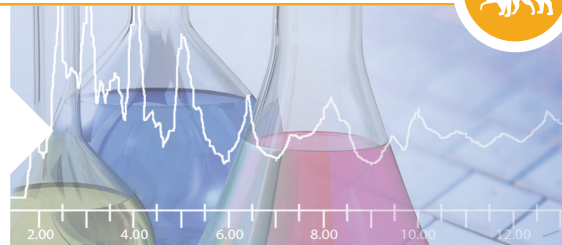




FOCUS ON RESEARCH



In-Home Validation of EpiCor® Pets Postbiotic Supplement Efficacy in Dogs

Indicators of health, wellness, and vitality along with changes in the gut microbiome were evaluated in dogs receiving either a daily supplement with or without EpiCor Pets postbiotic.

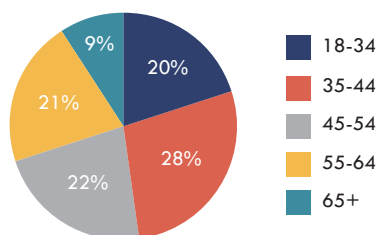
Background

To ensure pet foods and ingredients are efficacious and to fully describe their mode of action, controlled, evidence-based research studies are essential. However, insights on how products and nutritional technologies influence pet health and well-being through the eyes of the pet parent is an additional way to further strengthen the value proposition, uncover new insights for product development, and improve the overall usage experience. Therefore, the objective of this study was to capture both microbiome data and pet owner insights related to a supplement containing EpiCor Pets (a *Saccharomyces cerevisiae* fermentation product) using a robust in-home testing approach. These findings are outlined in our Pet Parents Insights Overview.

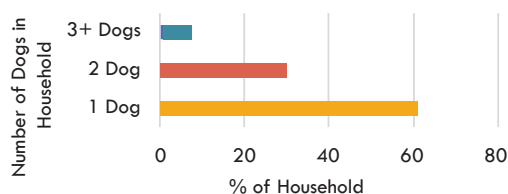
Overview

- 60-d study
- Daily supplement in a chew form
- 348 dog owners recruited from across the U.S. randomly allotted to two treatment groups blocked by breed, body weight (BW) and age
- Treatments
 - Placebo (Control)
 - Supplemented: chew containing EpiCor Pets postbiotic (formulated to deliver 7 mg EpiCor Pets per kg of dog bodyweight per day)
- Quantitative surveys fielded at Days 0, 15, 30, 45, 60
 - Pet parent and dog demographics (d0)
 - Food, treat, and supplement attributes and usage habits
 - Rating and ranking of health attributes
 - Reaction to concept
 - Supplement performance
- Fecal collections for metagenomics at Days 0, 30 and 60
- Qualitative interviews at end of study

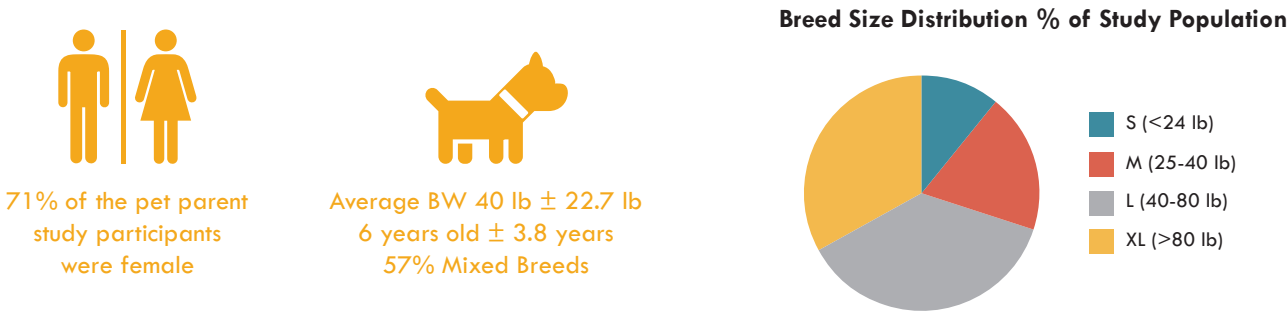
Pet Parent Age



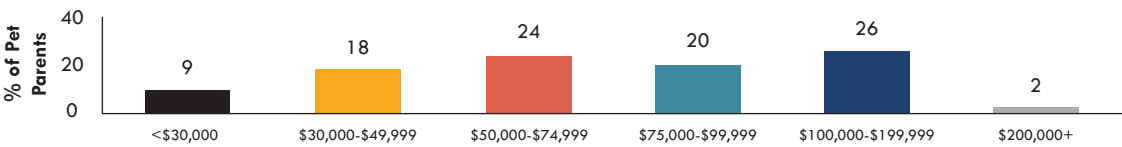
Single and Multi-Dog Households



Overview — Continued



Average Household Income



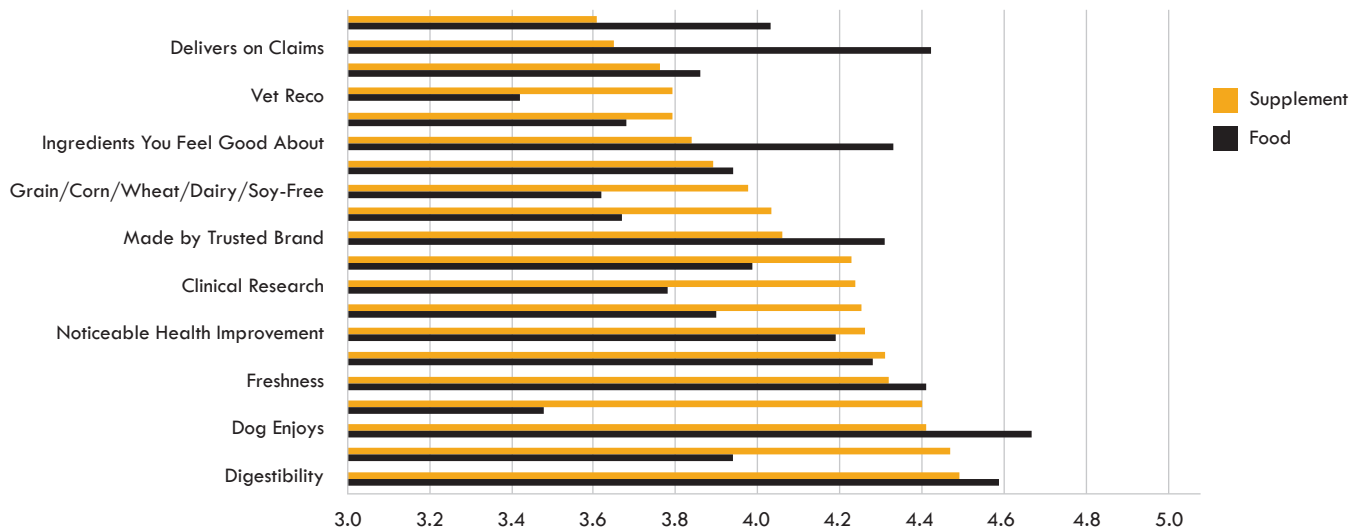
Data Analysis

- **Differential abundance** analysis was performed using Center Log Ratio transformed counts with the R package LinDA with significance set to 0.05 with Benjamini-Hochberg correction for multiple comparisons.
- Microbial **alpha diversity** was calculated using Shannon diversity index using the Phyloseq package in R.
- Ordinal logistic regression was applied to the survey data to understand relationships between the predictor variables and the ranked outcomes.

Key Findings

- Product attribute importance differed between food and supplements.** Pet parents were asked to consider various product attributes and rate the importance when selecting a food or a supplement.
- All factors were minimally IMPORTANT (3+-rating).
 - Importance was not necessarily the same for food and supplements (Figure 1).

Figure 1: Comparison of importance of product attributes between pet food and supplements

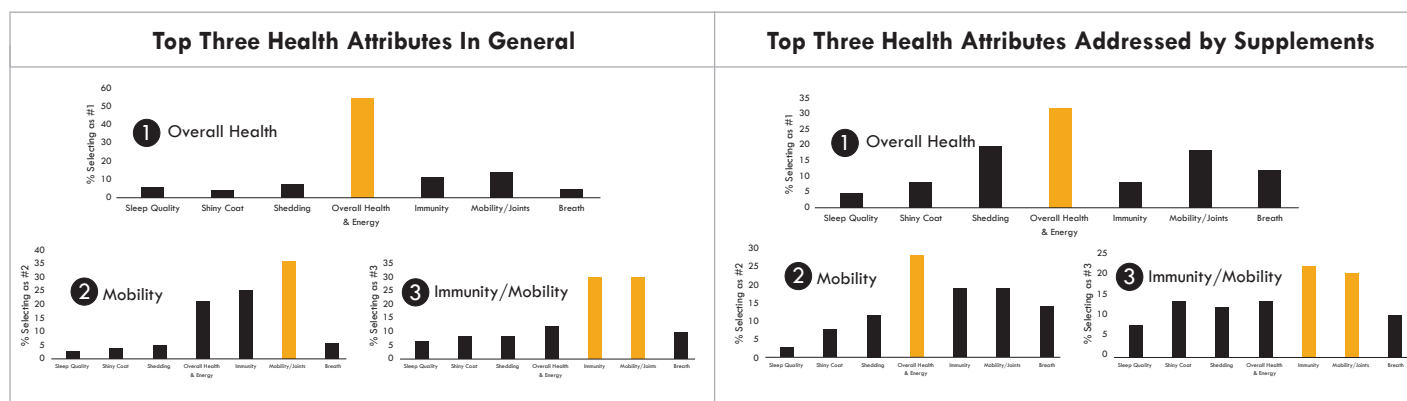


Focus on Research

Key Findings — Continued

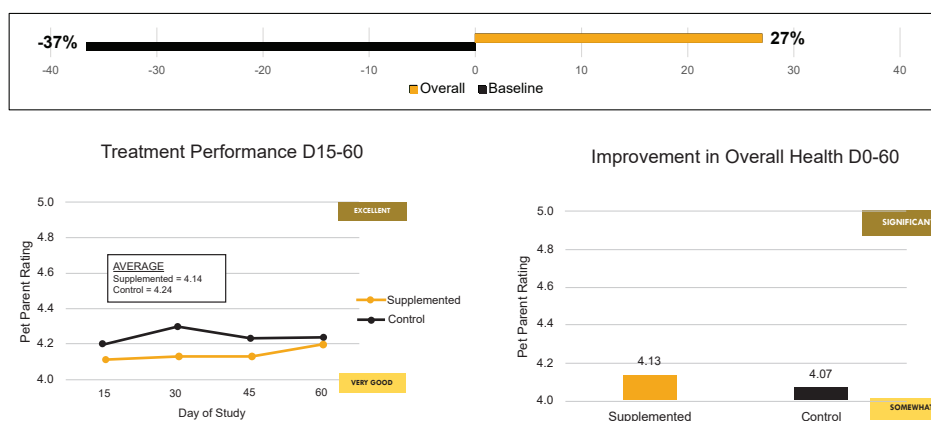
Three health attributes were ranked highest in importance. Pet parents were asked to consider 15 different health attributes and choose the top three in rank order. They were then asked the same question, but this time were instructed to focused on the 3 most important attributes to be delivered by a supplement. Overall health, immunity, and mobility were identified as the top attributes in general and for supplements (Figure 2).

Figure 2: Health attribute ranking



Overall health perception improved over time for dogs fed supplements containing EpiCor Pets. Statistically, overall health remained unchanged throughout the study with the rating for control dogs numerically higher at every timepoint than dogs fed EpiCor Pets supplemented dogs. However, while at the first rating period following supplementation, dogs in the EpiCor Pets group were 37% less likely to receive a higher overall health rating versus Control, but by the end of the study and considering the change over the entire 60-day study, the dogs supplemented with EpiCor Pets were 27% numerically more likely to receive a higher overall health rating than Control dogs (Figure 3).

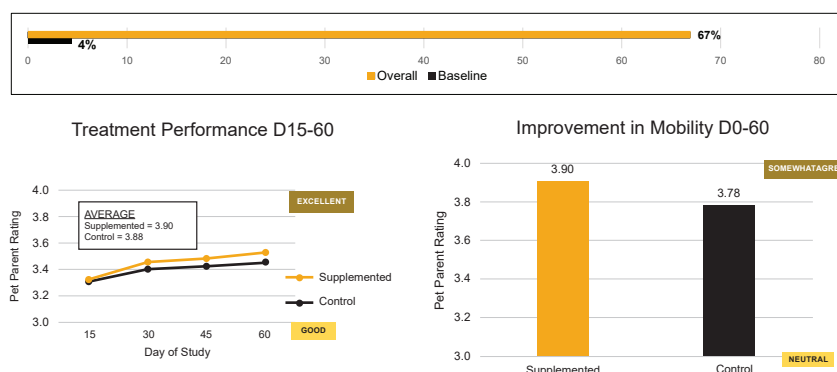
Figure 3: Overall health ratings as the result of supplementation between treatments days 0-60



Dogs fed EpiCor Pets were numerically more likely to exhibit improved mobility. At the first rating period following the initiation of supplementation (d15), mobility ratings were relatively similar between treatments. But, by day 60, dogs supplemented with EpiCor Pets were 67% more likely to receive a higher mobility rating than Control dogs ($P=0.22$; Figure 4).

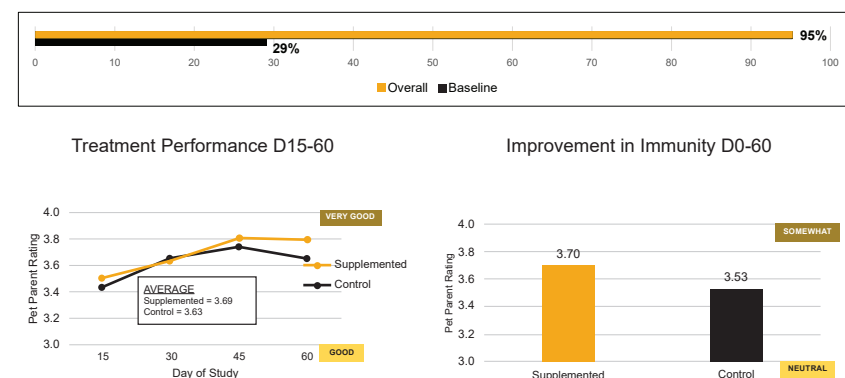
Key Findings — Continued

Figure 4: Mobility ratings as the result of supplementation between treatments days 0-60



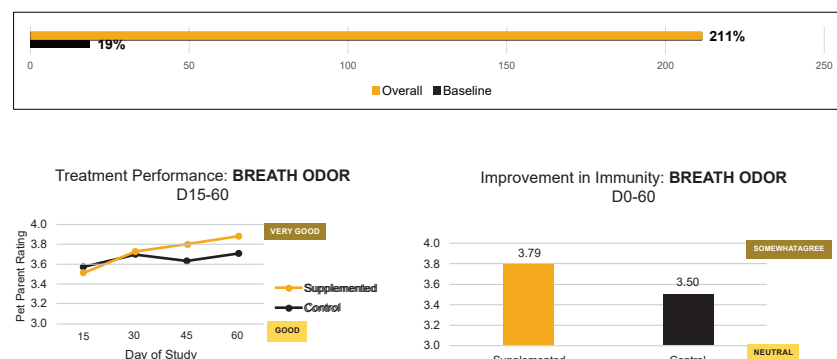
Dogs supplemented with EpiCor Pets received higher immunity ratings throughout the study. Additionally, after the entire 60-day supplementation period, they were 95% more likely ($P=0.10$) to receive a higher immune health rating versus dogs in the control group (Figure 5).

Figure 5: Immune health ratings as the result of supplementation between treatments day 0-60

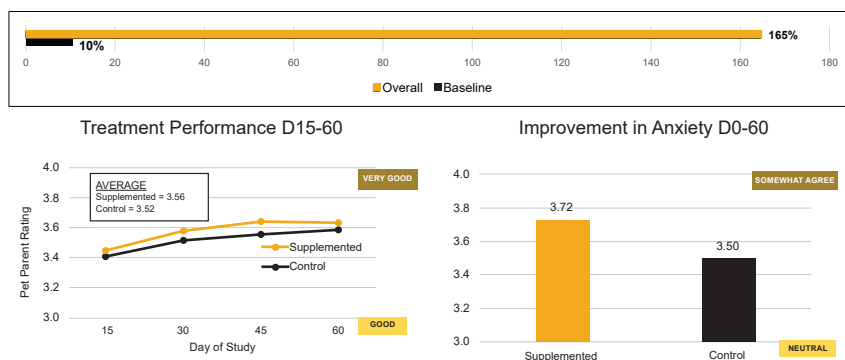


Breath odor and anxiety were significantly improved in dogs supplemented with EpiCor Pets. By day 60, dogs in the EpiCor Pets group were significantly more likely to have less breath odor (211% higher odds; $P=0.007$) and 165% more likely to be less anxious ($P=0.02$) than control dogs (Figure 6).

Figure 6: Breath odor and anxiety ratings as the result of supplementation between treatments day 0-60

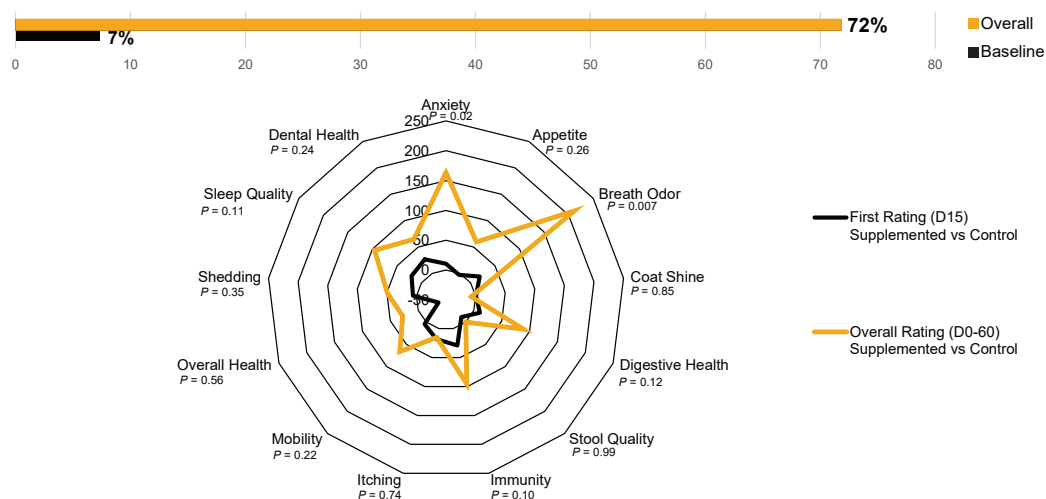


Key Findings — Continued



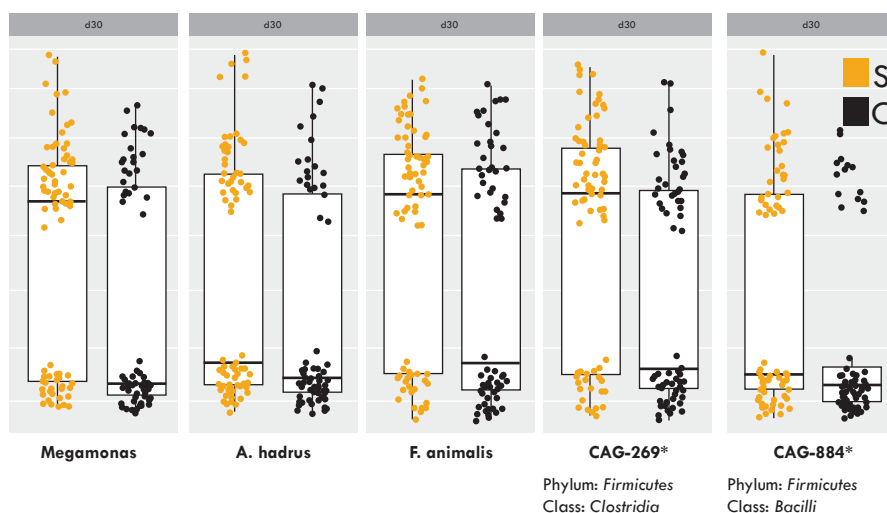
EpiCor Pets supports a spectrum of health benefits. By day 60, owners observed positive shifts in nearly all health benefits evaluated.

Figure 7: Comparison of treatment performance odds between control and EpiCor supplemented groups



A greater relative abundance of several beneficial gut commensal species was observed in dogs supplemented with EpiCor Pets. These differences emerged at day 30 and notably included an increased abundance in butyrate producing taxa (*Anaerostipes hadrus* and *Megamonas*) and *Fusobacteria* found in and associated with healthy dogs (Figure 8).

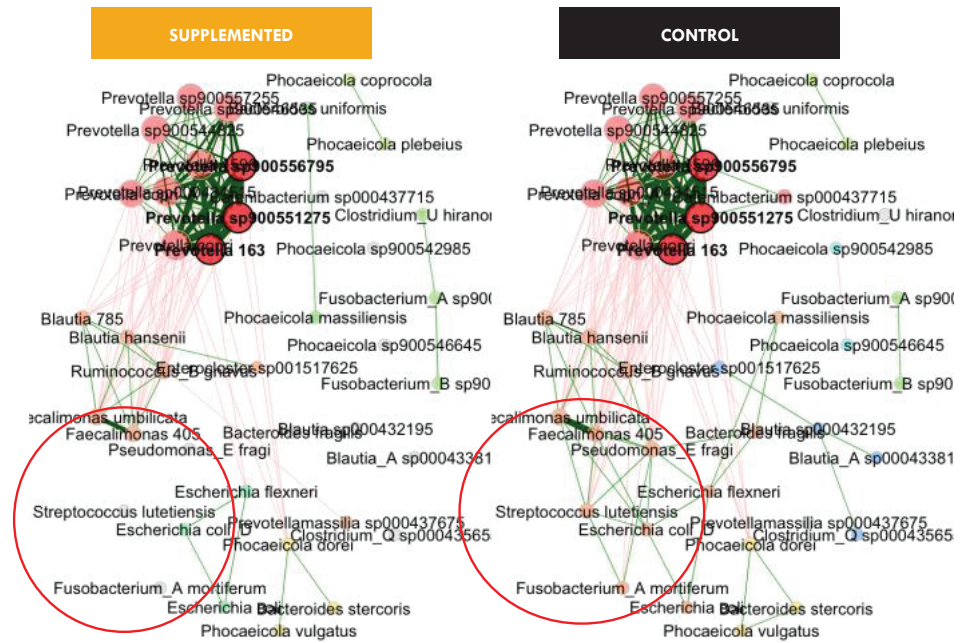
Figure 8: Relative abundance of beneficial gut commensal species (S=EpiCor Group, C=Control Group)



Key Findings — Continued

Network analysis revealed differences in the presence of a potentially deleterious taxa. Among dogs in the Control group, there was a trend for a greater degree of *Streptococcus lutetiensis* with more connections to other members in the community (Supplemented = EpiCor Pets; Control = Placebo; Figure 9).

Figure 9: Network analysis comparison between EpiCor (supplemented) vs Placebo (control) group



This information has been reviewed for products sold in the European Union. For products marketed in other countries, please contact a local representative.

Summary

- Daily supplementation of 7 mg EpiCor Pets postbiotic per kg dog bodyweight provides a spectrum of positive health outcomes in healthy adult dogs.
- There was consistency between owner-perceived improvements in immune, digestive, and mobility outcomes in this study and associated indicators of physiological benefits in more controlled studies. In addition, many of the observed improvements emerged around day 30. This timing is in agreement with controlled evidence-based studies of postbiotic effects on gut metagenomic changes in a number of species.
- Combining qualitative and quantitative methods helped to deepen understanding around how pet parents describe health, vitality, and well-being.
- This study also uncovered breath and anxiety improvements that were unexpected and previously untested in dogs supplemented with EpiCor Pets, but that are highly relevant and desirable outcomes. Additional research and/or validation may be needed in these areas.

Approved 09/23/2022

If you would like more information, please contact your local EpiCor Pets representative.

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¹ Hernot, D.C., et al. 2008. Microbiological and immunological effects of two yeast-based complex fermentation ingredients on adult dogs. J. Anim. Sci. Vol. 86, E-Suppl. 2. Poster Presentation, Abstract #W64.