

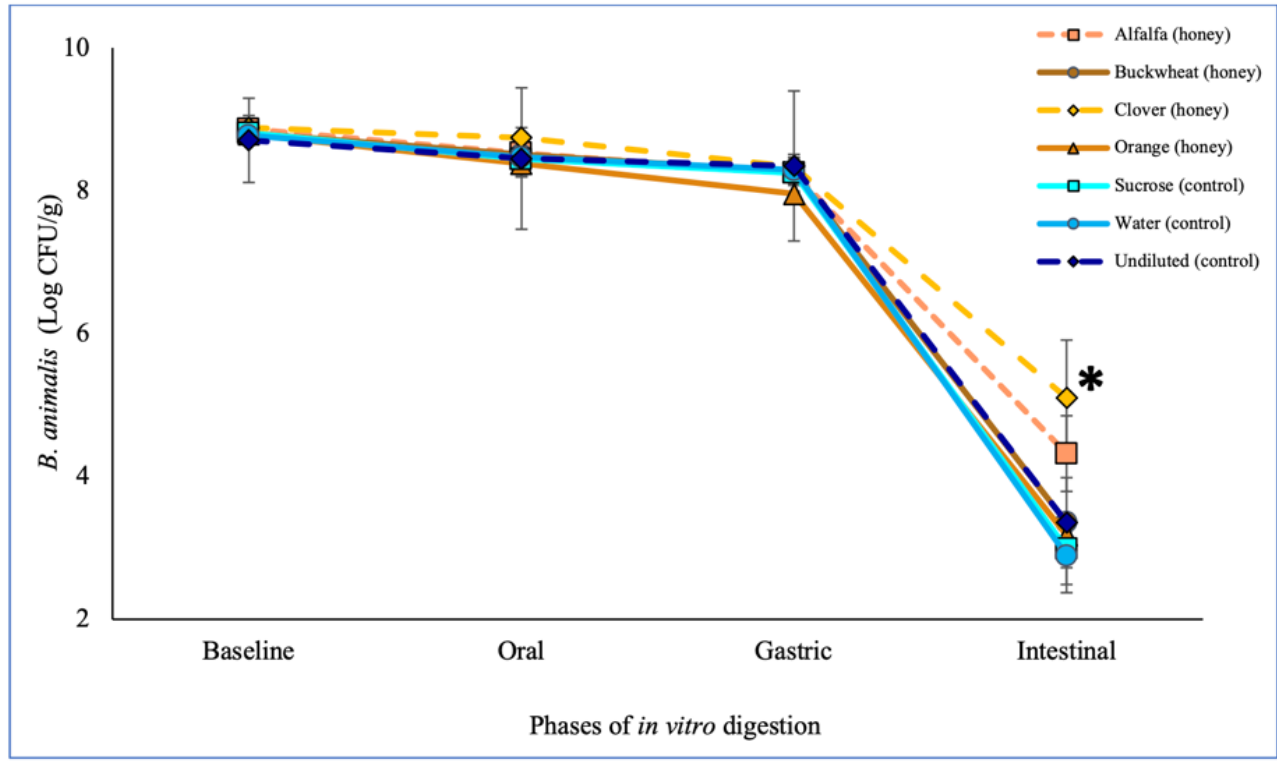
## CLOVER HONEY ADDED TO YOGURT SHOWS PREBIOTIC POTENTIAL.<sup>1</sup>

### HONEY VARIETALS DIFFER IN SUPPORTING A SPECIFIC BENEFICIAL PROBIOTIC IN COMMERCIALY AVAILABLE YOGURT.

**Study Overview:** Yogurt with honey is a popular culinary pairing, but honey may also help beneficial yogurt bacteria survive digestion to confer health benefits. In this study, four honey floral varieties were tested to determine how well a probiotic present in some yogurt products survives human digestion, when consumed as a honey-yogurt combination. The in-vitro digestion system utilized helps assess mechanisms of action at specific stages of digestion and compares effects between honey varieties.

**Method in Brief:** Yogurt made with *Bifidobacterium animalis* ssp. *lactis* (*B. animalis*) and added honey versus control samples underwent in vitro simulated human digestion. *B. animalis* levels were measured predigestion and after simulated oral, gastric, and intestinal digestion. In phase 1 of the study, 42 grams (2 Tbsp) of four honey varieties (alfalfa, buckwheat, clover, and orange blossom) were each separately added to 170 grams (6 oz.) commercial yogurt. The controls for the first experiment were undiluted yogurt, yogurt with added water 20% (wt/vol), and yogurt with 30.4 g sucrose added (isocaloric equivalent to the 42 g honey). In phase 2, the effect of clover honey on probiotic survival post-digestion was compared at seven levels (20, 14, 10, 9, 8, 6, and 4 % wt/wt). Honey compositional measures include sugars, antioxidant activity, phenolics, organic acids, and enzymes.

**Findings:** Although both alfalfa and clover were directionally similar in supporting *B. animalis* survival, only clover significantly improved retention of the probiotic post-digestion (figure reprinted from Alvarado, 2024). The prebiotic effect of clover honey occurs in the intestinal phase (but not in pre-digestion, post oral, or post gastric digestion phases). The authors reported “no statistically significant relationships between *B. animalis* survival and the honey components within the respective varieties.” In the second phase, comparing doses of clover honey, a lower threshold of 10% wt/wt (>21 grams honey per 170 grams yogurt) concentration improved *B. animalis* in-vitro digestion survivability. This translates into 1 Tbsp honey in a 6 oz. serving of yogurt.



\* Significantly different from the control (undiluted yogurt) using Dunnett's test ( $P < 0.05$ )

Figure reprinted from Journal of Nutrition Vol 154(3); Alvarado D.A, L.A. Ibarra-Sánchez, A.R. Mysonhimer, T.A. Khan, R. Cao, M.J. Miller, H.D. Holscher; "Honey varieties differentially impact Bifidobacterium animalis ssp lactis survivability in yogurt through simulated in vitro digestion"; Appendix A page 1; Copyright 2024; with permission from Elsevier.  
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**Conclusions:** Among varieties tested, clover honey shows potential to help the probiotic *B. animalis*, used in a commercially available yogurt, better survive simulated human digestion. Intervention trials are warranted to determine whether eating yogurt with honey translates into gut health benefits in free-living consumers.

1 Alvarado D.A, L.A. Ibarra-Sánchez, A.R. Mysonhimer, T.A. Khan, R. Cao, M.J. Miller, H.D. Holscher. "Honey varieties differentially impact Bifidobacterium animalis ssp lactis survivability in yogurt through simulated in vitro digestion" The Journal of Nutrition. March 2024. 154(3);866-874.

<https://www.sciencedirect.com/science/article/pii/S0022316624000282#appsec1>