

# FIELD TESTING THE BENEFITS OF PROBIOTIC SUPPLEMENTATION IN COMMERCIAL OPERATIONS



In light of the rise in probiotic supplementation's popularity among beekeepers, the California State Beekeepers Association (CSBA) awarded Bee Informed Partnership (BIP) funding to test the colony health benefits of probiotic supplementation in commercial beekeeping operations. To do so, we tested two commercially available probiotic products: SuperDFM, manufactured by Strong Microbials, and Mann Lake's ProDFM.

The colony health measures targeted by this study were colony survivorship, colony size, quality of brood pattern, *Nosema* load (as an indicator of stress), queen events, viral prevalence, and signs of disease. We also recorded *Varroa* loads to ensure it was not an influential factor and was evenly distributed across all treatment groups. We did not look at bee gut microbiota.

We had 3 treatment groups: SuperDFM, ProDFM, and a negative control (no supplement). We followed 72 colonies, 4 randomly assigned colonies per group, 12 per yard, in 3 yards in 2 regions (Oregon and California). In fall 2019, during visit 1 we set up the colonies, assessed baseline information and applied the product according to label. This was followed by visit 2 to record colony health metrics 2 weeks after the application. We repeated the same visits (3 & 4) with different colonies in spring 2020.



CA field trial colony receiving probiotic supplementation applied to the top bars of the colony's center frames. Photo credit: BIP CA Tech Team Field Specialist Matt Hoepfinger.

## Colony Survival and Queen Events

All 72 colonies survived until the end of the trial; therefore, we were unable to determine if probiotic supplementation had impact on colony survival. Additionally, we only documented four queen events during the course of this study, so the number of queen events was insufficient to determine statistical differences.

## Brood Pattern (Qualitative Score from 1 to 5)

There were significant differences in brood pattern change over time between the two geographic regions. However, the supplementation treatments had no significant effect on the quality of brood pattern.

## Colony Size (Frames of Bees)

Average colony size did change significantly over time, and this change varied according to region (Figure 1). However, supplementation had no significant effect on colony size.

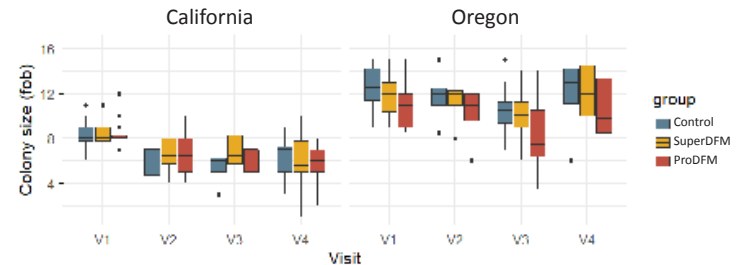


Figure 1: Box and whisker plot of colony size for each treatment group recorded at each visit. Colonies were visited four times: twice in fall 2019 (V1 & V2 = visits 1 & 2) and twice in spring 2020 (V3 & V4 = visits 3 & 4). Figure credit Nathalie Steinhauer.

## Nosema Loads

Though the treatment groups ended the trial without significant differences in their *Nosema* loads, we observed a significant drop in *Nosema* between visits 1 and 2 for colonies treated with SuperDFM, which could have resulted from slightly higher starting loads. However, the SuperDFM treatment group's change in *Nosema* load between visits 1 and 2 were not significantly different from the control colonies, and colonies receiving ProDFM also showed *Nosema* load declines during that time. Noticeably, supplemented colonies did not show decreased *Nosema* loads in the spring compared to the controls.

## Varroa Loads

There were significant differences in *Varroa* load between the two regions. *Varroa* loads significantly changed over time. However, those changes were inconsistent between CA and OR colonies. There was no significant difference in *Varroa* loads between experimental groups.

## Viral Prevalence and Signs of Disease

There was no significant difference in the rate of viral infection or remission before and after winter between the three groups for 7 of 8 molecular targets: ABPV, BQCV, CBPV, DWV-A (DWV), IAPV, LSV-2, DWV-B (VDV). There was a marginal effect of ProDFM on the prevalence of SBV infections cleared, but this effect was not confirmed once outlier colonies with high *Varroa* loads were excluded. There was no significant difference between treatments in the prevalence of any observed disease symptoms.

## Conclusion

Considering the limitations of this study—limited geographic scope and study duration—we found no significant effect of probiotic supplementation on population size or other standard colony health metrics.