Honey Bee Nutritional Study Bridge Grant: *In-Vitro* Analysis of Several Honey Bee Nutritional Supplements

Project No.: **07-POLL7-DeGrandi/Wardell**

Project Leader: Dr. Gordon Wardell
S.A.F.E. R&D, LLC
USDA-ARS Carl Hayden Bee Research Center
2000 E. Allen Road
Tucson, AZ 85719
(520) 670-6380 ext. 106
gordyaw@aol.com

Project Cooperator: Fabiana Ahumada-Segura
S.A.F.E. R&D
USDA-ARS Carl Hayden Bee Research Center
2000 E. Allen Road
Tucson, AZ 85719
(520) 670-6380 ext. 134
fahumada@ag.arizona.edu

Interpretive Summary:

The focus of this project is to determine how well specific honey bee diet supplements support bee development and adult bee longevity as determined through whole body protein analysis and adult honey bee longevity under controlled laboratory conditions. Newly emerged bees fed specific supplemental diets exhibited significantly different levels of body proteins over time. Bees that had higher protein levels in their bodies lived longer. In these *in-vitro* trials there is a strong correlation between protein levels and longevity. Bees fed the nutritional supplement MegaBee and natural pollen demonstrated the highest protein levels and the greatest longevity.

Objectives:

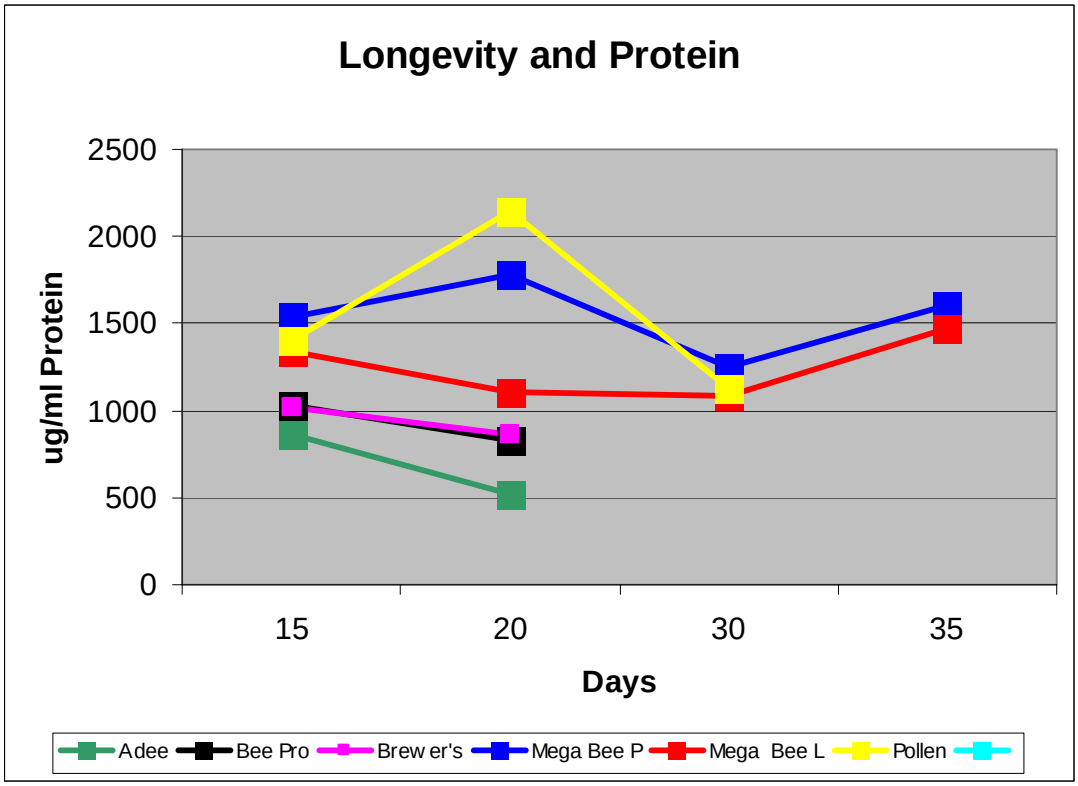
1. Conduct whole body protein analysis to determine if differences exist between bees fed different diets. Diets tested were: (1) Natural Pollen, (2) Brewers yeast and sugar, (3) MegaBee® Patties, MegaBee® Liquid, BeePro® , Adee diet (commercial beekeeper's personal formulation)
2. Honey bee longevity will be monitored for each diet and correlated with body proteins

Materials and Methods:

We followed the procedural methods for a caged longevity study as described by Schmidt et.al. (1987), sixty newly emerged bees were placed in a small Plexiglas and screen feeding cages (9 x 6 x 15 cm). Each cage was provided with water and a 3.5 by 7 cm strip of honey bee foundation wax on which the bees are intended to cluster. The bees were fed their respective diets *at librum*: Adee diet, BeePro, Brewers Yeast (equal parts drivert sugar and water to make a patty), MegaBee Patty, and MegaBee Liquid. The diets were prepared according to manufacturer's recommendations. BeePro was purchased from the manufacturer as a pre-made patty with no pollen included. The Adee was prepared by the producer. Water and 50% sugar syrup was provided as needed to all cages. All cages were placed in an environmental room at hive temperature and controlled humidity (32-34° C and 60% RH). Diet was replaced as needed, consumption noted, and mortality counted on Mondays, Wednesdays, and Fridays. Weekly mean survivorship of the treatments will be contrasted with the controls and any differences will be determined by a one-way analysis of variance.

Results and Discussion:

Bees fed natural pollen, MegaBee® Patty and MegaBee® Liquid had higher body protein levels, maintained these higher protein levels over time and lived longer than bees fed the other diets. Bees fed Brewers yeast, the Adee diet and BeePro® lost protein over time and were significantly shorter lived. Adult bee protein levels have been linked to longevity through complex storage proteins (Amdam et.al. 2006, and Robinson et al. 2007). The results indicate that increasing protein levels in adult bees has the potential to significantly lengthen adult bee longevity.



With honey bee colonies collapsing across the country, extending the longevity of adult honey bees through supplemental feeding may be one way to minimize or reverse the impact of colony collapse on bees exposed to migratory, pesticide, or other forms of stress stress.

What this study demonstrates to beekeepers is that it is important what protein supplement you your colonies. Just because the bees eat the protein supplement does not mean that the product is the best for long term development and longevity of the adult bees.

Further studies will be conducted in the field to see if the longevity of adult bees is extended under *in-vivo* conditions as was seen under laboratory conditions.

References:

Amdam, Gro V., Siri-Christine Seehuus, Kari Norberg, Ulrike Gimsa, and Trygve Krekling, Reproductive protein protects functionally sterile honey bee workers from oxidative stress, Proc Natl Acad Sci U S A. 2006 January 24; 103(4): 962–967

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