



# Honey Bee Nutrition

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## What do honey bees need nutritionally?



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## What do honey bees eat?

- Carbohydrates
- Proteins/lipids
  - Minerals, vitamins, micronutrients
- Water



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### Why is nutrition important?

- Honey bees need diversity of food sources



- Proper nutrition improves immune/detox response
  - Helps deal with pests, pathogens, even pesticides (e.g., Alaux et al. 2010, Mao et al. 2013, Schmehl et al. 2015)

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### Who does the foraging?

- Bees ~20 days old until death
  - (25-45 days)
  - Highly variable




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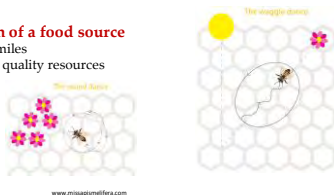
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### Dance Language

- Carl von Frisch -Austrian Zoologist
  - Cracked the dance code (foraging) of honey bees

- Foraging - location of a food source
  - Forage up to five miles
  - Forage for highest quality resources




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### Foraging for nectar

Nectar is collected and processed into honey

Nectar is transferred to receivers

Enzymes (invertase, glucose oxidase) are added and nectar dried

Carbohydrates necessary for:  
Winter/dearth provisions  
Wax production



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### Foraging for pollen

Pollen needed for  
proteins/lipids/micronutrients  
Reproduction  
Brood food  
Immune response  
Detoxification pathways



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Photos by Randy Oliver

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Foraging for water  
Drinking  
Climate control

**ALWAYS PROVIDE A WATER SOURCE (BEFORE YOU GET YOUR COLONIES)!!!**

Foraging for propolis  
Antimicrobial



Photo by Katie Lee

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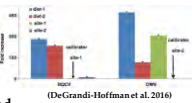
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### Natural nutrition is the best!

- But often can be a challenge
- Pay attention to what is blooming and when
- Watch to make sure foragers are bringing in food
- For bee gardening resources visit <http://hbgarden.ucdavis.edu/BeeGardeningResources>

(DeGrandi-Hoffman et al. 2016)



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### Supplemental carbohydrates

- In Nor Cal we often have to provide carbohydrates July – Feb (with some breaks)
- Sugar water
  - 1:1 for comb building in the Spring
  - 2:1 for storage
- Various supplements available for purchase




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### Other supplements

- ProSweet
- High fructose corn syrup
  - No neg effect found (Johnson et al. 2015)
  - However, can turn into HFMF toxic to bees
- Fondant
- \*\*\* Some toxic carbohydrates (e.g., soybean), other toxic plants (e.g., CA buckeye)



Brushymountainbeefarm.com



Mainisalehd.com



Brushymountainbeefarm.com

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### Feeders for carbohydrates

- Should be utilized with packages and during dry times
  - Feeding cans
  - Entrance feeders
  - In-hive feeders
  - Top feeders



AustinStarbee.wordpress.com



datant.com



Beekeepersid.org

mudong.org

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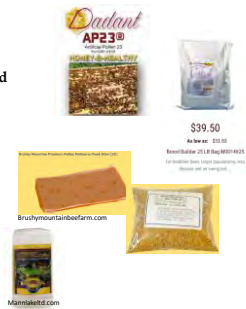
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## Supplemental protein

- Particularly important for colony build up and brood development
- Commercial beekeepers feed prior to almond pollination
- Collect pollen and store
- OR make your own
- Various supplements available for purchase
  - Dry and wet




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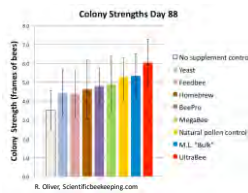
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## So which one do I feed?

- Pollen appears best
- Few others seem promising
- None as perfect as pollen!




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Photos by Randy Oliver

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### Probiotics?

- Recent developments in understanding honey bee gut microbiota
- Sparked more interest in probiotic use
- Several probiotics available on the market
  - Still unclear how effective (Johnson et al. 2015)



market4all.com



Gloribee.com

Australianbarbee.wordpress.com

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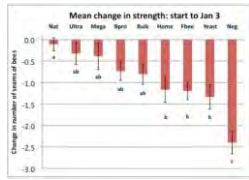
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### Monitor your colonies and feed!!!

- Watch pollen and nectar storage
- Monitor foragers
- Learn your local nectar flow
- If uncertain try feeding
  - If they eat **FEED MORE!**



R. Olivec, ScientificBeekeeping.com

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