Honey Bee Nutrition

WHAT – WHEN – WHY & HOW OF FEEDING HONEY BEES

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To Make a Bee

- 1 cell of pollen
- 1 cell of honey
- 1 cell of water

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Honey Bee Healthy Diet

- Proteins
- Carbohydrates
- Minerals
- Fats (lipids)
- Essential amino acids
- Vitamins
- Water

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Honey Bees Collect

- Pollen
- Nectar
- Water

A Comparison:

- Pollen (proteins) = meat
- Nectar (carbohydrates) = potatoes
- Honey (nectar) = energy
- Pollen = babies

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Pollen

- Pollen supplies
  - Proteins
  - Fats (lipids)
  - Vitamins
  - Minerals
  - Essential amino acids

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Pollen

- Pollen stored as bee bread
- Pollen nutritional values varies on plant source
- Pollen deficiency
  - Reduced brood production
  - Reduced longevity of workers
  - Longer for drones to reach maturity.
  - Drones neglected, discarded or eaten.
  - Fewer drones = poor mating and queen supersedure
  - Starvation

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Pollen

- Pollen consumption
  - 1 pound of pollen will develop + 4000 bees
  - A strong colony will consume 44 to 70 pounds of pollen annually to produce 200,000 bees a year.

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Pollen

- Crude protein – estimated protein level in pollen
  - Healthy pollen % of crude protein (CP%) = 30%+
  - Minimum Pollen CP% ranges from 20% to 25%

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Common Pollen Sources

- Buckwheat – 11% CP (crude protein) min (AA) amino acids
- Raspberry / blackberry – 20% CP min AA
- Blueberry – 14% CP min AA
- Pear – 26% CP min AA
- Alfalfa – 21% CP min AA
- Clover – 25% CP min AA
- Corn – 15% CP min AA
- Pine – 7% CP min AA
- Almond – 26% CP min AA

To provide 10 grams of protein the workers must collection 48 grams of 30% CP or 72 grams of 20% CP protein

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Nectar

- Nectar is processed into honey.
- Sugar content in nectar ranges between 4% to 60% based on floral source
- Nectar and sugar concentrations between 30% to 50% maximize collection response.
- Sugars in nectar – in order of preference
  - Sucrose
  - Glucose
  - Fructose
- Honey nectar is converted by enzymes allowing sucrose to be inverted into glucose and fructose
- Honey is 95% to 99% glucose and fructose.

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Honey Consumption

- Annual honey consumption per hive can be as high as 15 gallons or 150 pounds a year.
- 1 worker requires 14 mg sugar / day. (Note: 1 teaspoon contains 4000 mg)
- 50,000 worker colony requires 1 pound of sugar or 0.5 gal of 1:1 light syrup / day for adult bees.
- 50,000 worker colony requires 350 pounds of sugar / year.

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Water

- Dilute honey
- Maintain humidity within the hive.
- Maintain temperature in the brood area
- Larval food contains up to 66% water
- Source of minerals
- Bees collect but do not store
- Collect as needed from the nearest sources
- Use 0.5 to 1 gallon per colony every day in the hot summer
- Honey requires 8 gallons of water to make 1 gallon of honey.

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Pollen Feeding – What?

- Pollen – protein for bees
  - Harvested pollen
  - Pollen substitute
    - Palatability – bees will consume it
    - Digestibility
    - Balanced – Amino acids / crude protein
    - 5% real pollen in substitutes is recommended.

(Note: Trapping pollen reduces swarming.)

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Pollen Feeding – Why?

- Lack of pollen varieties – monoculture crops
- Weather issues – no flora / restricts access
- Stimulates brood production

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Sugar Feeding – What?

- Sugar – carbohydrates for bees
  - White granulated – cane or beet?
  - Not brown or powder
- High fructose corn syrup
  - Largely used in commercial operations
  - If it safe / healthy?

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Sugar Feeding – Why?

- Avoid starvation
- Bee package
- Establishing a hive – nuc
- Lack of forage
- Weather issues
- Removed to much honey
- Need to increase bees – spring and fall

Notes:

Poor feeding practices result in robbing.

Too much / too quickly – swarming

Don't feed with honey suppers

Essential oils [Honey-B Healthy] enhance bee feeds.

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Essential Oils in Beekeeping

- Essential Oils
  - Over 100 oils that may be used in one form or another
  - Common oils used in beekeeping
    - Lemongrass
    - Spearmint
    - Thyme
  - Other used:
    - Wintergreen
    - Eucalyptus
    - Peppermint
    - Menthol
    - Tea tree

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Beekeeping Oils

- Lemongrass oil –
  - Pheromone attractant
  - Supplemental food stimulant
  - Food preservative
- Spearmint oil–
  - Used with lemongrass to improve health
- Mite Control oil –
  - Thymol
  - Eucalyptus
  - Menthol
  - Wintergreen
  - Spearmint
  - Peppermint
  - Tea tree

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Sugar Feeding – When?

- Spring: March – April – May
  - 1:2 one sugar to two water. Very light. Stimulates the queen to lay eggs and bees to draw comb
- Summer: June – July – August
  - 1:1 one sugar to one water. Medium. Artificial nectar to feed brood and draw comb.
- Fall: September – October – November
  - 2:1 two sugar to one water. Heavy. Fall or early winter honey substitution to feed your bees.

(Note: One gallon of heavy syrup (2:1) may increase colony reserves by about 7 pounds.)

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Sugar Feeding – How?

- Winter feeding – At temperatures 50° F and below
  - Granulated Sugar

(Note: Granulated sugar does not stimulate brood production)

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Sugar Feeding – How?

- Candy board

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Sugar Feeding – How?

- Sugar cakes

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Sugar Feeding – How?

- Fondant

(Note: Soft, pliable, dough-like feed.)

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Sugar Feeding – How?

- Sugar water feeders
  - Open air feeders

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Sugar Feeding – How?

- Entrance feeders

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Sugar Feeding – How?

- Division board feeder

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Sugar Feeding – How?

- Internal hive top feeders

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Sugar Feeding – How?

- External hive top feeder

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Sugar Feeding – How?

- Baggie feeder

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Sugar Feeding – How?

- Other feeders

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Pollen Feeding – How?

- Pollen patties

(Note: A late winter, early spring feed.)

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Pollen Feeding – How?

- Dry feed pollen

(Note: A late winter, early spring feed.)

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Spring Build-up

- Start feeding 1:1 syrup mid-February until honey flow begins.
  - 1:1 stimulates the Queen to start laying. Once you start continue until nectar is available.
  - Temperature range should be high 40s to low 50s 3 – 4 days a week.
  - If feeding winter food, leave it on until the last of March.
- Start feeding protein patties mid-February until the honey flow beings.
  - Queen requires protein to lay eggs.
  - Feed only what bees will take to avoid hive beetles.
  - Continue to feed patties even if the bees bring in March pollen from maples.

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Conclusion

- Balanced diet supports immune system to battle varroa and associated viruses.
- A lot still not understood about bee nutrition.
- Benefits of supplemental feeding will vary from location to location.
- Timing of protein supplements is important.
- Protein supplements. Cost versus benefits.
- Protein supplements – spring feeding versus fall feeding in Ohio
- Best emergency feed – excess safe honey
- Next best emergency feed – moist granulated sugar on wax paper above cluster. May require spacer rim.

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Conclusion

- Internal top feeding is the easiest and most efficient way for small beekeepers.
- Thin syrup is the basic spring and summer feed. Heavy syrup to supplement winter food supply.
- Heavy syrup fall feeding better than emergency feeding during later winter – early spring.
- Heavy fall feeding better than the use of fondant, sugar blocks or candy board.
- Purchasing pre-mixed pollen patties. Quality / cost
- Essential oils can be beneficial to honey bees.
- Consider organic – Plant a wide variety of trees, shrubs, and plants to provide nectar and pollen for bees throughout the growing season.

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