

HONEY BEE NUTRITION AND SUPPLEMENTING FOR NECTAR AND POLLEN

Naal Ranim, Post-graduate student of the Department of Aquaculture and Beekeeping of Federal State Budgetary Educational Institution of Higher Education “Russian Timiryazev State Agrarian University”, ranimnaal92@gmail.com

Loktionova Svetlana Nikolaevna, Candidate of Philological Sciences, Federal State Budgetary Educational Institution of Higher Education “Russian Timiryazev State Agrarian University”, forlang@rgau-msha.ru

Abstract: Nutrition management is the new normal in apiculture. Colonies need 35 to 75 pounds (16-34 kilograms) of pollen, about 120 pounds (54 kilograms) of honey per year, and about 22 gallons (83 liters) of water just for a colony’s winter needs. Due to land management changes, beekeepers must do more to provide and supplement nutrition for their apiaries than they have ever before.

Key words: nectar, pollen, supplement nutrition, syrup, substitutes.

Nutritional Management

Honey bees require carbohydrates, proteins (amino acids), lipids (fats), vitamins, sterols, and minerals for normal growth and development. All these nutrients are supplied by the nectar and pollen bees collect. Uncontaminated water is also an important dietary input. Bees use water to maintain a constant temperature and humidity within the hive, to process nectar and pollen, and to liquefy crystallized honey. Water may also be a minor source of dietary minerals.

Plants produce nectar to attract pollinators. Nectar is mainly composed of water and different sugars (though trace amounts of vitamins and minerals are also present) and is the main source of carbohydrates for honey bees. Bees normally convert nectar into honey to be stored in the hive, though they also can consume it directly. Honey is the “fuel” of the colony: if the hive runs out of honey, it will die.

Pollen grains are honey bees' main source of protein (including all 10 essential amino acids), lipids, vitamins, minerals, and sterols.

Supplementing for nectar/pollen

Beekeepers often must feed colonies to provide sufficient nutrient quantity and quality.

Early in population buildup phase (spring): When floral resources may be scarce, supplemental feeding can help avoid starvation and tide colonies until natural sources of nectar and pollen are readily available and environmental conditions permit collection. Supplemental spring feeding also can stimulate brood production and colony growth if adequate food is not available.

Population decrease phase (fall): Sugar feeding may be necessary to provide bees with enough honey stores to last through the winter. Feeding supplemental protein can ensure that overwintering bees have the necessary nutrient stores in their fat bodies to rear brood before the colony can forage and to extend the lives of bees that overwinter.

Feeding bees is important when floral resources are not available to provide nectar or pollen. Colonies that run out of pollen will slow or cease brood production (via reduced queen egg laying or brood cannibalism by workers), and the population will decline. Colonies that run

out of honey stores and do not have access to nectar will starve. Starvation is a common cause of colony death overwinter and, in some instances, during spring buildup.

Feeding:

1-Making sugar syrup

Make sugar syrup at a concentration of 1:1 (equal parts sugar and water, by weight) or 2:1 (2 parts sugar to 1 part water, by weight).

Thinner 1:1 sugar syrup is generally used in the early population increase phase (spring) to feed colonies low on reserves and in danger of starving. Spring feeding can also stimulate brood production, promote a great percentage of foragers to collect pollen, and promote colony growth.

Thicker 2:1 sugar syrup is used in the population decrease phase (fall) to ensure colonies have enough stores to survive the dormant phase (winter). Since bees need to ripen (i.e. concentrate) syrup before it can be stored, a 2:1 syrup can be concentrated and stored more readily. Each colony should be fed 4 gallons (15 L) of 2:1 sugar syrup in the fall to prepare them for winter. Such feeding can begin as soon as supers are removed (at or following population peak) and should be completed before the temperature gets below 50°F (10°C). Bees will stop taking down sugar syrup once it gets too cold. Some evidence exists that overwintering on sugar syrup honey is more favorable for the bees.

2-Pollen supplements and substitutes

Hives should have frames of pollen. Bees store excess pollen as bee bread. Pollen is the only source of protein for bees, and bees need pollen for proper growth and development, including the development of glands necessary to feed and raise brood.

If pollen is not available, colonies should be fed protein supplements or substitutes.

3-Types of pollen supplements and substitutes

Supplements contain some amount of pollen while substitutes do not. Pollen is the most attractive protein source to bees, and its addition to a protein supplement can greatly increase the supplement's attractiveness, nutritional value, and consumption.

Protein substitutes include:

Brewer's yeast: The closest to pollen in terms of protein content and higher in vitamins and minerals.

Egg powder: A good option in terms of protein content and for retention of moisture.

Soybean flour: A good option in terms of protein content though less attractive to bees. Must be expeller-processed to remove excess fat.

Skim milk powder: Should be low in lactose, which is toxic to bees.

Torula yeast: A good option though harder to obtain.

Recommendations:

Hive-top feeders and inverted pails. Ideal for spring or fall feeding, as they hold large amounts of syrup, do not require the bees to leave the hive (helpful when the weather outside is cold or rainy), can be changed and refilled without exposing the colony, and do not encourage robbing.

Division board or in-hive frame feeders. Do not require the bees to leave the hive and are useful for spring feeding and for queen rearing. Opening the hive is necessary to refill.

Boardman (entrance) feeders. These do not hold very much syrup, bees will not break cluster to take syrup from them if it is cold, they encourage robbing, and they are exposed to the sun, which can make the syrup runny or cold from low night-time temperatures, making them

less attractive.

Open feeding. While it is easy for beekeepers with many colonies to feed bees from barrels of sugar syrup, this encourages robbing behavior, can spread disease, and generally favors strong colonies taking most of the syrup.

Protein mixed into a sugar syrup with 5-10 percent added bee-collected pollen, if available. The mix should create a paste or patty that can be rolled flat between two pieces of wax paper. The wax paper prevents the supplement from drying out. Place this protein patty directly on the frames above and to the sides of the brood area to ensure it is used by the bees.

Adding pollen increases attractiveness of the feeding patty to bees. Trap and collect pollen or purchase it from a beekeeping supply store or supplier. It is important to purchase pollen from a trusted supplier. A pollen supplement should contain at least 5 percent pollen though 7-10 percent pollen content makes the bees more attracted.

Not all trapped pollen is equal in attractiveness. Avoid using pollen from any single plant source. Beekeeper-collected pollen should be dried and kept frozen to maintain its nutritional value. Collect pollen only from colonies that are strong and disease-free.

Dry powder protein supplements for in-hive feeding. Bees can ignore the powder or throw it out the hive entrance, similar to feeding dry sugar.

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MÉTHODES POUR AUGMENTER L'EFFICACITÉ DU NETTOYAGE DES PIÈCES DANS LES LAVEUSES SUBMERSIBLES

Petrik Dmitry Yuryevich, le boursier de thèse de la première année, l'institut de mécanique et de génie électrique V.P. Goriatchkine, l'Université agraire d'État de Russie – l'Académie d'agriculture de Moscou K. A. Timiryazev, petrick.dmitry2016@yandex.ru

Guide de travail: Zaitsev Alexei Anatolyevich, docteur ès lettres, maître de conférences, l'Université agraire d'État de Russie – l'Académie d'agriculture de Moscou K. A. Timiryazev

Résumé: Le travail présenté est consacré à l'étude du nettoyage des machines, des assemblages et des pièces de la pollution opérationnelle et technologique. Nous entreprenons cette recherche à la fois historique, thématique afin d'examiner des moyens permettant améliorer l'efficacité du processus de nettoyage.