Ministry of Agriculture, Food and Fisheries

# Apiculture Factsheet

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**Factsheet #104**

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## THE HONEYBEE COLONY

The individual honeybee can not survive on its own for long but requires the social setting of the colony. It is the colony that matters, and where tasks are accomplished through division of labor. Every member works, not for itself, but for the benefit of the colony. During the summer season, large quantities of food are gathered and stored by the workers, even though the individuals do not live long enough to feed on these food reserves during winter. Defensive behavior of individual bees is not for their personal protection but for the benefit of the colony. Since stinging mostly results in death, the use of the stinger is of no value to the individual bee.

### The Worker Bee

Worker bees have given up the functions of reproduction and egg laying and passed on these tasks to the single queen of the colony. The worker bee has sex organs that are not fully developed. From the egg stage to her emergence as an adult from the brood cell takes 21 days. She will live for another three or more weeks when she is devoted to carrying out many tasks necessary for colony development and survival. The various tasks and roles she performs are the result of physiological changes that take place during the worker's life. The most important of these include the glandular secretion of royal jelly (brood food) and beeswax.

In addition to in-house duties, worker bees forage for nectar, pollen, water and propolis. They also serve as scout bees in finding these resources locating a suitable nest site for a swarm.

Three distinct phases may be observed in the life of the adult worker bee:

1. The "nurse bee" phase lasts about a week. At first she helps incubating the brood and preparing brood cells. Next comes the feeding of older larvae with a mixture of honey and pollen. About three days later the hypopharyngeal glands in the forehead become active. The concentrated milky secretion called "royal jelly" is fed to the queen larva in its pure form while a mixture of pollen, honey and jelly is fed to the worker and drone larvae.
2. The "domestic" phase. For about one week, the young worker bee takes on various hive duties such as storing of honey, building and repairing comb, and cleaning the hive. During this period, the young worker bee makes its first orientation flights and may carry out guard duties at the hive entrance.
3. The "field" bee or forager. The bee is now about fourteen days old. Foraging may last two, three, or four weeks according to the amount of energy expended. At this final stage in life, at the age of 6-8 weeks, most worker bees will die in the field. In winter, bees live from fall to the next spring.

Honeybees forage for four products: (1) nectar, which is converted into honey and functions as the principal carbohydrate source; (2) pollen, which is the protein and fat portion of the bees' diet; (3) water; and (4) propolis, or bee glue. Propolis is a resinous material from the buds of trees and is used by bees to ward of microbes and diseases, as well as used to close small openings in the hive.

When nectar is collected from flowers, it will be kept in the "crop" or honey sack where initial enzymatic conversions take place. Pollen and propolis are carried in the "pollen baskets" located on the hind legs.

### The Queen

The honeybee queen is unique of being the only individual responsible for the reproduction of the colony. Surrounded by a retinue of attendants, she goes about her single task of egg laying. During peak periods in spring she may lay as many as 1,500 eggs a day. Her sole task is to lay eggs; she does not nurse her brood. Egg laying usually begins in February and the rate increases until about mid-summer. By August, egg laying declines until mid-October when it stops altogether.

It is essential for the queen to maintain a high rate of egg laying if the colony is to replace all the workers that die during the normal development of the colony. The egg-laying ability of the queen is key to the success of the colony and ultimately to the beekeeper since a large population of worker bees is needed to optimize honey yields and pollinate crops.

Unlike worker bees, a queen could live as long as 4 or 5 years. At any time and especially later in life, the queen may falter in her egg-laying, which reduces brood development. Worker bees will then construct queen cells in preparation to replace her. To reduce the risk of a slowdown in brood rearing or queen failure, it is recommended to replace the queen every year or two.

**The Drone**

The drone is the male bee of the colony. It develops from an unfertilized egg and hence, the drone is a haploid with only half the number of chromosomes. All its genetic traits originate from his mother, the queen of the colony. Drones cannot sting and do not perform any duties within the hive or gather nectar from flowers. The rearing and feeding of drones require considerable resources from the colony. In the summer, a colony may raise 200-300 drones but in the fall when the colony prepares for winter it will drive out the few remaining drones. The sole purpose of the colony to rear drones is to have one or more of them mate with a virgin queen from another colony and have their mother's genes passed on.

**The Brood Cycle**

During its development, the honeybee undergoes four distinct stages of egg, larva, pupa, and adult, a process called *complete metamorphosis*. The queen is capable of laying fertilized eggs that produce worker bees or queens, and non-fertilized eggs that result in drones. During the first three days, the embryo inside the egg will develop rapidly. Then, just prior to hatching, the egg is provided a minute drop of bee milk. This applies to all brood regardless of caste.

In worker brood, the larva is liberally fed glandular food or "royal jelly" for two or three days, followed by a honey and pollen diet. This change of food determines the worker caste. When the diet is not changed and remains royal jelly throughout the larval period, the larva becomes a queen.

During the larval stage, five molts take place. After eight days, the larva is fully grown and fed, and at this point workers seal the cell with a porous capping. This is the start of the "capped brood" stage. The larva will spin a cocoon and undergo the process of pupation. The duration of the pupal stage depends on the caste.

Workers and drones are reared in hexagonal-shaped cells which comprise the comb, but the queen is reared in an acorn-shaped cell, normally protruding vertically from the comb surface, with the opening at the bottom.