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Drone honey bees – rearing and maintenance

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Introduction

Adequate rearing and maintenance of healthy drones are essential for successful queen bee matings. Information on drone bees and their management during an extended queen bee mating season has been collated to assist in the development of management programs to provide increased drone numbers.

A queen bee mates with an average of 12 drones (range 1–32) and a well reared queen bee when fully mated can contain from 4.3 million to 7 million spermatozoa in her spermatheca. A figure of 4.5 million is considered adequate for a commercially reared queen bee.

Canadian research has shown that a queen bee uses about 2 million sperm per year and a queen bee containing less than 3 million sperm after mating can be expected to be superseded within 12 months under commercial conditions.

A well reared, healthy drone can produce 5–10 million sperm. Drones mature at about 16 days of age, and become less suitable for mating after 28 days of age. The average life span of a drone is 55 days, and varies with seasonal conditions.

Capacity of a colony to rear and maintain drones

Strong colonies with large numbers of worker bees rear and maintain more drone brood and adult drones than weaker colonies. Adult drones do not feed themselves but depend on an abundant supply of healthy nurse bees to feed them on honey, pollen and gland secretions. Low numbers of healthy nurse bees in spring may contribute to problems with spring-reared drones.

The ability of a colony to maintain a high population of adult drones depends on a continuous supply of pollen coming into the colony and not on stored pollen. Only pollen stored in close proximity to brood shows a positive influence on drone rearing. Strong colonies require 300–400 g of high quality pollen daily (2.1 – 2.8 kg/week). If this is not naturally available then pollen should be fed to the colony each 3-5 days.

Colonies in which pollen had been added to a sugar syrup feed were found to have better-fed brood than colonies in which pollen had been fed dry.

Colonies receiving a continuous supply of pollen maintain maximum drone populations whereas colonies which do not receive a continuous supply of pollen have fewer drones.

Pollens from plants of European origin have been found to maintain drone brood and adults out of season while non-European sources of pollen may not.

Pollen fed to colonies must be disease free and can be irradiated to ensure that it is free from diseases affecting bee brood.

Factors affecting the eviction of drones

Drone eviction occurs when a colony stops feeding its drones due to a lack of incoming pollen supplies Over a number of days drones become weakened and are forcibly removed from the hive.

The most important factor is the amount of fresh pollen being collected. If pollen supplies coming into the colony are terminated, then drones are evicted; if pollen supplies into the colony are prolonged beyond the normal seasonal span then eviction of drones is reduced.

The absence of a queen bee also reduces eviction, though not by as much as an abundance of pollen.

A reduction in external hive temperature in hives containing a laying queen or laying workers contributes towards drone eviction.

The age of the queen was found to be important, with higher rates of drone eviction from colonies with young queens.

Weather conditions unsuitable for pollen production by plants or which prevent pollen collection by foraging worker bees may result in drone eviction.

Extending the drone breeding season

The most important strategy found was to ensure that colonies are fed pollen and/or pollen supplements on a regular and consistent basis.

An alternative method for maintaining adult drones out of season involves removing the queen from the hive and providing frames of bees and brood from a queen-right colony and supplying pollen on a regular basis.

The relationship between drones and pollen availability

When pollen is abundant then drone adults, pupae, larvae and eggs will be present. A shortage of pollen in the previous 48 hours results in the absence of drone larvae, but adults, pupae and eggs will be present. A shortage of pollen for the previous 7 days will result in adult drones being present, but no stages of drone brood.

A pollen shortage for 14 days or more will result in no adult or brood stages of drones present in the hive. Empty drone cells or drone cells filled with honey in the brood area indicates a need for pollen to initiate drone rearing.

The four basic requirements

* The provision of surplus quality pollen at all times is essential to produce adequate numbers of mature drones, as is sufficient sugar syrup or honey stores. The pollen may be either a natural pollen or a protein supplement
* Use strong colonies headed by a proven queen preferably more than one year old.
* Drones are produced earlier if a drone comb is placed in the middle of the brood chamber in autumn, preferably a comb with a mixture of drone and worker cells. In spring add one or two frames containing drone cells as hive strength and weather conditions allow.
* Drone mother colonies require the same amount of management as queen cell raising colonies.

Bibliography

Free, J.B.; Williams, I.H. 1975. 'Factors determining the rearing and rejection of drones by the honey bee colony', *Anim. Behav.*, 23, 650-675.

Harizanis, P.C.; Gary, N.E. 1984. 'The quality of insemination of queen honey bees mated under commercial conditions', *Amer. Bee Jour.*, 124, 385-387.

Laidlaw, H.H. Jr., 1979. *Contemporary queen rearing*, Dadant and Sons Inc., Illinois, USA.

Rinderer, T.E. (ed.), 1986. *Bee genetics and breeding*, Academic Press Inc., Florida, USA.

Rowlands, C.M.; McLellan, A.R., 1987. 'Seasonal changes of drone numbers in a colony of the honey bee *A. mellifera'*, *Ecological Modelling*, 37, 155-166.

Ruttner, F., 1983. *Queen rearing*, Apimondia Publishing House, Bucharest.

Szabo, T.I.; Davis, D.T., 1988. *Number of spermatozoa in the spermatheca of queens from 0 to 3 years old reared in Beaverlodge, Alberta, Canada*, Second Australian and International Bee Congress, Queensland, Australia.

Taber, S., 1987. *Breeding super bees*, A.I. Root Co., Ohio, USA.

Taber, S., 1998. 'Drones', *American Bee Journal*, 138 (12), 891-892.

Woyke, J.; Jasinski, Z., 1978. 'Influence of age of drones on the results of instrumental insemination of honey bee queens', *Apidologie*, 9(3), 203-211.

Further reading

Agnote DAI-111, *Drone mother colonies – numbers and positioning*
Agnote DAI-113, *Drone mother stock – selection and quality*

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