Information sheet for the rearing drones for instrumental insemination

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Merkblatt zur Drohnenaufzucht für die instrumentelle Besamung

Requirement for insemination: Many drones (approx. 20 drones for one queen)

1. Identify genetic source and ancestry
2. Coordinate insemination date with the appropriate age and maturity of drones
3. Care for adult drones to maturity

1. To Identify the genetic source and ancestry:

The most important factor of successful drone rearing is an overabundance of protein. The rearing of drone larvae requires several times the protein requirement compared to worker bee brood therefore, supply the designated drone colonies with an ample amount of pollen.

The “breeding atmosphere" in the colony (strong, crowded bees) is a requirement for stimulating drone production. Use a queen least two-years-old.

2. To coordinate the insemination date with the appropriate age and maturity of drones:

Before the insemination date, 45 to 42 days (6 weeks), place a drawn drone comb, consisting of three sections, incubated once, into the brood nest. To provide efficient laying of drone eggs, the queen is excluded on the drone comb.
Inspection of the comb should be made after 3 days and the laid comb marked for identification.

All other drone brood in the colony should be removed. During stressful times, the presence of younger drone brood in the colony can result in loss of the older drone brood, which is intended for the insemination. The idea of rearing a drone reserve with a second younger batch of drone brood in the same colony results in the exact opposite.

A constant supply of food resources must be provided until the drone brood is capped. In addition to nectar (sugar syrup,), sufficient pollen supplies must be provided.
Caution: During a heavy honey flow condition, the drones drone brood stages could be removed, therefore, always rear drones under "manageable" conditions (on the house, in the garden).

After capping of the drone brood, sections of comb from several drone colonies are placed into to a strong newly created, queen-less nursery colony free of unwanted drones. Don’t forget to exclude the entrance, to prevent drones from other colonies flying in.

Drone brood emerges 24 days after the eggs are laid (oviposition).
Drones require an additional 2 weeks after emergence to mature, to be ready for the insemination date.

In the event that the date drone eggs were laid is uncertain, an age-specific classification can still be made based on the date of drone emergence.
Allow the drones to emerge for 3 days in a confined area (a cage or hive section made of excluder material) in the nursery colony where all other unwanted drones have been removed. Remove the drone combs and allow them to go to another colony.

3. To care for adult drones to maturity:

Caring for newly emerged drones to maturity must be precisely defined by age.

Until sexual maturity, the drones are cared for in a colony or newly created colony that is queenless and prepared with a high ratio of nurse bees and all stages of worker brood. Open brood stimulates workers to care for emerged drones, therefore, open brood combs must be repeatedly added to the colony.

Routine and constant feeding of sugar syrup or in small amounts is required for a good provision of the drones. When feed is stored in the empty drone combs, this provides another resource for the drones. Drones are fed by nurse bees and can feed themselves from the large cells. Food from worker cells is difficult to reach for drones due to the size of their heads.

Maximum number of drones for a nurse colony is 2 drone combs, placed in confinement.

Drones tend to drift between colonies, therefore prevent drones from unknown sources to enter the drone nursery colony to protect the identification of the desired drones needed for instrumental insemination.

The provision of food and stocking the nursery colony with nurse bees up until the day drones are needed for insemination is required to ensure the care and maturity of drones that will yield semen. Care must be taken to avoid stress and malnutrition in rearing drones to maturity. Emerged drones require intensive feeding and care.

Do not forget, until the day of insemination: Maintain open brood , nurse bees and constant feeding to ensure the intensity of care drones require for their reproduction capability

On the day of insemination, we experience the "moment of truth" regarding the reliable work we put in!

The drone colonies should be set up separately.

Allow the drones to fly before insemination. Flight promotes sperm migration and allows the drones to defecate to minimize the risk of feces contamination during insemination.

The following approaches to provide drone flight opportunity include:

Option 1:
In the evening, after colony flight has stopped (6:00 – 7:00 pm), all entrances are closed.

The screened bottoms must also be closed.

This also applies to the colonies in the neighbourhood.

Then, the hive cover for the drone nurse colony is removed and the drones are allowed to fly. The drones will return after 10 – 20 minutes.

To allow repeated flying of the drones up to the age of maturity (two weeks) is beneficial. This creates a "training effect" so the drones will fly in weather conditions that are not optimal.

It is best to allow drone flight the evening before insemination.

Option 2:
Let the drones fly in confined aviaries as of the age of 2 weeks. Movement promotes sexual maturity (maturation flights).

The advantage is no loss of drones, according to Dr. Titera, Dol, Czech Republic.

Option 3:
Mark newly emerged drones with different colours based on their genetic origin. Free flight of drones is possible because the drones are identified. Vitality selection is a positive result of this method.

It is necessary for breeders to use a mixture of semen from diverse drones sources. Otherwise, inbreeding and a depletion sex alleles will occur.

A diversity of drones for breeding can be accomplished by placing several sections of capped drone brood from different genetic sources in a nursery colony, to avoid overburdening the nurse colony. Allow these to hatch for 3 days.

or

During the collection of semen: Drones from several colonies can be mixed together.

Collection of semen:
Prepare a warm (25 - 28 degrees C) and clean room.

To obtain drones, create a mechanism on the hive to enable controlled departure of drones for easy catching (hole in the cover). In good weather and during times of flight, the drones can be caught in a flight cage over the hole in the cover.
During poor weather conditions for flight, the drones must be collected from inside the colony.

Bring in a limited number of drones (100 to 150 specimens) into the insemination room in small quantities at short time intervals

Reason:
Drones lose vitality rather quickly when taken outside the colony, which makes the collection of semen difficult.