

Hive Requeening by Direct Queen Introduction With Smoke

Beekeepers often need to introduce a new queen into a hive. The receiving hive should always be queenless. Cage introduction is most common. A caged queen, often a mailing cage, is put into a queenless hive and released a few days later. This is the method most commonly described in beekeeping books and web sites.

However, cage introduction is probably not the best method. LASI research shows that direct introduction with smoke can give 100% acceptance. It is also simple and quick because it is unnecessary to open the hive to introduce the cage, or to uncork the cage a few days later to release the queen.

Direct introduction with smoke is simple. A queenless hive is set up and left queenless for a few days. The entrance is then smoked heavily, using more smoke than would be used to open the hive for an inspection. The new queen is immediately placed at the hive entrance and allowed to walk in. A simple way to do this is to remove the cork from the queen cage and to place the cage at the entrance. The queen can also be introduced directly onto the top bars or via the inner cover hole. Direct introduction can be used to introduce both virgin and mated queens and into both large and small colonies.

In one LASI trial, 3-day-old virgins were introduced into nucleus hives of 5 medium-depth Langstroth frames with bees and brood on 2-3 frames, after 1, 2, 3, 4, 5, and 6 days of queenlessness (13 hives per day). Hives were checked and any queen cells were removed before queen introduction. Virgins were held in wooden 3-hole mailing cages with attendant workers and fed honey. Each hive was smoked through the entrance and onto the top bars. The amount of smoke was several times more than used to make a regular hive inspection. The queen walked out of her cage onto the top bars and the covers were replaced. One day later the hives were inspected to determine if the queens were present. Acceptance was: 6 days queenlessness (13/13, 100%), 5 (13/13, 100%), 4 (12/13, 92%), 3 (12/13, 92%), 2 (11/13, 85%), 1 day (4/13, 31%).

In another trial 15 mated queens were directly introduced with smoke into larger hives (10 medium Langstroth frames with 6-7 frames of bees), queenless for 2 days. Queens were held for 3 days in wooden mailing cages with attendants and candy. Acceptance was 100%.

The first trial shows that the queenless period is not critical. High acceptance occurred after 3-6 days. However, 1 day was insufficient. LASI did not study the effect of longer queenless periods so we do not know the limit. However, it would be sensible not to wait too long else emergency queens in the queenless colony may emerge, or egg laying by queenless workers start.

The second trial indicates that mated queens are more easily accepted, given 100% acceptance after only 2 days queenlessness. A third trial studied queen acceptance using observation hives. Acceptance was higher for mated queens than virgins, and for longer queenless periods (study range 1-4 days). However, for mated queens direct introduction with smoke gave 100% acceptance after 1, 2, 3, & 4 days queenlessness (total 24 queens, 6 per day).

The observation hive study showed that mated queens and virgins behaved and were treated differently. For example, within 2 hours of introduction none of the 47 mated queens but all 28 virgins were chased by workers.

If direct introduction with smoke is a superior method, why is it not more widely used? There are probably several reasons. First, cage introduction is the standard method and gives good results if done with care. As a result, there is little perceived need for a better method. Second, direct introduction goes against normal beekeeping wisdom. In particular, beekeepers may be surprised that queens can be introduced directly, without acquiring odours from the receiving colony before having full contact with the workers. This indicates that acquiring colony odour is not actually necessary.

"How To" Introduce Queens by the Direct Method with Smoke: Basics

1. Organise queen availability and prepare queenless colony.
 2. After c. 2-5 days (mated queen) or 4-7 days (virgin) of queenlessness, smoke hive and immediately introduce by placing open cage at hive entrance so queen can walk in.
 3. Check queenless hives before introduction and destroy queen cells. LASI did not research whether this is helpful, but experienced queen rearers consider that it is.
- Note: Acceptance can also vary according to location, time of year, nectar flow etc.

Research Publication Behind This Information Sheet

Perez-Sato, J. A., Kärcher, M. H., Hughes, W. O. H., Ratnieks, F. L. W. 2008. Direct introduction of mated and virgin queens using smoke: a method that gives almost 100% acceptance when hives have been queenless for 2 days or more. *Journal of Apicultural Research* 47: 243-250. DOI: 10.1080/00218839.2008.11101469 <https://www.tandfonline.com/doi/pdf/10.1080/00218839.2008.11101469>

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