

Equalization of Bee Colonies Strength

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The aim of equalizing bee colonies is to make weak and strong colonies in the apiary of a similar strength before the nectar flow. We do this by boosting a weak colony by giving it either some brood or extra bees from a strong colony. There are many factors that may contribute to weakening of a colony. However, weak colonies are slow to build up, do not develop into strong colonies if they are left alone, have a smaller number of foraging bees, and produce little honey even if a good nectar flow exists. They are vulnerable to robbing by robber bees from stronger colonies. Strengthening those that are not too weak will speed up their growth a great deal and reduce the chances that the strong ones will swarm.

Colony strength

The population of a bee colony is not static and varies with the season of the year. A colony of bees will have a low population, approximately 10,000 to 15,000 early in the season (January and February), and will grow to 30,000 to 60,000 bees in the peak breeding season (spring and midsummer).

In early spring, a colony with 5 -7 frames covered with bees and at least 4 frames of brood is a strong colony, where one with 3 or 4 frames covered with bee is weak. On the other hand, in the peak breeding season a strong colony will have 10 -15 frames covered with bees and minimally six combs with brood, and have many foragers flying in and out as well as honey and pollen stores, whilst a colony with 5 -7 frames covered with bees, with e.g. 3 frames of small brood would be weak.

The value of colonies with larger populations can be illustrated by the amount of honey produced by colonies of different population. One colony of 30,000 bees produces 1½ times as much honey as of two colonies with 15,000 bees each. One colony of 45,000 bees produces 1½ times as much honey as three colonies with 15,000 bees each. One colony of 60,000 bees produces 1½ times as much honey as four colonies with 15,000 bees each.



Strong bee colony with large population. Plenty of bees cover the top of the combs.

Photo credit: MAAREC (Mid-Atlantic Apiculture Research and Extension Consortium) and Dave Hackenberg (photographer)



In a strong hive, plenty of bees can be seen between the frames
Photo credit: Imkersverenigingblaricum.nl

The advantages of the equalization

- It makes colonies more or less equal in strength for the honey flow
- It boosts weak colonies and does not affect the contributing colonies since strong colonies recover quickly
- It is an effective method of preventing swarming by reducing congestion in more populous hives
- It can result in a greater honey yield
- It makes all colonies productive
- It minimizes robbing in the apiary

Disadvantage

- Equalizing can transmit disease and mites between colonies in the apiary.
- Can cause chilled brood if it is not done carefully

Great care should be taken not to distribute brood combs and bees from sickly colonies. Always check the colonies for signs of disease before equalizing. Never equalize a weak colony caused by disease. Take care not to stretch the brood too far in weak colonies, as there may be too small a population of bees available to keep brood warm at night.

Starting the process

Equalizing is commonly done in the spring during the buildup period, three to six weeks ahead of the blooming period (nectar flow), and it is done when there is a need in the weak colonies. Only the very strong colonies with a large amount of brood and large bees population are equalized. Weak colonies that are due to an old or failing queen are not worth equalizing. In cases like this it is better to be unite or requeen as described below.

Extremely weak colonies with a low bee population and a few combs of small brood (10 -12 cm in diameter) are not worth keeping. The best thing to do is to

integrate 2 or 3 of the weakest colonies with a few combs (2 frames of bees) into one box and unite this box with moderately strong colony before the honey flow.

Methods of Equalization

There are many ways to strengthen weakened colonies. Here is how:

- *Transferring frames of sealed brood from a strong to a weak colony.*

Surplus frames of sealed brood with adhering bees are taken from a strong colony and given to a weak colony. You should never take brood away from a weak colony. Frames removed from the donating colony are replaced with drawn combs. If drawn frames are unavailable then frames of foundation are used. A strong colony will rapidly draw out fresh foundation and the queen will soon be laying eggs in it.

Give weak colonies one frame of brood at a time, so that bees can cover the entire brood. Insert the frame with brood in the middle where the brood is better nurtured. The number of frames of brood to be given depends upon how weak colonies are. If they need two or more frames of brood at one time, then you can find more than one donating colony. Be sure that any comb being moved from the strong colony does not have the queen on it.

Add frames with good quality brood e.g. a frame with the largest surface of brood (more than a half of frame) on both sides. Do not add unsealed brood. Very little will be gained by adding unsealed brood to a weak colony as there may be too small a number of young bees to care for the extra brood, and you want the sealed brood to hatch as soon as possible to add to the population of young bees. Unsealed brood requires maximum care from the colony, whereas sealed brood requires minimum care. The sealed brood will emerge, strengthen the bees in the weak colony and will start brood rearing. In 3 days they start to feed the oldest larvae, and in around 6 days they feed the youngest larvae. Newly emerged bees become foragers about three weeks after they emerge. They may forage up to three weeks.



A good quality brood frame. The frame has two thirds of capped brood on both sides

Photo credit: WV beekeeper - Cass Cohenour

It is important to check whether a colony is developing well. You have to go back and look in about 1-2 weeks to see how things are going. Whether or not they need another infusion. If the first attempt did not accomplish much, there is some other problems that needs to be addressed (i.e. disease, varroa, a bad queen, etc.)

Weak colonies being equalized with brood are given unsealed honey frames or fed with supplemental feed as needed during the equalization. This stimulates colonies to develop into strong ones.

- *Shaking frames of young bees taken from populous colony into the weak hive.*

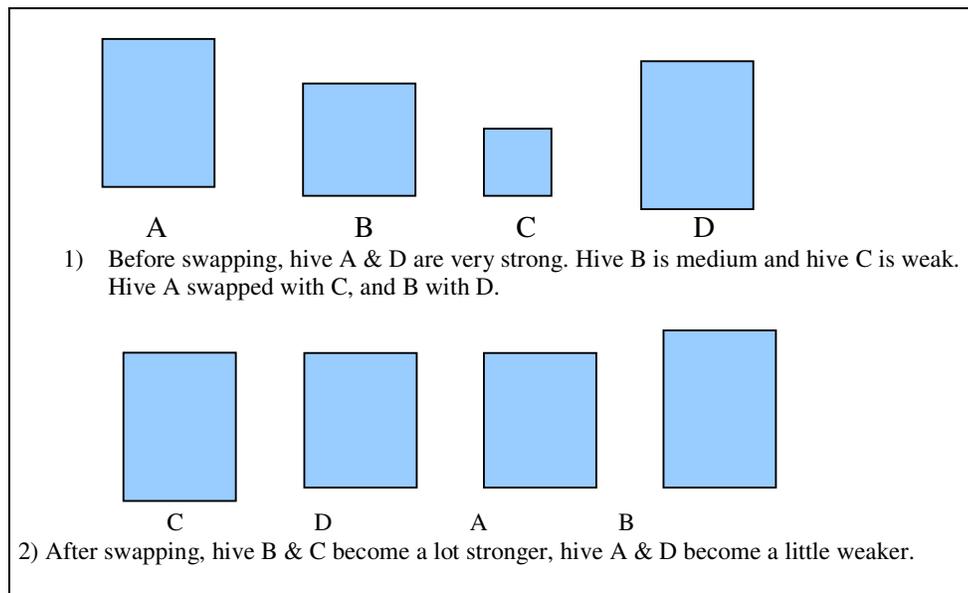
Surplus young bees from the largest adult population are shaken off. The equalizing can be carried out 2 - 3 weeks prior to the honey flows. This helps increasing the adult bee population. Make sure that the queen is not transferred with the bees when shaking out extra bees.

Tip: You can shake on to a queen excluder and capture any queen you mistakenly shook.

- *Exchanging positions of weak colonies with that of strong ones.*

Swapping the position of colonies is an easy practice to increase the number of foragers in the weaker colony and alleviate the congestion in the stronger one. A weak colony is removed to the spot occupied by a strong hive and the strong hive is moved to the former position of the weak colony. This is usually done when the foraging bees from a strong colony are out during the middle of the day. When the foragers from the strong colony return to the hive they will enter the weak colony now on this spot. Bees flying back laden with nectar or pollen are welcome and accepted into any colony without fighting.

Swapping Hive Positions



- *Adding a queenless package bees two or three weeks prior to honey flow.*

Read below how to unite two groups of bees by using the newspaper uniting method.

Uniting Honey bees by the newspaper method

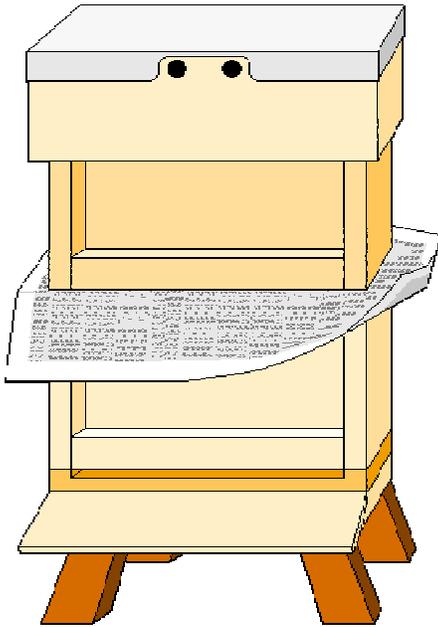


Image credit: melliferabees.net

Uniting honey bees by using a sheet of newspaper is the most common method of uniting two different colonies of bees together. The sheet of the newspaper separates the two colonies and allows a slow mingling of the odours of the two colonies, so bees integrate with minimum fighting.

A queenless or weak colony and packaged bees may be united with another by this method. The weaker colony is put on top of the stronger one. If both colonies are queenright, the least desirable or the older queen is removed before uniting. The process is carried in the evening when the bees are not flying as follows:

- **Cull the old or failing queen first.**
- **Open the hive with the queenright or strong colony.**
- **Place a one sheet of newspaper over the frames.**
- **Punch several holes in the newspaper with a nail or a matchstick to make it easier for the bees to chew and remove the paper. Holes in the newspaper prevent suffocation of bees, and allow the transfer of the queen pheromone to the new colony before they are opened enough for the bees to come through the enlarged holes.**
- **Place the hive with bees of the other colony without the bottom board over the newspaper.**
- **Close up the hive with the inner and top covers. The bees will remove the paper and be united gradually with little or no fighting.**
- **Inspect the colony three days later and rearrange the frames.**

When uniting a package of bees, a hive body with combs is placed on the top of the newspaper and all the bees in the cage are shaken into the top box.

Requeening A Hive

Requeening involves the removal of an old or substandard queen from a hive and putting in a new queen.

Requeening is an important part of hive management and is essential for maintaining strong and productive colonies. For successful requeening, the following points must be borne in mind:

- The colony, which is to be requeened, must be queenless. The undesirable queen is removed at least 24 hours prior to introduction of the new queen. Bees recognize their queen and differentiate between her and another queen for about 24 hours.
- Make certain that no queen cells are present in the colony after the colony has been made queenless.
- Allow the bees the time (usually 3 days) to get used to the new queen before she is released. This improves the chance of the new queen being accepted. If bees are clinging to the cage, this means they have not accepted the queen yet, and more time is needed before the cage is removed.
- Queens are more readily accepted by a colony in spring or in autumn. The colony is not overly large at this time.
- Queens are more readily accepted during a nectar flow. If nectar is not coming into the hive, feeding thin sugar syrup will help acceptance.
- It is easier for queen to be accepted by a small colony or nucleus than by a large colony.
- Ensure that there are no laying workers in the colony. It is impossible to requeen a colony that has laying workers. The bees will attack the queen, and she will be killed.
- Do not requeen a diseased hive. Requeening will not address the disease problem but will probably lead to the death of the new queen.

A hive may be requeened as follows:

○ **Using Queen introduction cage.** This is the most popular method of queen introduction. The idea is based on delaying the release of the queen and allowing time for the bees to become accustomed to the odour of the new queen. The method is carried out as follows:

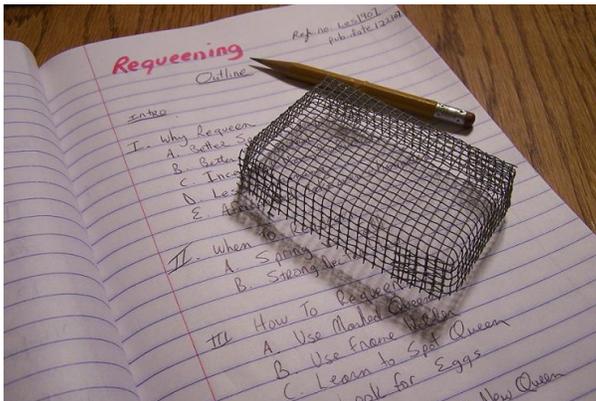
- Open the hive using as little smoke as possible. Find the old queen and dispose of her.
- Remove the cover over the candy end of the queen cage to expose the candy plug. Punch a small hole (2mm) through the candy with a small nail. Do not make the hole so large that the queen can get out immediately.
- Fix the queen cage with the new queen horizontally between the top bars of two frames in the middle of the brood nest with the screen side up or down.
- Close the hive and leave the colony undisturbed for a week. The bees will eat away the soft candy thereby liberating the queen.
- Inspect seven days after introducing to see if the new queen is free. If she has not been released from her cage after seven days, release her into the

hive. If the queen is free, remove the cage. It is not necessary to locate her if she is free and eggs are present in brood cells.



Introducing a new queen using the transit cage method
Photo credit: pacificcrestapiaries.com

○ **Introduction in push-in cage.** A square cage with one side open measuring 10 cm x 8 cm by 1.5 cm deep or a larger size can be made out of wire mesh with holes of about 3mm so that the bees may have antennal contact with the new queen. Take a frame with sealed/emerged brood out of the brood nest. Shake and brush the bees off. Push the cage with the queen inside with no bees into an area of sealed/emerging brood with a few cells of honey as food. Place the frame back and close up the hive. The queen will be accepted by the emerging bees inside the cage and eventually by the other bees of the colony. The queen is set free 3 - 5 days later by removing the cage.



Homemade push-in cage. Photo credit: basicbeekeeping.com

○ **Newspaper bag introduction method.** Make a bag of a newspaper sheet that will cover completely the frame. Prick several holes with a nail or pencil in the sides of the bag for the bees to smell the queen's odour through. Put the frame with bees and the queen into the bag and close with thumbtacks. Insert the bagged frame in the colony to be requeened and leave for several days. The bees will chew the paper away.

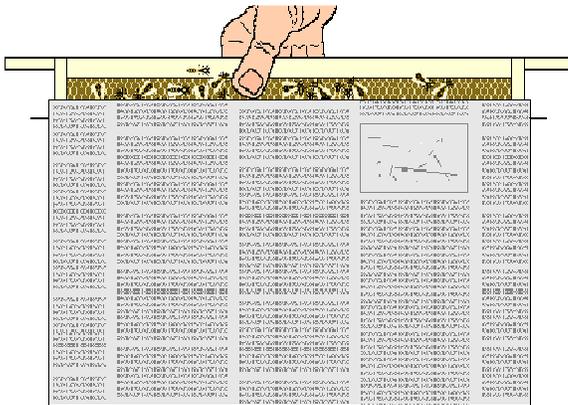


Image credit: melliferabees.net

Another variation that has been used by a French beekeeper is the introduction in a bag made of newspaper about 20 by 15 cm in dimensions. Pierce few holes in the bag and place 30 to 50 bees in it. Those bees are taken from the nucleus in which she was mated and should be house bees 6 to 11 days old in order to produce glandular food (royal jelly) to feed the queen in confinement. Put the queen in with the bees and close the bag. Insert the bag between two frames. The bees will gnaw away the paper, freeing the confined bees and the queen. This technique is claimed to work well.

○ **The nucleus method of queen introduction. A new queen is most readily accepted by a nucleus or small colony. The method involves introducing the queen first to a nucleus and then to the colony to be requeened. For best results, make up a nucleus consisting of two frames of sealed brood with emerging bees and one frame of honey. Shake in 1 or 2 frames of young bees. Young bees can readily accept a new queen. The queen cage is added 24 hours after preparing the nucleus. Place the cage between two brood frames after removing the cover or cork from the candy end. Examine after a week for the queen release and laying. Then unite the nucleus to the hive to be requeened by the newspaper method after making sure that it is queenless and without queen cells.**

○ **Requeening using ripe queen cell. A capped queen cell is easy to introduce because the queen is still in the cell with her odour. To introduce a capped queen cell into a hive, leave the hive for 24 hours without a queen. Position the cell in between 2 top bars in the centre of the brood nest or place it in the middle of a frame of brood by making a hole in the wax a little bigger than the queen cell and gently press the cell into the hole. You should remember, that a capped queen cell is very fragile. Treat it gently so that not to damage the pupa inside. Introducing queen cells are not usually accepted in colonies containing laying workers.**