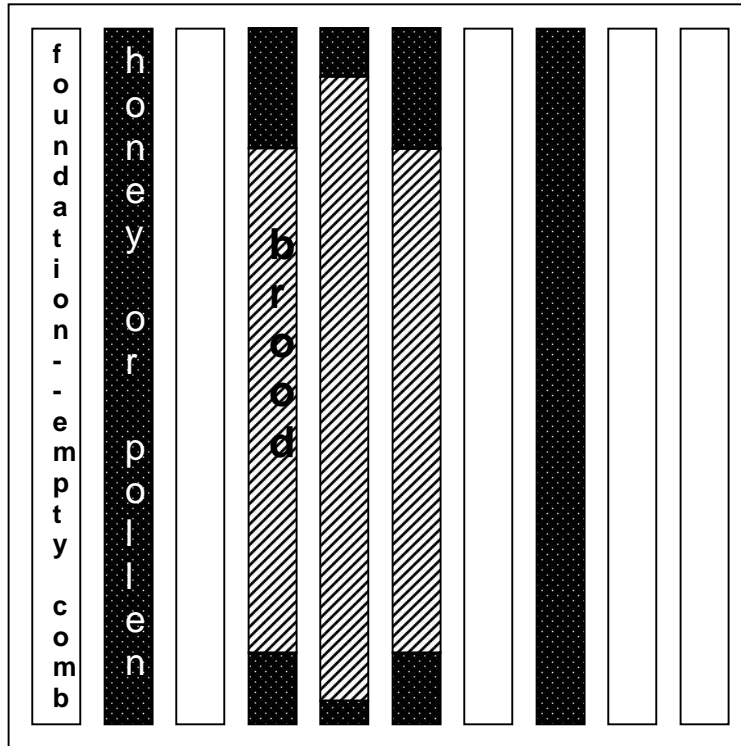


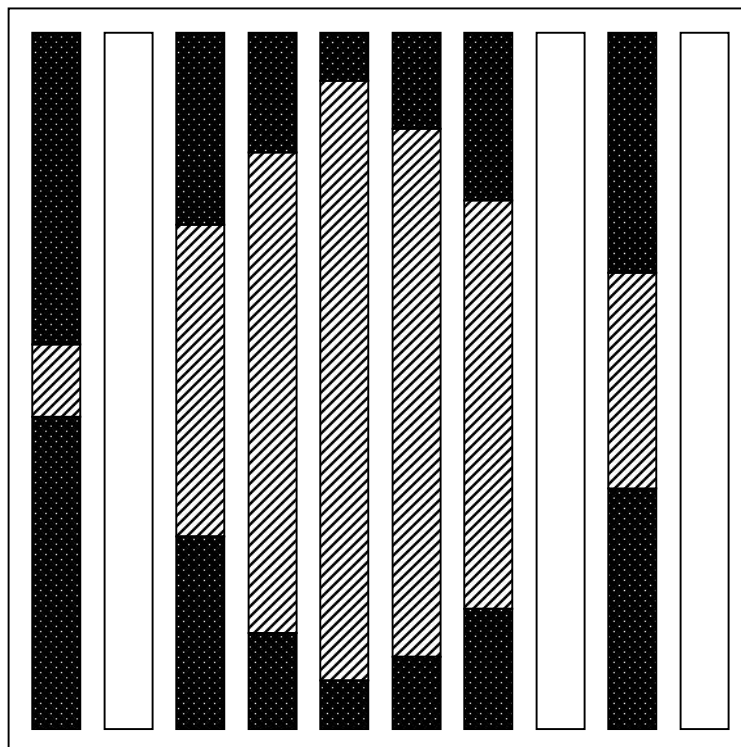
# Basic Beekeeping Techniques

by Buddy Marterre

Getting Started with nucs:



Arrange your first frames as above, feed, and when 70% of the frames are full...



Rearrange as above and add the next (empty) brood chamber. Keep feeding.

The above diagrams are as is looking down into a 10 frame deep (hive body depth) brood chamber which will be expanded to two deeps when a 5 frame nuc is introduced. The same principle applies to triple medium brood chambers and 8 frame equipment. In the latter case, arrange most of the middle brood-containing frames in the bottom chamber with a frame of foundation on each side of the brood, then pollen and honey-laden frames and put the remaining (one or two frames of brood and one of pollen / nectar) in the center of the second chamber. Expand the second chamber by inserting single outside frames of foundation into the brood nest as it expands and add the third chamber once the wax in the one below has been pulled out in 5 or 6 of the 8 frames. I sometimes also flip the outside frames around, particularly if the bees have only drawn the wax on the inside surface of these frames. If there is no major nectar flow (such as any time except the last week of April through the entire month of May), feed the bees 1:1 sugar syrup continuously via a top feeder until the wax cells have all been drawn out and the brood chambers are completely full (of adult bees, brood, pollen, and nectar/honey).

### **Feeding Bees:**

Feed bees 1:2, 1:1 or 2:1 sugar syrup (2:1 in the Fall):

- any time they need to draw wax honeycomb (no nectar flow) - 1:1 or 1:2
- expanding a nuc to a hive (FEED CONTINUOUSLY UNTIL ALL DESIRED COMB IS DRAWN – except perhaps from late April to early June) – 1:1
- to 'dispense' Fumagillin-B for Nosema treatment or prevention
- during any nectar dearth – such as after a nectar flow / honey harvesting
- from late July into the Fall (for broodnest expansion and Winter stores) – 1:1 or 2:1
- from mid January to March (prevents starvation and stimulates brood rearing) – 1:2 (which provides water and allows honey dilution) or 1:1

With small colonies (nucs, splits), feed ½ - 1 gallon every 3 - 7 days. Large colonies can be fed 1 - 2 gallons every few days. Use open feeding only when robbing is low risk (Spring) or if all your hives are strong. Top feeders work best from mid-March to November. Pails or jars on the top bars inside an empty deep work best from January to March. Division board feeders don't hold much and take up a frame space but prevent robbing well. Boardman or entrance feeders don't hold much and promote robbing. Never feed you bees someone else's honey, as it may contain American Foulbrood (AFB) spores.

### **Hive Inspections:**

Have a reason or goal every time you inspect your colony. In the fall, pick the entire hive up from the back and front separately (or each side separately) and try to determine its weight. Watch the activity at the entrance. Usually if bees are flying, it's OK to inspect them. Avoid cold, rainy, and windy days. Utilize the warm, calm part of a sunny day to your advantage as most of the defensive foragers will be out in the field, and you'll have fewer and nicer bees to upset and look through. If going into the hive, approach it from the rear, apply smoke judiciously, work gently but deliberately, and inspect only as much as you need to. If there is a honey flow in progress, you typically only want to inspect the top honey super, not the broodnest. Otherwise, immediately try to form a mental picture of the broodnest as you inspect it. Remember, it is shaped like an egg that has been sliced vertically by your frames. It is a sphere, with brood in the center, bee bread (wet pollen) and pollen outside the brood and more to the bottom, and nectar and capped honey outside that (with much more honey to the top). Is it off to one side? How large is it (where are most of the bees)? Then remove an outside frame (position 1 or 2) completely so that the other frames can be scooted over and removed without bumping the sides. As you look at a frame, try to decide where you are in this spherical brood nest, so that you don't have to remove every single frame. Just obtain an adequate 'sample' of frames to determine what is happening. Assess for all three stages of brood (and their ratio), make sure there are only singly laid eggs. Assess the pattern of pupae, and always make sure there are

adequate honey AND pollen stores. Are there queen cells? If so, how many? Are they in the same stage or different stages of development? How much drone brood is present? Is there a disease present? Do you need to manipulate the hive, such as expanding the broodnest, adding a honey super, or feeding sugar syrup and/or pollen?

### **Finding the Queen:**

In a typical broodnest inspection, you do not need to find the queen. If you have singly-laid eggs at the bottoms of individual cells in the broodnest, you have one! You must find her to replace her, however, and it is also important to make sure she is NOT on a frame you're transferring to another hive. So learning how to find her is a necessary skill.

When looking for the queen, pattern recognition skills come in handy. She is most likely in the broodnest. The broodnest can be quickly located by looking between the frames. It's the congested area, and although it is usually in the center, it may be off to one side. Have an empty hive body to put the first few already-scanned frames in and start in the upper brood chamber. Remove one frame at a time starting at the edge farthest from the broodnest. Scan both sides of each frame twice and then put it into the empty hive body. See below for scanning techniques. Once three or four frames have been removed, you may just scoot the frames over to the empty side of the chamber once they've been scanned, leaving a big space between already-scanned and yet-to-be scanned frames (that she can't jump across). Once the entire chamber has been scanned, replace the previously removed frames in the same orientation they were in, and go down to the next brood chamber.

Scan frames full of honey very quickly, and concentrate most of your time on those frames with eggs and emerging capped brood / empty cells within the broodnest. The first frame scan (on each side) should only take about 3 – 4 seconds. It is done in an almost 'out of focus' fashion – quickly from one side to the other. Then flip it over and repeat it on the other side. With this first scan, you are merely looking for something different; DON'T look at each individual bee. The second scan (again on each side, and this time making sure to look at the bottom and edges too) is much more thorough, and may take 20 – 30 seconds.

The queen looks and acts differently from the other bees. She has a long pointed abdomen, which she may drag on the comb. She holds her wings folded over her back, not out slightly like workers do. Her wings appear shorter because her abdomen is longer. Her legs are longer, and she walks (or runs) on the comb; she doesn't fly or even vibrate/fan her wings. She has a bald, dark thorax with no hair. She is not fat like drones and doesn't have big eyes like they do. Her retinue nurse bees may surround her, all facing her in a circle, licking her and feeding her. They will typically part (like the Red Sea for Moses) as she walks along. She doesn't like light, so she will quickly go to the side of the frame you aren't looking at! And she may have her abdomen down in a cell laying an egg when you first scan for her. This is the reason for two scans.

Once you find her, scoop her up with a queen catcher or gently set that frame to the side, outside the hive (so she can't move to another frame). You can determine her fate later. If you are requeening, once you're sure you no longer need her, squish her thorax.

After looking through both chambers thoroughly, if you still haven't found the queen, place a queen excluder between each brood chamber and come back in 4 days. She'll be in the (only) one with eggs. You can use a queen excluder to help narrow your search for the queen like this anytime. Coming back another day seems to help too, at least with your attitude!

### **Delayed Release Requeening:**

When the new queen arrives, remove the old queen from the hive. Place a small drop of water on the screen, and store the new queen in a 60° dark place overnight. The next day, introduce the new queen with a queening rim leaving the cork in the candy end of the queen cage for 5 - 7 days. [If you feel confident enough, remove her attendants from the queen cage first. Do this in an enclosed room with a window or light for the queen to fly to in case she escapes. The simplest way to remove the attendants is to temporarily remove the cork on the non-candy end, put your finger over the hole, and let the attendants fly up and out, one by one, replacing your finger every time the queen comes up toward the hole. Then replace the cork.] Once the bees have accepted her, shake every frame and cut out any queen cells that have developed and remove the plug over the candy end of the queen cage. You may wish to spritz the colony and the queen cage with light sugar syrup containing a hint of vanilla extract. Ensure her release in 2 more days. She'll start laying eggs in 0 – 3 days; recheck without smoke (for eggs *and* supercedure cells) in a week.

An alternative to using the queen cage and cutting out queen cells is to release the new queen into a push-in introduction cage. Push the cage onto an area of emerging, capped brood with plastic foundation and release her into it 24 hours after removing the old queen. Return in a week. After the brood has emerged from within the push-in cage, the new queen has been accepted, *and* laid eggs into the empty cells, you may let her out (if the bees haven't dug a tunnel to her under the wax yet).

### **Double Brood Requeening (all hive manipulations between Noon and 3 PM):**

Place a small drop of water on the screen, and store the new queen in a 60° dark place for 1 – 2 nights. Generate a temporary 'nuc' using the upper brood chamber of the hive to be requeened by arranging at least 3 frames of (mostly emerging, capped) brood in the center, then empty drawn comb, then nectar and pollen-laden frames on each end and shake all the adult bees into the bottom brood chamber. Put a queen excluder between the two brood chambers and the nurse bees will crawl up into the upper 'nuc' overnight. The next day, remove the queen excluder and move the upper 'nuc' with an entrance-reduced double screen bottom board, inner cover, and another top to a new location, open the 'back' entrance and feed 1:1 syrup. Introduce the new queen (without attendants) to the nuc after 24 hours (remove cork) screen side down with a queening rim and watch the bees' reaction. Recheck the nuc in 3 – 5 days with no smoke and ensure her release IF she has been accepted (do it if necessary). Remove the queening rim and place the nuc back over the parent hive with the double screen board between them for 4 – 7 more days and open both front entrances. Once you are sure the new queen is laying, remove the old queen (below). Replace the double screen board with a sheet of newspaper 24 hours after removing the old queen. The new queen will march down and take over the old queen's brood nest.

### **Laying Worker Colonies and Management:**

When a colony survives a queen loss for many weeks and does not successfully replace the queen, QMP production and brood pheromone levels are both low. This allows the ovaries of many of the larger (infertile) workers to develop further and these workers begin laying eggs. There will be multiple eggs on the side walls of each cell because the laying worker's abdomens aren't long enough to reach the bottoms of the cells and they can't detect that an egg has already been laid there. Their unfertilized eggs will develop into drones only, despite the fact that they are developing in worker-sized cells. The laying workers' combined QMP output is sufficient to fool the colony into believing they have a queen. Finding all of them is impossible. Simple requeening of a laying worker hive will

consistently fail, because: 1. There are no young accepting nurse bees present (only old, un-accepting foragers), and 2. The colony thinks they have a queen.

There are three ways to manage this situation. The best is to combine this colony with a queenright colony using the newspaper method described below. Make sure the laying worker brood chambers are on the bottom of the newspaper and the strong queenright colony is above the newspaper! A few weeks later, after the queen has moved down into the old broodnest, you can split out a portion of the combined colony to 'recreate' your old colony (and have them raise their own queen or provide them with a purchased queen) as described in requeening and making splits.

The second best management of a laying worker colony is to provide the laying worker colony with a queen cell, instead of a mature queen. This requires that she go out and mate and return and 'take over' the egg laying duties. Expect 60 % success with this technique.

Lastly, you can take all your bees a mile away, shake them all out on the ground, and return the (now empty) hive to its original location and then requeen it. This relies on the concept that the laying workers are too large to fly back to the hive, but the other bees will. This works poorly.

#### **Swarm Prevention vs. Swarm Control:**

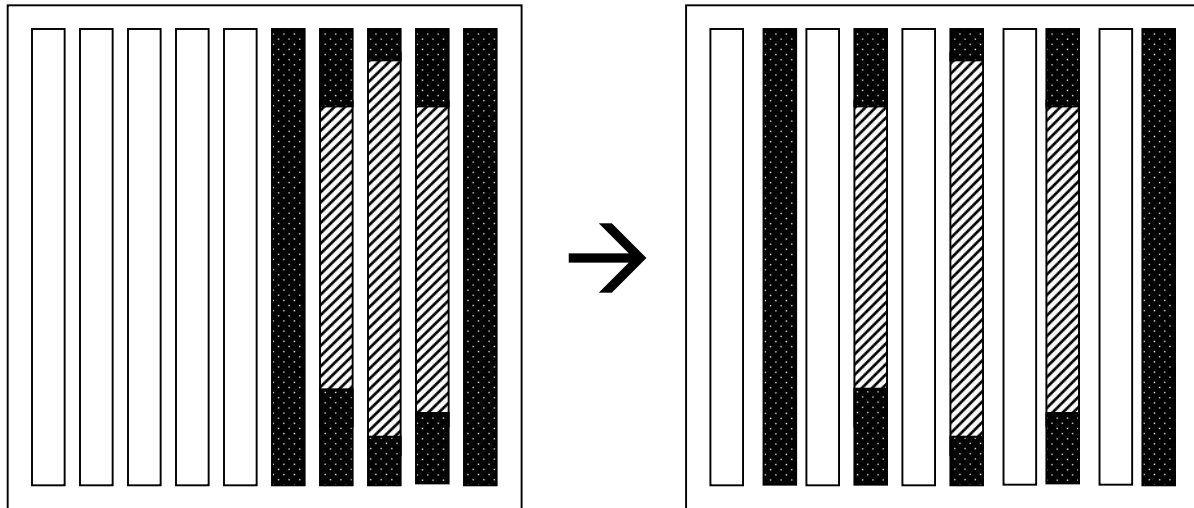
Remember that reproductive swarms typically have more than 12 queen cells per level in the last two weeks of March / first three weeks of April and overcrowding swarms have fewer than 8 queen cells and occur after April 21.

Swarm prevention techniques are based on creating more apparent space within the hive than actually exists. The first thing to do is avoid a 'honey bound' hive, by ensuring 2 – 4 frames of empty drawn comb in the middle of the upper brood chamber in the fall. This allows space for the broodnest expansion in the spring. If the colony hits a wall of capped honey as they move up during the winter, their apparent space for expansion is severely limited (and they may swarm). The two best techniques for preventing swarms are checkerboarding and reversing brood chambers.

Swarm control is a more drastic measure taken in order to keep a colony that has already decided to swarm from doing so. Swarm preps (broodnest reduction and filling brood cells with nectar as well as royal jelly and eggs, larvae, or even pupae in queen cells) are underway (but the swarm hasn't cast yet)! If you wish to expand your operation (and there are adequate drones in the area for mating), the simplest way to deal with the queen cells is to move them to another hive (and in the process, set up a mating nuc). If you do not wish to do this, you can create a double queen hive (see Advanced Techniques), or just temporarily remove the queen and then replace her. The key to swarm control is breaking the brood cycle, typically by separating the queen from the brood for at least 7 days (see below). If this is done, ALL the queen cells must be removed (either cut out or moved to another hive) TWICE (initially, and again at least 6 days later). Six days after the queen has been removed there will no longer be any larvae young enough for emergency queen replacement.

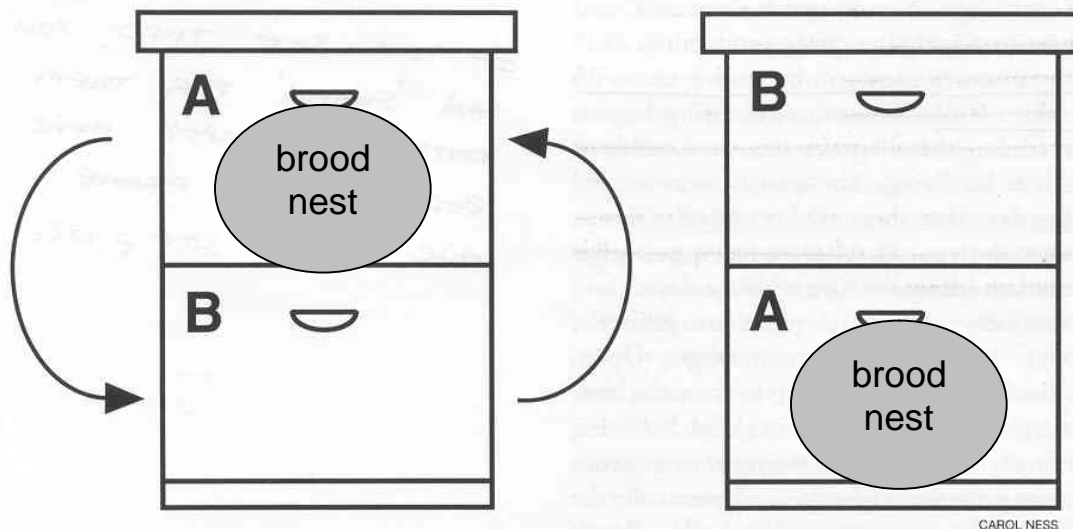
#### **Checkerboarding (swarm prevention):**

Once after mid-March, and perform in the middle of warm (> 60° F), sunny, calm days only! Place empty drawn comb (preferably) or a few frames of foundation in between every other frame within the broodnest in a staggered fashion. Thus the frames may end up something like this (in each brood chamber):



### Reversing Brood Chambers (swarm prevention):

Begin in mid-March, and perform in the middle of warm (> 60° F), sunny, calm days only! If the majority of the broodnest is in the upper brood chamber, reverse the brood chambers, moving the nest below. If the broodnest is half in each chamber DO NOT reverse until it is warmer (April) or you will expose the split brood to cold temperatures. Add an empty super in anticipation of the early nectar flow (also in mid-March). Repeat the reversal every 10 – 14 days until the final reversal just before the main nectar flow (3<sup>rd</sup> week of April). Also, provide lots of space with empty drawn comb in the middle of the upper brood chamber to prevent overcrowding swarms from 'honey bound' hives.



Reversing Hive Bodies

### Temporary Queen Removal (swarm control – works best just before main flow):

Shake the bees off all the brood frames in order to find all the queen cells and cut out all the queen cells. Move the caged queen (you can keep her in a queen catcher) onto the tops of the frames in a 5 frame nuc 'queen bank' w/ a queening rim for 7 – 9 days temporarily

and put temporary 'filler' frames in the main hive. Cut out all the queen cells in the main colony again after 7 – 9 days and then replace the previously removed frames and the queen (direct release her into the broodnest) from the temporary nuc. Add a super of empty drawn comb for the queen to begin laying eggs in again. For fall swarm control (mid September), just cut out the queen cells, place the queen in a queen catcher and put her on top of the frames of her own hive inside a spacer rim for one week and then let her go.

### **Baiting Swarms:**

Generate an empty hive with an entrance-reduced bottom board, deep hive body, foundation, and at least one frame of old, dark, drawn broodcomb and a top. Secure the hive at least 4 feet off the ground (6 or 8 feet is better) on the side of a tree at the edge of a tree line (it will be in the shade) facing South / East. Check regularly.

### **Hiving Swarms:**

Be prepared for a call. Have a complete empty hive with a single brood chamber full of frames of foundation, with moving screens and straps ready. Try to ascertain the size of the swarm, the height off the ground, and the length of time it has been there over the phone. Make sure this isn't a bee removal (of an established colony from a structure) job and try to differentiate whether it is honey bees, yellow jackets, or something else. Determine it's usefulness to your operation: Is it spring or fall? Did it come from a managed colony (one of yours?) or is it a 'survivor' swarm? Do you need it? How much trouble will it be getting it? Is it Africanized? Could it pose a danger to the public?

Go to the swarm about an hour or two before dusk with the empty hive and whatever other equipment you may need (chainsaw, rope, ladder, swarm bucket, etc). If the colony has landed within the last day or two, it will be docile (even if Africanized) and can be handled without protective gear. Once the bees honey stomachs get empty however, a 'dry swarm' can be defensive, so take your suit, veil, and gloves just in case.

After removing a few frames from the middle, shake the entire swarm into your hive with a single sharp blow. Then get as many stragglers into the hive as possible and gently replace the frames you removed. Leave the top off and in about 20 minutes (if you captured the queen!), the rest of the bees will come into the hive. Dusk works to your advantage here. Then put on a top and moving screen, and strap it up and take it (preferably 2 miles away) to your bee yard. If there isn't a major honey flow taking place, feed them sugar syrup. Swarms come with lots of wax builders, so putting them on new foundation will only set them back a few days and you'll get a bunch more comb!

### **Moving Hives:**

Only move hives more than two miles or less than two inches. It is best to move them when there is no foraging. This is very early morning, or after dusk. If moving hives at dawn, it is best to (at least partially) prepare them the night before. Put on a front door screen (I like the Florida moving screen from Brushy Mountain). Strap the hive up with a screened bottom AND inner cover (with no top), secure it in the back of a truck, and away you go! A hive carrier and the help of another person go a long way to make the move more comfortable. If moving bees on a very hot day for a long distance, consider adding some water to each hive through the top screen every few hours.

### **Queen Excluder Use:**

The queen excluder is used to keep brood out of the honey super. Place the queen excluder in between the lower brood deep chamber and the upper honey super once the bees have put something (eggs / brood, nectar) in it. If there is brood in the super, make sure the queen is down in the brood chamber below before trapping her up there! And make sure

there is an upper entrance / exit for the drones, so that they don't get trapped in the upper unit since they can't pass through the queen excluder to exit below it. If the queen is up in the honey super, you have to find her and move her down, or reverse the super with the bottom brood chamber (and make a brood chamber out of your super). Either way, if there is brood in the upper chamber, you have to wait for the pupae to hatch (over 3 weeks) before it will contain only honey and can be extracted.

Another use for a queen excluder is to help find the queen. If you can't find the queen (and you need to), place a queen excluder between each brood chamber and come back in 4 days. She'll be in the chamber with the eggs.

### **How to Super:**

Place supers *in anticipation of* storage needs (when existing supers are 70 % full and *before* they're capped) on top of existing supers. Placing new supers under existing supers (bottom supering) may increase honey storage, but it is a little more work.

If using drawn comb (early nectar flow), place 1 or even 2 medium supers on at a time with 8 or 9 evenly-spaced frames in a 10 frame box. The bees will draw this comb out further which will allow less wax capping and easier uncapping, and actually result in more honey production than 10 frames.

If supering with foundation (main flow), only use one super with 10 frames at a time. When the center 6 frames are almost fully drawn with wax, move them to the outside (moving the 4 outside frames of foundation to the center). Once the frames are 2/3 drawn and have nectar (uncapped), add another super of foundation. If there's no nectar flow, you must feed the bees 1:1 (or more dilute) sugar syrup constantly to stimulate wax formation.

If supering for cut comb honey production, make sure the hive is perfectly flat and level. Put frames with a 1" strip of wax-only foundation at the top into the super and place the super directly over the brood chamber of a strong hive right at the beginning of a major nectar flow. The bees will draw out the remaining comb perpendicular to the earth.

Only place a queen excluder between the brood chambers and the honey super a week *after* the bees have put something (brood or nectar – but if brood, make sure the queen is down below in the brood chambers *before* excluding the queen into the super) into it. This 'baits' the honey storage bees up into the super. Alternatively, move two frames of capped honey up in the super from the outside of the brood chamber and replace those frames in the brood chamber with empty comb or foundation (in the center). If you move frames of honey up as bait, make sure the brood chamber frames have not been recently treated with chemicals (or mark them and move them back once the bees have been 'baited' into the super so as to prevent extracting chemical-laden honey)!

### **Comb Drying and Storage:**

After the last honey of the year has been extracted from your supers, stack them outside near your bee hives alternating orientation and let the bees lick the wet combs dry over a few days and then store them over the fall and winter. Only store honey supers that contain no pollen and have had very little brood in them as wax moths will damage pollen-laden comb quickly. Cut out any wax moth tunnels before placing back in service.

### **Wax Processing:**

Place wax cappings into one leg of women's pantyhose and tie off the open end. Wash at least three times in very warm water, changing the water each time. Hang the stocking up

to dry. Place the pantyhose into the solar wax melter on a hot day and point it south. Collect pure wax as it drips into a pan.

### **Bottom Board Test for Varroa Mites (late July / August):**

Perform at least once a year at the Varroa mite peak (typically after the last honey harvest and before the fall broodnest expansion (late July/August). Repeat test after any treatment. Cover uncoated insert board with cooking spray oil and/or Vaseline (or use pre-coated boards). Insert the board in the slot under the screened bottom board of the hive. Remove it and count the Varroa mites 24 hours later. Mites are reddish brown, slightly oval, and are the width of the period at the end of this sentence. If there are greater than 100 mites / hive / 24 hours, treatment may be indicated (see below and see Varroa Mite Handout). If there are fewer, do not treat. Badly infested hives may have worker bees with curled up or deformed wings. Consider letting a severely infested hive die without treatment as obviously that colony has no tolerance to mites.

**External beetle and wax moth trap** - a 2 liter drink bottle with a hole cut 1 1/4" below the neck shoulder. Fill with equal amounts (1/4 – 1 cup each) of vinegar, sugar, and water. Shake until the sugar is dissolved. Then add a very ripe thinly sliced unpeeled banana or slum gum and place it in a warm place to begin fermentation. Then hang it from a tree near the apiary or the stored supers.

### **Preparing Colonies for Winter:**

From late July through the entire month of August, there are no nectar or pollen sources. Bees 'pick' their over-winter cluster location in October, but need to greatly expand their broodnest in August and September in order to have enough young bees to over-winter successfully (they need plenty of long-lived nurse bees to survive to begin brood rearing in earnest the following February). Since the fall (Aster) nectar flow is unpredictable, and winter bees are literally fatter than summer bees, sugar syrup needs to be fed to every colony every fall. Feed each colony sugar syrup from late July through August and early September. This causes the broodnest (and subsequent cluster) to be located in the bottommost brood chamber as they will store the honey on top. Decrease the size of the hive to just the brood chambers (3 mediums or 2 deeps), and reduce the entrance to the smallest hole to prevent mouse access. Ensure the weight of the hive is about 80 pounds (40 to 50 pounds of woodenware and bees plus 30 to 40 pounds of honey). In early October, combine weak colonies as they can be split back out into two colonies the following spring. In late October ensure that there are 3 – 4 frames of empty drawn comb in the center of the upper brood chamber, so that the broodnest can expand into this area the following spring and not be 'honey bound' (a solid sheet of honey that prevents upward expansion). Ensure adequate ventilation with open screened bottom board and either a screened inner cover or the use of ventilation blocks between the inner cover and top to prevent mold accumulation.

### **Combining (Weak) Colonies:**

Best done in the fall (if you have a colony with fewer than 5 frames of bees in October). Find the weak colony's queen and dispose of her. 24 hours later, move the weak hive to the strong one's location, and place the STRONG, queen-right colony ON TOP of the de-queenied weak colony with 2 sheets of newspaper in between them. Make sure the new combined hive is located where the strong hive used to be. Provide the combined hive with only a lower entrance so that the upper foragers have to traverse the lower weak hive after they chew away the newspaper. The queen will move down and take over the old lower broodnest in her own time.

### **Honey Estimates:**

A full, medium, 9 frame super weighs ~ 54 lbs and contains 38 – 40 lbs of recoverable honey, and 3 - 5 lbs of cappings wax and unrecoverable honey. Thus the wet woodenware weight is 11 lbs. A shallow 10 frame super weighs ~ 45 lbs and contains 30 - 32 lbs of recoverable honey.

**Bee Estimates:**

~ **2,500 adults / full deep frame** (25,000 if deep hive body full)  
½ pound bees / full deep frame (5 pounds of bees if deep hive body full)  
~ **1,500 adults / full medium frame** (15,000 if medium chamber full)  
3,500 brood / full deep frame (both sides)  
< 2,000 brood / medium frame