



2021 2020 Beekeeping Guide

TABLE OF CONTENTS

PREFACE	4
ABOUT EVERSWEET APIARIES	5
BEEKEEPING TERMS	7
BEEKEEPING CATEGORIES	7
HIVE EQUIPMENT	8
EQUIPMENT SET-UP FOR NEW BEEKEEPERS	8
ROOFS	10
TOP SCREENS	10
INNER COVERS	12
QUEEN EXCLUDERS	13
ENTRANCE REDUCERS	14
HIVE INSPECTIONS	15
INSPECTION TIMES	15
INSPECTION SUPPLIES	15
INSPECTION RECORDS	16
SMOKING	17
INSPECTION POSITION & APPROACH	18
WHAT YOU SHOULD BE LOOKING FOR...	19
QUEENS	19
EGGS	19
LARVAE	20
CAPPED BROOD / PUPAE	20
SPOTTY BROOD PATTERNS	20
DRONE BROOD	21
QUEEN CELLS	22
POPULATION STRENGTH	23
INTEGRATED PEST MANAGEMENT (IPM)	23
INSPECT BEES APPEARANCE & BEHAVIOR	24
SPRING SWARM MANAGEMENT	24
MONITOR WATER, NECTAR, & POLLEN INTAKE	25
NUCS	26
PURCHASING NUCS	26
STARTING A 5 FRAME NUC	28

REQUEENING NUCS	30
DEEP VS. MEDIUM 5 FRAME NUCS	30
PACKAGE BEES	33
PACKAGE INSTALLATION	33
PACKAGE CARE AND MAINTENANCE	35
WHICH IS BETTER . . . PACKAGES OR NUCS?	36
PACKAGES	36
NUCS	37
BEE NUTRITION	38
FORAGING	38
NECTAR	38
NECTAR FLOWS	39
WATER	40
POLLEN	40
MINERALS	41
WORKER & ROYAL JELLY	42
WET & DRY BROOD	42
VITELLOGENIN	43
SUPPLEMENTS	44
POLLEN SUPPLEMENTS	44
SUGAR WATER FEEDING	46
PREPARING SUGAR WATER	46
FONDANT	47
SUGAR SLURRY	48
ABSCONDING	48
PROGRAM MANAGEMENT CALENDAR	51
JULY	51
AUGUST	52
SEPTEMBER	53
OCTOBER	54
NOVEMBER - DECEMBER	54
JANUARY - FEBRUARY	55
MARCH	55
APRIL	56

MAY	57
JUNE	57
JULY	58
IMPORTANT TIPS	58

PREFACE



A Note from Herb:

Mother Nature is always a factor in beekeeping and will influence your management program. Bloom times may be off by a week or two depending on the weather. Too much rain or drought will also impact your hives. Nectar flow determines what happens each year close to the same date in all parts of the country. Monitor your bees' nectar and pollen intake and provide feeding supplements if necessary. Learn the plants that grow around your bees, their bloom times, and beneficial values for bees.

This management program covers how we do beekeeping in the West Virginia region. It has been prepared and made available as a free reference. Beekeepers should develop their own management guides for their region so they can prepare each year to care for their bees.



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ABOUT EVERSWEET APIARIES



Eversweet Apiaries was formed in 2002, by the handshake of friends Herb Everhart and Edward Burwell. It started out as a hobby for producing honey and to help increase the number of bees in the local area.

Eversweet has undergone a few transitions throughout the years. The business grew from a hobby into a successful bee equipment supply company and bee education center. The unfortunate passing of Herb in April 2015 not only marked a period of great sadness for Eversweet and the beekeeping community but it was a changing of the guards for beekeepers and Eversweet. Ed, who was 80 years old at the time, was able to retire and enjoy more time with his family and Jennifer King, Herb's daughter, took over the reins of Eversweet.

Herb was always very generous with his beekeeping advice and knowledge and he passed along his wisdom to countless beekeepers. Herb and Jennifer started Eversweet's Beekeeping Guide and Jennifer continues to add new chapters. Jennifer was fortunate enough to have Herb as her personal "Bee Bible" and mentor. Under Herb's tutelage, she gained valuable beekeeping knowledge and continues Herb's legacy of bee education.



Eversweet stocks a complete line of bee equipment including necessary tools, clothing, and all hive parts. They are the oldest, most trusted bee supply business in the area. Eversweet is centrally located in the tristate area making it very accessible and convenient for beekeepers in West Virginia, Maryland, Virginia, Pennsylvania, and the District of Columbia. Their Hygienic Italian, Carniolan, and Saskatraz queen supply from select breeders from April to September has provided an invaluable service to beekeepers in this region.

During the year, Eversweet holds numerous free workshops and field days for beekeepers throughout the region. These workshops and field days provide novice and experienced beekeepers alike the opportunity to advance their skills. Experienced

beekeepers are regularly present at the workshops to provide assistance and answer questions. Eversweet has successfully mentored and tutored hundreds of beekeepers since 2002.

Every attempt is made to supply only high quality products. Eversweet's primary goal is to not only have happy customers but make them successful beekeepers as well!



BEEKEEPING TERMS

Melittology - branch of entomology concerning the scientific study of bees.

Apiology - the scientific study of honeybees.

Apicology - the study of honey bee ecology.

Apiary - place where bees are kept; a collection of beehives; bee yard.

Apian – (adjective) of or relating to bees.

Apiarist - beekeeper

BEEKEEPING CATEGORIES

Hobbyist: Own a few hives. Work full time, retired, etc. Beekeeping is not their main source of income.

Sideline: Can own up to 300 hives. Attempts to make a profit from beekeeping but still has another source of income.

Commercial: Maintain hundreds or thousands of hives. Beekeeping is their sole income source.

Sub-categories or Specialties: Pollinators, Queen Breeders, Commodities (hive products – honey, pollen, wax, propolis, royal jelly)

When seeking information on the internet or from other beekeepers keep in mind which category the information is coming from. Commercial beekeepers tend to manage their bees much differently than how sideliners or hobbyists would.

HIVE EQUIPMENT

Equipment Set-up for New Beekeepers



As a new beekeeper, your primary goal for the 1st year is to build the population of your hives up to prepare and survive winter. You will most likely not get a honey crop your first year and should leave any honey the bees produce for their winter feed.

Therefore, you do not need to buy honey supers or queen excluders your 1st year. If you have extra money you can purchase two honey supers and an excluder for each hive. I repeat only TWO supers per hive. Even our overwintered, established hives only take two supers during a honey season. Maybe three supers during a good year. You do not need and will never need more than three honey supers per hive.

If your hive is strong enough in the summer, you can place a honey super on so they might draw the comb out for next year. Feeding them sugar water helps when you want them to draw out comb. However, producing wax is stressful and taxing on bees, so try not to overwork them.

Only place one box on at a time and wait until they draw the frames out before placing another super on. This method is also advisable for undrawn brood boxes. If you place all the undrawn boxes on at one time, they will rob the wax to cap brood. Most of the time they will not go back and fix the wax/comb that they robbed.

Also, when placing a bunch of boxes on at one time, creates safe havens for wax moths and small hive beetles. Bees can better police and regulate more confined spaces.

Beekeeping can be an expensive hobby. Don't buy more equipment than you will need. You can always purchase additional equipment later if necessary.

Woodenware Needed for One Hive Set-up:

- Metal Telescoping Roof
- Inner Cover (use during fall - winter)
- Top Screen (use during spring - summer)
- Brood Boxes (story & 1/2: deep and medium box, triple mediums: 3 medium boxes, double deeps: 2 deep boxes)
- Screened Bottom Board

Recommended:

- Hive Top Feeder

Optional:

- 2 honey supers
- 1 queen excluder

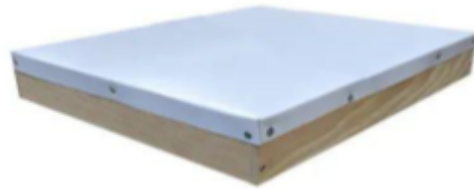
Roofs

There are two kinds of roofs: migratory and telescoping roofs. Most commercial beekeepers use migratory roofs as there is no overhang over the boxes which allow for more efficient hive placement while transporting. Hives can be placed snug next to each without spaces/gaps.

Telescoping roofs are used by most hobbyists and sideliners or stationary keeping of hives. Galvanized steel or aluminum is placed on the top to protect the roof from the element and extend the life of the roof.



Migratory Roof



Telescoping Roof

Top Screens

The top screen fits on top of your hive under the roof and its important purpose is to provide ventilation to the hive during hot, summer months. Most beekeeping sources tell you to use an inner cover in the summer. We do not recommend this as inner covers do not provide enough ventilation. Even when using screened bottom boards, inner covers do not provide enough air flow during hot months. We also do not recommend using an upper entrance to aid in ventilation as this leads to other problems such as burr comb and bees depositing pollen in honey supers. Also not recommended is propping the lid in any way with a stick or shim to aid with ventilation. This creates back doors in which the bees must guard.

Proper ventilation in the summer is critical to bees. A poorly ventilated hive equals a hot hive. Hot hives can cause bees to have bad temperaments and become unnecessarily overworked. Overworked because they spend valuable energy, time and

resources fanning the hive and collecting water to cool the hive when they could be spending their time and resources doing what you want them to do... collecting pollen/nectar, raising brood, and other hive related duties.

Tops Screens:

- Increase honey production.
- Ventilates hive. Bee don't have to work as hard by bringing in water to cool the hive and fanning.
- Helps to cure honey.
- Use in warm or hot weather
- Do not use with hive top feeders.



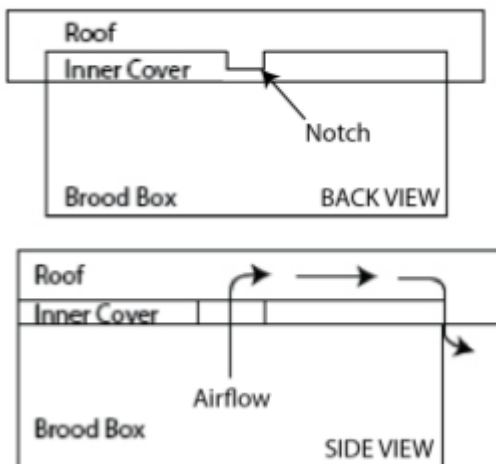
Top Screen

Inner Covers

Inner covers are best used in fall and winter. There are two kinds: raised and notched. Raised inner covers simply lift the roof slightly and do not have a notch. Notched inner covers are raised and have a notch. Notched inner covers are better and provide necessary air flow during winter months to allow hot air produced from bees to escape through the notch and reduces condensation and possible suffocation situations. The proper placement of the notched inner cover is the notch up and in the back of the hive which allows a updraft air flow or chimney effect.



Notched Inner Cover



Proper Placement for Notched Inner Cover

Queen Excluders

A queen excluder is a metal or plastic grid which is used to keep the queen laying in boxes where you want the brood to be and prevent her from laying in honey supers. The holes in the grid are big enough so the workers can pass through but not big enough for the queen or drones to pass. Queen excluders are also used to separate queens in a two queen system, to raise queens in queen-right colonies, and for emergency swarm prevention. An excluder is also useful for restricting the queen to areas so she can be found easier.



Metal Queen Excluder

When initially placed on hives, worker bees can be reluctant to pass through the excluder to store nectar in the upper boxes and will instead store too much in the brood area. This takes cells away from the queen to lay in thus causing overcrowding in the brood boxes. This overcrowding frequently leads to swarming.

Workers can be enticed to pass through the excluder by spritzing foundation and comb in upper boxes with sugar water. You can also put supers on before putting the excluder on so that they get used to storing in them.

You can also lure nurse bees to pass through the excluder by moving an uncapped brood frame above the excluder and they will go tend to the brood. Be careful not to take a frame with the queen on it.

For the West Virginia region, queen excluders and supers can be placed on in March. The excluders can be removed in July when the nectar flow stops. Never leave a queen excluder on year round. During cold months the queen will not be able to move freely with the other bees and they will not break the cluster to eat honey stores and will die of starvation.

Learning bee behavior and how to use your equipment will help you to become a successful beekeeper.

Entrance Reducers



Wood Entrance Reducer

Entrance reducers are used on hives to discourage robber bees. Weaker hives don't have enough bees to protect the entrance and an unguarded entrance is an open door for invasion. If your entrance is too large, more guard bees are assigned to protect it. This prevents them from doing more productive tasks within the hive. In our hives, we use them mainly during warmer months of Spring - Fall. During colder months, mouse guards are used.



Entrance reducers can be made of wood, plastic, or metal. We do not recommend wood reducers because they block air flow and encourage burr combing, especially if using solid bottom boards. The space in between bottom boards and frames tend to violate bee space. A dark space which is not well ventilated is created when using solid bottom boards and wood entrance reducers, thus encouraging burr comb.

In our hives we use a strip of #8 ($\frac{1}{8}$ ") hardware cloth. This hardware cloth comes in a roll and can be purchased at Lowe's or Home Depot. Use wire cutters or tinsnips to cut the cloth into a strip that will cover the entire width of the entrance and about 2" in height. You can easily fold the wire to the desired entrance height and width, small or large, as needed. These wire entrance reducers are also easier to remove than wooden entrance reducers.



Wire Entrance Reducer

If your hive is empty awaiting bees, leave the entrance closed to prevent unwanted visitors and to protect any honey stores. For established or newly established hives, bend the wire back about one inch. For stronger hives and during good nectar flows you can bend the wire back further to prevent traffic jams.

HIVE INSPECTIONS

INSPECTION TIMES

In the beginning, your hive inspections should not last longer than 10 minutes per hive. The less amount of time you have the hive open, the less you are disturbing and stressing the bees. As your skill level and confidence grows, your hive inspection times should decrease to 3-5 minutes per hive.

It is always best to perform inspections mid-morning. The temperature is cooler and the majority of the bees are out foraging making things easier to look at. Hot temperatures will make bees agitated.

Perform inspections on days where the weather is above 50 degrees. If you see bees flying, it is safe to say inspections can be performed. Pulling brood in weather that is too cool will give the brood “chill brood” which usually occurs on the outer brood and they die. Windy days are not good for inspections. Sunny days are best, however, cloudy days are permissible but be aware they may be a bit more aggressive than usual.

It is imperative to stay on a regular 7-10 day inspection schedule to stay ahead of potential problems. Do not go into the hive every few days or less than 7 days on a regular basis. While it's tempting and curious to see what the girls are doing all the time, you will be disturbing them too much and they may start to cannibalize the brood, or worse, kill the queen.

INSPECTION SUPPLIES

Listed below are recommended supplies for inspections. Adjust the list to your inspection/management needs:

Hooded Suit/Jacket or veil
Gloves, if used
Smoker
Fuel for smoker

Journal for keeping detailed information about your inspections

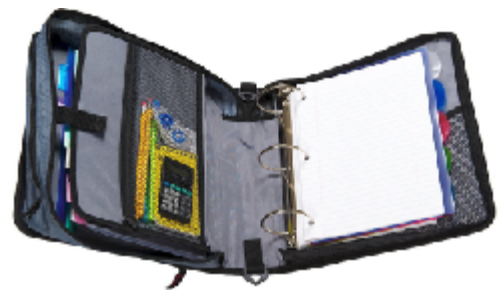
Tool bucket with the following supplies:

- Standard hive tool
- J-lifter
- lighter
- paper towels to aid in lighting smoker
- duct tape
- pens for writing in your journal

INSPECTION RECORDS

Keeping detailed information regarding your inspections is an important practice in beekeeping. Information such as inspection date and time, weather and hive conditions, etc. will prove useful later not only for yourself but also for a mentor who might be assisting you.

It is helpful to prepare a checklist in advance of things you should be looking for. We like to print blank inspection forms on three-hole paper and insert them into a zipper binder. The zipper binders with pouches are extremely helpful for storing pens!



We have prepared a form which we use in our yards. It can be downloaded at www.eversweetapiaries.com/EA_inspection_form.pdf or create one that suits your inspection needs.

If you have several hives or yards, it is helpful to draw maps with landmarks and label/number the hives on the maps. Maps drawn on card-stock paper are nice dividers in the binder if you have several yards.

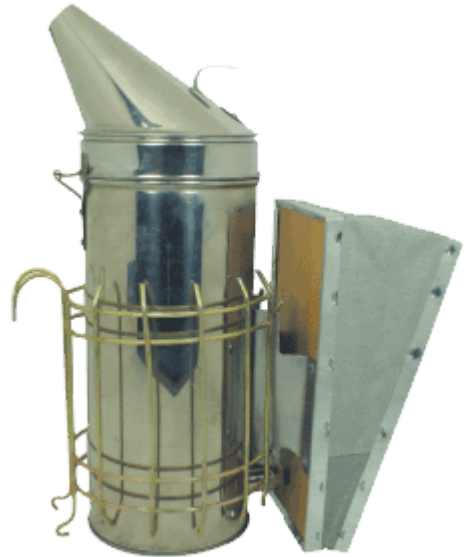
There are also software applications available which you can use on your mobile phone or tablet. However, we've found using phones in the yards is very difficult and usually results in propolis all over the phone.

SMOKING

Smoking bees is an outdated practice which should be used at minimum.

Smoking does the following:

- Smoking masks their alert pheromones and disrupts their ability to communicate with each other.
- The bees believe their house is on fire and they want to save their honey. If their house was on fire they would need that honey in order to produce wax and make a house somewhere else.
- The bees are more focused on saving the honey; they are not focused on the beekeeper. Then they are full of honey, making it more difficult to attack the beekeeper.



We know bees literally work themselves to death, so each time we are smoking the bees they are expending unnecessary energy to save their honey and then put it back. Therefore, we're shaving time off their lives by smoking them.

It's a very mean trick and very stressful on the bees. It would be like someone standing outside your house flicking matches saying "I'm going to burn your house down".

A better alternative to smoking is spraying them with sugar water. Spraying 1:1 sugar water on bees is called the drench method and works well. Be careful using this method; it can cause robbing during times of dearth. Adding Honey-B-Healthy (1 ounce to 1 gallon) will promote them to groom each other and knock mites off. The sugar water also weighs down on their wings making it difficult for them to fly.

Many bees can be handled without using smoke. During a nectar flow, they are much more docile. There will be times you have to smoke your bees. If the only time you can inspect is a cloudy day or in the evening, then smoking might be necessary. Also in times of dearth, the bees may become more aggressive. So having a smoker and knowing how to use it is another tool in your toolbox.

To Use a Smoker

Have your smoker lit and readily available. There are many fuels available that work well. We use weathered baler twine. Twine should be natural sisal and not synthetic or dyed. Exposing the twine to outside weather will neutralize any chemicals it may have been exposed to during manufacturing. Scrap denim, pine needles, wood shavings, and fuel that burns slowly and evenly works well. It should produce cool, gray smoke that does not burn hot or produce sparks.

Do not over-smoke them. Over-smoking can be just as bad as not smoking at all. Give two small puffs of smoke into the entrance, then a couple under the inner cover or top screen, and then a couple on the tops of frames. Wait a few seconds before each step.

INSPECTION POSITION & APPROACH

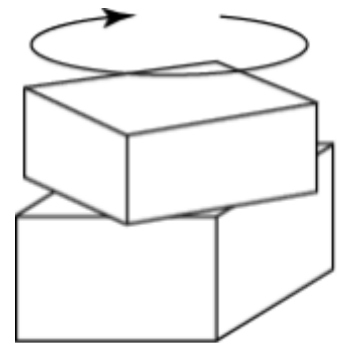
Approach the hive from either the back or sides. Standing in the front blocks the bees' flight path into the hive and you will get bees all over your back.

Standing at the side of the hive and assuming your hive is 10 frame, you can remove #9 or #2 frames for inspection. The brood is generally in the center of the hive. Bees should be using frames next to each other and not skipping frames. Always try to replace frames in the order you removed them unless you are trying to get them to build comb. However, never separate brood frames; brood frames need to be kept together for warmth. #1 and #10 frames can be harder to remove as they are usually stuck to the sides of the hive box. Work your way into the brood area. Always slowly pull the frames straight up while trying not to knock or touch adjacent frames. This prevents rolling the bees off of the comb or squashing them.



Place box on end.

After inspecting a top box and to get to the box underneath, place the removed top box on the ground on its end. Placing a box on its bottom on the ground could squash bees. When replacing boxes don't place them directly on top of each other. Set the box at an angle and slide back into place. Refer to the diagram on the right. This also prevents bees from getting squashed.



Replacing hive boxes.

WHAT YOU SHOULD BE LOOKING FOR...

QUEENS

While it is always very exciting to see the queen, this is not always an easy task. Some queens may hardly ever be seen and we call them “Runners”. As soon as the hive is opened, they scurry into dark places such as under odd shaped comb or under bees. It can be very time consuming to locate her, so the most efficient way to be sure of her presence is to look for her evidence – eggs and larvae. Seeing eggs tells us she has been present for 1-3 days. Seeing larvae suggests she has been present for 1-8 days.

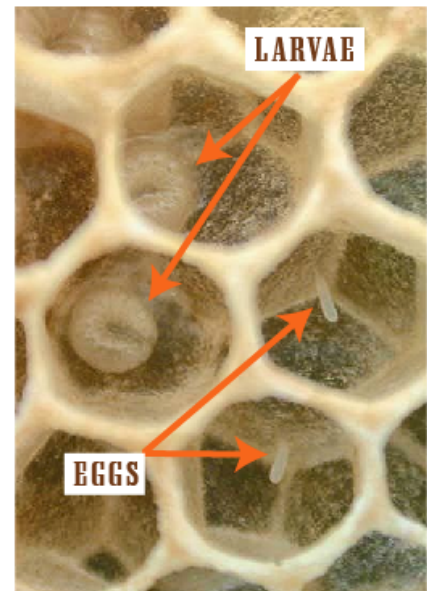


We recommend that you mark your queens. In addition to being able to spot queens easier, using the International Color Code system to mark queens tells how old queens are:

Years ending in 1 or 6 = white
 Years ending in 2 or 7 = yellow
 Years ending in 3 or 8 = red
 Years ending in 4 or 9 = green
 Years ending in 5 or 0 = blue

EGGS

Eggs can be very hard to see. Stand with the sun over your shoulder and tilt the frame back and forth until sunlight reaches the bottom of the cell. Bees build comb with a 5 - 9 degree upward pitch. This keeps the nectar or water from falling out of the cell until it can be utilized. One day old eggs should stand straight up. Two and three day old eggs will begin to fall over into the cell as they are preparing to transform into larvae. Eggs resemble grains of rice and should be one per cell. More than one per cell may mean you have a failing queen, a laying worker, or a queenless colony. Queens just starting to lay may deposit more than one egg to a cell.



LARVAE

Sometimes beginning beekeepers confuse bee bread for larvae. Larvae should always be pure white and shiny. They have the appearance of a grub. They are C-shaped and lay in the bottom of the cells. If the larvae are discolored other than white or have a bad aroma, these are signs of problems such as parasites, virus, or disease. Further research and testing is recommended if you see these signs.

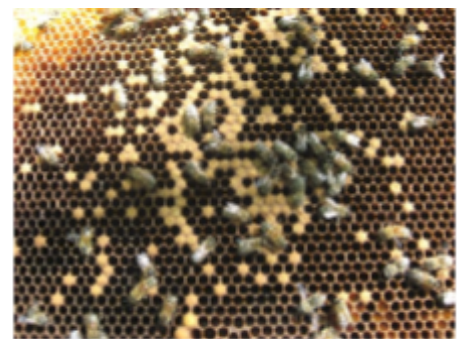
CAPPED BROOD / PUPAE

The wax of capped brood should be medium brown in color with no bad aroma. Look for signs of sunken, concave cappings or perforated cappings. Seeing signs of perforated cappings is not always an indication of a serious threat. It usually indicates that a worker has detected there was something wrong with the pupae; usually varroa mites are to blame. They chew through the capping and often will chew the head of the pupae, and they will eventually remove the pupae. This is a hygienic trait for bees and is an effort to rid the colony of problems. However, if you notice a lot of these perforated cappings it is usually a sign of Parasitic Mite Syndrome (PMS) and the bees are stressed and in danger of varroa mites. Refer to Integrated Pest Management (IPM) topics to combat this problem.



SPOTTY BROOD PATTERNS

Spotty brood is an indicator of several problems within a hive, including a failing queen. A failing queen has laid nearly all or all of her fertilized eggs. Laying workers will also lay spotty patterns often with more than one egg per cell. A good queen will lay in most every empty cell made ready by the house bees. A tight pattern should be present and there should be twice the amount of capped brood than eggs and larvae. Capped brood takes longer to develop.



Spotty brood

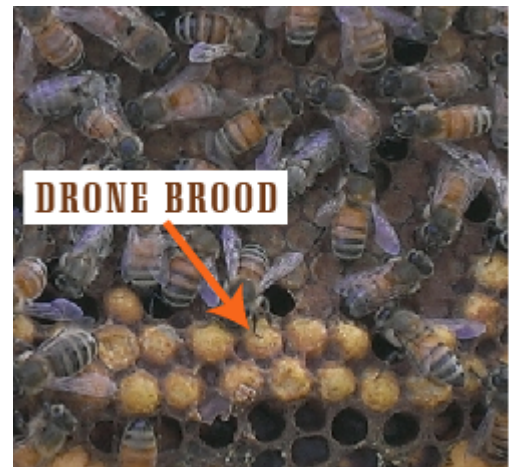
Empty cells here and there are intentionally left empty to regulate the temperature by heater bees. There should always be enough nurse bees to keep the brood warm and their combined effort is to regulate the brood temperature at 93 degrees. However, heater bees will insert the bodies into the empty cells to make this process more efficient. They vibrate their abdomens and wing muscles to produce heat.



Cells intentionally left empty.

DRONE BROOD

Drone brood is generally found on the outer perimeter of comb. Drone brood is larger than worker brood and their cells are larger. If a drone egg is laid in a worker cell it will grow upward in a bullet shape. Finding many drone cells in worker cells may indicate a failing queen or presence of a laying worker. This problem needs to be addressed quickly, usually by requeening the hive.



During seasonal build-up, it is normal to have a 10 - 15% drone population. An average hive may produce this amount as it may take 200 drones per queen for mating purposes. The drones must be the right age for mating with virgin queens; usually becoming fertile on the 38th day of their life cycle. In addition to being fertile at appropriate times, large drone numbers are needed in drone congregation areas (DCAs) where mating occurs. A viable queen should mate with 15 to 30 drones. This may take 3 to 5 days depending on the weather and mating occurs in mid-flight.

Varroa mites like to reproduce in drone brood because drone brood is more conducive for their development cycle. Refer to Integrated Pest Management (IPM) topics regarding tests and techniques you can perform on drone brood for varroa mites.

QUEEN CELLS

Supersedure and emergency queen cells look alike and are built on the comb. They both signify there is a problem with the queen and re-queening should be done as soon as possible.

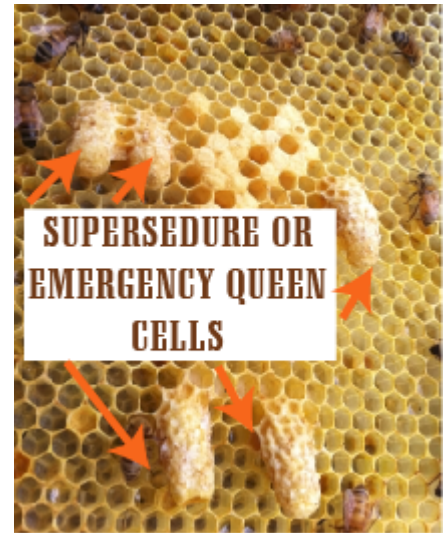
Emergency queen cells are made by workers when the queen is dead. Most likely she got squashed during an inspection.

Supersedure cells are indications of a failing queen. A queen may be failing for any or combinations of the following:

- Laid all or nearly all of her fertilized eggs
- Physical impairments
- Disease
- Mite infestation
- Old age
- Loss of pheromones

Sometimes workers will start supersedure cells and never do anything with them. They look like little empty olives. Check to ensure there aren't eggs or larvae inside. Usually, they are not anything to be concerned about. You can leave or cut them off. If you cut them off and they return, the workers might be trying to tell you the queen is failing.

Swarm cells are built on the bottoms of frames. This is an indication the hive has become overcrowded in the brood area and they are preparing to leave. The old queen leaves with the majority of the workers and honey and the new queen stays with what little is left of the hive. Refer to “Spring Swarm Management” in this guide for more info about swarming.



Empty supersedure cells or olives.



Supersedure cells with larvae.

POPULATION STRENGTH

A strong hive should have 40,000 - 60,000 bees with 5 - 6 deep brood frames. Keeping your hive at this population will keep them healthy. They can fight off parasites, pests, and diseases better. Perform inspections once a week to practice swarm management. If you feel the population is low and if you have another resource for brood and bees, add them to the weak hive to boost their population backup. This is why it is suggested you have at least two hives so hopefully if one is weak and the other is strong, then you can help the weak hive.



INTEGRATED PEST MANAGEMENT (IPM)

There are more things to look out for when inspecting larvae and pupae that you should be aware of such as diseases like American Foul Brood (AFB), European Foulbrood (EFB), chalkbrood, etc. However, IPM topics are usually lengthy with detailed instructions of how to combat pest, parasites, and diseases. These topics will also describe techniques which might differ from beekeeper to beekeeper. Some beekeepers prefer certain methods whereas other beekeepers don't like them at all. IPM is basically a more advanced topic that should have chapters devoted entirely to it.

INSPECT BEES APPEARANCE & BEHAVIOR

Look for unusual looking physical characteristics of bees such as Deformed Wing Virus (DWV), K-wing Virus, or dwarf bees. Also be aware of their behavior to see if any are shaking or trembling oddly. These are all signs that usually indicate there is a varroa mite infestation which also makes the bees susceptible to other viruses.

If you can spot the queen and she is not running for cover, look to see if she is just wandering around aimlessly and not laying. This could be a sign of a failing queen. She may be feeling the cells with her legs but not depositing eggs. Requeening with fresh brood is needed.

SPRING SWARM MANAGEMENT

By the first of May, your successfully wintered hives should be busting. Splits or nucs are made at this point to prevent swarming. You should be inspecting your hives every seven days for swarm queen cells. Be aware that bees can swarm at any time even in later summer and beginning of fall. However, spring is typically the time they swarm more because of a more intense nectar flow and brood build-up.

If swarm queen cells are present, it is best to remove the brood frame(s) from the hive. You should have a nuc box or new hive boxes (split) available to place the brood frames with queen cells. If you are not re-queening with a new, mated queen and letting them make their own queen you will leave the queen cells intact. Otherwise, remove all the queen cells. Do not remove the nurse/worker bees from the frames. Replace the brood frames with either comb or foundation. Place the nuc or split as far away as possible from the parent colony to prevent them from returning.

Cutting the queen cells off and not removing the brood frame from the hive does not work most of the time as swarm prevention because they are already on their path to



Deformed Wing Virus (DWV)
Photo Credit: klaas de gelder/flickr



K-Wing Virus
Photo Credit:
Nancy Ostiguy/Penn State

swarm. This practice might give you a few days if you don't have equipment ready to accept the brood frames, but it is very risky and only delays the inevitable.

The removal of brood frames (with or without queen cells) will decrease your population for a short period, gives the queen more space to lay, allows more room for the bees, and shocks them back into their regular routines. Strong hives with well populated brood frames and good laying patterns of more than 3 deep brood frames in a 10 frame story and 1/2 or 5 medium frames of brood in a 10 frame triple medium should be watched more carefully for swarm cells or considered for removing some brood frames. Sometimes removing only one brood frame is needed. If queen cells are present, cut them off and place them in a weaker hive. It is better to remove too much brood than not enough. Brood frames can be replaced a week later if it's discovered too much was taken before.

Adding additional brood boxes may temporarily help with swarm prevention, but again, it usually only delays the inevitable. Also, the empty boxes will invite wax moths. Instead, add foundations or comb and remove the oldest comb. Removal of brood frames and comb/foundation replacement is the best practice for swarm prevention.

Regular 7 day inspections will usually keep you ahead of potential developing problems. You will learn to detect and prevent them from occurring. Continue your spring swarm prevention until mid-June. Do not let your hives swarm as you will miss nectar flows, lose your bees and your honey as well.

MONITOR WATER, NECTAR, & POLLEN INTAKE

A water source is critical; whether it is a natural source or water you have provided for them. They need water to cool the hive. Ventilation must take place for hive comfort and proper curing of honey.

Monitor nectar and pollen intake. Usually a frame of pollen, full on both sides, is needed per 2-3 frames of brood. Larvae are eating machines and nurse bees are constantly feeding them bee bread (a honey and pollen mixture). They grow rapidly within the larvae stage; ending up 800 times larger than their beginning size. You should have one capped honey frame for every 2-3 brood frames with several frames containing curing nectar.

If you notice there is too much nectar in cells where brood should be present, this is usually a sign of a failing queen. The workers have no intention in preparing the cells for the queen to lay in and fill with nectar instead.

In times of pollen and nectar dearth, it is imperative you provide feeding supplements. It is better to offer the supplements to them than to let them starve. Domino effects occur if they don't have the proper food supplies which usually results in them failing to over-winter successfully.

NUCS



A nuc, or nucleus colony, is essentially a small starter hive. They vary in composition and size from 2 frame re-queening nucs to those with 10 frames.

PURCHASING NUCS

The ones most people come in contact with are 5 frame spring nucs used to start up full colonies of bees. Regardless of the make-up in frames that may come with it, the most important part is to purchase from a reputable dealer whose bees and equipment have been certified disease free. Certification is usually done by a state appointed inspector. After a complete inspection he/she will write a report on the colonies that will be used to provide brood, honey, and pollen frames for the nucs.

State law mandates that before nucs cross state lines they have origin inspections performed. Frames of drawn comb can harbor disease and pests hiding in pollen or brood frames. State inspectors work hard to control diseases and pests. By working with them it helps to control and contain all of these problems. Never hesitate to call on a bee inspector for any reason as you will benefit greatly by doing so.

The highest quality nucs will contain 2 frames of brood with eggs, larvae, and capped brood. Also the brood frame should have an arch of pollen and honey. The emerging brood will immediately feed before cleansing cells or other house duties. We like to place a frame of drawn comb next to the brood frames, then a foundation frame, and then a food frame.

Food frames can be scarce in some regions during springtime and division feeders can be used. Division feeders ensure sugar water is readily available at all times. Some other benefits of division feeders are they can be transferred inside permanent hives; bees do not have to move up to colder, traditional hive top feeders; and they can reduce robbing.

Quality nucs should already have the marked queen installed by the dealer. The dealer should monitor the nucs for at least two weeks (preferably three weeks) to ensure the queen is released, accepted, and laying. Also the dealer should be monitoring the population, their food supplies (honey/pollen frames or feeders), and the queens' laying patterns. A nuc should not be accepted by a customer if they see a queen cage still installed. This could mean that she may have just been installed recently and all the monitoring has not been performed. Simply handing over a nuc to a customer for them to install the queen or selling a nuc right after queen installation is not a quality nuc and are susceptible to failure.

By the time the nuc is ready to be released to the customer, the queen is usually laying on the drawn comb frame that was placed next to the brood frames. This makes a nuc to be proud of. Nucs should not be accepted by the customer if eggs and larvae are not present on frames. Quality nucs should have all stages of brood present.

When transferring the frames from the nuc box to the hive box, place the frames in the same order as they were in the nuc box.

Nucs can be expensive so it's best to buy them from a reputable, experienced dealer who guarantees their products. Some questions to ask when purchasing nucs:

- Where do the queens come from?
- When was the queen installed?

- Are the queens marked?
- Where do the brood frames come from and will I receive an inspection certificate?

Buying nucs later in the spring such as in May rather than April will yield more brood, stronger population, and will improve their success rates. April weather is cooler and plant blooming conditions are not always favorable for foraging and population build-up.

There are many things that can go wrong with nucs in their beginning stages such as queen cells, starvation, non-acceptance of the queen, etc. and it's best to leave the monitoring to the dealer. This takes all the hassle out and then you can simply transfer the frames and bees into their hive and begin beekeeping!

STARTING A 5 FRAME NUC

If you have the available resources and equipment, you should start a nuc for a back-up in your own yard. They can also produce extra brood for honey population build-up. Each yard should have one nuc for every 5 to 7 colonies for back-up use.

A starter 5 frame nuc to build on over the summer can be started with one frame of brood (eggs, larvae, capped brood present), a frame of comb, and three foundation frames. Nucs that progress well over the summer make nice winter nucs.

When making an early season nuc, think tomatoes. If it's warm enough to plant tomatoes, it's warm enough to make a nuc. Shake extra bees into nuc box to keep brood warm. If not enough nurse bees are present, you will get chill brood and outer edges of brood will die.

We use a 3" wooden shim/medication box which provides space for pollen patties and fondant. We also use 5 frame hive top feeders for sugar water. Using Boardman (jar) feeders have several drawbacks. The amount of water held is too small; robbing can become an issue; the syrup spoils quickly in hot weather; the syrup may become too hot for the bees to consume; and some medicines, such as Fumadil-B are destroyed by exposure to sunlight.

A key to a successful nuc, or any hive, is the queen. We like Hygienic Italian and New World Carniolans as they produce more brood and honey when compared to the other European bees. They are gentle and are reasonably disease resistant. The hygienic queens presently available co-exist with varroa and small hive beetles as well or better than the other types of bees. We have sold thousands of these queens over the years with great return reports. We also use them in our hives.

After pulling brood frames for nucs, we do not wait any time to install queens. Waiting will result in queen cells making queen acceptance difficult. We use California mini cages for all of our queens with no attendant bees. You do not have to remove any frames as the cage is small enough to install in any nucs or colonies. Install the queen between the top bars or slightly lower onto the combs. Be sure to place the wire side down so attendants can feed her. Within three days the queen will be out (candy tube empty).

Perform regular inspections. As the season progresses, you may have to remove brood to keep the nuc from swarming.

Winter nucs have the same composition as described above. They can be started as late as the beginning of August.

However, due to the seasonal timing, there is not a great nectar flow in our area and queen acceptance decreases. We do not use a candy tube at this time and use a cork instead. Place a small piece of duct tape over the cork so the bees cannot release her. After five days, check for acceptance by observing the behavior of the workers on the cage and the queen. If the queen seems nervous and is avoiding getting near the wire or bees most likely she has not been accepted yet. If the workers are trying to bite her legs or wings she is not accepted yet. Replace the cage and re-check in another day or so. If she has been accepted, release her onto a brood frame. This method of queen installation is also recommended for requeening hives.

Medications can be used just like full scale hives except in decreased amounts. We use 3 Hop-Guard strips a week apart to kill varroa mites. For Apiguard, use one fourth of the packet per application. OAV (oxalic acid vaporization) treatment is 1 gram.

Place a medium or deep nuc box full of honey on top as food for the winter. Care for a nuc has you would a full size hive. Regularly feed 1:1 sugar water and a half pound pollen patty. Continue to feed the nuc through September and check periodically for the queen. From November to January, use half a pound for fondant feedings.

REQUEENING NUCS

Requeening nucs are typically 2 frames of brood (3 if medium) and a frame of honey. We place the two brood frames between two frames of drawn comb. This helps to keep the brood warm. Install the queen and monitor the nuc as described above.

If re-queening nucs are purchased, be advised that sometimes the queen will start laying on of the drawn combs that were provided for warmth. A dealer will usually allow these combs to be purchased for an additional amount. If the extra drawn comb does not contain brood, it should be returned to the dealer. The honey frame and cardboard box can either be returned or purchased as well.

Install by transferring frames into an empty box on an old hive using the newspaper method. Place two frames of drawn comb on each side of the brood frames for warmth. Installed properly, these nucs are almost 100% successful for re-queening.

DEEP VS. MEDIUM 5 FRAME NUCS

Bottomline... 5 frame deep nucs are superior to 5 frame medium nucs simply because more resources (bees, brood, nectar/honey, pollen) are available in deep nucs.

It takes roughly two medium frames to equal one deep frame.



Side by side size comparison of medium and deep nuc boxes.



Side by side size comparison of medium and deep frames.

We really shouldn't have to do the math because we can see deep frames are bigger than mediums, but here we go:

- One deep frame (standard foundation/cells) has about 6,900 worker cells. If filled 90% with brood= 6,200 brood cells.¹
- There are roughly between 2,000 and 2,500 bees on a fully-covered deep frame.¹
- One deep frame 65% covered with brood, will produce roughly 4,500 workers. When emerged, will fully cover more than two full frames.¹



A safe estimate is to half the deep frame counts to get medium frame counts. So if we use the above figures for the nuc set-up, which is normally 2 brood frames, one drawn comb frame, foundation frame, and food frame... lets just focus on the 2 brood frames and say they are 90% full of brood:

Frame Size	Brood in 2 brood frames	Bees Covering 2 brood frames
Deep	12,400	5,000
Medium	6,200	2,500

When you stop to compare these numbers with a 3 lb pound package of bees which contain about 10,000 workers, it starts to set in how inferior a 5 frame medium nuc is. Sure, you're getting drawn comb which is always a plus, but it's hard to get over the amount of bees you're not getting in a 5 frame medium nuc. Sellers would surely have to shake in extra bees to even make it look good but you're still not getting as many bees as a deep.

It is a myth that 5 frame medium nucs, medium boxes, triple medium set-ups, etc. progress better than deeps or story 1/2 set-ups. Mediums have a smaller space so it gives the illusion that they are progressing better. If anything the bees are struggling because they had less bees and resources to start out with.

Medium nucs should be started and sold in 8-10 frame equipment for more healthy and better quality bees. The nuc composition should be something like 4 brood frames, 2 drawn comb frames, one foundation frame, and 1-2 food frames. I have never seen them sold this way. I think mostly because there isn't a temporary nuc box made for 8 or 10 frames. With the increase in lumber costs, it has become not economical to sell 5 frame nucs in wood nuc boxes and cardboard, corrugated plastic, or plastic boxes are mainly used. So making and selling an 8-10 frame nuc in regular, permanent wood equipment would dramatically increase the cost of the nuc and it is difficult to explain to the buyer these issues and differences when compared to deep nucs. For these reasons, we just stopped selling 5 frame medium nucs. Sure we could make the cost of the medium nuc cheaper than a deep, which it absolutely should be, however, that's not the point. The point is you're not getting as many bees as a deep, therefore, the medium is not getting as good of a start as a deep nuc would. It just feels very unethical and unfair to the bees, as well as to the buyer, to sell a 5 frame medium nuc.

^{1.} Modeling Nuc Buildup, First Published in ABJ June 2018, Randy Oliver
<https://scientificbeekeeping.com/modeling-nuc-buildup/>

PACKAGE BEES

In the world of beekeeping, a small box capable of holding a few pounds of bees and a food source such as a syrup can is called a "package". The use of packages to transport bees has a long history dating back to the 1880's. The main transportation method was by railroad with the bees, then transferred to the local post office for delivery. Commercial transportation and the post office are still used today although the most common method is for an individual to pick up a large number of packages for bee clubs and/or individuals. More and more clubs are buying direct from the suppliers.



Package prices can range from \$95 to \$150 dollars each depending on the source, quantities ordered, and type of queen. Price breaks can occur at 100, 300, and 500 packages. These prices are for three pound packages. Two, three, and four pound packages are most common available. A three pound package contains around 10,000 bees. (roughly 3,500 bees per pound).

PACKAGE INSTALLATION

Be sure to have your hive bodies ready to receive your packages. In the West Virginia tri-state area, mid-March is acceptable for installing packages if you have at least 5 frames of drawn comb and a frame of honey. Mid-April is better for installing packages because there is more nectar and pollen available to aid in rearing brood and building comb.

Do not accept a package if the bottom is covered with one-half inch or more of dead bees.

If you cannot install your package right away, place it in an area of 50-70 degrees, draft-free, and in low light or darkness. The package you have accepted can be kept for up to three days by spraying the cage with 1:1 sugar water. Of course, weather permitting, you want to install it as soon as possible.

Installing your package can be accomplished in many ways. You do not need to cover the bees with sugar water to slow flight or to smoke them. The best packages contain all young, nurse bees that have never flown and are very docile. These bees were shook into packages during the day when the field bees were not present.

Remove the small wooden cover from the top of the package, have five frames or foundation removed so that the package can be placed down in the deep body. You can do the same by taking two medium boxes and adding five frames in the second box, thus leaving a depth to drop the package into.

Now give the package one sharp bounce to knock the bees to the bottom of the package container. Remove the sugar can with the aid of your hive tool, reach in and remove the queen and quickly replace the small wooden cover.

Make sure the queen is alive and active. Install the queen, screen side down, on comb after removing the cork from the candy end. The candy end should face up so any dead attendant bees will not block the exit. It is not necessary to poke holes in the candy. The wire face on the cage should be exposed so the loose bees can feed the queen and the attendant bees. You can hang a queen cage or use pins to install on the lower frame of foundation if no comb is available.

The queen is kept warmer with a lower installation than placing on or between the top bars or in feeder spaces. Shake a small cluster of bees (two handfuls of bees) onto the queen.

Place your package down into the empty space made available by frame removal. Close the hive and in 12 hours or so the package should be empty. The bees will come out of the shipping cage on their own. If the outside temperature is 50 degrees or less it is better to shake the bees into the hive. Shaking is less desirable as it does small injuries to the bees and dead bees end up in hives. The live bees will remove the dead bees later. Remove the cage, replace the frames, and close up using only one box for brood.

To prevent packages from absconding, close the hive up for a few days. Make sure the hive is well ventilated with a bottom screen. Also make sure they have food available (honey or sugar water and pollen patties). Close the entrance up using 1/8 hardware

cloth, newspaper, or a piece of foam rubber. They will begin making the hive their home by building wax and spreading pheromones. Closing up the hive is also effective for preventing newly captured swarms from absconding.

PACKAGE CARE AND MAINTENANCE

Use only one hive body if foundation still needs to be drawn as placing more than that will sometimes result in the bees robbing foundation wax for capping brood. A second brood box can be added after all foundation is drawn in the first box. Using only one brood box also keeps the bees close to their food source if using hive top feeders. As described in the previous “Nucs” chapter, division feeders are beneficial at this time of year.

Since most are nurse bees with hardly any foragers you will need to immediately feed them. 1:1 sugar water must be supplied until the nectar flow starts. Pollen patties are a very good idea at this time as the weather may not be conducive for flight and no pollen may be available. Pollen equals protein which equals brood.

If you can obtain two frames of drawn comb from a reputable apiary this will be an excellent boost to starting a package as it provides a place for queen installation as well as a place for the bees to cluster in comfort. Packages tend to abscond more. Without the presence of brood to take of, bees will have one less thing tying them to the hive. Having some drawn comb will help to prevent absconding and the queen will have something readily available to lay on.

Place two HopGuard strips in the same area as the queen cage for mites. This serves to kill the phoretic mites (the mites on the bees). At this time there is no brood so the strips work to kill most of the mites on the bees.

About a week or so after installation of the package, if you have or can get a frame of brood covered in nurse bees it will greatly help the package develop. If you add another deep frame, you will probably get a honey harvest from this package. You will have added thousands of wax secretors who will finish two boxes of foundation into comb in short order.

In eight to ten days after installation, check to see if the queen is present. If you see eggs and larvae you have a queen. Look no further as the least amount of disturbance is best. Perform regular 10 day inspections. In the first three weeks a third of the population will die. In another three weeks your original population should be back and your hive will continue to grow.

WHICH IS BETTER . . . PACKAGES OR NUCS?

We are often asked this question. Packages might be tempting to purchase because they are cheaper than nucs but they require more maintenance and their chances of success are usually not as high as nucs. Packages can perform and overwinter just as well as or better than nucs.

We advise beginning beekeepers to start out with nucs because most of the hard work of establishing a hive has already been done for you. Beginners should not buy already established or overwintered hives. There is much to know about the management of these hives. A beginner should start small and grow the first season with starter hives. Your goal the first year is to grow strong hives ready to go into winter. If you do get extra honey the first year it is just a bonus. However, it is ultimately your decision based upon your needs, budget, and beekeeping skill level.

There are pros and cons to each and some are not huge advantages or disadvantages but you should be aware of each:

PACKAGES

PROS:

- Cheaper than nucs.
- Varroa mite and small hive beetle transmission and build-up can be lower than nucs because of lack of brood frames.
- Are available earlier in the season than nucs for those eager to start.
- Can be installed in various hive configurations (Langstroth, top bar, deep/mediums, etc.)

- Transport better than nucs. Nucs get plugged up for transport. Suffocation and heat can be a problem for long transports for nucs. Packages are totally ventilated by a wire cage.
- Varroa breeding cycle is broken.

CONS:

- The chances of failure are usually higher than nucs.
- Usually comes with an unmarked queen and not always the type you want.
- Queen is not always accepted.
- Queen is caged and you can't be sure she is mated.
- Bees need to be fed right away and continually be fed more initially because most are nurse bees with hardly any foragers.
- Packages do not come with drawn comb.
- Packages tend to abscond more. Without the presence of brood to take of, bees will have one less thing tying them to the hive. Having some drawn comb will help to prevent absconding and queen will have something readily available to lay on.
- Should be installed as soon as possible. Packages are caged to prevent bees from escaping. The sooner they are released and placed in their permanent home the better.

NUCS

PROS:

- It is a newly established, mini colony and success rates are usually higher than packages.
- Queen should already be marked.
- You usually have a queen breed selection.
- Queen is mated and already laying.
- Comes with drawn comb and food frames.
- While installation of packages is easy, nuc installation is easier.

CONS:

- Usually more expensive than packages.
- Available later than packages.
- Usually available choices are either Langstroth Deep or Mediums and aren't interchangeable with top bar hives.

- Pick-up times need to be arranged. Can only be picked up early in the morning or late in the evening so you won't lose your foragers.

BEE NUTRITION

FORAGING

Bees travel within a 3-5 radius of their hives to forage for nectar, water, and pollen to survive and to be able to produce food for their young. They forage for resin to seal the hive.

Honeybees need carbohydrates (sugars), proteins (amino acids), minerals, fats/lipids (fatty acids), vitamins and water. Nectar is carbohydrates and pollen is protein.

Macronutrients are proteins, carbohydrates and lipids. Micronutrients are vitamins and minerals.

The type of foraging, whether for pollen or nectar, is a colony-level trait with a genetic component, and is affected by the genotype of bee strain. Also, these tasks depend on collective and individual decisions of forager bees. Lack of one or more of these substances will potentially lead to:

- serious reduction in the population of the colony
- reduced longevity of the bees
- reduction in drone populations
- increased disease susceptibility
- death of the colony

NECTAR

Nectar is bees' principal carbohydrate source and without it the colony will perish in the short term (within days).

Nectar is 80% water and honey is about 14-18% water. Remaining water that is not used by the bees, is evaporated from stored nectar by bees fanning their wings.

When colonies rely on stored honey for their carbohydrate or the climate is hot and dry, the ratio of field bees in a colony significantly changes to water gathering rather than collecting pollen and nectar.

Lack of nectar and lack of stored honey can cause adverse reactions and responses to colonies:

- cause colonies to become more aggressive in defending their hive
- decline in field bees foraging for pollen
- reduce the hygienic behavior of a colony

NECTAR FLOWS

Learn about the plants that grow around your bees. Learn their bloom times and their nutritional values for bees. By learning your region's plants you will be able to schedule your population build-up, maintenance, and honey production accordingly.

Plants produce different amounts of nectar each year and weather will affect your crop average. Nectar flows usually last for about 10-14 days.



Eversweet's Pollen & Nectar Charts for Bees

WATER

A colony of honey bees needs water for several functions:

- To maintain body fluid homeostasis in the adult bees
- For the consumption of nurse bees to produce jelly for feeding the larvae
- Offer diluted honey to brood when diluted nectar is not available
- Thermoregulation - To cool the nest on hot days; to humidify the nest to prevent desiccation of the brood in dry climates

Water is mostly obtained through nectar. These are times when the colony's nectar collection is low:

- Cold weather or a dearth of nectar-bearing flowers
- Its water consumption is high because of a high demand for brood food
- Its water consumption is high because of a strong need to perform evaporative cooling

Foraging is regulated according to the current demand in the colony. Colonies do not maintain large water stores in their nests.

Reservoir bees are clusters of workers with swollen crops containing dilute nectar on the periphery of a colony's brood nest after intense water collection.

POLLEN

Different pollen has different nutritional values to honey bees. Not all pollen is nutritious to honey bees. Pollen contains varying amounts of protein (10 essential and other non-essential amino acids), fats/lipids, and minerals. Pollen protein is measured by a percentage of crude protein:

- crude protein below 20% = poor quality and unable to meet honey bee nutritional requirements.
- crude protein levels between 20% and 25% = average quality and are a satisfactory food source
- crude protein levels above 25% = good to excellent quality pollens, even though they may be deficient in one or more other chemical components, particularly amino acids.

As long as honey bees are able to consume sufficient quantities, they will usually be able to obtain the nutrients they require. For best health results, bees need varying pollen sources from plants for a well balanced diet.

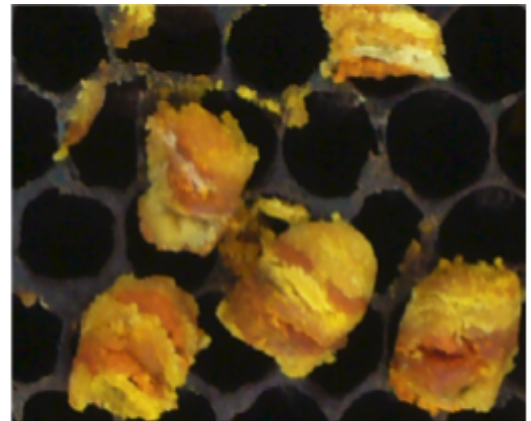
Forager bees do not eat the pollen they collect. When they transition into foraging, they stop producing the proteolytic enzymes necessary to digest it. They unload the pollen they've gathered directly into open cells. Mid-age bees then use their heads to pack it firmly into place, pushing out the air as well as adding more nectar, honey, or glandular secretions.

Other foragers then place additional loads on top, often resulting in multicolored layers. Nurse and mid-age bees consume pollen and nectar (bee bread) to glandularly convert it into brood food (worker and royal jelly). What is not fed to other bees and larvae is converted to vitellogenin and stored in the fat bodies. Young drones beg nurse bees for brood food and later feed themselves honey.

MINERALS

Bees switch their mineral preferences based on what is available in their floral diet and to what nutrients the colony needs. Bees also will forage for minerals when needed from:

- Mushrooms/fungi
- Carrion
- Decomp piles
- Animal urine/feces
- Swimming pools
- Mud puddles
- Salt licks



Layers of pollen packed in cells.

WORKER & ROYAL JELLY

Worker and royal jelly are often referred to as brood food.

Worker jelly is composed of 60-80% clear fluid produced by nurse bees hypopharyngeal glands and mixed with 20-40% milky fluid from nurse bees' mandibular glands. Worker and drone larvae and adults are fed worker jelly.



Royal jelly in queen cell.

Royal jelly is also produced by nurse bees hypopharyngeal glands but is not mixed. The queen is always fed royal jelly from larvae to adult. The continual feeding of royal jelly to queen larvae develops the queens' ovaries enabling her to lay future eggs.

Royal jelly is composed of 67% water, 12.5% crude protein, small amounts of many different amino acids, and 11% simple sugars (monosaccharides), and 5% fatty acids. It also contains trace minerals, some enzymes, antibacterial and antibiotic components, pantothenic acid (vitamin B5), vitamin B6 (pyridoxine) and trace amounts of vitamin C. The key ingredient in royal jelly which aids in developing queens is the protein, royalactin.

WET & DRY BROOD

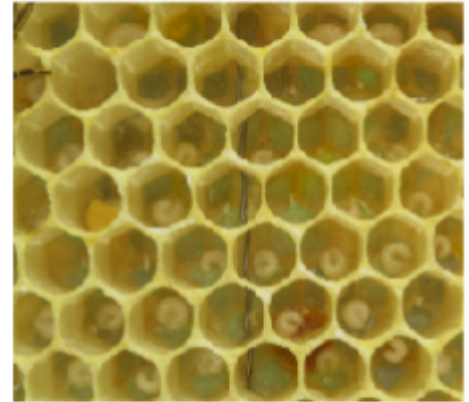
A good way to tell if your bees are getting enough food and nutrients is to look at the young 4 and 5 day old larvae. They should be swimming in jelly. This is called wet brood. If your young larvae look dry or have small amounts of jelly (dry brood), your bees are starving and cannot produce enough jelly to feed to the larvae. If the availability of pollen in the field is scarce, then one of the first reactions by a colony will be to cease rearing drone brood. If this condition continues, they will cannibalize the young to conserve resources and to obtain protein for themselves.



Wet Brood

Larvae are eating machines. They need to be fed constantly and grow about 800 times larger than their original size within 5 days!

In the West Virginia region, nectar dwindles around July 15th. There are some late blooming crops such as clover, alfalfa, and buckwheat. However, most natural resources for nectar are low or non-existent. Your bees will naturally start to decrease their population. 1:1 sugar water imitates a nectar flow and will supply your bees with carbohydrates and encourage them to keep rearing brood.



Dry Brood

The bees that will be born in August and September will be your overwintered bees. Do not let your population build-up be interrupted by starving bees. You need a very strong hive going into winter. Late summer and early fall are also critical times for varroa mite infestations. Mites take advantage of hives diminishing in size. Small hive beetles and wax moths take advantage of weak hives also.

Do not let your bees starve. Monitor nectar and pollen intake. Observe young larvae for jelly. If they do not have enough natural resources, you must feed your bees supplements (sugar water and pollen patties). Bees need both carbohydrates and protein to be able to rear brood.

VITELLOGENIN

Vitellogenin is a critical component of the bee's anatomy. It is classified as a glycolipoprotein, having properties of sugar, fat and protein. It is deposited in fat bodies in the abdomen and head.

Vitellogenin:

- Stores protein reserves



Abdomen deplete
of vitellogenin

Abdomen full
of vitellogenin

- Promotes the longevity of queen and winter bees
- Allows them to brood up in spring in the absence of pollen
- Part of their immune system
- Helps them make worker and royal jelly
- Has an effect upon their foraging behavior

SUPPLEMENTS

There is enough time to set up your nutrition (feeding) program before you get your bees. A beekeeper's goal is to:

- determine a course of action to ensure goals are achieved
- predict what the floral conditions that are immediately and in the future, available to a colony
- be able to ascertain the nutritional status of a colony



Attention to honey bee nutrition issues is a vital component of successful beekeeping.

Bees **MUST** have carbohydrates (nectar or sugar water) and protein (pollen or pollen substitutes) for their vitellogenin (fat stores) to raise brood. Monitor their pollen and nectar intake and begin supplemental feeding when they are not bringing enough in. Monitor the weather for foraging capabilities. If it is too rainy or cold, they will not be able to forage. Too much rain can also wash pollen and nectar away. In times of dearth they will need supplemental feeding. Bees prefer nectar and pollen over sugar water, supplements, and substitutes.

POLLEN SUPPLEMENTS

The use of pollen supplements implies that pollen is available to the colony in the field, be it either of poor quality or the quantity is restricted. The use of pollen substitutes suggests that there is no pollen naturally available to a colony and a complete substitute is required by the colony to allow brood to be reared. Neither are intended for prolonged feeding.

Never feed honey or pollen that is not produced by your bees. American Foulbrood spores may be present. Pollen made by bees other than your own should be sterilized with gamma rays.

Get together with other club members or friends and share an order of pollen supplements to save money and cut out the middleman. Have a pollen patty party and have fun learning how to keep bees!



Most commercial feed on the market is sufficient as substitutes. Mann Lake's Bee-Pro or Dadant's Mega Bee pollen substitutes are two really good products we recommend. Order enough so everyone will get 10-15 one pound patties. Freeze surplus patties for your fall feeding program. A quart ziploc bag will hold a one pound finished product.

Pollen patties are so simple to make. Two parts supplement to one part pure cane sugar. Don't use beet sugar (GMOs). One ounce Honey-B-Healthy, three tablespoons vegetable oil per 10 pound mix. Mix, pack, freeze, done. Add water as needed.

When we feed, we take a frozen patty and cut a big circle out of one side. At the bee yard, peel off the circle and place that side down. It stays moist and the bees consume it out of the bag. Remember every hive is different; some eat all of the patties you feed it and others will not touch it.

Feed 1 pound pollen patty per week to supplement if the hive is not bringing enough pollen.

If small hive beetles are present they like to lay their eggs in the patties. This is good. Remove and freeze the patty, then



Small hive beetle larvae in pollen patty.

feed it to the birds, chickens, etc. Do not throw it on the ground; that would aid the small hive beetles' metamorphosis process.

Ziploc baggies on the ground also litters your yard. Keep your apiary clean. Don't throw burr comb or other clutter in the yard; you could cause a robbing problem.

SUGAR WATER FEEDING

Monitor nectar intake and weather forecast to determine if sugar water feeding is necessary. Feed 1:1 sugar water in early spring to build up populations. 1:1 syrup imitates a nectar flow and will encourage the queen to keep laying. Feed 1:1 sugar water usually around July 15th until mid to end of September. If they are bringing in enough nectar, they usually stop taking the sugar water.

Mid to end September start feeding 2:1 syrup. This will help fatten up the bees. 2:1 syrup and supplemental pollen feedings will beef up their vitellogenin.

PREPARING SUGAR WATER

Use granulated cane sugar. Not powder/confectioners or brown sugar.

True 1:1 ratio: 1 pound sugar = 1 pint of water, or 1 gallon of water weighs 8 pounds, so add 8 lbs.

Boardman Feeder: 2 pounds sugar = 1 quart of water

Hive Top Feeder: holds 3-4 gallons, mix in a 5 gallon bucket and add 40 pounds sugar. We use a paint stirrer attached to a drill to mix.

Thin syrup: half of the sugar ratio. Example: 5 gallon water and 20 lbs. sugar.

Add one teaspoon of pure bleach (without fabric softeners or fragrances) or one teaspoon Honey-B-Healthy to help keep sugar water fresh.

Heating the water may help with mixing and dissolving the sugar, however, it is not necessary to boil the water. If the water is safe for you to drink, it is usually safe for the bees to drink.

FONDANT

Fondant is used as a supplemental feed for bees. The fondant should be cornstarch free with a low to regular ratio of corn syrup and not high fructose corn syrup. Corn syrup is used in fondant to keep it pliable. Fondant feeding is much more convenient than the candy or candy board method.



1 lb. fondant in quart ziploc bag

You should have 6 lbs. of fondant per hive. Fondant can be purchased in 50 lb. boxes and broken down into 1 pound sizes. A great idea is for a small group of beekeepers to go together to buy the 50 lb. boxes and split it up between them. One pound will fit into a quart ziploc bag and is fed just as a pollen patty would be fed. Fondant can be stored frozen for a long period of time.

If you're making fondant at home, avoid marshmallow fondant recipes. Marshmallows are coated with corn starch and the starch disrupts the bees' digestive systems. Powdered or confectioners sugar also contains corn starch. Use granulated cane sugar and light corn syrup.

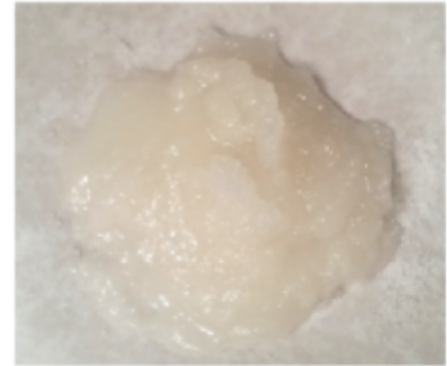
Start feeding fondant when you remove the feeders; usually the first of November in our region. Feeding fondant earlier than that is not only a waste of money but the brood production will slow up or come to a halt. The hives need as much brood as possible at this time to get through the winter.

The purpose of fondant supplement is to provide food for the bees so they will not eat their winter honey stores or hopefully it will stretch their stores out longer.

SUGAR SLURRY

If you've run out of fondant for winter feed, sugar slurry provides a great, quick alternative for a feed supplement.

Mix very small amounts of water to granulated cane sugar until you get a slushy texture. About one cup of slurry is sufficient for one hive. Place slurry onto wax paper and put it in the hive where you would put your fondant (place over bee cluster). You can cut a small circle in the wax paper so the bees can access slurry. Candy or medication shims are helpful to provide space for feeding.



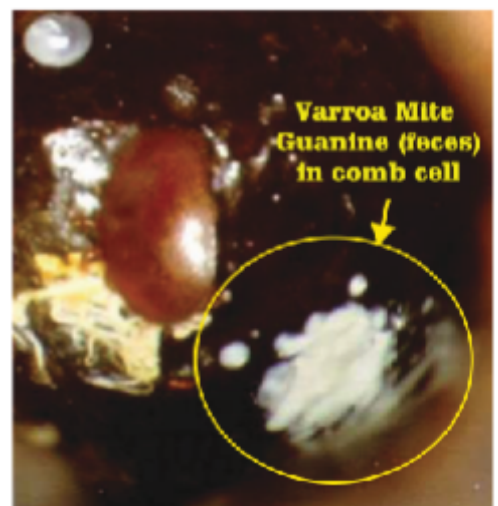
Emergency Feed - Sugar Slurry

Whatever the bees don't eat will harden after a few days so you will have to add new slurry. To prevent the slurry from drying out quickly, you can also place it into a ziploc bag and cut a slit or circle so the bees can get to it.

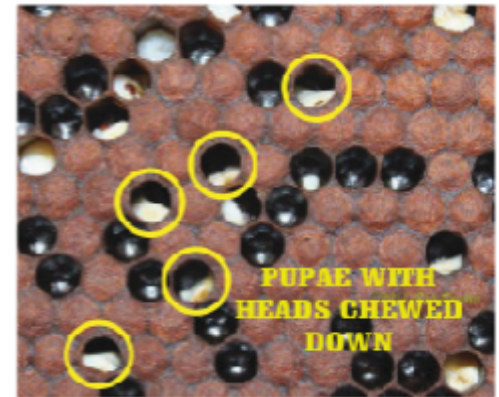
In early spring and times of dearth, you can also apply slurry to empty drawn comb. Do not place slurry on comb that contains brood, honey, or pollen.

ABSCONDING

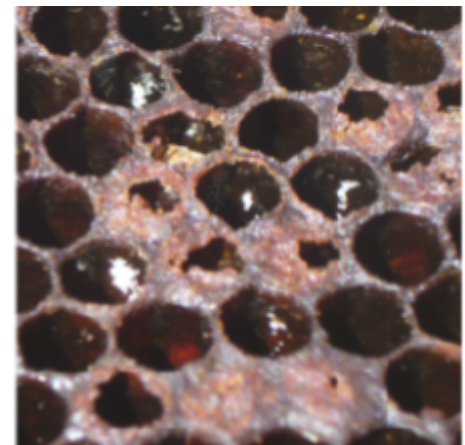
Abscending is often confused as Colony Collapse Disorder (CCD) or swarming. Abscending is when the entire hive leaves. There might be a few worker bees remaining but they are mostly likely robbers. A hive that has absconded usually takes the honey with them but not always. CCD is where the foragers leave and never return leaving behind the queen, young bees, and honey. Swarming is when the hive has become so heavily populated, the colony makes a new queen and separates itself. The majority of bees leave the hive with the old queen to find a new home and the new queen remains in the old hive with a portion of the workers.



It can be hard to diagnose if there are no obvious signs of why colonies absconded. Obvious signs would be infestations by small hive beetles (SHBs) or wax moths. Predators such as yellow jackets can also cause a hive to abscond. You will most likely not have dead bees to send off for sampling. If you see old capped brood with lots of perforated cappings or pupae with their heads chewed down, that is a sign of Parasitic Mite Syndrome (PMS). If you see lots of white spots in the cells, that is varroa mite guanine (feces) and that is an indicator of a heavy mite load.



Generally, the most probable cause are varroa mites. Absconding will be highest in the fall due to varroa mite populations being at their highest and bees' population being lower. In the West Virginia region, August to September is a critical time to be vigilant about varroa mites and medicating your colonies. The bees born in August and September will be your overwintered bees and the mites that are born with these bees will be over-wintered as well. In fall, your colony populations will decrease thus opening opportunities for mites to take over and weaken the hive further. SHBs, wax moths, and other scavenging predators will take advantage of weakened colonies.



In August to September, you must feed your bees sugar water and pollen substitutes in order to keep their population build-up strong. The best defense against many honeybee maladies is keeping a heavily populated hive to police against any problems that might occur.

Bees can be very finicky creatures. Any problems that they perceive can cause them to leave their homes. Possible problems could be frequent disturbances, lack of food or water, loud noises, bad odors, or diseases. Newly installed package bees also have high absconding rates. Bees also have both “fight and flight” mentalities when it comes to

mites, pests, and predators. First they will try to fight but after their colony has become weakened they will leave. It is their survival instinct to leave and try to find a better home. Varroa mites originated from Asia. Asian honeybees abscond and swarm more than the Western honeybees, thus breaking up the varroa mite reproductive cycle.

If your hive has absconded, shut the hive down as soon as possible. Shake out any remaining bees. It is not recommended to combine any remaining bees onto another hive because you could be introducing problems to a healthy colony. Freeze both drawn comb and honey frames for at least two days to kill SHB or wax moth eggs. Remove from the freezer and promptly store frames in airtight containers. The comb and honey can be reused.

PROGRAM MANAGEMENT CALENDAR

JULY

The beekeeping program starts in July because nucs, packages, and established hives have one thing in common. In July of a normal year, the nectar flow has either stopped or is dwindling in our area. There are some small nectar flows which will continue into fall but they do not provide enough nutrients for bees. Exceptions are hives that are near late blooming crops such as some clover varieties. Monitor their pollen and nectar intake.

It is time to take off your honey supers and let the bees have whatever remains. If your supers are uncapped and you are unsure if it is nectar or honey, give the frame a bounce. If it falls out, it is nectar and let the bees have it. If it stays in the cells, it is honey. You can extract uncapped honey but it will have a high moisture content and you can blend it with other honey to bring the moisture down.

Also remove your queen excluders and put them into a wax melter to remove burr comb and wipe of any existing propolis. Also remove top screens.

Put your feeders on and begin 1:1 sugar water feeding to hives which were started from nucs and packages if they continue to take it. If established hives do not start to gain weight around July 15th (they probably won't) start a 1:1 feeding program for them.

To keep the water fresh, we use Honey-B-Healthy (HBH) in our sugar feeding, one ounce per gallon. Honey-B-Healthy has been on the market for many years and has a multitude of beneficial purposes for honeybees. HBH contains lemongrass oil which mimics the pheromone created by the honeybee's nasonov gland, also known as an attractant pheromone.

We do not use HBH or anything else in our 2:1 sugar water for winter storage. Use pure cane sugar and water so that when they consume this in winter no additives will have to be digested.

Next, check the brood. For every 2 to 3 frames of brood make sure there is a full frame of pollen on both sides. If not, start feeding pollen patties. There must be protein as well as carbohydrates (corn syrup/sugar water) for brood rearing.

It is absolutely imperative to feed pollen supplements during pollen dearths. It is needed for bee bread to feed brood. In pollen dearths, nurse bees will cannibalize the eggs and larvae as a way of controlling the population and to conserve food. This will result in low populations and lead to various complications usually associated with varroa mites. Also, pollen is essential in building Vitellogenin (stored bee fat). It also is used in building protein stores, in hemolymph, and the hypopharyngeal glands and reduces nosema.

AUGUST

We begin treating for varroa and tracheal mites in the beginning of August. We use different organic treatments for varroa mites every year to prevent them from becoming immune to the treatments. Varroa are at their peak at this time and we want our treatments over so we can start our winter nucs which we start in mid-August.

Bees can still swarm right now. We do not advise doing splits this time of year. You want your bees going into fall/winter with the most resources and population as possible. Splitting the hive takes away resources and bees. Splitting hives only creates two weaker hives. It is better to remove some brood and put them into a weaker colony. This way you've helped to keep one hive from swarming but remain strong and strengthen another colony. In addition, weak hives are more prone to varroa mite and small hive beetle infestations.

Consider making a winter nuc only if you have enough brood and honey to spare from several parent colonies. Refer to the chapter on nucs in this guide for further reading and our info online about winter nucs at www.eversweetapiaries.com/winter_nuc.pdf.

If you haven't already done so, move your best drawn comb towards the inside of the boxes so the bees will be able to cluster better upon. It is very taxing for bees to draw comb and they use a lot of resources to do so. Most likely they will not draw it out anyway this time of year. Spring and the beginning of summer are the best times for bees to draw out comb.

Our hive top feeders hold three to four gallons of sugar water (depending on how level the hive is). This allows us to go six to eight days between feedings.

One pound pollen patties last about the same amount of time. Some patties, on inspection, will have small hive beetle larvae in them. We remove the patties, freeze them for three days, thaw, and feed them to the birds. This is an easy pest management technique. You are removing the larvae infested patty before they get a chance to metamorphosize in the ground.

Using bottom screens with the oil trays is another pest management technique for small hive beetles. Using one tray for four hives works well. Have the tray in place before inspection. A great percentage of the beetles drop into the tray during inspection and bees continue to chase the beetles for some time after inspection. Move the trays to another hive on a weekly basis. These trays capture beetle larvae before they can go to the ground.

For the month of August and September, we continue to feed pollen patties and 1:1 sugar water for winter brood buildup. The bees that are born in August and September will be your winter bees.

SEPTEMBER

Winter build-up continues through September.. We have found that if you wait longer than September 15th they might not take sugar water at all. We continue to feed the 2:1 sugar water for storage buildup. You may feed pollen patties all fall to stop goldenrod collection as the golden rod in our area has very poor pollen which is low in protein and produces no nectar.

Hives that stop taking any sugar water around September 1st are hives that have a problem that needs to be assessed. They likely are not going to survive as they are stressed in some manner. The top candidates for these problems are varroa, small hive beetles, queen failure, not starting the program on time, or failure to follow the program on a timely basis as stated earlier.

If your hive has gone queen-less in the middle of September - October, it is too late to re-queen this time of year in the West Virginia region. The overwintering survival rates will be greatly diminished due to a poor population build-up. In addition, the chances of queen acceptance are poor in the fall or when there is a dearth. It is better to combine the queenless hive onto another colony using the newspaper method or take whatever resources (pollen / honey), if any, from the queenless hive and transfer to another colony.

Unless the hive has gone queen-less, we do not combine bees in the fall. There is too much risk in putting a poor hive on a good which may serve to merely weaken a good hive. The added bees do not help a healthy population in any way.

OCTOBER

By the first week of October your hives should be winter ready with 30,000 plus bees and weigh 80 pounds or more. Lift up on the back of your hives. If you feel any are light, start feeding them 2:1 sugar water to fatten them up. We have no fall nectar flow that creates enough for storage which is why we must follow our feeding program to this date.

Purchase or make cornstarch free fondant for winter feed supplements. You should have 6 lbs. per hive. For more info on fondant refer to our “Bee Nutrition” chapter in this guide.



1 lb. fondant in gallon ziploc bag

In the beginning of October, remove entrance reducers and place mouse guards on your hives to prevent mice from entering and tearing up your comb.

NOVEMBER - DECEMBER

Our fall weather has been mild of late. However, the beginning of November is a good time to start fondant feeding as a supplement. The sugar water feeders are removed and the inner covers are now placed on as the bees generally stop taking sugar water at this point. You can stop pollen patty supplements. During days above 40 degrees or more, until the first of February, check for candy board or fondant replacement.



If you've run out of fondant for winter feed, sugar slurry provides a great, quick alternative for a feed supplement.

Mix very small amounts of water to granulated cane sugar until you get a slushy texture. About one cup of slurry is sufficient for one hive. Place slurry onto wax paper and put it in the hive where you would put your fondant. Candy or medication shims are helpful to provide space for feeding.

Whatever the bees don't eat will harden after a few days so you will have to add new slurry. To prevent the slurry from drying out quickly, you can also place it into a ziploc bag and cut a slit or circle so the bees can get to it.

In early spring and times of dearth, you can also apply slurry to empty drawn comb. Do not place slurry on comb that contains brood, honey, or pollen.

JANUARY - FEBRUARY

In January start feeding pollen patties. Protein is needed for new brood. Mid-February is generally when willow, oaks, and maples produce pollen and some small nectar flow, however, the temps are usually not warm enough for foraging so feeding pollen patties is necessary. If you get a warm day, 50 degrees or more, do a quick brood inspection. Your darker races of bees may have no brood while some Italians and crosses should have a partial frame of brood or more. January or February is a good time to use HopGuard strips or OAV (oxalic acid vapor) to kill phoretic mites.

Check on honey stores and add/replenish winter feed if necessary.

Remove any snow which may have accumulated at the entrance to avoid suffocation.

MARCH

March usually means spring has arrived. The next steps depend on above freezing weather. Remove your inner covers, install your feeders, and add a gallon of 1:1 sugar water. If they take it, step up your feeding as 1:1 sugar water will stimulate early brood production. Keep pollen patties on the hives. Never have a super with drawn comb on with a feeder in the spring. They will fill it with sugar water. Later, when the feeders are

removed, replace them with a top screen to insure proper ventilation. Honey production will be increased because the hive will be cooler and the bees do not have to bring in so much water to cool the hive. The energy saved is used to bring in nectar.

Place medium or shallow foundation on the hive under the feeder as some may start to build comb. If they do not, at least you had them on early and not late. In beekeeping, late is not an acceptable practice. Be sure to place queen excluders under boxes you will be using for honey production. This not only prevents the queen from laying in the comb but the bees will get use to traveling through it. If they are reluctant to pass through it, spray the comb with sugar water or Honey-B-Healthy.

There should be a minimum of three deep frames of brood or five medium frames before placing any foundation or drawn comb supers at this time. With less than that you have to wait for more brood build up, add brood, or re-queen. This is a monitoring stage.

Watch for the need to add more supers. We have two supers on queen excluders by mid- March. The supers have nine frame spacers with six frames of comb and three frames of foundation.

APRIL

By the first of April, dandelions are usually everywhere. If you are still trying to draw comb, continue to feed for another week or so. We are now at mid-April. Pollination hives are in the apple orchards. Stop feeding by April 15th. If hives are not at their listed numbers you may wish to seek help from a mentor or research why they are not at this level. There can be more than one thing causing a problem.

Give the queen until mid-April to prove herself. If conditions are not better by this time, re-queen. You do not want to miss the nectar flow. In our area, the nectar flow is from April 15th - July 15th. Do not miss it because of a failing queen.

Some hives will have enough brood to start a nuc. If you pull brood too soon it will affect your honey crop. We generally pull enough brood frames to make nucs that will not set the hives back on honey production. Sometimes only one or two frames is pulled per hive for nucs. Nuc brood frames should have eggs, larvae, and capped brood.

They should have twice the amount of capped brood as eggs and larvae. There should be a good arch of pollen and honey as the bees on emerging will need to eat as soon as possible. Read the “Nucs” chapter in this guide for more info about nucs and how to make one.

Packages should contain three pounds of bees (shaken during foraging time of the day as you need young bees). During March you can install packages of five frames or more on comb. Around April 15th in our area is best for package installations. Packages need immediate sugar feed and pollen patties. Do this 24/7 for brood and new comb build-up. Read the “Packages” chapter in this guide for more info about them.

MAY

By the first of May, the hives should be busting. Major brood build-up should result in four, five, or six deep frames of brood. Divides or nucs are made at this point to prevent swarming. You should be inspecting your hives every seven to ten days to practice swarm management techniques. This continues through mid-June. Do not let your hives swarm as you will lose your honey harvest. This is a good time to add foundations and remove the oldest comb. Be on a three to four year comb replacement program.

Nucs and packages may stop taking sugar water toward mid to late May. This means they are bringing in enough nectar and will not need any more sugar water until later in the season for winter stores.

Our honey extraction sometimes starts by mid-May to insure we get specialized honey. The first is apple honey, by May 15th we get black locust, followed by tulip poplar around May 25th.

JUNE

Continue swarm management. Make 5 frame nucs and 3 frame re-queening nucs if possible. It is advisable that each yard should have one 5 frame nuc for every 5 to 7 colonies for back up in case of hive failures. Re-queening nucs are used for hives that have problems in accepting new queens for one reason or another. These might include Parasitic Mite Syndrome (PMS), European Foul Brood, chalkbrood, or other problems where a new young Hygienic queen and new bees are needed. Re-queening nucs are also used to replace queens in hives that have an aggressive temperament and in hives

that have laying workers. For introduction to established hives, use the newspaper method for all types of nucs.

Continue the feeding program on young hives, monitor established hives for a possible feeding program. Install entrance reducers on weaker hives to prevent robbing.

JULY

In July, we requeen 1 - 1.5 year old queens. We save the best producing old queens in ten frame nucs for brood production and new drawn comb.

Use good queens for brood build-up for weaker hives. Install new queens with duct tape over the corks. Check for acceptance and manually release her 5-8 days from date of introduction. This helps to break the varroa mite cycle.

By mid-July, hives should have produced wildflower, staghorn sumac, thistle, and clover. At this point, most hives should have honey supers and queen excluders removed so any nectar flow goes to the bees for storage and feed.

We take good production hives to various alfalfa fields that are allowed to bloom before they are cut. A good hive will produce a super of honey every 5 to 7 days. We sell this honey by the bucket first as alfalfa honey will crystallize in 4 to 5 months after harvest.

Here we are back at approximately mid-July. There are other things which may arise throughout the season which would have to be addressed on a case by case situation. Again, this management program is to be used as a guide and you will need to adjust it accordingly to your region and style of beekeeping techniques.

IMPORTANT TIPS

- Be sure to keep a log book on what has gone on in each hive. This will be of tremendous help when requesting guidance or assistance.
- Make sure you register your hives and request a state inspection.
- Predominantly post “Caution: Honeybees” signs near your hives for legal purposes.

- Be extremely careful to provide sufficient ventilation to the hives at all times. Use notched inner covers with a center hole in the winter and top screens in the summer. Inadequate ventilation in the winter may allow condensation in the hive with a resultant loss of bees. Inadequate ventilation in the summer puts a heavy workload on the bees to keep the hive cool.
- Spray diluted sugar water and Honey-B-Healthy on foundations while installing them. Do not hesitate to spray some on the bees. They will groom each other, knocking off mites. This can be used as a regular method of treating bees without miticides. Do not do this at the same time as the powder sugar method as you will end up with little crawling dough balls. Be careful not to start a robbing scenario when drenching bees.
- Timing is critical. Perform regular inspections every 7-10 days.
- Try to attend as many monthly bee club meetings as possible and get involved as this is the best way to learn, keep up with changes, and get your questions answered.
- Beekeeping is 90% common sense. Learn the bees' biology and behavior. It will provide a strong foundation for your beekeeping experience.
- Learn about the plants that grow around your bees, their bloom times, and the plants' nutritional values for bees.
- Because of changes in the weather, it may be necessary to keep the supers on longer or to remove them sooner.
- Don't get discouraged if something goes wrong beekeeping is a learning experience! Keep trying!



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