

Beekeeping in Alaska

BEEKEEPING IN ALASKA

Alaska's beekeeping season begins each spring with newly hived bees. The honey flow usually ends the middle of August, but many people wait until the first of September to kill their bees. Though individuals have been working to keep bees through the winter in recent years, with varying degrees of success, as yet no truly economical or satisfactory over-wintering method has been successful. Package bees, therefore, are ordered in mid-winter for April/early May delivery.

Packages must be hived early to allow the colony population to increase enough to gather a surplus of honey during the short summer. Because hiving sometimes occurs before local plants are producing pollen and nectar, it is generally necessary to feed a sugar solution and pollen until blooms are available.

EARLY FEEDING

While there are many ways to feed dry or liquid sugar externally or internally, many beekeepers seem to prefer an internal liquid method. A 2:1 (by volume) sugar/water solution normally is fed when hiving the package, with either 2:1 or 1:1 syrup fed subsequently. Feeding usually is continued until the bees find sufficient natural nectar to cause them to ignore sugar syrup. Internal feeders allow bees to feed during cool or rainy weather when they can't fly, keep the feed warmer (and thus more acceptable) and restrict it to a given colony.

Internal feed systems are nearly as varied as the beekeepers who use them and they range from a plastic bag holding syrup to frame feeders to multi-gallon devices that sit on top of the brood chamber. One commonly used method of feeding is to place a dinner plate upside down on a lidless gallon container of sugar syrup, invert the assembly and place a wooden match between the container lip and the plate. Set this feeder on the inner cover above the brood chamber, keeping the inner cover hole open, then add an empty deep super and the hive cover. Some inner covers may need spacers to prevent the cover from sagging towards the frame top bars and eliminating desired bee space.

If foraging bees can't gather pollen locally for whatever reason, it should be fed in the hive. Put simply: no pollen, no brood. Pure natural pollen is eagerly accepted by bees, but is expensive to buy. Because pollen is costly, many beekeepers feed a supplement or a substitute, though bees seldom find these as attractive as pollen.

Pollen supplement — natural pollen mixed with pollen substitute — is more acceptable to bees than is a plain substitute. As little as five percent natural pollen can be used; the more pollen, the faster the bees will accept it.

Pollen substitute is just that, something used instead of pollen. Commercial preparations are available and a variety of formulas are in use. One nutritionally satisfactory recipe uses three parts (by weight) soybean flour and one part each dried brewer's yeast and dry skim milk. Mix the dry ingredients with 2:1 sugar syrup into a stiff dough that, when formed into a patty about ¼ inch thick, won't sag between the spread fingers. Spread from ¼ to ½ pound of the dough on waxed paper and place the patty, waxed paper up, directly on the top bars above the brood



cluster. Reverse the inner cover to provide space for the patty and, if pertinent, keep the cover hole open so bees can get to the syrup feeder. Pure pollen can be prepared and fed the same way.

HIVING THE BEES

Feed your bees with warm 2:1 sugar/water syrup as soon as you get them home. This is especially important if they've been packaged for three or more days. The syrup also settles the bees and makes them less active when you open the package. A small sprayer/atomizer such as the kind used for houseplant watering is ideal for feeding and hiving. A good alternate method is to use a 3- to 4-inch clean paint brush. Dip it into warm sugar water and splatter the bees. Do not brush across the package screening. This can damage feet, legs, antennae and tongues. If hiving immediately, spray or splatter thoroughly.

Wet sticky bees can't fly; dry ones can and will. If hiving must be delayed, keep the package in a cool dark place after feeding. Bees can be hived when it is snowing, raining, blowing or even dark, but the best conditions probably are calm, cool and late evening. There are several ways to get bees from the package to the hive; the following procedure is one in general use.

The hive is on location with the entrance blocked so bees can't get out. A wooden match or small nail under one

end of the block will allow sufficient air to enter. If a division board internal feeder is used, have it in place and filled with one gallon of 2:1 sugar syrup with Fumigillin-B already added.

Remove the cover and three middle frames. Put the frames where they won't get broken. Set the package on the top bars of the frames left in the hive so excess syrup will fall into the hive. Spray the bees through the screening again. Slowly roll the package back and forth to mix the bees and spray once more. Use the hive tool to remove

A BIT ABOUT NOSEMA

Besides sugar syrup or pollen, another "feeding" that may prove beneficial to the development of a strong colony is fumagillin. Available commercially as Fumagillin-B, it is the only drug known to control *Nosema apis* organism. When *Nosema* spores are present in adult honey bees and favorable conditions exist, highly infectious and often fatal nosema disease results. Many adult honey bees harbor *Nosema* — drones, workers and queens are susceptible — and hived package bees are particularly vulnerable to an outbreak.

As most beekeepers feed sugar syrup when hiving their bees, adding the amount of Fumagillin-B specified on the label to one gallon of the initial feeding is a good insurance against nosema disease. Local spring weather can be wet and cold well into June, repeatedly confining bees to their hive for several consecutive days. Such conditions are ideal for *Nosema* spore proliferation and rapid spread throughout the hive. The brood may be affected in either of two ways. An infected queen won't be laying at peak capacity. If the queen is healthy but workers are infected, they can't properly care for the brood the queen is capable of producing. If the queen and workers are sick, with a reduced new hatch and with the original bees ill and dying prematurely, one can understand how *Nosema* can weaken a colony.

Nosema disease shows no reliable visual symptoms, but poor brood pattern, rapid population decrease, early queen supersedure, unsuccessful attempts at flight and defecation on the combs may be indications that a colony is infected. A second gallon of medicated syrup may be desirable for a severely infected colony. A colony affected by *Nosema* will produce less honey than a healthy colony, by as much as 30 percent. The cost of treatment is offset by honey production. Treatment will greatly reduce the chance of contacting *Nosema*.



Installing a package of bees. Photo courtesy of Wendy VanDyk Evans, Bugwood.org

the strap holding the package feed can in place. Check the can to see that it is loose in the hole. See that the queen cage is also loose by sliding the metal tab back and forth in the slot. Keep the tab bent. Don't let the queen cage drop into the package.

Now grasp the package firmly with one hand on each end, raise it about 6 inches and slam it down hard, striking the bottom flat against the upper edge of the hive body. (The package can be slammed on flat ground or on the hive stand as well.) This jolts the bees to the package bottom. Quickly remove the feed can, slide the metal tab out of the slot and lift the queen cage from the package. Replace the feed can to keep the bees inside while you briefly inspect the queen. Is she alive? Active? Quite large? Apparently undamaged? Note her color for easier identification on later inspections. Flick any adhering bees from the cage and slip it into an empty breast pocket to keep the queen warm and draft free. This is important. The queen must not become chilled.

Spray the bees with syrup. Roll the package and spray again. Repeat the grasp, raise, slam procedure to force the bees to the package bottom. Remove the feed can and set aside. Invert the package and dump the bees into the hive. Shake, rattle and roll is the key here. The object is to get the bees from the package into the hive in the shortest time possible. Don't be gentle. Hold the package in one hand and beat it with the other hand. If bees are flying, pause to spray again. In less than one minute, the package should be empty. Don't worry about a dozen or so bees that usually refuse to leave the package. They'll probably be around to enter the hive when the hive entrance block is removed.

The bees will be in a heap on the hive bottom. Gently spread them with one hand or with the paint brush used for splattering. Replace one frame, gently easing it down onto the bees. They will soon crawl out from under it. If bees begin to fly, spray them down. Replace another frame in the same manner, then the last frame.

Now separate the frames at the rear of the hive, making a V-shaped gap as half the frames are pushed to the right as far as possible and the others to the left. Spray between the frames, especially into the gap.

Bring out the queen cage and use the hive tool to remove one of the two staples holding the screen in place. Two precautions: (1) Place one thumb across the cage so the screen won't be pushed down and possibly injure the queen, and (2) Remove the staple by using the tool from the center towards the end of the cage so if the tool slips, there will be less chance of gouging into the queen. When the staple is removed, hold the screen in place and spray the queen

thoroughly or dip her briefly into the sugar syrup so her wings are wet and she is sticky. Squat to eye level with the frame top bars, carefully open the screen and gently shake the queen from her cage.

Alternately, many beekeepers hold the queen in her cage for two days to let the colony accept her and then chew out the "queen candy" plug on the bottom of her cage to free her. Inspect the cage upon arrival to know what type of queen cage you have and plan accordingly.

Watch closely to be certain the queen falls between the frames. When she is in the hive, slowly reposition the frames to the proper spacing and put the cover on.

If an over-the-hive type feeder is used, have the sugar syrup ready and install everything at this time to avoid unnecessary hive disturbance a little later. Any syrup that's in the feeder can be added to the sugar syrup.

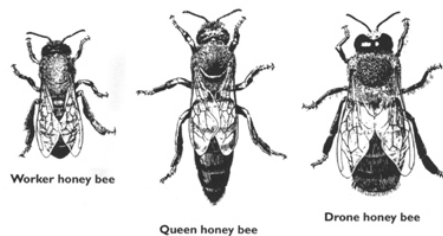
The following day, replace the entrance block with the entrance reducer, using the smallest entry slot for several days.

COLONY MANAGEMENT

There is a wealth of information available on colony management. Beekeeping literature, combined with advice from local beekeepers and your own experience should give you the best chances for success. The following management techniques are offered as guidelines for beginning Alaska beekeepers.

The bees are hived and the feeder is full. Five to seven days later the colony should be checked for queen activity. Make this check as brief and non-disruptive as possible, preferably in good weather, yet be sure to note if eggs are present in the desired elliptical pattern. If so, good. There's no need to find the queen, she's doing her job.

If no eggs are seen, search for the queen. She may (1) be a virgin and need the mating flight before starting to lay, (2) have just made the mating flight and will soon start to lay, (3) not be recovered from shipping and hiving shock, (4) be a naturally slow starter or (5) be missing or dead. If the queen is found and appears uninjured and normal,



From left: worker, queen and drone.

carefully close up and look again in four to five days. If the queen is not found, carefully close up and check in two days. (Always work carefully, especially with frames in the brood chamber when the queen's location isn't known.) If the queen isn't found on the second check and if no eggs are seen, close up and wait two more days. A more experienced beekeeper may be willing to help with this inspection.

If the third search is negative, there are three choices: order another queen, combine with another colony or wait several more days. Beekeeping season in Alaska is short; early brood production is essential. With four or fewer colonies, immediate requeening or combining probably is preferable to waiting more than seven to 10 days for the queen to start laying.

There has been at least one instance when an experienced beekeeper missed seeing the queen on several inspections: it was 19 days after hiving that the first eggs were laid, the queen wasn't seen until four days later. That was unusual, of course, but it emphasizes that not all queens conform to an expected role.

After the colony has settled into its normal duties, a weekly check should be enough to keep tabs on progress. Colony behavior or "morale" (health, activity, temperament, etc.) is significant and somewhat controllable. Some affecting factors are site location, hive placement, weather, food availability and the all-important queen. Other things to look for include comb building and cell preparation, placement of nectar and pollen for brood feed, worker brood versus drone brood, laying pattern of the queen, hive population and queen cells.

Queen cells and queens probably cause more concern than any other aspect of beekeeping. Again, there are no set rules. If one finds queen cells, one should look for their cause. Sometimes they're meaningless, sometimes they're crucial to the colony's existence. Are they swarm cells? Emergency cells? Supersede cells? Practice cells? It may be a serious mistake to arbitrarily destroy them without knowing the colony's condition. Experience is the best guide here. Read the literature in advance or discuss your concerns with other experienced beekeepers to know what best suits your situation. Serious beekeepers will try to read queen cells and use that information to their advantage.

HIVE BODIES: WHAT SIZE AND WHEN?

Super, hive body, brood chamber or just plain box all mean the same thing: a receptacle for frames and bees. Where the receptacle is used determines what it is called. A working hive has two sections, one containing the

queen and her "nursery," the brood, and the other for bees to store the honey, the super. A box or hive body used for brood raising would be the brood chamber; the same hive body installed for honey storage would be called a super.

Which hive body to use is an individual choice. Standard full-depth boxes, 9⁵/₈ inches deep, are best for brood chambers. Many Alaska beekeepers double brood by using two such boxes for brood rearing. If deep boxes are used for supers also, all hive components will be the same size. This simplifies repair, replacement and expansion, and offers the advantage of complete interchangeability. About the only drawback to this uniformity is the weight of a honey-filled deep super: 90 pounds isn't unusual. Medium depth supers, also known as Illinois, Western or Dadant, may go to 60 pounds when filled with honey. This box, 6⁵/₈ inches deep, is used almost exclusively as a super. The shallow box, 5¹/₁₆ inches deep, is the third common size. Used only for supering, most chunk and cut-comb honey is taken from these easily-handled hive bodies. Different types of foundations are available for each of the three sizes of boxes.

The question of when to add boxes must be answered each year for each hive. The prime consideration is to provide enough space for bees. With up to 1,500 hatching daily, it doesn't take long to overcrowd a hive. About 33 days after hiving or 28 days after the first eggs were laid is time for the second brood chamber, or if single brooding, the first super. If the bees were hived on new foundation, it's possible that the time interval will be several days longer than this. Other factors also affect the population buildup. A closer guide, perhaps, is to add the second box when the brood chamber has four to five frames of capped brood and two to three of eggs and larvae, and bees are covering and working the remaining frames

Supering is more variable than judging when to put on the second brood chamber, but the same general guidelines can be used. Extra supers complete with frames and foundation should be prepared long before their anticipated need. Newly hatched bees combined with an early or heavier-than-expected nectar flow can fill existing storage space unbelievably fast. A queen excluder, if used, should be placed between brood chamber and super.

Queen excluder use is another personal choice. It is a welded, grid-like "screen" of heavy wire precisely spaced to allow only workers to pass. It prevents brood laying in the super by restricting the queen to the brood chamber. Opponents claim it slows down nectar-laden bees en route to the super, thus lowering honey production. Excluder users disagree and point out that they always know where the queen is, or at least isn't, and there is no brood in the honey super. A decision as to its use should be

made only after personal trial. Incidentally, an excluder also keeps drones from passing through, which at times may be an advantage.

THE HARVEST

If one double broods, three deep boxes or their equivalent usually are ample for a first-year hive. A fourth box, or at least six or eight extra frames with foundation installed, may be wanted for the occasional great season. On the other hand, in some years the double brood will provide more than enough room for brood and honey storage. First year yields of from nothing to more than 90 pounds have been reported, but it may be more realistic to hope for 15 to 30 pounds of usable honey the first season.

The second year should be better and successive seasons better still. Brood chambers with drawn comb with stored pollen and capped honey left from the previous season are a solid asset. Supers with frames of drawn comb, especially those extracted and retaining traces of honey, act as magnets to bees at supering time. Such an established hive needs three deep boxes, and a fourth would be good insurance. A strong colony coupled with good management plus cooperative weather and ample nectar-producing blossoms can easily add up to two deep supers full of capped honey, for an extracted crop of well over 100 pounds.

Hive management can have a tremendous effect on a colony's production. Beekeepers who have managed as few as six to more than 86 colonies have recorded annual per-hive averages of as little as 12 pounds to as much as 187 pounds. Production will also vary among areas of the state and within those areas as well.

Estimating an area-wide average yield under these conditions is almost meaningless, but an average colony and management and season should produce about 45 pounds of extracted honey.

Alaska beekeepers think of their seasonal yields in terms of liquid or extracted honey. Though a few people may run occasional section supers, the lack of a dependable major nectar flow all but precludes successful section comb honey production. Cut-comb and chunk honey are harvested by some beekeepers using medium or shallow frames fitted with foundation made for eating with the honey, but this means installing new foundation and causing bees to draw fresh comb each year. Also, comb honey has fewer uses in the average household than does liquid honey. A commercially available extractor that removes honey from the combs by centrifugal force can remove all usable honey without damaging combs, so they can be reused year after year.

If an extractor isn't used, the only way to remove the honey is by pressing or melting. Neither method is really satisfactory or practical and both methods destroy the combs. Pressing or squeezing can be done many ways but in general is no more than forcing the honey through a cheesecloth or similar cloth bag by mashing the comb. This is messy and some honey usually is lost.



If melting, always melt combs — or any beeswax — in a container over hot water, not over direct heat and never over open flame. Beeswax is highly flammable. Use only enough heat to maintain melting temperature, about 145°F. Melted wax floats on honey. Much can be skimmed during the process, or, after cooling, the wax can be lifted in a solid chunk. Honey recovered by melting combs usually is darker and thicker than extracted honey and may taste somewhat stronger since heating releases some of the volatile properties. Use caution; prolonged overheating can ruin honey for table purposes.

ABOUT HONEY

Caring for liquid honey is simple. Straining through layered cheesecloth or fine mesh material will remove bee legs, bits of wax, etc. Or, let the honey sit 24 hours in a warm room and all such materials will float to the surface where they can be skimmed. Any container with an airtight lid can be used for packaging, but most people use bottles. Wide mouth jars are easier to fill than small mouth, and if the honey is at room temperature or cooler, easier to empty. Tight seals are important. Honey draws moisture, which can increase the chance of fermentation. Don't be alarmed when honey begins to granulate or becomes completely solid; it's bound to happen in time. (Fermentation and sugaring are discussed later.) Storage temperatures greatly influence both fermentation and granulation. Under 50°F, honey will not ferment; it sugars fastest between 55° and 65°F. Storage at over 80°F adversely affects both color and flavor within weeks. Freezing won't harm liquid honey.

Floral source, length of bloom period and weather affect not only yield but also the flavor and color of honey. Alaska honey ranges from water white (almost clear) to very dark amber (dark brown, almost black). Flavor usually gets stronger with darker colors. Honey almost certainly will vary from area to area in a given year, as it readily can between hives in the same yard. Even a single hive may produce honey of two distinct shades.

Many people have said that Alaska honey is sweeter than commercial honey bought at stores. While that may be opinion, it appears to be fact that Alaska honey is thicker than most commercially packed, shipped-in honey. The

probable reason is that harvest is well after the main nectar flow is over, and the bees have had time to evaporate enough moisture from the nectar to reduce it to ripe honey and to cap the cells. Many commercial apiaries pull supers before the bees have reduced the nectar to honey at the capping stage. Such honey is not ripe and is naturally thinner. This thin honey must be pasteurized to prevent spoilage.

Most supers will have some frames with uncapped cells. This does not necessarily indicate thin honey, but it is something to check. A simple test is to grasp a frame containing uncapped honey, and, holding it horizontally, give it a sharp downward thrust. If droplets spatter, the honey is thin and unripe. This honey means high moisture content, and high moisture, without further processing, means fermentation. Thin honey is good to eat but may ferment within months. An effort should be made to extract and bottle it separately from ripe honey. If it does get mixed, treat it as thin. It would be best to use it before ripe honey. Commercially processed and packed honey will keep indefinitely without fermenting as long as container seals are intact, though it may still sugar.

Crystallized, sugared, granulated, hardened, candied — these terms all describe honey that has solidified, whether in the comb or in storage containers. All honey will sugar, though it doesn't crystallize to the same texture or in the same amount of time. The key is the floral source. Some honeys don't start to sugar for many years and will take several more to fully harden. Other honeys begin to crystallize within days of placement in the cells and can be completely solid when supers are pulled at season's end. Honey sugared in the comb can't be extracted. The only way to recover it is to melt the combs or feed the sugared honey back to the bees. Bottled honey that has crystallized can be liquefied by heating. If in small containers, a water bath of about 115°F works fine. If in bulk, it should be heated by the double boiler method. Low heat takes longer, but it won't affect the honey's flavor. Be sure the honey is completely liquid, as even one unmelted crystal will start recrystallization as the honey cools. Again, use heat with care.

MISCELLANY

Ways to remove bees from hives prior to the honey harvest are too numerous to discuss here. Talk with other beekeepers and the Cooperative Extension Service about the various methods. One caution: beeswax can absorb and retain certain chemicals for varying lengths of time. Dichlorvos (NuVan strips) is a fumigant insecticide that is labeled under several trade names. Products containing Dichlorvos — including no-pest strips, aerosols and fog-

gers — should not be used near stored equipment for killing bees. Wax combs can retain enough of the insecticide over winter to kill bees installed the following spring. Do not use insecticides or other chemicals to kill bees if you don't know residual characteristics. Some beekeepers will utilize a shop vac to remove bees from the frames at the end of the season.

Some beekeepers kill the queen about three weeks before they expect to harvest honey. This allows all brood to hatch, helps to reduce mold potential during storage and reduces the bees' cleanup work next spring. It also eliminates the nuisance of emerging bees if brood chambers are taken into a warm room to prepare them for storage.

Hives can be stored indoors or out. If indoors, avoid high heat areas such as furnace rooms and all damp or humid areas. Wherever stored, thorough ventilation is needed to prevent moldy combs. Mold usually isn't harmful, but it causes additional work for next year's bees. Some people scrape all propolis and wax from frames and hive components; clean equipment is easier to manipulate. If stored outside, have hives rodent proof and bee proof while maintaining ventilation. Mice, red squirrels and even weasels will enter hives for honey if possible. Other honey lovers to guard against are bumble bees and yellow jackets, which may be flying after hives are stored in the fall and before hiving new bees in the spring. Extreme freezing, minus 45°F and colder, may sometimes crack full-drawn comb, which the bees will repair and use, but bare foundation and partly drawn comb often shatters from extreme temperature changes. Cold beeswax is brittle; avoid jolts if moving boxes when cooler than 50°F.

Alaska, in general, is free of honey bee diseases common to Canada and the Lower 48. Distance, climate and lack of many beekeepers overwintering are significant factors, but the prime responsibility for protecting our unique status rests on the individual beekeeper. With many new beekeepers and hives being introduced into the state, the possibility of unintended disease introduction is real. Since colony collapse disorder has been noted in Alaska, the importance of adhering to the Alaska Bee Registration through the Division of Agriculture is critical in keeping this industry healthy (<http://dnr.alaska.gov/ag/Inspection/BeeRegistrationCardMarch2017.pdf>).

Since our bees are imported from areas where disease is commonplace, every beekeeper should learn to recognize apparent indications of common honey bee diseases. Signs such as punctured brood caps, unnatural odors, mites, misshapen/deformed bees and abnormal bee behavior should not be ignored. Report suspected problems to a knowledgeable beekeeper and request immediate

help from your Cooperative Extension Service office, and contact the Division of Agriculture Inspection Service at 907-761-3857 or Kirk Brown at kirk.brown@alaska.gov.

Beekeeping offers much more than just honey. Accumulated beeswax can be used in homemade products such as furniture polish and floor wax, candles and cosmetics. Pollen can be trapped, stored and fed to bees when needed. Pollen also has some uses as a health food, thus creating a monetary market. Flowers and yields from fruit-bearing plants often show an increase because of honey bee pollination supplementing that of indigenous insects.

Keeping honey bees can be more than just a hobby; it can be an introduction to a new and fascinating world. Area libraries carry magazines and books about beekeeping, and the Cooperative Extension Service can help with local and USDA publications, as well as with advice and beekeeping classes. Another source of information is the experienced beekeeper. If you're considering beekeeping in Alaska, start by acquiring the information you need and your experience will be a rewarding one.

HIVE CONSTRUCTION

Rising costs of wooden products, such as hive boxes and frames, have discouraged some people from keeping bees and slowed the yearly increase in number of colonies. The additional cost of shipping has been a further disadvantage for the Alaska beekeeper. Foam hives have proved successful and are light in weight for shipping, but they cannot be constructed from easily available materials like wooden hives. However, anyone who can saw a board reasonably straight and hammer nails can build hive boxes, top and bottom boards, hive stands and entrance reducers. These are the heaviest parts of a beehive and the most expensive, so considerable savings may be realized by building them by hand. Frames are more difficult and their dimensions more critical, so many beekeepers prefer to buy these parts. If dimensions of the equipment are not exact, the bees will fill extra wide spaces with burr comb and make use of the equipment more difficult, so follow directions closely. Before attempting to build your own boxes, check lumber prices against the price of commercially built bee equipment to see if you consider it worthwhile. Used, sound lumber can often be salvaged and made into good quality hives.

Hive Body Cutting

- Mark the pattern of the sides and ends on a piece of soft pine or spruce.
- Cut the pieces.
- Cut the rabbet for use with or without metal rabbet; be sure of the dimensions.

- Cut the hand hold.

Bottom and Top Boards

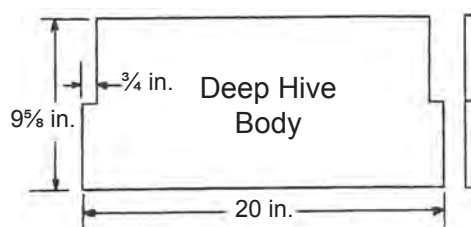
- Mark the pattern on the boards.
- Cut the pieces.
- Cut the entrance reducer.

Assembly

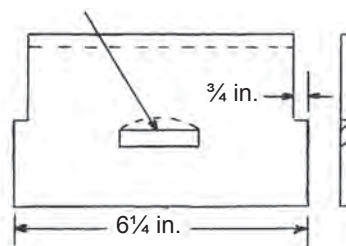
- Glue and nail the bodies.
- Glue and nail the bottoms and tops.
- Paint the outside of bodies and edges only. Paint top and bottom boards on all surfaces. Do not use lead-based paint on any beekeeping equipment.

Hive Stand Construction

- Mark the boards using a pattern.
- Cut the boards.
- Glue and nail.
- Paint, using two coats at least; three coats are better. Color is not important, but use a good grade of paint.

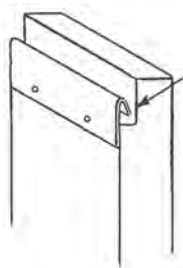


Hand hold 5/8-in.-deep cut with circular saw.



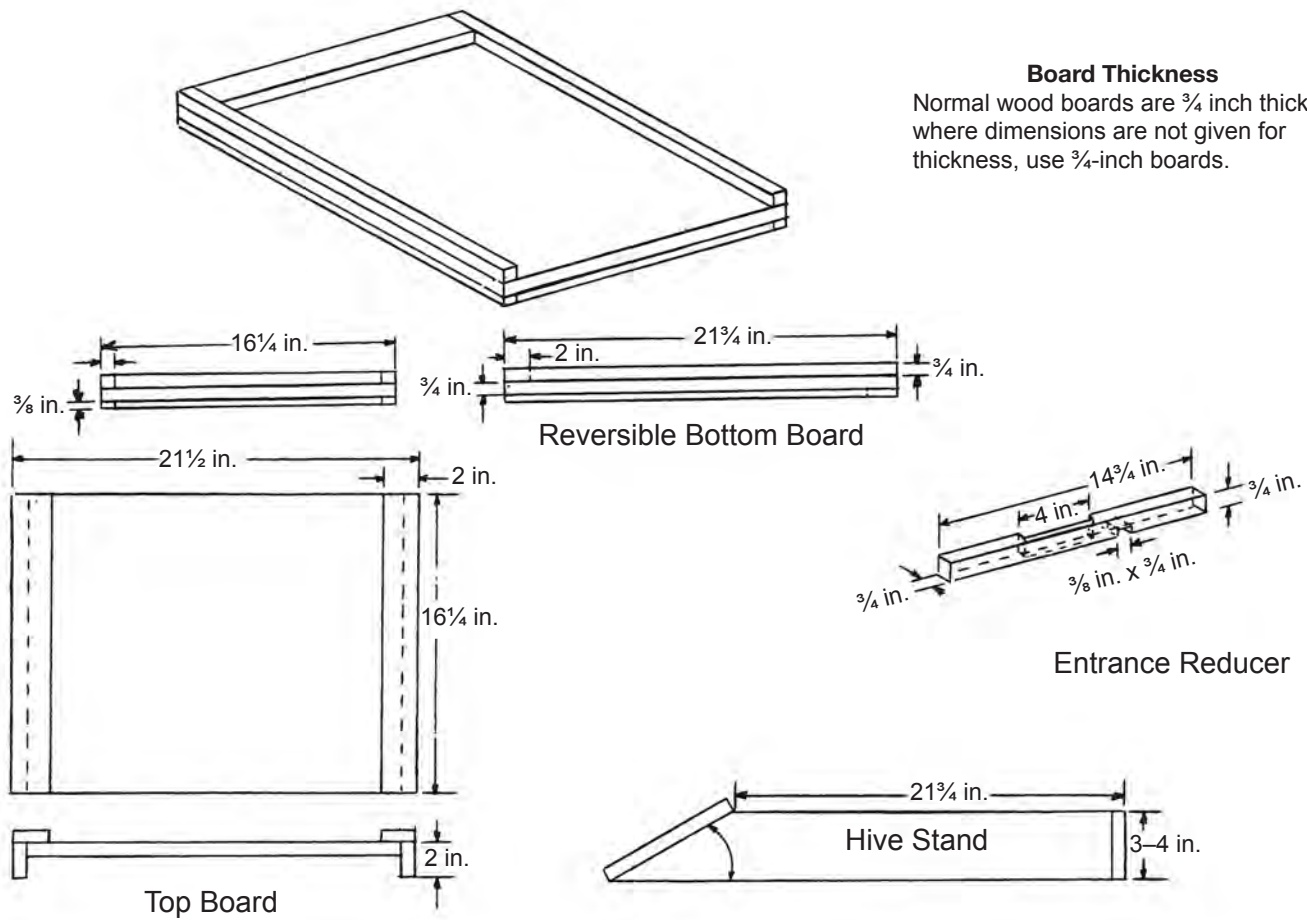
Depth of Supers

For medium deep supers, all measurements remain the same except for the depth, which changes from 9 5/8 inches to 6 5/8 inches (1/2 inch = 3/16-5/16 inch). Similarly, the depth for shallow supers changes to 5 11/16 inches (1/2 inch = 2 25/32 inch).



Rabbet Depth

With old style metal rabbet, 7/8 inches; with new style L-shaped metal rabbet or no metal rabbet, 5/8 inches.



Board Thickness

Normal wood boards are 3/4 inch thick; where dimensions are not given for thickness, use 3/4-inch boards.

Frame Assembly

- ➔ Layout parts: top bars, end bars, bottom bars, nails and wire.
- ➔ Tools needed: hammer, narrow-nosed pliers; a vise is useful.
- ➔ Glue sometimes is used but makes later disassembly difficult.

Nailing

- ➔ Top bar placed upside down and end bars pressed in place.
- ➔ Bottom bar placed in end bars and nailed with four nails.
- ➔ Frame inverted and top bar nailed to end bars with four nails.
- ➔ End bars nailed with one nail each to top bar, going through the end bar first.

Wire Reinforcing

- ➔ Two small nails in edge of one end bar near holes.
- ➔ Metal eyelets inserted into holes in end bars.
- ➔ Wire threaded into the horizontal holes in end bars.

- ➔ One end tied off and the wire tightened, then tied off at other nail; nails driven flush in the edge of the end bar.

Inserting Foundation (wired)

- ➔ Vertically wired reinforced wax foundation woven between horizontal wires with hooks up and secured with nailing wedge on top bar with five nails.
- ➔ Use heated embedding wheel to embed horizontal wires.

Inserting pure beeswax or plastic reinforced foundation

- ➔ Sheet woven between horizontal wires.
- ➔ Nail wedge secured with five nails.
- ➔ Wire embedding wheel used to embed wires.
- ➔ Foundation pins inserted if horizontal wire is not used to hold foundation straight.
- ➔ If using plastic reinforced foundation, follow manufacturers directions.

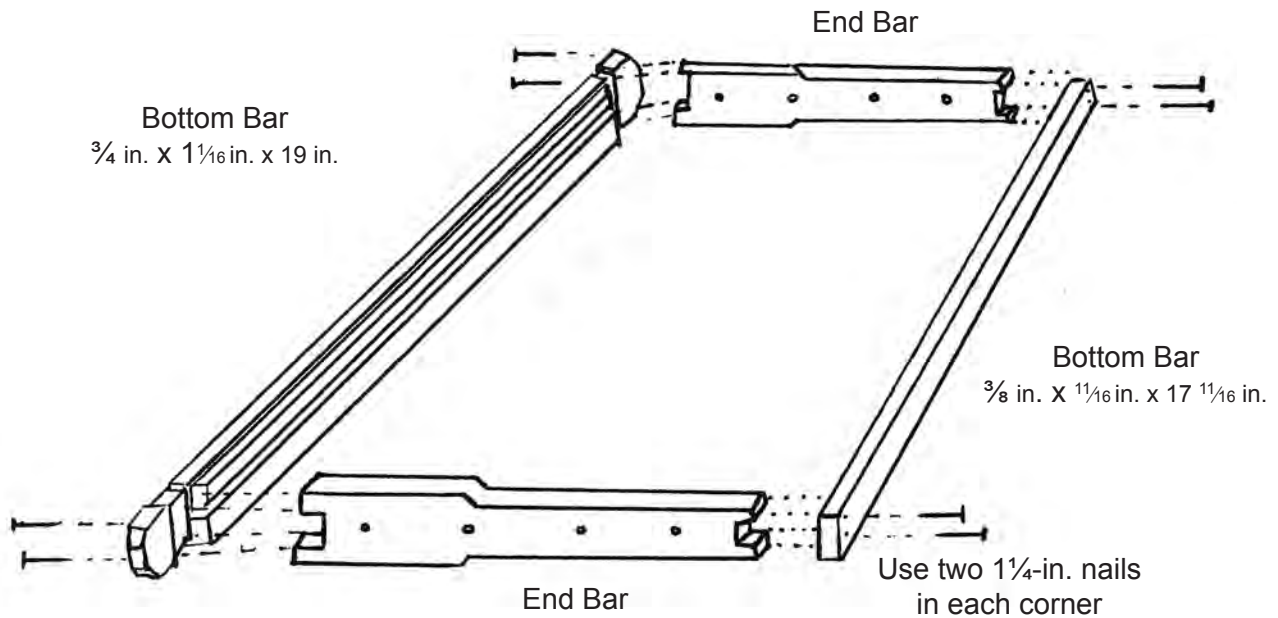
Replacing comb with new foundation

- ➔ Cut out old comb, leaving horizontal wires if in good condition.

- Replace or tighten horizontal wires.
- Remove nailing wedge and scrape bars clean.
- Insert new foundation and secure nailing wedge.
- Embed horizontal wires.

Cut Comb Frames

- Clean groove in top bar.
- Insert thin foundation carefully.
- Run thin stream of melted beeswax down groove to secure foundation.



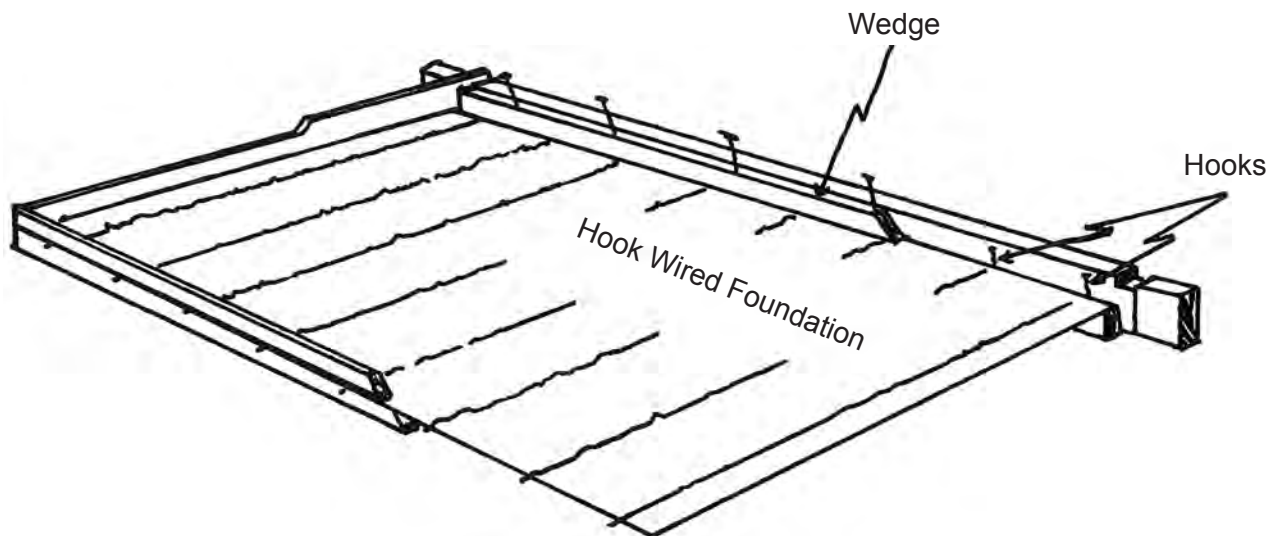
DIRECTIONS FOR INSERTING WIRED FOUNDATION

First remove wedge from top bar with a sharp knife. Be sure to remove all of the thin strip of wood by which the wedge was left attached to the top bar.

Spread the divided bottom bar slightly apart and slip the foundation between. Slide the top edge of the foundation up snugly against the top bar. Some beekeepers wire hori-

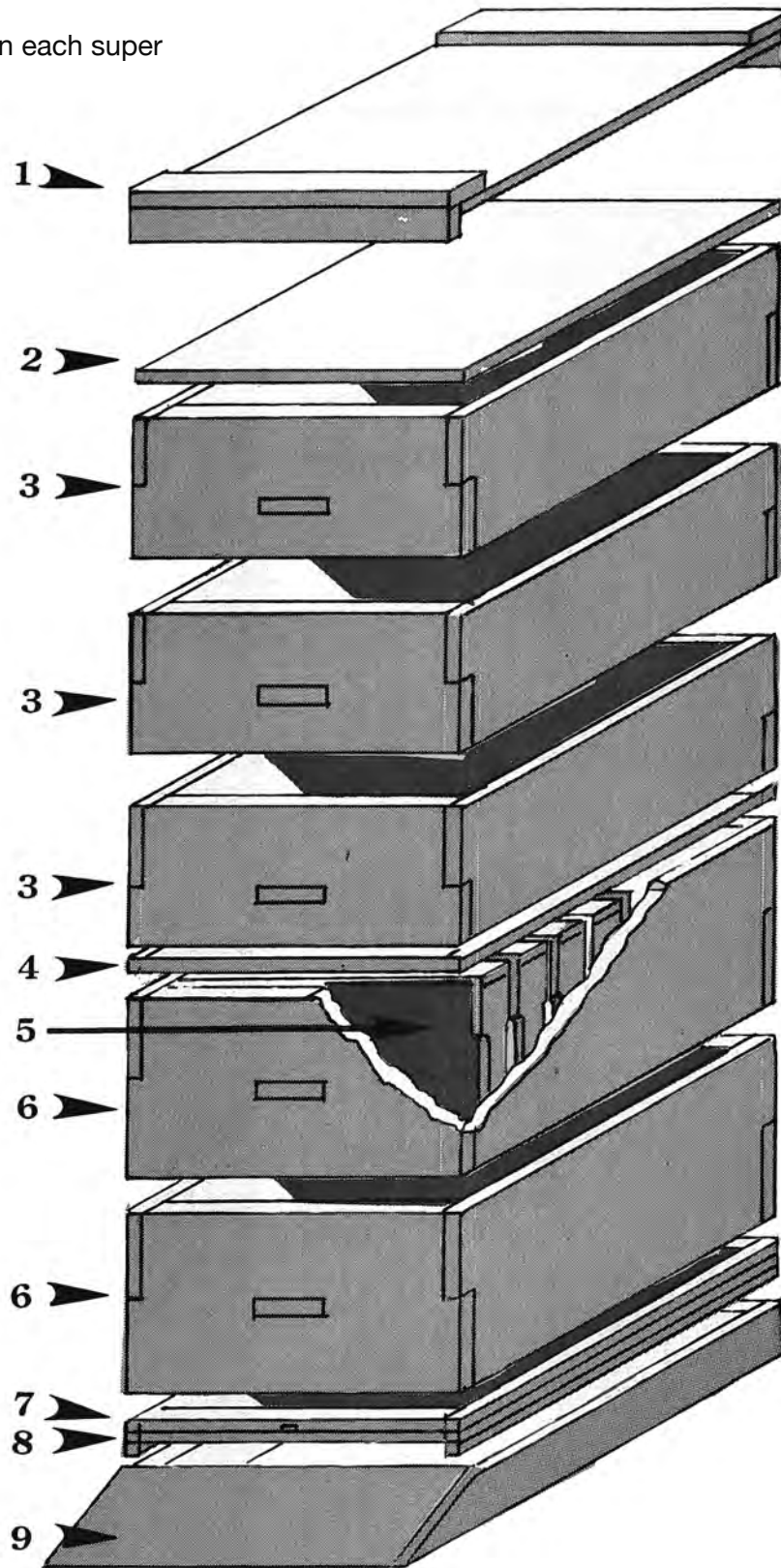
zontally first, then weave the foundation down through the wires before nailing the wedge.

In using wired foundation with hooks, be sure to place the hooks up and against the shoulder in the top bar. Then place the wedge in position, in front of the hooks, and nail straight down into the top bar, using the $\frac{7}{8}$ -inch nails. See illustration. On wired foundation without hooks, the nails should be driven as near the wires as possible.

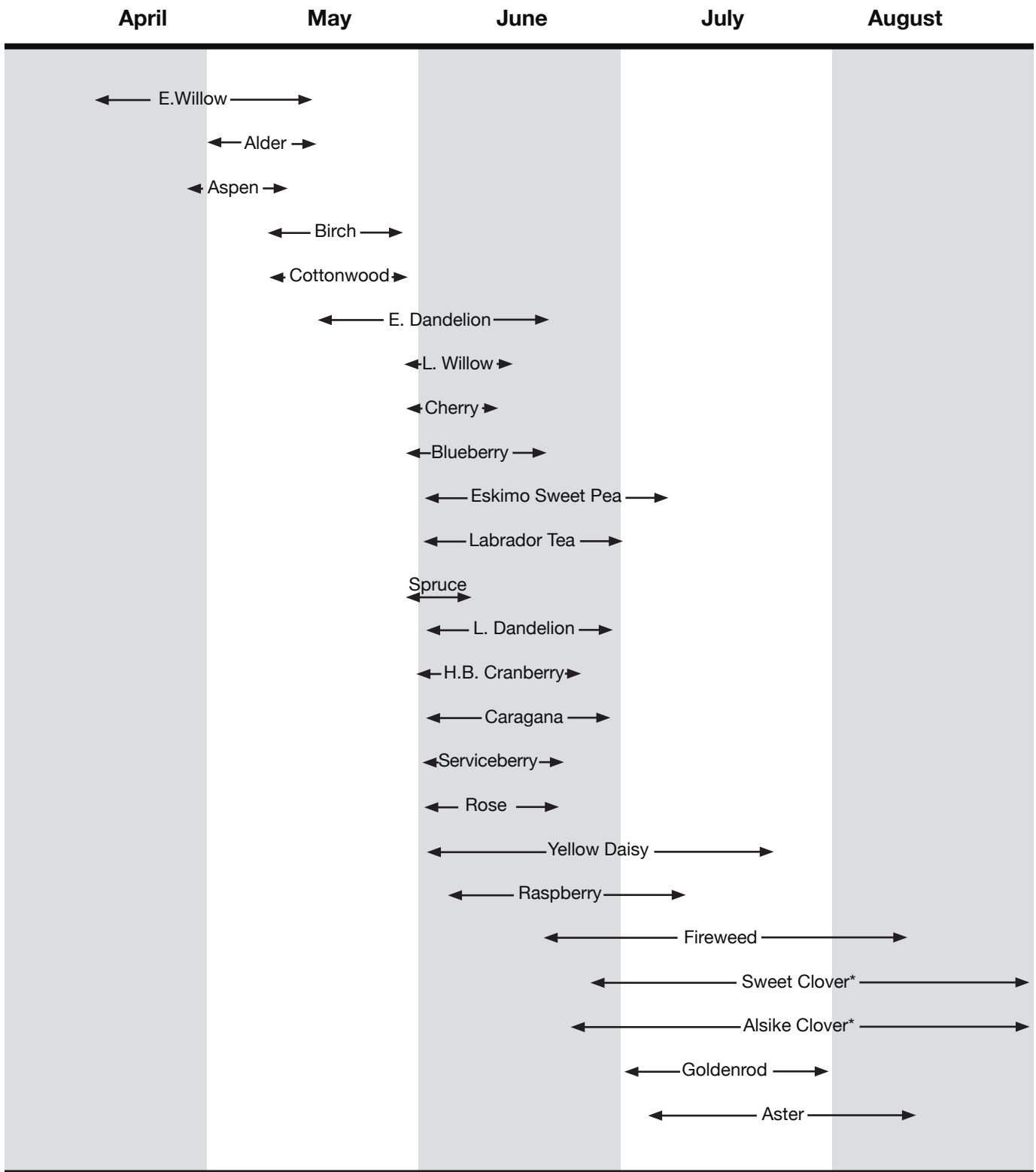


EQUIPMENT FOR HONEY PRODUCTION

1. Top board
2. Inner cover
3. Honey supers: 1 deep, 2 medium or 3 shallow
4. Queen excluder (purchased)
5. Ten frames with foundation in each super and brood chamber
6. Brood chamber
7. Entrance reducer
8. Bottom board
9. Hive stand



FLOWERING PERIODS



*Ended by frost

Dates shown observed for Fairbanks at elevation of 429 feet

TIMETABLE FOR SUCCESSFUL BEEKEEPING

Time	Activity
January/February	Repair and clean used equipment, assemble new equipment and paint. Order bees.
February/March	Attend various beekeeping meetings. Join beekeeper's association if one is available locally.
March	Order foundation and inspect frames.
April	Install foundation and embed wires. Receive and install bees, feed medication, pollen, sugar syrup.
May	Receive and install bees, feed medication, pollen, sugar syrup.
June	Add second brood chamber or queen excluder and honey super. Check brood weekly throughout the season.
July	Add honey supers.
August	Add honey supers or extract; first week eliminate queen. Second or third week, weather permitting and if nectar sources are depleted, eliminate bees. If overwintering, start preparing hive, leave adequate honey stores. Extract honey. Honey is easiest to extract while it is still warm, usually within two hours of eliminating the bees. If not extracted while warm, honey must be heated to 80°F and will usually take up to 24 hours to become thoroughly warm.
October	Sort equipment and clean frames; store equipment for winter; protect from mice and dampness.
November	Prepare honey for sale by straining or settling and skimming. Inspect, bottle and label.
December	Plan next year's activities and summarize this year's notes, including depreciable equipment costs, non-depreciable costs and income. Enjoy hot biscuits, butter and honey!

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