

Beekeepers' Guide to Comb Honey Production

Shelby Kittle¹, Louise I. Lynch-O'Brien², Autumn Smart², Judy Wu-Smart²

University of Nebraska—Lincoln, Department of Entomology,

¹Masters of Science graduate student,

² Faculty Advisors

What is comb honey?

For many people, comb honey is a special summer treat found at local farmers' markets or a novelty purchased directly from local beekeepers. For beekeepers, it is a unique way to produce, market and sell honey that, due to its scarcity in most markets, can fetch a premium price. Selling comb honey directly to consumers is also an opportunity to educate buyers on how food and honey are produced. Because many consumers have never encountered comb honey before, education has become a necessary part of the marketing process. Unlike the bottled honey typically found on store shelves, comb honey, contains newly built wax comb filled with honey, just as honey bees naturally store it (Figure 1). Before the invention of the honey extractor around 1865, comb honey was a common way to harvest, produce, and purchase honey due to the low overhead costs and minimal processing requirements. Back then, beekeepers laboriously produced pure liquid honey by crushing and straining the honey and beeswax through a filter to separate the honey from the wax. With the introduction of the honey extractor, liquid honey is now widely available. Comb honey is now considered a novelty product in the beekeeping industry dominated by bottled honey.

Comb honey requires specific beekeeping techniques. Beekeepers must manage their colonies (each containing one egg-laying queen and tens of thousands of her sterile daughters, i.e., worker bees) in a way that stimulates them to produce new wax each year because, as the final product includes both the wax comb cells and the honey



Figure 1. Comb honey is typically packaged in a clam-shell style box. The image shows what a cut section of comb honey would look like before the container is closed and sealed for sale.

stored within (Figure 1). To achieve this, beekeepers must maintain highly populated colonies within a more confined space than would be typical. As a result, comb honey production colonies are more prone to swarming—a natural response to overcrowding where the old queen and a significant portion of the colony leave to find a new home. A new younger daughter queen is left behind to continue the existing colony. A higher level of beekeeping knowledge and experience is required to manage such colonies. A noteworthy point is the energy cost of comb honey production. Honey bees require approximately 8 pounds of honey to produce 1 pound of beeswax. Since none of the wax is returned to the bees, it is more energetically demanding

for the bees. While comb honey requires honey bees to produce more wax, bottled honey has its own tradeoffs as well. Bottled honey requires an extractor that costs anywhere from \$200-\$800 for a small model to \$6,000-\$20,000 for large commercial models. In contrast, comb honey only needs standard kitchen supplies (see “Cutting and packaging comb honey” below). Bottled honey is widely available and sold at bulk for \$2–3 per pound while comb honey, due to its novelty in the market and unique presentation, can be sold at a premium price ranging from \$15 to \$30 per pound.

Uses of comb honey

When producing and selling comb honey, beekeepers are often asked, “What is it used for?” One of the main selling points to consumers is its rawness—consumers can eat an unprocessed product straight from the hive. The beeswax comb itself is indigestible but harmless and can be eaten along with the honey or spat out. Beeswax consistency may be improved by consuming the comb honey with a cracker, bread, or other similarly palatable item, making for an excellent addition to charcuterie platters. Using comb honey as an ice cream topping also adds a delicious twist to a classic dessert. Aside from the uses listed above, the potential for comb honey is only limited by a beekeepers’ imagination. Many chocolates, desserts, wines, meads, teas, and other acidic and savory foods can highlight the beautiful summer spirit of comb honey. **This NEBGuide will help you get started with comb honey production.**

Selecting honey bee colonies for comb honey production

The first step to producing comb honey is to identify the colonies to use for comb honey production and prepare them for the main nectar flow in the local area or region. In Nebraska, beekeepers typically evaluate colonies for comb honey production in early to mid-May. Look for:

- **Robust population size:** Ideally, colonies will emerge from winter with a robust population dominated by adult worker bees (Figure 2). To estimate a colony’s population size, visually estimate the total surface area on each frame in the colony covered by adult worker bees. Ideally comb honey production colonies will have between 16–18 standard Langstroth deep frames (out of 20, ten per deep box) covered in worker bees.
- **Developing brood:** Estimate the total surface area on each frame in the colony covered by capped (pupating)

brood soon to emerge as the next generation’s adult workforce. Robust colonies should have 8–12 frames covered with different stages of brood.

- **Fit queen with gentle offspring:** A colony’s queen bee should possess a solid egg-laying pattern. A solid egg laying pattern is characterized by spaces of brood that are all similarly aged and there are very few cells that are empty or sick. Her offspring should also be gentle in temperament and easy to work as the colony manipulation necessary to produce comb honey can trigger defensiveness.



Figure 2. The photo shows an example of a single deep Langstroth box filled with a large population of worker bees that would be appropriate for comb honey production. Honey bee colonies are typically kept in standard Langstroth boxes that contain 10 movable wooden frames in each box. The frames contain the hexagonal wax cells where the bees build comb to rear brood and store food.

When to start comb honey

Colonies should be selected before the nectar flow occurs. While the main nectar flow in eastern Nebraska typically starts around the first week of June, it can vary widely depending on region, weather, flower communities and land use conditions. To assess the start of a nectar flow, observe the landscape around the apiary (a place where honey bees are kept) and determine when the predominant nectar-producing flowering plant species start to bloom. A keen observer may also assess ongoing nectar flows within colonies as wax “frosting” appears. When worker bees freshly secrete beeswax, it appears white in coloration and is often layered on top of aged wax (typically yellow brown), giving it a frosted appearance (Figure 3).



Figure 3. The photo (right) shows the top view of a colony during honey flow. The lighter wax “frosting” is visible on edges and in between frames. New wax cappings over honey cells are light in color and can be seen from the top of the frames (left) The appearance of “frosting” on frames is an indicator of honey flow. (Photo credits: Bee Culture- SOME BEEYARD THOUGHTS, OBSERVATIONS AND UPDATES and Know the flow-The New Jersey Beekeeping Blog).

Setting up comb honey supers

After determining how many colonies will be used for comb honey production, the next step is to set up the boxes and the frames. Typically, one colony will only produce one super of comb honey a year. If a colony appears to be producing comb honey much faster than the other production colonies, another comb honey super should be prepared for it. Alternatively, if another colony is producing comb very slowly compared to the other colonies or is not working with the super at all, this box could be moved to a colony that needs another honey super. It is important to choose the right production colonies, properly prepare the supers ahead of time, and maximize comb usage during the short honey flow.

Timing is critical for comb honey production. Supers must be set up before the nectar flow begins. Winter months, when beekeeping activities are fewer, is an opportune time. Either shallow or medium sized supers should be used for comb honey production. However, while shallow supers were originally designed for comb honey, medium supers are preferred because they offer more comb area around the edges. This allows comb honey producers to trim imperfections and avoid uncured nectar cells during packaging. Deep, or “brood”, boxes are too large for most colonies to complete wax building within a production season.

When preparing comb honey frames, use frames with 100% natural beeswax foundation to ensure a completely edible product. Avoid foundation containing wires or other supports, as these cannot be removed without damaging the comb honey. For best results, add a small amount of melted beeswax to the top the frame (Figure 4). This se-

cures the foundation and prevents warping during the hot summer months. To add the beeswax safely:

1. Melt beeswax in a double boiler.
2. Put your finger over the end of a plastic bendy straw to draw up some melted wax.
3. Place the straw against the top groove of the frame, with the foundation already installed.
4. Release your finger from the straw’s end, allowing wax to flow into the groove that holds the foundation in place and harden.

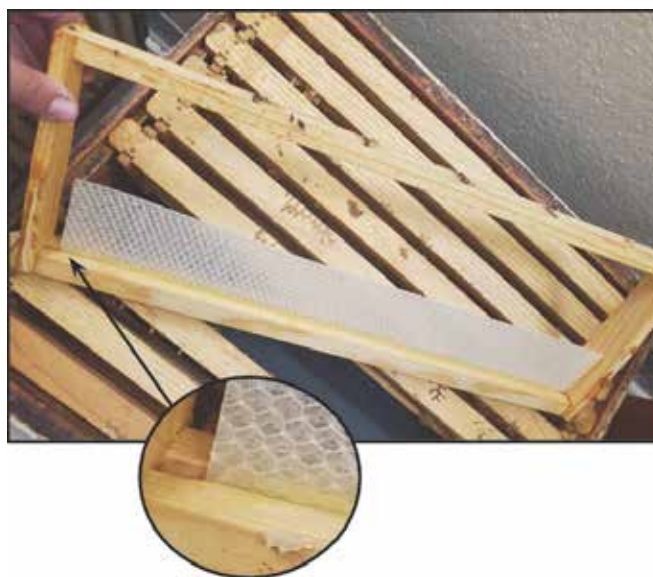


Figure 4. A frame with natural beeswax foundation is secured with melted wax in the top groove to produce comb honey (the frame is upside down to display the groove). You can choose a foundation sheet that covers a full frame or a strip of foundation, as shown in the photo, to help bees draw the comb correctly.

To maximize comb usage, each comb honey super should contain all its frames (usually 10) to discourage bees from building unwanted comb in empty spaces. Unwanted comb can occur as “burr comb,” built in empty spaces outside the frames, or “cross comb,” built to bridge one frame to another, and will destroy the comb honey when the frames are removed and separated. To further discourage this activity, provide a fully drawn frame in the center of the box that is empty—no food or brood present in the wax cells. The wax comb in this frame should be smooth, even and without defects so it serves as a template for the bees to build on neighboring frames correctly. As bees fill the center frames, move outer foundation frames inwards between frames that are being built and place the other

frame toward the outside of the box. This technique is known as “check-boarding,” and it works well with comb honey production in addition to stimulate colonies to initially build comb.

Hive compression process

Once frames are prepared and a local nectar flow has begun, it is necessary to compress the entire population of the colony down into one box. Compression can significantly boost your comb honey harvest because it crowds adult worker bees in an area lacking storage for incoming resources. This stimulates the bees to build more wax cells on the newly prepared comb honey frames described earlier.

The first step in compressing a colony is to locate the queen. She is typically found laying eggs on frames that contain brood. Carefully examine each frame of the colony for the presence of freshly laid eggs to narrow down her location. Once the queen has been located, gently place her in a queen cage or move the frame she is on into a separate empty brood chamber box that will become the brood chamber for the comb honey production colony (details on preparing this box in the next paragraph). The goal is to separate the queen from the box containing the comb honey frames.

In the new 10-frame Langstroth brood chamber box containing the queen, provide one frame each of honey/nectar and pollen/bee bread. If full frames of each frame are not available, two frames with a mix of honey/nectar and pollen/bee bread stores are acceptable. These food frames prevent the colonies from starving or decreasing brood production through the compression and comb-building process. Fill the remaining space in the brood chamber box with 5–6 frames mostly covered in capped (pupating) brood, while also including some open (larval) brood. Refer to Figure 5 for a visual guide on frame organization.

After organizing the frames in the brood chamber box, release the queen into the center of the brood chamber box and cover the box with a queen excluder to prevent her from leaving. Then stack the prepared honey super on

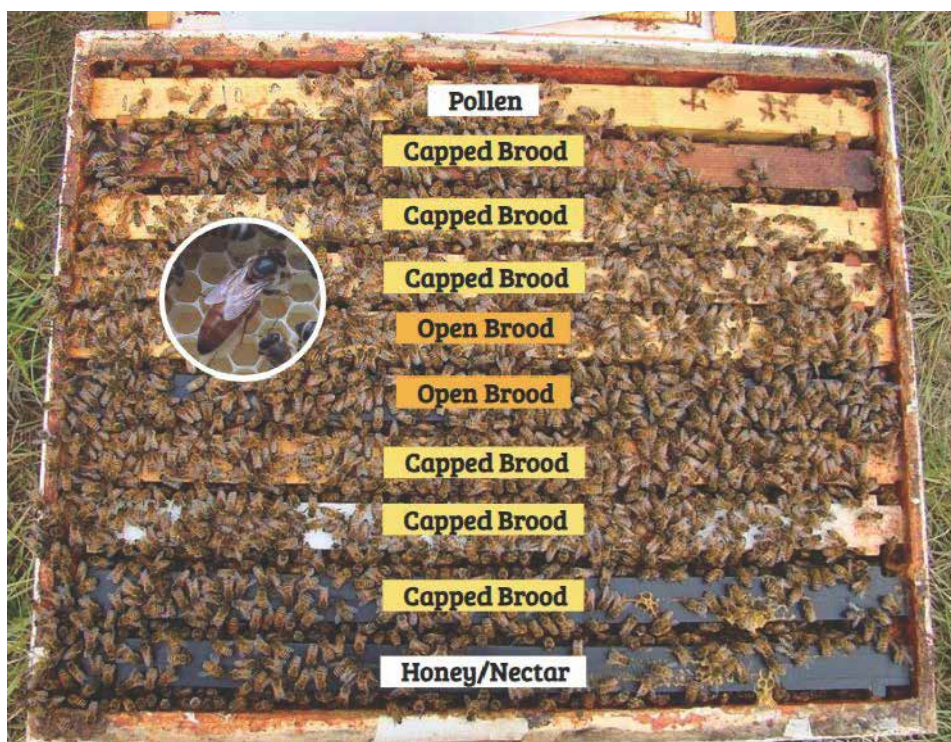


Figure 5. This diagram illustrates an ideal arrangement of resources and brood in the brood chamber. Position brood frames in the middle so the colony can maintain optimal brood-rearing temperatures. If caged, the queen should be released into the center of this brood chamber box.

top of the queen excluder. Move all remaining adult bees from the original colony box(es) into the prepared honey super by shaking the frames and equipment vertically up and down over the open honey super. A bee brush can help gently remove bees from frames and into the honey super. Seal all openings to the comb honey super thoroughly, including cracks where two boxes meet, missing box corners, and even the groove of the inner cover if present. In case of swarming, this prevents the newly mated queen from entering the super instead of the brood box. Any remaining frames of brood and resources can be added to other colonies in a beekeeping operation to support those colonies. The compression process is relatively invasive for a colony, and it may initially appear extremely crowded as the bees adjust to the new equipment (Figure 6). Over the next 1–2 days, a large number of bees may congregate outside the entrance. They will soon relocate inside and start to build wax in the comb honey super above the brood chamber.

Hive maintenance

During the comb honey production period, care should be taken to ensure that colonies do not become honey bound. This occurs when excessive amounts of nectar are brought back by foraging bees and stored through-



Figure 6. Example of what a recently compressed colony will look like. After the brood chamber is organized, the bees will initially congregate on the front of the colony. They will eventually move inside and start to build wax in the comb honey super above the brood chamber.

out the colony, leaving little room for brood-rearing. This buildup of honey in the brood area restricts the queen's ability to produce sufficient new workers to maintain the colony's population. A colony that is honey bound is also more apt to swarm since the bees are overcrowded with little brood to look after. Comb honey production will be severely hampered in colonies that swarm because the workforce is divided in half and a new queen must emerge, mate, and begin laying eggs, a process that takes approximately 2 weeks. It takes 21 days for worker bees to develop from egg to adult, so a substantial lag in population growth will occur, further limiting honey production through a nectar flow. If a colony happens to swarm, a newly mated queen will not always enter through the main entrance of her colony. If there is an entrance that leads to the comb honey super, she could decide to start laying eggs in the new wax that the beekeeper set up for comb honey. While there is a small chance a newly mated queen (which has not started laying yet) could get through the excluder and

into the honey super but this does not happen often. Unfortunately having brood develop in the comb honey super is a very quick way of losing an entire super of comb honey so it is also advised to seal any small alternative entrances to the boxes. This includes any cracks that bees can enter or exit through and ventilation grooves or other holes in inner covers.

To prevent colonies from becoming honey bound, the bottom box (containing the queen and brood) will need to be inspected every 10–14 days to assess the amount of honey in the brood chamber. If more than two frames of food resources (honey) are present, the excess food frames should be removed and replaced with empty, drawn wax frames. Capped honey frames that are removed become an early season bottled honey harvest that is typically light and mild in taste. Pollen frames should be treated similarly, wherein excess pollen in the brood chamber is replaced with empty drawn frames. The excess pollen frames can be given to any colonies in need of more pollen. If comb production colonies are reluctant to build wax, consider more frequent inspections (every 7–10 days). A colony that is reluctant to produce wax may have too many old foraging-age bees that might be less efficient in wax production. Add an additional frame of capped brood that is ready to emerge to boost the number of younger bees.

Harvesting comb honey

Once a colony has successfully built out wax, filled it with nectar, converted it to honey, and capped the comb in the entire super, the comb honey should be harvested, to ensure a successful harvest and keep the wax delicious. Over time, beeswax can develop a bitter taste as bees repeatedly walk over it and transfer pollen onto it from their feet. This also adds a yellowish darker tint to the wax. To avoid this, aim to harvest when the entire super is capped and honey production is complete, indicated by sealed wax cappings on honey cells.

Harvesting comb honey requires several pieces of equipment, starting with an empty super box to hold harvested frames and two or more extra lids. There should be enough lids to place one on the top and bottom of the super currently being harvested and any additional supers that will be harvested. One lid is placed under the empty box and the other lid will be used to open and close the box as frames are added to it. Next, the bees should be removed from each comb honey frame in each colony. The safest way to accomplish this is to use a soft bristled bee brush to gently brush the bees into the open brood chamber and then carefully place each frame into the empty super box.

Multiple harvested supers can be stacked but remember to place a lid on the top and bottom of the stack.

Quality control and storage of comb honey frames

Comb honey is fragile and more likely to crack with rough treatment. Excessive use of smoke should be avoided as it can leave an ashy flavor in the final product. Other chemical bee removal compounds are not recommended as they may leave unpleasant flavors behind. When transferring frames from the super to storage, keep them in the same order and orientation they were in originally. Bees do not always build comb out completely straight and, because a frame may have thicker and thinner portions, neighboring frames need to match to avoid breaking comb and leaking honey. If the comb does break, cut it immediately to salvage the quality of the remaining product (see “Cutting and packaging comb honey” below). As a rule of thumb, comb honey supers should be completely dry of honey outside of the frames. Liquid honey in the bottom of the box is a signal that an issue needs investigation.

Freezing comb honey is recommended to kill potential pests, even if none are visible. Freezing must be done before selling, whether before cutting or after packaging. Keeping comb honey frozen may also slow crystallization for longer storage. However, frozen honey is difficult to cut and cold wax is brittle so frozen honey should be treated gently. For clean cuts and sharp presentation, thaw frozen frames completely before cutting and packaging.

Cutting and packaging comb honey

Cutting and packaging comb honey requires, 1) the desired containers, 2) a very thin paring knife, 3) a cookie sheet with slightly raised edges, and 4) a cookie cooling rack that fills most of the area inside the cookie sheet. A flat spatula and damp cloth are also helpful during the packaging process. Inspect both sides of the frame to be cut and place the side with the least imperfections face down on the cooling rack inside the cookie sheet. This will be the top of the finished product. Upward-facing imperfections can be cut around. Any cells not capped by the bees before harvest do not contain shelf stable honey and should not be included in the comb honey pieces. Shelf stable honey has been dehydrated by the bees to a low moisture content (< 18%) which prevents fermentation from occurring. Uncapped comb areas can be processed into products to be sold and consumed immediately or may be given to friends and family to share in the bees’ bounty. Make a template to



Figure 7. This image shows the approximate cut locations and use of capped areas. The comb honey processing setup should look like the bottom image after the comb is cut out of the wooden frame. The top image shows what an ideal comb honey frame would look like. It is completely capped and has few imperfections to cut around. The bottom image shows an incomplete comb honey frame and is a good example of what beekeepers might have to cut around when packaging comb honey. The black square outlines show where one-pound pieces would be cut from. On the bottom image, the red markings suggest what pieces would not be complete enough to package for a shelf-stable product.

guide your cuts and minimize waste. Use a piece of clear, food-grade plexiglass or the bottom of a container and cut to fit the base of your packaging. Using a clear piece of material for the template allows imperfections to be easily located within the cut area (Figure 7). Once the pieces are cut, a spatula can be used to transfer the large squares into the desired containers.

Food safety and handling

As with many other food products, comb honey has regulations stipulating how it can be sold. Comb honey follows the same general food safety guidelines as extracted and bottled honey. Cutting and packaging must be done in a clean, sanitary environment. Surfaces should be sanitized before and after packaging and clean tools should be used. Regulations for selling comb honey can vary depending on location. In Nebraska, indirect sales of honey through a seller between the beekeeper and customer requires the honey be processed in a commercial kitchen. In other words, selling through grocery stores or another person requires a licensed, commercial kitchen for processing and

packaging. For more information on cottage food laws in Nebraska, or any other state, consult the appropriate state Department of Agriculture website.

Hive management after comb honey

After comb honey harvest is a suitable time to reset production colonies in preparation for overwintering. Many U.S. beekeepers in temperate climates overwinter in two Langstroth deep boxes. Immediately after removal of the comb honey, colonies will be comprised of just 1 deep box, so a second box with drawn frames should be stacked on top. This extra space allows the colony to expand and store honey to survive the winter. The end of the comb honey production season also coincides with when beekeepers should be conducting other late summer and early fall management practices such as treating for Varroa mites and feeding colonies that are low on food stores. In Nebraska, this is typically in early August. Comb honey should be removed before mite treatments are administered to colonies to prevent contamination of the food product.

Educating consumers

Comb honey is a unique, naturally beautiful product that cannot be faked. However, it may not be readily recognized by most consumers; thus, some education may be needed to market it. Highlight the advantages of comb honey to potential consumers. With concerns about “fake honey” and other products that may contain sugar syrup instead of honey, emphasize that comb honey is pure and unadulterated. Educate customers that comb honey lets them experience honey in its natural state, straight from the hive. Provide a sensory experience and spark interest by offering small, affordable bite-sized samples to entice customers to try comb honey before committing to a larger container. Bite-sized samples are also popular with kids who have a small amount of pocket money. Like honey sticks that are packaged individually in plastic clear straws,

bite-sized comb samples act as a quick snack at a farmers’ market. Comb honey provides opportunities to show people where their food comes from as it is minimally processed and demonstrates what honey looks like in the colony.

Gathering knowledge on what comb honey can be used for and how the bees produce it in the colony can go a long way in making a sale, especially when paired with a smaller sample purchase. Highlighting the “beautiful summer spirit of comb honey” is a fantastic way to describe it to potential customers so their curiosity is piqued! People who are familiar with comb honey often do not need much convincing to make a purchase and often will seek out beekeepers that are known to produce it. Product properties to bring up during the sales pitch include the inability for comb honey to be adulterated with other ingredients, the raw state of it, the novelty or specialty of it, and its use in education and outreach. Develop a 2–3 sentence attention-grabbing pitch that combines the suggestions above to start communicating with a potential customer.

Conclusion

Comb honey, a unique type of honey sold in its natural state, offers a chance for beekeepers to diversify their product line and stand out from the crowd. While producing comb honey takes more time and management, it is a novel product many people will have never seen before. Treating comb honey gently and making sure supplies and packaging are clean goes a long way in producing a tasty and eye-appealing product that customers will love and want more of. Offering comb honey as a product is an excellent way to connect with customers and illustrate where their food comes from. Children especially enjoy the novelty of the product as their curiosity is always strong. Comb honey production is remarkably close to becoming a lost art in beekeeping. By producing it and educating the public about its production, beekeepers can ensure this part of beekeeping history is not lost.

Materials needed by section

Setting up comb honey boxes

- ☐ Medium super
- ☐ Foundationless wood frames
- ☐ 100% natural beeswax foundation
- ☐ Melted beeswax
- ☐ Plastic “bendy” drinking straws

Hive compression process

- ☐ Standard safety equipment (smoker, hive tool, bee suit, etc.)
- ☐ Prepared comb honey supers, minimum one per colony but having an extra couple is a good idea
- ☐ Queen excluders, one per colony
- ☐ One extra empty deep “brood chamber” box
- ☐ Tape (for sealing any extra entrances into the super, including inner cover grooves!)
- ☐ Bee brush (optional)
- ☐ Suitable colonies
 - 16–18 frames covered in adult bees
 - Productive queen
 - Gentle temperament

Hive maintenance

- ☐ Standard safety equipment (smoker, hive tool, bee suit, etc.)
- ☐ Extra empty, drawn brood chamber frames
- ☐ Bee brush (optional)

Harvesting comb honey

- ☐ Standard safety equipment (smoker, hive tool, bee suit, etc.)
- ☐ One extra empty “super” box

- ☐ 4 or more extra telescoping lids (must not have spaces that allow bees in)
- ☐ Bee brush (optional)

Cutting and packaging comb honey

- ☐ Desired containers
- ☐ One very thin paring knife
- ☐ One cookie sheet with slightly raised edges
- ☐ One cooling rack that fills most of the area inside the cookie sheet
- ☐ One flat spatula
- ☐ A damp cloth
- ☐ One template to fit each size of container (a food-grade plexiglass template or the cut-out bottom of a container)
- ☐ Extra food storage containers for any pieces not fit for sale

Hive management after comb honey

- ☐ Standard safety equipment (smoker, hive tool, bee suit, etc.)
- ☐ One extra brood chamber per comb production colony
- ☐ Chosen Varroa mite treatment

Educating consumers—talking points

- ☐ Raw and unprocessed
- ☐ Beeswax cappings are the “bee’s seal of approval”
 - Comb honey cannot be heated otherwise comb will melt
- ☐ Comb honey is a specialty or novelty food item
- ☐ Demonstrates what honey looks like in the colony
- ☐ Demonstrates where food comes from

Other References

Phase 1 Comb Honey Production- Frame Setup

<https://youtu.be/2nQ0gZMBIqI>

Phase 2 Comb Honey Production- Hive Compression

https://youtu.be/olJJ2_pbs20

Phase 3 Comb Honey Production- Honey Harvest

<https://youtu.be/GQXp6j43tGY>

Phase 4 Comb Honey Production- Packaging and
Marketing

<https://youtu.be/qJazMvJA-JQ>



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