Beginning Honey Beekeeping Equipment and Associated Costs

EXTENSION

October 2021

Courtney Bir
Extension Specialist for Farm Management

Justin Talley
Extension Specialist for Livestock Entomology

JJ Jones
Southeast Area Extension Agriculture Economist

This fact sheet provides information regarding the equipment necessary to begin beekeeping. Please note that there are many differing opinions regarding which equipment is necessary. Costs may vary between locations, and costs can be reduced by building some equipment. Additional costs may be incurred in the general upkeep of hives. The steps of bee production, bee diseases and other beekeeping-related issues will be covered in other fact sheets.

Currently, Oklahoma apiary laws are in place to prohibit county, municipal, consolidated government or other political subdivisions from restricting the establishment or maintenance of beehives.[1] Although beekeeping is protected and encouraged in the state of Oklahoma, if you are an urban/suburban beekeeper, it is important to be a good neighbor and consider the impact on those nearby when choosing a hive site. A conversation with neighbors regarding your intentions and answering questions could help prevent future animosity.

Necessary Items Needed Immediately

The Beehive

Before you obtain bees, their habitat will need to be assembled. The habitat is referred to as the hive box (hereafter referred to as the "hive". There are many commercially available hive options. It is important to note that the size of the components of the hive can vary slightly between manufacturers. Future issues can be avoided by sticking with one company or beekeeping supply provider that will be easily accessible. Beekeeping equipment has become readily available and can be found in most farm stores, beekeeping shops or online. One of the most popular hive types for its ease of use and functionality is the Langstroth hive. There are several components of the base hive, including the brood box (often called a deep super), frames, vented inner cover, telescoping outer cover and bottom board (Figures 1 through 7). The vented inner cover goes directly on top of the uppermost box.

1 oklegislature.gov/cf_pdf/2005-06%20COMMITTEE%20SUBS/hcs/HB1809%20cs.pdf

Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
extension.okstate.edu

Figure 1. Empty Langstroth style brood box with screened bottom.

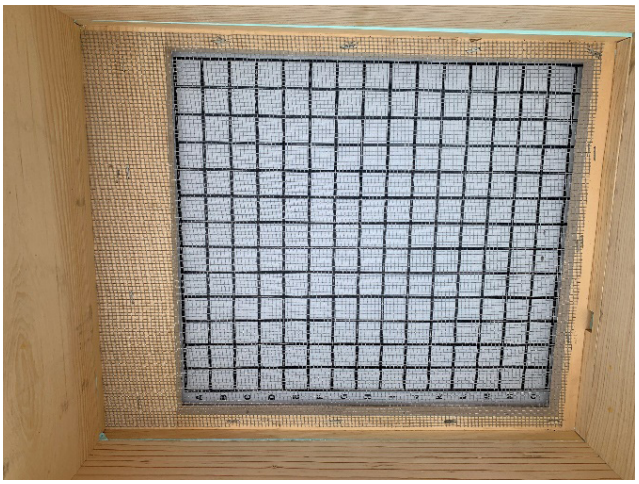

Figure 2. Empty brood box with mite count board.

The notch on the uppermost box should be at the front of the hive, with many beekeepers keeping it in the notch up position year round. Others recommend a notch down position in the winter to help keep hives warmer, and a notch up position in the summer to help keep hives cooler and prevent bees from creating or "drawing" comb between the vented inner cover and

Figure 3. Ten frame Langstroth brood box with frames in place.

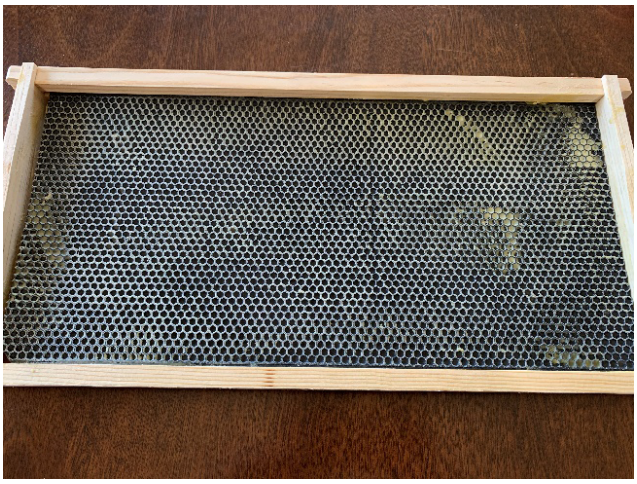

Figure 4. Frame with additional wax.

Figure 5. Vented inner cover.

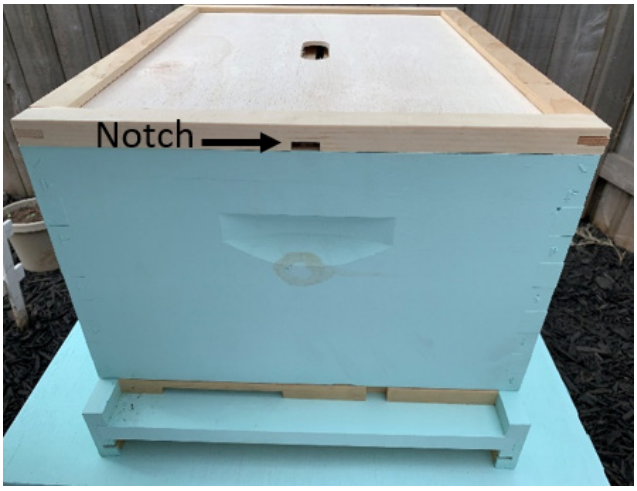

Figure 6. Brood box with vented inner cover in notch down winter position.

Figure 7. Hive brood box with telescoping outer cover.

frames. The spacing of hive equipment is carefully constructed because bees will create comb in any location larger than a "bee space." A bee space is between 1/4 and 3/8 of an inch and allows for movement of crawling bees, but discourages them from enclosing the space by building comb.

Many commercially available kits will include the beginning hive and other items such as an entrance reducer or mite count board. Entrance reducers can be used in colder weather to decrease the amount of cold air that enters the hive. They also may be used to decrease bee movement out of the hive while establishing a new hive, or to prevent robbing of resources such as honey or syrup by other bees. Mite count boards can be used to evaluate the varroa mite (a pest) on your bees and determine if they require treatment. There is some

debate surrounding the use of both mite boards and entrance reducers as they can also decrease the honey bee's ability to control the temperature and humidity in the hive. Larger kits may include additional brood boxes, or honey supers that will be added later as your hive grows. All additional boxes will be added on top of the brood box and below the vented inner cover and telescoping outer cover.

Setting up a Beehive

Most beehives that can be purchased are made with untreated pine wood. If you would like to extend the life of these hive boxes (recommended), paint all outer components with a low volatile organic compound (VOC) outdoor paint. Any color of paint can be used, but it is recommended that the hive be painted with white or pastel colors. Darker hives may become too hot, thereby affecting honey production. As seen Figure 1 through 7, only the outer components of the beehive are painted, with any space the bees will occupy being left unpainted. All painting should be completed at least two to three weeks before your bees arrive. This allows the paint to cure.

When choosing a location for your beehive, choose a well-drained location with good airflow. If possible, a northern windbreak is ideal. If the location is not near water, you will need to provide the bees with a reliable source of water. Urban/suburban beekeepers often will use small buckets or dog bowls. Just make sure to provide a landing spot for bees, such as floating pieces of wood or river rocks, as bees can easily drown. If water is not provided, a neighbor's pool may become their source of water and a problem for you. Another consideration for urban /suburban beekeepers is the substrate underneath the hive. You may not want to mow near and under the hive, thus, placing mulch or rock under the hive will eliminate the need for mowing under the hive. Note it would be best to make such decisions prior to installing bees.

If you decide to have multiple hives, it is important to space them properly to prevent "drifting". Drifting is observed when some bees go to the wrong hive. Most drifting is caused by prevailing winds but is observed more often when the hives are placed in long rows too close together. When using multiple hives, they should be placed in a horseshoe pattern and should be spaced at least 5 to 8 feet apart.

Beehives should be elevated off the ground. This can be done using custom-made stands or cinder blocks. Note that if wooden stand is built, the legs of the stand may eventually rot, causing problems. In the example photos, the beekeeper has chosen to use four leveled cinder blocks with a piece of plywood on top to elevate the hive (Figure 7). Given the wind in Oklahoma, it is important to secure your hive. Beekeepers often use a tie-down to secure the hive or many simply place a large rock on top of the hive.

Commercially made plastic frames will have some wax applied to help encourage bees to create comb on the frame. Many beekeepers recommend adding wax to frames when starting a new hive. Wax should be bees wax, not general wax, and it can be purchased from a beekeeping supplier or from another beekeeper. Simply melt the wax and apply with a brush or roller.

Other Beekeeping Tools

Personal protection is highly recommended when handling bees, and there are many varieties. Some beekeepers will use just a beekeeping veil and gloves, while others wear a complete suit. Jackets are available as well, and some people sew their own garments. The option really depends on your personal preference and risk tolerance. Light colors are preferable to dark colors. Many beekeepers opt to wear a baseball cap under their veil to keep the mesh further from their face.

Most beekeepers will feed their bees during certain times of the year. Bees consume a 1:1 sugar-to-water ratio in the spring, and a 2:1 sugar-to-water ratio in the fall. To stimulate brood (immature bees including eggs, larvae and pupa) rearing a 1:2 mixture is recommended. Use white granulated cane sugar, mix with the correct amount of hot water and stir until dissolved. When bees first arrive, it is critical to provide sugar water. Most beekeepers will remove the feeder on a new package in April or once nectar flow begins. There are two main types of feeders. A Boardman entrance feeder is an external gravity feeder, which is essentially an inverted mason jar on a stand (Figure 8). These feeders are easy to refill without disturbing the bees and are easy to monitor. However, they do not hold much, and a newly established colony can consume a lot of sugar water. The feeders also may encourage robbing, as they are easily accessed by other bees. Additionally, sunlight exposure can spoil the syrup quickly. Another option is an internal feeder (Boardman division board feeder). This feeder can hold significantly more sugar water. However, you need to open up the hive to see if the feeder is low so it can be replenished. Although these feeders are designed to minimize bee drownings, there is still the potential

Figure 8. External gravity feeder.

Figure 9. Internal feeder.

Figure 10. Internal feeder installed in a hive.

for drowning. For internal feeders, remove at least one frame to install the feeder (Figures 9 and 10). Other feeder types, such as plastic feeder pails are also available. There are many feeding supplements commercially available. Other types of food include non-syrup foods such as dry sugar, mock candy, fondant or sugar candy and pollen patties. More advanced bee feeding will be discussed in other fact sheets.

A smoker makes handling bees much easier (Figure 11). There are many versions of a smoker, but in general, they consist of a fire chamber with bellows and are designed to provide cool smoke. The smoke will drive the bees toward the bottom of the hive, encouraging them to drink honey, which makes them more docile. The smoke also masks the bees alarm pheromone which encourages stinging. Smokers do not take long to start, and can be started 5 to 10 minutes or so before an inspection for optimal smoke. There are many types of fuel sources for a smoker, some of which are marketed specifically for bee smokers. Items that can be used include straw, wood shavings, cedar bark, peanut shells, pine needles, burlap, rags (100% cotton), dried dung and cotton. Please note that the smoker gets very hot. Make sure the fire is out and the smoker is cool before putting it away, and never leave a lighted smoker in a vehicle.

Figure 11. Bee smoker.

Figure 12. Bee brush.

A bee brush is a soft bristle brush used to clear bees off a frame (Figure 12). It is a handy tool, but not practical for clearing bees from multiple honey frames. This tool is mostly used to remove a few bees at a time.

A hive tool is one of the most important tools for a beekeeper (Figure 13). Bees will "glue" together frames and the other components of the hive using a substance called propolis (plant saps that they collect). This makes the hive tool necessary to help separate the hive components when doing a hive inspection. Additionally, a hive tool can be used to remove comb that is not on a frame, for example built on the tops of frames or other undesirable locations. This undesirable comb is called burr comb or brace comb.

The Bees

There are three main ways to obtain bees. The two options for purchasing bees include a package of bees or a "nuc" (nucleus). There are many pros and cons for both options and we will only list a few. A package of bees contains only bees (including a queen) and does not include any frames. Without frames, the package does not include drawn comb, brood,

Figure 13. Hive tool.

honey stores or pollen stores. A package can be shipped directly to you. The advantages of package bees include less expense, easier to handle as there are fewer bees, no brood disease and easy-to-obtain replacement queens. Cons include slower turnover time (time until the next generation of adult bees) and additional feed requirements. If flowers are not in bloom when the package is received, you will also need to provide the bees with pollen patties. The seller of the bees should include instruction on how to install the packaged bees.

Nucs contain three to five frames, adult bees, comb with eggs and brood, stored honey and pollen and (usually) a reproductive or "laying" queen. Nucs cannot be shipped, but can be purchased locally. It is easy to transfer the bees while on the frame from the nuc into the new hive box. Nucs have a faster turnaround because there is already drawn comb and many life stages of bees. This is a benefit, but also means the beekeeper must be prepared to add more equipment as the hive can quickly grow. If the frames are not brand new, they may contain disease spores and pesticide residue. Nucs may also require feeding and the seller of the package should provide directions on how to install the nuc. Most companies will take package and nuc reservations around January, although it is often possible to secure them later in the year.

Another option is to find a swarm of bees (preferably in a tree and not inside a dwelling), capture the swarm and then establish the swarm within your hive. Catching a wild swarm is beyond the scope of this fact sheet. The pros of capturing a swarm include the price (free other than your time). The main con, other than not being able to count on finding a swarm, is not knowing the pedigree of the bees captured, which could be aggressive. Swarming generally occurs in the spring.

Items Necessary Within the First Year

Once the bees have drawn comb on eight of 10 frames, it is time to add a second box. There is some debate surrounding what size box should be added. Some beekeepers will suggest, in our Oklahoma climate, only a single deep brood box is needed for the bees to overwinter. If you agree, you will be adding a medium honey super on top of the brood box. Wait until the bees have begun to draw comb in the new medium honey super, then place a queen excluder on top of the brood box between the brood box and the medium honey super. A queen excluder eliminates the chance the queen will place eggs in your honey box. If you do not anticipate doing a split of the hive, you may consider using a medium-sized box as a second brood box. In this case, you would not place a queen excluder. A split occurs when the colony is large and strong enough to be separated into two separate hives. A separate fact sheet will be written on this procedure. If you are considering doing a split, or perhaps live in a more northern region of Oklahoma with harsher winters, use another deep box as the second brood box. Remember, the new box will need to be pained and cured in all of these situations, so do not wait until the box is needed to get started. Bees work from the top of the hive downward, which is why additional boxes are added as needed and not all at once.

Optional or as Needed Items

There are many diseases and pests that can be identified in a hive. Those diseases and pests will be discussed in detail in another fact sheet. There are two additional items you may want to purchase. Hive beetle traps are a small plastic trap that you fill with oil (Figures 14 and 15). The trap is then placed between frames to catch small hive beetles. Secondly, many people routinely treat for mites. There are many treatment options. In the example budget, the price for mite strips is included.

Other items may include a frame holder. This metal item is designed to fit on the outside of the box when you are doing inspection. Inspected frames can be hung on the frame

Figure 14. Hive beetle trap.

Figure 15. Hive beetle trap installed in a hive box.

holder, which will allow for more maneuvering space as you work through the hive. A spray bottle containing 1:1 sugar water is also a handy tool to have and is often recommended when installing new packages of bees.

State Registration

In the state of Oklahoma, beehive registration is currently on a voluntary basis. Beehives can be registered at: kellysolutions.com/OK/beekeepers/newapplication/applynow.asp. There are three types of registration as outlined in the apiary act: migratory beekeeper ($100), voluntary beekeeper ($10) and sensitivity registration ($0). The migratory beekeeper registration is for beekeepers who move or transport colonies of bees into the state on a temporary basis. The voluntary beekeeper registration is available to "Any person establishing, maintaining or locating an apiary within the state; Any person shipping bees into the state; Migratory beekeepers that transport colonies of bees into the State." This registration also includes listing the hive on the sensitive area map and is often required by farmers' markets. The sensitivity area allows pesticide applicators to know where the apiary is located, so treatments are not applied nearby. Additionally, if a larger apiary is being established, you may qualify for government disaster assistance and must be registered with the state prior to registering with the Farm Service Agency (FSA). Sensitivity registration simply adds the apiary to the sensitive area map.

Budget

Following is an estimated budget of necessary, optional or as-needed items and future purchases. The bare minimum equipment in the estimated budget costs $458, totaling $520 by the end of the year. There are many price differences, and slight changes can be made that will change the budget. Also provided is a blank budget for you to consider your own costs. It is important to remember these are starting costs and do not include additional items that will be needed later or equipment needed to harvest honey. An excel version of this budget is also available here.

References

Blackiston, Howland. Beekeeping for dummies. 5th edition. John Wiley and Sons inc: Hoboken, NJ, USA.

Oklahoma Legislature. Apiary act. Available online from: oklegislature.gov/cf_pdf/2005-06%20COMMITTEE%20SUBS/hcs/HB1809%20cs.pdf

Sammataro, Diana and Avitabile Alphonse. The Beekeeper's Handbook. 4th Edition. Cornell University Press: Ithaca, NY, USA.

Example Bee Equipment Budget

Item	*Quantity*	*Estimated Cost*
Necessary items immediately needed		
Brood box with frames, vented inner cover, telescoping outer cover, bottom board and entrance reducer	1	$120.00
Hive stand (Cinder blocks)	four concrete blocks	$7.12
Plywood sheet for base	1	$15.00
Low VOC paint	1 quart	$15.98
External feeder	1	$6.50
Veil or full beekeeper suit (suit price with gloves listed)	1	$40.00
Bee Smoker	1	$40.00
Smoker fuel (chicken litter listed)	4.5 cubic ft	$9.99
Hive Tool	1	$5.99
Bee Brush	1	$6.00
Bees (Nuc price listed)	1 nuc	$180.00
Sugar or bee feed (sugar listed)	25 pounds	$11.78
	Necessary items total	**$458.36**
Necessary within first year		
Second brood box (either deep hive or medium super)	one deep hive	$61.99
	Additional first year total	**$61.99**
Optional or as needed items		
Queen excluder	1	$6.49
Internal hive feeder	1	$8.99
Ratchet strap and anchors for tying down hive	1	$14.00
Spray bottle	1	$3.28
Pollen patties	2	$9.98
Additional frame wax	1 pound	$11.00
Hive beetle traps	pack of 12	$14.98
Oil for hive beetle traps	48 fluid ounces vegetable oil	$2.00
Frame holder	1	$17.49
Mite strips	two treatments	$15.65
State registration	1	$10.00
	Optional/as needed item total	**$113.86**
Future purchases		
Honey Super (likely will need multiples)	1	$49.99
	Future Purchases Total	**$49.99**
	Grand total	**$684.20**

Fillable Budget

Item	*Quantity*	*Estimated Cost*
Necessary items immediately needed		
Brood box with frames, vented inner cover, telescoping outer cover, bottom board and entrance reducer		A _____
Hive stand and base		B _____
Low VOC paint		C _____
External feeder		D _____
Veil or full beekeeper suit		E _____
Bee Smoker		F _____
Smoker fuel		G _____
Hive Tool		H _____
Bee Brush		I _____
Bees		J _____
Sugar or bee feed		K _____
Necessary items total (AA) = A+B+C+D+E+F+G+H+I+J+K		_____
Necessary within first year		
Second brood box (either deep hive or medium super)		L _____
Additional first year total (AB) = L		_____
Optional or as needed items		
Queen excluder		M _____
Internal hive feeder		N _____
Ratchet strap and anchors for tying down hive		O _____
Spray bottle		P _____
Pollen patties		Q _____
Additional frame wax		R _____
Hive beetle traps		S _____
Oil for hive beetle traps		T _____
Frame holder		U _____
Mite strips		V _____
State registration		W _____
Optional/as needed item total (AC) = M+N+O+P+Q+R+S+T+U+V+W		_____
Future purchases		
Honey Super (likely will need multiples)		X _____
Future Purchases Total (AD) = X		_____
Grand total = AA+AB+AC+AD		_____

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President for Agricultural Programs and has been prepared and distributed at a cost of 20 cents per copy. October 2021 GH.