



4-H Beekeeping

Advanced Beekeeping Methods



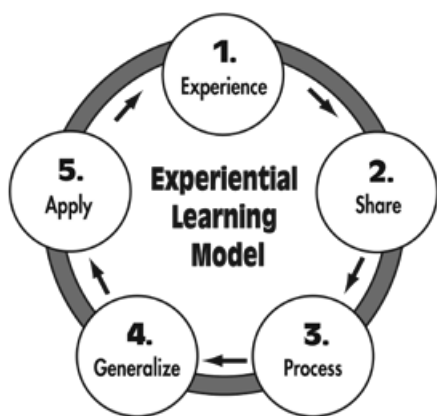
4-H Beekeeping, Division III: Advanced Beekeeping Methods

The 4-H beekeeping project is intended to help you learn about bees and how to be a beekeeper. Beekeeping offers many hands-on educational experiences, from learning about bees and honey plants, to learning to raise bees and produce honey, to learning how to market your honey.

If you have completed the 4-H beekeeping manuals, *Division I, Understanding the Honey Bee*, and *Division II, Working with Honey Bees*, you are now experienced and knowledgeable enough to study more advanced topics. These may include increasing the number of your honey bee colonies, increasing honey production, producing special kinds of honey, and learning more about the bee societies. If you have not studied the Division I and II beekeeping manuals, you should review them and start slowly in *Advanced Beekeeping*.

Note to Parents and Volunteer Leaders

The 4-H beekeeping project helps youth learn about raising honey bees. Beekeeping offers many exciting educational experiences, from learning about bees and honey plants to learning to raise bees to make and sell honey. The *4-H Beekeeping Helper's Guide* (4-H-576-W) has information about youth development stages, experiential learning, and other resources that might be useful. The learning experiences in this manual have been planned to initiate “experience centered” activities. Youth are encouraged to take responsibility for their beekeeping projects. They can enhance their learning by consulting resources on the Internet, at school, and at the library, or by talking to someone who raises bees.



Experiential learning distinguishes 4-H youth development education from many formal educational methods. Activities are designed so youth *experience* a learning activity, *share* what they did, think about their experience (*process*), *generalize* what they learned to other situations, and then think about how they can *apply* what they learned in their lives (now or in the future). You can help guide youth through the experiential learning steps to enhance their learning.

Purpose

Division III Beekeeping is intended to help youth learn many things, including

- how to increase the number of their honey bee colonies;
- how to increase honey production, producing special kinds of honey;
- more about the bee societies;
- how to compile beekeeping records;
- how to present the results of their work to others; and
- how to develop inquiring minds — the habit of asking questions and searching for answers.

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Advanced Beekeeping Methods

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Introduction

When you feel confident in your ability to maintain a beehive throughout the year and have been successful in producing surplus honey, you are ready to undertake more complex and difficult projects with your bees. In *Advanced Beekeeping*, you will continue to develop your skills as a beekeeper. Good beekeepers not only care for their colonies, but also manage them to increase honey production.

Your goals for advanced beekeeping should be

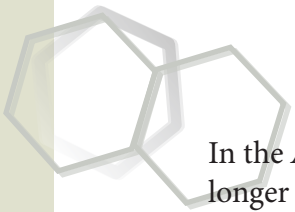
- keeping strong, populous colonies with young queens,
- continuing to improve your understanding of the ways of bees, and
- experimentation.

As your beekeeping experience increases, your ability to work more quickly and competently also increases. You will be able to add new hives to your small original apiary until it contains the maximum number of hives that you can care for. Good beekeepers know what their maximum apiary size should be and do not try to overextend themselves.

To determine the number of hives you can tend, you will need to consider a variety of factors: time, expense, space considerations, your own physical condition, local climate, etc. The maximum number of hives differs from beekeeper to beekeeper. For a hobby, the maximum may be two hives; for a young farmer, it could be 200.

To achieve the greatest amount of honey production, you must realize that your beehive is a dynamic, changeable system with much potential for growth. Be alert to the apiary operations that can be improved and consider experiments that will help you understand more about your bees. As you learn more, you will be able to help your bees produce more honey.

Although you have had some practical experience in beekeeping, you should not neglect the help that other beekeepers can still give you. As you continue this project, the advice of more experienced people will be as valuable as it was the first time you watched a beehive being opened. Continue to read all you can and to take your questions to your beekeeping advisor, local bee inspector, and local and state associations.



In the *Advanced Beekeeping* project, you are in charge. No longer will you be told what to do and when to do it. No longer will you be asked specific questions to show your understanding of a concept or procedure. Now you are basically on your own. You choose your activity, do it, and when you believe you have mastered it, move on to another.

Projects

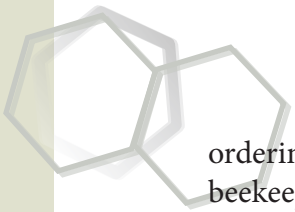
The project suggestions given later in this manual are just that: suggestions. They are intended to develop your beekeeping skills. You can pursue any beekeeping project of your own design. Choose one that fits your own interests and the needs of your bees. See the list under Project Suggestions for ideas. Select a project that you are interested in and read about it. If you are still interested, begin work on the project. Undertake as many activities as you think you will be able to complete, but do at least two projects each year. Keep a notebook with an up-to-date description of your work. With the aid of a beekeeping diary, you can write a detailed report explaining your project from start to finish. Consider taking photographs, making drawings, or using other ways of adding to the explanation of your activities.

Use the Resources section to find sources of information. Many projects may be done using the **Scientific Method** (page 34). Following the steps listed for the scientific method helps to organize your thoughts and experiment. This makes for a nice comparative project. Make your own data sheet following the five steps listed.

An **interactive demonstration** (page 35) is a good way to show others what you have learned and to interest them in beekeeping. Read the guidelines in this manual for ideas about how to present and evaluate your demonstration. Ask your county Extension educator about doing an interactive demonstration at the Indiana State Fair, if you are interested in doing that.

Resources

There are two books that are recommended for the serious beekeeper, *Honey Bee Biology and Beekeeping* and *The Hive and the Honey Bee*. These books contain a lot of information about bee biology and products of the hive, including most of the information a beekeeper would ever need. Therefore, it is a good idea to purchase a copy of one of these books or to make certain that your local library has one. *Honey Bee Biology and Beekeeping* is the better one, but is more expensive. See the Resources section of this booklet for



ordering information and for information on subscribing to a beekeeper trade journal.

Record Sheets

Keeping accurate records is important. Records help you remember what you did and evaluate the success of your work. They also help you keep track of how much time and money you are spending on your beekeeping project. The record sheets given in the manual may be copied, or you can use them as guides to create your own record sheets.

Managing Honey Bee Colonies

Choosing a Good Apiary Site

The site you choose for your apiary should have plenty of floral sources within two miles of your hives. In much of the Midwest, wild clover will be a major source of nectar for your bees. Any place that has a mixture of trees and unplowed fields is good. Ideally, there should be water available within a quarter mile of the hives. Bees can collect water from dew and puddles, but during a hot, dry summer, even dew may be scarce, and bees need water to air-condition the hive and to dilute royal jelly for feeding brood. The apiary should be accessible at all times of the year. It is best if the hives are placed on hard, dry ground that you can drive up to in a truck. It is advisable to place the bees near some trees that block the wind from the west and on a slight hill to avoid frost pockets. A protected site with good air drainage will improve the chances that your bees will survive over the winter.

Increasing the Number of Colonies

You can increase your colonies by buying nucs, installing package bees, or dividing your existing colonies.

Buying nucs

Purchasing nucleus hives or “nucs” is a very good way to increase your colonies. The nuc is a small hive of three to five frames containing comb with bees, brood, honey, and pollen. A nuc will build up more quickly than a package of bees that is installed on foundation, because there already are some capped brood and empty cells where the queen can lay eggs. Nucs purchased locally are more likely to have queens that produce bees adapted to your local conditions. Ask at beekeeper meetings or look on the Internet for beekeepers that sell nucs or local queens. Usually, you will need to supply the brood box and enough frames with foundation or comb to fill out the box.



Installing Packages

Sometimes you cannot find a provider of nucs or they are not available early in the year when you want to get your bees. In this case, buying package bees is a good option. Package bees are produced in southern states early in the year for shipment up north. They can be purchased from a supplier and shipped to you directly, or you can make arrangements with someone who is planning to bring a truckload of packages to your area.

1. Order a 2- to 3-pound package of bees with a marked queen to arrive at a specified date. Order early (preferably by January), because some years they sell out. Packages can usually be installed in the Midwest about April 1.
2. Prepare all of your equipment before your bees arrive. For each colony, you will need the following:
 - a. Hive stand to keep the bottom off the ground
 - b. Two deep brood boxes with ten frames of foundation each (or 9 to 10 frames with comb)
 - c. Bottom board
 - d. Entrance reducer
 - e. Inner cover
 - f. Two supers for the honey flow
 - g. Cover
 - h. A way to feed the bees (A “friction pail” or gallon jar with small holes in the lid both work well.)
 - i. Division board feeders (These can be used with floats to keep the bees from drowning. Entrance, or “Boardman,” feeders are convenient, but don’t work well in temperatures below 40°F)
3. When the package arrives at the post office, check to make sure the bottom is not covered with dead bees. If there are 2 to 3 inches of dead bees, notify the shipper and ask for compensation. Keep the package in a dark place at about 50° to 70°F. Spray with 1:1 sugar syrup, but do not soak the bees too much. If you need to wait a day or two before installation, spray with sugar syrup twice a day.

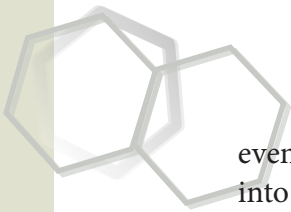
Install the package as soon as possible. Just before dusk is ideal. Packages can be installed at other times of the day if it is raining or cool (45°F or less). Installing in the



Removing the queen cage



Shaking the bees onto the hive

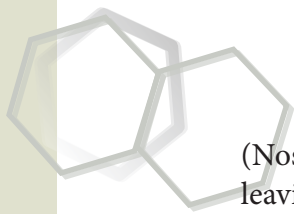


evening keeps the bees from leaving the hive and drifting into others. If you only have one hive, this is not important. If installing during the day, block the entrance with some grass for an hour to keep the bees in the hive, otherwise the bees will tend to drift into the most visible hive (usually the bees fly into the one on the end). Remove the grass after a few hours or the next morning. Spraying the bees with 1:1 sugar syrup right before shaking them into the box can also help keep them from flying. Installation steps:

- a. It usually is not necessary to use smoke when installing a package, but it is a good idea to have a smoker lit. It may encourage them to go down into the box.
 - b. Pry out the syrup can with your hive tool and set it aside.
 - c. Remove the queen cage and put her in your pocket.
 - d. Jar the package sharply to knock the bees down to the bottom. Turn it over and shake it vigorously from side to side to get the bees into the box. You may need smoke to encourage the bees to go down between the frames.
 - e. Let the bees release the queen by eating the candy. Remove the cork from the candy and put a small hole in it with a frame nail (being careful not to stab the queen). Then, position the cage at an angle between the middle frames with the screen facing down so the bees can feed the queen. It is a good idea to put the candy end of the cage at the bottom, just in case it gets wet. This prevents it from flowing onto the queen.
4. Feeding the bees after installing the package is very important. Your colony will decline in population until the new brood hatches and the queen needs comb to lay eggs in. Feeding will allow them to draw out the comb from the foundation. Feed the bees with a gallon jar of 1:1 sugar syrup (at least 50 to 60 percent sugar by volume) that is inverted over the hole in the inner cover and has about six small holes in the lid so the bees can feed on it. In cold weather, it might help if the first two gallons of syrup contain the medication fumagillin, which is sold as a powder called Fumadil-B. This will prevent dysentery



Introducing the queen in the cage



(Nosema). Place the feeder jar over the inner cover hole, leaving a space for bees to come out. Cover the jar with an empty hive body. Check the feeder jar regularly and refill it whenever it is empty. You may need about 5 to 7 gallons of 1:1 sugar syrup per package if installing the package onto foundation. If you are installing the package onto comb, much less syrup will be needed. It is also possible to feed the hive with a division board feeder or Boardman feeder.


5. Check the feeder the next day to make sure your bees have consumed some syrup. If the bees are not clustered in the middle, rearrange the empty frames so that the bees are in the middle.
6. Check the queen in three days. If she is still in the cage, make sure the bees are not biting the cage. It will be easy to push them aside with a finger unless they have latched onto the cage with their mandibles. Then, pry off the screen and allow the queen to walk between the frames. If the bees are latched onto the cage, do not release her, because they will kill her. In this case, you may have another queen in the colony, or it may just require more time for the introduction. If the queen was released by the bees already, check for eggs in the bottom of the comb by tilting the cells up to the light. If there are no eggs and no queen, you may need to order a new one. But it is also possible that she just hasn't laid any eggs yet because she is too young or because there are no cells to lay them in, and you just can't find her!
7. Check the bees one week after installing the package. Always carefully remove an outer frame first to avoid crushing the queen. Look for drawn comb containing eggs. If there are no eggs, search for the queen. If you cannot find her you will need to buy a replacement queen.
8. Inspect the bees every 7 to 10 days to make sure there are eggs and a queen. Observe the expansion of the brood nest, but do not disrupt the nest by rearranging the frames. Replace the frames in roughly the same configuration.
9. When all of the comb is drawn from the foundation in the first box, or at least started by the bees, add a second deep box. You can take one or two outer frames of drawn comb that have little or no brood from the first box and place them toward the center of the upper box to encourage the bees to move up and draw out the foundation and expand the nest.



Bottle feeder



Division board feeder



10. Watch. Give the bees new boxes as soon as they fill up the old ones. When adding supers that contain foundation, place them directly above the brood nest even if you have one super of drawn comb and honey in place already. This will encourage them to draw it out. Supers with foundation should have ten frames; those with comb can have 8 to 9 frames if properly spaced.

Splitting Colonies

There are many ways to divide colonies. Two examples are given below. You need to complete the following preparations before using either method.

- Choose strong colonies to divide. The best time is 4 to 6 weeks before the time swarming usually occurs. This is early to mid-April for most Midwestern states.
- Be sure to use enough smoke.
- Ideally, the colony should have brood on 8 to 10 frames or more.
- Arrange for a new queen to be delivered either the day before you want to divide the colony or the same day that you will divide the colony. She will be shipped in a cage with candy and worker “attendants.” If the queen of the strong colony is more than a year old, you may want to order two queens and replace the older queen with a new one. If necessary, a queen can be kept in the cage with the attendants for several days to a week in a location that is 65–70°F. Give them a tiny droplet of water with your finger once or twice a day on the screen, but don’t let them get wet.
- Have your equipment ready for another colony. You will need the following items:
 - Another hive stand
 - A bottom board
 - Top and inner covers
 - Two deep hive bodies with combs or frames with foundation
 - A feeder is a good idea if there is no nectar coming in from the flowers or you are adding foundation instead of drawn comb (use a division board feeder or gallon jar with a few nail holes in the lid and 1:1 sugar syrup).
 - An empty, deep hive body to enclose the feeder



Strong hive ready to split!