



Indiana 4-H Beekeeping

Helper's Guide





4-H Beekeeping Project

4-H Beekeeping

Studying and learning about bees can be both fun and profitable. The Indiana *4-H Beekeeping* curriculum was written for youth who want to learn about bees and beekeeping. The first manual, *Understanding the Honey Bee*, covers information on the basic facts of beekeeping: the types of bees, the honey and wax they produce, the plants that attract bees, and the equipment a beekeeper needs. Youth do not need to own bees to complete the first year of beekeeping. The second manual, *Working with Honey Bees*, helps youth learn how to care for their own beehive. Basic beekeeping operations and the production of honey (extracted, chunk, or cut comb) are covered. When youth are experienced and knowledgeable enough in the basic care of a beehive, they should move on to the third manual, *Advanced Beekeeping Methods*, and other resources. The advanced topics include increasing the number of your honey bee colonies, increasing honey production, producing special kinds of honey, and learning more about bee societies. Youth will enhance their learning experience by using other resources from the Internet, school, or a local library. See the “Resources” section at the back of the manual for recommended publications.

Parents can be a big help if they are involved with their child’s learning, especially for younger 4-H members. Parents that sit in on meetings and ask their child about what they learned and what they did not understand help their child have a stronger learning experience. Youth are more excited to learn if they have parental support and interest in what they are doing. As they mature, youth should take on more responsibility for their learning and move to independent learning. Parental interest will reinforce what youth learn at any age.

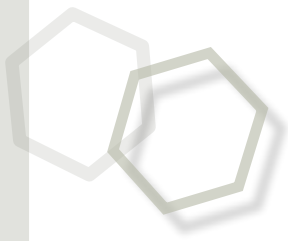
General information about the Indiana natural resource projects, including *Frequently Asked Questions* and exhibit pictures from the Indiana State Fair are available at:
www.four-h.purdue.edu/staff/home/natalie/4h.html

Exhibit guidelines and record sheets are available on-line at: www.four-h.purdue.edu/projects.

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Youth Learning Goals

4-H Beekeeping, Division 1, Understanding the Honey Bee

- Begin to learn about bees and how to become a beekeeper.
- Develop an understanding of, and an appreciation for, bees.
- Share the information learned through exhibits.

4-H Beekeeping, Division 2, Working with Honey Bees

- Learn more about bees, beekeeping, and making honey.
- Learn to keep records.
- Expand your knowledge of bees and beekeeping.
- Exhibit your work to teach others in an engaging manner.

4-H Beekeeping, Division 3, Advanced Beekeeping Methods

- Expand your understanding of and appreciation for bees and beekeeping, especially:
 - ◇ Managing honey bee colonies
 - ◇ Taking care of your queen
 - ◇ Seasonal management
- Use resources beyond this manual for in-depth study of beekeeping topics of interest.
- Continue to keep accurate records and use the records to make decisions.
- Educate others about beekeeping through exhibits, presentations, action demonstrations, and mentoring younger 4-H members.

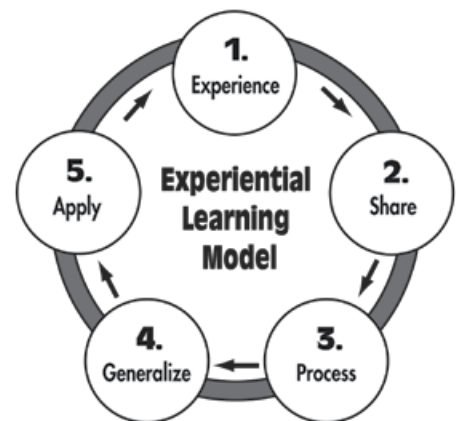
The Experiential Learning Model

(Source: Excerpted and adapted from “Experiential Learning in 4-H Project Experiences, 4-H Volunteer Leaders’ Series,” University of Arkansas Cooperative Extension Service, Dr. Darlene Z. Baker. You may view the entire document at: <http://publications.uaex.edu/>. Search using the word “experiential.”)

The Experiential Learning Model is a way of teaching to help youth make the most of any activity that they experience. Experiential learning distinguishes 4-H activities from many other educational methods. Experiential learning is a process that allows youth to first learn by doing, before being told or shown how, and then process the experience. Activities are designed so youth **experience** a learning activity, **share** what they did, **process** what they did (discuss, analyze, reflect), **generalize** what they learned (to test the 4-H members comprehension and appreciation of the activity), and then think about how they can **apply** what they learned to other situations (generalize).

The advantages of using the experiential learning process in group settings include:

- The adult can quickly assess the student’s knowledge of the subject.
- The student builds on past experience or knowledge.
- The adult is a coach rather than a teacher.
- The youth relate the experience to their own lives and experiences.
- Mentors may use a variety of methods to involve the youth in the experience.
- Youth with many different learning styles can be successful.
- Discussions can move from the concrete to the abstract and analytical, at the middle and high school ages.
- Youth are stimulated to learn through discovery and to draw meaning from the experience.
- Youth can work together, share information, provide explanations and evaluate themselves and others.
- Youth take responsibility for their own learning.



Pfeiffer, J.W., & Jones, J.E., "Reference Guide to Handbooks and Annuals"
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Evaluating youth learning using a simple rubric (such as the one shown) can help 4-H volunteer leaders assess the effectiveness of their teaching methodology and youth interest. Evaluate each step of the experiential model by indicating what you think the 4-H members learned in a particular activity (your best guess). Work on improving any low scores.

Step	Excellent	Average	Minimal
Experience			
Share			
Process			
Generalize			
Apply			



Youth Development Stages

Understanding the physical, mental, social, and emotional development of youth will help you when working with the 4-H members in your club. No two youth develop at the same rate and transitions are often gradual. Your teaching and involvement helps 4-H club members grow and mature and makes 4-H a rewarding and fulfilling experience.

Activities at 4-H club meetings are not always as successful as you, the volunteer leader, had planned. Sometimes youth talk among themselves rather than listening to you; sometimes no one comes to a planned field trip; or sometimes no one speaks up to answer your questions when you are trying to involve the youth in the discussion. If you are working with a broad age range, the activity may be too simple for the older youth and too difficult for the younger ones. This is very challenging for the 4-H leader. Giving the older 4-H members leadership opportunities can be very effective.

Youth of the same age can vary greatly in physical, mental, social, and emotional growth and interests. These differences are even more marked between age groups. Research has shown that there are some generalities that can help you understand how to plan activities for different age groups.

Early Elementary (Pre-4-H Age)

This is a very active age, so it is important to keep children in their early elementary years busy. They are concrete thinkers and need to understand what you want them to do and how to do it. They are generally more interested in making something than in completing a project (process is more interesting than product). Youth in this age group tend to seek adult approval and depend upon adults, although the opinions of their peers are beginning to be important. They do best in small groups with set rules and rituals. Competition is inappropriate for this age group.

Upper Elementary

This is also a very physically active age so hands-on activities work best. Youth in the upper elementary grades are still fairly concrete thinkers (things are black/white or right/wrong), but are beginning to think logically and symbolically. Because this age group has a strong need to feel accepted, it is best for an adult to evaluate each product, rather than hold competition among peers with only one winner. This age child prefers to know how much they have improved against past efforts and how to improve in the future.

These youth are beginning to identify with peers, but continue to value adult guidance. They are also beginning to discover the benefits of making other people happy, but more for the benefits to themselves rather than the benefit to others. They begin to take responsibility for their actions at this age and begin to develop an increased independence of thought, which may allow them to try new things. Letting this age group help in the decisions of the club helps them start to learn about leadership.



Middle School

Middle school youth are beginning to move to more abstract thinking. Justice and equality are important to this age. Therefore, project judging may now be viewed in terms of what is fair, as well as being regarded as a reflection of self-worth. Youth in their middle school years prefer to find their own solutions, rather than to be given solutions by adults. Try to provide supervision without interference. Independence of thoughts and actions begins to emerge. Avoid comparing middle school youth with each other – performance should be compared with past accomplishments.

Junior volunteer organizations often are popular with teens toward the end of this age group, particularly if there are opportunities for developing leadership and interaction with youth of the opposite sex.

High School

Most high school-aged teens know their abilities, interests, and talents. They tend to be very concerned with themselves and their peer group. While they can understand the feelings of others, they tend to be self-absorbed, particularly in the earlier years of high school. Relationship skills are usually fairly well developed. Getting a driver's license increases both independence and dating. Acceptance by members of the opposite sex is very important.

High school-aged youth begin to think about the future and make realistic plans. They enjoy career exploration and preparation. Their vocational goals influence the activities they select.

Projects requiring research and creativity give teens an opportunity to demonstrate how much they have learned and what they can accomplish. Teens set goals based on their personal needs and priorities – goals set by others are generally rejected.

As teens master abstract thinking, they may try new ideas in ways that confuse adults. Teens can generally initiate and complete tasks without supervision. A leader can help by arranging new experiences in areas of interest to teens but must be sure to allow them plenty of input. Assume the role of advisor/coach for independent workers, rather than teacher/lecturer. Club meetings, rituals, and uniforms do not generally appeal to this group. Many teens enjoy looking back on their achievements in 4-H, teaching younger 4-H members, and appreciate special recognition for leadership activities. By the time they graduate from high school and begin college or a career, youth feel they have reached the stage of full maturity and expect to be treated as such.

Some Final Thoughts

You, as the club volunteer, are a valuable asset to your community and to the members of your club. The guidelines for the stages of child and youth development – in combination with your special skills and interests in youth – will help you plan and carry out a successful 4-H program and make a positive impact on the lives of young people.

These guidelines only give a brief overview of child and youth development. They are intended as a resource to help you plan your activities as a volunteer leader. The publication, *Ages and Stages of Child and Youth Development*,* has more in-depth information and is available from your county Extension Office.

* *Ages and Stages of Child and Youth Development, A Guide for 4-H Leaders*, NCR 292



Division I, Understanding the Honey Bee

Answers and Suggestions


Reference for this section: *The New Starting Right with Bees*, 1988.

Page 6, Activity: What basic steps should you follow to keep an unexpected swarm? (Answers from *The New Starting Right with Bees*, Chapter 1, page 1)

First – don't panic. Put on a bee suit and veil and spray the swarm with sugar syrup (1:1 ratio by volume). Find a sturdy box, put the bees in it, and closed the lid. Set up a hive, spray the swarm with sugar water, and gently shake the bees into the hive. If your hive is ready, you can just shake the bees into it and blow smoke on them to encourage them to go down between the frames.

Page 6, Activity: Briefly describe the nine “Directions for Hiving Your Package.” (Answers from *The New Starting Right with Bees*, Chapter 1, page 3)

1. Place the package somewhere to hold them until you are ready to proceed. Use a cool, dark room in hot weather (warmer than 80°F) and warm room (maximum temperature 70° F) when it is colder than 45°F.
2. Note the friction-top can of sugar syrup and the suspended queen cage.
3. Install the dampened bees in your hive in the late afternoon or evening.
4. Tap the cage on the ground so the bees fall to the bottom. Use your hive tool to help remove the can of syrup. Remove the queen cage from the package, remove the cork plug that covers the candy, and place the queen cage in between the frames in the hive with the candy facing down. Use a little board or cardboard to cover the opening in the package so the bees stay in.
5. Tap the package again to shake the bees to the bottom. Shake the bees on top of the frames where the queen cage is and give them a little smoke to move them down.
6. Another method would be to remove some frames and just set the open package in the bottom of the hive after shaking a few onto the queen cage. This requires another trip to the hive to remove the package.
7. Feed the bees sugar syrup. Fumadil-B can be added to prevent dysentery.
8. Reduce the width of the hive entrance with an entrance-reducer block.
9. Check the hive in 3 days to make sure your queen was accepted and order a new one if she is gone.
10. Keep feeding sugar syrup until they stop taking it, especially if installing the package on foundation.



Page 8, Activity: Answer the following questions. (Answers from *The New Starting Right with Bees*, Chapter 4, page 33)

Describe the queen and tell how her body shape, wing size, and stinger are important to her work. What do you find most interesting about the queen bee?

The queen's abdomen is larger than the worker bees' abdomens. Her entire body is considerably longer than that of a drone or worker and her wings are proportional to her size. She has a curved stinger. The queen lays all the eggs in the hive and determines if wthey will be worker bees or drones. The stinger is used only against a rival queen.

It usually takes 16 days to develop a queen from the egg to the adult stage. She will remain a virgin queen for about 5 days. Within 2 or 3 days after mating, the queen begins to lay eggs. Unfertilized eggs become drones. Fertilized eggs become worker bees.

Page 9: What is a drone and what does it do?

A drone is a male, unfertilized bee. It has half the number of chromosomes as a worker or queen. He is shorter and heavier than the queen and larger and clumsier than the workers. A drone's wings extend the entire length of his body and his eyes are very large. The drones' main function is to fertilize the virgin queen after which they die. Drones do no work and can not sting.

List the duties of the worker bees.

Worker bees do all the work. They collect, store, and cure flower nectar to make honey. They collect and store pollen and secrete beeswax to make the honeycomb. They also are the guards, nurses, and cleaning crews that keep the colony running smoothly.

Why do some worker bees live to be six months old, and other die after only six weeks?

Worker bees that are born in the fall do little foraging before winter. Bees born earlier do not live more than about six weeks.

What are foragers and what do they do?

Forager bees are older bees. They collect water, nectar, pollen, and propolis.

How is honey made from nectar? (Explain briefly.)

Honey is made from the nectar of flowers – gathered, evaporated, and modified by bees.



Page 14, Activity: Observing the Hive Entrance

Chart – observations of blooming flowers in the area (spring to fall) and bees. This activity will depend upon 4-H member observations. There are no “right” or “wrong” answers.

Page 17, Activity: Beeswax and Honeycomb

Name three different substances that can be found in the cells of honeycomb.

1. pollen
2. honeycomb bee
3. glue (propolis) – a sticky brown material that is used for many purposes
Eggs (drone, worker, queen) can also be found in the honeycomb cells.

Draw a simple picture of honeycomb.

4-H members may sketch either of the pictures shown in Figure 5 (page 16) showing the slope of cells or the hexagonal shape of honeycomb cells.

Why is it true that the older the comb is, the darker it is?

New combs are usually white or light yellow. As each new bee is born it sheds its skin, which becomes part of the cell and makes it darker. Also, the propolis that bees collect can make it darker.

Page 18, Activity: Beeswax and Honeycomb, *continued*

Describe how bees build comb.

Comb is built out of beeswax by young worker bees. They chew small flakes of wax in glands on the underside of their bodies and to form the comb.

Why is a drone cell larger than a worker cell?

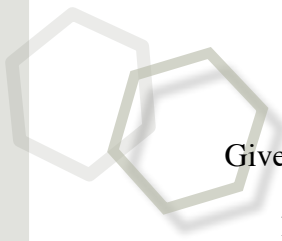
Because drones are larger than worker bees. Queens lay unfertilized eggs in these cells.

What is the brood, and where is it found?

The brood is generally found in the central part of the comb and consists of worker cells full of eggs, developing larvae, and pupae.

Why is the brood area surrounded by pollen storage cells?

The brood area is surrounded by pollen storage cells so that they are near the pollen, which is the food for the larva growing in the brood cells.



Give five uses of propolis.

1. Holding down the hive lid.
2. Covering the inside walls of the hive.
3. Fastening frames.
4. Strengthening comb.
5. Plugging holes.
6. (Sometimes) Narrowing the entrance.

Name another substance besides pine pitch that honey bees could probably use as propolis.

Bees may use buds (especially poplar), bark (especially from conifers).

Page 20, Activity: Observing a Beekeeper

Beekeeping Inventory

Chart – This activity will depend upon 4-H member observations. There are no “right” or “wrong” answers. (The chart does not really match the instructions before it, so please allow a lot of leeway in the answers.)

What is meant by the term “movable-frame hive”?

The movable frame allows the removal of combs to examine the queen, brood, or honey. The movable frame allows us to obtain honey without killing the bees. It was invented and perfected by Lorenzo Lorraine Langstroth. His classic book, *The Hive and Honey-bee*, was published in 1853.

What is meant by the term “crossed comb”?

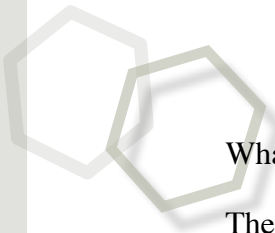
This is comb that attaches the comb in one frame to another. Any comb that is not where the beekeeper wants it is called “burr comb.”

Why is it necessary to have a hive stand, bricks, or something similar to keep the bottom board off the ground?

A hive stand or bricks are used to keep the hive off the damp ground and to minimize some pest problems and to keep the bottom board from rotting.

Explain how the frames are built to maintain the “bee space.”

The frames are separated from each other with a notch to keep the bee space exact but the beekeeper can also space them by eye. A bee space must also separate the frames from the walls, tops, and bottoms of the supers.



What are the advantages of using comb foundation in your hive?

The comb foundation centers the comb in the frames. It can help control the worker and drone population because it provides a pattern for worker-size cells.

What is the function of a smoker? Name some materials that would make good smoker fuel by burning slowly with much smoke.

Smoke prevents the bees from smelling alarm pheromone and makes them go down away from it. Smoke also stimulates the bees to gorge on honey so they are not flying around or stinging. Dry rotten wood, chips, burlap, and corn cobs make good quality smoke.

What is the function of the hive tool?

Hive tools are used for prying off covers and supers, removing frames and staples, and for scraping propolis and burr comb.

How does a queen excluder work, and what is its purpose?

The queen excluder allows worker bees to pass through but keeps the queen from accessing an area and laying eggs where you do not want them.

Explain the various types of clothing a beekeeper must wear when working with hives.

Beekeepers should wear a veil, light colored coveralls, gloves, and socks.



Division II, Working with Honey Bees

Answers and Suggestions

Page 6, Activity: Selection of Location

Name factors to consider when choosing a hive location.

Ideally, the hive location should be close enough to the beekeeper's house to be easily accessible and to reduce the chance that it will be vandalized. There must be honey plants and water close by. The site must also have adequate sunlight and protection from flooding and winter winds. It is good to have a site that is accessible by a vehicle.

What are the advantages of placing your hive near a stand of trees?

Trees that are to the west and north of the hive will help protect the bees from winter winds.

Page 7, Activity: Selection of Location, *continued*

What special considerations must be made by the backyard beekeeper with close neighbors?

Supply water for the bees so they will not visit the neighbor's water faucet, children's wading pool, etc.

Can an area be overpopulated by honey bees? Explain.

Yes. Bees will get most of their nectar and pollen within a half-mile radius of their hive location. They can travel further, but it will reduce the amount of honey that they can make. If there are too many bees in an area, they will have to travel further to find nectar and pollen.

Describe a perfect beehive location.

The perfect beehive location will be near enough for the beekeeper to walk from their house, not near other neighbors, close to ample honey plants. A good source of nearby water, abundant sunlight, especially during the winter, adequate drainage, and trees or shrubs to provide winter protection are also required.

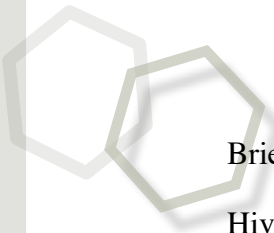
Page 8, Activity: Getting the Bees

What equipment do you need to get started in beekeeping?

A beekeeper needs the proper clothing, a smoker, a hive tool, and the hive, consisting of the wooden hive body, frames, foundation, a bottom board, a inner cover, and an outer cover, and bees.

What is a swarm of honey bees?

A swarm is a collection of bees, containing at least one queen, that split apart from the mother colony to establish a new one. It is a natural method of propagation of honey bees.



Briefly explain the steps in hiving a package of bees.

Hiving the package of bees was explained in the 4-H Beekeeping, Division I Answers (second answer).

Why is the queen in a cage when shipped in a package of bees?

The queen is in a cage so that she can be checked before the cage is placed in the hive. A candy plug (or part of a marshmallow) will keep her in the hive long enough to help the bees adjust to their new home.

Explain the “feeder can” method of feeding sugar syrup to your bees.

Punch about a dozen holes in the lid of a jar with a small (3d) nail. Plastic pail feeders with a mesh screen in place of holes can also be used. The feeder can filled with warm syrup is placed over the hole in the inner cover with the perforated lid down. Put an empty super over the feeder can to protect it from rain, robbing bees, or other pests.

Which race of honey bee do you want to get? Why?

The answer to these questions will vary, probably depending upon the bees the 4-H member’s mentor has and availability. It is more important to get bees from a breeder that selects for good traits (such as hygienic behavior or mite resistance) than to choose based on race.

What are the advantages and disadvantages of purchasing an established hive from a beekeeper?

An established hive or a nuc that is purchased from a beekeeper only needs to be moved to the new location so it is much less work to get started and the bees will build up more rapidly than a package. Locally produced bees may already be adapted to local weather. Most packages are brought up from down south and the bees are not bred to survive hard winters. Disadvantages include the cost of the hive and the loss of experience that starting your own hive gives.

Page 12, Activity: Bee Diseases and Pests

Explain how honey bee diseases spread from hive to hive.

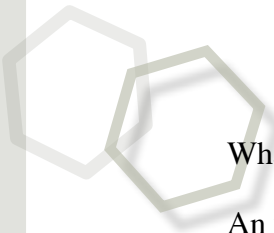
Food and water can contain Nosema spores that spread the disease.

What are the signs of Nosema disease?

Brown spots and streaks on the hive box where the bees come out. If the colony is heavily infected, the bees will become increasingly restless and the colony becomes weaker. The streaks are often seen after winter when the disease is worse.

How would you protect your bees from Nosema?

Provide good ventilation and feed them Fumadil-B in syrup.



What are the signs of American foulbrood disease?

An uneven pattern of brood with lots of empty cells. Some cell cappings may look darkened and sunken. Cells may be partially opened by bees. Larvae die after cell is capped. You might notice an unpleasant smell.

Describe how American foulbrood can be successfully treated.

Destroy badly infected frames with scales of dead larvae by burning or discard in sealed trash bags. Dust the hive 3 times, 5 days apart with terramycin antibiotic in powdered sugar. The safest thing is to burn the whole hive, but sometimes it can be treated by re-queening with stock that has good hygienic behavior and an initial antibiotic treatment. Do not use antibiotics unless your hive has the disease.

What is chalkbrood disease?

Chalkbrood disease causes larvae to die and become white or grey cottony “mummies” inside the cells. This is usually a cool weather problem.

Page 13, Activity: Bee Diseases and Pests

How is chalkbrood disease treated?

You can feed sugar syrup and requeen. It may clear up when the nectar flow starts.

How would you know if your bees have Varroa mites?

Look for Varroa mites in capped cells (especially drone cells) or on adult bees. You can also monitor mite fall with “sticky boards” inserted at the bottom of the hive. In bad infestations, you see an uneven pattern of brood with some dead brood. Some bees may have deformed wings. Left untreated, Varroa mites will eventually cause the death of the colony, especially in early winter.

What would you do to treat them for Varroa mites?

Use Apistan™ strips (fluvalinate) , CheckMite+™ strips (coumaphos), ApiLife VAR™ tablets or Apiguard™ (both of which contain thymol oil). It is probably best to use “natural” controls like thymol to prevent pesticide contamination of your wax and possible side effects for the bees. Coumaphos is an organophosphate and is hard on developing queens.

What is the best method of avoiding damage by the wax moth?

Use PDB moth crystals (not moth balls) when storing equipment. Remove dead colonies. Keep strong, healthy colonies that can fight off the moths.



Page 17, Activity: Seasonal Management, Summer and Spring

Note: Youth will find it helpful to read Chapter 8, “Spring and Summer Management,” in *The New Starting Right with Bees*.

What flowers are important for the bees in your area?

The best flowers for bees in a given area are best found by observation.

When installing a queen in a hive, why is it important to keep feeding them sugar syrup?

Feeding syrup (to simulate a honey flow) before, during, and after queen introduction will facilitate her acceptance.

What is “balling the queen,” and why does it happen?

When a strange queen is placed in a colony, the bees usually resent her presence, and consider her an intruder. The term “balling the queen” refers to the bees forming an angry mass, clinging closely to her body (or to the queen cage), and smothering her and tearing her apart.

List indicators of swarming.

Indicators of swarming include: bees clustering on the outside of the hive, colonies that have been busy at work and then stop without apparent reason when other colonies are busy, and the presence of queen cells (“swarm” cells).

What is a play flight? What behaviors distinguish play flights from robbing?

Play flights occur when young bees are testing their wings. There is a sense of great activity but no fighting and no sneaking into other hives. The unusual flying generally subsides soon, whereas in a case of robbing, the excitement increases.

Page 18, Activity: Late-Season Management

Why is it important to combine weak colonies with other hives?

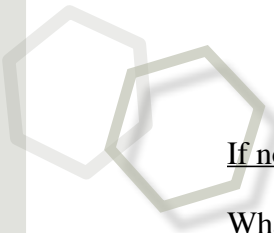
Weak colonies will probably not be able to withstand the rigors of winter in northern states.

Experienced beekeepers recommend making certain that your colony is strong in the autumn so that you will not have to go through the hive during the winter. Why?

Bees should not be disturbed during the winter, unless you think the bees are starving. Disturbing bees during midwinter may kill them, especially if the colony is weak to begin with.

What is important to successfully overwinter your hive?

The colony should have a good queen, plenty of pollen, and ample honey to overwinter successfully. If the hive has a failing or missing queen there is not time to raise a new one. Well ripened sealed honey is preferred to sugar or artificial stores for overwintered colonies.



If necessary, feed heavy sugar syrup (2:1) in the fall.

What are the benefits of top entrances in winter?

A top entrance allows moisture to escape at or near the top of the hive. Without it, the bees may become wet, freeze, chill, and die.

Why is it important to monitor food stores in spring or late winter?

By January or February the queen will begin to lay eggs and brood-rearing begins. The eggs and brood must be incubated at 92°F, so you need good food stores and winter protection.

Page 19, Activity: Late-Season Management, *continued*

Note: The answers to the questions on swarms will be found in Chapter 8 of *The New Starting Right with Bees*, not Chapter 9.

Explain the old beekeeper's poem:

A swarm of bees in May, is worth a load of hay.

A swarm of bees in June, is worth a silver spoon.

A swarm of bees in July, Let it fly.

Later swarms are often smaller because the hive may have already swarmed once or twice and they will have much less time to build up and store enough honey to survive the winter.

Does a young queen or old queen leave the hive with a swarm?

Colonies with young queens are much less likely to swarm than colonies with queens a year or more old. When the colony swarms, it is the reigning queen that leaves and a new queen hatches out and inherits the hive.

Why are swarms usually very gentle in nature?

Swarming bees are generally engorged with honey and when they cluster it is a temporary camp. They do not have a nest with brood and honey to defend. Once they start building comb, they may become more defensive.

How can a recently hived swarm be encouraged to remain in its new home?

The bees need to have a queen or they will leave the hive within hours. When you catch a swarm, it usually is not possible to find the queen, so you try to get most of the bees in the box. If they are gone in the morning, you missed the queen. If you see the queen, she should be caged and placed in the hive and released when all the bees have returned.



Page 20, Activity: Late-Season Management, *continued*

Beekeepers say that if you want some comb foundation drawn out quickly into good frames of honeycomb, give it to a newly hived swarm. Explain.

The newly hived swarm will be busy making honey and caring for brood. They have lots of bees of the right age to have wax glands and have eaten plenty of honey before leaving their nest.

What is the greatest advantage of using a double brood chamber system as the basic structure of your beehive?

It is common in northern states, to use a double brood chamber (two-story hive) with a large, healthy colony of bees. By the time of the first snow, the lower story should be full of bees and broods and the upper story full of honey. An attempt to winter a small colony in a single-story hive is taking a chance that they will not be strong enough to over-winter.

Why is it dangerous to feed your bees in the middle of winter?

Bees should not be disturbed during winter because of the chance of killing them by opening the hive and disturbing them too often. Feeding corn syrup in the winter may promote dysentery. Sometimes people use hard candy boards or pour cane sugar on the inner cover, if necessary.

Packing of hives is not recommended for Midwestern beehives.

Packing is recommended when temperatures remain around 0°F for long periods of time, which is generally not the case in the Midwest. Packing does no harm and may be beneficial provided there is ventilation, but is not considered necessary.

What method have you chosen to control Varroa mites?

Use Apistan™ strips (fluvalinate), CheckMite+™ strips (coumaphos), or ApiLife VAR™ tablets (contain thymol oil).

Page 21, Activity: Late-Season Management, *continued*

The following descriptions will be based on the 4-H members' own experiences and observations.

- Write a paragraph describing in detail your experience in carrying out each of the following duties of the successful beekeeper.
- Spring feeding to stimulate brood production.
- Supering and other swarm prevention techniques.
- Fall feeding and “taking the hive down” to prepare it for the winter months.



Page 25, Activity: Extracting Honey

Chapter 7, “Harvesting,” in *The New Starting Right with Bees*, will help answer these questions.

What are the advantages of using shallow supers in the production of extracted honey?

Shallow supers weigh less. Brood chambers (deeps) full of honey weigh about 90 pounds.

How do you know when a frame is ready to be removed from the hive for extraction?

When the honey is capped by the bees with wax (or at least 80% of it).

For the beginner, the brushing method of removing bees from comb is convenient. Describe the method.

Remove the super of extracted or cut comb honey. Gently brush bees from each frame at the hive entrance using a bee brush. As you finish a frame, place it in an empty super and cover to prevent robbing.

Explain the purpose of the basic pieces of equipment necessary for the extracting process that you will use for your harvest.

Honey extractor – a spinning tank that will force honey out of the combs, fitted with a strainer, that extracted honey is poured through before entering the storage tank.

Settling tank – a storage tank that allows wax to float to the top. Honey is removed from below.

Uncapping tank – some container to catch the cappings as they are removed.

Uncapping knife – cuts off the cappings that hold the honey in the cells.

Cappings scratcher – an alternative to the knife. Or it can be used to uncap parts missed by the knife.

Buckets – for the cappings and one that allows the honey to drip out.

Cheesecloth or stainless steel strainer – to strain impurities out of the honey.

Explain how and extractor removes the honey from the comb.

The extractor removes the honey by centrifugal force by spinning the combs. Basket-type extractors will only spin out one side at a time. Radial extractors do both sides.

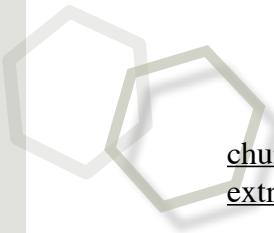
Page 26, Activity: Extracting Honey, *continued*

Explain why it is important to maintain a weight balance and a steady, moderate speed while using the extractor to spin out the honey.

If the weight is not balanced in the extractor, the extractor will not spin smoothly and may put strain on the motor or the combs.

Explain the statement: “To produce chunk honey, you should use a light brood foundation, not wired. In the production of extracted honey, you should use three-ply foundation wired in the frames, or a plastic foundation.”

Chunk honey is cut from comb with special light foundation and put in jars of honey. The



chunk will be consumed and should be the highest quality wax. Foundation is needed for extracted honey to reinforce combs so they do not break in the extractor.

Page 27, Activity: Bottling and Marketing Honey

Define clarification of honey.

Clarification is the process of removing air bubbles, introduced during extracting and filtering of honey. Bubbles and wax particles will rise to the top, leaving the honey clear and clean. Clarification is faster if the honey is heated, but over-heating should be avoided to preserve the flavor.

Page 28, Activity: Bottling and Marketing Honey, *continued*

Honey does not have to be heated before it is sold. What are the advantages and disadvantages of heating your extracted honey? Tell whether you will process your honey by heating it.

Honey that is sold or given directly to the consumer for immediate use does not need to be heated. Heating makes it easier to extract, strain, and bottle honey. It also speeds up the clarification of incorporated air bubbles during extracting and filtering. Care must be taken, however, because overheating can ruin the delicate flavor of your product or actually destroy it. Overheating can also melt beeswax suspended in honey, giving it a waxy taste.

Explain the cause of cloudiness in honey and how to avoid it.

Cloudiness that develops is caused by crystallization. Heating the honey briefly will retard the process. Heating it too much will reduce its quality but prevent crystallization. Honey crystallizes fastest at 55-60°F and slower above and below this temperature. The best way to store honey long-term is in the freezer.

Describe several different possibilities for places to give away or sell your honey.

The answer to this question will depend on the plans of the 4-H member.

Describe in detail your plan for marketing your honey.

The answer to this question will depend on the plans of the 4-H member.



Division III, Advanced Beekeeping Methods

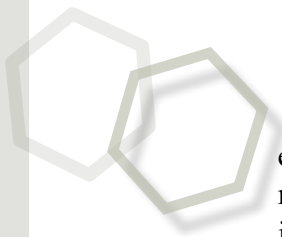
Suggestions

The advanced beekeeper will explore a variety of topics, depending on what happens with their particular apiary. They may have worked at increasing the number of honey bee colonies, increasing honey production, producing special kinds of honey, or problems encountered in managing a bee colony. Youth should be encouraged to think about and discuss the decisions and choices they have made and the results of those decisions to complete the Experiential Learning Model. This model has three major parts: experiencing, sharing (discuss, analyze, reflect), and generalizing what they learned. Following through all the steps will assure that the youth gain the most knowledge that they can from any activity.

The following suggestions and questions are intended to give you, the volunteer instructor, ideas of ways to encourage the advanced beekeeper to share and generalize their beekeeping experiences. You might do this in a one-on-one discussion or as a suggestion for an exhibit that the beekeeper can create to educate others.

Possible starter questions are given below. Ask follow-up questions as appropriate to stimulate discussion. Keep your questions open-ended to see what the 4-H member has learned and what they want to learn (not to teach them at this point).

- Describe your beekeeping experience. How did you get started? What did you find the most difficult? What is most rewarding?
- Have you attended any beekeeper meetings? What were they like? What did you learn? Who did you meet? Why are beekeeping associations important?
- Have you exhibited an informational poster or done an Action Demonstration at your county fair? Did you advance to the state fair? What were you trying to teach? How effective do you feel your presentation was? Can you think of anything you would do to improve your presentation if you were to do it again?
- Have you exhibited honey at your county fair? Was your honey chosen for advancing to the Indiana State Fair? What did you learn from this experience?
- Review one of your record sheets (see the list below) and explain what it shows. What can you learn from keeping these records?
 - Inventory
 - Receipts
 - Financial summary
 - Work record
 - Apiary record
- Ask if the advanced beekeeper used the *Scientific Method* to determine the best management practices to use. They might have explicitly used the Scientific Method (by going through each step from writing a hypothesis to drawing conclusions) or they might have implicitly followed this research methodology without consciously following



each step. In either event, the beekeeper will learn that experimenting with different recommended management techniques is a scientific process when the knowledge gained is used to make better decisions in the future.

The following list gives the topics that are discussed in the *Advanced Beekeeping* manual. Ask the advanced beekeeper which management techniques they used. What did they learn? What will they do differently in the future? What advice would they give to someone new to beekeeping?

Managing Honey Bee Colonies

- Choosing a Good Apiary Site
- Increasing the Number of Colonies
- Installing Packages
- Splitting Colonies
 - Simple Divide
 - Double-Screen Method
- Taking Care of Your Queens
 - Requeening Methods
 - Candy Cage
 - Nucs
 - Push-In Cage
 - Virgin Queens
 - Queen Cells

Seasonal Management

- Colony Troubleshooting
- Short Guide to Using Honey Bees in Pollination
 - General Considerations
 - Pesticides and Bees

Data Sheets

- Inventory
- Receipts
- Financial Summary
- Work Record
- Apiary Record



Poster Exhibit Guidelines and Suggestions

Fair exhibits give youth the opportunity to show the public what they have learned in their beekeeping project work. Indiana State Fair guidelines require the following:

- Exhibits must be displayed horizontally, sized 22" x 28", mounted on a firm backing (foam-core board or other), and covered in clear plastic or other transparent material.
- A display box (18" x 24"), orientated horizontally, may be used to make specimens more secure.
- Each exhibit must include a label with name, grade, and county.
- The exhibit title should indicate the level: Beekeeping 1, 2, or 3. The sub-title should explain the topic being exhibited.
- The Indiana State Fair exhibit guidelines are given on the Indiana 4-H Web site (www.four-h.purdue.edu, click on "Projects" in the menu bar right under the green "Indiana 4-H").

Suggestions from the Indiana State Fair judge for displaying honey:

- Fill level: the honey should be filled to the jar shoulder, not over, nor under.
- Chunk honey should go in a wide-mouth jar, preferably one specially made for chunk honey (see beekeeping catalogs).
- Be careful to distinguish "chunk honey" (comb in jar) from "cut comb" (comb only in box).

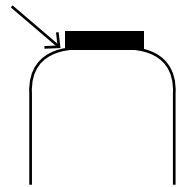


Exhibit Suggestions, adapted from suggestions developed by Roger Sherer, Extension Youth Educator in Wells County.

1. Poster board – use white when required. Youth can experiment with other colors when white is not required.
2. Mounting adhesives – the best is rubber cement since it leaves no marks and won't wrinkle paper. White glue should be used only in cases where wrinkling or damage will not occur.
3. Colored pencils – the best are soft-leaded – they are easy to color and blend easily – strokes will not show if handled properly. Soft-leaded pencils can be purchased at art stores. Hard-leaded pencils are less expensive, but are more difficult to use.
4. Labels – plain 3" x 5" file cards work well as they have a smooth finish and are sturdy enough for gluing and removing smudges.
5. Stiff backing – any material that will keep the poster from bending will work. Foam-core board works well, if you can find it in the correct size, because it can take the place of poster and backing. Examples of backing include: foam-core board, very stiff cardboard, plywood (which makes the poster heavy), and masonite (1/8" thick works well and can be re-used).
6. Acetate or other clear plastic covering – this is required for most posters to keep them clean before judging and if fairgoers touch them. Coverings generally come in various thickness (3, 5, 7 1/2, and 10 mill) in rolls or sheets.
7. Plastic tape – not necessary but it makes attaching poster board to stiff backing easy. Tape is available in many colors and widths, and may be cloth or plastic. The 1 1/2" wide tape can give the poster a border. Available at discount stores.
8. Lettering – type labels and title on a computer or typewriter or use stencils, self-adhesive, or press-type letters purchased at discount or art stores.
9. County ID labels – an identification label should be placed in the lower right hand corner of poster projects. Check your county guidelines for requirements.
10. Your poster should read like a dollar bill:

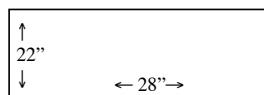


Exhibit suggestions, adapted from suggestions developed by Amy Nierman, Extension educator, Washington County, and Angela Apple (1998 Indiana State Leader's Conference)

A Good Poster	Planning
<ul style="list-style-type: none"> • Attracts attention • Is simple and clear • Interests someone in some aspect of your project 	<ul style="list-style-type: none"> • Know the project requirements. • Read the manual – look for ideas. • Brainstorm ideas and make a list. • Think of titles with alliteration (repeating a sound in words). • Look at other posters for ideas – but <u>don't copy</u>.
Tips - Do's	
<ul style="list-style-type: none"> • Don't use too many words. The poster is not intended to show all that you know, but to teach some aspect of your project. • Use a combination of illustrations and words. • Be as neat as you can. • Cut evenly, cement carefully, blend colors when using crayons or colored pencils. • Leave white space on the poster. • Make sure the poster is balanced. 	<p>Choose colors carefully. General guidelines:</p> <ul style="list-style-type: none"> • Black tends to be more formal, neat, rich, strong. • Blue is cool, melancholy, or depressed. • Purple is considered royal, rich, imperial. • Red stands for love as well as anger and hatred. • Orange is generally used for Halloween and is festive and gay. • Yellow tends to be warm, light, or ripe. • Green is fresh, young, or growing. • White means pure, clean, and neat.
Don't	
<ul style="list-style-type: none"> • Make a vertical poster. • Use Saran Wrap to cover. • Use staples, tacks, or tape. • Use fluorescent posters. • Create a poster that is all words or a poster that is all pictures. • Put too much information on the poster. Fairgoers rarely look at a poster for more than 10-20 seconds. If it catches their interest right away, they might read it for 1-2 minutes. 	
Steps to Making Your Poster	
<ol style="list-style-type: none"> 1. Read your project manual. 2. Read your county project requirements. 3. Decide on information to include on the poster. 4. Sketch out your idea. 5. Collect supplies. 6. Mark guidelines for lettering and pictures (lightly). 7. Layout letters, pictures, etc. on the poster. 8. Cement (glue, etc.). 9. Clean up the poster so it is neat. Erase any guidelines that are showing. Remove excess rubber cement or glue. 10. Glue poster to backing. 11. Cover poster with plastic. 12. Take your poster to the fair on the right day and at the right time. 	



Poster Judging Suggestions for Judges

Reminder – The goal for all project work is to give guidance to youth learning about something they have a particular interest in. The goal of a poster is for the 4-H member to share information that they have learned by doing their project work. The poster is not intended to show all that the 4-H member knows, but to teach some aspect of their project. Posters should be eye-catching and attractive. Fairgoers rarely will look at a poster for more than 10–20 seconds, unless it catches their interest right away. Then, they might read it for a minute or two.

Age-appropriate judging is critical so that each youth is treated fairly. Young 4-H members (grades 3–5) should not be expected to have the fine motor coordination or advanced thinking skills of an older 4-H member. Older members should begin to take the concepts they have learned and apply them to a particular situation. Originality is expected of high school youth.



Frequently Asked Questions

Q – In the 4-H Beekeeping I manual a book, *Starting Right with Bees*, is mentioned. Its publisher is the A.I. Root Co. Where can I get this book?

A - This book is available from the publisher, A.I. Root, at (800) 233-7929 or 800-289-7668. When you call, ask for Jim Thompson. He is happy to send a price list to County Extension Educators.

Q - I have a young 4-H member who is interested in beekeeping, but does not have a hive or access to one. Do you know of any leasing programs?

A - The president of the Indiana Beekeepers Association indicated that some members would be interested in leasing a hive to 4-H youth and helping them learn about bees. Contact me (Natalie Carroll, ncarroll@purdue.edu) for help in identifying beekeepers in your area that would be willing lease a hive to an interested 4-H member.

Q - What plants are considered honey plants?

A - The best way to determine which plants bees will use to make honey is to watch them. The following lists will help youth know which flowers to watch. Many of the flowers do not make much surplus honey because of their duration of bloom or conditions in a particular year. The plants listed first tend to produce more surplus honey.

- yellow sweet clover, white sweet clover
- small white (Dutch) clover
- black locust
- blueberry (bees are very important for blueberry pollination)
- basswood
- tulip poplar (tulip tree, the state flower)
- goldenrod (late summer to fall, different kinds)
- asters (in fall - especially the small white frost weed aster)
- dandelion (important in the spring because it blooms early)
- apple blossom (and other fruit trees)
- mint
- blue vine or climbing milkweed (mostly in southwestern Indiana)
- elm
- box elder
- silver maple, red maple (maples mostly important for pollen, not honey)
- raspberry
- blackberry
- ground ivy
- currant and gooseberry

The following plants must be pollinated by honey bees (or wild bees):

- squash, pumpkins
- fruit trees
- blueberries
- cucumbers

There are also a lot of exotic plants in people's gardens that are attractive to bees.



Action Demonstrations

What is an action demonstration (action demo)?

An action demo is a fun way to share what you have learned in your 4-H project with others. It's a kind of "Show and Tell" but with more action. Action means that you need to get the audience involved in what you are doing, not just show them. An action demo is not like a regular demonstration where the audience sits and listens to a prepared talk. An action demo gets the audience involved. Action demos can be given anywhere there are a lot of people, such as a county or state fair, shopping mall, street fair, or any 4-H event. Your job as a demonstrator is to interest the audience in your topic so that they stop and learn something new or try their hand at what you are doing.

How do I choose a topic for my action demo?

Your action demo should be related to this project. Consider the following questions when choosing a topic:

- Can you complete the action demonstration in 3 to 5 minutes?
- Is your action demo showing something that would interest the general public?
- Is there a good way to involve your audience in your action demo ("hands-on" or answering questions)?
- If you will be doing it multiple times: Can the supplies for the "hands-on" section be used over and over again, or will they need to be replaced? (Remember – if the materials must be replaced, it will cost more to do the demonstration.)

How can I get the audience involved?

The first thing you need to do is be enthusiastic and attract people's attention as they walk by your table. You might have a colorful tablecloth or poster to spark their interest. You might ask them a question, "Can you tell what mineral this is?" or "How old do you think this fossil is?" Many people enjoy hands-on activities, so once you get a few people at your table, they will attract others. Some ideas for getting your audience involved include:

- Show how you would identify a fossil or mineral.
- Use your audience to make a geologic timeline.
- Judge the quality of various items.
- Play a game.
- Answer questions.

How long does my action demo have to be?

Your action demo may vary in length. But the demonstration itself should last only 3-5 minutes, because most people do not like to stop to watch very long presentations. If you do your Action Demo at the Indiana State Fair, be prepared to repeat your action demo over and over again with different people during your assigned time.



Action Demo Checklist

Topic	Yes	No
Was the topic interesting to the general public, causing them to stop, watch, or participate?		
Did the topic stimulate questions from the audience?		
Was the topic of suitable length?		
Did the topic include something “hands-on” for the audience to do?		
Organizing the Content	Yes	No
Was the topic organized into short “show and tell” segments, which were done repeatedly?		
Were segments presented in logical order?		
Were segments explained so that the audience understands “why?”		
Was it evident that the 4-H member was knowledgeable about their subject and could answer questions?		
Did visuals, pictures, posters, or actual objects clarify the important ideas?		
Presenting the Demonstration	Yes	No
Did the 4-H member seem enthusiastic?		
Did the 4-H member encourage the audience to become involved in the demonstration?		
Did the 4-H member speak directly to the audience?		
Did the 4-H member show evidence of practice and experience?		
Did the 4-H member show that she/he enjoys talking to the audience?		
Did the 4-H member show friendliness and a business-like manner?		
Did the 4-H member tell about what they learned through this 4-H project?		
Comments:		

PURDUE AGRICULTURE

New 05/08

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