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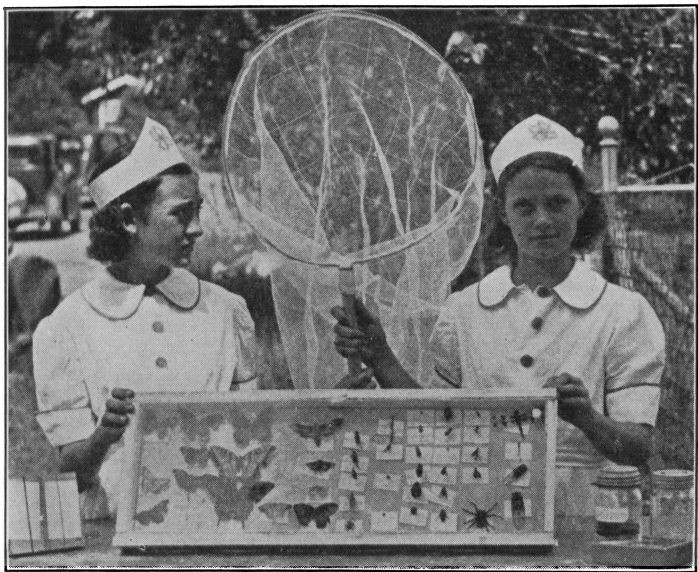
ENTOMOLOGY

II—4-H BEEKEEPERS' CLUB

4-H CLUB CIRCULAR 61

COLUMBIA, MO.

FEBRUARY, 1939



COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS

UNIVERSITY OF MISSOURI COLLEGE OF AGRICULTURE AND THE UNITED STATES DEPARTMENT OF AGRICULTURE COOPERATING

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**The Leader's Guide for Entomology II—4-H Beekeepers' Club is to be used with this circular.*

The 4-H Beekeepers' Club*

INTRODUCTION

The care of bees is a type of husbandry which was begun ages ago. Our early ancestors kept bees because honey was the only known sweet at that time. Not until recent times has sugar been developed. The value of bees in terms of honey production is small compared to the value of bees to mankind in their pollination work. Many of our flowers and plants have no doubt survived because the nectar secretion attracted bees and brought about cross pollination. Through this wonderful relationship the continuation of the species has taken place. All of this development has taken place over a period of ages. The honey bee was originally and is yet fundamentally an agent for pollinizing flowers to effect seed and fruit set of plants. There are other insect pollinizers but the honey bee is the only one subject to the control of man.

In this work, the club members will have an opportunity to study the habits of these interesting little friends of man. In addition, if conditions are favorable, there will be a definite monetary value derived, and the fundamental steps in beekeeping will be studied.

I. BEES AND THEIR LIFE HABITS.

1. The Honey Bee and Other Bees.

Bees of all kinds belong to one of the large orders or groups of insects. It is a true insect, having six legs and two pair of wings. The name of the order is Hymenoptera, which includes other stinging insects such as wasps and ants. The bumble bee is closely related to the honey bee, but it does not have a highly developed colony organization. Only the queen bumble bee survives the winter and she performs the duties of both a queen by laying eggs, and a worker by making the nest and doing the work until the brood develops.

The honey bee is not a native American insect. It was introduced into this country from Europe by the early colonists and escaping swarms stocked the forests. As the early settlers moved westward, so did the honey bee. If one reads the early history of most any Missouri county he will find that many of the trails through the forest followed "bee" trails. One of the many enjoyable experiences of that time was the fall excursion into the unsettled regions in search of bee trees and the winter's supply of nature's sweet.

*Prepared by George D. Jones, Extension Specialist in Entomology, in collaboration with T. T. Martin, State Club Agent.

2. Life Habits and Kinds of Individuals In a Colony.

The honey bee is called a social insect. It lives a highly specialized life in a colony. The queen, or mother, of the colony is much larger than the workers. She may be seen on a brood comb dragging her elongated abdomen from cell to cell, in each of which she deposits an egg. Normally there is only one queen in a colony. At swarming time, the old queen goes with the swarm, and the new queen or queens which may be unhatched take over the colony in due time. If there is more than one new queen developing, the worker bees kill all except one of the queens, or the queens fight until one is left. The queen does not feed herself. She is fed by the worker bees. During the spring and summer months, she lays an enormous number of eggs, perhaps averaging a thousand or more each day for part of the time.

The worker bees make up the vast majority of the individuals in a colony. They do all the work of the colony, such as secreting wax and molding the comb, nursing the young, feeding the queen, gathering food and building materials, producing heat by fanning their wings and forming the cluster during cool weather, guarding the hive and ventilating and conserving heat in the winter cluster. The worker is a female bee but it never becomes the queen of the colony. At times, under exceptional circumstances, a worker becomes what is called a "laying worker," but the colony ceases to function properly as egg laying seems not to be the function of the worker bee.

The drones, or male bees, are fairly numerous in a colony and may be distinguished from the energetic workers by their sluggish movements. They are the stout, clumsy appearing, loud buzzing bees seen about the entrance of the colony. They cannot sting, as only the female bees have a sting. The sting is the same organ with which other female insects use in inserting their eggs into objects or in the soil. In bees, it is a greatly modified ovipositor.

3. Development.

A small grub or larvae develops from the tiny egg laid by the queen in the cell. Like many insects, bees in their life cycle go through four stages of development—the egg, larvae, pupa, and adult. The queen may lay a worker egg or an egg from which a drone will develop. The drone eggs are laid into the larger and uneven cells. The egg from which a queen is developed is laid in a queen cell, which is much larger than the other cells. They are often located on the edge of the comb along the bottom side of a

frame. It is shaped something like a thimble and is very prominent. The workers and queens are developed from exactly the same kind of eggs, called fertilized eggs. The drone eggs look like the worker and queen eggs, but are slightly different, being unfertilized. All the grubs, or brood, are fed by young worker bees. After a few days the young worker bees begin the field work.

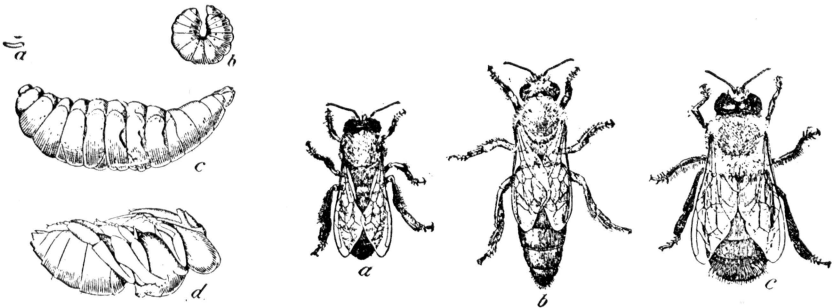


Fig. 1.—On the left are the earlier stages in the development of the honeybee. a. Egg. b. Young larva. c. Old larva. d. Pupa. On the right are the three adult or mature forms slightly enlarged. a. Worker. b. Queen. c. Drone. (After Phillips).

The grub which is to become a queen develops faster than a worker grub. It is fed "royal jelly," a very rich food. Only 16 days is required for a queen to develop from the egg stage to the adult. The workers require 21 days; and the drone, 24 days for development. When the worker, drone or queen grub has completed its growth (the larval stage, Figure 1), the cell is capped over, as shown in Figure 2. It goes through the pupa stage in the smooth, capped cell from which it emerges.

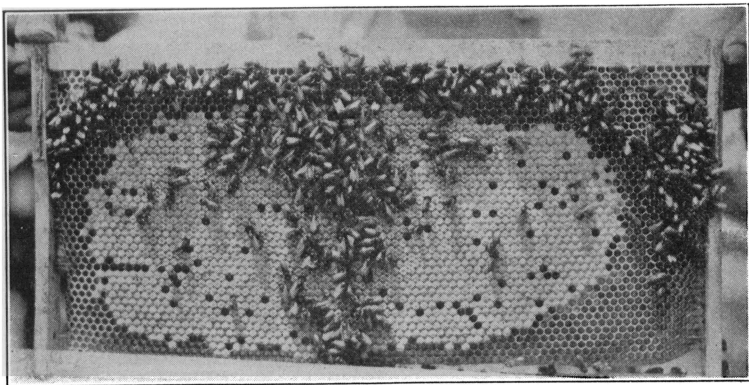


Fig. 2.—A comb well filled with capped brood.

An individual adult bee will live about six weeks during the period of greatest activity. The bees developing in the fall live until early spring. The process of egg laying and brood development goes on continuously, except during the coldest winter months. Often during early February, a small amount of brood rearing begins. The bees cluster into a solid ball-like mass in the center of the brood chamber, whenever the temperature goes below 57 degrees. This is the temperature which they must maintain during the winter months, or they will freeze to death. By clustering and keeping up muscular activity, they keep themselves warm and thus survive cold weather. The young brood is developed in the center of the brood chamber only if a 90 degree temperature is maintained. If developed too early, the young brood may be chilled.

During the period of the honey flow, a strong colony may include 50,000 to 100,000 individuals.

II. STARTING THE BEE CLUB PROJECT.

1. Selection of Apiary.

A club member should not start with more colonies than can be handled successfully. A few colonies are better than several. Not more than five should be used by the boy or girl in this project. Preferably one or two should be used.

The club member will find it best to secure his colonies of bees from a beekeeper. The bees should be of the Italian strain and should have a good queen not more than two years old, if it can be determined. It will be of vital importance if the club member will keep an accurate account of all income and expenses. Club members should not use swarms of wild bees for this project.

2. Selection of Standard Hive and Equipment.

Under most Missouri conditions, the members should produce only extracted honey.

Since most of the club members will be securing their colonies in the spring, it will be well that colonies be bought in their hive bodies just as they were wintered. Be sure that the hive bodies are of standard equipment and interchangeable with each other. Do not buy one hive of one make and another of another. The frames should be movable and interchangeable and preferably of Langstroth size. If the members desire to produce comb honey, proper equipment must be secured.

3. Working with Bees.

Every one who works with bees should secure a bee veil, hive tools, and a smoker. The beginner may also find gloves, with the fingers removed, desirable. Hasty movements and the jarring of the hive are to be avoided as this attracts the attention of the bees and causes them to attack. By the use of smoke the bees may be quieted, so that they may be handled readily, the guards are disorganized and the bees gorge themselves with honey after which they are not so liable to attack. Too much smoke may disorganize the colony entirely. In opening the hive a little smoke should be blown into the entrance and then when the top or cover is lifted a little more should be directed over the frames before the bees have an opportunity to escape. Experience will soon teach one how much additional smoke may be needed, if any. One should stand at the side or back of the colony when working with the bees to prevent interference of the bees that are leaving and returning to the hive.

The best time to handle bees is in the middle of a warm day when they are busy bringing in nectar. They should never be handled at night or on wet, cold days. Clean "gunny sack" is a good material to use in the smoker. With a little experience and observation, club members will soon learn how to open the hive and handle the frames.

4. Remedies for Stings.

Various remedies for stings have been tried but none have proven to be very beneficial. As soon as possible after being stung the sting should be removed. This should be done by scraping the sting out with a knife blade or the finger nail. If one attempts to pull the sting out with the fingers he will squeeze the attached poison sac and force more poison into the flesh. The sting is barbed and when one is stung the poison sac is entirely torn from the bee's body which eventually causes death to the individual bee. With wasps and bumble bees the sting is not barbed so they are able to sting many times. Most beekeepers simply forget the sting, however, as the intense itching soon disappears. Rubbing the injured spot serves only to spread the poison. The use of a "cold pack" will be helpful in the case of a severe sting.

5. Location of Colony or Apiary.

The colonies or apiary may be located on any suitable place where the colonies may be spaced not less than six feet apart. Often bees are kept on roofs of houses, in back yards, in open fields or among orchard trees. Natural windbreaks, such as high board fences and trees, should be used when available.

Each colony should have an east or south exposure and if natural shade is not provided, shade boards may be used. These are boards that shade the sides and front of the hives. Do not shade the colonies too much. The hives should be placed on sloping ground and on some firm object about the height of a brick. Ordinary bricks are found good for this purpose since they keep them off the ground and yet are not too high. The hives should be sloped slightly forward for drainage and should be put on permanent locations and wintered in the same place.

6. Unpacking Winter Protection.

The colonies of bees should not be unpacked until after danger from frost has passed. Bees have to generate enough heat to maintain about 90 degrees of temperature in the brood chamber after brood rearing begins. By taking off the insulation too early, one causes the bees to become unduly exposed to the varying temperature of Missouri spring weather. If the bees have to be fed, one can replace such insulation that may have to be removed. When weather permits, each stand should be given a thorough house cleaning by removing excess comb, dead bees, etc. This is a good time to check amount of stores, strength of colony, etc.

7. Spring Feeding.

In case spring feeding is found necessary, a thin sugar syrup made from equal parts of water and sugar may be used for this purpose. In making the syrup, care must be taken to prevent scorching. Thin syrup tends to stimulate activity and also induce brood rearing.

The feed should be placed inside of the hive. This may be done by putting the syrup in a container such as an inverted syrup pail. Several small holes should be punched in the lid. One will find that by placing the bucket in an empty super body and then putting the top of the hive over, it will work satisfactorily.

III. EARLY SUMMER MANAGEMENT OF BEES.

1. Diseases.

It is not likely that the club member will be confronted with the task of combating disease in his colonies, but in case one does it is well to know something about the diseases which attack bees. There are several so-called diseases of bees. Most of them are of a microscopic nature and require thoroughness in prevention and thoroughness in their control. By their very nature they are easily spread by careless methods of manipulation. At all times when handling bees one should be clean and neat and avoid scattering honey and preventing robbing whenever possible. Much has been said about diseases and little so far has been accomplished in their control. Disease still takes its toll but more bees die from poor and improper handling than from disease.

The Isle of Wight disease is caused by a small mite similar to the common chigger which works in the respiratory system of the adult bee. Bees become sluggish and may tend to be paralyzed.

The so-called Nosema disease is supposed to be due to a microscopic protozoan found in the digestive tract of bees and is thought to cause losses.

Arsenical poisoning of adult bees may be classed as a disease also.

There are two brood diseases which cause the most losses. They also have caused a great amount of discussion. They are the European foul brood and the American foul brood. They both are thought to be caused by microscopic bacteria, each of a separate species. Being of microscopic nature, they make control measures tedious and difficult. Care should be experienced at all times to prevent any spread of the disease through careless habits of work. The European foul brood attacks young larva usually before they are capped over. The dead larvae and their contents in the bottom of the cell are not ropy. The American foul brood, besides having a very decided odor similar to heated glue, and attacking more nearly mature and capped brood, has a distinct ropiness as a characteristic of its dead brood and contents in the cell. Old dried remains of the larvae commonly called scales will be found on the floor of the cells.

To be certain that one has a diseased colony and to know what particular disease it is, he should send a portion of the dead brood to the Bee Culture Laboratory of the Bureau of Entomology at Washington, D. C. One should also consult the local leader or county extension agent.

2. Control and Treatment.

Ordinarily, the first three named diseases do not require any treatment or control measures.

The European foul brood usually is cleaned up by heavy feeding of the affected colonies, or by building up the strength by uniting colonies and giving them a new queen. It is most likely to be prevalent in regions where early favorable spring nectar flows are absent, or during backward springs which curtail nectar flows.

The American foul brood is not so easy to control. First of all, the beekeepers in the entire neighborhood should try to recognize the diseases and keep their colonies clean and prevent its spread. It is supposed to be spread through careless manipulation and by allowing an affected colony to be robbed of the store. Once it is introduced into a colony, it is hard to eliminate. As a rule, it causes most damage in unfavorable dry years. Much yet needs to be known about the disease.

An affected colony may be handled in different ways in getting rid of this disease. Treatment should be made preferably during a honey flow. Suggested treatments are as follows:

1. Many beekeepers prefer the destruction of the diseased colony and all of its contents. This is a sure way of cleaning up a diseased colony. This should be done in a pit in the ground and the remains burned to prevent the melted diseased honey from being picked up and scattered where other bees can become infected. If one has only a few diseased colonies in a large apiary, this is one of the safest and best ways to get rid of American foul brood disease.

2. Many very careful beekeepers in Missouri shake the colony of bees into a clean hive with frames containing either part or full sheets of comb foundation. The old combs and frames should be burned as discussed above. The honey may be used for human consumption. Sometimes, a second shaking is necessary. Some beekeepers shake bees into a small box and let them remain for about 3 or 4 days and then change them to combs with full foundation. The hive body must be cleaned out thoroughly to destroy all traces of the disease, if it is to be used again. This may be done by scorching out with a blow torch after working thoroughly with soap and water by using a hot lye solution.

3. A modification of the above method is to drive the bees from the diseased colony by smoking them into a hive body with the original queen, first caging her, of course. This is done by placing the new hive just above and back of the diseased colony. This method prevents exposure of the diseased colony and permits one

to keep from dropping bits of comb and honey about the yard. The greatest care should be exercised at all times to prevent any spread of the disease through careless habits.

Many of our so-called bee diseases are caused by mismanagement, faulty stores and other preventable causes, and only by better bee-keeping practices and education will their control be successful.

When in doubt as to what is wrong with the colony of bees, whether by any of the other so-called diseases such as dysentery, paralysis, sacbrood, pickle brood, etc., consult the local leader or county extension agent.

3. Swarm Control.

Swarming is a natural instinct of the bee and even though it cannot be entirely prevented, it can be regulated somewhat by man. It is better to have one strong colony if it can be held together than to have two weaker colonies caused by swarming which is the same as a division of the original colony.



Fig. 3.—When preparing to open the colony, one should work from one side of the hive. This permits the field bees to return without interference.

By beginning early and providing additional supers, one may to a certain degree control the crowded condition by giving more space in which the colony may work. The brood may be spread by alter-

nating empty combs with those containing brood. One may cut out the queen cells and thus prevent the rearing of young queens, or requeen if the colony is one that persists in swarming.

4. Summer Feeding

When a dearth of the nectar producing plants comes in the early summer, it is sometimes necessary to feed the bees. The same kind of syrup and its method of feeding should be used as discussed under spring feeding.



Fig. 4.—Thousands of blossoming acres of Missouri apple orchards require bees for pollination each spring.

5. Care During A Honey Flow.

About all one needs to do during a honey flow is to provide plenty of space for work by adding additional supers when needed.

IV. LATE SUMMER MANAGEMENT AND THE BEE CLUB TOUR.

1. Marketing.

The club member will likely market his crop mainly in his own neighborhood or in nearby towns and cities. Some members use the roadside market for disposing of their honey. This is an attractive method of selling honey. Several pounds of honey can be disposed of in this way if the market is located alongside a good highway. In this case quality of honey and attractiveness of package are particularly essential.

2. Grading.

The members should attempt to grade their honey at least into two grades, the dark and light honeys. Make it a practice never to sell honey which is off in flavor or color. Use the undesirable honey, which is not suitable for the market, at home in cooking or as feed for the bees during the winter months.

3. Containers.

One should choose clear glass containers for marketing his honey crop. The hexagon sided jars are fine. The ordinary Mason fruit jars are very attractive and satisfactory. Five and ten pound pails are very good as packages for larger orders. Remember that honey is a food and is to be eaten so it must be put up in a clean and neat package. The more attractive it is to the customers, the more likely it will find a ready sale. Neat and attractive labels enhance the appearance of the containers and are very inexpensive.

4. Condition of the Apiary.

Each club member should have pride in his work and his apiary. All weeds and tall grass should be kept down in front of the hives. This will assist in allowing free entrance to the hives.

The shade boards should be in place if they are needed and the entrance should be wide so as to provide ample air circulation.

5. Requeening.

This is a problem which often is neglected but should be understood by the club member. Whenever a colony is not up to normal due to its queen, as shown by shortage of bees, brood and surplus honey, it should be requeened in the spring or in the fall. However, the colonies normally should be requeened at least every two years and it is good bee management to requeen every year.

The best time of the year to requeen is sometime in the summer during a honey flow. This might be at the end of white clover flow or it may be in late August at the beginning of the fall honey flow. Queen cells may be selected from the best producing colonies in the apiary or may be purchased from beekeepers who produce queens on a commercial scale.

6. Taking off Honey.

During the summer, honey may be removed from the hive when at least two-thirds of the surface of the comb is capped over. Remove the frames, one by one, and return those that are not quite ready. Brush, or shake, off the adhering bees. To extract, one removes the capping from both sides of the comb with a sharp knife. Small stationary extractors are available at a reasonable cost, but the club members are not expected to buy one. Perhaps the club leader has one available for use. For cut-comb honey, the members simply cut the combs into the size desired and fill the jars with the pieces. The frames may be placed back on the hives for the bees to clean. After a day or two, they will be ready for placing comb foundation in and use again.

When taking off honey in the fall, be sure that you do not rob the colonies too closely for they will be rearing the brood until after killing frosts and will need 45 to 60 pounds per colony for food during winter.

7. Tour.

The local leader, the county extension agent and, if possible, an extension specialist from the College of Agriculture, will assist with the tour and give instructions to the members.

V. PROPER WINTERING AND FEEDING AND DETERMINING YIELD.

One of the important parts of club work is to determine the yield per colony in the project. In the fall, all expenditures and income should be correctly determined.

1. Kind and Amount of Packing.

Wintering bees under Missouri conditions is one of the most neglected of practices in beekeeping. Each colony should have an abundance of young bees, plenty of stores of good quality and some kind of outside insulation or windbreak.

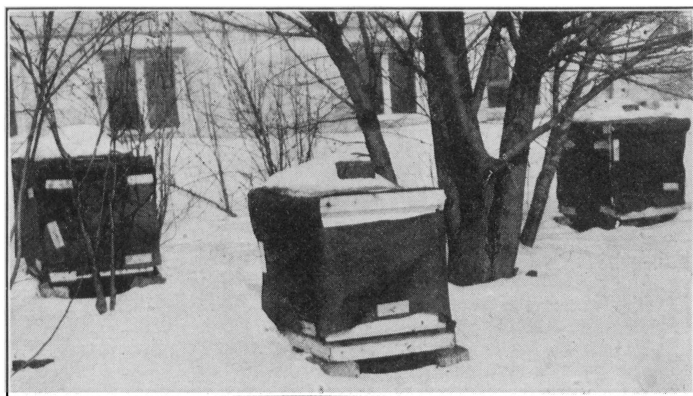


Fig. 5.—Hives wrapped with roofing felt for winter protection.

If leaves or any other materials are used around the sides of the hives, they should be 2 inches thick under the hives, 4 inches thick around the sides and 6 inches thick over the top.

If newspaper or other paper material is used for outside insulation, it should be at least one inch in thickness. This may then be covered with heavy building paper.

Packing should be put on as soon as the temperature averages below 50 degrees F. This will usually be about the middle of November. It should not be removed in the spring until freezing weather is past.

2. Quality and Amount of Store.

Only a high grade of honey should be left for winter food in the hives, for if poor honey with a large quantity of indigestible material is used, the bee's digestive system is disorganized and the disease known as dysentery will develop. Honey dew honey should never be used for bee food purposes. The average sized colony of bees will require 45 to 60 pounds of honey to bring it through the winter satisfactorily and in good shape.

3. Feeding in the Fall.

When feeding is necessary in the fall, one may use pure cane sugar as a syrup. This should be made into as thick a syrup as possible by using 2 parts of sugar to 1 part of water. Caution, do not scorch the syrup when making it. It may be fed as one feeds in the spring. Care should be observed to prevent robbing.

VI. SCORE CARD FOR JUDGING.

Apiary of 4-H Members.

STANDARD REQUIREMENTS

	VALUE
Equipment and Location	100
1. Standard equipment in use	40
2. Hive bodies painted (white)	10
3. Hives properly placed on foundations	30
4. Shade provided for colonies (if desirable)	20
Total	100
Manipulation	300
1. Colonies examined and fed when needed	30
2. Disease controlled	40
3. Swarm control attempted	10
4. Well-bred queens in use	30
5. Colonies requeened each year in June or August (two years with good queens)	30
6. Honey graded	15
7. Sufficient stores left for winter. (45 pounds a minimum.)	40
8. Ample winter protection provided	40
9. Record of expenditure and production kept on each colony	20
10. Total production on colonies (After allowing 60 lbs. per colony)	40
11. Reports in County Agent's office by October 10	5
Total	300

1. How to Use the Score Card.

The score card is a measuring stick by which one may score an apiary and compare the methods used with the best known standards of beekeeping. A relative value is placed on each phase of proper manipulations. One can use the different values to estimate the relative importance of each phase of beekeeping. The local leader should score the apiary and work of each club member.

Each item or phase may be explained as follows:

2. Equipment and Location.

(1). Standard equipment refers to equipment which is recognized as standard because of having the same dimensions.

(2). Having the hive bodies painted (white) is to indicate that one recognizes the importance of preserving the wood in the hives.

VII. RECORD AND REPORT BLANK—ENTOMOLOGY II—4-H BEEKEEPERS' CLUB.

NameAddressCounty.....
Leader's nameName of Club
Date StartedDate Completed

PROJECT SUMMARY

- 1. Describe briefly your start with bees: Equipment and location
Source of colonies
Kind of bees
2. In May, state briefly the spring care which was given:
Time of unpacking
Kind and amount of feed given
3. In July, tell briefly about summer care and early honey flow
4. In August, discuss the bee club tour: Time tour was made
Important things noted on the tour
Were the different apiaries scored?
5. Explain how the honey was marketed
6. Describe briefly how you prepared the bees for winter:

SUMMARY OF GENERAL CLUB ACTIVITIES

Where did you exhibit?

No. of individual demonstrations given before the club?

How many team demonstrations did you help give?

Where?

Where did you judge?

Value of club awards won \$.....

What special club activities, if any, did you attend, such as a 4-H club camp, State 4-H Club Round-up at the College of Agriculture, etc?

.....

How many club meetings did you attend?.....

FINANCIAL SUMMARY

Number of colonies at beginning of season..... At close.....

Income

Value of marketable honey sold: No. lbs \$.....

Value of other honey produced: No. lbs. @..... \$.....

Value of colonies at close of season \$.....

Value of equipment at close of season:

Value of original equipment \$.....

Increased value of equipment \$.....

Total income \$.....

Expense

Cost or value of colony or colonies at beginning \$.....

Cost of equipment for the season \$.....

Cost of feeding for the season: \$.....

Other costs:

..... \$.....

..... \$.....

Total Expense \$.....

Receipts less expenses \$...... Cash value of prizes won \$.....

Date (Signed)

(Club Member)

Explanation—Fill out all the blanks and the summary of club activities; write the story of club work for the year on loose sheets and attach hereto; hand this record and report blank to the local club leader; attend the round-up or achievement program; and then your club work will be completed.

(3). By having the hives properly placed on the foundations, one is more likely to have straight combs and little excess moisture in the hives.

(4). Furnishing shade is important because it assists the colonies in keeping cool in summer. It is not always necessary.

3. Manipulation.

(1). By examining colonies and feeding them, you may keep them at full strength.

(2). When one learns how to control the diseases, he is then able to maintain his apiary and make it profitable.

(3). Swarm control has to do with manipulation which tends to reduce the tendency of bees to swarm.

(4). When one uses bred queens (preferably Italians) he is able to maintain a high producing and gentle colony.

(5). By requeening every one or two years, depending on quality of the old queens, one is usually assured of maximum egg production each year and a strong colony of young bees.

(6). By grading his honey for color and perhaps a particular blend, one is able to have a standardized product which is uniform in color and taste, which should bring a better price.

(7). One should always provide plenty of stores for the bees to carry over the winter. A shortage of store means poorly fed and undernourished bees for the spring brood rearing.

(8). Bees need assistance in order to maintain their 57°F. of temperature during changeable weather. Remember at zero degrees F., the bees have to manufacture or generate 57°F. of heat. Protection helps conserve as well as keep out cold temperatures.

(9). Keeping a record of all expenditures and production enables one to make a business out of his work. A record should be kept on value of increase in bees as well as all other items including wax.

(10). Total production means the total amount of honey produced in all the colonies or apiary after allowing 60 pounds per colony for store.

(11). As soon as the honey flow is over in the fall and the proper amount is left for winter stores, the reports should be made out and sent to the county agent.

VIII. THE BEEKEEPERS' EXHIBIT.

Frequently at county agricultural fairs and at 4-H achievement programs, an effective club exhibit may be planned.

It is suggested that a beekeeping exhibit be made educational in nature which should consist of some of the following material:

1. A wooden hive body, showing the frames and comb foundation.
2. A glass exhibition case showing a frame of brood with some honey and the queen and her workers.
3. Improper equipment, such as a log and box hive.
4. Different kinds of honey displays, such as attractive glass jars.
5. A hive tool, smoker and other equipment.
6. Pictures might be added if such are available, showing: (1) colonies with several supers, (2) extracting and (3) apple or sweet clover blossoms.
7. A few cookies, bread, cakes, pies or other foods may be displayed, showing how honey may be used in cooking. Perhaps another method may be used to show the important use of honey for persons who are suffering from diabetes.

IX. GENERAL REFERENCES.

Missouri College of Agriculture Experiment Station.

Bulletin No. 305 Beekeeping in Missouri.

U. S. Department of Agriculture, Washington, D. C.

Farmers' Bulletin No. 1,713, The Treatment of the American Foul Brood.

Farmers' Bulletin 1,039, Commercial Comb Honey Production.

Farmers' Bulletin No. 653, Honey and Its Uses in the Home.

Circular No. 386, The Wax Moth and its Control.

Circular No. 392, Diagnosing Bee Diseases in the Apiary.

X. OBJECTIVES FOR CLUB MEMBERS

The objectives of each club member are to own, or through partnership, care for one or more colonies of bees, and to produce economically as great a quantity as possible of comb, extracted or chunk honey; and to keep project records.

The essentials to be observed are:

1. Selection of a well-bred Italian Queen.
2. A standard hive with movable frames.
3. Frames equipped with full sheets of foundation, wired.
4. Shallow or deep supers.
5. Provision for adequate bee pasture.
6. Harvesting of crop at the proper time.
7. Proper wintering and feeding.
8. Exhibiting and judging honey for quality.

The project work should be started before May 1 and completed by November 15.