

MN 2000 F
130 2.1

Extension Folder 130

Reprinted June 1954



Pollen Substitutes

To help bees in distress
To produce strong colonies earlier

BEES REQUIRE pollen for the development of their own bodies and for the production of larval food. It often happens in any locality that the supply of pollen available is not sufficient to sustain the normal life of a honeybee colony. Under such circumstances the beekeeper should assist his bees in this period of distress. He can provide them with either a pollen supplement or a pollen substitute. A pollen supplement consists of some food material fortified with pollen. A pollen substitute is any food used to entirely replace pollen.

The directions for preparing and using a pollen supplement can be obtained from Dr. C. L. Farrar, North Central States Bee Culture Laboratory, 105 King Hall, University of Wisconsin, Madison 6, Wisconsin.

The procedure for preparing pollen substitutes is given in this folder.

M. H. Haydak

UNIVERSITY OF MINNESOTA
Agricultural Extension Service
U. S. DEPARTMENT OF AGRICULTURE

Two Ways to Feed POLLEN SUBSTITUTES to Bees —

★ ★ ★

Feed it dry outside



Note the number of bees collecting dry pollen substitute offered in a sheltered place in the University Farm Apiary. The food is spread in corrugated paper boxes placed on some sort of support. The boxes may be protected from rain by a slanting roof which will allow the sun to shine on the pollen substitute. The roof may be made from ordinary window glass which should be whitewashed to prevent the bees from flying into it.

WHERE TO OBTAIN MATERIALS

In the current issues of bee journals you may find advertisements of firms selling the ingredients for preparing pollen substitutes. Your bee supply dealer may have the materials on hand to sell in small quantities. Your druggist can give you addresses of companies producing medicinal yeast. Usually the same companies produce dry yeast for animal feeding. Otherwise your livestock feed dealer will advise you where to get "animal" yeast as well as soybean flour. Be sure that you buy pure dried brewers' yeast and not a dried yeast food mixture.

Preparing Pollen Substitute

Ingredients

1. **Soybean flour** produced by the expeller method or soybean flour from which the fat has been extracted with a solvent and the flour heated afterwards. The fat content of the flour should be 5 to 7 per cent.

2. **Dried brewers' yeast** for animal feeding. Thoroughly mix the ingredients in the ratio of four parts soybean flour and one part dried brewers' yeast in preparing the pollen substitute. If a richer pollen substitute is desired, add 5 per cent dried egg yolk.

The most convenient way of feeding pollen substitute to colonies outside is to offer it dry. Place the substitute in shallow trays (these can be made by cutting down the sides of corrugated paper boxes) and offer to the bees in a sunny and protected place in the apiary. Some of the mixture will be wasted by the bees around the collecting place, especially on windy days. This loss can be minimized by spreading canvas under the trays.

A more economical method of feeding pollen substitute in the apiary is in the form of sugar candy. To make the sugar syrup *dissolve two parts of granulated sugar in one part of hot water by volume. Thoroughly mix one quart of cold sugar syrup with one pound of dry pollen substitute* by pouring the liquid into the substitute.

However, this formula can be modified. With different brands of ingredients, you may need to use somewhat more or somewhat less sugar solution. The cake should be of such a consistency so that candy will stay on the top bars of the frames without running down.

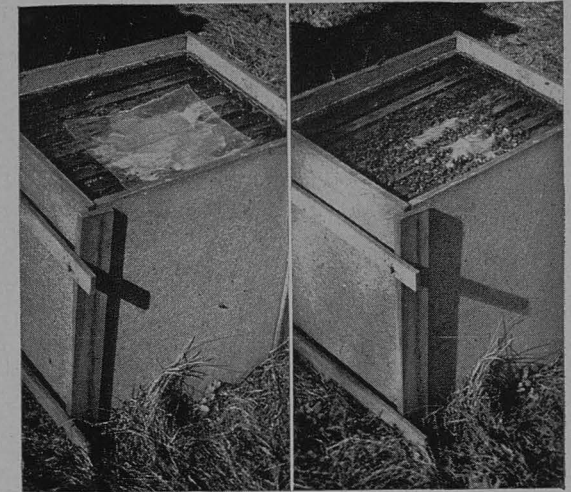
The above mixture will provide about 3½ pounds of candy which consists of one pound of dry pollen substitute, about 1½ pounds of sugar, and one pound (pint) of water.

To prevent drying, cover the candy with waxed paper and pat it down so that it will adhere to the surface. Allow to stand overnight so that the liquid will penetrate the dry particles of food. It is then ready for use.

With a wide scraping knife or a hive tool, spread the candy over a piece of waxed paper in

★ ★ ★

Feed as candy in hive



In the picture at the left a pollen substitute candy, covered with waxed paper, had just been placed on the top bars of the frames over the cluster of bees. The hive had been protected during the winter with insulating boards. The picture at the right was taken a week later. Note how the bees have eaten through the pollen substitute in the spaces between the frames. The waxed paper now covers only the remaining portions of the candy. The bees have chewed and carried out the paper.

a layer about one-quarter to one-half inch thick. Open the hive, smoke away the bees, and *place the cake directly over the cluster on the top bars of the hive so that the waxed paper is on top.* Invert the inner cover of the hive to provide space for the candy.

Begin by giving about a pound of the candy to each colony. Repeat feedings every 7 to 10 days, increasing or decreasing the amount depending upon the amount consumed the previous period.

Once started, the *pollen substitute* (either the candy or dry material) *should always be available to the bees as long as natural pollen is lacking.* Any interruption in the availability of the pollen substitute may cause a setback in brood rearing.

Sometimes the bees do not touch the candy substitute. Change its consistency. If the bees still do not take the substitute, stop feeding. Maybe there is enough stored pollen in the hive.

When using pollen substitute for packages, do not give the cake at the time of installation. Wait about a week and then start feeding, placing the food directly over the brood nest.

If you are unable to obtain dried brewers' yeast, dried skim milk can be used in a proportion of four parts soybean flour to one part dried skim milk by weight. However, this mixture is considerably less effective than the dried brewers' yeast mixture.

About one-half cup less of sugar syrup to a pound of dry pollen substitute should be used when preparing candy from the soybean flour-dried skim milk mixture.

In computing the amount of food necessary for the apiary, remember that candy made of one pound dry pollen substitute and one quart of 2:1 sugar solution will provide food for a single feeding of 3-4 colonies, depending on their strength. Estimate how many times you are going to feed your colonies (about 8-10 times if you start feeding in March). Multiply by this number the number of your colonies and divide by 3—this will give you the approximate number of pounds of dry pollen substitute you have to prepare. Make only as much candy at a time as you need for a single feeding of your colonies. The candy doesn't keep well in storage. The dry pollen substitute can be kept more than a year if stored in tightly covered containers and if kept free from insect infestation.

The author would greatly appreciate it if beekeepers would report to him their results from feeding pollen substitutes.

Experimental Results

Beekeepers of all countries have commonly offered various kinds of flours to bees when natural pollen was absent. The practice arose because bees were observed to collect meals and other dusty materials in the spring. Many beekeepers claimed that very strong colonies were built up when rye, oats, and other flours were offered to bees.

Controlled experiments to determine how much the bees used these materials and what benefits they derived were performed only recently by isolating colonies of bees in greenhouses without access to pollen and feeding a variety of foods to them.

It was found that wheat, rye, and some other flours could not take the place of pollen in the

brood-rearing activities of bees. These results have been confirmed by several other investigators.

In 1933 experiments with pollen substitutes were started at University Farm. Methods generally applied in animal feeding tests were used. Young bees which had never eaten pollen were hived in small nuclei in isolated wire screen cages, laying queens introduced, and a variety of foods fed. The growth of bees, their brood-rearing activity, and their mortality were noted.

After about 25 foods had been tested, a mixture of soybean flour and dry skim milk was recommended as a satisfactory pollen substitute.

When war caused a shortage of dry skim milk, a mixture of dried brewers' yeast and soybean flour was tested in experiments conducted during the summer of 1944. These tests showed that the colonies fed a mixture of dried brewers' yeast and soybean flour produced about twice as much brood as those fed either pollen supplement or soybean flour-dry skim milk mixture.

On the basis of these results the formulas given in this folder for pollen substitutes are recommended.

Additional Information

For further details consult your County Agricultural Agent or write to the Entomology Department, University of Minnesota, Institute of Agriculture, St. Paul 1, Minnesota.

Directions for the management of bees throughout the year are contained in Agricultural Extension Bulletin 204, "Beekeeping in Minnesota."

UNIVERSITY OF MINNESOTA



3 1951 D01 928 737 P

UNIVERSITY OF MINNESOTA, INSTITUTE OF
AGRICULTURE, ST. PAUL 1, MINNESOTA

Cooperative Extension Work in Agriculture and Home Economics, University of Minnesota, Agricultural Extension Service and United States Department of Agriculture Cooperating, Paul E. Miller, Director. Published in furtherance of Agricultural Extension Acts of May 8 and June 30, 1914.

5M-5-54