

Value of Pollen Substitutes for Brood Rearing of Honeybees¹

MYKOLA H. HAYDAK,
University of Minnesota, St. Paul

In previous publications (Haydak & Tanquary 1943) the use of a mixture consisting of four parts of soybean flour and one part of dry skim milk by weight was recommended for feeding of bees when reserves of pollen are not present in the hives and a new supply is not available in nature. Although the controlled experiments showed that dried yeast was superior to dry skim milk as a food for bees, the latter was selected because of its inexpensiveness and general availability. As the war has caused a shortage of dry skim milk it was deemed necessary to investigate the efficiency of some other more available food materials, namely dried brewers' yeast, dried egg yolk and pollen collected by bees as supplements to soybean flour.

The procedure in these experiments did not appreciably differ from that described previously (Haydak & Tanquary 1943). However, in order to evaluate the influence of tested foods on the brood rearing activity of bees more thoroughly, the experiment was carried for three consecutive ten-day periods instead of one as was done in the previous tests. The appearance of the first sealed cell in each colony was noted and ten days later the total number of sealed cells and that of the unsealed larvae were ascertained. Then each colony was supplied with a cake made of 200 grams honey and 70 grams dry pollen substitute. The counting of the total brood was later repeated at the end of each 10-day period.

Soybean flour produced by the expeller method and containing about 7 per cent fat was used. Two types of dried brewers' yeast were tested: "Medicinal" yeast, used for human consumption, and "animal" yeast utilized in animal feeding. Dried egg yolk produced by the spray process served for supplementing the soybean flour—"medicinal" dried brewers' yeast mixture. Pollen collected by the bees at the University apiary during the

month of August of the previous year was used for mixing with soybean flour. The experiment was started by the middle of July 1944. Two colonies made of about 10-hour old bees which had never eaten any pollen were employed for testing each of the foods. Dry skim milk, "animal" dried brewers' yeast and pollen were mixed with soybean flour in the proportion of one to four by weight. "Medicinal" yeast-soybean flour proportion was 1:9 by weight. Five per cent of dried egg yolk was added to medicinal yeast-soybean flour mixture. Because it was necessary to soak the pollen pellets in water before mixing with soybean flour and honey, the paste for distribution to the cells of the combs for feeding bees during the first 10-day period was made as follows: 35 grams dry pollen substitute mixture, 20 cc. water, and 200 grams honey.

The strength of each colony at the beginning of each 10-day period was established by subtracting the weight of dead bees from the original weight of bees used in establishing the nucleus. This was done in order to ascertain to what extent the strength of the colonies would be correlated with the variations in the results obtained. The queens added to the nuclei were all good layers, forming compact brood nests in the colonies from which they were taken out.

The indices of food efficiency were obtained by assigning one point to the food giving the lowest average brood production in each category (sealed and unsealed larvae) and dividing by this lowest average the averages of the brood counts in the colonies supplied with other foods. The sum of points for sealed and unsealed brood gave the index for each ten-day period; the sum of indices for the three periods gave the total index of food efficiency.

The results of the experiment are presented in Table 1. From the table it is evident that the strength of the colonies used in the experiment may be considered to be about equal. Certainly slight differences in the weight of the initial population did not influence the outcome of the feeding in

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