

## Comparative Value of Pollen and Pollen Substitutes

### I. Bee Bread and Cottonseed Meal-Dry Skim Milk Mixture\*

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In the previous articles on the value of pollen substitutes (Haydak 1933, 1936, 1937) the author has paid attention almost exclusively to the question of whether any given food substance can replace pollen as a food for bees. Little emphasis has been placed on the exact comparative value of pollen and pollen substitutes studied, except in the first publication. From those investigations an impression might have been gained that those substances which bees can utilize as food are inferior to pollen as stored by the bees. One has to remember, however, that the control colonies in the previous experiments were given bee bread in a natural undiluted state, while the experimental colonies were given mixtures of the dry food and honey in proportion 1:4 to 1:7. Under such circumstances the qualitative and quantitative differences which were observed in the experiments might

have been due to the fact that the bees fed pollen actually consumed more food per volume intake than did the bees fed pollen substitutes and therefore showed a better physiological performance.

For an evaluation of the nutritive value of any food substance the food intake of the experimental animals must be equalized. In case of bees where any restriction in food brings a certain reaction of the colony as a whole (restriction of egg laying, change in the rate of brood rearing activity), such equalization may bring additional factors which may make very difficult the interpretation of the results obtained. Therefore it was decided to feed the experimental colonies *ad libitum*, but to equalize the percentage of food per volume intake. The amount of food given to the experimental colonies was noted.

**METHODS.**—The method and the procedure of the present experiment did not substantially differ from those described previously (Haydak 1937). It was found, however, that an addition of a laying queen during the first day simultaneously

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