



# Pollen Substitutes and Supplements

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The presence of pollen in the hive is critically important to the health and well-being of the colony. Pollen is the principal protein source for bees and without it no brood development and colony expansion can take place.

The amount of pollen required to raise one bee is estimated at about 10 loads. A strong colony may rear as many as 200,000 bees over the course of one year, which would require 2,000,000 pollen loads or about 20 kg (45 lbs) of pollen. As a rule of thumb, one kilogram of pollen is needed for every one kilogram of bees (9,000 - 10,000 bees).

Pollen production by a colony varies and in many areas it may not be sufficient. Colonies experience pollen shortages most frequently in late winter / early spring, when brood rearing has started while pollen sources have not become fully available yet. To ensure large bee populations are available during the primary nectar flows, beekeepers stimulate brood rearing through supplemental feeding from early spring onward. Supplemental or substitute pollen feeding has become a standard management practice in commercial beekeeping. This type of feeding may also be applied during periods of pollen shortage throughout the production season.

Many different formulations have been developed for supplemental feeding. Even among pollens, there is considerable difference in food value. To illustrate the difference in quality, colony brood rearing was assessed:

| Pollen Formulations                  | Average number of bees<br>produced per colony |
|--------------------------------------|---|
| Honey alone                          | 575   |
| Honey + soybean flour                | 2,600   |
| Honey + soybean flour + 12.5% pollen | 4,900   |
| Honey + soybean flour + 25% pollen   | 5,500   |
| Honey + soybean flour + 50% pollen   | 7,300   |
| Honey + cakes of pollen alone        | 8,600   |

Please note that a **pollen substitute** is a replacement of pollen while a **pollen supplement** is a formula that also contains natural pollen.

## Collecting Pollen

Ideally, pollen should be collected from one's own disease-free colonies. Pollen traps can be purchased or constructed according to design plans available from equipment suppliers and the Apiculture Program office.

## Purchasing Pollen

If pollen is purchased, it may contain diseases, e.g. spores of American Foulbrood. It could also contain other organisms, such as beetles, mites, molds and insects. To prevent disease introduction, the pollen should be irradiated at the Iotron Irradiation Facility in Coquitlam. If irradiation is not available, the addition of antibiotics (oxytetracycline) in the supplemental feed is recommended. For correct dosage, please follow label instructions.

## Ingredients of Pollen Substitutes and Supplements

There are various pollen substitutes and supplemental feeding formulas commercially available. The most common ingredients include:

- **Brewer's Yeast** - This product is readily available in small and large quantities. Brewer's Yeast is very similar in protein content to the average pollen, and is superior in vitamins.
- **Torula Dried Yeast Type S** - This product has been used for a long time in the United States, often in combination with soybean flour and Brewer's Yeast. Torula Dried Yeast may not be readily available in B.C.
- **Soybean Flour + Dried Brewer's Yeast** – This involves a mixture of soybean flour with Brewer's Yeast. The soybean flour has about 50% protein content. It should be of low fat content (5%-7%), manufactured through the 'heat treated expeller' process. The addition of dried or frozen pollen will make the mixture more attractive to bees. Casein and egg yolk powder may also be beneficial.

### Preparation of Patties:

Patties must have the right consistency, i.e. the mixture should not be too hard or runny.

Prepare patties as follows:

- Prepare Dry Mix formulations (see below).
- Prepare heavy syrup of 3 parts sugar to 1 part water.
- Slowly add 2 parts of syrup to 4-5 parts of **dry mix** (see formulations below), while kneading.
- Leave overnight and knead again before flattening into a 1.5 cm cake.
- Cut into squares weighing about 0.5 kg (1 lb) each.
- Place on wax paper and cover with another wax paper to prevent drying.

### A. Dry Mix Pollen Supplement Formulations

| #1   | #2   | #3   |
|--|--|--|
| 3 parts soybean flour<br>1 part pollen   | 4 parts Brewer's Yeast<br>2 parts dry sugar<br>1 part pollen<br><br>2 parts <u>light</u> sugar syrup (2 sugar : 1 water) | 10 parts Torula Type S Yeast<br>10 parts Brewer's Yeast<br>1 part pollen<br><br>Note: use 2 parts dry mix to 3 parts syrup |
| In supplement mixes, the percentage of pollen can be increased or decreased depending on availability. |  |  |

### B. Dry Mix Pollen Substitute Formulations

| #1  | #2   | #3   |
|---|--|--|
| soybean flour only  | 4 parts soybean flour<br>1 part Brewer's Yeast | 10 parts soybean flour<br>6 parts casein<br>3 parts Brewer's Yeast<br>1 part egg yolk powder |
| Add 4-5 parts of the dry mix to 2 parts heavy sugar syrup as indicated earlier in directions on preparation of patties. |  |  |

## Installation of Patties

In early March, remove hive cover and smoke the bees down below the top bars. The patty, flattened into a cake about 1.5 cm (1/2 inch) thick, should be placed on the top bars directly over the center of the cluster. **The top of the cake must be covered with waxed paper to prevent dehydration and hardening.** The inner cover, when used, should be inverted with rim side down to provide space for the cake.

Note: When natural pollen is available and the weather is suitable for foraging, the colony will not use the pollen substitute or supplement. However, in early spring and during any dearth periods, pollen supplements and substitutes will be readily taken up by the bees.

## Apply or Not Apply Pollen Patties

When colonies are short of pollen, brood rearing and subsequent population decline will occur. A measured application of pollen patties is recommended to prevent cessation of brood rearing.

The use of pollen patties in early spring for stimulating brood rearing has become part of standard beekeeping management. In many areas of the province, the use of pollen patties may not be necessary or advisable.

In areas where honey production is limited to a single floral source for a short period in summer, it is essential to maximize the foraging bee population at the start of the blooming season. The entire management program from early spring onward is directed to colony expansion. Pollen patties play a key role in stimulating brood rearing.

In areas where nectar and pollen sources are available through most of the beekeeping season, the use of pollen patties for stimulating brood rearing stimulation may not be necessary or advantageous. Beekeepers may consider two key points:

- Pollen patty formulations often include ingredients that may have some indigestible components. As bees retain their feces during the winter months, the ingestion of indigestible material may aggravate Nosema infections.
- Early season colony expansion may outpace the availability of forage sources in the area. Long periods of inclement weather in spring will then require supplemental feeding of colonies to sustain the large population and prevent decline or starvation.