



Instructions for using Ferro-Bee®

Overview

Dissolve Ferro-Bee® in sugar syrup and administer this solution regularly to your bee colonies in the periode July until September/Oktober, each time 100 mg per bee colony. Do this in preference one time per week, and under the circumstances mentioned under point C.

The total maximum dose of Ferro-Bee® per colony during the whole period of administering is 1,8 gram.

Warning:

Do not use other products in combination with Ferro-Bee®.

These instructions supplement the instructions for use dated April 2013.

The instructions below apply to 5 bee colonies.

- A. Preparing Ferro-Bee®**
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A. Preparing Ferro-Bee®

Preparing Ferro-Bee® using dry sugar (for 5 bee colonies)

1. Using the measuring scoop provided, put one dose (a flat measure, 0.5 gram) in a small bowl
2. Mix the powder with a small amount of sugar (1-2 dessertspoons).
3. Stir well.
4. Add a little water and continue stirring to make a paste.*
5. Add this paste to 1 liter of sugar syrup. If necessary, add a dessertspoon of honey.**
6. Stir the sugar syrup thoroughly.
7. Leave this sugar syrup to rest for at least 4 hours at room temperature.***
8. Stir this sugar syrup thoroughly again.
9. The Ferro-Bee® solution may still separate a little.
10. Administer the sugar syrup to your bees, 200 ml per colony.
11. In this way, each colony is administered 100 mg of Ferro-Bee®.

Preparing Ferro-Bee® using sugar syrup (for 5 bee colonies)

1. Using the measuring scoop provided, put one dose (a flat measure, 0.5 gram) in a small bowl.
2. Add a small amount of sugar syrup (1-2 dessertspoons).
3. Stir well until thoroughly mixed to a paste.*
4. Add this paste to 1 liter of sugar syrup. If necessary, add a dessertspoon of honey.**
5. Stir the sugar syrup thoroughly.
6. Leave this sugar syrup to rest for at least 4 hours at room temperature.***
7. Stir this sugar syrup thoroughly again.
8. The Ferro-Bee® solution may still separate a little.
9. Administer the sugar syrup to your bees, 200 ml per colony.
10. In this way, each colony is administered 100 mg of Ferro-Bee®.

Notes/explanation:

- * By mixing, Ferro-Bee® will remain dispersed throughout the solution due to the emulsifying properties of sugar (this well-known principle is widely used in the food industry).
- ** Honey contains glucose oxidase (GOX), and this enzyme transforms glucose into gluconic acid.
- *** When you leave the sugar syrup with Ferro-Bee® to stand for a while, the Ferro-Bee® will partially dissolve. The iron (Fe^{2+}) binds to the sugars, which may or may not have been transformed into gluconic acid.



B. How to administer Ferro-Bee®

Administer the freshly made sugar syrup with Ferro-Bee® in the same way you administer the winterfeed, in other words, use the feeder at the top of the hive.

You can administer the sugar syrup with Ferro-Bee® via an internal feeder (a frame feeder, for example) or an external feeder. See illustrations.



Number of doses, quantity

Administer Ferro-Bee® to your bees every week. In the circumstances mentioned in paragraph C. you can administer Ferro-Bee® twice a week.

Make sure that you do not administer more than 1.8 grams per bee population in total, over the whole period of administering.

Notes:

You need to make a fresh solution once a week.

You can also make a larger quantity and store this in the fridge (no more than 2 weeks).

What happens to Ferro-Bee® after it is taken up by the bees?

The ferrous fumarate administered with Ferro-Bee® is slowly converted into ferrous gluconate in the bee. Gluconate is formed from glucose by the glucose oxidase enzyme (GOX). In principle, GOX is always present or is always formed. GOX is formed by micro-organisms and is also present in fresh honey, for instance. Ferrous gluconate is much more soluble than ferrous fumarate. As a consequence, this improves the biological availability of the iron. This insight has led to the procedure described above.



C. Special circumstances/moments when you should administer Ferro-Bee®

- In the event of rain or humid weather conditions, administer Ferro-Bee® prior to or after these conditions have past.
- If you observe that your bees are lethargic, or when they hang under the flight shelf. This is often the case during warm weather (but not only then).
- When the bees demonstrate abnormally aggressive behavior. Aggressive behavior is most often observed towards the end of the day during warm weather, and after rain.
- If you expect the number of mites will increase considerably. Do not base this solely on the number of varroa mites (mite fall). Rain, damp weather and/or humid weather are more decisive factors.

D. Special considerations

Take up by the bees

Check whether the bees are taking up the sugar syrup with Ferro-Bee®. In principle, the bees should take up the feed containing Ferro-Bee® within one day. If the bees have not consumed the syrup within a few days, check to see whether the bees can actually access the sugar syrup. There is not much more you can do.

Influence on reproduction

Ferro-Bee® suppresses reproduction somewhat. This is one of the influences of iron (the way it works). When you administer Ferro-Bee® to bee colonies this will not only affect the reproduction of the bees, but it will influence the mite reproduction too. Theoretically, this is favorable, when the reproduction in the colonies begins to diminish from July/August, for example because there is less food. This will have a similar influence on the reproduction of the mites, which naturally may also be favorable.

Use in combination with other treatments

The use of Ferro-Bee® in combination with **formic acid** is strictly discouraged.

The use of Ferro-Bee® in combination with **oxalic acid** is discouraged.

The use of Ferro-Bee® in combination with **thymol** or products containing thymol is discouraged.

The reason for this is that these substances increase the solubility, or availability, of iron considerably, resulting in an overdose effect.

The use of Ferro-Bee® in combination with **Amitraz** does not appear to give rise to any particular problems. As Amitraz is used only to counter mites, this usage is purely supplementary. Amitraz has multiple effects (see website). It is possible that Amitraz reinforces the working of iron due to the chelate effect.



Administering to small colonies / split-off colonies

In general, we do not recommend administering Ferro-Bee[®] to split-off colonies, small colonies or colonies in breeding hives from August. Practical experience has shown that these colonies do not survive, even if the dosage is adjusted for the size of the colony.

Warning

Do not administer Ferro-Bee[®] to small colonies / split-off colonies from August.

E. Observations and assessment of the effectiveness of Ferro-Bee[®]

Increased activity

The bees will become more active immediately after administering Ferro-Bee[®]. This is partly due to the extra sugar.

Breeding pattern

Exceptionally regular breeding patterns have been frequently reported after administering Ferro-Bee[®]. The breeding pattern should be regular, so no 'shotgun brood' (dotted brood).

Color of the bees

Ferro-bee[®] may give the bees a slightly darker color. This is due to the oxidation, for example of the exoskeleton.

Color of the honeycomb cells

It has been reported that after administering Ferro-Bee[®] the edges of comb cells are darker. We suspect that this is due to iron being deposited here. The darker color may also be the result of oxidation of the wax. A marked darker coloring of the honeycomb cells may indicate an overdose.

Mite fall

Administering Ferro-Bee[®] results in higher mite fall. This is due to the increased activity of the bees and is possibly attributable to other processes as well.

Important information

When you administer Ferro-Bee[®], due to the fact that the bees fly in and out, the bees are redistributed across the hives at that particular location. This means that weak colonies are strengthened. This may also mean that strong colonies at that location become weaker, but with the result that ultimately all colonies (with the queen bee) will survive the winter.



F. Additional information about administering iron to bee colonies

Iron has several effects. For beekeeping, the influence on reproduction and on the bacterial composition are significant.

Dosage regime

Generally speaking beekeepers should administer small amounts of Ferro-Bee® regularly. We recommend regularly administering small quantities in preference to administering a large dose via the winterfeed.

Iron availability

The main problem with iron is that it is difficult to dissolve. For this reason, administering Ferro-Bee® regularly will ensure a steady supply and will counter any iron deficiencies.

Transport

The iron is transported by the sugar.

What happens to the extra iron administered?

The majority of the iron supplement is stored.

A small proportion of the iron is taken up by the bees themselves.

A modest amount of iron will end up in the honey.

Forms of iron storage

Iron is stored in various chemical forms, often in forms that are difficult to dissolve or in almost completely insoluble complexes. This means that from that moment on, the iron is no longer available to the bees.

Additional information

You will find further information about the effects of extra iron in the pages describing the various models of bee decline.

Administering Ferro-Bee® in patties (protein products)

Experiences to date have shown that it is not worthwhile administering Ferro-Bee® in patties (protein products). The reason for this is that the active element (Fe^{2+} , ferrous fumarate) binds itself to the proteins and other components in the patty. The additional iron is therefore not available to the bees.

**Overdose**

The recommended maximum dose of Ferro-Bee® is 1.8 gram per bee colony in total, over the whole period of administering.

Experiences with overdoses

In situations where much too much Ferro-Bee® was administered to bee colonies (8 – 11 gram in a period of 5 weeks, after administering twice a week) no detrimental effects were observed in the bee colonies. After the 5th week all the bees left the hives; however, they did return after a while, sometimes after several days.

Consequences of an overdose

In the longer term, an overdose of iron will result in loss of the bee colonies.

G. Adding Ferro-Bee® to the winterfeed

It is possible to administer Ferro-Bee® via the winterfeed. For this, add 1 gram (= 2 scoops) of Ferro-Bee® to the sugar syrup. Refer to paragraph A for detailed instructions for preparing the solution.

For further information:

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