

# Impact of delaying fall varroa treatments and hive feeding on the efficacy of varroa control and winter survival of *Apis mellifera* L.

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## Introduction

Beekeepers in northern climates must prepare their colonies for winter. After harvesting last honey flow, colonies are reduced to one or two brood chambers, fed a sucrose solution (2:1, 8 to 10 litres per hive) and treated against varroa mites. Afterwards, colonies are either wintered indoors or outdoors. Our main hypothesis is that different time frames of these operations will have an impact on the wintering success of colonies.

## Materials and methods

Seventy two hives of equal strength were randomly distributed in three experimental Groups (figure 1): control Group 1, early strategy Group 2 and late strategy Group 3. Colonies of Groups 2 and 3 received the same winter preparation at different times (14<sup>th</sup> of September and 16<sup>th</sup> of October). All hives were moved indoors (1 brood chamber, controlled environment: 5C, 40% RH) on November 17<sup>th</sup> and returned outdoors on April 8<sup>th</sup>.



Figure 1. Experimental design

## Results

Our results show that survival is best in early fed hives (fig. 2). Average weight of early prepared hives is higher when compared to late prepared hives before and after wintering ( $p < 0.05$ , fig. 3).



Figure 2. Colony survival

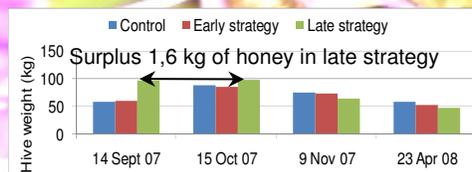


Figure 3. Colony weight



Figure 4. Colony strength

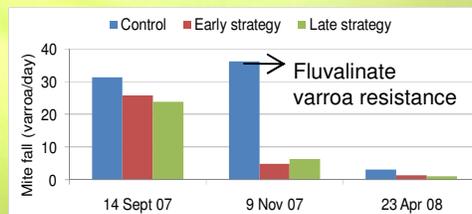


Figure 5. Varroa population

## Results (continued)

Average surplus honey production from Sept. 14<sup>th</sup> to Oct. 15<sup>th</sup> in late strategy hives is 1,6 kg (fig. 3). Colony strength is similar in all three Groups in November ( $p > 0.05$ , fig. 4). In spring the early strategy colonies (groups 1 and 2) have an average of four full frames of bees and brood compared to 1.4 frames for the late strategy colonies ( $p < 0.05$ , fig. 4). Spring varroa populations are similar in all groups (fig. 5). Apistan treatment of control group hives was inefficient due to Fluralinate varroa resistance.

## Conclusions

Successful fall feeding and efficient varroa treatment of hives is essential to the young fall bees that undergo important physiological changes before winter. Winter bees must get 'fat!' (Fat bodies and hypopharyngeal glands).

Early fall feeding (ref. early strategy and control hives) offers a better chance of succeeding wintering preparation of hives because fall climate change can be a problem!

### When using an early strategy:

- Wintering survival is higher;
- Fall feeding is more efficient;
- Spring colony strength is higher.

### Delaying the treatments:

- Gives the varroa time for further reproduction in brood;
- Maintains parasitic pressure on colonies;
- Efficacy of organic treatments are lowered when temperature is below 10C (Formic acid and thymol products).

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