



RAISING QUEENS

A How-To Guide to Sustainable Queen Rearing



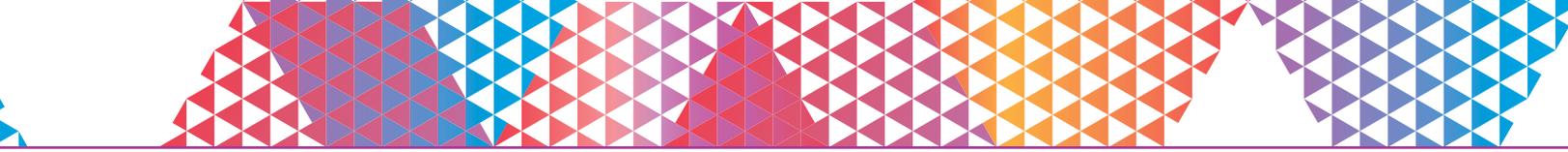


TABLE OF CONTENTS



3 Introduction +
Anatomy of a Comfort Hive

4 Queen Rearing Day 1-5
+ 48 Hour Queen Cells

5 Queen Rearing Day 8-15
+ 10 Day Method

6 Queen Rearing Day 20-33

7 Comparing Queen Rearing
Methods: Results From
Our 2021 Project
+ Upcoming Work

8 Acknowledgements



INTRODUCTION

Why Raise Queen Bees?

Raising your own queens achieves three important objectives:

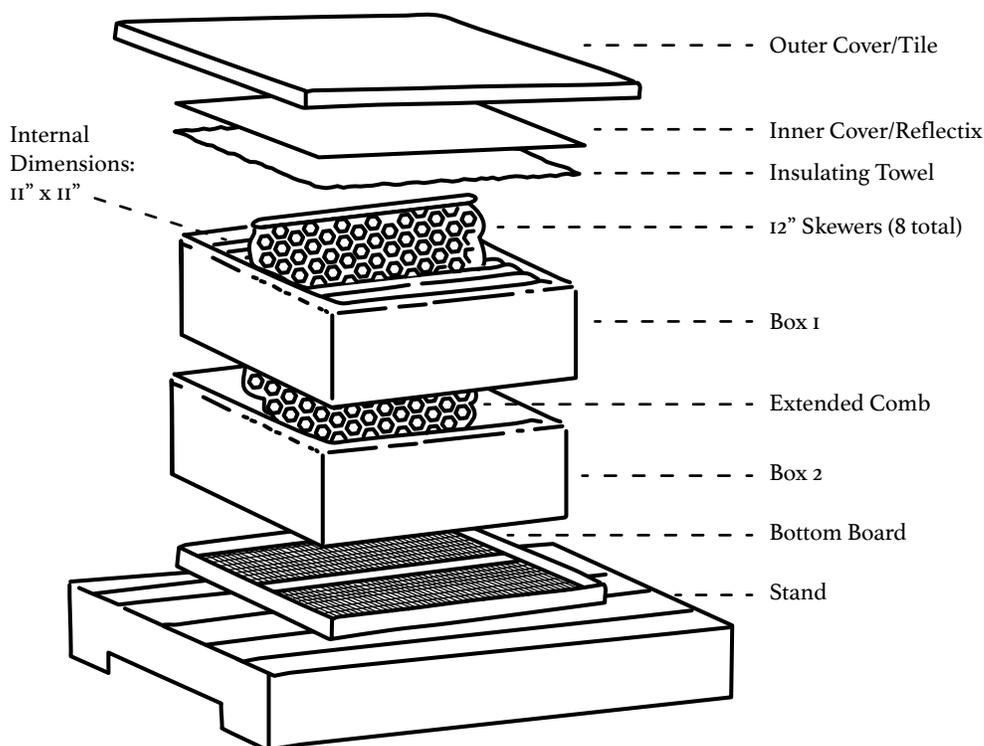
1. You are raising bees uniquely adapted to your bioregion and your beekeeping practices. The best bees to select for your apiary are the ones who do best in your care.
2. Genetic diversity is an important factor in maintaining honey bee health and viability.
 - a. Individual colonies that have good diversity among the bees in each hive are more productive, have increased colony growth, and are less susceptible to severe disease infections^{1,2}.
 - b. Lack of genetic diversity (inbreeding) can be devastating in honey bees. Brood viability decreases when there is little genetic diversity among the drones with which a queen mates³.
3. Raising queens will make you a better beekeeper, more in tune with what your hives need to thrive.
 - a. Raising queens gives you a strong understanding of the hive biology because you have to consider the steps and inputs necessary to raise high quality queens.

How Do I Start Raising Queens?

1. In order to raise queens it is important to have a firm grasp of the honeybee hive's anatomy, including:
 - a. The pupation cycle of a worker bee
 - b. The pupation cycle of a queen bee
 - c. The pupation cycle and the role of the drone bee
 - d. Our favorite texts on this are
 - i. *Bee Sex Essentials* by Lawrence Connor
 - ii. *Mating Biology of Honeybees* by Gudrun Koeniger, Nikolaus Koeniger, Jamie Ellis and Lawrence Connor
 - iii. *Contemporary Queen Rearing* by Harry Laidlaw
2. An entry point to queen rearing is the simple and accessible walk away split method.

- a. Beekeepers can rear a new queen by splitting a colony (one of the subsequent hives receive the old queen; one rears a new one). This is a common and relatively easy queen-rearing method, but it gives the beekeeper little control over rearing conditions, and there is little research on it. In our study in order to simulate this method, we removed queens from mating nucs, and allowed them to raise a new queen.
3. The industry standard for raising queens is to produce 10 day queen cells.
 - a. Conceptualized in the late 19th century, today the 10 day method is considered the "gold standard" for queen rearing.
 - b. The beekeeper grafts young larvae into queen cups, which are placed in a nutrient-rich starter hive. 10 days after the graft, the queen cells are transferred into mating nucs. This method is the most complicated, and requires the most management, but gives beekeepers the most control over rearing conditions, and reliably produces high quality queens.
4. A novel approach to raising queens is the 48 hour queen cell method.
 - a. This is an abbreviated version of the 10-day method, where queens are placed into mating nucs 2 days after the graft. It is easier and requires less management of cell raisers than the 10-day method, but gives beekeepers less control over larval rearing conditions and limits production. It is a new and understudied technique.

- 1 Mattila, H.R. & T.D. Seeley. 2007. Genetic diversity in honey bee colonies enhances productivity and fitness. *Science* 317: 362-364.
- 2 Tarpey, D.R. 2003. Genetic diversity with honeybee colonies prevents severe infections and promotes colony growth. *Proceedings of the Royal Society, London* 270: 99-103.
- 3 Mackenson, O. 1951. Viability and sex determination in the honey bees. *Genetics* 36: 500-509.



ANATOMY OF A COMFORT HIVE

A simple, small hive suitable for producing queen bees.

How to inspect a Comfort Hive:

Part 1 Video

Part 2 Video

QUEEN REARING TIMELINE

So what goes into queen rearing? Follow our queen rearing timeline to learn more about each step.

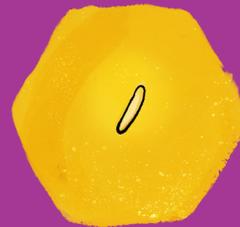
Illustrations by Hang Tran



Day 2:

The beekeeper makes up a queenless starter hive, called a “cell raiser”. There are several ways to build a successful cell raiser. Here is an instructional video for how to make a cell raiser:

Method 1



Day 0:

The egg is laid by the origin queen.

See a video here.



Day 3:

The beekeeper chooses a hive to graft from, and places grafted cells into the starter hive.

Part 1 Video

Part 2 Video



Day 5:

The beekeeper checks the graft to ensure success, and re-grafts if necessary. If making 48 hour cells, you can remove them at this stage.

48-HOUR QUEEN CELLS:

At this stage the cells can be removed and you can skip to Day 9 on page 5.

See a video here.

Paper: *Comparing Queen Rearing Methods*



QUEEN REARING TIMELINE *(cont'd)*



Day 8:

Queen cells are capped by young worker bees.

[See a video here.](#)

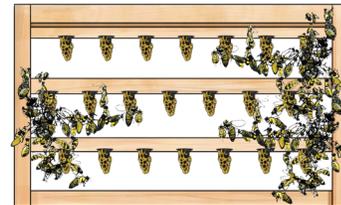


Day 12:

The beekeeper creates mating nucs for capped queen cells.

[Method 1](#)

[Method 2](#)



Day 13:

The beekeeper moves capped queen cells into mating nucs.

[See a video here.](#)



Day 15:

Queens emerge.

[See a video here.](#)



QUEEN REARING TIMELINE *(cont'd)*



Day 20:
Queen begins mating flights.



Day 26:
Queen lays eggs, beekeeper
checks the mating nuc
for eggs.

[See a video here.](#)



Day 33:
Larva mature and pupate, some
will be capped. The brood
pattern can be analyzed by
the beekeeper.

[See a video here.](#)



COMPARING QUEEN REARING METHODS



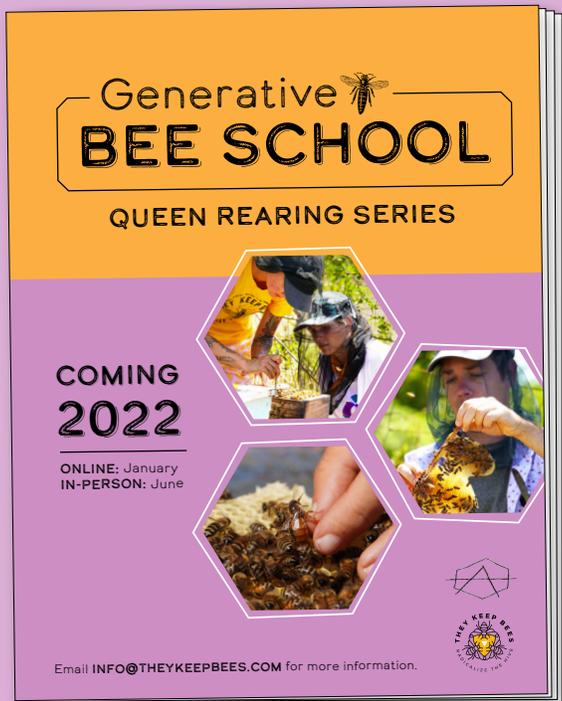
RESULTS FROM OUR 2021 RESEARCH PROJECT

Presentation on queen rearing research results:

Middlesex County Meeting 4/20/21

Walk Away Split Data from a second trial of Walk Away Splits:

Fact Sheet: Comparing Queen Rearing Methods



FUTURE WORK

QUEEN REARING SCHOOL

Anarchy Apiaries and They Keep Bees will host a Queen Rearing School sponsored by NESARE. Courses will begin in Winter 2022 and span the Summer 2022-23.

BONUS:

How to Monitor for Varroa Mites in Your Honey Bee Colonies

[See a video here.](#)

ACKNOWLEDGEMENTS



This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under subaward number ONE19-326.

The team:

HANNAH WHITEHEAD is the Honey Bee Extension Educator at The Center for Agriculture, Food and the Environment, University of Massachusetts Amherst

SAM COMFORT is a beekeeper with Anarchy Apiaries, based in Hudson Valley, NY, South Florida and NC

ANG ROELL is a beekeeper with They Keep Bees, based in Western Massachusetts and South Florida

BI KLINE is a beekeeper with They Keep Bees, based in Western Massachusetts and South Florida

Thank you to our partners:

