Atlantic Tech Transfer Team for Apiculture (ATTTA) Update

Robyn McCallum, PhD, PAg

October 19, 2019

Truro, NS

@mccallumrobyn

WHO WE ARE

- Established in April 2016
- Based at Perennia Food & Agriculture
- Working with multiple industry partners (blueberries & bees)
- Covering New Brunswick, Nova Scotia & Prince Edward Island
- Your membership in NSBA supports ATTTA!

OBJECTIVES

- **Optimizing** hive placement, timing, density, and strength for wild blueberry pollination
- **Improving**
  - overwintering success and addressing spring dwindle
  - honey bee health and nutrition
  - disease and pest monitoring and management
  - queens + biosecurity

2019 Highlights

- Maritime Wild Blueberry Field Day
- Taught Modern Beekeeper (Dalhousie University)
- Blueberry twilight meetings
- Steering Committee meeting
- Continued numerous research projects
- 2 research papers published
- Several fact sheets developed

Funding Announcement

Apimondia Workshop

Dalhousie University
Big On Blueberries Event

NSBA Field Day

PEI Workshops

RESEARCH ROUNDUP

- Queens
- Stocking density and bee growth in pollination
- Pollen supplement during pollination
- Pollen supplement feeding project
- Nosema
- Miticides (Formic, Apivar, Bayvarol, Hopguard)
- Research in PEI

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QUEEN UPDATE

- Year two of program
- Working on cost summary for beekeepers
- Collaborating on national comparison

Blueberry Pollination

POLLEN DURING POLLINATION UPDATE

- Report just uploaded to website
- Examined colony growth among 0, 1 & 2 lbs of pollen patty
- Also investigated European Foulbrood
- Collaborating Canada-US on future projects

Photo from Country Fields

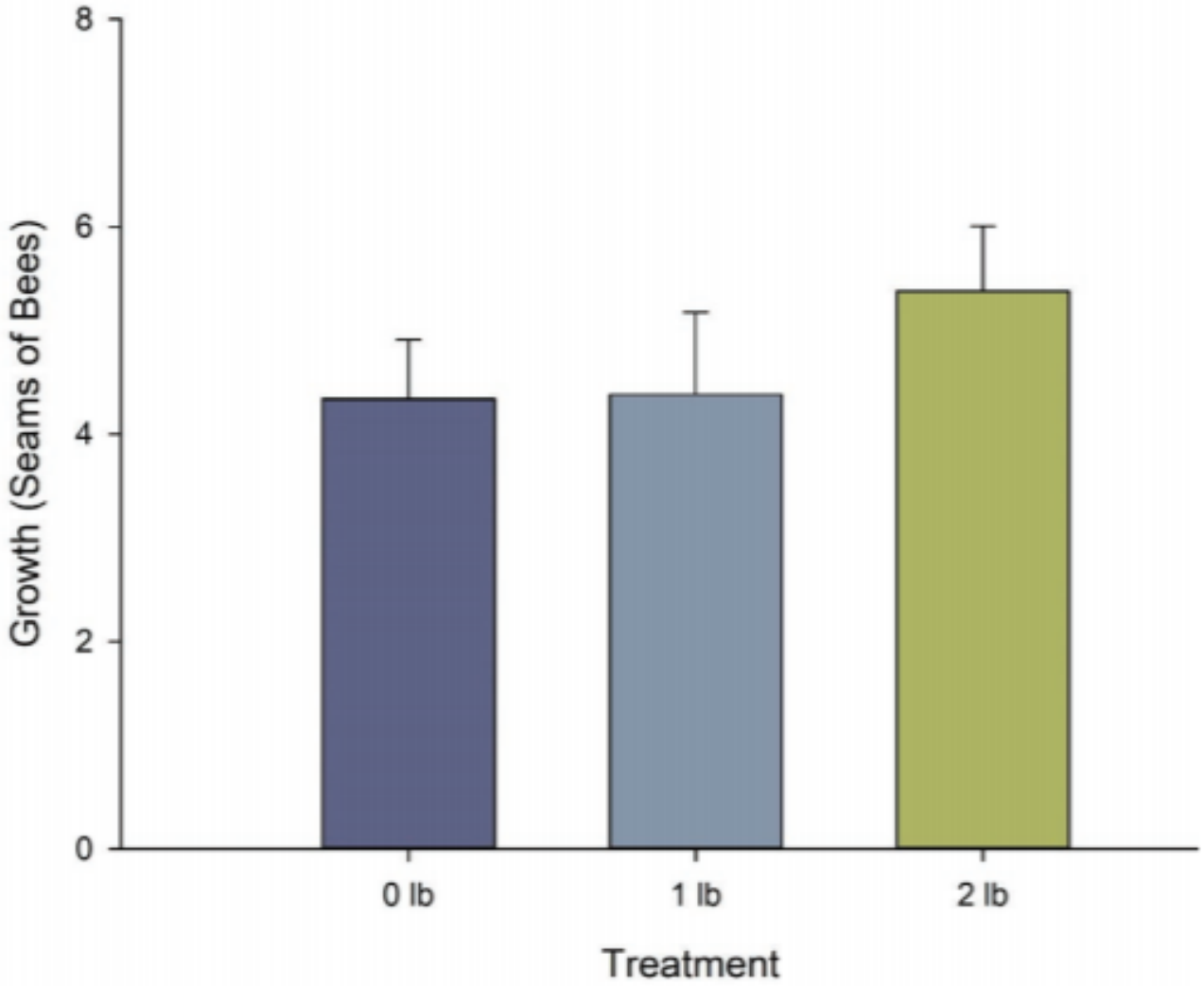

Figure 1: Mean honey bee colony growth during blueberry pollination in Colchester County, Nova Scotia, 2019 among groups fed 0, 1, or 2lbs of pollen. Error bars represent standard error.

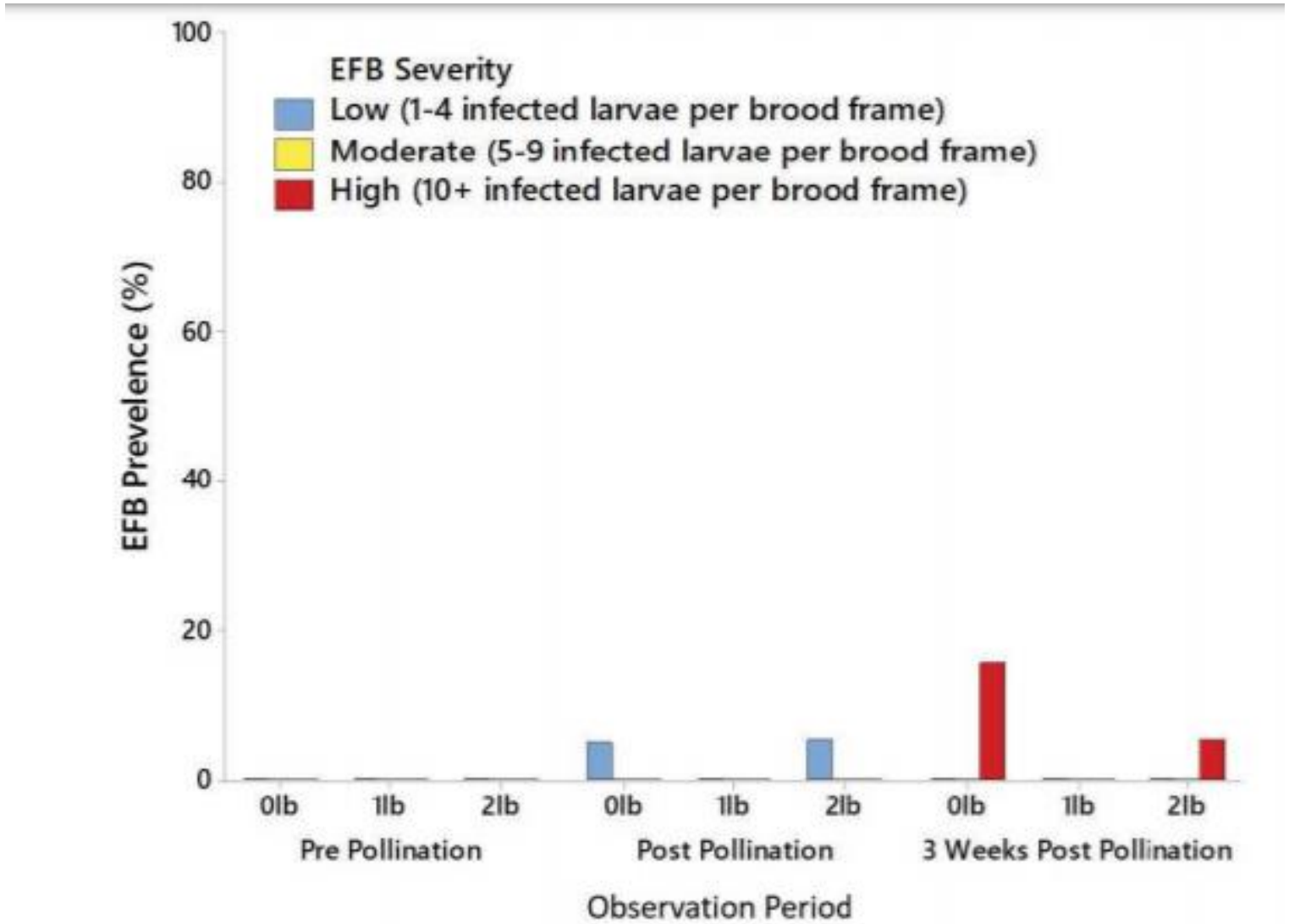

Figure 2: European Foulbrood prevalence and severity rating of honey bee colonies pre-pollination, post-pollination and three weeks post-pollination in Colchester County, Nova Scotia, 2019.

https://www.perennia.ca/wp-content/uploads/2019/10/ATTTA-FactSheet-Oct-2019.pdf

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Evaluating the effect of feeding pollen substitute to honey bee colonies destined for wild blueberry pollination in Colchester County, Nova Scotia

Sawyer Olmstead, Robyn McCallum, and Jillian Shaw, 2019
Atlantic Tech Transfer Team for Apiculture (ATTTA)
www.perennia.ca/portfolio-items/honey-bees/

INTRODUCTION

Wild blueberry (*Vaccinium angustifolium* Aiton) is a

fields in eastern Canada. It is therefore of interest to test potential solutions to help insure that colonies sent to wild blueberry pollination return strong and disease-free.

The objectives of this trial were to 1) determine the effect, if any, of providing pollen substitute to honey bee colonies

RESEARCH IN PEI

- Comparing efficacy of two oxalic acid vaporizers (Varrox vs Provap)
  - Track mite drop before (natural drop) and after applications in November
  - Track mite levels and colony strength the following spring
- Comparing overwintering wraps (Wellington Co. vs. PEI style)
  - Track overwintering success, brood build up, hive strength
- All findings will be shared with industry

Above 2 images from Country Fields

Photo from innisfilcreekhoney.com

Honey Bees and Pollination

ATTTA PUBLICATIONS AND FACT SHEETS

- Evaluating the effect of feeding pollen substitute to honey bee colonies destined for wild blueberry pollination in Colchester County, Nova Scotia
- A Closer Look at Splitting and Nucleus vs Packages Buildup
- Maritime Queens: The importance of producing or purchasing local queens
- Cell Builder Cheat Sheet
- Varroa Mite Management Options for Atlantic Canada
  Des options pour la gestion de l'acarien Varroa au Canada Atlantique
- Evaluating the Effect of Honey Bee Stocking Density on Bee Growth and Fruit Development in Wild Blueberry
  Évaluation des effets de la densité de ruches d'abeilles mellifères sur la croissance des colonies et sur le développement des fruits du bleuet sauvag
- Initial Findings on Miticide Efficacy in the Maritimes
- Small Hive Beetle Poster
  Affiche- Petit coléoptère de la ruche
- Creating a Bee Yard
  La création d'un rucher
- Feeding Honey Bees

Our website:
https://www.perennia.ca/portfolio-items/honey-bees/

- Summer Disease and Pest Monitoring in Honey Bees
  Dépistage estival des maladies et ravageurs chez l'abeille mellifère
- A Comparison of Honey Bee Swarm Prevention Techniques
- Fall Honey Bee Management Guide
  Guide de gestion automnale de l'abeille mellifère
- Condensed Report on Miticide Resistance in Atlantic Canada
- Comb Rotation
- Spring Honey Bee Management Guide 2018
  Guide de gestion printanière de l'abeille mellifère

SUSTAINABILITY PLAN

- Survey launching later this fall
- Consider the projects you'd like ATTTA to do, and let us know!
- Also think about collaborations- we are open to ideas

- Summarize feedback for March 2020

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Spring Management

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ATTTA'S SPRING MANAGEMENT GUIDE

https://www.perennia.ca/wp-content/uploads/2018/03/Spring-Management-Guide_2018.pdf

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In this Guide:

Spring Honey Bee Management Guide

Purchasing Bees

Purchasing bees is an exciting time for any beekeeper, but it is important to be on the lookout for pests and diseases, as well as keeping biosecurity and bee health in mind.

Five Tips to Ensure Purchased Bees are Healthy and Disease Free

1. Be familiar with brood diseases. Know how to identify American Foulbrood (AFB), European Foulbrood (EFB), chalkbrood, and sacbrood. Know what a healthy larvae is supposed to look like, and be on the lookout for anything that looks unhealthy. Check the brood pattern and cappings; are there unusual holes? Is there a good brood pattern? Have a toothpick handy and good lighting to check any suspicious cells. Check out the Atlantic Tech Transfer Team for Apiculture's (ATTTA's) *Summer Disease and*

Spring management begins in the fall…

- https://www.perennia.ca/wp-content/uploads/2018/04/09-fall-honey-bee-management-guide-eng.pdf

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Fall Honey Bee Management Guide

Fall is a busy and important time in beekeeping. It's time to get diseases and pests under control, ensure adequate nutrition and food stores for bees going into winter, prepare hives for the overwintering period and start thinking about equipment needed for next year. This management guide is designed to highlight all of

What's Happening in the Hive During the Winter?

In autumn as temperatures cool, days grow shorter and the amount of nectar and pollen coming into the hive begins to slow down, brood rearing is reduced and

What is Spring Dwindle?

- Spring turnover = summer bee population replacing the winter bee population
- If the winter bee population dies before adequate summer bee population is produced, “dwindle” can occur
  - E.g. old bees die faster than new bees produced
- Contributing factors include pest + diseases, poor queen, weak colonies, inadequate food stores, weather

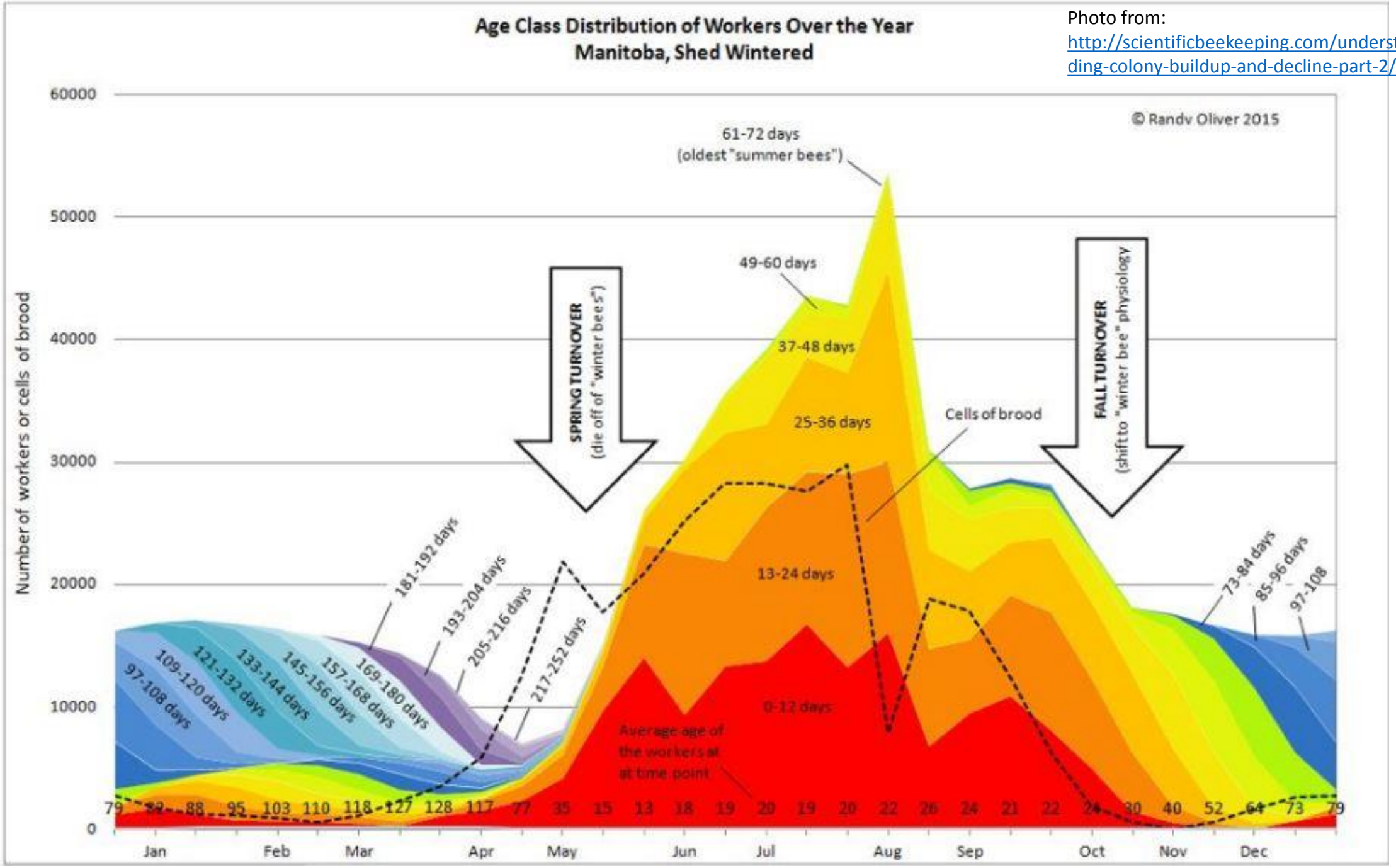


Photo from:
http://scientificbeekeeping.com/understanding-colony-buildup-and-decline-part-2/

Winter bees vs summer bees

-longer life spans that will get them through the winter (~100 days)

-more fat bodies

-higher fat and sugar levels -lower hormone levels

-enlarged food glands

-will survive the winter

-shorter lifespans (4- 6 wks)

-fewer fat bodies

-lower fat and sugar levels - higher hormone levels

-will not survive winter

Managing Spring Dwindle

- Overwinter strong, healthy colonies with productive, young queen
- Ensure adequate food stores
- Choose good overwintering yards (e.g. windbreaks)
- Manage weak hives in the spring- place on top of strong hive, or combine with newspaper

Spring Feeding

- Not necessary, but can help avoid spring dwindle and boost hive
- 1:1 sugar syrup in the spring
- Pollen patties help until natural pollen is available, or during rainy days when bees aren’t foraging

Spring Feeding

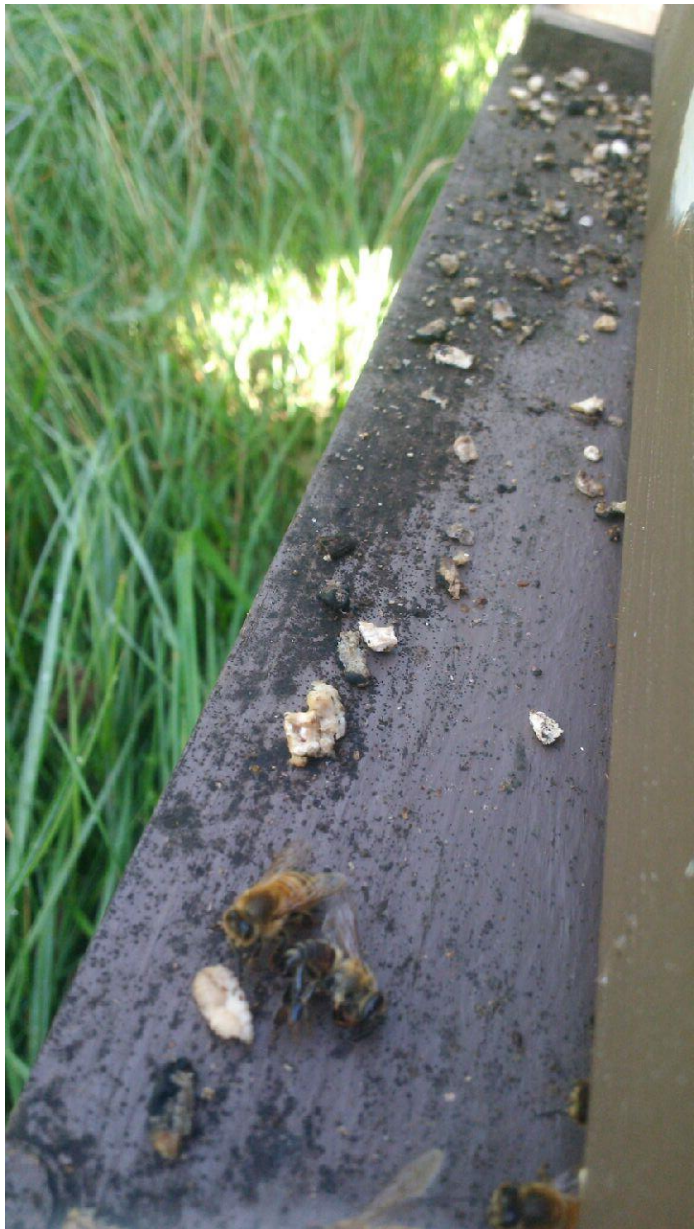
- Begin mid-late March
- Once started, don’t stop until natural food available
- Common spring flowers include alders, poplar, willow, maple, dandelion, coltsfoot

Special Spring Management

- Avoiding starvation
- Fondant, dry sugar, honey frames, emergency sugar syrup
  - Baggie method
- Rim feeder, spacers, candy boards

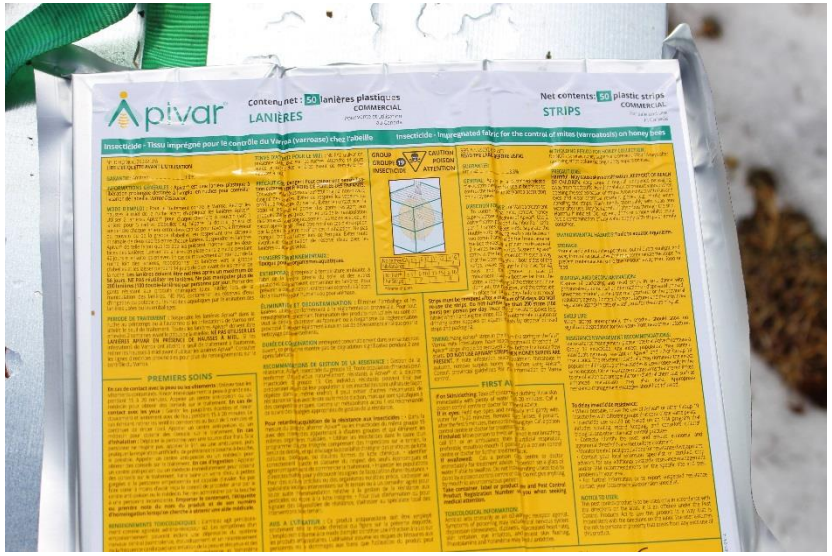
Spring Pest & Disease Management

- EFB/AFB → oxytet with VCPR
- Chalkbrood → cultural methods
- Varroa
- Nosema



Varroa Management

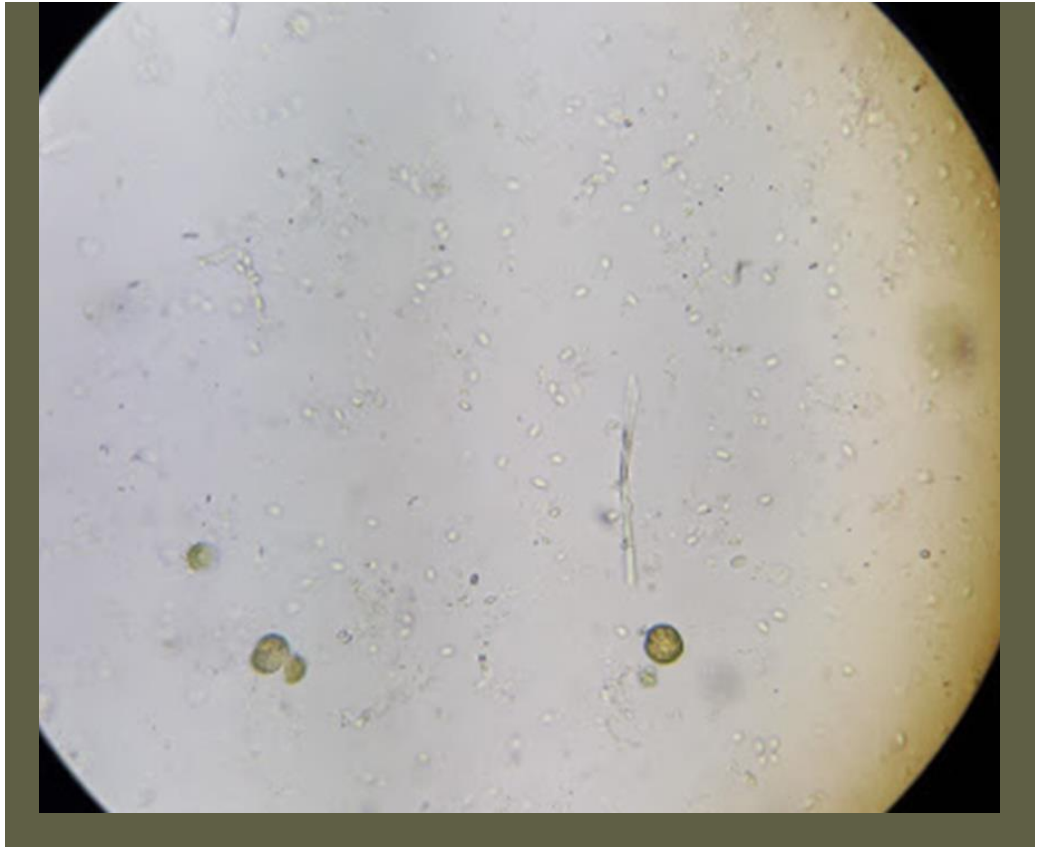
- Synthetic miticide strips mid-late March
  - Not temperature sensitive
- Formic acid- need large enough populations- can be tough on bees in spring
  - Temperature sensitive
- Thymovar- similar story to Formic
- Oxalic acid- does not kill varroa mites under brood cell cappings



- More info here: https://www.perennia.ca/wp-content/uploads/2018/03/varroa-mite-management-options.pdf

Dysentery or Nosema?

- Dysentery = bees confined from cleansing flights and have build up of food material in intestine- release fecal matter inside the hive
- Not a disease
- Usually due to poor food stores (e.g. aster sources), and long winters (no opportunity for cleansing flights)
- Poor ventilation can exacerbate dysentery- provide upper entrance
- Feed 2:1 sugar syrup in fall & ensure diversity of food stores



Dysentery or Nosema?

- If nosema, Fumagilin B can be fed during first spring feeding in sugar syrup

Nosema causes:

- Reduced lifespan, honey production, pollen collection, queen fertility, queen acceptance
- Poor overwintering
- Poor spring build up
- Reduced function of hypopharyngeal glands

Hypopharyngeal Gland

- Young worker bees use this gland to produce proteins, lipids, and vitamins
- As bees develop, gland is used to transform nectar → honey through production of invertase enzyme

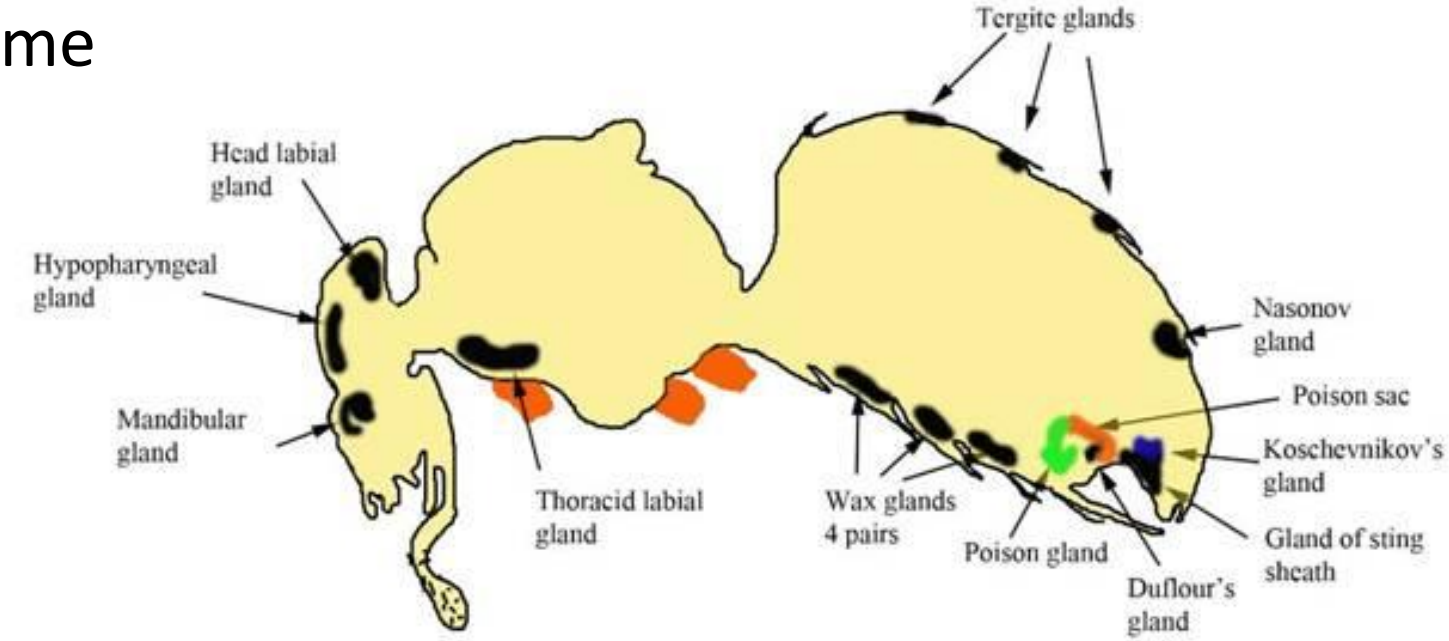


Image from Orange County Beekeepers Association

Hive Management

- Remove winter wrap (late April- or when night temp consistently above 0°C)
- Remove entrance reducers & mouse guards
- Scrape bottom boards
- Remove deadout hives, inspect frames
- Rotate comb
- Make notes of poor brood pattern, limited brood and investigate further if queen should be replaced

Reversing Brood Chambers

- Applies to overwintering in 2 chambers
- Cluster generally moves upward during winter and ends up in top box
- Some beekeepers rotate boxes so bees start season in bottom box again
- Pros- top box could become congested (swarm risk)
- Cons- splitting brood nest, chance of chilling
  - think football shaped brood nest

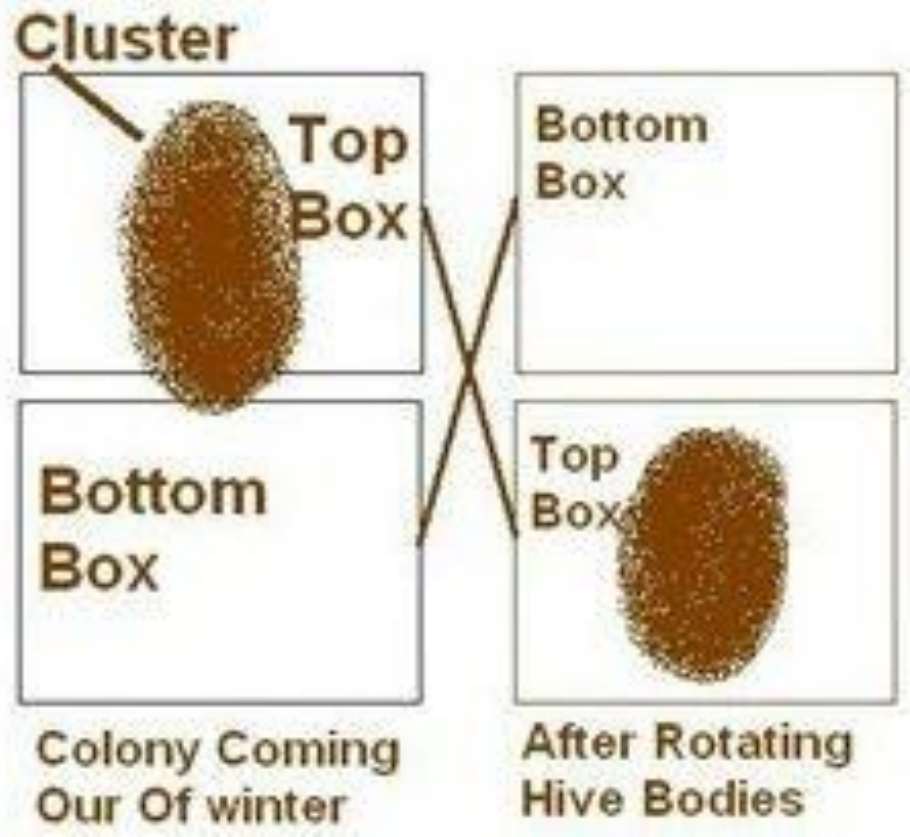


Photo and article here: http://basicbeekeeping.blogspot.com/2011/01/lesson-93-rotating-hive-bodies-in.html

Special Spring Management

- Placing weaker hives on top of strong hives (can make into a single colony or remain as two separate colonies)
- Reducing hive size- e.g. weak hives may need to be downsized to a single brood chamber or a nuc box
- Transferring frames from strong hive to weak hive to “boost” the weaker colony
- Maintain insulation and entrance reducer

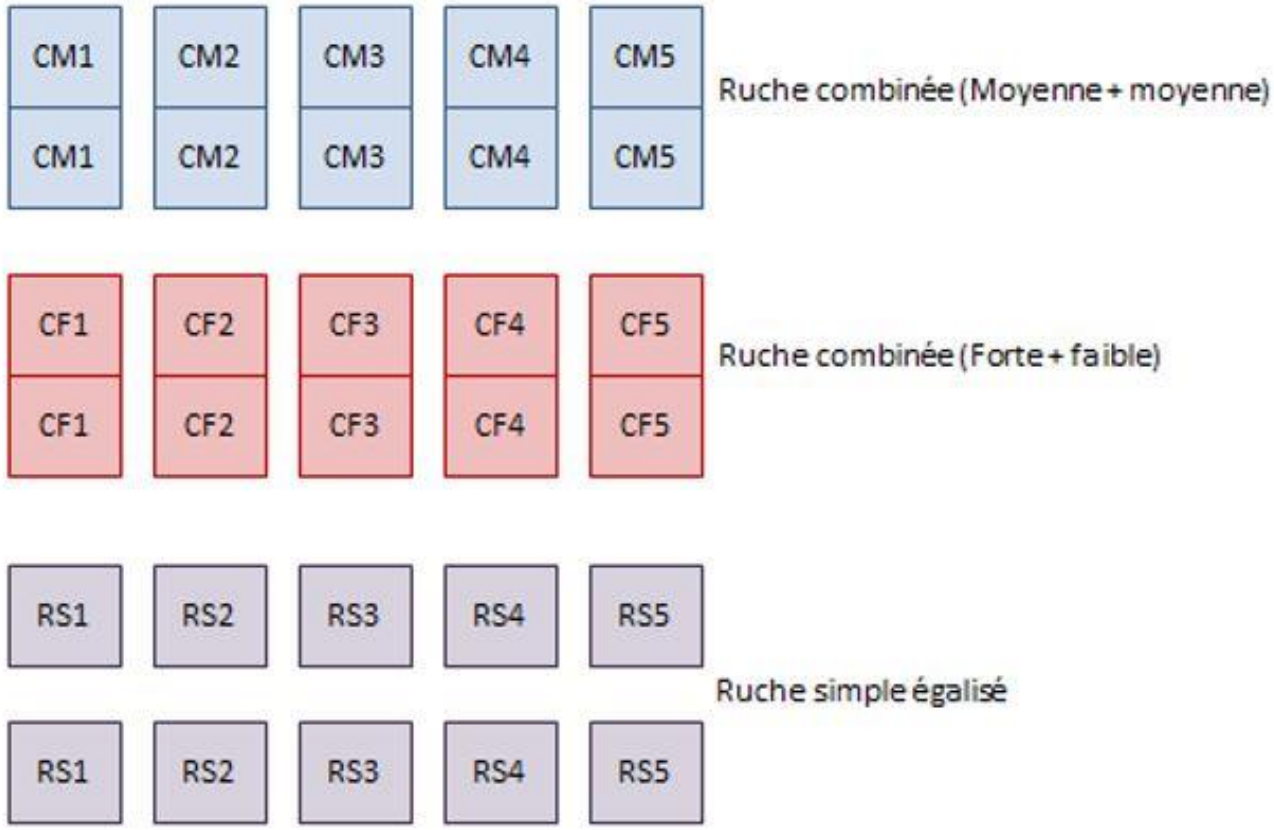
NB Spring Management Trial

- Acadian Peninsula
- May 2016
- Led by Jesse Chiasson, NB Department of Agriculture

NB Spring Management Trial

- Tested stacking hives in the spring (May 4) after unwrapping

- Three treatments:
  - Medium + medium hives
  - Strong + weak hives
  - Equalized hives
- Weak hives = 2-4
- Medium hives = 5-7 frames
- Strong = 8-10



NB Spring Management Trial

- **Strong + weak group grew by 8.8 frames of bees – significantly more than the other two groups**
- Medium + medium group grew by 5.8 frames of bees
- Equalized group grew by 5.8 frames of bees

Evaluating Hives

For Colonies that are alive but "weak" (only a small cluster = 1-2 frames of bees	For Colonies that are alive & "normal" (a moderate cluster = 3-5 frames of bees	For Colonies that are alive & "strong" (a big cluster = 6+ frames of bees)
• reduce to a single brood chamber • close off the top entrance • move cluster frames to the middle of the box • move distant honey frames closer to cluster • leave entrance reducer in place boost population by donating nurse bees • OR, combine with another colony	• reverse brood chambers • check the brood for disease, laying pattern • move feed frames closer to cluster • individually feed colony if stores are low • close off top entrance to prevent robbing	• reverse brood chambers • remove capped brood frames/honey frames if queen needs space to lay • exchange "strong" colony's spot with a "weak" colony • don't feed syrup or pollen unless absolutely necessary, • put on honey supers if early flows happens • remove bees and brood for splits and nucs if queens are available

Table adapted from: Ontario Tec Transfer Team publication:
http://www.ontariobee.com/sites/ontariobee.com/files/document/Spring%20Colony%20Management%20web.pdf

Next Steps

- Prep equipment + queens to make nucs or splits
- Prep for pollination and/or honey production

Pollination Prep

- Palletized system?
- Transportation
- Securing hives (e.g. ratchet straps)
- Thinking ahead (enough space)
- Pollination standards
- Fencing
- Communication

NS Pollination Standard

-4 frames of brood (100% coverage of equivalent of 4 frames)
-8 frames of bees (100% coverage of equivalent of 8 frames)
-2 frames of honey
-1 laying queen

- http://www.nsbeekeepers.ca/newBeekeepersDetail.php?Pollination-Standard-12

Hive Inspections as Spring Progresses

- Monitor for mites
- Monitor for brood diseases
- Evaluate queen performance

- More information here: https://www.perennia.ca/wp-content/uploads/2018/04/07-summer-disease-and-pest-monitoring-eng.pdf

European Foulbrood

European foulbrood (EFB) is a brood disease caused by the bacteria *Melissococcus plutonius*. Unlike its cousin American foulbrood (AFB) – caused by the bacteria *Paenibacillus larvae* – EFB appears in weak colonies or during times of stress (e.g. seasonally poor forage availability, transportation stress, etc.). Symptoms of EFB are typically prevalent in the spring and subside at the onset of a good nectar flow but can return when food resources become scarcer later in the summer.

Healthy uncapped brood.

- Dead larvae not adhering to cell walls
- Dry dark brown scales on cell walls easily removed (unlike scales of AFB)
- Tracheal tubes often visible in dead larvae

Larvae displaying symptoms of EFB (from www.beeinformed.org)

Swarm Management

- Consider equipment needs
- Extra space (new yard?)
- Queens
- https://www.perennia.ca/wp-content/uploads/2018/04/08-swarm-prevention.pdf

Next Steps

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A Closer Look at Splitting and Nucleus vs Packages Buildup

Atlantic Tech Transfer Team for Apiculture (ATTTA)
Sawyer Olmstead and Robyn McCallum, 2019

Splitting colonies is an essential practice in any beekeeping operation to achieve sustainability, but can be particularly unique in the Maritimes due to the timing of wild blueberry pollination and seasonal honey flows. This fact sheet takes a closer look at splitting honey bee hives in this region, and also discusses the buildup of different types and styles of splits.

What is splitting?

'Splitting' is a general term often used to describe multiple activities in the bee yard. For example, 'splitting' can refer to splitting a strong honey bee colony into multiple smaller

When is splitting conducted in the Maritimes?

The easy answer is once hives are large enough, and this can vary among locations in the Maritimes and among hives in a bee yard. In the Maritimes, splitting can sometimes occur in May before blueberry pollination, but more commonly after blueberry pollination, until early August. Many beekeepers from Nova Scotia report that about a third to half of their colonies are strong enough to split in May before blueberry

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MARITIME QUEENS: THE IMPORTANCE OF PRODUCING OR PURCHASING LOCAL QUEENS

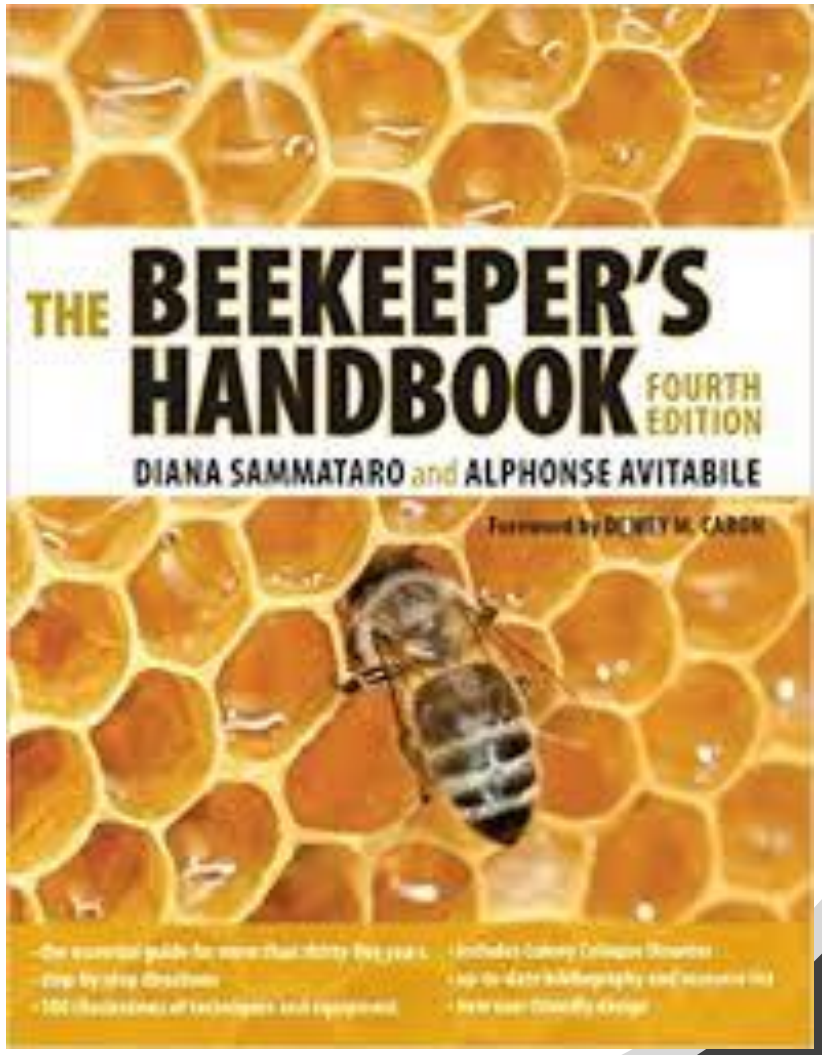
The objective of this fact sheet is to outline the benefits and advantages of using locally-reared and adapted queens in beekeeping operations.

LOCAL VS IMPORT. IS THERE REALLY A DIFFERENCE?

The quality of imported queens can be variable, and in certain cases, poor queen acceptance has

or July. This is too late for any beekeeper who wishes to split colonies to make pollination units for blueberry pollination, and may result in the colony swarming before local queens are available to split the colonies. An effective technique to overwinter queens, besides in nucleus colonies, has yet to be devised on a commercial scale. Although queens can be successfully overwintered in nucleus colonies, the value of the nuc in the spring is greater than the value of the individual queen, and thus it is difficult economically to motivate queen

https://www.perennia.ca/portfolio-items/honey-bees/



ADDITIONAL RESOURCES

- Excellent overview, just remember our region is unique


THE BEEKEEPER'S HANDBOOK
FOURTH EDITION
DIANA SAMMATARO and ALPHONSE AVITABILE
Foreword by DEWEY M. CARON
MARK L. WINSTON
The Biology of the Honey Bee
The Hive and the Honey Bee
EDITED BY JOE M. GRAHAM
THE HONEY BE
A Guide For Beekeepers

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