Thinking Inside the Box

SWARM PREVENTION

Eastern Apiculture Society

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THE Beekeeper's CORNER PODCAST

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INTRODUCTION – Kevin Inglin

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By the way, This is a progress indicator bar.

It tells you how far along
we are in the presentation

When it is full… *we are done*!

SWARM PREVENTION – THE ANSWER

Begin with the end in mind

For those new to beekeeping, you might wonder…

Why do beekeepers talk about swarming?

When bees fly away, well, that's not a desire

- ***Beekeepers do not want half of their honey force flying away***
  - Though some of us are ok because it's a natural act and if you can support that, there are some benefits
  - We do not want our bees to load into ours or our neighbor's soffit or scare the neighborhood.
- *In order to not have them fly away, we want to know how to keep it from happening.*
  - Beekeepers want to be able to recognize when swarm prep is underway.
  - Beekeepers want to be able to limit or prevent swarming behavior

Topic Groups

- Swarm Background and Types
- Swarm Timing
- Swarm Triggers and Swarm Indicators
- Colony Management and Swarm Prevention
- Spring Management To-Do List

The group we are discussing will be stipulated in this corner from here on in.

Mostly no need for title slides like this going forward; just look for the group marker to change.

Swarm Background and Types

Foundational basics about **swarming types** and **timing**

What is a swarm?

- **Swarming is about colony reproduction**
  - *Only as a collection can honeybees propagate*
  - *It is important to recognize that while colony growth is by the individual bee, colony survival is through reproduction through swarming.*
    - No single bee can split off and make a new colony

Definition

Propagate: Breed specimens of (a plant or animal) by natural processes from the parent stock.

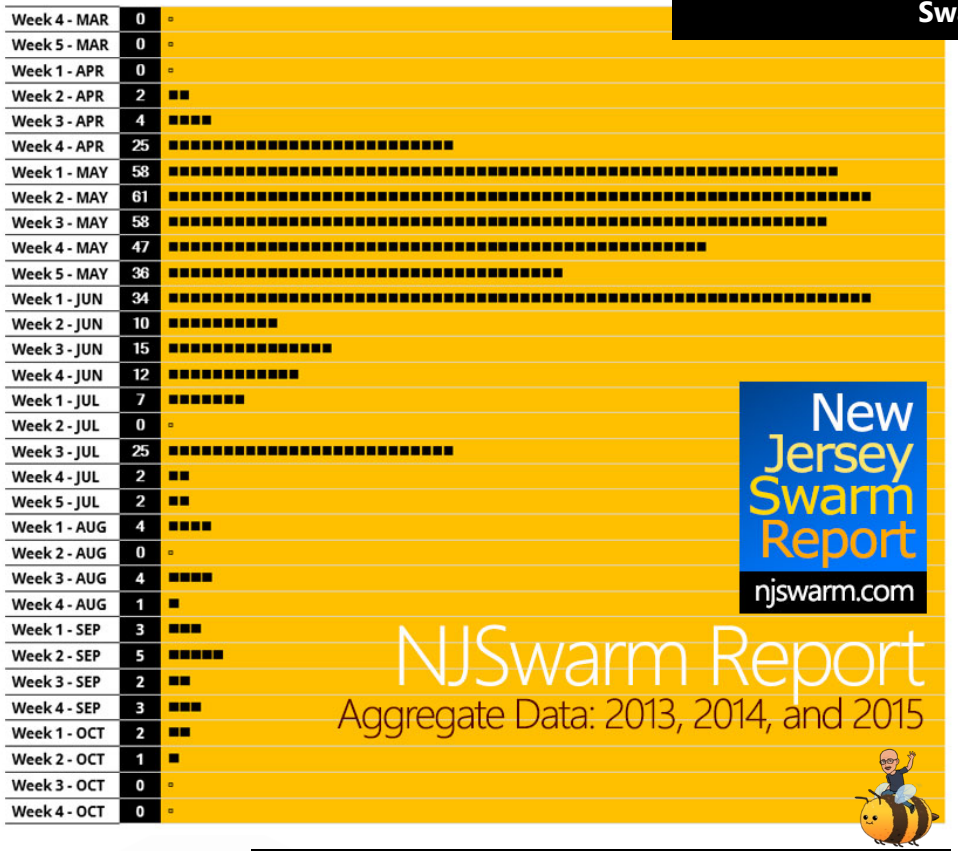
Swarm Types - Terminology

- **Reproduction "Prime" Swarms**
  - *Natural and instinctive behavior of the honeybee colony to reproduce.*
- **"After" Swarms**
  - *After an initial swarm leaves the hive still has swarming pressure so it issues more swarms.*
- **Late Season Swarms**
  - *For "some" reason a subset of the colony decides to leave to re-establish a home.*
- **Absconding ~~Swarms~~**
  - *Not really a swarm type… Something often does not suit the colony and the colony leaves*

Swarm Timing (NJ)

❑ April 15th through July 15th

- *Data from NJ shows the common swarm season begins 4/15*
- *Timing can be impacted by: weather, elevation, forage, size of colony*



❑ Swarms timing will follow biology

- *Swarms will cast off only if certain biological occurrences have occurred in the hive*
  - Appears of drones, food for the colony to sustain, brood to take over the operation, replacement queens underway

Timing is like a wave from the south to the north

Get aligned with the timing in your zone

Signals: Drones and White Wax

❑ Drone Appearance

- *For a colony to requeen, there must be drones.*

❑ White Wax

- *Bees will signal a nectar flow with the presence of new, fresh, white wax.*
  - In abundance, you will see it on the top bars and other places in the hive.

Drones and **White Wax** are logical **signals** that the conditions for swarming have begun;

Swarm season is now in play.

Swarm Timing: Not Spontaneous

Definition

Stave Off: To defend against or keep something at bay.

❑ Hives do not simply up and swarm

- *Timing wise, swarms are forecast in advance*
- *Triggers forecast swarming: capped queen cells for example.*
- *The colony is often making preparations **10 to 20 days in advance** of the actual issuance of the swarm.*
  - If you know what to observe, and take action in time, you can likely stave off a swarm.
  - However, sometimes swarms are going to swarm for the purpose of swarming
    - And nothing you do is going to matter.
    - Maybe you missed something, or maybe it is genetics. Sometimes prevention is a misnomer.

An alternate perspective about timing

❑ Swarming often begins from the fall

- *<u>Large quantities of healthy bees in the fall</u> manifests in <u>strong colonies in the spring</u>.*
- *Large colonies have the best workforce profile to build early, and obtain key resources, that set the stage for swarming.*

❑ Older Queens

- *Older queens from the previous year also play a role*
  - Young queens are said to be less ‘swathis,. Colonies are happy with younger queens.

Good Times: Abundance & Diversity of Forage

❑ Good Nutrition

- *When the food coming in is of high abundance, and high quality; it is conducive to strong colony performance.*
- *When colonies are experiencing a strong growth curve, the queues that drive swarm impulses are all on high*
  - Brood pheromone, honey drying, fresh pollen in spades, etc. ***TRIGGERS…***

What is a trigger?

Trigger: Condition that incites an action

- **Swarm Triggers,** The list
  - *Crowding, both bees and resources*
  - *Worker motivations – and queen signals to the workers*
  - *Chemical communication breakdown*
  - *Genetics*
  - *Warmer weather and longer days*

We will spend time expanding on these with the next slide

Crowding as a trigger to swarming

- **Crowding comes in two forms:**
  - *First is a simple over abundance of bees.*
    - In the case of abundance of bees, vertical bees emerging from the cells become horizontal bees on the face of the comb.
    - Bees simply sense the crowding and that there is no room to work

Crowding as a trigger to swarming

- **Crowding comes in two forms:**
  - *Second is a lack of space to work;*
    - Lack of space for the queen to lay eggs
    - And/Or no place to store incoming resources
      - One impact: If there are no cells to store nectar outside of the brood area, bees will use the brood area and the queen will have no place to lay eggs.

Crowding and the Queen

❑ The queen avoiding the bottom of the hive

- *If a hive is really active, and congested, the queen will not police the bottom of the brood chamber due to all of the coming and going.*
  - When her presence is not there, **workers are free to build queen cups**
  - It is speculated that in less crowded conditions her presence might thwart this activity.

Worker Motivations?

One takeaway: a colony is a complex eco system in which **the queen doesn't necessarily drive all of the decisions.**

❑ Workers messing up the program?

- *Sometimes it is observed that even if you provide proper supers with drawn comb the bees will fill the brood nest anyway.*
  - Some speculate hive crowding, or even eagerness at the abundance of resources, prevents foragers from going up to the storage area you provide so they drop it off in the brood nest.
- *Workers know things that influence colony outcomes?*
  - The Outside World - forager bees have been outside the hive and know the conditions.
  - Workers can sense how old the queen is and they know the quality of the offspring she's producing.
  - They also know the ratio of bees being produced - drones to worker bees.

Work Motivations: Idle Bees

- **Foragers return to the hive full of nectar and there is no place to put it.**
  - *Since there is no place to place the nectar, they hang around waiting for things to change. These idle bees cannot return to foraging.*
- **Unemployed Bees**
  - *There is an idea that with significant congestion, some bees are unemployed.*
    - Bees hanging around with nothing to do *have to go*.

Worker Motivations: Queen Pheromone

- **Queen Pheromone helps to keep the hive operating cohesively.**
  - *The bees in the hive come in contact with the queen and distribute the pheromone throughout the hive.*
    - Queen pheromone suppresses worker ovary development and worker impulses to swarm.
    - The distribution of the queen's pheromone among other things demonstrates she has a presences and inhibits the colony from building queen cells.

No Room for Eggs

- **What causes a queen to lay in queen cups?**
  - *Why would she do it?*
  - *What if she simply ran out of room?*
    - All cells on the face of the comb are full
    - And with no place to lay eggs on the face of the comb, a queen cup is as good a resource as any

Swarmy Bees

- **Some bees are "swarmy" by nature.**
  - *Certain races of bees have a propensity to swarm more often or conditions contribute to swarming*
  - *Carniolan (Apis Mellifera Carnica) bees are one of the bee races that are said to swarm more often than other types of bees.*
  - *Rumor has it that Russian bees are also "quote" "un quote" swarmy*
    - The truth is they build up quickly and if beekeepers do not pay attention, they get to swarm strength quickly and in the trees they go…
  - *It is genetically in the disposition of some bees to swarm more often.*

What is an Indicator?

Indicator: Signs that swarming has potential

- **Swarm Indicators, The list**
  - *Congestion: To many bees, congested brood nest and storage*
  - *Queen Cells: Cells that have royal Jelly*
  - *Early Season Appearances of: Drones and White Wax*
  - *Queen State: Age and Appearance*
  - *Worker Behavior - Listlessness*

First, what do they need?

If they had notions to swarm…

- **A Healthy Hive**
  - *Nature demands that it be a working, established, colony*
    - "Runty hives" do not swarm, they build for survival
- **Daughters to replace the queen that leaves**
  - *To be clear, the long-standing queen leaves with the swarm*
    - She leaves the hives to her daughters
- **Bees to go….*made up of a mix of ages***
- **Bees to stay….*to keep the operation going***

Queen Cells; Capped or with Royal Jelly

- **Queen Cups with Royal Jelly**
  - *The mere presence of queen **cups** is not an indicator.*
- **Capped Queen Cells – Queen replacement underway**
  - *Time of year taken into consideration of course*

Congestion

Bees and Hive

- **Hive Congestion**
  - *Lack of room to lay eggs*
  - *Lack of room to place food*
- **Abundance of Bees**
  - *Overcrowding of frames*
  - *Unemployed bees*
  - *Bearding*

Queen State and Appearance

Queen Age

- *Younger queens have less propensity to swarm*
  - Queens grow old and lose their vigor. Two keys are lower egg production and less pheromone.
  - When you have an old queen, the logical answer is to replace her with a more vigorous one.

Queen Appearance

- *If you could be observant enough to see this you might encounter that:*
  - The queen slims down and is kept from laying an abundance of eggs.
  - This can be observed by a difference in brood patterns

Hive lethargy

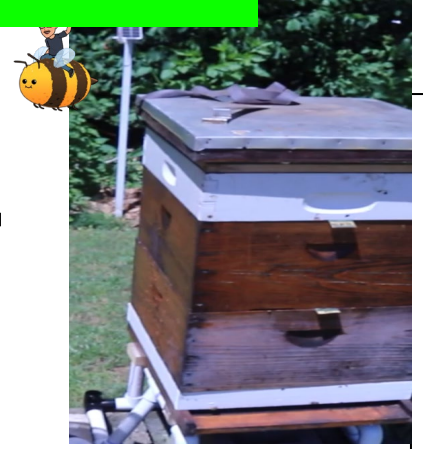
- **The observed slowdown**
  - *Prior to swarming, the bees that will leave with the swarm need to prepare*
    - They will knock off activities to rest and gorge on food
  - *If you could observe:*
    - The hive will be less productive in the period preceding a swarm

Swarm Instigators

Bee fervor

- *Prior to swarming, some of the bees will instigate and excite those going along*
  - They will run around the colony in a heightened state
  - They bump, buzz, shake, and cajole the other bees. Sometimes they even grab other bees and shake them.
- *It is common to see this in a hive that is preparing to swarm*

Brood Minder



A different indicator

- *Beekeepers can employ sensors that take advantage of known behavior patterns or biological events that warn of imminent swarms*
- *Recognizable/Detectable spike in heat and activity*

A good case of swarm detection

Two weeks ago, our friend Theo Hartmann, who had installed some of the new T2s in his apiary, received an SMS alert informing him that an event was happening. On the measurement report, he saw the hive weight drop by 2kg while the temperature was rising – as you can clearly see on the graph below. He went to his apiary and found the swarm clinging to a tree near the hive.

But the experiment doesn't stop there. Remarkably, as you can see on the graph and the photo below, the bees returned to their hive an hour later. Theo witnessed it, not without a bit of excitement!

^ Broodminder.com Image

SWARM MANAGEMENT

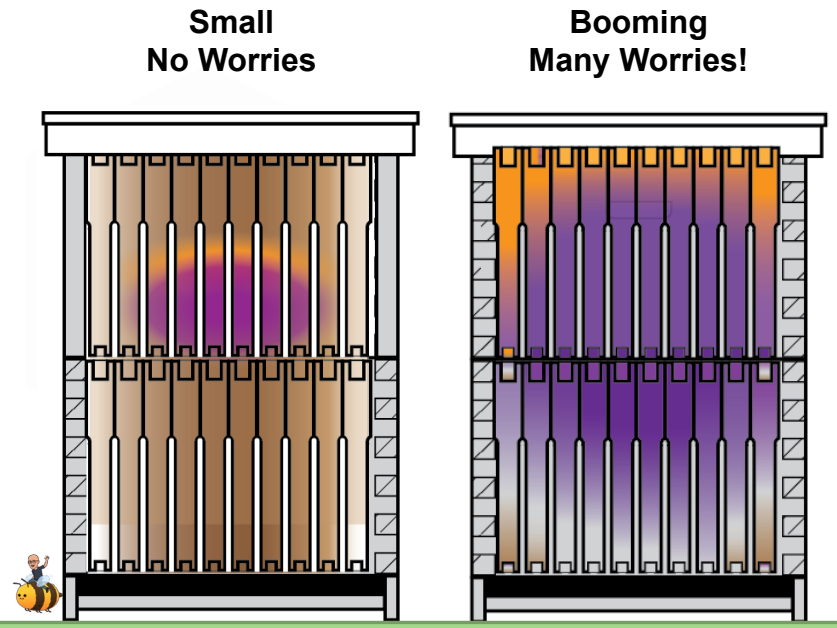
A RUN THROUGH PREVENTION STRATEGIES

Swarm Prevention Window

- **For a large colony…**
  - *Reminder that swarming typically comes some time after drones appear.*
- **Consider drones being raised the first marker**
  - *Drones signify a time when queens could lay eggs for their replacement* ***because mating is possible****.*
  - ***This window when you have to pay attention*** *because….****Eggs in a queen cup are a turning point***
    - You have to consider that in window of 21 days queens could emerge to replace your queen – *more on this shortly*

Preventative Measure Options

- **During the window you will want to take action if you are in jeopardy of your hive swarming**
  - *Look at the colony profile*
- **For the hive on the right**
  - *Provide more space*
  - *Relieve Brood Nest Congestion*
  - *Relieve Storage area Congestion*

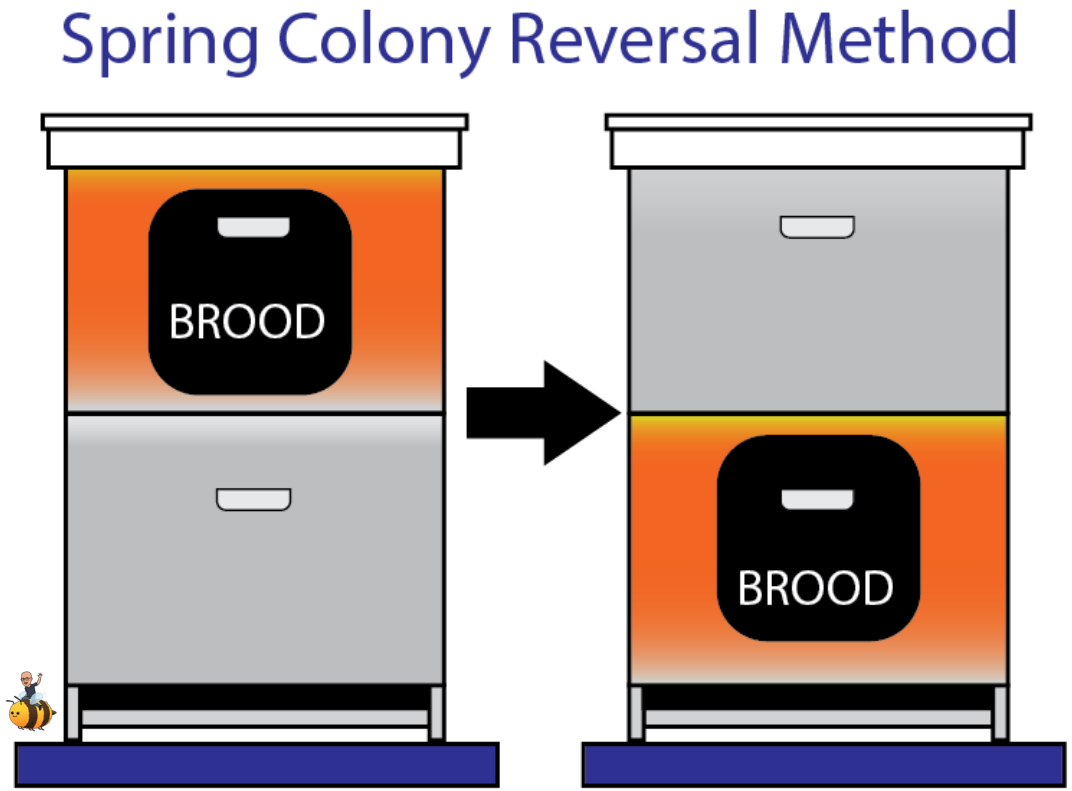


A programming note

- **I am about to go through a lot of techniques**
  - *Inevitably when I give this talk, someone in the audience will tell of a technique that can be used*
    - For the sake of being thorough, and because someone will share, I will speak to many options. Please bear with me, I'll make it educational.
  - *I will show you a lot of things,* ***and then tell you what to do***.
    - Do not be dismayed, just sit back, relax, think about the reasons that all of these methods exist, and the pros and cons of each.

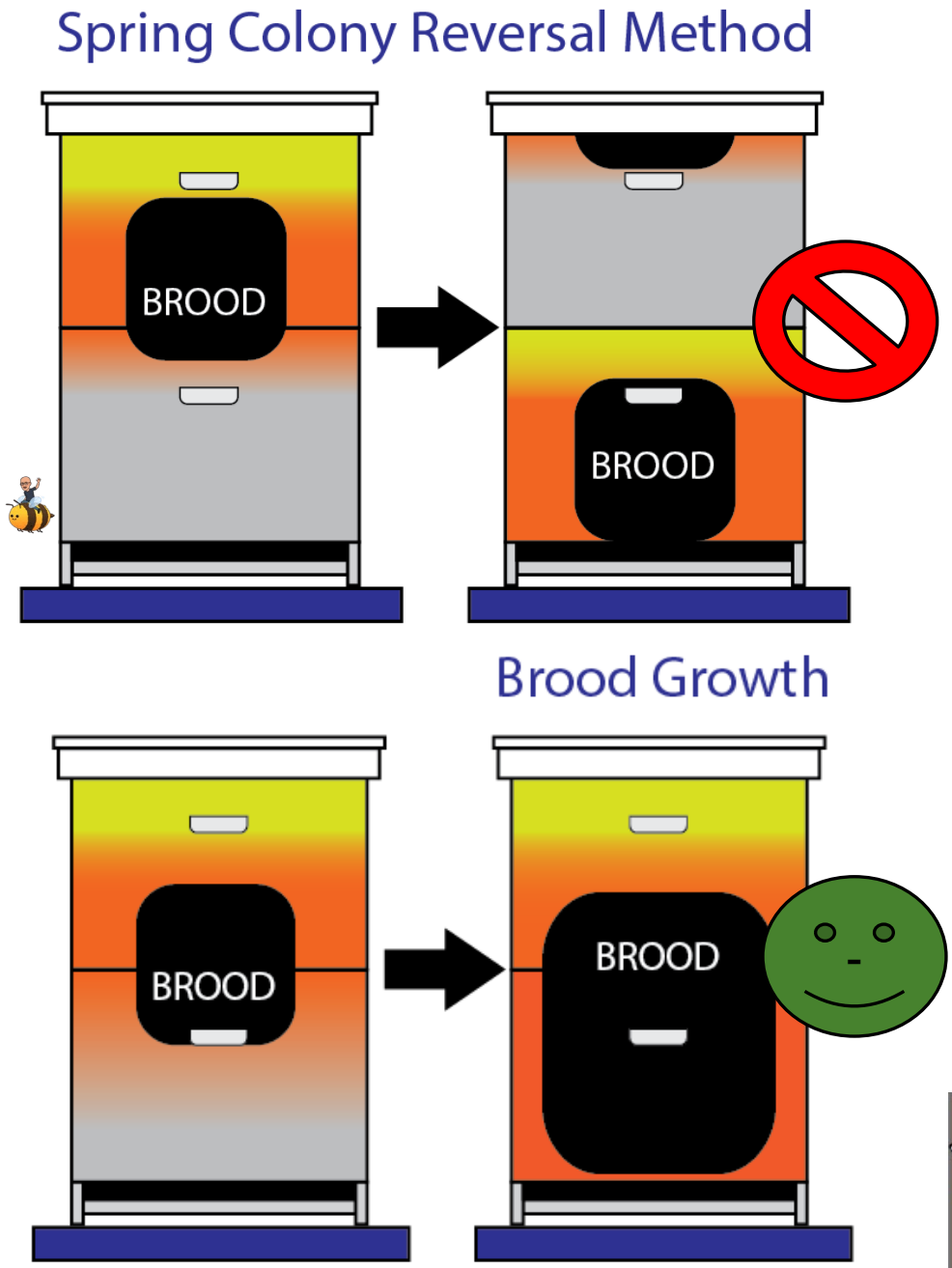
Spring Colony Reversal

- **"Bees build up"**
  - *There is a common impression that bees build up*
    - I think it has merit for describing new hive growth
    - And it gets applied to relieving congestion
    - Hence the technique to do a spring reversal.



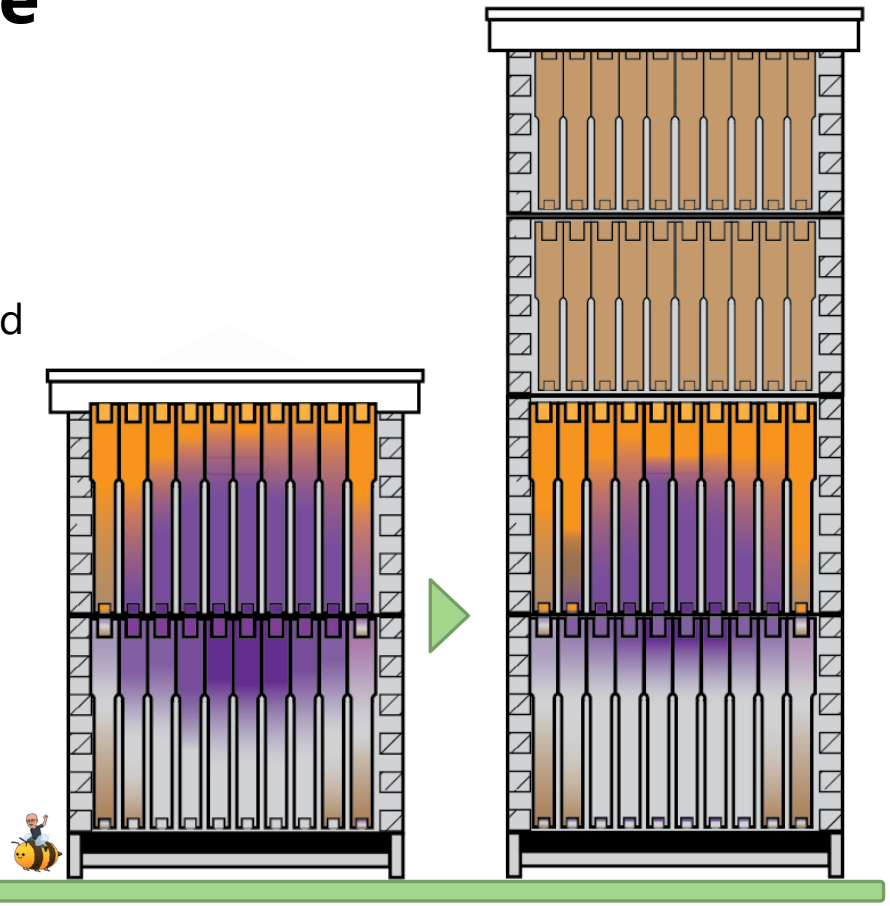
By the way…

- **Don't do this**
  - *You'll doom part of the brood*
- **Let this happen instead**
  - *Simply let the grow to occupy the space.*
    - Because, contrary to "bees build up", they will build up, down, sideways (think top bar), etc.



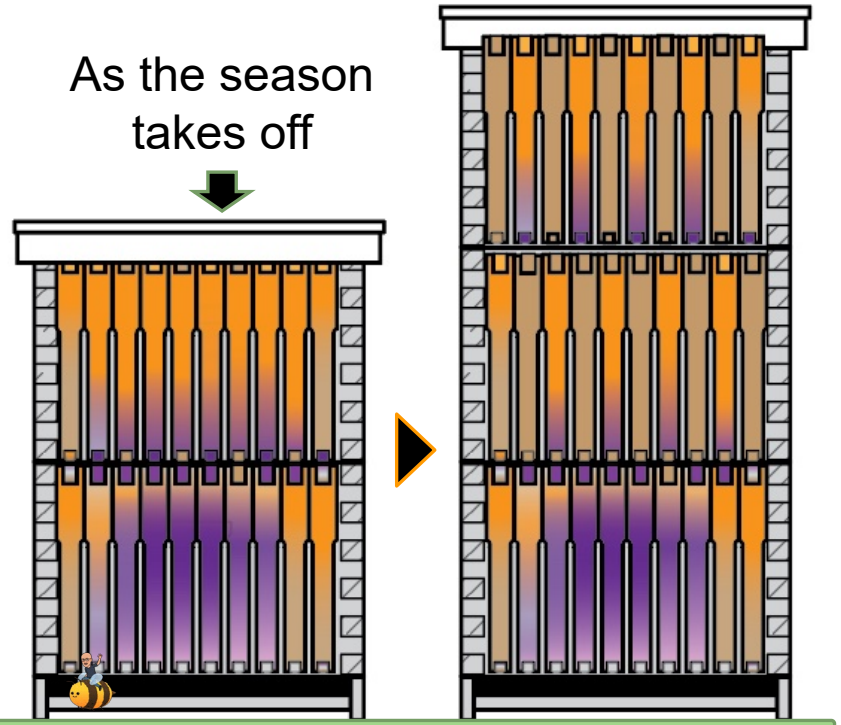
Preventative Measure: More Boxes

- **Relieve Congestion, in the storage area, Option 1**
  - *Give More Space*
    - The first common sense thing is to add honey supers ***before the nectar flow***
      - Let the bees discover the extra space
      - Consider an upper entrance
  - *Why 2 honey supers?*
    - Great question.
    - Because someone said so.
      Who-*beats me*…



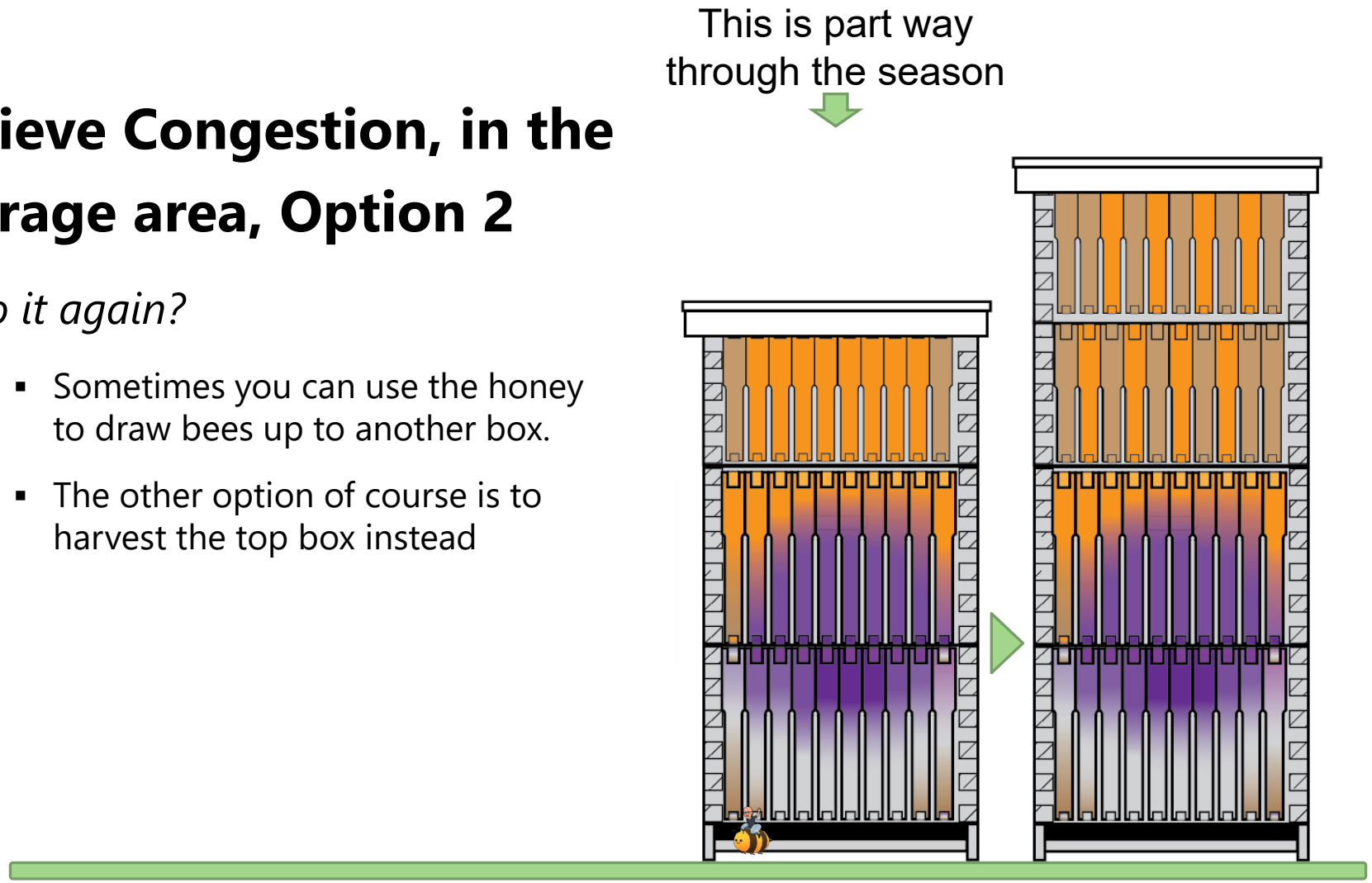
Preventative Measure: Checkerboarding

- **Relieve Congestion, in the storage area, Option 2**
  - *Open up the **honey dome***
    - With the top box being mostly full, add another box (has to be a full)
    - Move every other honey frame up
    - This gives space for colony to store more food, and serves as enticement
      - Consider an upper entrance



Preventative Measure: Checkerboarding

- **Relieve Congestion, in the storage area, Option 2**
  - *Do it again?*
    - Sometimes you can use the honey to draw bees up to another box.
    - The other option of course is to harvest the top box instead



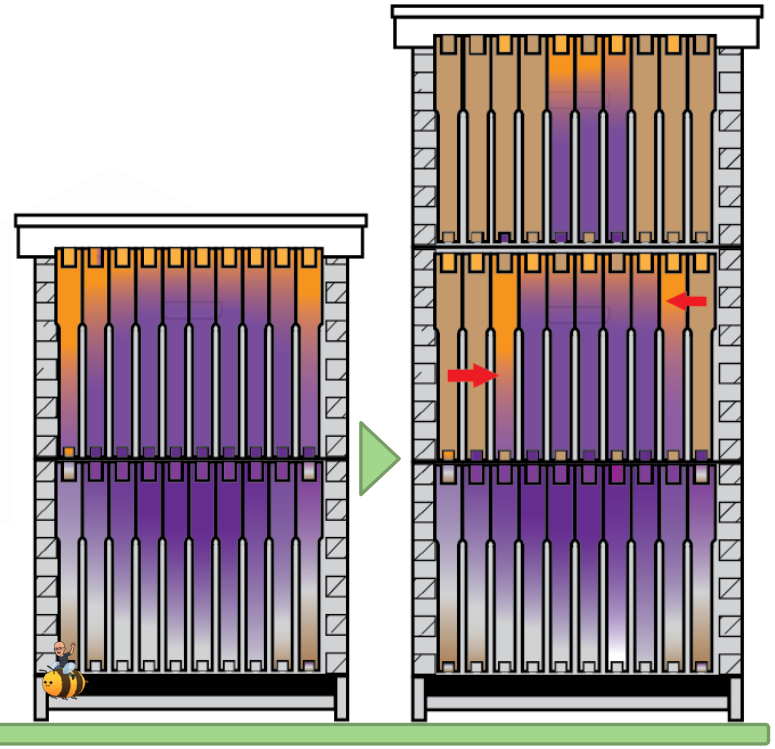
A word on Checkerboarding

Many get really confused about what the checkerboarding technique is

- **The late Walt Wright was a beekeeper from Elkton Tennessee who coined the phrase**
  - *He is the one who articulated that if you provide space in the* ***honey dome*** *and the bees will hold off on swarm preparations.*
  - *Provide extra hive bodies and intersperse fresh drawn comb frames between capped honey frames.*
    - Do this right over the brood chamber.
    - Do not make the mistake of using frames with plain foundation only, it will not work.
    - Do this before they start backfilling the brood chamber or you could be too late.

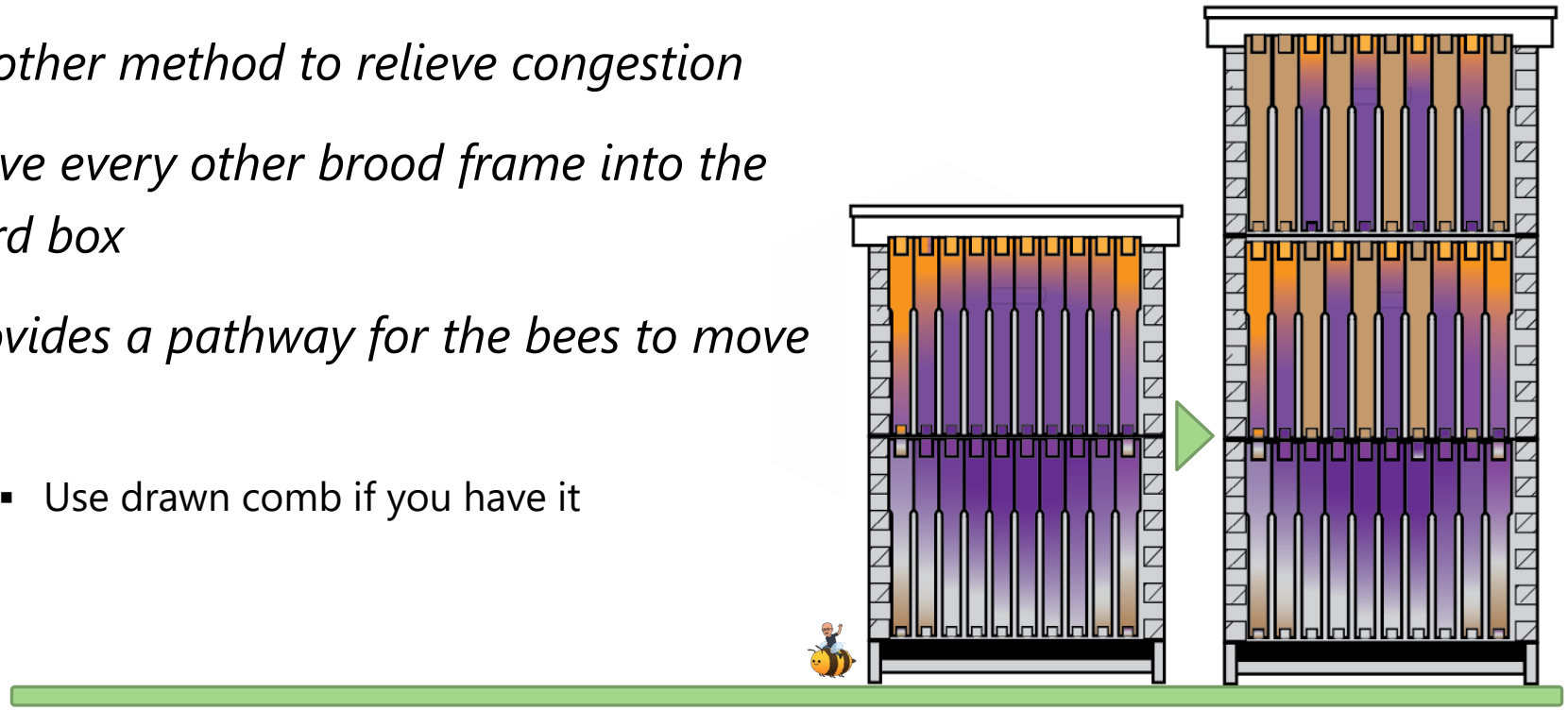
Preventative Measures: Pyramid Up = (NEST!)

- **Relieve Congestion in the nest, Option 1**
  - *Relieve congestion in the **nest** and give space for the queen to lay*
  - *Add a box and move frames into a pyramid shape*
  - *Room for colony expansion into three boxes*



Preventative Measures: Expand

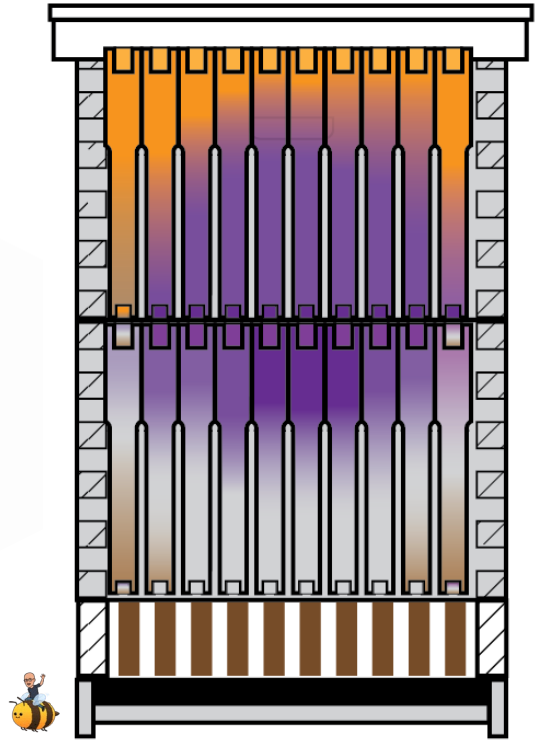
- **Relieve Congestion in the nest, Option 2**
  - *Another method to relieve congestion*
  - *Move every other brood frame into the third box*
  - *Provides a pathway for the bees to move up*
    - Use drawn comb if you have it



Preventative Measure: Slatted Rack

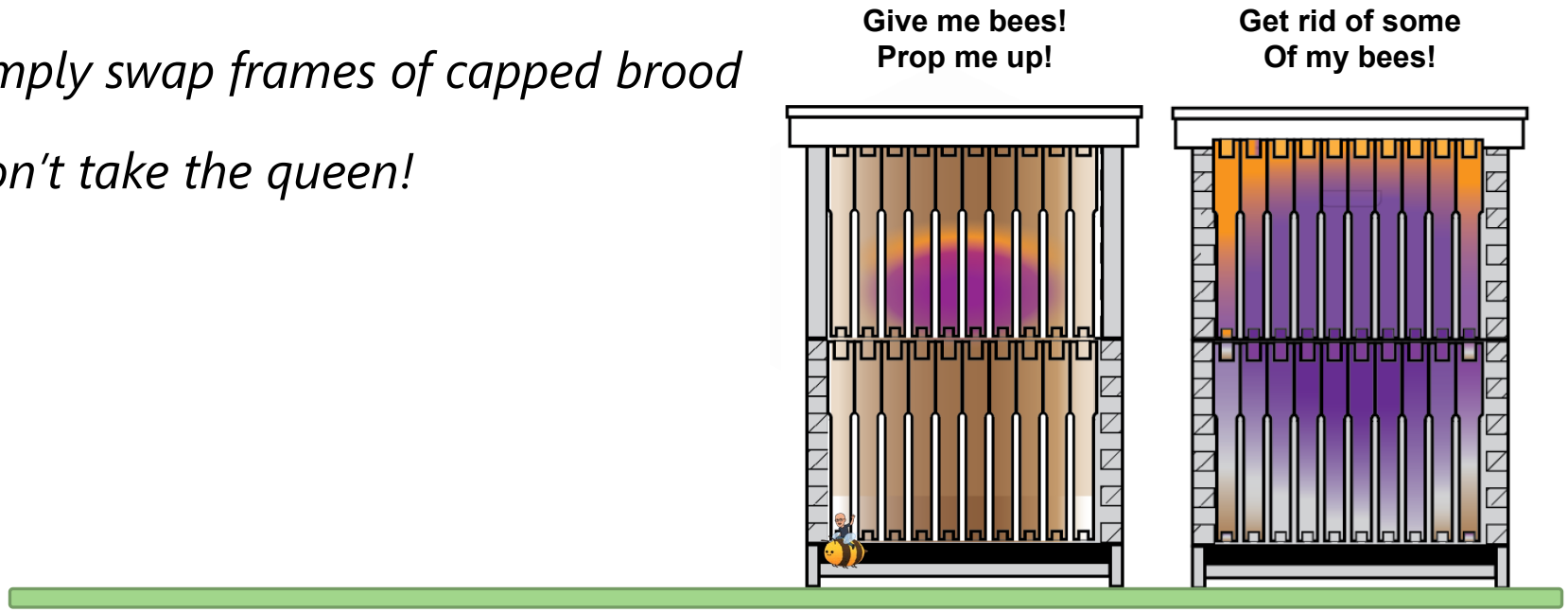
- **Slatted Rack to relieve congestion**
  - *Not a commonly employed device*
  - *Allows extra space in the hive for bees to accumulate and hang out, off of the frames*

< Photo Credit
GloryBee.com



Preventative Measure: Equalization

- **You could exchange frames between these two hives and prop up the small one while diffusing the big one.**
  - *Simply swap frames of capped brood*
  - *Don't take the queen!*



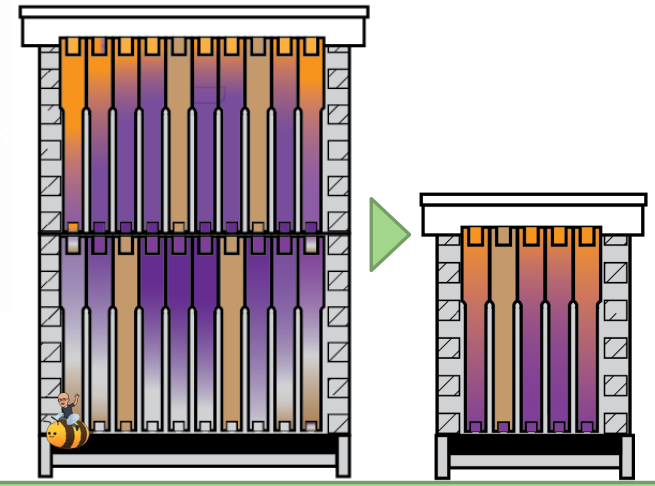
Preventative Measure: Do not overfeed

- **Sometimes beekeepers want a good start**
  - *Overfeeding causes hoarding and backfilling of the brood area.*
  - *They get too good of a start and it can lead to massive populations*
  - *If you are stimulating the colony in the spring, you best have a plan to cope for success*

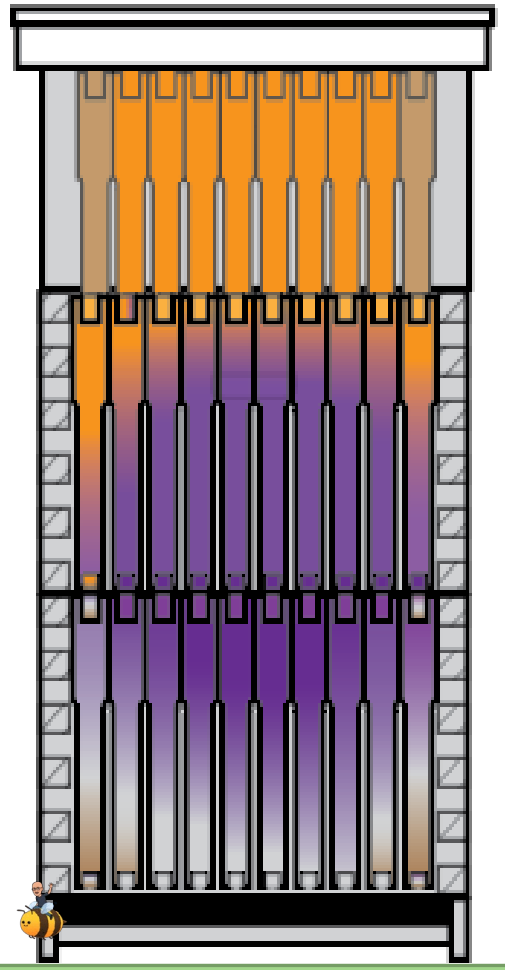
Preventative Measure: A divide / split

Split (aka divide): Pull four (or 5) frames out

- *Make a separate Nucleus colony*
- *Replace frame removed from the origin colony with drawn comb*
  - No Drawn comb? Place all active comb toward the center of the origin hive, and put foundation to the outside.
  - Ok to put one or two foundation frames in the middle of the drawn frames to have the build comb for you and keep them occupied
- *For the split (Nuc)*
  - 2 Brood, One Honey, One with Pollen
  - Take the queen to the Nuc, just like nature



Psuedo Demaree or Vertical Separation



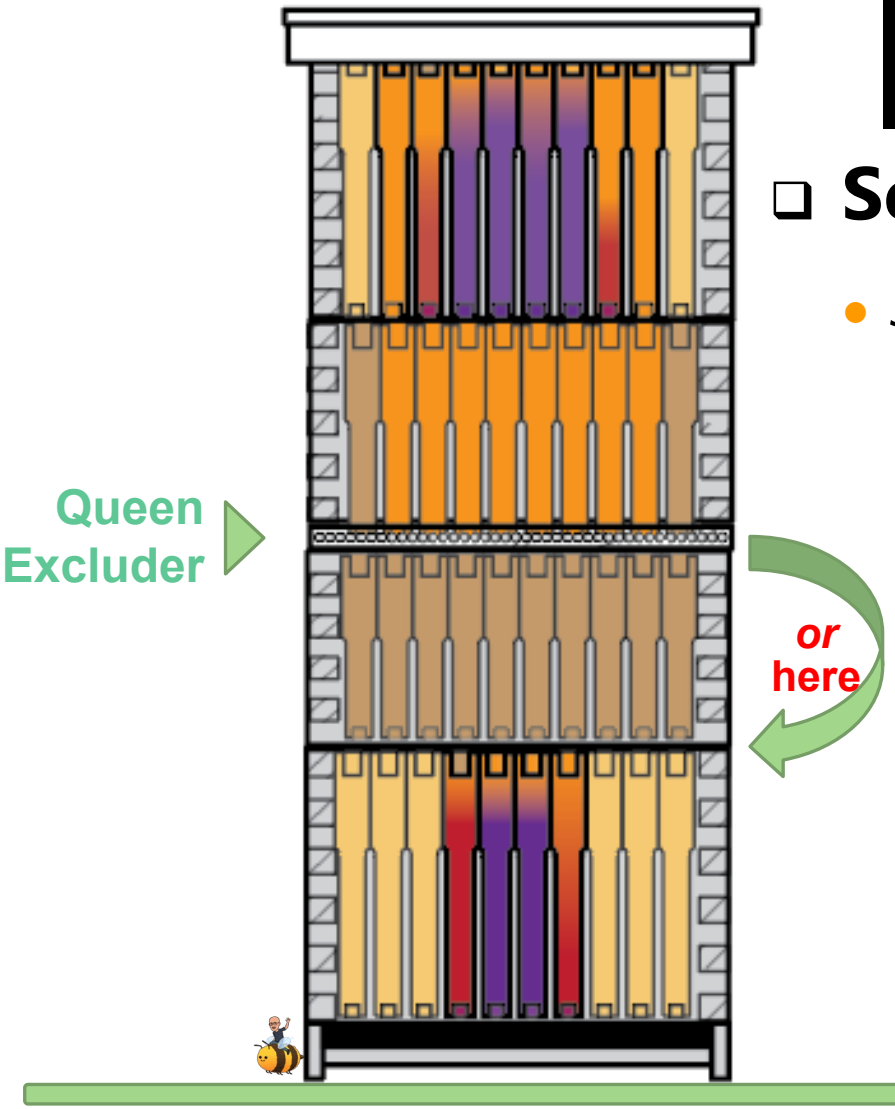
❑ Hive is fully loaded

- *State: Swarming is imminent*
  - The hive will have plenty of bees, drones, and be on the cusp of building swarm cells
- *Goal*
  - Produce an environment where:
    - □ The **nurse bees** are vacated from the brood nest area
    - □ Most of the brood is vacated from the brood nest area
    - □ Congestion is relieved

Demaree Synopsis

Psuedo? The original Demaree technique (from George) was not this complicated.

Concept: Separate the queen and foraging force from the brood and nurse bees

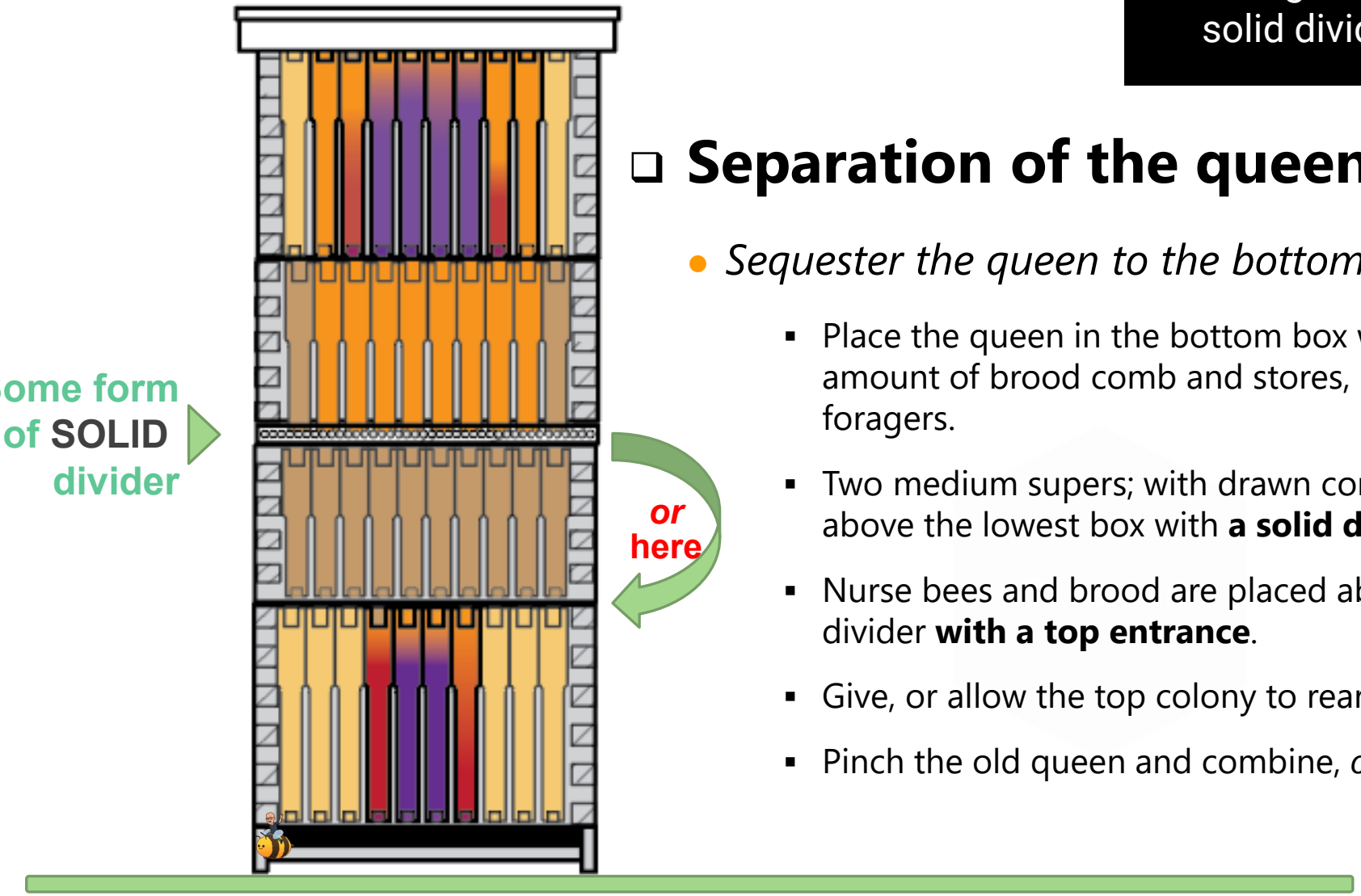


❑ Separation of the queen

- *Sequester the queen to the bottom of the hive.*
  - Place the queen in the bottom box with a minimal amount of brood comb and stores, + some foragers. Supplemented with drawn comb if possible.
  - Two medium supers; with drawn comb, are placed above the lowest box with a queen excluder.
  - Nurse bees and brood are placed above the excluder **with a top entrance** (so drones can exit)
  - Any swarm cells are torn down. Check every 7 to 10 days to ensure there are no surprises
  - In time, when the swarm impulses slow down, recombine by removing the queen excluder.

Vertical Separation Variation

Isn't this a Demaree? Not really a Demaree – George did not use a solid divider.



❑ Separation of the queen

- *Sequester the queen to the bottom of the hive.*
  - Place the queen in the bottom box with a minimal amount of brood comb and stores, + some foragers.
  - Two medium supers; with drawn comb, are placed above the lowest box with **a solid divider**
  - Nurse bees and brood are placed above the divider **with a top entrance**.
  - Give, or allow the top colony to rear a queen.
  - Pinch the old queen and combine, *or* split off.

Damn It! I am more confused than before

- **You told me 25 options and I don't understand what I should do!**
  - *Add honey super boxes early*
  - *Relieve congestion in the brood chamber when frames are covered with bees.*
  - *Let the brood expand, and observe honey storage starting*
  - *Add extra brood box and expand the brood chamber*
  - *Add more honey boxes or harvest some honey boxes*

Damn It! I am more confused than before

This is the visual representation of what was described in the previous slide.

- **Progress Your hives in this way**

Strategy: Proactively stay ahead of congestion

THE SWARM THRESHOLD

DEALING WITH IMMINENT SWARMS

What if you missed it?

Concept: Threshold: in this case, something that has been crossed and you cannot go back

❑ What if the threshold has been crossed

- *Discovery of Key indicators (capped queen cells, etc.)*
  - What can you do if you get in and it is too late
  - You find active queen cups, or see other things that demonstrate that a swarm is imminent

❑ Can you take preventive actions?

- *Once things are underway, what can be done?*

Timelines – Swarm Emergence

Concept: Day Zero: when the first egg is laid in a queen cup, it constitutes Day 0

❑ You find a larva in a Queen Cell

- *1st, not a queen cup > Bees build queen cups in spring. This is not a concern*
- *However, the day an egg is laid in a queen cup then it is considered a charged queen cell* ***(DAY 0)***
- *Beekeepers typically discover the egg some time* ***after*** *it has been laid in the queen cup*
  - This means the timer is ticking, and the threshold has been breached.
  - One should act promptly prior to swarm issuance

More on this in a second

Window of Opportunity…

Under normal circumstances the colony will swarm once the new queen cells are capped

❑ Swarm Correlation

- *Customarily, swarms will issue when the first queen cell is capped*
  - Queen Cells are capped around day 8.

❑ Day 8 – 16 is the action window

- *Day 8* | *1st cells sealed.* ⬅ **The game is on**
- *Day 8-16* | *Swarm issues (prime swarm).* ⬅ **Swarms can happen here**

Under normal circumstances the colony will swarm once the new queen cells are capped.

It has started, what should I do?

Day 8 through 16

- ***Before they get away**, perform an **artificial swarm** (AKA Split) or some other intervention.*
- *It is NOT advisable to mash all of the queen cells.*
  - First thing to consider is are you sure that the queen hasn't left and now you've made your hive queenless
  - Second thing to consider is that it is possible that the colony will still issue the swarm – regardless of if you smashed the queen swarm cells.
  - Reserve a few frames with queen cells in a queen castle or even leave 1 or 2 cells and hope that relieving the congestion has thwarted ambitions.

Hedge Your Bets?

Destroying Queen Cells is not Swarm Control

- **You can opt to destroy charged queen cells**
  - *Confirm the colony is queen right and destroy all queen cells*
    - Shake bees off of **EVERY FRAME** and check every inch of comb – smash **EVERY** queen cells.
  - ***Miss destroying only one queen cell and they'll likely swarm***
  - *Figure out a game plan to remediate the problem*
    - Not a good plan to think you can keep this up week after week – and if you miss one cell, they will swarm which negates all actions.

Possibilities

❑ Dealing with Queen Cells

- *Leave a few in there*
  - If you took a split, then they need cells, but only leave one or two.
- *Queen Castle option*
  - Cull and Mini-Split
    - □ Take a small split out of the colony, with some of the swarm cells. Put it aside in reserve.
    - □ Cull all of the capped queen cells and make room for expansion. Hope that the full colony stays in the box.
    - □ If a swarm issues, combine the mini-split so they have a queen.

Are you too late? Yes of Course

Are you too late? Yup, highly likely

Are you to late? Yes, very much so

The good news, *if they are tearing down queen cells*, they are done swarming.

The new queen has eliminated the competition and the swarm impulse is gone.

Colony health – *if the swarm got away*

- **Ensure colony rebounds**
  - *Inspect about one week after the swarm, see if queen is operational – but don't panic if not. Wait another week and check again for eggs.*
  - *Knowing if the hive is in trouble*
    - Without a queen you'll see:
      - No eggs and all cells have older larvae and/or capped brood
      - Less bees
      - Load of honey and/or pollen
  - *Requeen to get it restarted.*

Consider Swarm Traps

- **Make and place them near your apiary**
  - *Catching your swarm is a like a free package of bees*
  - *Better to have traps and making an attempt to catch any that get away.*
    - Keeps you from having bad encounters with your neighborhood.
  - *Tom Seeley says they are most effective if they are at minimum 100 yard from your apiary.*
    - Seely places his 300 yards out

Questions

- **Note: This presentation is available for download**

  https://www.bkcorner.org

  - *Search for presentations, it will appear in the search results*
  - *It will also be on the EAS website*

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