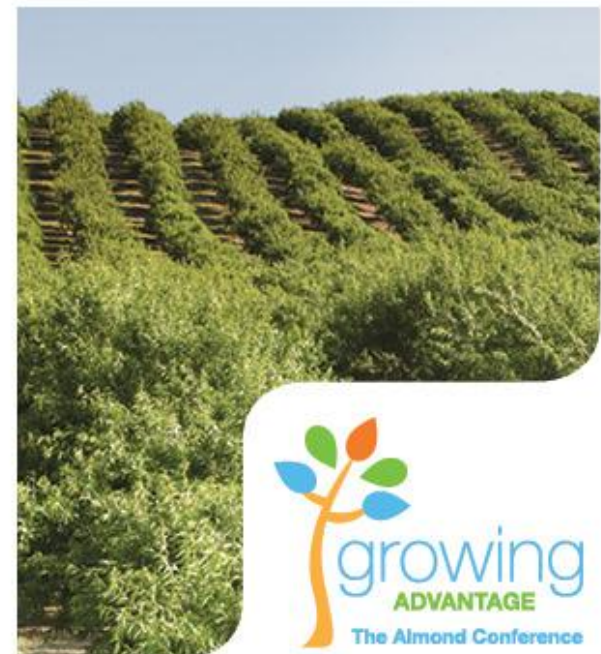




Honey Bee Colony Assessment Workshop





Colony Strength Evaluation

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Learning Objectives



Following this presentation, you will be able to:

- **Understand how the pollination contract relates to the colony strength inspection.**
- **Understand how to evaluate the elements that contribute to colony strength.**
 - **Worker Population**
 - **Brood**
 - **Queen**
- **Understand both methods of colony strength evaluation.**
 - **Frame Inspection**
 - **Cluster Count**

Colony Strength Evaluation

Pollination success is dependent upon a number of factors, but in terms of the pollinator, it is a function of both the **number of colonies and the **average strength** of the individual colonies.**

- Strength of a colony is evaluated by estimating the adult honey bee population and, in some cases, the amount of brood in a hive.**
- Colony strength can vary with time of the year and management by the beekeeper.**

Colony Strength Evaluation



When colony strength is important, the grower and the beekeeper agree on the strength of the colonies to be delivered.

A signed contract spells out each person's expectations, which may help avoid misunderstandings and possible legal action later.

Independent confirmation that bees are present in the number and strength promised is frequently desired.

Conducted at the request of the grower or the beekeeper.

The person requesting the certification typically pays for the inspection.

Apiary inspectors

- independent contractors**
- work for bee brokers**
- employed by County Ag Commissioners**

Using consistent procedures and definitions for inspection criteria helps insure consistency.

Colony Strength Evaluation



Make every attempt to notify the beekeeper of the inspection and he or she can observe the process or assist in handling the hives if the inspector desires.

The beekeeper is in no way involved in the selection or evaluation of the hives, but the process will move more quickly if there is an additional person to help.

Colony Strength Evaluation Contract

Any or all of the following factors might be considered in colony strength evaluation

- **Presence and quality of the queen**
- **Size of the worker population (frames of bees)**
- **Amount of brood (i.e. alfalfa seed pollination)**



Growers and beekeepers should agree on the standards for colony strength and that forms the basis for the contract.

Agree on *average* and *minimum* strength requirements
8-frame average and a 4-frame minimum

Define what will be considered a *frame of bees*

Specify *outside temperature at the field site* for inspection

Inspector is a neutral third party and gives an impartial evaluation of what is observed.

Colony Strength Evaluation

Visual inspection of the colony is required. All hives must be accessible. Hives can't be double stacked, banded, or presented in such a fashion as to prevent inspection.

Growers should provide a location for beekeepers to place the bees to they remain accessible during the pollination period.



Colony Strength Evaluation

- Generally the inspection includes only a ***representative sample*** of the hives in the apiary
- Random or Systematic selection
- Report percentage of hives inspected
 - Ag Commissioners – 15%



Supplies to Bring to Inspection

Required

- Bee Suit, Pant Clips, Veil, and Gloves
- Hive Tools
- Smoker, Fuel, & Matches
- Clipboard with data sheet listing hives to be inspected
- Thermometer

Recommended

- Toothpicks/Matchsticks
- Sample Jars/Bags
- Marker to label samples
- Lumber Marking Crayon (red)
- Camera



Presence and quality of the queen

“Actively laying queen”

- Presence of eggs will indicate queen activity within last 3 days.
- Examine the brood. Look for a solid, good-sized brood pattern.
- Be careful not to injure the queen during the inspection!



Size of the Worker Population

Definition of **Frame of Bees** should be specified in the contract.

- *Two sides of standard Hoffman frame of comb or equivalent comb area at least 75% covered by bees at a density of 4 bees/in² or more.*
 - Area of frames with less than 75% coverage should be combined and counted toward the standard of an active frame of bees.
 - Non-standard frames should be converted to the equivalent of a standard frame.



Size of the Worker Population

Frames of Bees



>75%



50%

Evaluating Brood Area

- **Open or uncapped larvae require constant feeding which stimulates pollen collection.**
 - For that reason, some pollination contracts may specify a requirement for brood area.
- **Total area containing healthy brood *in any stage of development*, including eggs or larvae in open cells and capped brood.**



Evaluating Brood Area

Evaluate each side of the frame

Healthy brood has a single egg in the bottom of the cell, glistening white larvae, smooth cappings.

Record the in² or % coverage of the frame

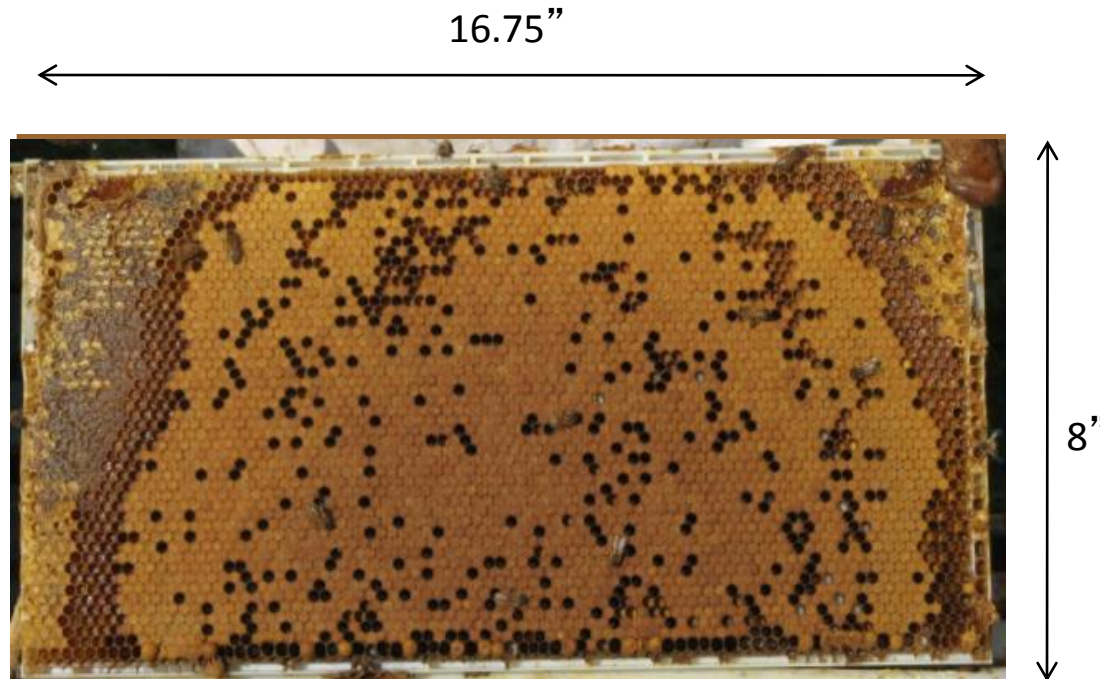
Total the area for all frames in the hive.



Evaluating Brood Area

Frame with comb:

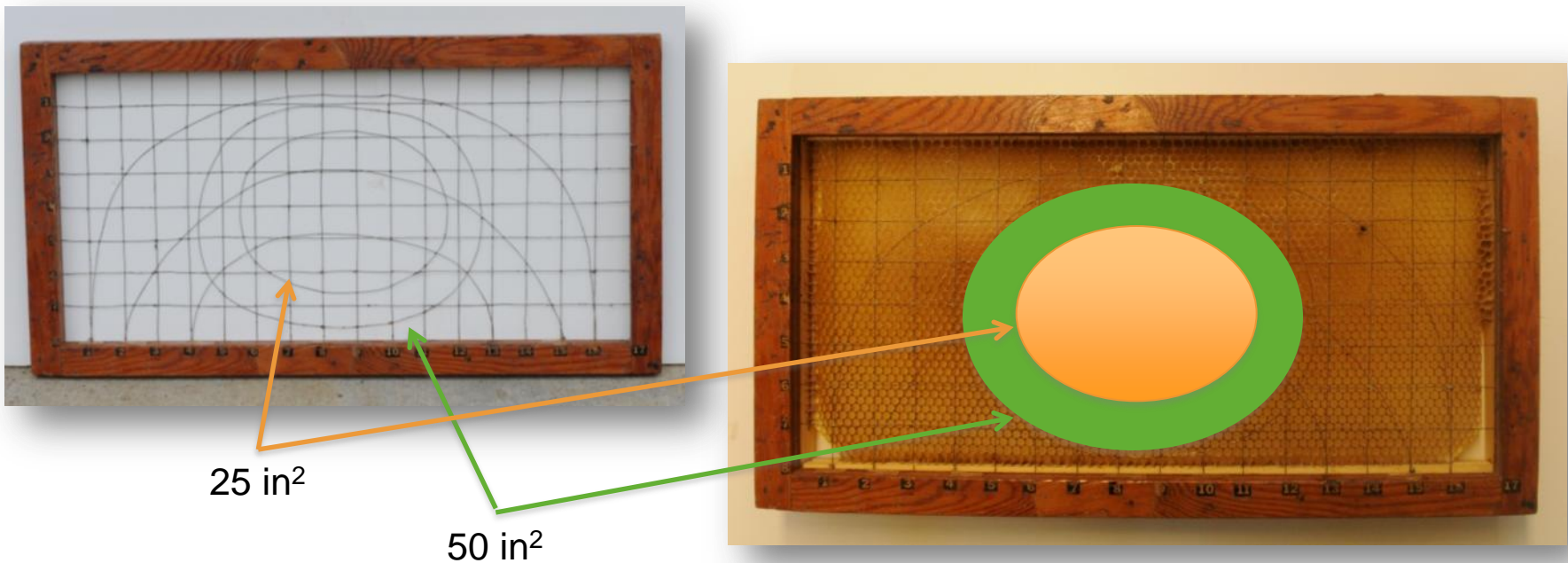
- 8 inches x 16.75 inches = 134 in² (on each side)



Reference Templates

Reference templates are highly recommended

- It is very difficult to estimate square inches without a template.





Frame Inspection

- Judging individual frames

Cluster Count Method

- Viewing the cluster from above and below without removing frames from the hive
- Based on frames of bees only, not brood.



Frame Inspection

Takes more time

**Requires greater
experience in handling
the hive**

**Can cause substantial
colony disturbance,
especially during cold,
early spring days**

**May injure or kill the queen
as a result of the extra
handling and prolonged
exposure**



Frame Inspection Method – Step 1

Single story hive

- Smoke the entrance and under the lid
- Remove lid

Two-story hive

- Smoke the entrance
- Separate the two stories using your hive tool



Frame Inspection



During spring inspections, in a two-story hive, the top box is typically examined first followed by evaluation of the bottom box.

- The bottom box may be ½ to totally empty if the bees have worked their way up into food stores above the brood.**

Frame Inspection



Mid-season, the brood chamber is likely to fill two boxes and some beekeepers prefer to work from the bottom up if there are a lot of bees.

Set the top box aside, evaluate the bottom box, then return the top box to position and evaluate it.

Frame Inspection – Step 2



Top story set aside



Carefully remove an outside frame.

Frame Inspection



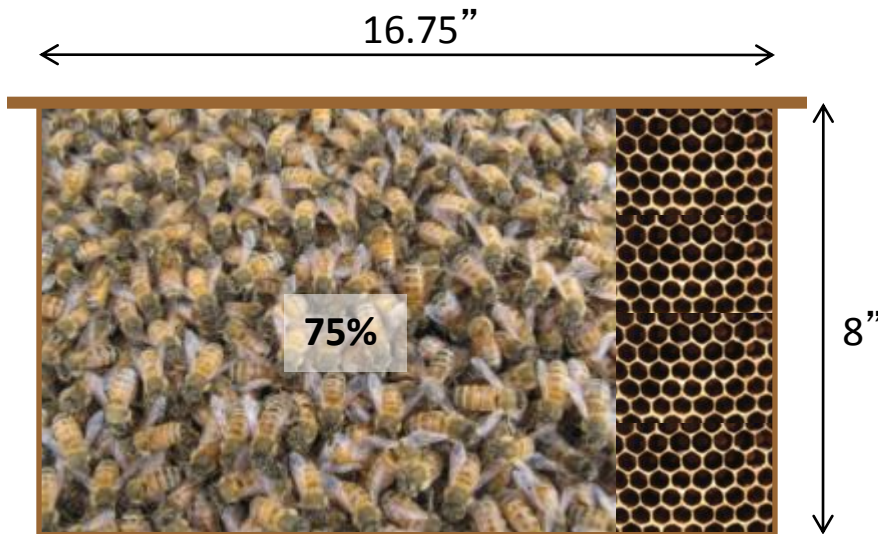
Assess both sides of each frame while holding it over the open hive.



Frame Inspection

Frames of Bees – definition

- Add partial frames to make a whole.



*Whole comb,
including the frame,
densely covered by a
layer of bees
= 1000 bees per side*

Remove Frame 1, set it outside of the hive



Remove Frame 2, replace in hive in position of frame 1



Remove Frame 3, replace in hive in position of Frame 2



Remove Frame 4, replace in hive in position of Frame 3



Remove Frame 5, replace in hive in position of Frame 4, etc.



Push everything back into its original position and replace the first frame



Frame Inspection

Single story hive

Replace lid

Complete evaluation notes

Two story hive

Replace top story and inspect it

Replace the lid

Make sure everything is squared



Summarize Results



Four estimates per frame

Adult worker bees (both sides of frame)

Brood (both sides of frame)

9-18 estimates per hive (single vs. two-story)

Average Colony Strength

Total individual hive results / # colonies in the sample

Cluster Count Method



Rapid

**Easier, moderate
experience required
once inspector develops
a feel for the technique**

**Not excessively disruptive
to the colony**

**May crush the queen if she
is on the top or bottom
bars when hives are
repositioned**

Cluster Count Method

Identify the hive to be inspected.
***Random or Systematic* selection**



Cluster Count Method



Open the hive in the middle and tilt the upper box onto the edge or the cleat of the lower box.

Cluster Count Method



**Frames in top box
+
Frames in bottom box
=
Colony Strength**

Cluster Count Method

**Don't just look at bees on the top and bottom bars.
Look down, between the frames.**



Cluster Count Method



View from top bars



View from bottom bars

Cluster Count Method

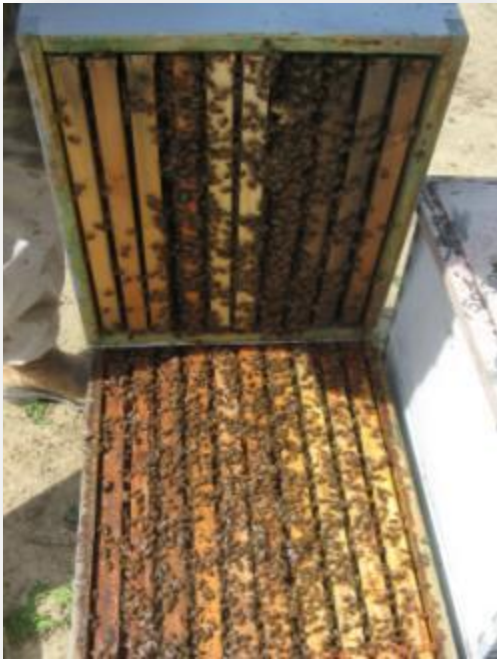


Extremely strong colonies – 15 to 18 frame hives.

When a colony is strong, sometimes it is easier to count the *missing* frames and subtract from the total.

Frames per box

Number of frames may vary *within & between* hives
7-10 frames per box



10 frames in top and bottom



9 frames in top and 10 in bottom



7 frames + feeder in top
9 frames in bottom

Colony Strength Evaluation

All deadout colonies included in the random sample are recorded as part of the official inspection.

- *If the hive is in the orchard, it is part of the population. If the beekeeper doesn't want it to be counted, it should be taken OUT of the apiary.*

Colonies found with symptoms of AFB must be marked and the beekeeper or regulatory agency will make sure they are abated as required by law.



Colony Strength Evaluation

After inspecting each hive, it is put back the way it was found and the inspector moves on to the next hive to be inspected.

When finished, the report is completed and a copy is provided to the grower and to the beekeeper.



Colony Strength Evaluation



Understanding the evaluation process helps make contract expectations clear.

Colony strength evaluations help almond producers make sure they are getting what they pay for in terms of numbers of colonies at a strength specified in the pollination contract.

The inspections also help ensure that beekeepers are appropriately compensated for their additional expense in providing quality hives for spring pollination.

Link to the Online Training

<http://ucanr.edu/colonystrength>

