W 1151

Honey Bee Inspections and Recordkeeping

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Inspections of honey bee colonies are critical for ensuring the health and success of colonies and are also enjoyable to many beekeepers. Visual inspections may assess general colony conditions or be used for more specific reasons. It is helpful for a beekeeper to think about the purpose of their inspection before opening a hive. This helps ensure the actions taken align with that purpose, time is used efficiently and hives are open only for a short time.

A general, basic inspection typically assesses three main areas — queen status/bee population, food stores and disease/pest issues. These are all areas where beekeepers can implement management strategies to prevent and/or mitigate issues. It is important to remember that these areas are also dynamic because the colony activity and management needs change across the seasons. The purpose and frequency of an inspection are not necessarily the same year-round and may vary by the beekeeper's reason for keeping bees.

QUEEN STATUS AND COLONY POPULATION

The queen is the mother of the honey bee colony, giving rise to the workers (females) and drones (males). Making sure a colony is queen-right, meaning it has a queen, helps ensure the success of the colony. Without a queen, the colony will dwindle and die without intervention or resources to develop a new queen. Thus, a key component of a colony inspection (and recordkeeping) is knowing if the colony is queen-right. The queen is larger than the workers, but she can still be difficult to identify in a crowded colony. One way that beekeepers can help themselves is by having a marked queen — queens can be purchased already marked or beekeepers can mark her themselves. Even looking for a marked queen can feel like looking for a needle in a haystack, so the presence of neatly laid eggs is often a more commonly used measure of the colony being queen-right. However, beekeepers are still encouraged to maintain, inspect for and record the presence of marked queens because a new, unmarked queen denotes a change in the colony's genetics and traits. These queen events can also affect the interpretation of parasite monitoring assays and the implementation of treatments.

Figure 1. *An unmarked queen is not always as easy to observe as in the photo on the left; however, her longer abdomen and shinier thorax (segment between the head and abdomen) are helpful characteristics to look for. Additionally, watching the movement of bees on a frame can help locate the queen, as the workers form a retinue or circle around her, even as she walks across the frame. The photo on the right shows a paint-marked queen surrounded by workers. An international color marking system helps beekeepers keep track of the age of their queens — blue for queens produced in years ending in 0 or 5, white for years ending in 1 or 6, yellow for years ending in 2 or 7, red for years ending in 3 or 8, and green for years ending in 4 or 9.*

Considering the colony's seasonal biology helps determine the main purpose of an inspection. The spring is the most common period of swarming in Tennessee — colonies divide and the old queen leaves with roughly 40-75 percent of the adult bee population to establish in a new site while a new, developing queen takes over the old site (hive). During this time, beekeepers are urged to be diligent about preventing swarms by one or more management strategies such as providing adequate space for the colony to grow, destroying all developing queen cells in a colony and/or splitting colonies. Since it takes 16 days for a new queen to develop, it is wise to inspect every week during the height of swarming season because the early stages of queen cell development are challenging to see. Without preventative management, a colony may swarm multiple times in a year — do not let your investment fly away! These swarms aggregate at a temporary location (often a branch, see Figure 2) before finally taking off to a permanent nesting site. Homeowners who find a swarm can contact their local beekeeping association (tnbeekeepers.org) or their county Extension office (utextension.tennessee.edu) to find a beekeeper to relocate the bees. Allowing the bees to find their permanent nesting site could mean having them establish in the walls of a building or inside a cavity of a tree, making them very challenging to remove.

Figure 2. *Swarm cells are typically found along the edges of a frame. In the photo on the left, there are several swarm cells (it is typical to have several produced) along the bottom of the frame. The bottoms of many of the cells are open and with raw edges, indicating new queens emerged and the original queen likely left the colony in a swarm, with much of the adult bee population. These swarms aggregate at a temporary location (often a branch, as shown in the photo on the right) before finally taking off to a permanent nesting site.*

FOOD STORES

Monitoring and knowing what type and how much food a colony has stored helps manage honey bee colonies; frames from healthy colonies with plentiful stores can be swamped into other colonies that may have more need. However, an overabundance of food stores can become a problem if adequate space (additional boxes and frames) is not provided and the bees store so much food that it restricts the area where the queen can lay eggs. If colonies are low in food stores, supplements can be provided; however, some studies have reported that colonies fed protein supplements do not perform as well as those receiving real pollen. In addition, constituents present in honey, but absent in sugar syrup, affect the expression of genes involved in detoxification. Planting floral resources is another way to supplement nutrition and food stores. Still, more research is needed to better understand how environmental factors affect the abundance and nutritional qualities of different floral resources.

Figure 3. *Typically, a colony utilizes space efficiently and effectively, with brood (developing bees) toward the center of the frame, surrounded by a ring of pollen (protein), and nectar and honey along the periphery, outer frames and supers (the uppermost boxes of a hive). A colony that becomes honey/nectar bound or pollen bound will not be able to maximize its bee population growth. In the photo on the right, you can see that the bees are storing pollen in cells within the brood nest. This indicates that the colony needs more space and inaction by the beekeeper will result in swarming or a lack of colony buildup.*

DISEASE/PEST ISSUES

Honey bee diseases and pests can make beekeeping quite challenging and costly in terms of time and money. There are several concerns in this area (check out PB 1745 Beekeeping in Tennessee for more information), but for the scope of this factsheet, important considerations include (1) knowing what to look for, (2) actively monitoring for parasitic *Varroa* mites, and (3) keeping and referring to records to look for changes in numbers or concerns. Mitigating a problem while it is still in its early stages can be much easier than when the problem is full-blown. Regular inspections that include looking for early signs of problems, can be advantageous. Sometimes, when a disease or infestation is advanced, there are limited or no options in terms of mitigation. For example, parasitic *Varroa* mites feed on developing and adult bees and can vector harmful viruses. Visually inspecting bees for *Varroa* mites is not reliable or recommended, as *Varroa* are most likely found within brood cells or on the underside of the bee, and beekeepers are observing the backs of the bees. Thus, the colony *Varroa* mite load is underestimated and delays treatment, which can result in high virus levels and symptoms such as paralysis and deformed wings (see Figure 4) that can contribute to colony decline due to fewer workers to perform necessary tasks for colony success and growth.

Figure 4. *The photo on the left shows the results of an alcohol wash assay of 300 bees — it is easy to count and calculate an infestation level to determine if management is necessary. The middle photo shows worker bees with an unsustainable* Varroa *mite infestation. You can see several bees with red-brown mites on their thoraces, indicating this colony is likely heavily infested, and management is late. A monitoring assay is still recommended to compare the starting infestation level to post-management levels. The photo on the right shows a worker bee with crumpled wings resulting from deformed wing virus, one of several viruses vectored by* Varroa *mites.*

RECORDKEEPING

Recordkeeping is an essential component of beekeeping management and evaluation. These records serve as snapshots to help guide decisions and help piece together what events could have led to the colony's current conditions. They also serve as a way to document one's growth and improvement as a beekeeper. A basic inspection sheet follows on the next page, but you may decide to develop your own depending on your specific needs. For example, a beekeeper interested in breeding bees would want to develop specific inspection sheets to document the traits they are selecting.

An important consideration is that these records are to help the **future** you. Reading through the notes from your last inspection before heading to your apiary can help ensure that you bring any equipment, medications and tools to accomplish tasks you identified the last time. The sample inspection sheet has a box where you can write any notes from the previous inspection. Likewise, you can transfer information about the queen's marking so you have a search image in your head when you start your inspection. Backup notations can also be helpful. While notes can be taken about adding or removing woodenware to/from the hive, there are also entry boxes to enter the configuration of your hive at the start and at the end of your inspection, which should match up with the additions/removals. Coding such as "DD|S" could indicate a hive that consists of two deep boxes, a queen excluder and a shallow box on top.

Checked boxes allow for quickly marking off inspection elements without needing to write out details; however, if your learning style or memory is enhanced through writing, write out words or more details after closing up the hive. Digital copies of records not only serve as a backup but are more easily searchable. There are also phone apps available to record inspection results; some are free, some have paid features and others require payment for all features. Choosing between paper and digital is less important than choosing to keep records. These records will help you and will help others help you in the long run. The focus and reason for keeping bees may change over time, but no matter the reason, records will help assess whether you and your bees are on track for success!

Date and time:

Weather:

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Apiary name/location:

Colony:

Reason for inspection:

Notes from last inspection:

Starting configuration:

Ending configuration:

Queen/population

Q mark:

Q seen: ☐ Y ☐ N

Q replaced: ☐ Y ☐ N

Q cells:
☐ Supersedure
☐ Swarm

Eggs seen: ☐ Y ☐ N

Larvae seen: ☐ Y ☐ N

Pupae seen: ☐ Y ☐ N

Brood pattern
☐ Good ☐ Medium ☐ Poor

Adult worker population
☐ Strong ☐ Medium ☐ Weak

Swarming potential/need to split?
☐ High ☐ Medium ☐ Low

Food stores

Nectar
☐ Excess ☐ Medium ☐ Low

Pollen
☐ Excess ☐ Medium ☐ Low

Supplements
Carb:
Protein:

Disease/Pests

small hive beetles:

wax moths:

bees with deformed wings:

Other:

***Varroa* monitoring assay**
☐ Alcohol ☐ Powdered sugar
V/300 bees:
V/100 bees:
Treatment needed? ☐ Y ☐ N

Medications
Issue:
Product:
Initiation date:
Removal date:

Notes / Needs / Actions taken this time / Actions needed to be taken next time:

Prioritize next inspection? ☐ Y ☐ N

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