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## Winter “Deadout” Evaluation Guide

In the upper Midwest colony mortality over winter has become a common phenomenon, to common unfortunately. It is important for a beekeeper who has a colony(ies) die over the winter to take the time and try, as best as possible, to determine the cause of the mortality. The purpose of this guide is to provide a structured approach to examining a dead colony which will help minimize the chance of missing important causal clues or indicators.

To use the guide, start at the top and work step-by-step answering the questions and following the guide instructions.

### 1. What do you see around the entrance of the hive?

- a. Prominent yellow or brown spotting or streaks on the upper and/or lower entrance(s) to the hive that is new since your last inspection of the live hive; dead bees at the entrance and on the ground in front of the hive. **Go to question 7.**
- b. Nothing. The entrance(s) is/are clean, or there are only a few dead bees around the entrance. **Go to question 3.**
- c. Other signs of disturbance, such as a damaged or missing entrance reducer, outer and/or cover blown off hive or out of position, etc. **Go to question 2.**

**2. Are there signs of an animal predator such as: chew or claw marks on the exterior of the hive around the box edges, shifted boxes, wax particles (laying outside the entrance)? Are there mammal fecal deposits, entrance reducers pulled out, scratch marks at the entrance and scat, filled with dead bees? Are there dead bees outside the hive that are nothing more than exoskeletal remains? Take apart the hive. Are there mice or mice nests inside the hive?**

- a. Yes. Answer: The bees most likely died as a result of hive damage and/or predation from skunks, mice, bears, etc.
- b. No. Answer: The bees most likely have died from weather exposure following hive body disturbance such as wind or other.

For both 2a. and 2b: Take apart the boxes; if there are dead bees in a small cluster, they probably died of exposure or there were too few bees to keep colony warm.

### 3. What do you see under the inner cover?

- a. Nothing, just the tops of the frames, and there is honey in those frames. **Go to question 5.**



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- b. A cluster of dead bees. **Go to question 4**
- c. A lot of moisture, mold, dripping water under inner cover and moldy frames. – If so the most likely cause of death for the hive was excess moisture dripping on the bees plus cold temperature. Hive ventilation was inadequate.

**4. Is there honey and bee bread (pollen packed into cells) in the hive?**

- a. Yes. **Go to question 5.**
- b. No. – It is very likely the bees starved.

**5. How many bees are in the hive?**

On a warm day, more than 40°F, take out some frames and look for bees. If you have more than one box on your hive, and there are no bees in the top box, remove it and look in the lower box(es) until you find the bees. Be careful not to dislodge bees still clinging to combs. Estimate how many bees there are among all the frames. Dave Cushman's website is helpful for figuring out how many dead bees are clinging to your frames based. Diagrams are available at <http://www.dave-cushman.net/bee/beesest.html>.

Examine the bottom board and estimate how many dead bees are on the bottom board. You can do this most accurately by scooping them into a measuring cup. 300 bees is equal to ½ cup, and there are approximately 3,600-3,700 bees to a pound. This means that 6 cups of bees is about one pound. Add the number on the bottom board to the estimate you make for the number on the frames.

- a. There are at least one pound of dead bees in the frames and on the bottom board/screen. Collect 300 bees, ½ cup, in a Ziplock bag for later inspection. **Go to question 6.**
- b. There is fewer than a pound of dead bees in the entire hive, including the dead ones on the bottom board. - The most likely cause of death was cold due to lower-than-critical mass of bees to move in cold temperatures to honey or to maintain cluster core temperature. A less likely, but possible cause, is tracheal mites. Examine some bees for tracheal mites through dissection.

**6. Are the bees attached to combs in one fairly compact area?**

- a. Yes. **Go to question 7.**
- b. No, the bees are spread out over several combs and/or hive bodies. Many are dead on the bottom board. **Go to question 8.**



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**7. Examine the bees' wings.**

- a. The wings are normally aligned for the most part. – The bees may have starved even though they still had honey in the hive. Sometimes the cluster is unable or unwilling to move to nearby stores and dies. You can check for tracheal mites and Nosema, but the symptoms suggest starvation due to failure of the cluster to move.
- b. A large number (more than 1 in 10) have K-wings (bees have 4 wings, K-wing is when the wing pairs are separated into the shape of the letter K. The bees probably succumbed to one, or more, viruses. You can have some bees professionally analyzed to confirm this, but note that this is not a free service. If you have access to a microscope, you can examine the bees for tracheal mites and/or nosema. Nosema testing can be performed by crushing a small sample of bees and making into a dilute paste with some water. The diluted paste can be put on a microscope slide and the Nosema spores can be seen and counted. See video link for tracheal mite dissection tips on Diana Sammataro's website at USDA:  
<https://www.ars.usda.gov/pandp/docs.htm?docid=14370>.

See Randy Oliver's site, [www.scientificbeekeeping.com](http://www.scientificbeekeeping.com) for Nosema spore count procedure.

If the bees were in a hive with noticeable smearing or spotting at the hive entrance tests negative for Nosema, **go to question 8.**

**8. Hold a brood frame by the top bar and at a 45 degree angle to your eyes.**

Examine it in the sunlight or any bright light, placing yourself so that the light shines over your shoulder and onto the brood frame. Do you see a large amount of white speckling in empty brood cells around the top edge? The white specs are varroa mite frass.

- a. Yes. - These bees most likely had a severe varroa mite problem and died of parasitic mite syndrome (one or more viruses vectored from varroa mite to honeybee)
- b. No. **Go to question 9.**

**9. Is there any brood?**

- a. No. - It is likely that this hive died of "spring dwindling" due to a weak or dead queen or to an unknown viral disease.
  - b. Yes. **Go to question 10.**
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**10. Are there brood abnormalities such as punctured caps, brood scales, slimy brood, chalkbrood, etc?**

- a. Yes. - Evidence of brood disease in early spring suggests a weak colony with a heavy pathogen load (viruses, etc). Send a sample to the USDA Beltsville Bee Lab for analysis.
- b. No. - If the hive had no signs of external tampering, plenty of honey, at least a pound of bees, and recent, meaning late winter/early spring brood, but was still dead, then it is not clear why your bees died. You could send some representative brood and bees to the USDA Beltsville Bee Lab for diagnosis of viral problems.