STAHLMAN BEEKEEPING NOTES FOR 2025

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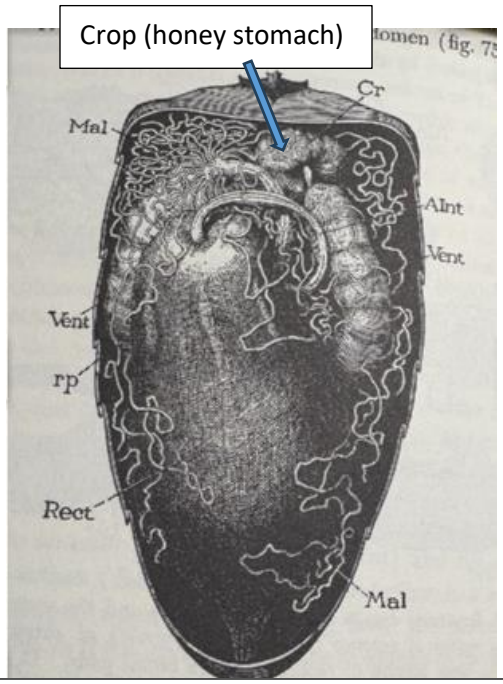
Some reasons bees die over the winter season

I would like to begin this series of topics with some background information about honey bee survival during the winter season. We don't normally think about the anatomy of a honey bee but winter/cold seasonal weather is unique.

The mid gut of a honey bee digests food. The rectum is a storage chamber for waste matter. Waste is discharged by frequent flights called cleansing flights. From *Anatomy of the Honey Bee* by R.E. Snodgrass – an illustration of the abdomen of a winter worker bee.



The dark area in the illustration is the expanded rectum filled with waste matter.

'During prolonged cold periods in winter bees are forced to retain so much intestinal waste that the rectum becomes expanded to an enormous bag occupying all available space in the abdomen' R.E. Snodgrass.

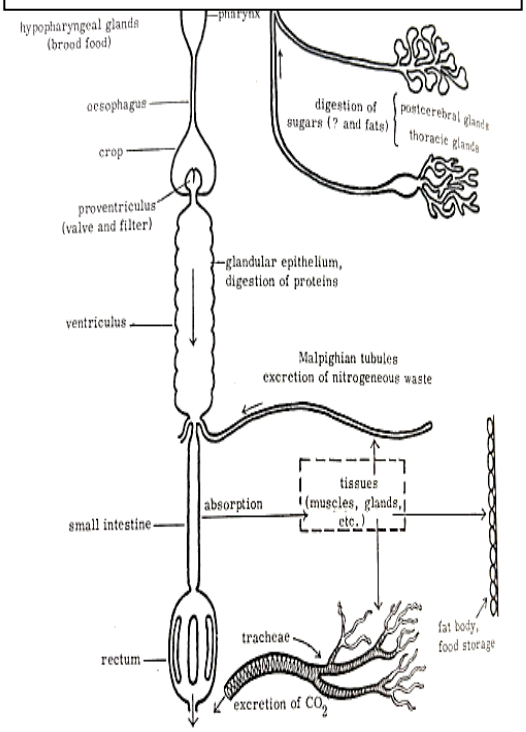
From ***The Anatomy and Dissectrion of the Honeybee*** H.A. Dade published by the Bee Research Association (London) 1962.

Dade points out that the rectum like the crop is very capable of very great distention. When fully distended, it almost fills the abdomen. In this condition it (the bee) is able to accommodate the large quantity of waste matter which accumulates during long periods of confinement in winter conditions.

Dade specifically points to indigestible food such as brown sugar as a problem. Waste can ferment in the rectum and bacteria, yeasts, and micro fungi will thrive in enormous numbers. ('This may cause dysentery'**)** **Be careful of what you feed during the winter season.**

I am also going to share figure #18 from Dade's book page 52 showing the physiology of nutrition (1962) 1962 was a long time ago, so I checked recent material and found an excellent source to be downloaded as a PDF file: [HBHC-Honey-Bee-Nutrition-Guide-Supplementary-Feeding-Guide-2024.pdf (honeybeehealthcoalition.org)](HBHC-Honey-Bee-Nutrition-Guide-Supplementary-Feeding-Guide-2024.pdf) It is available from the Honey Bee Health Coalition and it surpasses anything I could share with you about feeding bees.

Figure 18 from Dade's book showing the digestion system of the honeybee



It is important for bees to take frequent cleansing flights. Bees do not normally defecate inside the hive. However, confinement to the hive during cold weather can last for a considerable period.

I remember reading A.I. Root's autobiography in which he reports the most serious error he made keeping bees was trying to keep them warm during the winter. He built a unique bee house to over-winter his bees. He included a stove to keep the building warm. BIG MISTAKE – Bees thinking the outside was warm took cleansing flights.

Winter bees are referred to as *diutinus* bees -- they have longer life spans, large fat bodies and large hypopharyngeal glands. *See page 192 in ***The Hive and Honeybee*** revised second printing 2018. If this topic interests you, section 3.2 in Physiology and Social Physiology of the Honey Bee should be a good read on ways to make bees live longer. ***Easier to understand is sick stressed bees cannot be expected to live thru the 100 plus days of a cold winter***.

Many seasoned beekeepers have found hives with plenty of honey and no bees or dead bees when hives are opened in the spring. The question for why the bees died can easily be determined by three signs:

- Where surplus honey is stored.
- Where the bees died.
- Signs such as diarrhea and dead bees in comb or around the hive entrance.

Diarrhea

Dade points out that dysentery in bees is a problem and can be caused by feeding the wrong food to bees or is caused by Nosema disease. Nosemosis (Nosema disease) has been around for a long time. And a new strain Apis cerana has arrived which is more serious than Apis mellifera.

Feeding bees to avoid diarrhea. The **link** above is about types of food used to feed bees. It covers products available in today's market place and shares information about proteins, lipids, Micronutrients, and management needs. Especially important is information about poor nutrition and other stress factors bees face. I highly recommend that you download this document.

Nosema Disease is often overlooked as a bee problem.
This disease is considered serious and prevalent in honey bees and is caused by a microsporidian parasite of the genus *Nosema*. Two species of this disease have been identified in the U.S. (*Nosema, N. apis* and lately introduced *Nosema Apis cerana*). "Adult honey bees ingest Nosema spores when eating spore-contaminated food and when cleaning up infected fecal materials. This is a gut disease and according to all I read is treated by fumagillin mixed with liquid sugar syrup.

The best way to share information about Nosema disease is for me to share some photos of a colony that died this past winter. As the reference *The Hive and Honey Bees* points out, beekeepers do not diagnose the cause early enough to apply treatments to save a colony of bees. The cause could be from something such as buying a package with nosema infected bees, an infected queen, infected equipment, or nosema spores in infected honey fed to bees. Remember what I said about winter confinement. One indication of the disease is bees defecating inside or outside on the hive.
Photo # 1 is a colony of dead bees. **This is not a case of starvation!** This colony has a good supply of stored honey.

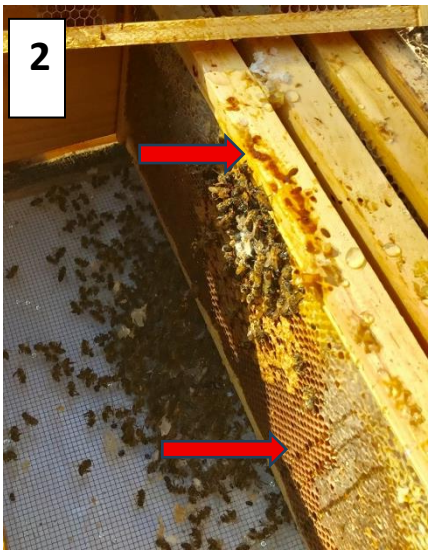


Photo # 2
Going into winter this colony had a fairly large population of bees.
One might think that mites killed these bees. But check out the presence of fecal material inside the hive and on the outside of photo #3. The conditions of the midgut of a bee with Nosema triggers the germination of millions of spores and within a short period of time 30 to 50 million can be found in the midgut. Not good for a bee to relieve itself during confinement during a cold winter. These bees die when confined in the hive as these photos show.

Photo # 3 shows a really bad case of a colony with *Nosema*.
Fecal matter is associated with staining – a tobacco like substance left dripping on the surface of wood and comb. Note the staining on the top bars and the vertical stains on the face of the comb in Photo # 2. Staining can also be seen on the front of hives usually above the entrance as shown in Photo #3.

Dealing with a colony that has died from *Nosema disease*

Do not just clean out the bees so a new package can be placed back into this hive! More must be done or new bees will try to clean up

the (poop) with spores and become infected with *Nosema disease spores*.

Important information:

- Fumigation is recommended and this topic should be investigated if that is an option.
- Equipment such as hive bodies, top cover, bottom board, and inner cover can be saved by:
    - Through cleaning by scraping and treating with bleach -- Then painted.
    - Frames might be cleaned of the comb, and placed in boiling water for a short period of time. Make sure the cleat to hold foundation should be removed and treated separately.
    - I am assuming that the wax in the comb could be recovered. Information I have is that N.apis spores can be killed at a temperature of over 120°F for 24 hours. Wax melts at 148°F.
    - The equipment could be burned and destroyed.
- **The honey should not be used to feed bees!**
- One will find various natural treatments on line. **However, you as a beekeeper can avoid much of what happened to this colony. "Good hive management and adequate nutrition" are necessary to prevent a colony such as this from dying.** The signs of spotting should be identified early. I call these things **"red flags!"**
- **Understand that bees must hold excrement for long periods during the winter and must at some point "go" in the hive.** Active flight allows bees to discharge poop outside the hive.
- **Combining a hive with these signs will only contribute to other bees being infected with *Nosema* disease.**

Diarrhea –streaks and dark spotting on and in the hive may also have these signs:

- Colonies with Nosema disease generally have low productivity within the colony. Not as much honey stored, feeding only increases bowel movement and lethargy – fewer active bees.
- The life span of bees is significantly shortened as many studies have shown.
- Not aways but often one can see bees crawling – unable to fly back to the bottom board.
- A rapid population decline.

Some of these signs could also apply to Varroa mites. But the diarrhea seen in the pictures clearly point to something very wrong happening.

If you suspect that your bees died from or have Nosema disease check with your state agriculture inspectors and get a definite report. They can examinate hive excrement or gut contents of a honeybee with laboratory microscopes for the presence of Nosema spores. **In fact, I would do that before any equipment is burned.**

I look back at the work done by Tom Webster. Tom was a frequent speaker at EAS meetings and published articles in various bee journals on how to identify Nosema disease. He proposed a simple field test a beekeeper might use to help identify a healthy bee from one infected with Nosema. I have included a link on this test so you can investigate Tom's testing procedure.

Nosema ceranae The Inside Story – Bee Health (extension.org)