

# "THE BUZZ!

March 2007

*An electronic newsletter from the Kentucky Department of Agriculture's State Apiarist's Office*

## **Winter colony losses – starvation and unknown causes**

There's an old Beatles song (that's The Beatles – no relation to small hive beetles!) that goes "It's been a long, cold, lonely winter." I think that's how beekeepers are feeling this month. With all the doom and gloom (and dead bees) being reported by the news media, it would be easy to think that there's not much to look forward to. But the song goes on to announce, "Here comes the sun", to remind us that things will look better in the spring sunshine. Though it has been a long, cold winter, we are finally getting some warm early spring days, bees are starting to fly, and we're seeing brood in our hives and some flowers in the fields. We had some great beekeeping schools around the state this winter, and both old and new beekeepers are anxious to get this beekeeping season started. I'm hearing that the hives down south in Georgia are "busting out" full of bees, and very soon the first packages of bees and shipments of queens will be headed this way.

In this newsletter I am going to discuss in some detail news media accounts of heavy losses that some beekeepers (mostly large, migratory beekeepers) are experiencing across the country. Keep in mind that, though the news is unsettling, the media accounts are hardly the whole story. Here on the home front, 2006 was one of the worst honey crops in many years, and as I talked about last fall, I was seeing many hives in Kentucky entering the fall and winter low on food reserves. As we should all know, low food reserves going into winter can mean dead bees in winter and early spring. So I really believe that we have our own problems here in Kentucky and the surrounding region that have everything to do with how our bees fared last year (not well) and very possibly little to do with what is going on elsewhere.

Before I talk about the latest (this is not the first time this sort of thing has happened) unexplained, sudden, heavy colony losses (meaning that the bees in the hives have died) that are occurring around the country, I'm going to discuss why we lose colonies in winter and how this relates to last year's beekeeping season. But, this newsletter is about more than dead bees. We also have an upcoming beekeeping class, a revised beekeeping manual by Dr. Tom Webster, and a warning to watch out for small hive beetles this year.

## **Beekeeping class in Anderson County**

Phil Craft, Kentucky's State Apiarist, will conduct a beginning beekeeping class on March 31 (Saturday) at the Anderson County Extension Office (1026 County Park Road) in Lawrenceburg starting at 10 a.m. This will be a follow-up class to the beginning beekeeping classes taught at the Bluegrass Beekeeping School in February. Topics will include mites, diseases, other pests, queenless hives, swarm control, and the installation of package bees. This is a good class not only for beginners but also for more experienced beekeepers who wish to learn more about the topics covered in the class.

If weather permits, we will travel to a nearby beeyard and open hives. (Bring veils and personal protective equipment.) Pre-registration is not required, and there will be no charge for the class. For more information, contact Phil Craft by phone at (502) 564-3956, or by e-mail at [phil.craft@ky.gov](mailto:phil.craft@ky.gov). For directions to the Anderson County Extension office go to <http://ces.ca.uky.edu/anderson/directions/>

## **Revised Beekeeping Primer on State Apiarist's Web page**

Recently Dr. Tom Webster, apiculture Extension specialist at Kentucky State University, revised his very popular beekeeping manual – "Kentucky Beekeeping: A Guide for Beginners." This manual has been a primer for Kentucky beekeepers for many years. It is a concise yet very complete beginner's manual written specifically for Kentucky beekeepers. Topics covered include honeybee biology, components of hives, choosing a hive location, hive management, beekeeping diseases and pests, harvesting honey and getting hives ready for winter. And the price for this manual is right: It's free! It's available for download at my Web page with other information for the new beekeeper. Just go to <http://www.kyagr.com/statevet/bees/info.htm>.

### **Why do we lose colonies in winter?**

Before concluding that those deadouts (hives where the bees have died) in our bees yards suffered from a new bee disease or malady, let's examine the issue of why we lose colonies during the winter.

When preparing hives for winter, a process that begins as early as July in Kentucky, there are three considerations that we keep in mind in helping a colony of honeybees get through the winter: 1 – sufficient food stores in the hive; 2 – a sufficient number of bees for a winter cluster, and 3 – making sure that these bees are healthy. The first two are pretty quantitative; the third is more complicated.

- 1 Food stores:** The amount of food stores needed to get a colony through the winter is determined by where the hive is located geographically, how severe (cold) winter is, and the length of the winter. Here in Kentucky we say that a hive needs 50-60 pounds of honey (or stored sugar syrup) for the bees to feed on through the winter. A deep hive body full of honey will contain more than enough, though most beekeepers in Kentucky will winter bees in two boxes, a deep hive body on the bottom – full of bees and containing some stored honey – and a full or nearly full super (or a second deep or medium box) on top. If you have bees north of Kentucky, they need more stored honey, and further south, less. Throughout the mid-summer and fall of last year, as I looked into hives with beekeepers, I saw a serious lack of food stores – many hives with virtually no stored honey. Many beekeepers were feeding hives from July through fall and into winter. After warning beekeepers to check hives for food stores, I heard more reports of hives low on stored honey. At that time I began predicting heavy hive losses due to starvation this winter and early spring in Kentucky.
- 2 Number of bees:** The minimum late fall hive population that is required for the colony to make it through the winter is about 25,000-30,000 bees. This number of bees will cover eight or nine deep frames, so the minimum is roughly a deep hive body full of bees. By spring this 25,000-30,000 bees will be greatly reduced – see next paragraph on healthy bees. The bees cluster together and consume honey to keep warm during the cold winter months (when the temperature is below about 55°F). The colder the outside temperatures, the tighter the cluster. The more bees in the cluster, the easier it is for them to maintain the cluster temperature. Furthermore, the number of bees in any hive decreases throughout the winter as the older bees die. (An “average” hive will lose half its bees during the winter.) So as the winter goes on there are fewer bees available for the cluster. Smaller clusters are less efficient at maintaining the cluster temperature (around 90°F), plus the cluster must move to additional stored honey during the winter, a more difficult task for smaller clusters. I always say that as the number of bees decreases in a hive through the winter, the hive may reach a critical cluster size – below which survival of the bees is unlikely. Small clusters very often fail to move to stored honey and will starve inches away from food, sometimes even inches from a full super of honey.
- 3 Healthy bees:** Even in a disease- and pest-free colony of bees with sufficient food and enough bees for a good cluster, half of the bees in a hive will not survive into the spring. Only the bees that develop in the late fall will live that long. Honeybees that have been weakened by mites or disease will die even sooner. If monitoring and control of mites or disease are not performed, you can't tell whether your bees are actually as healthy as they appear to be.

Nosema disease and mites (both varroa mites and tracheal mites) are common causes of reduced lifespan for bees. Since a laboratory test is required to diagnose both Nosema and tracheal mites, many beekeepers use grease patties (for control of tracheal mites) and the antibiotic fumagillin (for the control of Nosema disease) in the fall as part of their routine winter preparation. While I am not a proponent of preventative disease and pest control (there is really no such thing), these are two very worthwhile management routines that may enable your bees to get through the winter.

Young bees that develop in the presence of varroa mites are usually weakened and have reduced life spans. If varroa mites are not controlled, we can expect losses of 30-60 percent of wintered colonies. Thus, control of varroa mites is critical in helping hives get through the winter. While we have a number of varroa control products on the market today, monitoring for the presence and level of varroa infestations is still very important. Varroa mites may be resistant to some of the control products (Apistan and CheckMitePlus), other varroa control products have specific temperature requirements when used, and may require multiple applications for effective control. So carefully following the label requirements is of the highest importance, and monitoring varroa numbers after the products have been applied is still a good idea (to make sure that the product worked).

Furthermore, healthy bees are bees that are well-fed throughout their development. Lack of food, particularly pollen, will cause a decrease in the ability of nurse bees to produce royal jelly (which is fed to all larvae). Larvae that are fed the mere minimum of nutrients will be smaller, less healthy, and have a shorter life span than bees receiving optimum nutrition.

Very often when we discover hives in which the bees died during the winter, we find a small cluster of dead bees (the size of a baseball or softball) on comb that contains no honey. We'll find some of the bees headfirst in the cells – also dead. These bees have starved to death. We sometimes find honey near the dead bees; this is not unusual. What occurred was that the small clusters of bees were not able to move to additional honey stores during cold weather. Extended periods of extremely cold weather, like what we experienced in February, make the movement of bees in a cluster especially difficult. I think a lot of hives in Kentucky were lost during this cold snap. Periods of warm weather in winter followed by cold weather is also hard on bees. They'll become more active, consume more honey, and then must re-cluster. Sometimes they will fail to re-cluster completely and will end up in multiple small clusters. I've had reports of this occurring this winter, and the result is dead bees in multiple small clusters. When we find empty hives with a very small number of dead bees or occasionally no dead bees at all, we ask, "Where have they gone?" Some bees will die in winter, as in summer, when they fly during periods of warm weather and fail to make it back to the hive. We often have these periods of warm then cold weather in Kentucky. Bees weakened by disease, pests, or poor nutrition are even more likely to fail to make it back. Also, survivors will remove dead bees in the winter (again, during warm periods), and the dead bees may not collect in front of the hive either because they have been carried several feet away or because predators such as raccoons and skunks have eaten them. Also, bees may, either individually or as an entire small cluster, migrate to an adjacent hive during winter. Finding deadouts with few or no dead bees is not unusual here in Kentucky.

This spring, when examining that deadout in our beeyard we should ask ourselves, "Is there an explainable, though unknown, cause for the loss?" Most of the time there is, especially in the winter after a very poor nectar flow. Unfortunately, these days we consider a loss of 20-25 percent of our colonies each winter acceptable. Also, unfortunately, it is common to lose one or two hives – which means that beekeepers with only a few hives can lose all or most of them. Beekeepers with larger numbers of hives, be it 20 hives or 200, routinely make plans in the spring to replace lost colonies by making divides or purchasing package bees. Still, these losses are much lower than among feral (wild) colonies. In the wild, a majority (as much as 75 percent) of first-year honeybee colonies fails to survive through winter. The difference between the high losses in nature and in our managed colonies is good beekeeper management and good preparation of hives for winter. Unfortunately, last year's honey flow made this preparation especially difficult for Kentucky's beekeepers. That's why beekeepers who failed to feed their bees heavily last fall may find starved bees this spring.

### **Colony Collapse Disorder (CCD)**

Last fall, reports began coming in from migratory beekeepers around the country, but especially from Florida and the eastern U.S., of the discovery of many hives that were empty of bees. These losses were not winter losses but fall losses during periods while bees were still raising brood. This phenomenon is now being called CCD (short for Colony Collapse Disorder) and has received a great deal of coverage in the national media. The cause of these still-unexplained losses is being called a disorder instead of a disease because, at this time, no disease-causing agent or pest has been identified. A sampling of the beekeepers reporting these losses owned from 200 to 3,000 hives, and colony losses were between 30 percent and 90 percent. A number of these migratory beekeepers also reported heavy losses of newly made nucs last fall, which is very unusual. Normally, the survival rate for new nucs is very high. One beekeeper made up and moved 400 nucs to Florida last fall. A few weeks later, all but one of them were empty of bees.

Characteristics of hives said to be hit by this disorder are: 1) Hives that started out full of seemingly healthy bees and brood were found a short time later with no adult bees and few if any dead bees in or around the colonies. 2) The hives still contained brood, pollen, and honey. 3) There was a delay in other bees robbing these deadout colonies and in wax moths attacking them. Hives in decline with this condition have mostly very young bees, brood, food stores, and a queen. The weakened hives seem reluctant to consume provided food, such as sugar syrup or pollen patties.

While earlier reports said that only migratory beekeepers with large operations were affected, late in February some larger non-migratory beekeepers, particularly from Pennsylvania and the mid-Atlantic region, reported losses of greater than 50 percent. Soon after the initial reports, other migratory beekeepers announced heavy losses of colonies under similar circumstances. A number of large beekeepers across the country are discovering higher than normal losses compared to the past few years (although heavy over-wintering losses were reported in 2003-2004 for many northern beekeepers). Losses attributed to CCD are now reported to have occurred in about 25 states, but CDC might or might not have been a real factor in all of these cases. I recently spoke with a Pennsylvania beekeeper who owns about 200 hives (many of the reports of CCD are from Pennsylvania), and this beekeeper has had no known losses from CCD. And reports from some of the large beekeeping operations in Georgia, which provide package bees to Kentucky beekeepers every spring, were that these Georgia hives were thriving. Losses reported here in Kentucky seem to be more related to starvation and poor condition of bees than to CCD.

What is causing these colony losses?

There are several possible causes under investigation by researchers. These include, but are not limited to:

- Chemical residue/contamination in the wax, food stores and bees.
- Known and unknown pathogens in the bees and brood.
- Parasite load in the bees and brood.
- Nutritional fitness of the adult bees.
- Level of stress in adult bees as indicated by stress-induced proteins.
- Lack of genetic diversity and lineage of bees.

One common factor in the colonies of many of the beekeepers (again, mostly migratory beekeepers) experiencing this disorder was stressed colonies, usually due to movement of the colonies (colonies moved at least twice and some as many as five times). Heavy re-use of brood comb is also a common practice of migratory beekeepers, so buildup of pathogens or other contaminants (chemicals used to control mites?) could be related to this problem.

Could this be occurring in Kentucky?

So far, most reports of colony losses in Kentucky appear to be related to last year's poor honey crop. The lack of laboratory confirmation for CCD makes it difficult to say whether a hive has lost its bees due to CCD or to some other cause such as being weakened by poor nutrition, mites, or disease, especially in winter when hives are not raising brood. But, if you have unexplained colony losses, you can go to the following site to fill out a questionnaire: <http://beealert.blackfoot.net/~beealert/surveys/index.php>. I think we'll really not know until later in the spring as we get warm weather, spring pollen, and nectar flows.

What can I do to protect my hives? – Cull old brood comb

One of the areas of investigation by researchers for CCD is the buildup of contaminants or disease causing pathogens in brood comb. Culling of older brood comb has long been advocated as a sound beekeeping practice and is one of the best things we can do to promote a healthy environment in our hives. I often observe slow buildup in hives that contain a great amount of old brood comb. Some experts advocate using brood comb no more than five years, some as few as three years. Older brood comb, deformed comb, or comb with holes is not as effective for raising brood as newer comb. Older brood comb may even provide a better environment for varroa to reproduce in than fresher comb. See this abstract:

<http://www.edpsciences.org/articles/apido/abs/2004/04/M4012/M4012.html>

Old brood comb also can soak up pesticides that we use to control varroa and may affect drone and/or new queen viability, thus its possible implication as a contributing factor in the loss of hives to CCD. When examining your hives this spring, plan to replace old brood comb or poor quality brood comb with new foundation. Once the bees start bringing lots of nectar, they will quickly draw out the new foundation. A good tip is to mark each frame with the year that new foundation is placed in it, then plan on a regular rotation of brood comb every four or five years at the maximum.

What can I do to protect my hives? – Treat with fumagillin

Another suggestion is to treat all hives this spring with fumagillin. Another complication of the CCD issue is the discovery of a new species of Nosema disease (see next article in this newsletter). The good news is that this strain of Nosema, like the old strain, responds to treatment with fumagillin. Due to the possibility of the presence of these two forms of Nosema, it may be especially helpful to treat your hives with fumagillin when

feeding with sugar syrup this spring. This antibiotic is available from all beekeeping supply companies. Add one rounded teaspoon of fumagillin to each of the first two gallons of sugar syrup fed to each colony.

You can go to the Mid-Atlantic Apiculture Research and Extension Consortium (MAAREC) Web site for more information about the current CCD situation:

<http://maarec.cas.psu.edu/pressReleases/ColonyCollapseDisorderWG.html>.

Also, go to <http://www.entm.purdue.edu/entomology/research/bee/ccd.html> to read Dr. Greg Hunt's take on CCD, and the Indiana situation. Their experience appears similar to the one here in Kentucky (poor nectar flow in 2006).

### **Nosema Ceranae – another problem for beekeepers?**

The strain of Nosema disease that has long plagued beekeepers in the United States is called Nosema aphs. In 1996, a new form of Nosema was discovered in Asia in the Asian honey bee *Apis cerana* and was subsequently named *Nosema ceranae*. At first it was assumed that this disease was present only in the Eastern honeybee (*Aphis cerana*). However in 2005, Chinese researchers reported that *N. ceranae* had been discovered in the Western honeybee (*Aphis Mellifera*), in Taiwan. Also in 2005 this new strain of Nosema was found to be present in honeybees in Europe. In Spain in 2004, the rate of infection of hives with *Nosema Ceranae* was reported to be 88 percent. Large honeybee colony losses in Spain are thought to be a result of this *N.ceranae* infection. A massive loss of adult bees was also observed in those apiaries, similar to the symptoms of heavy Varroa mite infestation. (Is this sounding familiar?) Since 2004, other colony losses in Europe are suspected to be a result of this new strain of Nosema.

Could *N. ceranae* be related to CCD?

At this time we do not know that it is. We are not getting reports of the discovery of widespread Nosema (of either strain) in bees that appear to be suffering from CCD. And see below – reports are that *N. ceranae* results in large numbers of *dead bees in the hive*. But stay tuned.

What is the difference in the two strains of Nosema?

*Nosema ceranae* appears to be more deadly than *Nosema aphs*, which typically is considered a more minor disease, resulting in weakened hives and smaller cluster size. *N. aphs* is typically described as a winter disease. *N. ceranae*, however, is described as a year-round disease. Symptoms include weakened crawling bees and sometimes rapid colony losses *with large numbers of dead bees being found in the hive*.

This winter reports began to surface that *N. ceranae* had indeed made it to North America. Dr. Tom Webster, our apiculture Extension specialist at Kentucky State University, has confirmed that he has discovered this new strain of Nosema in hives in Florida. Is it here in Kentucky? We don't know, but we have not actually looked yet, and a laboratory diagnosis is needed to determine the presence of Nosema. Plus it takes an even more extensive diagnosis to distinguish *N. aphs* from *N. ceranae*. If you have hives that seem unusually weak this spring, you can send samples to Dr. Webster (mail to: Dr. Thomas C. Webster, Atwood Research Facility, Kentucky State University, Frankfort, KY 40601). Send 20-50 bees (at least 20 and as many as 50 is better) in alcohol in a small jar (lids TIGHT). If you have more than one hive that you're sending samples from, send them in separate jars with labels.

The good news is that *N. ceranae* does respond to fumagillin, which is also the treatment for *N. aphs*. So it may be especially important to treat colonies, especially weak ones, with fumigillin this spring. (See information regarding fumigillin in the article about CCD).

### **Small Hive Beetles in Kentucky**

If you have been present for one of my beekeeping talks recently, you probably know that small hive beetles (SHB) seem to be on the move in Kentucky. We're now seeing them in most Kentucky counties except those in eastern Kentucky. If you have not seen beetles in your hives before, this may be the year. A warning that I wish to make to beekeepers this spring is to be especially observant when using pollen patties (or pollen substitute patties) in hives infested with SHB. One requirement for beetles' producing larvae in a hive is a

source of pollen, and pollen patties, while very helpful for our bees in the early spring, may provide the beetles, as well as our bees, with a good pollen source. Dr. Mike Hood who gave talks on SHB at the winter Bluegrass Beekeeping School, reports that he has observed SHB larvae in hives in South Carolina, even in winter, when pollen patties were being used. Of course, Kentucky is not as warm as South Carolina, and we tend to use pollen patties more in the spring. I would not completely discourage the use of pollen patties but would definitely suggest close monitoring of hives when using them if you have seen beetles in the hives. If you observe beetles feeding on patties, see SHB larvae while using patties, or have heavy infestations of SHB, you may wish to consider open feeding of the pollen substitute. On a windless day you can literally put the dry pollen substitute in a pan out in the bee yard for the bees, or you may find it more convenient to feed it from a covered container or box so as to protect it from the rain, and from blowing away. See photo at: <http://www.kyagr.com/statevet/bees/infophotos.htm>.

If you wish to hear more from me on the topic of small hive beetles or other beekeeping topics, I have a number of beekeeping presentations scheduled around the state. You can view my upcoming speaking schedule on my Web page at <http://www.kyagr.com/statevet/bees/philsspeakingschedule.htm>.

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Keep those smokers lit and your bee veils on!

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