Boardman Feeder / Stimulative Feeding

by Walt Wright

Several months ago (midsummer '06) an extensive article was prepared on the boardman feeder. My contention in that treatment was that the experienced beekeepers, who knocked the Boardman, didn't understand the principals on which it operates. Wanting to be on firm ground before submitting the article for publication, a PhD in physics was consulted. Wayne Long of Tullahoma, TN was kind enough to review my draft and offer critique. I suspect that we both learned something from the exercise. Having spent several months on the subject, and being burned out on all the details, this submittal will shrink the treatment to a discussion of the important factors.

That should leave some space for a related subject – stimulative feeding in late winter/early spring. It is my opinion that stimulative feeding of syrup in the early season is a myth. The opinion is based mostly on observation of colony scheduling of activities, and there is no supporting data. The subject will be treated later in this submittal. You may ignore it at the risk of unwarranted time and expense.

Boardman Feeder – Discussion

The most consistent reason given for contempt of the device is that it "incites robbing." Robbing is not automatic with its use. To cause robbing some feed needs to be exposed on the outside of the hive. Stronger colonies in the area, finding feed exposed, will be inclined to call out more foragers to take advantage of the source. The worst case scenario is when robbing gets started, and the pressure is on the colony being fed, robbers overwhelm the weak colony, and take what little stores they had on the inside. It's less a problem when field forage is available, but in a nectar dearth, robbers can be vicious. It sometimes seems that stronger colonies form a temporary alliance to attack in greater strength.

The robbing campaign all starts with some feed exposed on the outside of the hive. Care taken in use of the Boardman can prevent exposed feed from attracting the attention of other colonies. Assuring the unit performs properly before installation and some care in application will provide trouble-free use. The unit that leaks, weeps, or seeps feed onto the landing board starts the big problems. Causes of weeping will be treated below in the order of significance.

First, let's counter a popular misconception. The airspace at the top of the inverted jar is often referred to as having a "vacuum." The implication is that the vacuum is holding up the weight of the feed. Not true. To have any significant reduced pressure below atmospheric, you must have closed system, such as a tank or vessel of some sort. The Boardman jar is not closed to atmospheric pressure by virtue of the openings in the cap. There will be atmospheric pressure, or close to it, in the airspace at the top of the inverted jar.

What actually supports the weight of the feed (head pressure at the bottom) is surface tension across the holes in the cap. Surface tension is that property of fluids that causes a droplet to be round in free fall, or bead up on a dry surface. Surface tension has its limits. To be effective in holding back the weight of the feed, the holes in the cap must be tiny. The wider span of larger openings will cause some fluid to pass or weep. If the hole is large enough, the fluid will pour. The bottom line is that before installation, the cap perforations need to be demonstrated to be small enough. The test described below can be performed with tap water. If the cap passes the test with tap water it will do better with the feed of your choice. Any feed has more surface tension then pure water.

When the jar is inverted with perforated cap, there is a stabilization time. A full jar stabilizes almost instantly, and the nearly empty jar takes longer. That's because the trapped air volume is more elastic

than the water volume and it takes longer to equalize the competing physical forces, or reach equilibrium. For this test a half jar of water is used to average the stabilization time.

Another factor that can influence results of this test is inertia. Hold the jar relatively still. Upward motion of the jar, and the inertial effect on the water, can overcome the surface tension at the holes and punch water out at the holes. With that much background you are ready to test your cap hole size.

Invert the half-filled jar at eye level. The dribbling of water should stop in a few seconds. If it doesn't, you are already in trouble. A mildly oversized hole will continue to build a bead on the cap surface until it drips, then start a new bead. A significantly oversized hole will drip continuously. Either constitutes test failure. If there are just a few offenders, they can be plugged and retest performed. Otherwise, discard, and punch smaller holes in a replacement cap.

Now that you have a cap that meets the static fluid support requirements, you are <u>not</u> ready to use it with confidence. Conditions are not static in the beeyard. Ambient temperature change can affect seepage. Warming both fluid and air causes expansion of both. The only relief from expansion is to push fluid out at the bottom – another cause for seepage.

In the frosty morning period, where night-to-day temperature rise occurs while the colony is still clustered, some accumulation of feed is possible inside the Boardman. With properly sized holes in the cap, however, the accumulation is not normally enough to spill over onto the landing board.

Expansion rate of the feed can be increased by direct sun warming of the feed itself. Sun rays pass through the transparent jar and warm the not-so-transparent feed. The accelerated expansion of direct sun warming can be offset by shading the jar. We use a lunch-bag sized paper sack on our half gallon jars.

A couple other "just in case" recommendations are offered for your consideration. Just in case your Boardman weeps after doing the best you can to avoid it, the following will tend to reduce robbing:

1. Install the feeder on the extreme outside of the landing board – nearest the cluster.

2. Install a solid entry block to a small entry opening at the far side of the landing board.

3. Elevate the side rail on the entry side with shim stock such that the entry is higher than the feeder. With the feeder on the low side where potential overflow can be expected, there is no direct trail of feed to the entry to encourage invasion by the robbers.

A hundred Boardman feeders were ordered to go "all-up" on stimulative feeding. The caps provided with the units all weeped to some extent – some worse than others. The naïve beekeeper, expecting to be sold a functional unit, thought that was normal performance. Using them in the early season, all the potential problems came into play. When we figured it out, it was resolved to someday write it up to keep others from having to endure the hardship. Someday was yesterday.

SUBJECT CHANGE:

Clear the slate; we are starting over on a new subject. This topic is expected to encounter stiff resistance from the "old dogs." "Stimulative" feeding has been a literature mainstay for a long time. Taking the word stimulative at its dictionary meaning, we assume that improving colony growth rate is the objective. That assumption implies that the growth rate is accelerated by feeding the nectar substitute. The implication that the bees are misled into acting on nectar availability, and accelerate brood nest expansion is just another hand-me-down misconception from yesteryear. Keep in mind that my reservations on stimulative feeding are *restricted* to the feeding of syrup or nectar substitute. Feeding pollen or a pollen substitute is

a different discussion, but in some ways relevant. Since I'm not there yet, it's difficult to predict how much of each is likely to be treated.

There are several situations where late winter feeding is beneficial. More severe colony needs could be considered mandatory feeding situations. Those situations are those that help is needed to *sustain* brood nest growth at normal rates. The well-provisioned colony does not need that help. The question being addressed here is whether or not the feeding of nectar substitute actually accelerates brood nest growth (stimulates.) Ok, so I'm a nit-picker. Let's get into it.

A little history might be appropriate. Having tried several other ways to supplement retirement income such as fertile eggs, meat rabbits, and beef cattle, three hives of bees were purchased. It was obvious that the other ventures were not the way to go. Buying feed at retail prices canceled out any potential profit. But the bees feed themselves. That's a big plus.

Spurred on by the first full season (a super year) beekeeping seemed like the way to go. In the second full year, a few swarms were collected to run the hive count up to 10 going into winter. That 3rd winter the T mite penetrated the area and took out 8 of 10. The two survivors, in essence, caused me to start over with a major obstacle to overcome.

T mite effects do the most damage over the winter and into the early build up. It was imperative to become familiar with the build up process. There was not enough time in my schedule to sample mite infestation levels. This meant that judgments would be made on growth rates of the colonies. Written records were not kept at that time, but scrawled outlines of brood volume on the back were maintained on each hive opening with a permanent, felt-tipped marker, and dated. As the season progressed, a record of growth rate was conspicuous before popping the top. Slow developing colonies were inspected in greater detail.

The above background material is included to alert you to the fact that I had pretty good feel for growth rates before trying stimulative feeding. A second motivation for the trial was that medication for Nosema needed investigation. The feed was used as the carrier for the medication. After two full build up seasons of across-the-board stimulative feeding the effort was discontinued. There was no evidence that build up rates were accelerated by the extra work and expense.

Reflecting on the causes for this disappointment, it makes sense when you understand the bees' format for build up. Collectively, the following observations provide ample reasons for the ineffectiveness of feeding syrup to stimulate growth. Be advised that these personal observations have not been blessed by anyone in academic circles. Most of these observations have been mentioned before as they relate to other subjects. This list is considered those that are relevant to build up rates. This list is also oriented to "well provisioned" colonies – those that met requirements for dependable wintering in the fall.

1. The colony can roughly double brood volumes in each successive worker brood cycle. The doubling accounts for the "explosion" in the swarm prep season.

2. Brood nest expansion is limited by at least two factors: The amount of honey consumed by population and brood – freeing up cells for expansion. And the population of adult bees required to maintain brood rearing temperatures. In mid winter the second has the greater impact. In late winter, honey consumption is the controlling factor.

3. Adult bees in early build up are mostly foragers. This permits them to take better advantage of limited foraging opportunities.

4. The primary stimulation for full bore build up is pollen availability in the field. Early season foraging is predominately for pollen and water to thin honey for consumption. The colony in contact with overhead honey has little need for nectar if water is available;

5. The honey bee is greedy. They can't pass up free carbs, even if it is not in their best interest to do so. They will rob out less fortunate cousins when they have no place to store the booty.

6. In the buildup period, the colony wants all cells filled within the cluster perimeter. With the exception of cells of honey being drained in the direction of expansion, filling empty cells with nectar is a high priority.

So what happens to the stimulative feed? I suspect that individual bees are pressed into service as mini storage tankers. We are guessing here because that is not easily confirmed by observation. One thing we are sure of is that they are not going to throw it overboard. If the guess is correct, you are actually doing the colony a disservice. Those tankers are taken out service for the mission of the period – pollen foraging. That could slow expansion. The literature reports that northerly locations sometimes have a brood break in late winter. The colony that has used all the residual fall pollen puts brood rearing on hold pending field pollen availability. If that is true, it would seem reasonable to feed pollen or a substitute to stimulate. Only feed syrup to fill the brood nest. That would help. An internal water source might also be an asset.

If you feel cheated out of a more comprehensive discussion of my opinion, go back and digest the content of the observations. It's all there. Although this was not intended to be a test of your deductive powers, you might come to the same conclusion that stimulative feeding of syrup can be counterproductive. It seems to me that excessive feeding of syrup, when the objective is honey consumption for brood nest expansion, is pushing the colony in the wrong direction.

There is, however, a circumstance where feeding could accelerate expansion. That is the case where an empty deep is reversed in late winter. The bees are not going to expand into the empty deep until nectar is stored there first. If field nectar or flying weather is delayed, expansion is delayed. Feeding at reversal would speed up the process.

The recommendation from here is to take a hard look at stimulative feeding for your area. Keeping in mind that the doubling effect of normal brood nest expansion could mislead you into thinking the feeding is helping. If you get more than double the brood volume in a worker brood cycle, stimulative feeding is an asset for your location.

But you are building increased swarm potential.