

The Traveling Beekeeper



WHAT BEES SHOULD I HAVE?

by LARRY CONNOR
Wicwas Press

1620 Miller Road, Kalamazoo, MI 49001
LJConnor@aol.com • www.wicwas.com

Ways Bees Are Bred

I am writing this from a campground in South-Central Florida, the week after the ABF meeting in Orlando. This is an area south of Lake Placid described by ecologists as 'wet prairie' meaning that when the wet season arrives in the summer, it is quite possible to be standing in water. Think of it as a transition area to the Everglades. Don't walk your little yippy dog too close to the pond where the 'gater feeds. The campground is set up in an oak hammock, with towering water oaks festooned with Spanish moss providing a respite from the hot Florida sun. This month has not been that, quite the opposite actually, with a prolonged cold spell that turned much of the landscape into a shade of brown or grey.

A great horned owl woke me in the night as I slept. Or perhaps it was answering my undirected snore. The sound echoed around the trees and the strong single 'whos' were followed by a more rapid call, answered by another owl, some distance away. There are bears in this area, and panther too. I was lucky enough to see one years ago when I ran the Genetic Systems, Inc., bee breeding program in LaBelle, about 30 miles away, and we had apiary sites just a few miles from here. It was a young male with spotting, and a long, long tail.

The bee-breeding program is the one started by Dadant & Sons, Inc., with Dr. Bud Cale Jr. They produced two breeding stocks, the Starline and Midnite hybrids. In LaBelle we produced two others, the Cale 876 and the Cale 235, both produced by instrumental insemination. That part of the program ended in 1980.

Since Dr. Cale had been trained by Iowa corn geneticists, he used the hybrid corn model as the mechanism for the production of Starline and Midnite bees. A number of

queens were located and developed into lines by crossing closely related queens to drones of the same bloodline. Repeated crossings produced queens that had genetically 'locked-in' certain genetic traits. These queens and their colonies were inbred, but when crossed with other inbred lines via instrumental insemination, the worker bees they produced were hybrid bees, two-line hybrids. The queens grafted from such a queen were also hybrid.

Various two-line hybrid combinations, on both the queen and drone side, were inseminated and the final colonies compared in Illinois for honey production, gentleness, wintering ability, and initially for disease resistance. Later hybrid queens focused mainly on honey production and brood rearing, and the disease resistance was dropped due the abundance of antibiotics for bees. The resulting four-line hybrid bees were very popular as the Starline and Midnite hybrids.

The Dadant and Genetic Systems operations were responsible for developing the breeder queens and releasing them under cooperative agreement with breeder cooperators. These were queen producers and commercial honey producers who could sell or had need for a large number of highly uniform queens. The breeding plan was amazingly simple. On the first year, the queen producer would graft from the two-line breeder queen sent for this purpose. Since the queen in this cross was herself still inbred, she was often kept in a five-frame nucleus or a single deep hive, and frames of brood were added to supplement her reduced egg-laying rate. During the first year all of the colonies in the beekeeper's operation were requeened with the Starline or Midnite daughter queens. These queens pro-

duced pure Starline drones, regardless of the drones they themselves mated with, due to the haploid-diploid mechanism of sex determination in honey bees.

In the second year, a second two-line cross breeder queen was sent to the cooperating beekeeper, still operating under agreement. Since this queen was genetically unrelated to the drones produced in the operation, her daughters were able to mate with a large number of highly productive drones and, in turn, produce a hybrid queen that generated a large hive of hybrid bees.

Bud Cale referred to this program as the 'Criss-Cross' program, since unrelated queens were shipped every year to mate to the drones in the beekeeper's colony. Cale liked to have all beekeepers in the program on the same side of the cross so that only one type of breeder queen was produced that year and available to the breeders. This prevented, in large part, the possibility of genetic inbreeding if one beekeeper 'borrowed' a breeder queen from another Starline or Midnite cooperator.

While I was part of this program we had 13 inbred lines, meaning that some were not used. It cost a lot of money to maintain these lines with their constant need for food, brood, and careful management. A support team was needed for queen production and instrumental insemination.

It was this high cost and the arrival of tracheal and varroa mites that brought the end to the program.

Serious Sideline Symposium V, Orlando, January 2010

As part of this small-scale beekeeper conference, separate from the main speakers at the American Beekeeping Federation meeting in Orlando, we had a review of the Russ-

ian, VSH and Minnesota Hygienic bees. This will help us review the similarities and differences.

Russian bees—Dr. Tom Rinderer traveled to Eastern Russia nearly 20 years ago to bring stock back from that region of the world where *Apis mellifera* was exposed to *Apis cerana* colonies where varroa mites have evolved. Beekeeper and queen breeder Carl Webb discussed the Russian program.

The Russian stock was established as a closed population bee breeding program, where 18 beekeepers are responsible for maintaining one or two of the queen families that make up the program. By a planned rotation of stock exchange, each Russian breeder receives stock from other breeders and uses this as part of their effort to maintain the stock without producing any noticeable level of inbreeding. Selection is essentially completed except for the constant removing of any unacceptable traits, so the stock is in a subtle state of improvement.

Webb said that it is not possible to purchase a breeder queen from any of the 18 breeders. Instead, a beekeeper must purchase production queens from these beekeepers. It was not clear if any of these people are producing queen cells for sale, something that might limit the nature of the final queen without acceptable drones. While this keeps the economic incentive in place for the 18 cooperating beekeepers, it does eliminate the rapid use of the stock by a large number of beekeepers. The only way to get breeding stock is to become another Russian bee breeder. Of course, a beekeeper could graft from a Russian queen and all of her daughter queens would produce pure Russian drones (if the Russian breeders did their job right).

Varroa Sensitive Hygienic (VSH), formerly called the Suppressed Mite Reproduction (SMR)—These bees are still maintained by the Baton Rouge Bee Lab and breeder queens are available for purchase from Tom Glenn Apiaries in California. This has made it possible to purchase VSH stock by simply writing a check, getting the queens, and grafting from them.

The selection program was started by Drs. John Harbo and Jeff Harris about 20 years ago. Dr. Roger Hoopingarner at Michigan State University was involved in the initial part of this program. Nearly 100 survivor queens were identified from around the country and brought to Baton Rouge for testing and evaluation. Several queen families are maintained, as Jeff Harris explained at this program. This means that different breeder types exist and can be used in a criss-cross type bee breeding program, switching from one queen to another every other year.

At first the researchers felt that the bees had the ability to suppress the reproduction of mites, but it has since been shown that these bees are also hygienic. Harris showed an exciting video clip where he introduced a frame of worker brood filled varroa mites into a colony of VSH bees. A bee is seen chewing the capping of the cell, and other

bees remove and tear apart the worker pupae inside. The strain is able to detect cells with reproducing mites and remove them. This reduces the reproductive rate of the mites. Further, when the mite crawled out of the cell, she immediately jumped onto one of the worker bees. That bee reacted strongly to the mite on her body, and may have triggered a grooming response from one of her sisters, implying that a second resistance mechanism is at work in this strain of bees.

Minnesota Hygienic Bees—U of MN scientist Gary Reuter discussed the development and status of the Minnesota Hygienic strain of bees. This is perhaps the best known of these selection efforts due to Reuter and Dr. Marla Spivak discussing them at so many meetings. Now the program has been turned over to beekeepers, as in the Russian model, who are responsible for stock maintenance, testing and propagation.

The program started in 1993 when Spivak and Reuter used bees in the University apiary. These bees were primarily Starline bees, so they represented a good strain of bees. These bees were put through a testing program of using liquid nitrogen to kill a circle of brood in a brood frame. Once warmed to air temperature, the killed brood was returned to the hive and checked at 24 and 48 hrs. Then, the percentage of brood removal was counted. Non-resistant stock had removed little of the brood, but highly resistant stock had removed all of the brood in 24 hrs. With constant selection the entire MN Hygienic stock has over 95% brood removal.

Since the genes in this system are recessive, there must be recessive genes on both sides of the cross. Therefore, like the Starline and Russian program, alternative breeders must be used to prevent inbreeding and to promote high levels of mite removal.

Perhaps key to the Minnesota program is the fact that any beekeeper can duplicate this outcome with his or her bees. A few years of selection for general characteristics in conjunction with the liquid nitrogen (or frozen brood) method of testing will produce a result in a very short time period.


Final thought

This is more work than I want to do on a day marked on my calendar 'South Florida Vacation'. But I think I would like to see several hundred beekeepers try this in 2010:

1. Contact Tom Glenn Apiaries and explain what you want to do. He is probably a bit better at this than I am!
2. In 2010 obtain either a Minnesota or VSH breeder queen and produce daughter queens for your operation, as well as all your neighbor beekeepers. I am becoming more and more an advocate of production of queen cells and virgin queens and you may want to sell some of these in your county/surrounding area.
3. In 2011, obtain either the Minnesota or VSH breeder you did not get in 2010. Produce queens from this queen (or several) and let them mate to the 2010 queen's drones.

4. In 2012, repeat 2010 and you have started a criss-cross program. Dr. Bud Cale would be pleased. And I will want you to get up at a future Sideline Symposium to tell fellow beekeepers what you have done. Deal?

When not slaving at the laptop while on vacation, you can order books from Dr. Connor from his online website www.wicwas.com. That site has a complete list of bee books printed by Wicwas Press. Many of these titles are also available from leading bee supply dealers.

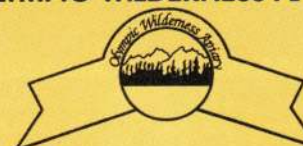


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