

An essay on Queen Rearing Characteristics and Qualities based upon many years of trying to raise good queens.



Introduction

Of all the books written about beekeeping few discuss the topic of raising queens. Of these, a few are standouts such as, *Scientific Queen-Rearing as Practically Applied* by G.M. Doolittle published in 1889 and *Breeding Techniques and Selection for Breeding of the Honeybee* by Friedrich Ruttner.

This short essay is based upon practical experience gained over a long period of time. It serves as a guide line for anyone wanting to start a small business raising queens and if the model is followed, all principles can be followed as the size of the business grows.

Thinking of a business plan is extremely important if one is to expect success. First, technique is a skill to be learned and when mastered can result in predictable results. However, the business must survive on the quality of the product to be sold. If sales do not materialize because the product is less

than being sold by others, customers will seek out the better product. Thus, the selection of mating stock is of prime importance. And that should be the first principle : Produce a good product!

The second principle is to grow slowly – it takes time to develop a loyal customer list and a willingness to seek better grafting stock is extremely important. It also takes time to develop the equipment needed to produce queens. This includes developing hives with drone mother mating yards producing the necessary number of drones required for good mating of queens, cell builder hives and all the other equipment that go into raising queens.

The third principle is to develop the technique to successfully graft and produce queens. I place this last in the manual because anyone can raise queens. Developing a schedule and technique to produce good queens is a skill learned by doing rather than learning. The acquisition of knowledge based on experience is what will separate the want to be's from the individuals who succeeds. One principle without the others is a road map to failure.

I highly recommend either of the books mentioned – they are full of great information. Other queen manuals may fill the needs you have but if you are serious about raising queens, you will want to go to the most outstanding authorities and materials to help guide your thinking.

The commercial production of queen cells requires skill and precise timing of all events leading to well mated queens.

Commercial beekeeping is vital to agriculture

One is addressed by those who rent bees to farmers to provide the necessary pollination services required for crops to set fruit, produce large quantities of honey, and those who provide bees and queens for the beekeeping industry. The other is the hobby beekeeper with a few hives of bees and those somewhere in between called sideline beekeepers. The hobby beekeepers far outnumber commercial beekeepers but not in the total number of hives kept. You will find hobby beekeepers often seeking certification as Master beekeeper – these people by the way do not earn a living from managing bees and often would never survive in the commercial beekeeping world. They rely on the academic world of book learning and scientific research. They would like to tell the world what is right and what is wrong. The problem with this approach is that honey bees can be researched to death in the search for government grant money. Researchers find and search for anything to study (i.e. CCD to seek information which will be helpful to the beekeeping industry). Well-meaning scientist are also living in a world of survival – get grant money or lose funding from educational institutions who can't afford to pay the salaries of highly paid trained professionals unless the grant money is available to support the research they seek to do. I am not trying to say that all research is a waste of money. Varroa mite has been a pest to the honey bee. Colony Collapse Disorder has become a catch word for anything causing the death of honey bees. There is no argument that honey bees are dying in large numbers.

The Two Worlds of Honey Bees

Many factors go into the making of a good hive of bees. It is easy to pick out a hive with a special trait. Many beekeepers share with me that they have a queen they like. Most do. At one time pure races of bees existed in the U.S. The first references to honey bees in the U.S. described a black bee. It was referred to as a German black, Dutch black, or European black bee. It had some valuable characteristics – especially capping honey with nice light attractive cappings on honey when comb honey was mostly produced. But it also had some characteristics that were not so good – aggressive behavior, running on the comb, and queens were very difficult to find.

It was quickly replaced with Italian bees imported in the United States during the mid-1800. First, the Italian was attractive and it was a gentle bee to work with compared to the black bee. In the later 1800's a number of other races of bees were introduced into the United States. I take the liberty to mention just a few of these. My material comes from an essay written by Silas M. Locke called *New Races*. This essay was included in a book written by Henry Alley in 1883. It is my belief that a queen breeder should have an idea of the genetic pool that exists in our bees. The Italian is still around and prominent. Variations of Italian bees exist even today including something called the Cordovan bee that more or less fits the description of the Cyprian bee described below. In fact, queen breeders are trying to isolate bees not by race but by traits especially using terms such as genetic diversity, SMR, Survivor queens etc. In addition several lines of queens are rather distinct and breed to retain those distinctions (Russian and New World Carniolan). Most bee stock in the United States is a hybrid stock – not pure Italian or pure Carniolan. Stock can be kept pure only by artificial insemination. Open mating opens the door to queens mating with many different drones of vast genetic diversity.

Many things were happening to beekeeping from 1853 on in the United States. First, hives were designed to allow beekeeper to finally look inside an active hive of bees. Once frames could be removed from hives and bee books and bee journals promoted the new way to keep bees, the subject of beekeeping exploded. Naturally the subject of queens became more important. The race was on to find a better bee. Frank Benton traveled the world looking at various races and some of these were imported into the United States.

The Italian Bee

Characteristics of the first Italian bees imported into the United States as reported by Silas Locke. Locke referred to them as “superior in every respect to the native bees: they swarmed earlier, were more industrious and better honey gatherers, more gentle and more courageous and active in self-defense and far more beautiful.” I might add that the physical characteristics made it rather easy to identify the Italian bee. I would also add that Italian queens crossed with the native black bees and

before long we had what could be best described as the American Italian bee. By the 1980's – a hundred years later – the native black bee had almost disappeared from the American scene.

The Cyprian Bee

This bee was introduced to the United States from the Cyprus Island by Frank Benton. According to Locke the Cyprian was very similar to the Italian bee. However, it had some distinctive features to identify it. First, the color of the bees was much lighter than the Italian. Lock says, “all pure Cyprians are more or less yellow on the sides and under parts of the abdomen, the tip or point being very black, the yellow part underneath their bodies looking as glossy as though varnished; in fact, when the hive is opened and the rays of the sun penetrate between the combs, the golden hues of the bees reflected back present a sight that is simply beautiful.” Another feature Locke mentions is the wonderfully prolific egg production of the queen “laying almost an incredible number of eggs in a season” and they do not stop breeding as early in the fall after the first frost as do the blacks and Italians, but keep on breeding.” One objective characteristic of the Cyprian bee was the disposition of the bee “easily irritated and revengeful to the last degree.”

The Holy Land Bee

In Locks opinion the Holy Land bee was in many respects similar to the Cyprians. He describes the bee “they are strong, energetic and active and although not as irritable or vindictive as the Cyprians, yet they resent rough or careless handling much sooner than do the Italians. Lock indicates this bee may have been the source of most yellow races of bees – it was found and imported into the United States from the area near Jerusalem and thus the name “Holy Land Bees”. But the characteristics he describes “winter better than Italians, come out better in the spring and do not dwindle so badly; they are fully energetic in defending their stores against robbers and gathering honey as the Cyprians and make a greater effort to obtain honey when there is scarcity, than the other races.” He adds they were a light yellow color “the hair covering the Holy Land workers is lighter than that of the Cyprians or Italians and they have a thicker coat of it. The alternate rings of yellow and black are so divided by the light hair covering, that the bees appear to be beautifully striped, present an entirely different appearance from any of other races when clustered on the comb.”

Hungarian Bees

Imported into the United State late in the 1870's by Henry Alley (according to Locke). Lock describes them as follows “The queens, workers, and drones of this race are quite dark, although the hair covering of the workers was whitish or light gray. They proved unprofitable on account of a great propensity to swarm.... Where increase of stock is desired, this race cannot be excelled.” He seems to dismiss the bee because it was difficult to keep it pure as it crossed with blacks and Italians and

degenerated and soon became nearly similar to the common black bee in color and when crossed with Italians became quite handsomely marked. Evidently the race could not be kept pure and degeneration ended the attempt to breed them. This was in the years before artificial insemination of queen honey bees.

Modern choices

The modern beekeeper is faced with similar choices. In fact, checking a current beekeeping magazine turned up a number of strains that were not identified as Italian or Carniolan. A visit to the web site: <http://www.beesource.com> and a check of forums for specific strains or races of bees will turn up a lot of information usually based upon the opinions of beekeepers on a particular strain or race. Experiences of beekeepers vary and a reader of information posted must weigh the information provided. Not that one would be deceptive but because some races or strains of bees do better in various climate conditions and most reporting on the blogs do not share or report the past experience they have in evaluating queens.

Identification of various races and strains currently being produced in the U.S.

One comment about specialized strains of bees. When artificial insemination is used to develop a line of bees, future generations from open mated daughters of the A.I. queens are disappointing. It takes great effort to maintain quality in a strain over a long period of time. Generally future generations of these open mated daughter queens revert back to the general characteristics of the race in general.

Because it is hard to maintain a line of bees without reverting back to less desirable characteristics certain lines that were once popular are now unavailable. These include such recent strains as Star line, Midnight, Yugo and the term Buckfast means little compared to the bee developed by Brother Adam of Buckfast Abby fame.

Italian *Apis mellifera logistical*

A rather common race of honey bees in the United States. It was introduced into the United States in the mid 1800's and quickly became popular. Its original characteristics are described above. It has become highly hybridized with other races of bees and many strains are now advertised for sale. The breeders selecting queens are looking for special characteristics and the Italian race has a number of identifiable characteristics that make it popular in the southern states in the United States. They generally are golden brown with dark bands (often three) on the abdomen. It is a bee that developed in Italy (thus called Italian) where winters were not harsh. The race in general is gentle. Because of various crosses, some can be very hot (aggressive). The Italian race is also characterized as being very prolific and good honey producers. The race is prone to rob, drift into other hives and swarm. There is great variation in the strains of the various named varieties based on breeder's objectives.

Cordova

The Cordovan bee is one of the most identifiable of the various strains or subsets of the Italian Race but because it technically is a color gene, in theory the Cordovan gene could be identifiable in any breed and is often used as a marker for breeding purposes.

The Cordovan is most likely the most beautiful and gentle bee I have ever raised. I would call it a blonde color looking golden with no distinctive dark marking of the segments of the abdomen. In addition to the color, another very good characteristic is the gentle behavior of the bees (the most gentle of any bee I have ever worked with). However, the major complaint against the strain is the failure of the queen to reduce brood production when periods of dearth occur and the large populations of bees in the colony consume vast amounts of honey stores subjecting the hive to starvation if not fed. *This would be an ideal bee for the beginning beekeeper but survival for this strain in hard northern winters is an issue.*

From Tom Glenn, a noted queen breeder:

<http://www.beesource.com/forums/showthread.php?248293-Cordovan-Bees>

In these times of Africanized bee awareness, known parentage of your bees is more important than in the past. Unlike the ordinary yellow and black bees, cordovan color is controlled by a single recessive gene which will breed true only through controlled breeding, either artificial (instrumental) insemination or isolated mating areas. A quick look at the bees at the entrance will let you know if your cordovan queen has been replaced by swarming or supersedure. If the color of your bees reverts back to the ordinary color, you know the queen has been replaced. Another interesting effect is that you can recognize your bees working in the field, always a satisfying sight.

Minnesota Hygienic Hybrid

The Minnesota Hygienic Hybrid is an Italian strain developed by Dr. Marla Spivak of the University of Minnesota. It was bred to produce a trait showing strong hygienic behavior. Hygienic behavior in bees to remove affected brood within a selected period of time is extremely valuable. This trait is often referred to VSH (Varroa sensitive Hygienic) was identified at the LSU bee lab in Baton Rouge, Louisiana. The bee uncap cells in which they detect disease or Varroa mite damage. A great deal of research has been done with hygienic stock and the work done by Dr. Spivak has been instrumental in developing lines carrying and passing on this trait.

Any bee advertised as VSH supposedly has this trait which improves the ability of the bees to tolerate Varroa mite infections keeping Varroa mite damage to a minimum.

The Minnesota Hygienic Hybrid is a strain of the Italian race and has the characteristics of that race described above. Queens carrying this trait must be bred by drones from VSH stock to produce worker bees that are hygienic. Test can easily made to determine if any hive of bees in hygienic and that will be described later.

Many breeders advertise in bee journals with VHS or reference to Minnesota Hygienic bees. Beekeepers need to realize that some of these are not queen breeders but queen producers who use selected stock of their own choice from VHS stock. Only those who can verify the use of artificial insemination in breeder stock can give assurances of consistency in the queen stock they sell.

Buckfast

The name Buckfast has endured because of the work of Brother Adam of Buckfast Abby in England. He passed away in 1996 and the bee is still available in the United States. But many bees sold as Buckfast have lost the pedigree developed by Brother Adam. Work has continued in Denmark following the guidelines developed by Brother Adam. The original Buckfast was developed by Brother Adam starting with Italian bees and crossing them with many races of bees to find characteristic making the bee resistant to the Isle of Wright of Disease (tracheal mite) and other improvements in the line.

Two strains of Buckfast seem to be available in the U.S. One is of Texas origin and the web page of the company selling the bee describes literature that is old (1982 for example of test and study done on the bee in comparison to other races). It has the appearance of the Italian bee with many of the Italian characteristics. Read the blogs on Buckfast queens sold from Texas to get a true picture of the current Buckfast being sold from that location.

The other source is of registered pedigree breeders selling Buckfast queens. Breeders in Canada and Florida have genuine pedigree breeder queens imported from Denmark and Canada. They are required to follow strict guidelines to upgrade their stock to meet the requirements established by the successors of Brother Adam. It is hard to say the Buckfast is one race or another because it was developed from many races including Italian. Characteristics are: hardiness in a variety of climates, good housekeeping traits, low swarming trait, excellent foraging, gentleness, superior resistance to disease, and overwinters well by reducing brood to conserve stores. They do a good job of surviving Canadian winters.

Caucasian *Apis mellifera caucasica* (Most likely no longer available)

The Caucasian honey bee originates from the high valleys of the Central [Caucasus](#). [Georgia](#) is the “central homeland” for the species, although the bees also can be found in eastern Turkey, Armenia and Azerbaijan according to wikipedia.org.

This bee may be hard to find. At one time it was bred in Alabama and available for purchase. But a check for anyone selling the bees turned up nothing in the google search I made. It lost favor due to slow build up characteristics and diseases such as Nosema nearly wiped them out. In the 1990's I had several colonies with Caucasian queens. They were gentle to work with. I did not notice the excessive build-up of propolis that is one of the characteristics of the race. In appearance it was much like the Carniolan bee but light grey hairs made it distinctive from the Carniolan bee. In comparison on honey production they did not do as well as Italians and died out with the wave of tracheal mite that was a scourge to all bees in the 1990's. I did not replace them. The literature indicates they build up in mid-summer and would be idea for a region with nectar flows in mid-summer which was not the case in Ohio. No one I am aware of invested much effort to breed the bee to diminish the major problem of propolis production and disease resistance. I did like working them because they were very gentle. If anyone knows where pure stock could be purchased, I would appreciate getting the information.

Carniolan *Apis mellifera carnica*

. These are darker brown to black. They fly in slightly cooler weather and in theory are better in northern climates. They are reputed by some to be less productive than Italians, but I have not had that experience. The ones I have had were very productive and very frugal for the winter. They winter in small clusters and shut down brood rearing when there are dearths.

Midnight

These are, sort of, to the Caucasians what the Star line is to the Italians. I'm not certain but I always thought they are a pure hybrid Caucasian. But I've also heard they are a cross of Caucasian and Carniolan. They have that hybrid vigor that disappears in the next generation of queen. York used to sell them and before them Dadant. I don't know where they are available anymore.

Russian

Apis mellifera Caucasia. Not sure of the exact variety here in the US. They came from the Primorksy region. They were used for breeding mite resistance because they were already surviving the mites. They are a bit defensive, but in odd ways. They tend to head butt a lot while not stinging any more. They are watchful guards, but not "runny" (tending to run around on the comb where you can't find the queen or work with them well). Swarminess and productivity are a bit more unpredictable. Traits are not well fixed. Frugality is similar to the Carniolans. They were brought to the USA by the USDA in June of 1997, studied on an island in Louisiana and then field testing in other states in 1999. They went on sale to the general public in 2000.

Buckfast

These are a mixture of bees developed by Brother Adam of Buckfast Abbey. I had them for years. They were gentle. They built up rapidly in the spring, produced awesome crops and dropped back in population in the fall. They are just like the Italians as far as robbing. They are resistant to the tracheal mites. They are more frugal than the Italians, but not as much as the Carniolans.

German or English native bees

Apis mellifera mellifera. These are the bees native to England or Germany. They have some of the characteristics of the other dark bees. They do well in damp cold climates. They tend toward being runny (excitable on the combs) and a bit swarmy, but also seem to be well adapted to Northern climates.

LUS

Small black bees similar to Carniolans or Italians in production and temperament but have mite resistance and have the ability of a laying worker to raise a new queen. This ability is called Thelytoky.

Africanized Honey Bees (AHB)

Looking at Locke's advice for raising queen stock, I find it interesting to note his comment "As a people, we are often too sanguine and are not content to follow the straight and sure but slower path which leads to success". Many modern day queen producers are raising queens and selling them as "mutts". To be successful, a queen producer must also be a queen breeder. There is a difference. Those raising queens should have a goal in sight to improve the stock – not just produce bees to meet the demand for early queens and a quick buck. How much follow up do queen producers make with customers? It is critical to get feedback because it seems that today's modus operandi is once the queen arrives alive, the queen is yours and no longer my problem. Much goes into raising good queens. These will be covered in this manual.

It goes without saying that not all beekeepers will agree with something called a good queen. One reason for this is the region in which we live. Some bees have adapted to colder climates and some have adapted to warmer regions of the U.S.

The environment they live in varies greatly. It is clear that a hive located in the back yard of a beekeeper with little foraging possibilities is going to be different than a similar beekeeper keeping bees several miles away with great foraging possibilities. One may require feeding to survive the coming winter season and the other will provide some surplus honey to the beekeeper as well as

provision their hive with the necessary stores to survive the winter. One beekeeper is happy if the hive survives and the other will most likely face the loss of a hive with Tender Loving Care. The difference is clearly a case of nutrition. Honey bees require a proper natural diet and pollen patties and sugar syrup do not make up for the variety of local pollen and nectar sources. I want to point out that pollen patties and sugar syrup have a place in keeping bees alive but bees build strength and health on a natural diet rather than an artificial diet. Feeding pollen substitutes and sugar syrup supplements the diet of the bee, and does not replace the need for natural food sources.

A beekeeper with the ability to move bees to foraging locations has a superior advantage over the beekeeper with a fixed location. Beekeeping locations are not equal and the amount of foraging will vary from year to year depending on the plants available to the bees. A beekeeper managing bees for a honey crop needs to locate sources of nectar producing plants in an area close to the bee hive location. It is often assumed that bees will fly several miles to gather nectar and pollen. However, in actual practice bees will select nectar sources close to the hive and the further they fly from the hive the energy required to reach the nectar source will reduce the amount of nectar returned to the hive.

The basic is that you have to be able to listen to what your bees tell you. Which bee colonies are giving the result you want? Or are closest to it? If you can discern differences between your bee colonies, you can become, not only a Buckfast breeder, but also a successful bee breeder. Actually it is a necessity.

been produced by a single Buckfast colony. According to Brother Adam, "The average annual honey yield over the last thirty years has been 30 kg (66 lb.) per colony. Thus we have a favourable balance compared with the average production in America or in Europe. "

The stock has been imported into the United States (eggs, semen, and adult queens via Canada) and they are easily available.

A Bee Breeding Program

One can select a number of existing bee improvement programs but one needs to identify the qualities and characteristics in the breeding program. Brother Adam, a leading English queen breeder developed a "Buckfast Queen" using the following qualities. He broke are the characteristics down into three groups.

Primary qualities are those qualities essential for any **maximum honey production**.

- Fecundity - maintaining at least 9 frames of brood May - July
- Foraging zeal - a boundless capacity for foraging work, close inbreeding to intensify this quality can be counterproductive.
- Resistance to disease
- Disinclination to swarm

Secondary

- Longevity
- Wing-power
- Keen sense of smell
- Defensive characteristics
- Hardiness and ability to overwinter
- Spring development
- Thrift
- Instinct of self provisioning
- Arrangement of honey stores
- Wax production and comb building
- Gathering of pollen
- Tongue-reach

Tertiary

- Good temper
- Calm behavior
- Disinclination to [propolize](#)
- No brace combs
- Cleanliness
- Honey capping
- Sense of orientation

Characteristics

Strengths

- Good honey producer
- Prolific queens (lay many eggs)
- Overwinters well
- Frugal - low amount of brood during fall (uses less honey stores during winter)
- Packs brood nest with honey for good wintering
- Curtails egg-laying during dearths
- Brood-rearing ceases during late fall
- Extremely gentle, with low sting instinct
- Low swarm instinct
- High tracheal mite tolerance
- Low incidence of chalkbrood and wax moths due to good housecleaning techniques
- Very hygienic
- Build up rapidly once started

- Produce little propolis/brace comb
- Does well in cold/wet spring

Why have I decided to talk about bee yard location and nutrition? Beekeepers will often judge a queen based on the amount of honey production. Honey production is one criteria used to judge good queens and hives. One must be very careful in selecting good hives over others based on honey production. Selection of queens from different locations must take into consideration the varying amounts of nectar sources available. If I move my bees to a good location, I would expect the bees to produce a good honey crop. It would be unfair to compare that queen with one that gets much less honey in a poor nectar/pollen location.