Chapter 5

Management Manual

If you have read this far you are either interested in honeybees and their welfare, a beginner beekeeper, a ZEST convert or someone with nothing else to read.

To the first I say you are wise to be concerned. There are a lot of beekeepers in a state of forceful denial out there. To the second I say you are the ZEST missions unencumbered target audience. To the third I say I admire your decision to convert in the face of inertia and a natural desire to stay in bed and just hope that the ZEST beehive design analysis will all just go away. To the fourth I suggest joining a book club.

This book is packed with hard won practical, but exciting stuff such as creosoting the ground under the ZEST paving slab foundation to deter vermin using it as a roof to live under and consequentially undermining it. How much excitement do you want? There is more.

A. Establishing a ZEST Colony

Having built your ZEST it needs to have the bees installed.

1. You can simply capture a swarm, tip it in and feed it internally though the closing partition. Conversion from traditional frames is then not an issue. Feed the swarm well internally with a proprietary feed such as Apivert. The bees will draw out wax vertically with ease and enthusiasm, naturally working upside down in a cluster. The bees have many workstation T-bar options.
2. A shook swarm from a traditional hive which has the merit of culling brood, comb diseases and varroa, but which sets back the strength of the colony. I have not tried this, but it will work as well as it does in traditional hives. Not preferred though.
3. The final and preferred option is to follow the guidance in **The ZEST Transition and Management Diagram**. It is designed to move bees on B.S. National frames onto ZEST ones

   It is simple and stress free for bees and their keeper. It requires 2 ZEST plastic vertical queen excluders and 2 partitions. The central ZEST frame area has the queen present and is expanded at the expense of the B.S. frames at each end until in 3 weeks they can be removed without loss of bees or brood. Any honey can be harvested or fed back to the bees.

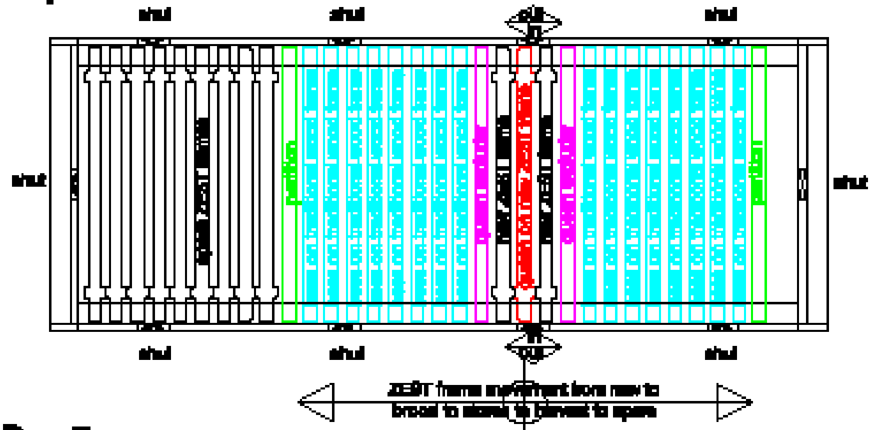
Bees that draw out their own comb (without the dubious benefit and cost of wax foundation) have a slight tendency to draw it out “wild”. This can be remedied with the deployment of 2 correctly drawn down honeycomb frames with a blank frame between them for drawing out. The already drawn comb frames act as templates on either side of the blank frame ensuring that it too is drawn down correctly. Unlike a frame with foundation a blank ZEST frame does not split the brood or the bees. When you have 3 drawn down frames you can then insert 2 blank frames between them and so on.

If you do have unevenly drawn out honeycomb it is best pressed straight as soon as it is spotted, lest other adjoining frames are drawn out the same.

If very uneven move badly drawn out frames behind a queen excluder. The queen cannot then reach them to relay eggs in them. Allow the bees to hatch and the cells to be honey filled.

THE ZEST TRANSITION AND MANAGEMENT DIAGRAMS

Days 0 commencement



Queen or queen cells

Insulation

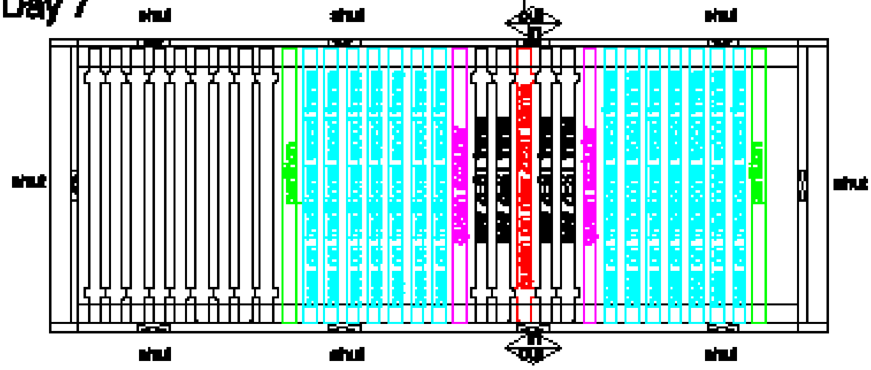
Queen excluders

Partitions

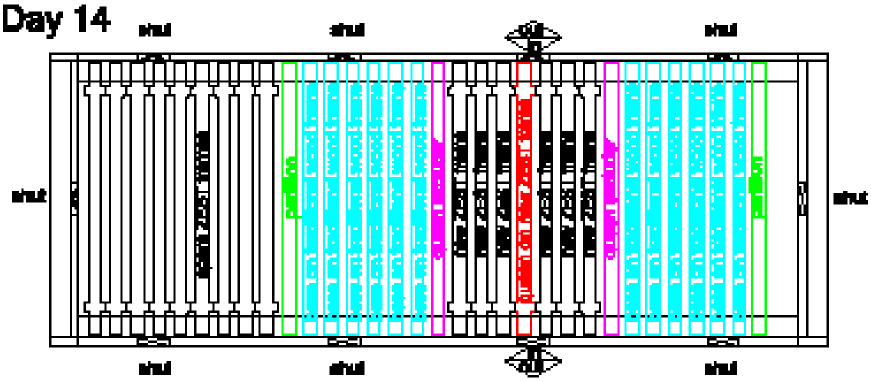
B.S. Wood frames

The Rest

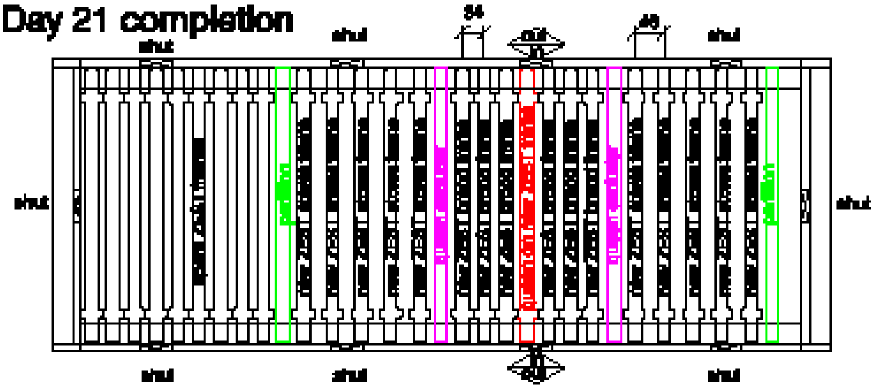
Day 7



Day 14



Day 21 completion



All the usual ways to start a colony in a ZEST hive are available, but the preferred ZEST BEST way is described pictorially and sequentially here. It is without stress.
It allows for the transfer of the queen and bees over 3 weeks without discarding any brood. Shake the drones off of the wood frames before they are installed so they are not shut in and trapped inside.
The brood hatches over time to join the queen on ZEST frames in the ZEST brood centre which expands upon demand as the brood hatches from the wood frames. The queen cannot lay any more eggs in the wood frames as she is excluded from them. Use of the old wood frames is reduced over 3 weeks and are then discarded.
If any stores in wood frames remain they can be put into the frame storage area where they will be robbed by the bees.

Insert new frames into the brood area between 2 frames that are well drawn and will act as guides. Move any frames in the brood area that are mostly honey or are distorted over the queen excluders into the honey areas. If well drawn and not capped deploy the 46mm spacers onto the frames, being the bee preferred spacing for honey storage.

B. Yearly ZEST Management

The basic strategy is to:-

1. **Go through the winter with a colony at each end of the ZEST, each on no more than 6 frames so they can maintain their temperature easily. Many more and the colony may find it difficult to keep warm and varroa free.**
2. **In early February provide a remote feeder so that the bees can fly and collect it when the weather is good enough, but when there is no nectar to gather. Last year's leftover wax, pollen and honey, kept in a sealed container over winter, is perfect.**
3. **Spring clean as soon as weather permits. Remove pollen and granulated honey blocks to the queen laying eggs. Mark her with the year colour that she was born. Cut out drone and irregular comb that was not cleared out in the previous Autumn. Clean floor of debris and inspect it for the information it provides.**
4. **Decide at the spring clean if the 2 colonies need to be united around the best queen just as the honey flow begins. This can be done with a queen excluder and paper sello-taped to the queen less side which the bees chew away to unite the colonies. The best (usually the youngest) queen is selected with the other queen redeployed elsewhere such as into a queen less colony if you have one or to another ZEST bee keeper. The united colonies can become over strong and tending to the spiteful end of the scale for some reason.**
5. **If you do not choose to unite the colonies you have chosen to run them as they are at each end of the ZEST or you can move one to a new ZEST. This does not leave them with enough room for brood and stores over the entire season. You will need to regularly take out any sealed honey, deploying it as a larder ZEST.**
6. **After the longest day, eggs laid do not take part in the honey gathering for that year. If the queen after this time is allowed to lay eggs freely she may over-breed, providing you with a strong colony at years end, but with few stores. They are not usually so stupid, but be prepared to deploy the queen excluders in early July to restrict the queens laying to no more than 6 frames, which are for over wintering. Provide a fully open entrance on each side of the now 6 frame brood nest, but shut it down if predators are around. To prevent robbing allow bee access into the stores area only via the brood nest.**
7. **If you wish to make more colonies do so according to the Queen out breeding section E in this chapter.**

NOTES.

A. When there is a strong honey flow the queen battles to fill cells with eggs while the bees battle to fill them with honey. Insufficient space to do both induces swarming. Provide frame space so both needs are met and the colony does not swarm.

B. On the first warm day of March when the bees are flying or early April carry out the spring clean. Sweep the floor and cut out old pollen if blocking the queen from laying eggs. Move frames that are drawn out nicely with worker

cells so the queen can lay in them. Uncap old sealed stores, if granulated and difficult to access dip it in hot water for a short while so the bees can access and use it to warm up the hive and draw out comb. Remove any defective and excessive drone comb. Many drone brood is a warning that the queen may be failing and will need to be replaced.

If you have a colony at each end of your ZEST hive consider uniting them around the best queen or move frames with sealed brood to balance their strength with other weaker ones.

C. Throughout May, June and July add frames and position the enclosing end partitions to contain the colony so that they are neither too crowded nor have too much space. Crowd them so as to drive them down into the bottom sections of the frames.

D. Shutting down for the winter in about October is probably the most important manipulation you can do, because it determines their condition in the spring. Do not just go away and leave them to their own devices. Leave bee access and ventilation open on each side just enough for bees to pass. Another judgement call. Enough, but not too much ventilation. Bees do not need a lot, but they do like to keep warm above all other criteria. Ensure that they have sufficient accessible stores. Remove drone comb and empty frames. Ensure a sheet of insulation on the roof blocks, under the tin roof sheet and behind the partitions inside.

E. The bees have been proven to be accepting and enthusiastic about drawing out their own comb. If the bees wish to draw comb for brood it tends to be about 35mm.c/c, but for honey about 45mm. Once you have a stock of well organised combs they will then build further ones to match those. When a comb for brood (35mm.c/c.) has been built it can be drawn out further with the deployment of 3#45mm. additional spacers supplied with the frames.

One week's work from empty.

C. Short Term Management

1. **Keep the colony contained**. Deploy insulated partitions to assist the bees to warm up the hive, draw out wax and maintain the brood nest temperature with the assistance in a general way of the beekeeper adjusting the entrances for minimum ventilation. They must not be allowed so much space and ventilation that they will have trouble thermo-regulating the brood nest.
   The volume available to the colony needs to be incrementally enlarged and reduced by the beekeeper to ensure that it is just right for the bee's needs at the time. Neither over crowded nor with too much space. Estimating their space needs in advance is a high art based on experience. Learn quickly or you will slow the bees advance or lose them.
2. **Prevent swarming.** ZEST hives are naturally slow to swarm. The reason for swarming is normally hive congestion which need not occur in a ZEST with simple, almost let alone, management.
   There is a volume available in a ZEST that is the equivalent to 60 B.S. National brood frames. It is best brought into use incrementally and in good time. A good honey flow in warm weather with a strong colony of hatching brood may bring a sudden need for more frames.
   The bees in a ZEST without partitions will tend to fill the top of the frames first and then work down, just as they would naturally. Partitions drive the bees down on the frames ensuring a more compact brood nest.

3. **Maintain a regime of comb renewal**. The tendency to reuse comb is strong with traditional frames due to the cost and effort of its replacement. The ZEST system is designed to be constantly replaced with natural comb as honey is taken. The queen prefers fresh comb to lay eggs in and does so quickly when available.
4. **Deploy the Queen excluders in early July**.
   The use of horizontal excluders in a traditional (vertical) hive is multiply flawed from the bees position, but their use in a ZEST is bee friendly management, having advantages over the B.S. ones such as:-
   The brood and honey can be horizontally separated on a frame by frame basis rather than on a box upon box vertical basis.
   A frame with all or mostly honey can be put outside the brood nest to hatch and then be harvested.
   The movement of frames can be from brood to honey "adjacent" then harvest.
5 **Ensure a healthy winter shut down**. Go to every hive at seasons end in October. It must have sufficient stores, but this is less than in a traditional hive due to a naturally warmer and top trickle vented environment. A ZEST hive uses very little stores during winter, but colonies can die of starvation if surrounded by food that is granulated and inaccessible or mostly pollen. It is better to strip out large areas of pollen, rapeseed and ivy honey and to give back artificial bee feed which will not granulate. The ZEST allows for the avoidance of artificial feeding, but if you do need to feed do so with the in-hive ZEST feeder through the enclosing partition as described in the **Design and Construction Chapter**.
   Your choice, but remember, if you do not ever artificially feed you can take honey at any time of year without fear of it being adulterated. The overwintering colonies at each end of the ZEST needs to be compact with 4/6 frames each, all of which have at least the top two spaces in each frame full of brood and/or stores. There needs to be ventilation, from 2 opposite entry points, but not too much. This should prevent mould in the stored pollen. All entrances can be left open, but sized in winter to reduce cold and damp, the killer of bees. Ensure that the foil backed insulation is deployed against the partitions and that a sheet of insulation is under the tin roof.
6. **Deploy "let alone" beekeeping methods**. Visit them only to add frames and adjust the queen excluders and insulated partitions to suit the colony size and number. Accept that much else is optional. A good spring clean, maintenance and disease inspection is not. Manage further only upon demand revealed by observation.
   Time normally spent beekeeping can be spent on the beach playing Frisbee and preparing for the Olympics. Carrying out a swarm cell inspection on a ZEST every 9 days is time consuming and not its best use. They tend not to swarm so why spend time stopping it?
7. **Balance the colony strengths** Move frames with sealed hatching brood from strong colonies into weaker ones to strengthen them, particularly in the spring. The bees are shaken or brushed off first. Overcrowding is prevented in the stronger colony and the weaker one will make more honey. You will also need

to take nukes from strong colonies to ensure an ordered succession, for sale or gift. See the queen out-breeding section in this chapter for guidance

8. I**mprove the quality of the queens.** This is true of any sort of beekeeping and is important. ZEST colonies seem to be better tempered than others, perhaps because they are not spending nervous energy constantly thermo-regulating the brood nest. ZEST inspections do not take off the roof, break up the house beneath, chill the brood and then put it all back together crushing the bees. The frames in a ZEST are removed one at a time. With the use of a plastic cover sheet under the roof blocks bees need not be crushed when the roof blocks are replaced. Proof of better temper is that a smoker is not needed for a ZEST. Ours were habitually lit, but went out from lack of need.
   A queen rearing program needs to be implemented. The ZEST approach to queen breeding follows in section E below and is different to all others insofar as it is designed to out-breed rather than in-breed.
9. **Reduce bee deaths**. For bee diseases see the book chapter "Objective (The Brief)" for the broad picture. As a species we have a collective desire and interest in increasing colony and bee numbers in our own apiaries and across the planet. Our relationship with honeybees is symbiotic. While this cannot be denied it can be ignored by those who find it inconvenient to their business plan to wipe insects from the planet.
   At an operational level bee deaths can be avoided by:-

a) Using only ZEST hives which are warm and dry rather than cold and damp.
b) Making a frame by frame check for brood diseases in the spring clean and deal with it if found. The ZEST was designed to be functionally free of Nosema and Acarine and it is. It was an unintended consequence of the ZEST design that it is also functionally free of varroa.
c) Observe the bees. Are they taking in pollen? Are some weaker than the others?
d) Deploy wasp/hornet traps during spring when the queens are foraging for themselves.
e) Shut down the already small access and ventilation openings in the ZEST so they are easily guarded.

10. **Make more colonies.** See the Queen rearing section E which combines queen rearing with making nukes. Take nuclei at any time from strong colonies. Make artificial swarms in late spring to overwinter with a colony at each end. The ZEST hive is designed to hold 2 colonies over winter and gives options in the following spring not normally encountered with traditional hives with their large winter losses.
    The winter of 2016/2017 at Hosey Bridge commenced with 19# colonies.
    3# in Paynes poly nukes modified to ZEST design principles,
    3# in wrapped wood nukes on ZEST principles,
    10# in (some) double ended ZEST hives.
    1# on bamboo frames in a ZEST larder hive.
    2# double storey mini-nuke colonies on B.S. frames in a ZEST hive
    In the spring of 2017 the only death was one of the 2 double storey mini nukes.

11. **Relax**. It soon becomes evident that ZEST colonies do not take up much time compared to traditional hives. They are able to incrementally expand. They tend to build from the top down, starting where it is warmer. They then move sideways in both directions and down. They tend to store honey at each end of the brood nest and below it. Adjust to this natural self-management of the bees. The queens have plenty of room to lay eggs and are disinclined to swarm. The division boards are easily moved to accommodate the size of the colony and to make the colony compact, but not over crowded. So, no worries.
12. **Ensure that the roof sheet is strapped down** in a curve over the roof blocks and that the rope used is protected from fraying at the roof edges with short sections of hose pipe.
13. **Adjust the bee entry/vents** to the size needed in the circumstances. Deploy the slide binders or virgin cages at the entrances to restrict access, control ventilation for when it is cold. If the colony is weak or when wasps and hornets are present restrict the openings. Gentle trickle top cross ventilation suitable for the ambient conditions is the ambition.
    It is reasonable to suggest that holes drilled in the walls for bee access are easier to defend, because predators such as wasps or Asian Hornets have to fight their way along it as an army attacking a castle entrance would have to.

D. Comparative Hive Management

Traditional hives have the dubious benefit of being amenable to a split inspection for queen cells. If they become overcrowded such as in a honey flow they can do so very quickly. Most traditional hive owners inspect every nine days. The bees do not enjoy this and become bad tempered.
30% of traditional hives die in the winter according to the BBKA and the BFA surveys. The following season must first be used to make up the number of colonies to replace the die outs.
Feral colonies in London were found to be 3 times less likely to die in winter than in man-made hives of any kind. What does this say of those hives?
Traditional hives are visited by the beekeeper for the following reasons:-

1. Spring clean, disease scan and to spread the brood.
2. Stimulation feed in spring.
3. Weekly inspections to check for swarm cells, spread brood, to add boxes and move honey blocks into supers (if brood boxes are used as supers as well).
4. Assembling mostly capped honey to be taken by employing Porter bee escapes, enticing the bees onto boxes of fresh comb or foundation.
5. Collecting the bee free honey two days later.
6. Returning wet frames to the hive for cleaning up after extraction.
7. Taking shook swarms, artificial swarms and nuclei.
8. Called to site to recover damage or swarms.
9. Feeding for winter.

Some of these operations can be carried out at the same visit, but not on all of the hives at the same time. The logistics of actions on site visits can be compared to a complicated military campaign such as the D-day landings.

The traditional method of extracting honey at a small scale from standard hives is time and energy consuming by radial or tangential spinning of frames after uncapping, which preserves the frame and comb for reuse.
The disadvantages of this honey gathering method are:-

1. It is messy and can lead to a divorce.
2. The frames when reused can transfer disease.
3. The cost of the extractor is high. The local bee keeping association's extractor is always busy being used by a member of the committee when you need it so the tendency is for everyone to buy one. Collectively, that is a small mortgage.
4. Unless the frames are carefully and evenly balanced the machine leaps about the kitchen, breaking the crockery.
5. Granulated honey is not harvested, but fed back to the bees.
6. Three site visits to take honey are needed, to install the Porter bee escapes, to take the honey and finally to return the wet frames to the bees.

The advantage of honey extraction from re-usable comb is that the bee's time and energy is saved by re-using the drawn comb. It is suggested that this allows them to collect more honey, putting it directly into already drawn out honeycomb. The savings in bee time claimed by deploying wax foundation however may be more apparent than real. There is more wax in honeycomb formed on foundation than that made naturally without it. They do not draw out foundation so much as use it as a template to build comb on. They already have a honeycomb in-built template of their own. Why not let them use it?

But this shoulder to the wheel and nose to the grindstone stuff can now all be history. ZEST is a better way.

ZEST hives are generally better tempered, less likely to swarm and unlikely to die from disease in the winter. The ZEST is a comfortable hive for the bees to fulfil their needs, and without a horizontal queen excluder which encourages swarming. Honey can be constantly removed from a ZEST, which can be treated as a larder and which would normally block up the brood space. New or returned empty frames are put back in to keep the bees busy.
The paramount ambition of a ZEST hive is to assist the bees in thermo regulating the brood nest in a warm, dry envelope. Slugs are common in traditional hives, but none have been seen or reported in a ZEST. The ZEST hive design facilitates warm and dry by having a thermal mass, insulation all round with top entry and trickle top ventilation which prevents any draft from the stack effect found in a traditional hive.
The system can be substantially "let alone". The insulated partition boards will need to be moved to ensure a compact brood nest without crowding it, but little else needs to be done. Honey is taken on a frame by frame basis when it is sealed, cutting it into nylon bags in wine tubs for removal and hanging to drain. Preference based on experience has been to brush off the bees and place the honey laden frames in the back of a car away from the bees. Take it away and deal with it later in a bee proof space.
The ZEST hive is a third of the cost than a traditional hive on a honeycomb face area comparison, the labour and time needed is also about a third. At such a low

capital cost migrating bee keeping can be consigned to history and the diseases that are spread by it.
The ZEST management plan varies with the traditional hive in the following way:-

1. They cannot be and do not need to be split inspected.
2. They do not readily make swarm cells that were not induced by blundering or queen failure.
3. The ZEST bees can do what they want and need to in a free and unrestricted manner. This does not seem to include swarming. Why should it?
4. The ZEST is resilient to swarming being roomy and environmentally appropriate to the needs of the bees. They tend to supersede on their own account as they perceive the need.
5. The ZEST hive has proven to be functionally varroa free. The occasional ones may be found, but it will be a lonesome stranger.
6. Just add and take single frames as needed, not a whole box.
7. Place the 2 queen excluders to contain the brood volume as required by the queen, but so that she does not over breed.
8. Insert the queen excluder to reduce the brood volume in early July to about 4/6 frames at one end enclosed with a queen excluder. Move the rest of the frames out of the brood area into the honey “adjacent” to be capped off for harvesting.

The ZEST operating system has the merits of:-

1. The bees survive the winter with fewer stores.
2. Eliminates chemicals, pathogens and pests with the honeycomb removal.
3. Eliminates granulated honey (by melting) and pollen blocks preventing the queen laying eggs in the spring.
4. Each ZEST can have 2 colonies through the winter giving normally unavailable options in the spring.
5. Uniting the 2 overwintered colonies in the spring by redeploying one queen and uniting the 2 colonies around the remaining one. Use a queen excluder with newspaper stuck with sello-tape to one side which is torn down over a day.

The biggest test for the ZEST hive concept in practical use is the tidiness of the comb on the frames. The moveable frame concept is not negotiable, but requires a measure of discipline to ensure good straight comb at the beginning. The method is explained in **Section A Establishing a ZEST Colony.**

However twisted the comb is on plan, the bees will always defer to gravity in the vertical. Comb is always built vertical. The frames always hang vertical on their point supports at each end.

An appropriate ZEST frame design should cause the honeycomb to be:-

1. Drawn down parallel to each other at 35mm apart and not cross from one frame to the next.
2. Drawn down from the lowest point of the diameter of the bamboo frames if deployed
3. Drawn down from the starter strips rather than an edge of the bar if machined wood frames are deployed.
4. Drawn down off the plastic T-bars tails which can be brushed or dipped with hot wax for the bees to recycle it.
5. Not built anywhere other than in a moveable frame.

The ZEST was originally intended to be a hive of minimum provision with just one short central starter strip in a wood frame at three levels. The bees however tended to draw the line of the comb across the thickness of the frame horizontal bars after leaving the discipline of the (one) starter strip. Two strips as a minimum became the standard. Less provision was a saving too far. The bees were less than absolutely delighted to have their frames separated forcefully, but which was easily avoided with the use of 2 wax starter strips for each wood horizontal bar.
Bamboo and plastic do not need starter strips, because the bees will draw the spine of the comb from the lowest point on the horizontal bars of the frame.

ZEST hives do not suffer from varroa. During the 2012/13 season onwards none were seen in any of the colonies and this was finally confirmed at end of 2014 when none could be found in the ZEST hive floor debris. Dave Durrant also carried out the icing sugar test on his 9 ZEST hives. None were found in the 8 strongest ones and a few in his remaining weak one. This infection rate is reversed in strong/weak

traditional hives where the strongest are most infected.

F. The ZEST Queen Outbreeding Method

A simple method to out breed honey bee queens using a bungalow ZEST hives, traditional wood frames and the Cloake Deception System

As well as it being a bee hive design that is suitable for disabled use, the Bungalow ZEST hive is a very simple way to make out-bred queens with the least disruption to their natural instincts.

The ZEST Queen Out Breeding system using Bungalow ZEST hives and the Cloak system is a better system than any other.

We assert that we are currently inbreeding our honeybee queens which if continued for long, is likely to lead to serious harm, not only to the bees themselves, but to the environment upon which we all depend.

The standard commercial bee breeding management system using Jenter cages, sable hair grafting brush and Artificial Insemination equipment is

an assembly of in-breeding devices which reduce the size and quality of the gene pool. They need to be discarded. Some beekeepers use these tools with great skill and are revered as experts in their field. The spectacle of a room full of beekeepers listening in awe while millions of years of honeybee genetic evolution are trashed is a sad one.

It is not such a difficult problem to solve, but it is one that needs to be accepted as such and dealt with in a simple and timely manner. The ambition is for a Queen out-breeding system that can be described in a British Standard Code of Practice. This is not a law, but a form of Guidance for best practise on the “nudge” principle. The problem is mostly one for commercial queen breeders where quantity trumps the quality of a diverse genetic base going forward.

Honeybees have been the long suffering recipient of man’s attentions with thin walled wood hive design, insecticides and the inbreeding of queens. This last issue can be dealt with by a set of protocols that will outbreed rather than inbreed.

The process of selective breeding of crops and animals has served us well since Roman times. To transfer that success into the breeding of honeybees with current methods is likely to lead to in-breeding and the eventual demise of the honeybee species. Queens are increasingly failing without obvious explanation, but the likeliest one that must be considered is in-breeding.

The New Zealand approach to breeding sheep is “letalone” in which the extreme intervention characteristic of sheep husbandry in the UK is spurned, because it compromises the stock’s ability to survive in the long term. For farmed animals bred for our purposes, either method has its merits, but neither is suitable for honeybees. Farmed animals are selectively out-bred as the norm and control is complete over time with barbed wire containment. Bee breeding does not have complete control over time and the norm is for us to in-breed by default. All the queens in an apiary may be sisters and most of the drones born there are their nephews.

Many beekeepers purchase and breed from breeder queens raised by professional breeders in isolated apiaries which are themselves conducive to in-breeding. They may take a “best” mother queen and make (say) 100 daughter queens from her. These daughters are then distributed to local breeders who may make a further 100 granddaughters from each of those daughters. This makes 10,000 grand daughters of minimum genetic variation loose on the planet. The queens are selected for such qualities as temper, brood pattern,

honey gathering and reluctance to swarm, not for genetic diversity.
There is a tendency for all creatures to breed “out” rather than “in”, to achieve hybrid vigour or Heterosis. This strengthens the gene pool, but it is being confounded by us.
The system that honeybees have evolved to perpetrate their species successfully is one that has every queen superseded lineally by its daughter, or at the most by several daughters, if swarming. When we breed from “chosen for qualities” queens in isolated apiaries it is both deeply incestuous and only one step away from cloning on the matrilineal line. This would not be so bad if (as in beef cattle) the end of the “line” was Sunday lunch, but these (almost) clone queens are then allowed to breed in the wild themselves, reinforcing the in-breeding tendency. The genetic pool shrinks whenever selection for our needs takes precedents over the bees for theirs, which is to breed out. Fewer and fewer queen lines produce more and more of the queens on the planet, reducing the size of the gene pool.
A high gene recombination rate of 20 times more in honeybee drones than in humans has so far been on the side of diversity despite humanities best efforts to confound it. There are reasonable grounds to assume that a reduction in genetic diversity will compromise the viability and survival of the honeybee.
Furthermore, professionally reared and sold queen bees are artificially inseminated. These queens generally only last a year whereas 3 years is common when the queen is open mated. Drones are selected for Artificial Insemination by breeders at random, not for the drone’s strength, commitment and chosen by the queen. How can we be sure that the few drones that we milk for sperm with A.I. would have been the queen’s choice? Just because we can catch them does not mean that they are the strongest and best and are not related to the queen, however distant?
The author’s experience of rearing queens from an expensive, imported, breeder queen in 2017 was seminal to understanding that we seem to have an in-breeding problem. 38 queen cells were raised in 4 batches and distributed into mini-nukes for hatching and mating. 2 of these did not hatch. 16 of those that did just disappeared. 5 were seen to have the right rear leg deformed to a stump and one had both of them so. They could not fly and be mated. Those queens that did become mated disappeared when introduced into production colonies. Some of those colonies made their own queens and others did not. The worker bees showed signs of aggression towards the queens.

We have feral colonies that somehow always seem to survive, thrive,

collect lots of honey, but are aggressive. We have an international industry tirelessly churning out queens from a small base that have been selected for qualities such as a quiet temperament, but are always in danger of in-breeding and indeed is a sign of it.

North Carolina State University carried out some research in 2013 that is worth referring to. It concluded that "Genetic diversity is the key to survival of honey bee colonies" and which was published in Science Daily on 17 June 2013. Survival of colonies was said to be strongly related to drone diversity.

It also said that "When it comes to honey bees, more mates is better". This study from North Carolina State University supported by the University of Maryland and the U.S. Department of Agriculture shows that genetic diversity is the key to survival in honey bee colonies -- a colony is less likely to survive if its queen has fewer mates.

With our interference, in-breeding can occur on both the patri and matri lines. If we set aside short term commercial considerations we could defer to the natural selection opportunities available to each bee genus acted out, in the natural state. It has after all been proven over 30 million years.

Evolution is about selection and all 3 bee genus have a role in that. The selection opportunities for the honey bee worker genus to make honeybee queens occur at both the egg and larval stage. They tend to be selected from the most genetically rare (or stranger) "royal" line in the colony. The workers do get another selection opportunity at the sealed larva stage, because several queen cells are made and they break some down.
The selection opportunity for the virgin queen genus is for which drones to mate with and how many. After mating on the wing there is a process of oviduct rejection of about 90% of drone sperm. The criteria are not known at this time. The virgin queens may also be self-selected by combat with the survivor prevailing to take over the hive.
The selection opportunities for mature drone genus are few and the rewards dubious, but the most aggressive and strongest are likely to prevail for access to the mature virgin queen in mating flights.

On day 1 of the queen breeding process leave a queen right colony in the middle of the bungalow taking a split to each end. Each is composed of frames with eggs, sealed brood, stores and plenty of nurse bees. They are far enough away from their queen to be deceived into thinking that they do still have a queen, but she needs replacing. This is the Cloake deception technique in which the queen pheromone available to the bees at each end is only reduced. They make fewer, good supersede queen cells rather than many panic one’s which queen death or removal would cause to be made.

Day 10. When the queen cells are sealed load the frames, with their queen cells into poly-nukes and take to a remote stud apiary to avoid local in-breeding. The queen cells are more likely to be hatched and mated, being completely away from near their mother queens.

Day 30. When the queens are mated and laying in the nuke boxes they can be taken back to their original apiary or elsewhere to be overwintered with a ZEST hive wrap to help to ensure survival. In the following spring they can then be transferred into a full ZEST hive or used in a traditional thin walled wood hive, although this is not recommended.
The queen rearing cycle in a bungalow ZEST can commence on the first day of May, June and July in each year. Each bungalow ZEST can provide over the season 6 mated and laying queens intact with their progeny. The later ones will need feeding to overwinter.

This is all an efficient queen breeding method that is based on a human/honeybee symbiotic relationship that is not exploitive, does **more with less** material, time and effort and does not take production hives out of use. It provides new queens in colonies on demand without the prospect of in-breeding. It gives detailed **positive** selection criteria to the bees, but **negative** matters such as bad temper, disease and low fertility resting with the bee keeper on a cull basis.
Honeybees left to their own devices will select eggs, larvae and pupa to become queens, and drones to become fathers. The strongest and fittest drones only get to mate naturally with the queen, but let us not forget that

breeding females of any species choose their mating partners if they are allowed to. There is a place for us in honeybee breeding as long as it can be described as symbiotic and on behalf of honeybee genetic diversity.

In summary a British Standard Code of Practise needs to include:

1. No more than 6 queens to be bred from any queen.
2. Deploy the Cloake deception system to make 2 nukes of frames comprising stores, eggs, sealed and open brood, and plenty of nurse bees.
3. Cull queens only if failing, diseased or heading a bad tempered colony.
4. Allow the bees to make their own comb. Do not use wax foundation.
5. Do not use Jenter cages, grafting tools, brushes or Artificial Insemination.
6. Take unhatched virgin queen cells and their stock to remote “stud” apiaries.

Such a British standard Code of Practise would go a long way to ensure that our custody of honeybees is at worst supine and at best supportive of honeybees.
In the meantime you may wish to prove that the system works to your own satisfaction. Give it a try. If you have standard wood brood frames with bees on them you just need the insulation blocks to try it.

G. Harvesting

Preparation to Harvest

A typical ZEST hive arrangement in early July.
Prepare to take the honey and get ready for winter.
On the left is a new late spring mated and laying queen in a nuke formed earlier after being allowed to make new queen cells using the Cloake deception method. This nuke, once the queen cells are formed is best taken away to a distant “stud” apiary for mating and then returned. This increases Heterosis or hybrid vigour in the new queen.
Between the (blue) partition in the middle and the (blue) queen excluder on the right the mostly honey frames are assembled in the honey “adjacent” where the brood will hatch out and where the queen cannot then lay in them again. To the right of the queen excluder is the original queen on 4 frames containing most of the eggs and brood. (This eventually becomes the winter colony space). Honey frames can be added in later if required. 4 frames are usually enough to over winter, but security is assured with 6.

A wood ZEST frame shown with 4kgs. of sealed honey.
Bees are brushed off on site with a goose feather and carried away.

Rendering Equipment

Honey and wax is harvested from ZEST hives very simply. Your grandmother would have recognised the mesh bag method. There is no

stainless steel extractors required. The frames of honeycomb are simply crushed and drained down.

The photograph shown above is what you need, from the left, the following:-

A. Double height poly nuke, able to contain and carry away ZEST frames of honey after the bees have been brushed off of them at the hive. Black plastic bags for each frame will also work. A wheel barrow will help as well.

B. 20ltr. wine making bucket that has a honey tap on it and a large coarse nylon mesh strainer bag inside it to receive the cut out and well crushed comb from the carrier poly nuke.

The nylon bag, when full is lifted out of the bucket and attached to an S-hook hanging from a very strong eye fixed securely to a ceiling and be able enough to carry 25kgs. The honey is allowed to drain out of the mesh bag over a couple of days in a warm, bee proof room and back into the bucket from where it can be bottled from the tap. Manipulate the crushed comb in the bag several times until no more honey will run out. If you find the honey is dripping off your elbows your technique needs enhancing, but with practice this will improve.

At this point you have 2 choices.

1. To put the nylon bag contents into a sealed container and feed it incrementally back to the bees in the spring as a stimulation feed.

2. To continue to process the nylon bag contents as follows:-

C. To deal with the remaining nylon bag contents a 2 gallon stainless steel bucket (shown on the right of the picture) is needed into which fits a saucepan that has multiple 10mm holes drilled into the bottom of it. The remaining contents in the nylon strainer bag can be pressed into the short nylon stockings and then tied up at the top. A small saucepan to act as a mould is helpful. These filled stockings are then placed in the saucepan with the holes in it and that in turn is placed inside the stainless steel bucket. This is then all placed in the honey heater and turned on.

D. The honey heater has a heating (incubation) coil in the bottom of it and is thermostatically controlled. How you make this is shown in the Design and Construction Chapter – Accessories and is titled “The ZEST Small Honey Warmer”. To melt the honey in the stockings in the saucepan set the heater at 43C.Deg. Cover it all with a quilt to assist. As it melts into the bucket pour the honey back into your plastic wine bucket with its tap. Then raise the temperature to 63C. Deg., to melt the wax. Pour this out while still hot into a shallow stainless steel bowl where it will cool into a wax cake on a little honey, which may be burnt. Discard the nylon stockings and the dross they contain.

Rules for success include not taking much, if any, uncapped honey. Use a refractor to determine the water content, which must not be above 20%, because it will ferment in the jar.

Honey

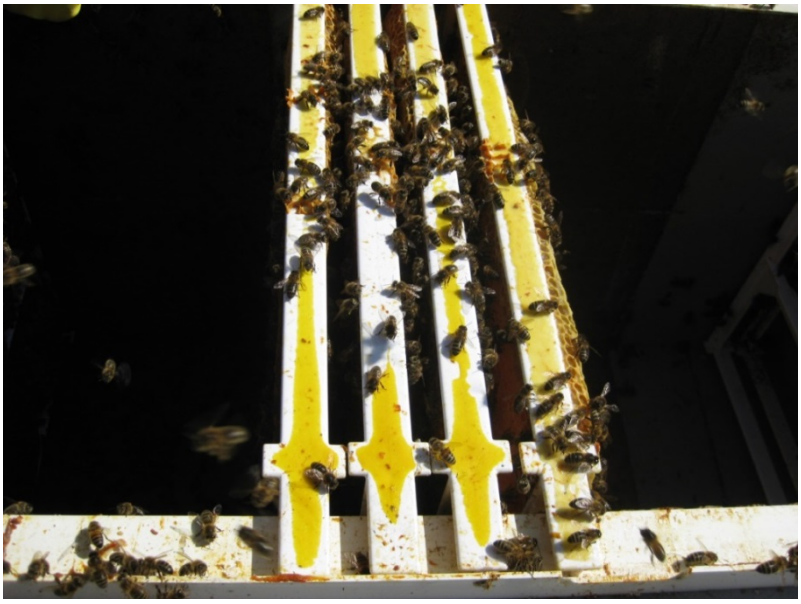
The conventional use of honey is to eat it, praise the gods and pay the dental bills, but it has an external medicinal property as well. It can be used as a poultice that cures the flesh eating disease Necrotising Fasciitis, being a species of Streptococcus untouched by modern medicine. Is this hard to believe? It is easier if you have it. It was on the BBC so it must be true.

Wax

This is produced in abundance by the ZEST hive. The policy of cut-out honeycomb and hang up in a bag does the trick. The wax and pollen remains and the wax melted, cooled, hardened and cleaned can be re-melted so the ZEST frames can be dipped into it to return it back to the bees for recycling back into honeycomb.

This needs a central heating header tank or similar with a slot cut in the top to allow the insertion of the inverted frame deep into the wax. The two top bars of the frames could be wax covered if the wax is deep enough. A second and third dip could be used to increase the thickness of the wax covering. This gives a strong pointer to the bees that the wax is available for redeployment. It uses up the surplus of (heated and sterilised) wax that naturally occurs with ZEST beekeeping. The bees take the wax where it is not needed and deploy it where it is. Much energy is used by the bees to make wax, but very little to redeploy it.

Top bars of plastic frames having been dipped in hot wax.



Wax melted onto top bars of plastic frames being recycled by the bees.

Pollen

The areas of stored pollen can be cut from the comb. About 100grams. at a time can be laid on some sheets of kitchen roll and placed in a microwave for one minute. Ensure that the bees have cleaned all the honey from the comb before putting in the microwave or it will turn it all into a mess. The wax is melted in the microwave and soaked up by the kitchen roll and the pellets released to be collected.

They can then be consumed as pellets (left) or turned back into pollen grains in a coffee grinder (right). It works well on porridge, but has a bitter taste with a sweet background. It has higher protein content than meat by weight and has lots of other goodies in it as well.

In countries where microwave ovens are hard to find the concept remains valid, but with the deployment of a glass covered solar heated bowl acting on the same pollen filled honeycomb on the same kitchen roll.

Pollen is frequently left in the colony over winter which then often goes mouldy, being hydroscopic. Even if it does not go mouldy it is often ignored in the spring by the bees in favour of fresh pollen. Harvesting all

the pollen from frames that do not have brood in them in the autumn seems to meet with the bees natural ambitions for dealing with pollen over time. Taking pollen as the loaded bees enter the hive is unfair, but let us not have qualms about taking it from the honeycomb as pellets during the honey harvesting.

Propolis

This needs to be collected at the spring clean or in a propolis trap made for the purpose. Just because it is free and not made by Big Pharma do not underestimate its value. It is well documented medicine that claims to boost the immune system and to prevent/cure/relieve arthritis, cancers and other maladies and morbidities. Drugs companies have investigated its possibilities. A small percentage part could not be analysed. As it was "discovered" rather than invented it could not be patented. They soon lost interest. Why wreck a billion pound income from arthritis drugs and others that are at best a palliative.

Let ZEST owners collect this bee product and dispense it to ailing friends and family with a daily prophylactic dose. It can do no harm and may do much good. Also try Googling "propolis + cancer" and see the research. Descriptions of its efficacy are persuasive, but there is no mention of it on the Cancer Research UK site despite there being grants made to about 120 research posts across the country. Propolis may be the most best unsung medicine on the planet.

A plastic propolis trap sheet can be deployed in the top of a ZEST partition board. Since the bees cannot get through it they block it up with propolis which can then be collected.


A propolis trap

G. Feeding

There are many reasons and strategies for feeding bees. If asked, the bees would probably see it as our primary and most useful function. This is part of our side of a symbiotic relationship in which we supply food when there is famine in exchange for taking honey when there is a surplus.

A ZEST feeder works shockingly well in autumn with the full strength feed rapidly being taken and stored with only a few dead bees found. This

works less well in the spring to stimulate them, when remote feeding is preferred.

Spring stimulation “remote” feeding can also be deployed in a corner of the apiary from mid-February onwards so all bees can access it. The bees build up their numbers on the feed rather than on the later nectar which can be stored. The feed needs to be half strength so that the bees eat it to warm up the hive rather than storing it. It should be a 50/50 proprietary feed or cane sugar with rainwater added. Honey is worth adding so the bees can find it easier by olfaction, but is not essential.

The feeder is a tub with exposed honeycomb floating on it to which the bees can directly fly. The bees treat it as a very large nectar source at a time when there may be some flying weather, but nothing to fly to.