Bee Smart® DESIGNS

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Pragmatic Beekeeping®

Pragmatic Beekeeping® is the Simply Better way of keeping bees that combines the feature from traditional, scientific, natural, and Darwinian beekeeping, along with IPM and more, including common sense. Since keeping bees in wooden boxes in your yard is the furthest thing from how bees live in the wild, Pragmatic Beekeeping is about finding solutions that mimic nature, apply science and focus on the management of bees, as well as the way beekeepers approach beekeeping. The bottom line is a 'Smarter, Not Harder' approach. One can never forget that beekeeping is all about animal husbandry since the bees are being taken out of their natural environment and put into an artificial one created by people.

The underlying principle of Pragmatic Beekeeping® is the acceptance of the fact that beekeeping is experiencing many changes and needs to stay current with regard to new issues that require new solutions. Maintaining a flexible approach to management and acceptance of the changing world along with new research findings is critical. Following hard and fast rules or relying on anecdotal observations is not a viable or long-term solution. Working harder is not the solution but working smarter is. The focus should be on brains over brawn.

Beekeeping is about the survival and health of the bees under your care and there is no one solution that works for all and there is no one system that has all the answers. In as much as everyone would love to be treatment free and hands off as much as possible, the modern world of beekeeping does not easily allow this and solutions that involve compromise are essential. Pragmatic Beekeeping® is about 'Satisficing'; a decision-making process that aims for a satisfactory or adequate result, rather than an optimal solution; it's a combination of satisfying and sacrificing.

One key to successful beekeeping is proficiency. One needs to learn the basics and create a proven track record before experimenting, and then in steps, on a small portion of hives, to determine what works and what does not work. There is a lot of discussion about minimalist/natural beekeeping and other untested methods, as well as innovative designs that outperform Langstroth hives without solid research to support claims, but these do not make sense for the beginner. After all, if you want to be successful you need to become a beekeeper and not a bee haver.

Another aspect of Pragmatic Beekeeping® revolves around the equipment and treatments you use to manage your colonies. There is no one perfect piece of equipment or treatment but there are approaches that simplify things to make it easier for the beekeeper to manage their colonies for lower losses and increased honey yields. This is tied in with proficiency and staying current with research, not watching You Tube videos from people with questionable backgrounds and/or knowledge, as well as with unproven or unsafe practices.

The following addresses the basic concepts of Pragmatic Beekeeping® and how Bee Smart products are part of the solution to build stronger and healthier hives with lower losses and increased honey yields, while making it easier on the beekeeper. All concepts are based on using traditional Langstroth hives (8-frame, 10-frame, or other frame counts) since these are the most common hives in use and lend themselves perfectly to the pragmatic approach; most other hive designs also benefit from this approach but may be limited by equipment availability.

- **Definition of 'Pragmatic'.**
  - *Dealing with things sensibly and realistically in a way that is based on practical rather than theoretical.*
  - *Practical not Idealistic.*
  - *Solving problems in a way that suits the conditions that really exist now, rather than obeying fixed theories, ideas, rules, and traditions.*
- **Keeping bees in wooden boxes is not natural, regardless of the type of box.**
  - *No matter the type of box (Langstroth, Warre, top bar, etc.) none mimic the conditions in a hollow tree that is the natural home for honey bees.*
  - *Trees have unlimited top insulation, strong side/bottom insulation and thermal mass for very stable nest conditions, temperature, and humidity, while traditional wood boxes offer none of these benefits.*
  - *Feral hives are generally smaller than managed hives, are higher up in trees than hives on stands, have smaller entrances and don't offer any top ventilation or top entrance; they are basically sealed except for the bottom entrance.*
  - *Feral hives tend to have a narrow, vertical, layout since they occupy the center of a hollow tree while managed hives tend to have a wider and more horizontal format.*
- **If you are not taking care of your bees, you are having bees.**
  - *There is a difference between managing your bees for health, colony development and honey instead of having bees and hoping that they survive. Keeping bees is about using all resources at hand to ensure their survival and ability to reproduce; beekeeping is not a passive activity, it requires active involvement.*
  - *Survival of the fittest beekeeping, where hives are left to perish from any type of disease or predator infestation is not responsible animal husbandry. Treating the colony for survival and re-queening makes more sense on every level.*
  - *Not managing colonies and constantly replacing bees in search of no maintenance, survivor colonies is having bees and this is neither sustainable nor ethical.*
  - *Many traditional techniques are based on historical methods, passed down from one generation to another, and don't address current needs or follow actual science and/or research. Just because it worked in the past does not mean it works now. The world has changed, the stresses on the bees have increased and a lot has been learned.*
- **What is Pragmatic Beekeeping®**
  - *The following outlines different aspects of beekeeping and how the pragmatic approach applies. In many cases the approach is simple and in others more complicated as there may be multiple options; some traditional methods are included since they are effective.*
  - *The bottom line is that there are options, and it is up to the beekeeper to decide which ones work best for them from both management and idealogic perspectives.*
  - *The key driving principle of Pragmatic Beekeeping is that there is a better, easier, smarter way since most current and traditional management techniques as practiced are not working well and high unsustainable losses continue. There is little downside risk in adjusting management methods especially on a portion of colonies to compare outcomes; after all, it is hard to think we can do worse than we are doing now.*

Theory

Basic underlying concepts

- **Keeping bees in wooden boxes requires management; survival of the fittest does not work when you are living in an artificial environment-think livestock, fish farms, zoos, etc.**
  - *Anytime an artificial environment is substituted for a natural environment management is required to try to duplicate what has evolved over time through natural selection.*
  - *Evolution takes place on n-dimensional playing fields and takes time; it is fine tuned to its local environment which means that there is no one universal solution.*

- *Reinventing what nature has created is virtually impossible which means we need to follow or mimic what has worked naturally as closely as possible; there are just too many nuances and considerations that we either don't recognize or understand.*

- **Pseudo-Science and anthropomorphizing the bees is destructive and damaging.**
  - *Misinterpreting and misrepresenting science to fulfill a personal agenda or pre-conceived notion, or justifying a behavior is not productive.*
  - *Not following current science and research is destructive and dangerous since it can obfuscate facts and confuse issues.*
  - *Anthropomorphizing or trying to think like a bee is a trip down fantasy row, it makes no sense, especially with our limited understanding of the super organism that is the colony.*
  - *Obtaining, understanding, and maintaining an understanding of basic bee biology is critical to effective management. After all, you can't manage what you don't understand.*

- **Following basic science is the first step in moving forward. Whether biology, earth science, physics, fluid dynamics, etc., decisions should be based on the facts at hand not what we would like them to be.**
  - *Most basic science related to bees is well understood, but more is coming to light continuously which requires actively keeping up.*
  - *The primary challenge is applying this knowledge to the management of bees in a manner that is easy to understand and implement. Management tools are there to be used.*
  - *Knowledge should be our friend and we should relish the fact that these tools are available. We should not be fitting the facts to our beliefs and our understanding should be based on the facts.*

- **Insanity; doing the same thing over and over and expecting a different result.**
  - *This could easily describe a great majority of beekeepers that continue to have high losses but are unwilling to change what they do.*
  - *Keeping an open mind and maintaining a willingness to try new things is the only way to move forward and advance.*
  - *If what you are doing now is not working out then there is very little downside risk in trying something different, even if only as a comparison test. After all, you have nothing to lose and everything to gain.*
  - *Being penny wise and pound foolish can be a financial disaster especially with the high cost of replacement packages/nucs, as well reduced honey yields.*

- **Beekeeping is both an art and a science.**
  - *Working with bees requires skills developed over time and like art is open to interpretation; each beekeeper has handling techniques that work for them.*
  - *Skills are continuously evolving and are easily passed along to help others improve.*
  - *On the other hand, the science of beekeeping is less forgiving since we are working with living creatures that are subject to the laws of nature.*
  - *There are many aspects of mimicking a feral/natural hive and many follow scientific principals; biology, earth science, physics, fluid dynamics to name a few.*

• Pragmatic vs. Traditional and Natural/Survival

- **Traditional beekeeping practices are not practical in the modern world.**
  - *What has worked in the past by trial and error is not a recipe for success in a changing environment of new and novel exposures; specifically pests, pathogens and pesticides.*
  - *Times and conditions continue to change, and management techniques need to keep up. Doing things just because that's the way it has always been done, without a good reason, is a recipe for disaster in a changing world.*
  - *Pathogens, pests and pesticide issues continue to escalate which requires better understanding of how these effect the colony and what can be done to control the consequences.*

- **Traditional beekeeping has not kept up with the science regarding hives and disease.**
  - *The understanding of bees, the advancement of basic science and the development of new materials allows for breakthroughs in how bees are managed. The world continues to evolve, and beekeeping needs to move forward as more information becomes available.*
  - *With the worldwide spread of diseases and pests, what worked in the past will not work now or in the future; new approaches need to be explored.*

- **Traditional beekeeping relies on old, outdated techniques and equipment.**
  - *Change is inevitable and beekeeping needs to be open to new concepts, better understanding of the basic underlying science and the acceptance of new tools and techniques to advance the art.*

- **Treatment free management is not a viable option.**
  - *Survival of the fittest or Darwinian beekeeping is neither a simple or quick solution. It has taken a millennium for bees to evolve to handle pathogens and pests in their localized environments so to assume that they will accomplish this in a few generations is foolish.*
  - *With the global movement of bees, pests, and pathogens (new and old), it is not realistic to assume that bees will evolve resistance quickly especially to foreign pests and pathogens.*
  - *Evolutionary and breeding options are limited and not viable in the near term.*
  - *Just because other species of honey bees (Apis mellifera) have evolved resistance to local pests and pathogens does not mean that these traits are easily transferred between different species.*
  - *Allowing colonies to perish is neither productive nor ethical.*

• Management

- **Bees require management.**
  - *Keeping bees in artificial homes under artificial circumstances requires periodic intervention in the form of inspections and/or intervention for colony health.*
  - *With the influx of pests (varroa, small hive beetles, hornets, etc.) and outside influences like robbing, it is imperative to regularly check on the condition of the colony.*
  - *Testing and treating for varroa is both imperative and essential for the health of the colony and to mitigate transmission to other colonies. How you test is not as important as testing on a regular and consistent way with good record keeping.*
  - *Checking stores and feeding is mandatory in managed hives that are much larger than feral hives, especially when taking honey. Access to supplemental feed is essential. After all, if the bees can't get to it then the quantity or source is irrelevant.*
  - *With so many stressors on the colony, it is critical to keep track of the brood nest since its health is essential for long-term survival of the colony. Although the queen may continue to lay, the nurse bees may not raise the brood if conditions are not optimal so as not to waste resources.*

• Stress (environmental, disease, management)

- **Stress on the colony comes from a myriad of different sources, either singly or in combination that can snowball to create a doomsday scenario; these are separate from pathogens, pests and pesticides.**
  - *Stressors can come from a variety of sources and the additive effects can be detrimental, especially if not controlled or managed in a timely manner.*
  - *Many stressors can be controlled with proper management techniques.*

- **Some common stressors are:**
  - *Beekeepers: inspecting hives too often or too invasively, especially without a plan, creates a multitude of disturbances for the bees that interfere with their normal survival. This includes leaving the hive open too long, mixing up frame positions and orientation, as well as physical shocks.*
  - *Temperature: Thermal equilibrium is especially essential for brood rearing and in a natural hive this is achieved with heavy top insulation and a sealed roof, plus thermal mass, so that the bees can easily control ventilation through the entrance. In a managed colony, this can be obtained with top insulation to reduce heat fluctuations and maintain internal temperature along with sealed inner cover to maintain homeostasis in the colony.*
  - *Humidity: Humidity control is critical for brood rearing and survival, this is achieved by eliminating top ventilation with the use of a closed inner cover and allowing the bees to naturally ventilate through the entrance as needed.*
  - *Robbing: With denser/closer hive placements and larger entrances, managed hives are more prone to robbing and the resulting transmission of mites. Healthy bees picking up mites from weak hives or weak bees with mites spreading them to healthy hives. Fortunately, there are a number solutions starting with reduced entrances and Robbing Screens that are most effective.*

- ## Genetics

- **Bee genetics is complicated and virtually impossible to manipulate over time through multiple generations thanks to polyandry and the haploid/diploid issue.**
  - *Bee genetics is fairly unique in the animal world and has evolved over time to ensure survivability but is not geared for rapid long-term change as there are too many, unrelated, moving parts.*
  - *Polyandry, multiple fathers providing sperm to a single mother, provides genetic diversity in the colony by creating half-sisters for increased survivability when subject to different stressors.*
  - *Haploid/Diploid genetics allow the queen to pass on more of her genes (50%) to future generations, since drones only carry her genetics which are shared when mating with queens from different hives.*
- **Bee genetics does not work with small populations or populations of controlled breeding.**
  - *Small, isolated populations tend to lead to genetic bottle necks and inbreeding, especially when you start with stock from a queen breeder.*
  - *Using commercially bred queens does not ensure diversity of the gene pool, especially when all queens come from the same source since these come from a limited number of breeder queens.*
- **Controlling bee mating is virtually impossible with open mating.**
  - *Open mating and polyandry by its very nature is designed for variability and diversity, which is almost impossible to control; it is what has helped bees survive for millennia.*
  - *Open mating and polyandry ensure genetic diversity and eliminate the ability to control mating unless bees are maintained in an isolated area with controlled genetics.*
- **Natural, non-intervention beekeeping as practiced is a dead-end unless in an isolated population.**
  - *Any attempt to control the genetics of a population kept in captivity, without intervention on any level, cannot work, without isolation.*
  - *Trying to control genetics opens up a Pandora's Box of issues (disease, nutrition, environment, etc.) not faced by populations (managed and/or feral) living in the outside world where genetic diversity insures robustness of the population.*

- ## Homeostasis; (Temperature/Humidity)

- **Bees require homeostasis for colony survival.**
  - *Homeostasis is any self-regulating process by which biological systems tend to maintain stability while adjusting to conditions.*
  - *Insulation and controlled ventilation are critical to maintaining homeostasis in the colony for survival by mitigating temperature and humidity changes.*
- **Bees have evolved living in hollow trees by maintaining homeostasis.**
  - *Bees require a stable and self-controllable environment with regard to temperature and humidity; the hollow tree provides an ideal solution (insulation and thermal mass), and any artificial hive should provide the same features, no more, no less.*
  - *Not providing insulation for temperature control and allowing drafts in the hive are diametrically opposed to how bees survive on their own.*
  - *Not providing a stable draft free environment for controlling temperature and humidity in the brood nest, year-round, is in conflict with how bees survive in trees.*
- **Bees require a nest with stable elevated temperatures and high humidity to raise brood.**
  - *Bees are masters of self-regulation of their nest environment and any man-made hive should factor this into account and eliminate any features not found in a natural nest from a hollow tree.*
  - *Any behavior on the part of the beekeeper that interferes with natural temperature or humidity regulation may be detrimental to the colony.*

- ## Insulation

- **Insulation is essential to minimize heat gain or loss.**
  - *In nature in a hollow tree, there is infinite top insulation and high side insulation along with thermal mass of the trunk to stabilize the interior environment regarding temperature and humidity; both critical to survival.*

- *Bees are sensitive to changes in temperature and humidity and have evolved to survive in a relatively stable environment where they can maintain the optimal environmental nest conditions.*
- *Heat gain in the warm months may cause reduced brood rearing (the queen lays but the nurse bees may not raise the brood), sperm damage (queens and drones) and increased water gathering that may take away from foraging for nectar and pollen.*
- *Heat loss in the winter increases the need for food and reduces the ability of the cluster to move to access food. It can also cause top condensation that can drip onto the cluster causing stress or death.*
- *Swings in temperature in a hive add stress to the colony since the bees are not able to maintain a stable microclimate, especially for raising brood.*
- *Top insulation allows condensation to form on the cold walls, not the warm roof, to prevent dripping on the bees and to provide water for survival; this assumes no top ventilation.*

- **Insulation basics.**
  - *Insulation slows down the transfer of heat. The higher the R-value, the better the insulation and the slower the heat transfer; hot to cold or cold to hot.*
  - *EPS (expanded poly styrene) is a closed cell material that is a highly efficient and affordable insulation material that does not break down or absorb moisture over time which makes it ideal for insulating beehives. This is the same material that white coolers are made of and has minimal outgassing.*
  - *Open cell expanded foams like the pink, blue and green products found in home centers lose their insulation value over time as the gas used to create the foam outgasses resulting in the loss of insulation and exposure in the hive to the gases used; primarily pentane which is a hydro carbon.*
  - *Insulation at the top of the hive is most effective since heat rises inside the hive and heat gain is primarily through the roof; the roof accounts for 60%-70% of heat gain/loss.*

Ventilation

- **Ventilation is essential and best controlled by the bees.**
  - *Mimicking a natural hive that is sealed, without any top ventilation or top entrance, allows the bees to control their environment through the entrance.*
  - *Allowing the bees to control the micro-climate in the nest through self-ventilation insures the correct temperatures and humidity levels for optimal brood rearing and survival.*

- **Top ventilation can have deleterious effects.**
  - *Brood rearing requires a narrow temperature (90°-95°) and humidity (50%-70%) range that when disturbed through open ventilation can cause nurse bees to abandon brood.*
  - *Communication in the nest is through the transmission of pheromones and ventilation may interrupt this by effecting the concentrations of the signals.*
  - *Winter survival requires elevated humidity that is controlled through condensation on the cold walls when the roof is insulated, like in a tree, and ventilation disturbs this balance.*
  - *Adding an upper entrance or vent above the colony creates a draft through the hive that removes heat and moisture during the cool weather.*
  - *Top ventilation makes it more difficult for the winter cluster to move about to access stored honey by eliminating the warm air bubble at the top of the hive provided by top insulation.*

- **Reduced ventilation may help with varroa mite control.**
  - *Increased CO2 concentrations have been shown in some studies to reduce varroa mites in overwintering colonies; this research is ongoing and needs to be followed.*
  - *Increased humidity has been shown in some studies to reduce varroa mites in overwintering colonies; this research is ongoing and needs to be followed.*
  - *Eliminating top ventilation allows for increased CO2 and humidity levels.*

- **Insulation reduces ventilation requirements.**
  - *Insulation reduces heat gain and loss throughout the year to reduce ventilation requirements by maintaining a more consistent temperature range in the colony.*

- **Queens/Drones**

- **Feeding**
- **Supplemental feeding is essential.**
  - *Since taking honey from a hive is not a natural situation, beekeepers need to leave adequate provisions for the bees to survive. Providing food as needed is essential for survival during the Winter and for brood rearing in the Spring.*
  - *Bees in nature consume honey from inside the hive where the temperature and humidity are managed; requiring them to go into a cold box above the colony through a hole in the inner covers eliminates the micro-climate in the nest and is destructive.*
  - *Bees like all living organisms need water to metabolize food and make up for water lost during respiration. Sugar syrup provides both water and carbohydrates for survival as long as it is easy to access directly from the nest.*
  - *Bees do not store dry carbohydrates; fondant, candy boards and dry sugar all require water to dissolve and metabolize making them less readily available and requiring both energy and water to utilize. It also prematurely wears out the bees tongue.*
  - *Nipple style feeders allow easy access to the syrup, maintain the colony microclimate, and can easily be monitored/filled without disturbing the bees.*

- **Treatments**
- **Treatment free management is not a viable option.**
  - *Keeping bees is animal husbandry and it is the responsibility of the beekeeper to maintain the health of their colonies using a combination of management practices, IPM techniques and treatments as needed.*
  - *There are many options for treatment of mites and diseases, with both soft and hard products, along with techniques to improve the genetics of the colony with queen replacement. Letting the hive perish is irresponsible and not ethical, plus it is NOT management.*
- **Options are abundant.**
  - *IPM techniques are a first line of defense to assist the bees in protecting their hives. Options include robbing screens, screened bottom boards for monitoring, drone culling, etc.*
  - *Observation is key for monitoring hive health.*
  - *Testing for mites is essential to track infestation rates and there are many options ranging from simple monitoring of inspection boards and drone brood to formal testing with sugar rolls and alcohol washes.*
  - *Treatment and testing is essential, not an option, when monitoring indicates a problem.*

- **Equipment**
- **Choosing the right equipment.**
  - *Beekeeping is supposed to be an enjoyable hobby and one that is easily done without a lot of physical effort or strain; lifting heavy boxes because that's what has always been done doesn't make sense.*
  - *Choosing the right size boxes and frame is critical in both the short and long term.*
  - *Deciding on a specific size box and frame simplifies your operation, allows easy swapping of equipment and minimizes inventory since everything is interchangeable*.
- **Choose a box size that is manageable and best mimics a feral hive.**
  - *Using 8-frame equipment provides multiple benefits. The boxes are lighter and easier to handle, the colonies are taller, and more closely mimic a tree which has a reduced top surface area for reduced heat gain/loss. Using 10-frame equipment is a good option if you are willing to lift heavier boxes now and in the future.*
  - *Using all 8-frame equipment with medium frames minimizes the equipment needed since all boxes and frames are interchangeable; one size box and one size frame means less inventory and more versatility.*
- **Choose a frame size that is convenient and manageable.**
  - *Using medium frames helps to reduce the weight of the boxes (brood and honey supers) so that they are easily lifted and managed; this becomes more important with more hives.*

- *Using single depth frames allows drawn comb from honey supers to be used to replace old comb in the brood box that is culled allows the queen to lay without delay; it effectively doubles its life. New frames with foundation are easily added to honey supers at the start of the honey flow to be drawn out.*

- **Mites**
- **Testing and treatment are mandatory.**
  - *Mites are here and mites are a reality. Get over it and deal with them in a productive and constructive manner as they are not going away on their own.*
  - *Many treatment options are available, but once your hive tests positive for mites (currently 2-3 per 100 bees with a sugar roll or alcohol wash) timely treatment is essential.*
  - *Testing can be done in a variety of ways. The most important thing is to be consistent and timely.*
  - *IPM methods can help reduce mite loads and some, like robbing screens, reduce transmission, but they are not treatments.*
  - *It's not about the type of treatment you use, it is that you treat and rotate treatments to help mitigate resistance; testing after treatment is essential to insure treatments worked.*

- **IPM; Integrated Pest Management**
- **IPM is a great first step with lots of options.**
  - *Robbing screens are a great way to mitigate the transmission of mites in both the Spring and Fall, especially during times of robbing.*
  - *Screened bottom boards allow monitoring hive activity and can help reduce mites in a small way.*
  - *Drone culling helps to reduce mites by removing the most highly infected drones before the mites emerge with the bees.*
  - *Splitting hives or re-queening at strategic times can help reduce mites.*
  - *Breaking the brood cycle in any way for any amount of time works to reduce mites.*
  - *Understanding the life cycle and growth curves of both mites and bees helps in determining the most critical times to test and treat.*
  - *Understanding the benefits of propolis on hive health is essential.*
  - *Yes, treatment is part of IPM, it takes place after more passive interventions do not work.*

- **Disease** (SHB/mites/nosema)

- **Cool Tools**
- **Tools that make life easier are essential.**
  - *Working smarter, not harder, is a key element of Pragmatic Beekeeping.*
  - *Reducing the strain on your body will allow for years of enjoyment.*
  - *Using tools and techniques that minimize stress on both the beekeeper and the bees is a win/win.*
  - *Utilizing ergonomics reduces stress on both the bees and beekeeper.*

The Bottom Line

- **Management options are varied but essential.**
  - *From a practical perspective, minimal management is preferred and having a variety of techniques and interventions available allows beekeepers to adjust their approach based on how a particular situation develops.*
  - *IPM is a great start, followed by natural remedies and ending with stronger products to control outbreaks with the end goal of not letting the colony perish due to conditions beyond its control.*
- **Beekeeping must be done in a productive and constructive manner.**
  - *The takeaway message is that beekeeping requires thoughtful input from the beekeeper since the bees are not able to fend for themselves when kept in an artificial environment with unique stressors not found in nature. Anything less is irresponsible.*

- **The bottom line or the reality check.**
  - *In as much as everybody would love to keep bees in what they consider ideal conditions and/or management practices, the reality is that this is not possible when you are keeping bees under artificial conditions.*
  - *Compromise is the key to success. There is not one perfect solution, but the first goal is to be able to manage colonies for survival and then try to tweak the system to meet any specific or particular goal.*
  - *Bees have evolved over millions of years and the goal should be to mimic nature as much as possible and not try to mess with success. One primary goal is to minimize stress, primarily environment, heat, and humidity, since wood boxes are poor replacements for hollow trees.*

The Bee Smart System

- ***The Bee Smart System is a collection of Next Generation advanced hive components designed to help mimic a natural hive as close as possible utilizing standard Langstroth hive boxes (8-frame or 10-frame) and frames (shallow, medium and deep). The products can be used in any combination with traditional woodenware used together for maximum effectiveness.***

- Ultimate Hive Cover: this is a White double wall cover that helps to reflect heat and insulate the hive while offering passive ventilation to minimize heat gain.

- Ultimate Insulated Inner Cover: this inner cover offers an R-10 closed cell insulation to provide maximum insulation year-round and mimic a natural nest by eliminating top ventilation so that the bees can maintain their optimal micro climate where condensation forms on the wall where it is available to the bees during the winter and where heat gain is minimized during the summer to help reduce water requirements for cooling.

- Ultimate IPM Bottom Board; this screened bottom board allows for Varroa control with its inspection/sticky board and includes adapters to control the hive opening as needed and prevent mouse intrusion.

- Ultimate Robbing Screen: this robbing screen can be used in the early spring before the nectar flow or in the fall after the nectar flow before the dearth to both prevent robbing and transmission of Varroa between hives in an apiary; they also prevent unwanted drifting.

- Ultimate Hive Stand: this hive stand raises the hive 12” for easier access to the beekeeper and to minimize interactions with predators.

- Ultimate Direct Feeder: this is the only Patented feeder that allows the bees to feed directly from the brood nest non-stop, 24/7, while maintaining the micro-climate of the colony; it can be checked or refilled without disturbing the bees and can function as an emergency feeder, liquid candy board, during the winter.

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