BEEKEEPING Level - II

Learning Guide

Unit of Competence: **Assist in Opening & Reassembling a Beehive**

Module Title:- **Assist in Opening & Reassembling a Beehive**

Learning Guide #1

LG Code: AGR BKG1 M08 LO1-LG-1

TTLM Code: AGR BKG1 TTLM 0919v1

LO1. Prepare to open a beehive

Instruction Sheet	Learning Guide #1

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Identify tools and equipment regarding SOPs.
- Reporting all tools and equipment according to SOPs.
- Asses' nectar availability and plan to minimize risk of robbing and hive stress.
- Minimizing beehive damage and correct manual handling techniques
- Check all Personal Protective Equipment (PPE) are selected
- Identify Occupational Health and Safety (OHS) hazards
- Follow site quarantine/bio security

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to: –**

- Identify tools and equipment regarding SOPs.
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Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.

3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.

4. Accomplish the “Self-check 1” **in page -.**

5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).

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Information sheet 1	Identify tools and equipment regarding SOPs.

1.1. Bee keeping Equipment and their uses

Bee keeping equipment is material used (necessarily important) for bee keeping and also honey production.

Some of the most important bee keeping equipment are: -

1. **Beehive: -** Successful beekeeping means easy manipulation of the frames of brood and honey to provide a surplus of honey beyond that which the bees need to live on and rear their replacements. It is this surplus of honey which the beekeeper removes and marketed for his product.

Components of the Improved (modern) hive

Hive stand ⟶ Bottom Board ⟶ Brood chamber ⟶ Queen Excluder⟶ Extracting or bulk comb supers (may be added as needed) ⟶ Inner Cover Telescoping cover⟶ (outer cover)

Hive stand (function): - is keeping the hive off the damp ground & keeping the cluster and comps drier in winter.

Bottom Board: serves as the floor of the beehive and is supplied with various means of reducing or enlarging the entrance to the hive.

Hive Body (Brood chamber)=Full depth super

The first hive body resting on the bottom board will be the brood chamber where the queen lays the eggs & the baby bees are raised.

Queen Excluder: -if used is placed b/n the brood chamber & the supers.

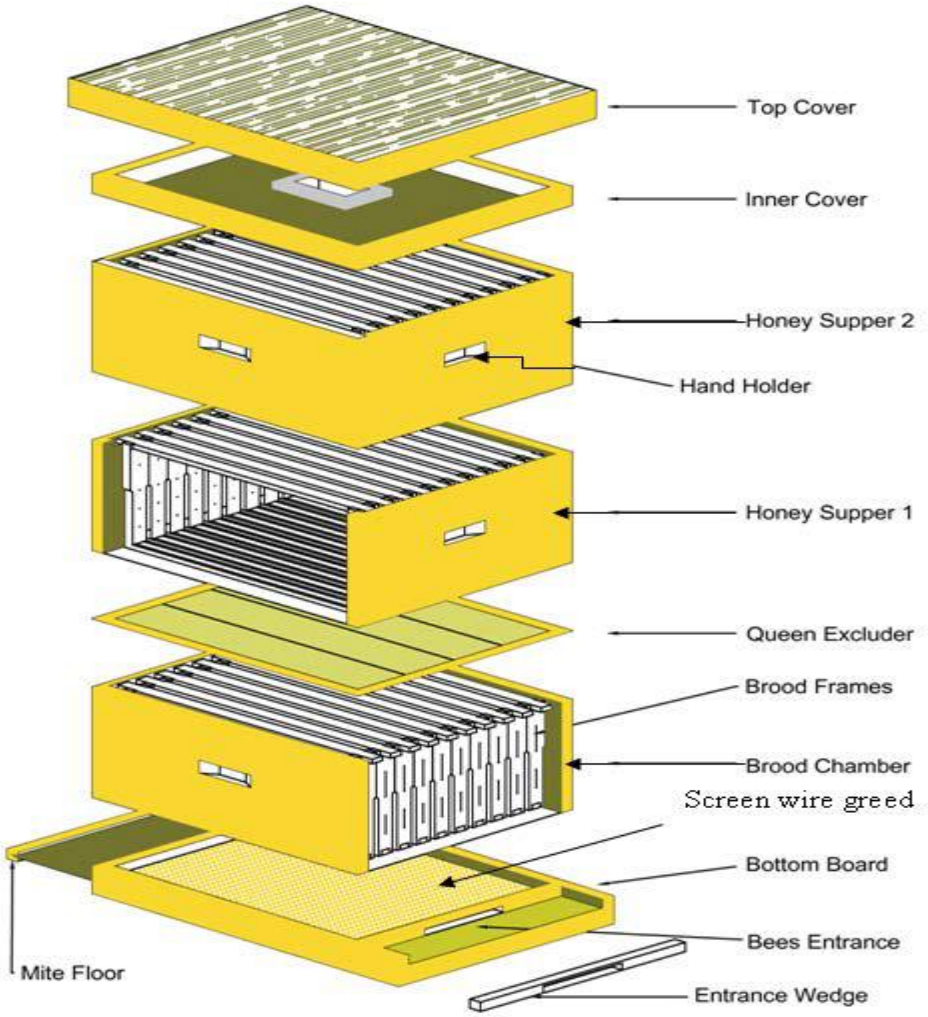
Supers: -are constructed in various depths for different reasons.

Inner Cover: -a rectangular covers & fits B/n the top hive body & the telescoping

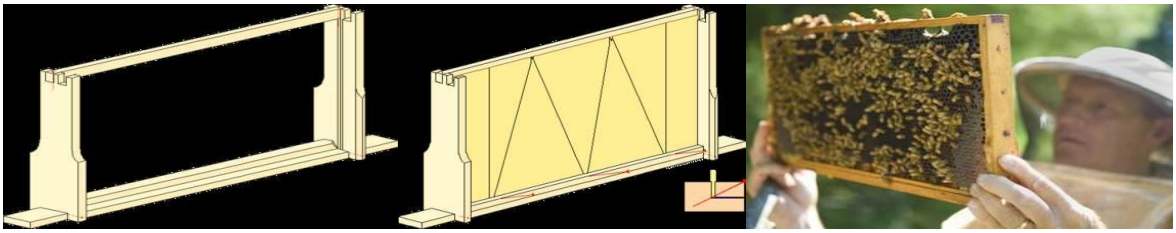
cover or roof of the beehive.

Outer cover -is the roof of the beehive & is supplied in beginner kits.

It is usually metal covering a wooden frame for added protection against the weather and its sides telescope well down over the inner cover &the top super or body for a rainproof fit and extra stabilization in high winds.



2. **Frame wire**- it is used to support the honey comb in the frame



3. **Casting mould**- it is a metal caused with zinc. It is manually operated and used to make artificial comb foundation sheet.

4. **Transformer**-it is of 18-24 volts, it can reduce the 220v down to 18-24v.
   This transformer is used for fixing comb foundation sheets on the frame wires but it is not used in areas where electrification is lacking particularly in most places of rural Ethiopia.

5. **Embedded knifes**- is used as an alternative or hot iron bar to do the same purpose (as of transformer)
6. **Honey extractor (Centrifugal)-** it can be hand drive or electrically operated
7. **Honey presser**- it is used to extract honey be methods of hand pressing of the honey combs which are not framed
   E.g. honeycomb harvested from traditional and Transitional hives.

8. **Uncapping** - fork it is operated manually

   This device is mainly used to decamp the cells, of ripened honey before the framed honey combs are placed in the extractor.

9. **Uncapping knife** - is also used for the same purpose, but it is electrically operated.

10. **Queen excluder** (Separating careen)

    Advisee used to form an appropriate partition between the brood and honey chambers so as to prevent the queen bee and drones from interning in to the honey super.

There are three types of queen excluder based on the materials they are made of.

I. Hard metal

II. Metal sheet Queen Excluder

III. Plastic

11. **Honey storage tank** -This is made of stainless steel with a very tight lid, it has a tap

There are at least two types of them-

The one, which has, get calamity of 50 kg and 30 kg.

12. **Honey jars** (glass or plastic)

Each contains 500 gm.

13. **Chisel** (bee keeper's tool)

It is made up of iron metal and has sharp surface on one end.

It is a hand tool of a beekeeper. One has to use or have in his/her hand before appetizing bee hives.

It is used to open the hive, clean porpoise and other up necessary materials seen in the hive. It can be made locally.

14. **Bee brush**- a soft bristled used to remove bee from a frame combs.

(to draw bees into the hive)

15. **Smoker**- it is manually exported

It sub dues the bees and induces them to feed (engorge), Bees full of honey or other feeds are much easier to handle being.

Aggression is at a minimum while the colonies are disrupted in response to smoke.

It is also believed that the smoke deadens the effect of alarm pheromones produced during the disturbance caused by evening up the hive.

16. **Water Sprayer**

Used to spray water on bees (especially at lo land areas like Gamble) to reduce-

- ✓ Aggressiveness
- ✓ Immediate evacuation from their nest.

17. Honey weighing scale

- ✓ It is used for weighing honey harvested
- ✓ It is used also to keep production records of honey obtained from a hive and/or from an apiary

18. Honey strainer.

- ➢ It is a double course screen
- ➢ It is used in the normal processing of honey freshly extracted from the comb to remove the Bits of wax that flow out of the extractor with honey.
- ➢ All honey as it comes from the extractor and before it goes into bottles (jars) should be run through a strainer to remove sediments and wax cupping.

Information sheet 2	Reporting all tools and equipment according to SOPs.

2.1. Report and record work outcomes and seek feedback

After completing any work directed by supervisor any work outcome and work problem have to be reported to supervisor Beekeeping activity should be reported daily, weekly, monthly and yearly to the concerned body as well as for documentation. It is important source of information and advice from someone who has collected and studied the farm profitability, in order to make decisions and take actions. Reports should be clear, understandable, and meaningful. The outcome measurement process have gone well, poorly reported information will discourage use or provide misleading information.

The following minimum information should be recorded during reporting work problem:

Date month and year------

Name of reporting organization--------

Address

Title of the report

Problems encountered(brief description of the incident)----------
---

Possible solutions (actions) which taken on the work site by different bodies ----------
---

Required support from the institution will listed ----------

Possible copies

- **to ----------**
- **to----------**

Each address

Signature of the investigator

The names of the persons who investigated the incident

2.2. Repair and Clean, maintain and store tools and equipment

Whenever we are going to our work area we have to take our equipment materials and tools safely. And also after completing our task we have to replace them to their place (store) safely without any damage on the equipment and our selves by cleaning and maintaining if necessary. Before starting beekeeping work, clean all tools and equipments Wash both hands thoroughly first and then rinse in an effective antiseptic solution before beekeeping work.

Information sheet 3	Asses' nectar availability and plan to minimize risk of robbing and hive stress.

Information sheet 4	Minimizing beehive damage and correct manual handling techniques

4.1. Assess weather conditions and nectar availability

Honey bee products such as honey, royal jelly, bee wax, bee pollen, bee venom, and propolis hold a special place in the lives of humans. Some of these products are used in the pharmaceutical industry, while some are used as nutrients due to the enzymes they contain. Moreover, some bee products are also used in the cosmetics industry. Therefore, beekeeping has grown into a large industry. Besides this, direct or indirect pollination by insects has important benefits for humans. Honey bees are estimated to be effective in the pollination of 80% of agricultural crops. Honey bees are of vital importance, and the nectar-producing plants they use to produce honey vary from one region to another. Given its geographical location, climate conditions, and vegetation.

With the spring months approaching, the bloom period of plants with nectar and pollen production potential starts. The bloom period varies depending on the plant species, time, and altitude.

Essentially, honey yield varies depending on the condition of the hives as well as certain environmental factors. In a honey bee monitoring project, the winter losses of the monitored honey bee colonies were examined. Varroa destructor was found to play the key role in the losses of colonies among all other factors. Rapidly increasing loss rates were also found in the colonies infested with Varroa destructive.

4.2. Structural Beehive damage

Honeybees buzzing around your property may be a welcome addition for gardeners and naturists. Unfortunately, their beehives can cause significant structural damage to your home if left unchecked. When you hear or see bees gathering in a certain area near your home, it's time to call the bee removal experts for help.

The most common damage caused by bees is not from the bees themselves but from the wax and honey. Honey is a great attractor of other creatures such as small rodents and other insects. Those types of pests will inflict their own kind of damage when trying to get to the hive.

When bees abandon a hive or begin spreading to other areas, the honey left behind is likely to drip and even ferment. Homeowners will first notice a strange smell coming from the area, and then a corresponding stain on the walls or ceilings. That is a sure sign that honey has made its way out of the hive and into your structure.

The waxy substance of a beehive produces its own set of problems as well. In high temperatures, the wax can actually melt. The melted wax will leave a similar stain on walls and ceilings. A hive is much easier to remove when it's intact and not melted into hard to reach areas. For this reason, you should try to determine the extent of the infestation right away.

The larger issue with wax from live and abandoned hives is damage from wax moths. These bugs will take over both abandoned hives and areas of existing hives that are not occupied for their nest. Wax is the perfect safe place for the insects to reproduce. Once the new moths have hatched, they will start to chew and eat through the wood in surrounding structures.

The bee's building activity when creating a new hive may leave behind damage to your home as well. To attach the hive to interior walls and lining, the bees will eat away at the materials that insulate your home. The moisture barrier in the walls can be compromised which will leave you susceptible to water leaks. Dry rot and mold are common side effects of this kind of bee damage.

Despite your like or dislike of bees, their hives can definitely cause structural damage to your home. If bees are present, a safe bee hive extraction is recommended. You can save yourself from costly repairs by being proactive and taking action right away. Don't wait until you have visible damage to check your property for hives.

4.3. Cause of beehive damage

Honey bee colonies are subject to infection or infestation by a range of pests and diseases. These include insects, mites, fungi, viruses, and bacteria, such as the microbes that cause American or European foulbrood (AFB and EFB) (Paenibacillus larvae and Melissococcus plutonius). Honey bees are social insects and are at risk of epidemics, so it is essential that beekeepers not only recognise the signs of such pests and diseases, but also know how to reduce their impact in colonies, apiaries and the locality. A key factor in preventing the spread of infection is good hygiene. The following Fact Sheet provides some advice about when and how you should be cleaning your hives and your equipment.

4.4. Correct manual handling techniques

4.4.1. Preparation and personal safety

General preparation

Emergency plan

All beekeepers should have an emergency plan written out and posted in a convenient location. The emergency plan should include, but not be limited to, physical injury, internal (heart, respiratory, or digestive) condition, and a plan for a sting emergency. Know where the closest medical facility is and map out a route to the facility. Have your cell phone on your person (not in your vehicle or sitting on a hive) and know how to describe the location of your apiary to an emergency service (911) dispatcher. If you are working alone at the apiary, let someone know where you are going and when you expect to be back.

First aid kit

Keep a first aid kit in your vehicle, stocked with antihistamine, pain relief, antiseptics, bandages, gauze pads, etc. Also keep first aid items in the honey house and storage facilities, and clearly label their locations.

Hydration

In hot weather, make sure you hydrate prior to working bees. Once you suit up and have a veil in place, stopping to drink water can be bothersome. Supply your workers and yourself with enough water for frequent breaks and for washing hands after inspections.

Ergonomic safety

When inspecting heavy hives, beekeepers bend, lift, and twist. Bend and lift with your knees, not your back, as much as possible. Avoid lifting and twisting with heavy supers if possible. Consider using a back brace or knee support when inspecting hives. To ease back and knee fatigue, sit or kneel when doing inspections. Simple warm-up exercises prior to bee activities help to keep backs and knees in better shape and muscles toned. Hand strength and dexterity are important.

Equipment safety

Be sure you and your employees or helpers understand the safe operation of honey house and beekeeping management equipment.

- Post safety precautions prominently, and indicate emergency procedures clearly.
- Clearly label emergency shut-offs of power and water.
- Train operators in safety, proper equipment use, and how to keep equipment in top repair. Review annually before use.
- Be careful around electricity (honey is a good conductor), and avoid open flames around beeswax (it has a low fire flash point).
- Keep floors and surfaces reasonably clean of wax and honey to minimize potential falls and to limit attraction of vermin.

- Have a flow plan for movement of full supers — entry to extraction to removal of empty supers — as well as handling of liquid honey and beeswax capping.

Beekeeping tool box.
Photo Credit: Mann Lake Bee Supply

Information sheet 5	Check all Personal Protective Equipment (PPE) are selected

Veil: Always wear a veil, even if you are approaching a hive for simple, quick tasks.

Clothing: Wear clothing that covers all skin. Periodically inspect bee clothing for tears or openings.

Gloves: Wear gloves to protect your hands and wrists to avoid stings. Tight fitting gloves are best because they allow you to move nimbly within the hive and avoid crushing bees.

Footwear: Boots or work shoes are recommended when working with bees to protect your legs and ankles. Tuck coveralls or pants into footwear or close pant legs with strapping to keep crawling bees out.

Body Odor: Scents in perfumes, shampoos, soap residues, cologne, etc. can attract or irritate bees, which are highly sensitive to scents. Do not apply anything with a scent.

Personal protective equipment when handling pesticides or chemicals

Additional PPE is required when handling Varroa mite treatment chemicals and other pest controls. Mite treatments are pesticides, and there is a legal requirement to follow all label instructions. •Before using any chemical, always check or recheck the label to

identify what specific protective clothing or equipment is required and direct employees to do likewise. This includes specific gloves, eye protection, and respirators. •Do not eat or smoke when actively mixing or using treatment chemicals, and keep your hands away from your mouth and face.

Tool safety

Smoker

Always use a smoker to control the bees during an inspection. Don't over smoke (i.e. lightly apply just a few puffs prior to opening the hive, and continue lightly once the hive is opened and the frames are separated). Smoking is not intended to subdue but to change behavior.

Follow these safety precautions:

- Practice fire safety when lighting and using your smoker, especially when dry vegetation might be close to your working area. Some fuel sources, such as fuel pellets, can fall out of the smoker nozzle and ignite dry ground litter.
- Hot smokers can burn clothing or skin. Smokers with wire guards keep heated surfaces away from clothing, skin, and flammable fuels.
- Use a hook to hang the smoker from an open hive, so it is always readily available. Avoid setting a hot smoker on surfaces; the bottom plate of a smoker often gets very hot.
- The hinged top of a smoker needs to fit snugly. Smokers build up creosote, so periodically remove it with a wire brush.

- Close hot smokers with a cork or stopper to conserve unspent fuel for reuse another time.
- When moving between bee yards, enclose the hot smoker in a metal box, such as a surplus army ammunition box or a commercial smoker enclosure device, for safe transport. Don't leave smokers on open truck bodies.
- When emptying a smoker at the end of a day's work, be sure that the fire is completely out and ashes are fully extinguished.

Tool sanitation

Always keep tools clean by removing all of the propolis and wax using a chlorinated scrubbing cleanser. You can also use fire or rubbing alcohol to further sanitize a tool that has been cleaned. Heat the hive tool to a high temperature with a portable torch or by flames in the smoker. Use caution when handling heated hive tools.

Sanitizing hive tool with portable torch.
Photo Credit: Canadian BMPs for Honey Bee Health

Information sheet 6	Identify Occupational Health and Safety (OHS) hazards

6.1. Identifying Occupational Health and Safety (OHS)

The sting

The worker sting is a highly modified for its defensive purpose.

The sting is found in the sting chamber, invisible, last segment. The entire pack of the sting is divided into two regions.

Factors affecting the sting of a worker honey bee

1. Genetic make up Some are highly aggressive Eg. Tropical bees

Some bees are highly gentle/docile/. Eg. European bees

2. Condition of time

- ✓ When there is scarcity of forage or less nectar flow
- ✓ During this time the bees use high venom

3. When the colony becomes queen less during this time they get exited

4. Insecticide poison, mostly organophosphate

Reactions of stings

In human reactions to stings take place on three levels

1. Localized reaction
2. Systematic reaction
3. Anaphylactic

1. Localized reaction

In the first kind of reaction the initial localized swelling is followed by more extensive swelling a few hours later and the affected area may be red, itchy and tender for 2-3days.

2. Systematic reaction

A systematic reaction generally occurs within a few minutes of stinging and it may involve a whole body rash wheezing, nausea, vomiting, abdominal pain and fainting.

3. Anaphylactic reaction

In this reaction symptoms can occur within a seconds, and they include difficulty in

- ✓ Breathing
- ✓ Confusion

- ✓ Vomiting
- ✓ Falling blood pressure that can load to loss of consciousness and death from circulatory and respiratory collapse.

Generally, one can develop some resistance to beestings the more one is stung although the reaction to stings can become shuddery acute for no apparent reason. Those who are extremely sensitive may die from a single sting.

First aid for sting

- ➢ The sting should be removed with a sharp needle or by scraping it away from the side with a knife or fingernail.
- ➢ An ice-cold compress applied after sting has been removed will relieve the pain
- ➢ Anti-histamine;
- ➢ In the form of (1) Ointment (2) Injection
- ➢ Adrenaline injection

In addition to these;

- ❖ Work with bees in the late or in the evening
- ❖ Avoid working bees in rainy, windy time
- ❖ Smoke under the frame and wait two minutes before opening
- ❖ While moving in the apiary, move slowly and quietly
- ❖ Avoid crashing
- ❖ Wash your protecting materials (glove, overall, etc) after three operation times.
- ❖ When bee stings develop into large swelling and rash, medical advice should be sought straight away.
- ❖ Anyone who is acutely allergic to bee sting and knows that unconsciousness may our a few minutes after a sting, must immediately inform someone, so that they may be transported as soon as possible to a doctor or a hospital for emergency injection treatment.

Finally, any beekeeper suffering abnormal aping side effects from bee stings should give up keeping bees.

Information sheet 7	Follow site quarantine/bio security

7.1. Bio security

What is bio security? Bio-security is the protection of livelihoods, lifestyles and the natural environment, all of which could be harmed by the introduction of new pests, or through the impact of pests

Bio-security is a national priority, implemented off-shore, at the border or in an apiary.

What is honey bee bio-security? Honey bee bio-security is a set of measures designed to protect your honey bees from the entry and spread of pests. Honey bee bio-security is the responsibility of every beekeeper and every person visiting or working in an apiary. Implementing honey bee bio-security is essential for your business. If an exotic or endemic pest establishes in an apiary, business costs will increase (for monitoring, hive management, additional chemical use and labour), productivity will decrease (yield and/or colony performance) and markets may be lost. The health of the honey bee industry also ensures the continued success of many other plant industries that rely on honey bees for pollination. Early detection and immediate reporting increases the chance of an effective and efficient eradication.

BEEKEEPING LEVEL II

Learning Guide #2

Unit of Competence: **Assist in Opening & Reassembling a Beehive**

Module Title:- **Assist in Opening & Reassembling a Beehive**

LG Code: **AGR BKG1 M08 LO2-LG-2**

TTLM Code: **AGR BKG1 TTLM 0919v1**

LO1. Open the beehive

Instruction Sheet	Learning Guide #1

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- ❖ Controlling Bees by using smoke according to OHS and SOPs.
- ❖ Care out work, safe *and appropriate position* in relation to beehive.
- ❖ Undertake using of hive tool and queen excluder.
- ❖ Removed frames and supers from dirt

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- ❖ Control Bees by using smoke according to OHS and SOPs.
- ❖ Care out work, safe *and appropriate position* in relation to beehive.
- ❖ Undertake using of hive tool and queen excluder.
- ❖ Remove frames and supers from dirt

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Information sheet 1	Control Bees by using smoke according to OHS and SOPs.

1.1. Bee hive smoke

A **bee smoker** (usually called simply a **smoker**) is a device used in beekeeping to calm honey bees. It is designed to generate smoke from the smoldering of various fuels, hence the name.

Why Do Beekeepers Smoke Their Hives?

When it comes time to do a hive check or harvest honey, a smoker will help calm the bees and protect the beekeeper from stings

1.2. History of bee smoker

Long before the invention of the bee smoker, humans had discovered that smoke calmed bees. It is not clear when this practice started but it has been used in various parts of the world where honey is collected in the wild. A camp fire can be started in near proximity to the nest, a smoldering stick or torch can be brought to the nest. It is still used today in Nepal to collect wild psychotropic honey from cliff colonies.[1]

Moses Quinby invented the modern bee smoker with a bellow attached to a tin burner in 1873 in the Mohawk Valley, New York. When combined with a wooden dowel with a handle on one end and the smoking end of a long thin rod on the other end, a short wooden stick on the end of the stick is used to blow air into the metal bowl. As part of his Quaker upbringing and belief, he did not patent any of his inventions (including the smoker) and therefore gave it to the beekeeping community. Tracy F. Bingham of Farwell, Michigan improved and patented on January 20, 1903 (US Patent # US718689A) an improved smoker based on the design of Quinby.

1.3. Action and usage

The fact that smoke calms bees has been known since ancient times; however, the scientific explanation was unknown until the 20th century and is still not fully understood. Smoke masks alarm pheromones[5] which include various chemicals, e.g., isopentyl acetate that are released by guard bees or bees that are injured during a beekeeper's inspection. The smoke creates an opportunity for the beekeeper to open the beehive and work while the colony's defensive response is interrupted. In addition, smoke initiates a feeding response in anticipation of possible hive abandonment due to fire.

Smoke is of limited use with a swarm, partly because swarms have no honey stores to feed on. It is usually not needed, either, since swarms tend to be less defensive as they have no home to defend, and a fresh swarm will have fed well at the hive it left behind.

There are many modifications to the basic original design. Since the burner can get very hot, a safety guard against burns is often placed into the second, outer can (making the smoker double wall). Alternatively, the burner can be surrounded with a protective wire cage.

1.4. How to Smoke a Hive

The traditional smoker—a metal can with a hole on the bottom, with bellows attached and covered by a cone lid—is the preferred method used by modern beekeepers. To use one, first, you need to start a fire. Fill the smoker with fuel material, such as pet bedding, wood chips or shavings, dead pine needles, or untreated burlap, and light with a grill lighter. Take care not to overfill, adding just enough that it will create a nice smolder.

“Once we get a bit of a fire going, we’ll snuff out the open flame, and stuff more fuel on top of it. “We’ll try to get the cinders burning. You don’t want an open flame in your can because if you hit the bellows, they can become like flamethrowers, and you can melt the wings on the bees.”

Once you’re satisfied with the amount of heat and smoke being produced, return the lid to the smoker. Puff smoke around the hive using the tips below. When the smoker is not in use, keep it in a safe spot where it’s not likely to start a fire. Puff it occasionally to keep the embers burning. Once you’re finished with the smoker, extinguish it completely by dumping the fuel material in water.

1.4.1. Tips for Using a Smoker:

Smoking your hive shouldn’t take more than a few minutes. To get the job done safely and effectively, use these tips from the University of Kentucky.

- Take slow steps as you approach the hive, and avoid sudden motions to reduce your chances of getting stung and to help maintain hive integrity.
- When possible, work your hives when the temperature is above 70 degrees F, anywhere between the middle of the morning and the middle of the afternoon. This is when more bees are likely searching for pollen and not in or around the hive.
- Approach the hive from the rear or sides to stay out of the bees’ flight path.

- Insert the first two or three puffs of smoke at the entrance of the hive to clear out the remaining bees.
- Use smoke in moderation. Too much will cause the bees to eat up more honey or drive them away from the hive.

Understanding how to properly smoke a hive will help make your beekeeping hobby more safe and efficient. And as you know, soon enough, you'll be reaping the sweet benefits.

1.5. The Role of Smoke

One of the main reasons to use smoke when harvesting honey is to interfere with the bees' lines of communication.

That sense of smell is one of the main ways bees communicate. The alarm pheromone bees emit when they feel an imminent threat smells similar to banana oil. The colony is also similarly alerted when a bee stings you, increasing the likelihood you'll get stung repeatedly in the same spot. If you do end up getting stung, make sure to wash your clothing before approaching the hive again, as bees will smell the pheromone left on your clothing on future visits.

Smoking bee colonies also makes bees less likely to sting because they go into survival mode, making you less of a concern to them. "When bees smell smoke on the colonies, it makes them think the hive is going to catch on fire. Their natural reaction to this is to try and save as much honey as they can. If the hive is going to melt, they're going to need to make a new one."

When the smoke enters the hive, the bees begin storing up as much honey in their bodies as possible in preparation to build a new hive—it takes 8 pounds of honey to make a pound of wax, which they'll need in the construction. Once they're full, they're less apt to sting; stinging you will cause them to die, meaning the honey won't make it to their new home.

The disruption caused by the smoke is temporary, so it won't hurt the long-term health of your colony. Once the smoke dissipates, bees recover their pheromone sensitivity within 10 to 20 minutes.

1.5. Operation of a traditional smoker

Many types of fuel can be used in a smoker.[10] These fuels include hessian, burlap, pine needles, corrugated cardboard, paper egg cartons, rotten wood or herbs. Some beekeeping supply sources also sell commercial fuels like pulped paper and compressed cotton. Experiments have shown that smoke from pellets of the dried female hop flower (Humulus lupulus), containing the sedative lupulin, is particularly effective.

The fuel in the smoker's burner smoulders slowly because there is only a small amount of oxygen inside, until a squeeze of the bellows provides a blast of fresh air. In this way the fuel is used more sparingly than in an open pan, and one load of fuel may last for several hours, or even days (if it is extinguished and rekindled again later). To calm the bees, the smoke must not be hot.

Information sheet 2	Care out work, safe and appropriate position in relation to beehive.

Information sheet 3	Open beehive using hive tool and remove components according to workplace procedures

3.1. Inspection of beehives

3.1.1. Getting Ready to Inspect

Inspect your beehive on a regular basis—but not too often. For beginners, every seven to 10 days during spring and summer is a good range. Inspecting more than weekly will make your bees unhappy. Every inspection disrupts their hive activity and sets them back a day.

To get ready for an inspection, don your bee suit or jacket and veil. Gather your smoker and hive tool. If you will be refilling feeders during the inspection, have them ready to refill. Light the smoker and wait for it to pump out nice, cool smoke for the bees.

3.1.2. Open the Hive

Smoke in front of the hive, by the entrance, to confuse the guard bees. Lift the outer cover slightly and direct a few puffs of smoke underneath it. Let the cover back down gently and wait for one to two minutes for the smoke to take effect. People often say smoke "calms" the bees, but what it really does is give them the signal that there is a fire nearby, which makes them gorge on honey. When they're gorging on honey, they're not worrying about the big, white-suited animal that is messing with them. When you see their little heads line up at the top bars, looking at you, it's time for more smoke.

3.1.3. Remove the Outer Cover

Remove the outer cover and carefully set it on the ground upside down. Direct some smoke into the hole in the inner cover, if you have one. Wait a minute or two for the bees to get the message

3.1.4. Remove the Inner Cover

Use your hive tool to gently pry up the inner cover and remove it. If there is wax or propolis on the inner cover, use your hive tool to scrape it off. Set the inner cover on top of the outer cover on the ground, being careful not to smash any bees.

3.1.5. Remove the Super

Pry up the honey super (if your hive has one) using your hive tool. Lift off the super and set it on top of the inner cover.

3.1.6. Smoke the Deep Hive Box

Gently puff smoke into the second hive box, or second deep, if you have one. If you have three medium boxes instead of two deeps, you'll just repeat this twice until you get to the bottom box. You will start your inspection with the bottom box.

3.1.7. Remove the Second Deep

Remove the second deep and place it gently on top of the super or inner cover. You will inspect this box it later.

3.1.8. Remove the First Frame

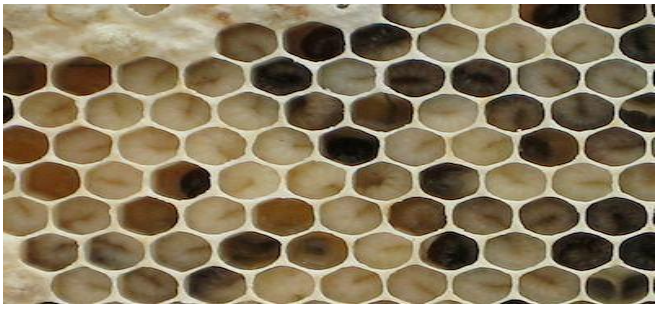
Direct smoke in between the frames in the bottom deep hive box. Remove the first frame and set it either in a frame holder or gently on top of the other hive boxes or the inner cover, taking care not to smash any bees.

3.1.9. Inspect the Frames

Carefully pry each frame free using your hive tool, then lift up the frame and inspect it:

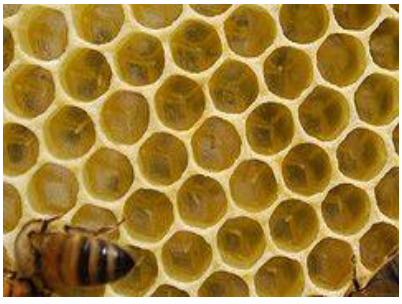
- Try to identify the queen. This is easier if she's marked, but it's still possible if she isn't. Look for her long, slender, unstriped abdomen and for a circle of workers around her. If you can't find the queen, it's important to find eggs, which indicate the queen was there in the past one to three days.
- Check for any parasites or pests—mites, wax moth larvae, foulbrood, etc.
- Determine how many frames are drawn out. When seven of 10 frames are drawn in the bottom deep, it's time to add the second one. When seven of 10 are drawn in the second deep, add a honey super. If the honey super is close to full, add another one.

3.1.10. Check for Larvae



Part of inspecting the frames is looking for brood capped and uncapped larvae and eggs. Shown here is a beautiful pattern of developing, uncapped larvae; this is what you're looking for in your bee hive inspection.

3.1.11. Look for Eggs



Identifying eggs is the most important part of the beehive inspection for the new beekeeper, but they can be difficult for beginners to find. Eggs look like thin grains of rice. There should be one per cell, laid in the middle of it. If you have more than one per cell, you have laying workers—consult an experienced beekeeper about this situation.

The best way to see eggs is to hold the frame tilted up toward the sky at about a 30-degree angle, with the bright sun shining over your shoulder. Hold it slightly to the side of you so that the shadow pattern of mesh from your veil doesn't obscure the eggs.

Using reading glasses or a magnifying glass can also help. You can tilt the frame back and forth and experiment with the angle of the sun and the frame until you see them. The bottom center of the frame is usually the best place to positively identify eggs.

3.1.12. Replace the Frames

As you inspect each frame, put it into the open space left by the first frame you removed. Push each frame up against the one in front of it as you replace it—gently! You don't want to squish any bees. Using a bee brush or smoke helps move the bees out of the way, especially at the frame ears where they are likely to get squished.

Inspect the frames in order, and don't change the order of the frames during inspection. When you get to the final frame, push the whole set of frames together, using your hive tool, as one single unit, making space in the front for the first frame. Replace the first frame, then use your hive tool to even up the space on either side of the first and last frames so that the set of frames is centered in the box.

Replace the second hive box and inspect its frames, as with the bottom box. Then, replace the super if you have one. Use the bulldozer method: Start with the box on the back edge of the hive, sliding it forward slowly so as not to squish any bees. You can use the smoker or bee brush to gently move the bees out of the way, especially at the end when you are almost done sliding the box on.

3.1.13. Replace the Inner Cover

Slide on the inner cover using the bulldozer method: Start at one end and slowly slide the cover across the box. Use the smoker or bee brush to move bees out of the way as needed.

3.1.14. Replace the Outer Cover

Gently replace the outer cover on the hive. Finally, record your observations in your bee notebook or journal. Do this right away because it's too easy to forget the exact date and the details of the inspection. Remove your suit, and put away your smoker where it can burn out safely.

Information sheet 4	Removed frames and supers from dirt

4.1. Super beehives/ honey super

A **honey super** is a part of a commercial or other managed (such as by a hobbyist) beehive that is used to collect honey. The most common variety is the "Illinois" or "medium" super with a depth of 6⅝ inches, in the length and width dimensions of a Langstroth hive.

A honey super consists of a box in which 8–10 frames are hung. Western honeybees collect nectar and store the processed nectar in honeycomb, which they build on the frames. When the honeycomb is full, the bees will reduce the moisture content of the honey to 17-18% moisture content before capping the comb with beeswax.

Beekeepers will take the full honey supers and extract the honey. Periods when there is an abundant nectar source available and bees are quickly bringing back the nectar, are called a honey flow. During a honey flow, beekeepers may put several honey supers onto a hive so the bees have enough storage space.

Honey supers are removed in the fall when the honey is extracted, and before the hive is winterized, but enough honey is left for the bees to consume during winter.

4.2. Closing the hive

Now the hive must be closed. Using occasional puff of smoke to control the bees carefully replace the frames in their respective places in the hive. Make sure that during this operation the queen is not injured and the bees are not squashed.
Replace the super. Smoke the bees on the top of the frame of the brood chamber driving them down wards, and then brush off any bees from the bottom of the super. Starting from the back with a steady pressure slowly slide the super onto the brood chamber till the outer edge of the brood chamber and the inner edge of the super are just about to touching.

Next the inner cover must be replaced. Shake off all adhering bees in front of the hive and then scrape the inner cover clean of burr comb and propolis. It can now be replaced in the same way as the supper. Finally the outer cover is replaced.

Precautions

Squashed bees give off an odor, which is essentially the same as that of bees sting. This odor alerts bees making them more likely to sting. So try to avoid squashing during all operations and thus reduce stinging.

BEEKEEPING LEVEL II

Learning Guide #3

Unit of Competence: Assist in Opening & Reassembling a Beehive

Module Title:- Assist in Opening & Reassembling a Beehive

LG Code: AGR BKG1 M08 LO3-LG-3

TTLM Code: AGR BKG1 TTLM 0919v1

LO3. Reassemble the beehive

Instruction Sheet	Learning Guide #3

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- Controlling bees by using smokes and water according to OHS
- Placing brood frames in to hive
- Replacing appropriate boxes for queen rearing
- Replacing beehive lid and use hive fastener
- Considering time for brood out of hive

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to: –**

- Control bees by using smokes and water according to OHS
- Place brood frames in to hive
- Replace appropriate boxes for queen rearing
- Replace beehive lid and use hive fastener
- Consider time for brood out of hive

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described in number 3 to 20.
3. Read the information written in the “Information Sheets 1”. Try to understand what are being discussed. Ask you teacher for assistance if you have hard time understanding them.
4. Accomplish the “Self-check 1” **in page -.**

5. Ask from your teacher the key to correction (key answers) or you can request your teacher to correct your work. (You are to get the key answer only after you finished answering the Self-check 1).

6. If you earned a satisfactory evaluation proceed to “Information Sheet 2”. However, if your rating is unsatisfactory, see your teacher for further instructions or go back to Learning Activity #1.

7. Submit your accomplished Self-check. This will form part of your training portfolio

Information sheet 1	Control Bees by using smoke according to OHS and SOPs.

1.1. Bee hive smoke

A **bee smoker** (usually called simply a **smoker**) is a device used in beekeeping to calm honey bees. It is designed to generate smoke from the smoldering of various fuels, hence the name.

Why Do Beekeepers Smoke Their Hives?

When it comes time to do a hive check or harvest honey, a smoker will help calm the bees and protect the beekeeper from stings

1.2. History of bee smoker

Long before the invention of the bee smoker, humans had discovered that smoke calmed bees. It is not clear when this practice started but it has been used in various parts of the world where honey is collected in the wild. A camp fire can be started in near proximity to the nest, a smoldering stick or torch can be brought to the nest. It is still used today in Nepal to collect wild psychotropic honey from cliff colonies.[1]

Moses Quinby invented the modern bee smoker with a bellow attached to a tin burner in 1873 in the Mohawk Valley, New York. When combined with a wooden dowel with a handle on one end and the smoking end of a long thin rod on the other end, a short wooden stick on the end of the stick is used to blow air into the metal bowl. As part of his Quaker upbringing and belief, he did not patent any of his inventions (including the smoker) and therefore gave it to the beekeeping community. Tracy F. Bingham of Farwell, Michigan improved and patented on January 20, 1903 (US Patent # US718689A) an improved smoker based on the design of Quinby.

1.3. Action and usage

The fact that smoke calms bees has been known since ancient times; however, the scientific explanation was unknown until the 20th century and is still not fully understood. Smoke masks alarm pheromones[5] which include various chemicals, e.g., isopentyl acetate that are released by guard bees or bees that are injured during a beekeeper's inspection. The smoke creates an opportunity for the beekeeper to open the beehive and work while the colony's defensive response is interrupted. In addition, smoke initiates a feeding response in anticipation of possible hive abandonment due to fire.

Smoke is of limited use with a swarm, partly because swarms have no honey stores to feed on. It is usually not needed, either, since swarms tend to be less defensive as they have no home to defend, and a fresh swarm will have fed well at the hive it left behind.

There are many modifications to the basic original design. Since the burner can get very hot, a safety guard against burns is often placed into the second, outer can (making the smoker double wall). Alternatively, the burner can be surrounded with a protective wire cage.

1.4. How to Smoke a Hive

The traditional smoker—a metal can with a hole on the bottom, with bellows attached and covered by a cone lid—is the preferred method used by modern beekeepers. To use one, first, you need to start a fire. Fill the smoker with fuel material, such as pet bedding, wood chips or shavings, dead pine needles, or untreated burlap, and light with a grill lighter. Take care not to overfill, adding just enough that it will create a nice smolder.

“Once we get a bit of a fire going, we’ll snuff out the open flame, and stuff more fuel on top of it. “We’ll try to get the cinders burning. You don’t want an open flame in your can because if you hit the bellows, they can become like flamethrowers, and you can melt the wings on the bees.”

Once you’re satisfied with the amount of heat and smoke being produced, return the lid to the smoker. Puff smoke around the hive using the tips below. When the smoker is not in use, keep it in a safe spot where it’s not likely to start a fire. Puff it occasionally to keep the embers burning. Once you’re finished with the smoker, extinguish it completely by dumping the fuel material in water.

1.4.1. Tips for Using a Smoker:

Smoking your hive shouldn’t take more than a few minutes. To get the job done safely and effectively, use these tips from the University of Kentucky.

- Take slow steps as you approach the hive, and avoid sudden motions to reduce your chances of getting stung and to help maintain hive integrity.
- When possible, work your hives when the temperature is above 70 degrees F, anywhere between the middle of the morning and the middle of the afternoon. This is when more bees are likely searching for pollen and not in or around the hive.
- Approach the hive from the rear or sides to stay out of the bees’ flight path.

- Insert the first two or three puffs of smoke at the entrance of the hive to clear out the remaining bees.
- Use smoke in moderation. Too much will cause the bees to eat up more honey or drive them away from the hive.

Understanding how to properly smoke a hive will help make your beekeeping hobby more safe and efficient. And as you know, soon enough, you'll be reaping the sweet benefits.

1.5. The Role of Smoke

One of the main reasons to use smoke when harvesting honey is to interfere with the bees' lines of communication.

That sense of smell is one of the main ways bees communicate. The alarm pheromone bees emit when they feel an imminent threat smells similar to banana oil. The colony is also similarly alerted when a bee stings you, increasing the likelihood you'll get stung repeatedly in the same spot. If you do end up getting stung, make sure to wash your clothing before approaching the hive again, as bees will smell the pheromone left on your clothing on future visits.

Smoking bee colonies also makes bees less likely to sting because they go into survival mode, making you less of a concern to them. "When bees smell smoke on the colonies, it makes them think the hive is going to catch on fire. Their natural reaction to this is to try and save as much honey as they can. If the hive is going to melt, they're going to need to make a new one."

When the smoke enters the hive, the bees begin storing up as much honey in their bodies as possible in preparation to build a new hive—it takes 8 pounds of honey to make a pound of wax, which they'll need in the construction. Once they're full, they're less apt to sting; stinging you will cause them to die, meaning the honey won't make it to their new home.

The disruption caused by the smoke is temporary, so it won't hurt the long-term health of your colony. Once the smoke dissipates, bees recover their pheromone sensitivity within 10 to 20 minutes.

1.5. Operation of a traditional smoker

Many types of fuel can be used in a smoker.[10] These fuels include hessian, burlap, pine needles, corrugated cardboard, paper egg cartons, rotten wood or herbs. Some beekeeping supply sources also sell commercial fuels like pulped paper and compressed cotton. Experiments have shown that smoke from pellets of the dried female hop flower (Humulus lupulus), containing the sedative lupulin, is particularly effective.

The fuel in the smoker's burner smoulders slowly because there is only a small amount of oxygen inside, until a squeeze of the bellows provides a blast of fresh air. In this way the fuel is used more sparingly than in an open pan, and one load of fuel may last for several hours, or even days (if it is extinguished and rekindled again later). To calm the bees, the smoke must not be hot.

Information sheet 2	Placing brood frames in to hive

2.1. Adding super frame

How to know when your brood box is ready to add the super?

- To check whether your colony is ready for supering, you need to open up the brood box – so, you'll need to use the appropriate safety gear.
- It is important to install your bees in the brood box and wait until they are fully established before adding the Flow Super/ Hybrid Super. This can take anywhere between 1-8 weeks (longer if conditions are not favourable), depending on whether you have a nuc or package of bees, and will vary greatly depending on the time of year and the local resources available for your bees.
- We supply foundationless frames with our brood boxes, as we think it's beneficial for the bees to build their comb from scratch. Many beekeepers also use foundation in their frames as it requires less maintenance when the bees are first establishing themselves in the brood box. When using foundationless frames it's a good idea to inspect the brood box whilst the colony is building the comb to prevent the bees building cross comb in the frame. This way if they have run off course, you can gently nudge the comb back in place.
- Remember to keep all of the brood frames tightly together towards the centre of the box. If there is any extra space this should be distributed evenly on the outer edges of the brood box to further reduce the risks of cross comb. For best results, it is recommended that you check to ensure that all 8 brood frames have been drawn out and contain substantial comb before adding the Super. The combination of a full brood box and a significant amount of bees will help to encourage your bees to make fast progress on the Flow Frames.

- Once you are ready to add your Flow Super/ Hybrid Super to the brood box, you need to place the queen excluder between the two boxes to prevent the queen from moving into the super and laying eggs in your Flow Frames.
- Next, place your Flow Super/ Hybrid Super on top of the queen excluder.
- If you have a Hybrid Super, it needs to be set up with the 3 Flow Frames pushed together in the centre and secured in place with the supplied screws or dowel). The extra timber frames in a Hybrid Super need to be added; 2 on either side of the Flow Frames. These should be pushed up close to the Flow Frames with any gaps in the super to the outside edges—this will help the bees to build straight comb. The Flow Hive Hybrid Super 3 comes with special brood frame slots to ensure that the spacing is even and optimal.
- Make sure you reset your Flow Frames before adding them to the super to ensure they are in correct alignment.
- For Hybrid Supers, double check there are no gaps on the edge of where the Key Access Cover sits which would allow bees to exit when you are harvesting (the Flow Hive Hybrid Super comes with modified timber panels to prevent this). You can choose to swap a brood frame with one of your traditional frames to encourage fast progress in the super – just make that if there is any drone brood, to allow a gap at the roof for about two weeks, to allow the drones to exit once they have hatched.

Information sheet 3	Replace appropriate boxes for queen rearing

3.1. Replacing old brood comb

Why should I change old brood combs?

Combs should be changed regularly as they become damaged, contain extensive amounts or inconveniently placed drone comb, but mostly because used comb may contain the causative organism of many bee diseases, such as EFB, AFB, Nosema, etc.

How often should I change them?

There are many opinions as to this question but no brood comb should be used for more than three years. Used comb should be rendered or disposed of rather than being used in a different colony. For the small cost involved it is not worth the risk.

Is it easy?

Yes, providing you approach the change with a plan.

Are there different plans for single or double brood management?

These should be approached in different ways to gain the best results. The next Q. & A's will help you decide how to do it.

Can I just replace the odd brood comb with foundation?

This is the most common system used by beekeepers and probably creates the most problems especially in single brood chamber management systems with the smaller types of hive. Foundation placed in a bottom brood chamber is invariably spoilt unless a powerful swarm with a good honey flow is drawing it out. Foundation put into a bottom brood chamber is drawn out from the top downwards, as a result it becomes travel stained and covered in propolis. The bees then nibble the foundation away leaving holes between the comb and the bottom bars of the frame. In double brood chamber systems the foundation can be put into the upper chamber so this problem does not occur.

What are the best systems?

There are two easy and effective systems, these are:

A. To replace old comb with prepared drawn comb and

B. To perform a 'Bailey Comb Change'.

How do I prepare drawn comb?

This is only practical for the smaller types of brood chamber. A clean brood chamber is filled with frames of foundation and placed over a queen excluder during a honey flow. I.e. used as a super. When the combs have been drawn and filled with honey they can be carefully extracted and stored for use as replacement combs.

How do I use these combs?

Towards the end of the bee keeping season frames that you wish to replace are moved to the ends of the brood chamber. During winter these frames become free of brood so in early spring, before the colony is expanding rapidly, they can be removed and replaced with drawn combs. Use of foundation at this time is not possible, as without a honey flow or extensive feeding the bees will not draw it out. This exchange can take place on a warm day in March. Ensure that sufficient stores remain, if not feed the bees.

How do I perform a Bailey comb change?

Prepare a clean brood chamber filled with frames of foundation. Place this chamber over the existing brood chamber. Unless there is a strong nectar flow feed with winter strength sugar syrup i.e. 1 Kg of sugar to 650ml of water. When the bees have drawn out some of the foundation, find the queen and place her on this comb. Put a queen excluder over the old brood chamber and under the new, thus trapping the queen in the upper chamber. If possible arrange a new hive entrance between the two brood boxes and close off the old. This helps to reduce the amount of pollen stored in the old lower combs. After three weeks, remove the old brood chamber. The brood will have hatched and the comb can then be rendered to recover the beeswax. This system is ideal for replacing all the combs at once and is best performed in early spring often, with clement weather, March is suitable, but remember to keep feeding so the bees can build comb.

3.1.1. Re-supering

- If a flow is still ‘on’ when you come to remove the supers full of honey, you can replace the full supers with ones with empty combs.
- As the intention is to have bees covering all the combs, you will need to judge the strength of the colony to decide whether you need to replace the full supers with more or fewer empty ones. If only a few frames are full, then you can replace them with empty combs for the bees to refill.
- If the replacement supers or frames have been fumigated with Phosphine to control wax moth, then they must be aired with forced air for two days before placing them on the hive. If ventilation is poor, then air them for five days before use to prevent adult bee mortality.

3.2. Procedure of using queen excluder

Time of queen excluder (Q.E.) inserting

Q. E has to be inserted 21-30 days before the expected honey-harvesting period.

Methods of inserting Q.E

- 1st force the bees including the queen to the base box,
- Take out each frame one by one while brushing or shaking away the bees to the box.
- When the supper is free from combs and bees, remove the super and check frames with honey & nectar or sealed brood from the base and replace with combs with young brood or pollen from the top box.
- Then put the Q.E. on top of the base hive & place the super and put combs with honey, nectar & sealed brood above Q.E

Information sheet 4	Replacing beehive lid and use hive fastener

4.1. Returning the Frames to the hive

The Frames may be replaced in the same or a new sequence or inserted to another hive. However, with knowledge, beekeepers can interfere and adjust the brood nest for the following reasons:

To control Swarm

If a colony becomes over-populated, it is likely to swarm thus losing half the colony's field bees. You can control this by removing four frames of brood and bees and replacing the brood frames with comb foundation. This is only ever done in the swarming season in warm weather. Place the foundation between frames of brood so you have the wall comb, frame of foundation and so on until you have used the four frames of foundation.

If swarm cells are present, they must be broken down at this time. By doing this you have removed four frames of bees and brood and the hive is unlikely to swarm.

The frames of bees removed can be used to strengthen weaker hives or start new colonies. This is done by moving the removed bees and brood to a new site so the bees don't drift back to the original hives and then introducing a queen cell or laying queen. Always check the health and condition of bees before combining them with others.

To expand the colony

Sometimes, after a heavy pollen or honey flow or if a queen is failing, brood nests can become constricted by frames full of honey or pollen, giving the queen very little room to lay. Under these circumstances, the colony will expand quicker if the full combs of pollen and honey are removed during spring and summer. In warmer areas you would do this in early spring or on a winter honey flow that provided nectar and pollen.

The combs are replaced with drawn combs of worker brood and are placed on both sides of the original brood nest as the hive may be down in adult bee numbers.

If the cause is a failing queen, she should be replaced at the same time as the frames are adjusted.

Frames can be manipulated to encourage hive expansion when the brood nest is normal. In spring, and summer when the weather is warm, it is possible to split the brood by placing one or two drawn worker combs between existing frames of brood in weaker colonies.

If a hive has eight frames covered with bees and five frames of brood, two drawn frames can be placed between frames with brood provided the bees in the hive can cover the existing five frames of brood and the two frames you inserted between the existing brood frames.

With strong colonies, it is possible to remove brood and bees to increase your hive numbers. Select strong colonies and remove three frames of bees and brood replace these frames with either drawn worker comb or combs of foundation.

Place the frames between frames of brood. If bees still cover all the frames or the replacement combs at the edge of the expanded brood nest, then as the colony expands they will work the combs.

To make up the increase, the brood and bees are placed into a nucleus box and removed to a new location and given a queen cell or introduced a new queen.

Lifting brood to increase brood area

When they want to increase numbers, some beekeepers will lift up brood frames to the super, often above an excluder, replacing the lifted combs with drawn combs or foundation spaced between existing brood.

At times, the bees may draw queen cells on the lifted brood. Check for this after four days and break down any queen cells so that the colony won't swarm

To replace the old comb

Brood combs quickly become dark in colour and the cell size decreases as each bee leaves a larval skin. Most beekeepers replace two brood combs every year.

Select the dark combs and replace them with drawn new worker combs or foundation, placing the combs between existing brood combs, making sure that the bees cover the

comb. You should also cull combs if they contain too many drone cells or if they have broken wires or top bar lugs.

4.2. Monitoring the colony

After the bees have settled down, inspect all the hives to ensure the queen is present (you may have damaged or lost her during the manipulation), that there are no diseases and that there are adequate stores.

The queen is mostly found around the warm brood, nearer to the egg laid, moreover, could be recognized by the fresh eggs &newly hatched out larvae.

When there is no stored food (pollen and nectar) the colony need to be fed with supplementary food. The presence of dried larvae is another indication of starvation of the colony.

It is important to observe the presence of disease and any enemies of bees in the hive. The general indications for the presence of disease and are:

- Presence of dead bees on the entrance of the hive
- The unusual color(color change) of the egg and larvae
- The abnormal flying of bees
- If the queen fail to lay egg
- The unusual smell in the hive
- The presence of died larvae in the hive

The objective of monitoring the colony after manipulation is to identify the problems of the colony and to take necessary measures so that that the maximum strength of the colony coincides with the max nectar flow and others in order to obtain a maximum honey production. Therefore, it is necessary to take the recommended measures to minimize the problems which could be associated with hive manipulation.