Bee Product Processing -Level-II

Based on October 2019, Version 1 Occupational standards

Module Title: Performing honey pressing and Extraction Process

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LG #29	LO #1- Prepare the honey pressing and extraction process for operation

Instruction sheet

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

- Confirming products and materials availability
- Preparing product and materials
- Confirming services
- Checking and confirming equipment readiness
- Setting the process

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

- Confirm products and materials availability
- Prepare product and materials
- Confirm services
- Check and confirm equipment readiness
- Set the process

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
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Information Sheet 1- Confirming products and materials availability

Honey pressing and extraction is an essential activity in honey processing for different purposes for home consumption or further processing for adding value into different products such as the locally so called 'birz' and mead (tej) production. Thus, in order to perform honey pressing and extraction process, identifying the availability of products (Honey) to be pressed and extracted, Honey presser, extractor, barrels, water buckets and other necessary equipments for extraction process is mandatory. Beside to identifying its availability, checking and confirming its functionality is mandatory before starting honey pressing and extraction for successful operation of the activities.

1.1. Confirm products and materials availability

Before starting the honey pressing and extraction operation, the processor must confirm the availability of raw honey to be pressed and extracted, Honey presser, extractor, barrels, water buckets and other necessary equipment and tools for extraction activities. In addition to confirming the availability of tools and equipment, identifying and pre-checking each material, tools and equipments is mandatory to carry out the tasks without any problem. Therefore, in order to press and extract honey, the following products, tools and equipments are required.

Product, tools and equipments required for pressing and extracting honey

The product, tools and equipments are very important for honey pressing and extraction. Before undertaking the honey pressing and extraction the availability of the required equipments coupled with its functionality must be confirmed. This helps to carryout the operations successfully and safely as workplace procedures. Thus the common ,materials,tools, equipments and product (honey) are illustrated as below.

Product (honey)

the raw honey can be taken from three type of hives(traditional, transitional and modern hives) depending on its quality interms of brood and moisture content.

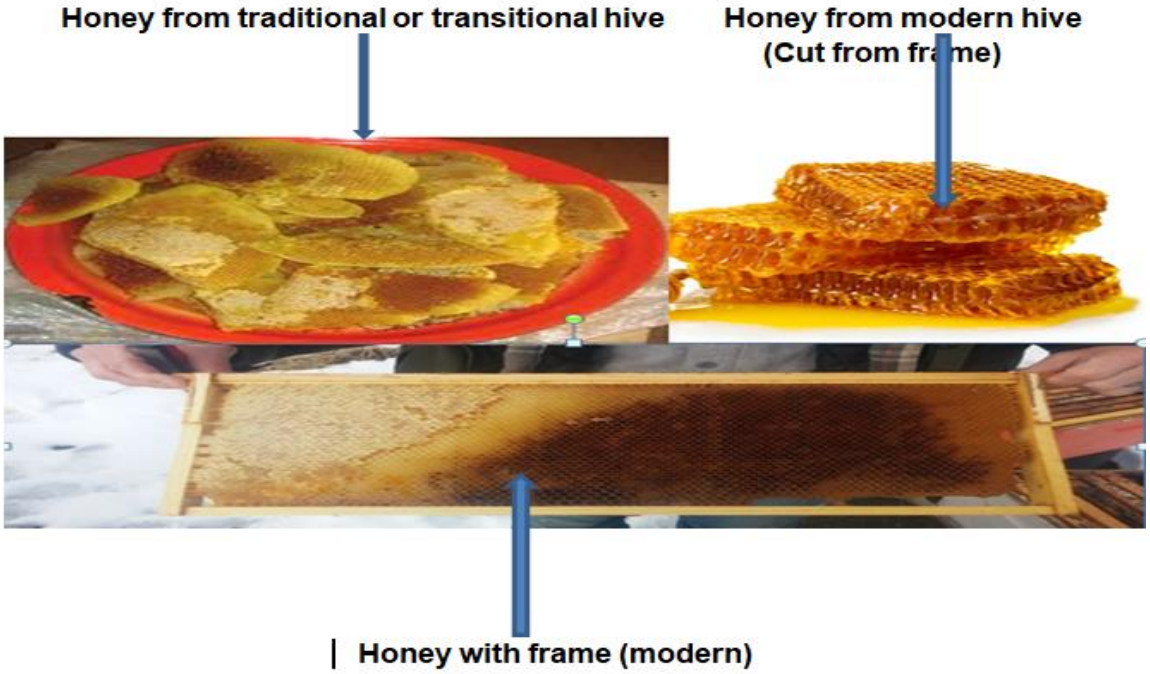

Figure 1.Crude honey

Equipment

Honey presser: A honey press is a mechanical machine that is used to press the honeycomb to separate the honey from wax.

Figure 2: Honey presser

Manual honey extractor: is a mechanical device used in the extraction of honey from honeycombs without destroying honey frame.

Figure 3: Manual honey extracted

Electric honey extractor: is a mechanical device used in the extraction of honey from honeycombs without destroying honey frame.

Figure 4: Electrical honey extractor

Water bucket: is used for holding water and simultaneously honey during extracting

Figure 5: Buckets

Honey sieve: Honey Sieves allow you to strain large pieces of beeswax, pollen and even bee parts from your honey as it flows from your extractor

Figure 6: honey sieve

Honey barrel: is a stainless steel used to handle and store an extracted honey

Figure 7: Honey barrel

Tools

Uncapping Fork: is tool used to uncap the honey cells allowing honey flow during the extraction process

Figure 8: uncapping fork

Self-check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List all the necessary tools and equipments required for pressing and extracting honey with their function(10 point)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____

_____

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Information Sheet 2- Preparing product and materials for pressing and extraction of honey

In order to undertake the honey pressing and extraction activity, all the necessary product, tools and equipments are identified and prepared in good manner as to maintain the quality of the honey and to carry out the tasks easily. The product, tools and equipment required to prepared are discussed as below.

Raw honey: The raw honey harvested straight from the hive should be collected to the honey extracting or honey pressing area for extraction or separating the honey from wax. The first thing in extracting honey is preparing honey for pressing and extraction.

Honey extracting equipment

Honey extracting equipments including honey presser and honey extractor (manual and mechanical) are very important for separating honey from wax for different consumption purposes. Depending on its availability and advantages in terms of purpose, quality, time and labour intensiveness), the honey processor should select and prepare the honey extracting equipment. Before starting honey pressing or extraction, the equipment selected for this purpose must be dismantled and cleaned properly to minimize the contamination of the product.

Before extraction make sure:

- The extractor must be clean and dry before the start of extraction
- Do not allow the build-up of wax, caramelized honey, and foreign matter (e.g. wax, dirt, dead bees) in the extractor.

Uncapping fork: Before starting extraction of honey by using honey extractor, the sealed capping of honey must be uncapped by using uncapping fork. Thus, before using this tool the processor must be cleaned and sanitized to maintain the quality of honey through minimizing contamination.

Water bucket: is the bucket used for holding either water or honey during honey extraction must be cleaned and sanitized prior to using.

Barrel or honey storage: this equipment must be cleaned, sanitized and dried properly before using as storage.

In general, all other materials, tools and equipment required for honey pressing and extraction must kept its hygienic standard as to maintain the quality of honey through minimizing contamination.

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is the importance of preparing tools and equipment for honey pressing and extraction? (10pts)

You can ask you teacher for the copy of the correct answers.

Note: **Satisfactory rating - 10 points** **Unsatisfactory - below10 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Short answer questions

_____

_____

_____

Information Sheet 3- Confirming services for honey pressing and extraction

4.1. Services availability

In order to undertake honey pressing and extraction, there must be an accessibility of services to undertake the extraction tasks successfully. Before conducting the task, confirming the availability, accessibility and functionality of different services is the key. Subsequently for operation of honey pressing and extracting process service availability is mandatory. Among different services, the most frequently required services for honey pressing and extraction are electrical service (power), water accessibility. These services are very critical for the operation of honey extraction and to be confirmed before conducting the operation.

Electrical power accessibility

In electrically based honey extraction, electrical accessibility is very critical for separating honey from honey comb.

Accessibility of water

Accessibility of water is also very important and critical for cleaning tools and equipments before and after pressing and extracting honey. Thus, water must be freely accessible in the workplace area.

Compressed air

Air compressor is also the most important equipment in must preparation. At the start of each process, air compressors pull air in from the surrounding atmosphere, creating the pressure that is key in nearly every process moving forward. The next part of the process involves pushing liquid from one tank through piping while maintaining ideal conditions along the way.

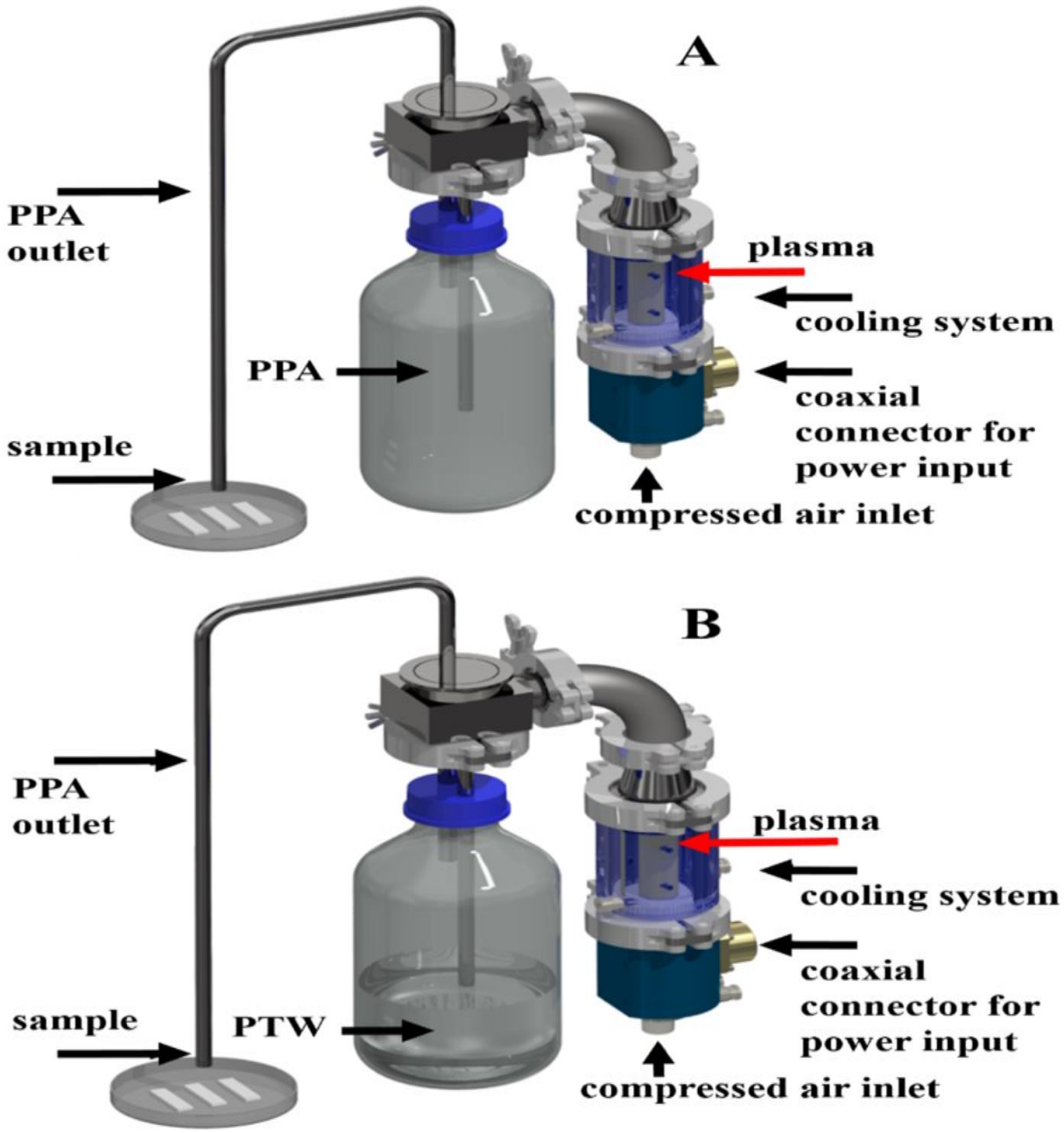

Figure 9: Air Compressor

Inert gas: is one of the best solutions for controlling oxygen exposure to aging wine. It protects the wine from oxygen and keeps the wine freshness, sherry-like aromas and flavors, and volatile acidity production.

Figure 10: Inert gas system

Steam

Steam is an efficient and effective energy medium which is widely used in brewery industry for honey extraction.

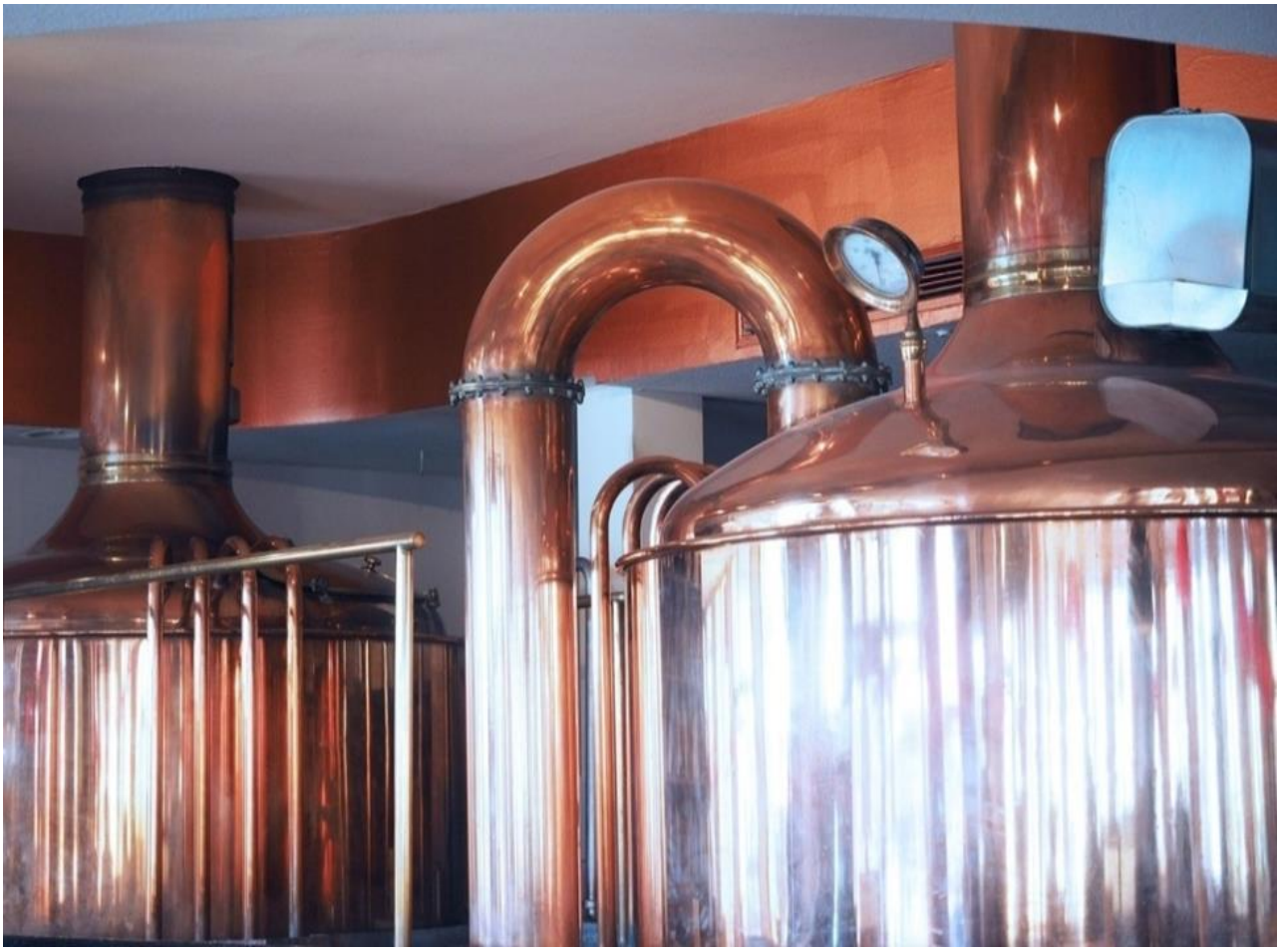

Figure 4: steam machine

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What are the most import services required for honey pressing and extraction?(6pts)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Short answer questions

1. _____

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Information Sheet 4- Checking and confirming equipment readiness

Importance of checking equipment

The purpose of an inspection is to identify whether work equipment can be operated, adjusted and maintained safely with any deterioration detected and remedied before it results in a health and safety risk. The need for inspection and inspection frequencies should be determined through risk assessment

Checking and equipment of honey pressing and honey extraction is very important as to identify and confirm that hygiene and sanitation standards, safety standards and pre-start requirements are met and that equipment is operational.

Therefore, all tools and equipments required for honey pressing and honey extraction must be checked for its functionality sanitation and dryness to confirm their readiness for the operation.

The main advantages of checking equipments readiness is to confirm:

- The sanitation standard of the equipment according to workplace procedures
- The overall functionality of the equipment

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

2. What is the importance of checking and confirming equipments readiness for honey extraction?(6pts)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Short answer questions

1. _____

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_____

Information Sheet 5- Setting the process

Setting honey extraction process

In setting process, all necessary tools, products and equipment required for honey pressing and extraction should be identified, prepared and arranged properly as to suit operation activity at the workplace area.

After confirming the availability of all the necessary materials, tools, product and equipment at the workplace, start honey extraction either by honey pressing or honey extractor depending on the availability of extracting equipment and the type of honeycomb to be extracted.

Figure 9: setting honey extraction process

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is the important materials for setting for honey extraction?(6pts)

Note: **Satisfactory rating - 4 points** **Unsatisfactory - below 4 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ **Date:** _____

Short answer questions

1. _____

_____

_____

_____

LG #30	LO #2- Operate and monitor the pressing, extraction and mixing process

Instruction sheet

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

- Follow workplace procedures
- Starting up pressing, extraction and mixing processes
- Monitoring control points
- Specifying pressed, extracted and mixed product
- Monitoring equipment
- Identifying, rectifying and reporting defected products and equipment

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

- Follow workplace procedures
- Startup pressing, extraction and mixing processes
- Monitor control points
- Specify press, extract and mix product
- Monitor equipment
- Identify, rectify and report defected products and equipment

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Information Sheet 1- Follow workplace procedures

Following workplace procedure is very important in any workplace area as to maintain the occupational health and safety. In honey extraction and pressing, following the workplace procedures related to honey extraction condition, time of extraction, sanitation and hygiene of the required tools and equipment. Following workplace procedures has the following importance:

- Maintain the quality of the product
- Minimize occupational Health and Safety hazards related to honey pressing and extraction
- Maintain personal health and safety

1.1. Honey extraction condition

Cold extracting

Most unprofessional beekeepers cold extract honey, that is, no heat is applied to the liquid honey during the extracting process. The honey combs are removed from the hives and because the honey is warmed by the colony, if it is extracted the same day it is still warm enough to spin out of the combs.

The extracted honey is placed in a tank with a gate raised slightly above the bottom and left for a couple of days so that any foreign matter, wax, pollen rises to the top of the tank or settles below the gate with clean honey in between. The clean honey is then drawn off and put into containers.

Hot room extraction

Most commercial-scale beekeepers use a hot room to lower the viscosity of the honey. This increases the flow rate of the honey and so helps extract it from combs. The hot room is heated by electric elements; the hot air is circulated by fans around the supers. Supers are left in the hot room until the honey in the combs reaches 35^0c.

Timing

Check that at least two-thirds of each comb is sealed. The moisture content must be low enough to avoid fermentation, less than 20%. Honey should be extracted as soon as possible after the frames have been removed from the hives. It is very important that all honey from hives where small hive beetles have been present is extracted within two days of removal of the combs from the hives. This is to prevent any small hive beetle damage to the honey.

Food safety requirements and quality assurance

During extracting, you must be aware of and address any hazards, including chemical hazards, physical hazards, biological hazards and other hazards, that may affect the quality and food safety of the honey.

The Food Safety and quality assurance standards require the food producer to have systems in place so that they can participate in a product recall. A batch of recalled food must be able to be identified and isolated so that it may not be sold. To achieve this, you must have a recall protocol in place and take and retain samples of each batch of honey you extract. Quality assurance programs usually specify how samples must be taken and stored.

Cleaning and sanitizing

All surfaces that honey comes into contact with during the extracting process must be cleaned carefully after each extraction. The supervisor or manager must document the cleaning requirements and these instructions should be displayed in the extracting room. All surfaces should be checked prior to starting the next extraction and if not up to standard, cleaned again.

Water used in the sanitizing process must be hot unfortunately how hot depends on which state or territory you are working. Food safety regulations in each state will specify the temperature required. All equipment must be dry before use because any moisture or dampness can cause the honey to ferment.

Personal Hygiene

In honey pressing and honey extraction, the processor must meet standards of personal hygiene. These are:

- maintain personal cleanliness
- wear clean protective clothing and head covering
- do not wear jewellery
- use blue band aids to cover open wounds or scratches
- Wash hands with unscented germicidal liquid hand soap and dry hands before starting to extract.

Occupational health and safety (OHS)

Occupational Health and Safety hazards related to extracting honey may include:

- bee stings
- incorrect manual handling
- slippery and uneven surfaces
- sharp tools and equipment
- burns from hot knives
- belt drives
- steam or hot water pipes
- moving chains and other machinery parts

How to minimize workplace OHS hazards?

As to minimize the exposure of occupational Health and Safety hazards related to extracting honey, the honey processor or worker must:

- **Using of PPE**
  - Overall
  - Rubber boots
  - Glove
  - Hair cover

Self-Check – 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What are the common OHS hazards in honey extraction?(4pts)
2. What is the importance of meeting personal hygiene in honey extraction?(4pts)
3. Explain the honey extraction condition? (4pts)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____
_____
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2. _____
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3. _____
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Information Sheet 2- Starting up pressing and extraction processes

Honey pressing and extraction is the process of separating honey and wax. For this operation, adjusting pre-requisition condition is mandatory. In general, before extracting or pressing the raw honey, you need to **consider** the following:

- Where you will be extracting honey
- The equipment you need
- The timing of the extraction
- Quality assurance and food safety requirements
- Occupational health and safety
- Other special requirements

2.1. Methods of hone extraction

There are two common methods of honey extraction or separation of honey and wax practiced in our country. These are honey presser and honey extractor.

1. Honey extractors

Honey extractors use the principle of centrifugal force to remove honey from combs without damaging honey frame. The honey extractor can be classified in to two based on its operational systems. These are manually operated honey extractor and electrically operated honey extractor.

1.1. The Electric Honey Extractor

The electric honey extractor uses electricity to spin the frames that are attached on the central shaft located in the middle of the drum. It has an electric motor which is connected to your electric current supply so that it can turn the frames at a certain speed. Speed is controlled because if the frames inside the drum are spun at very high speeds, then there is a possibility of damage to the honey combs. The electric honey extractor is the best option for large scale commercial beekeepers because they are fast and don't need much energy to operate. Large commercial honey companies use electric extractors due the convenience that such extractors offer.

Figure 1: Electric honey extractor

Advantages of Electric Honey Extractors

Below are some of the advantages of electric extractors over manual extractors:

- Electric honey extractors can be used to extract large amounts in a much quicker time.
- They are easy to operate. Simply turn on the electric motor has been turned on the spinning starts automatically.
- They are faster compared to manual extractors.
- Can be used by large commercial honey extracting companies.

1.2. The Manual Honey Extractor

The manual honey extractor is manually operated using your hands, and you can even make one yourself if you're so technically inclined. The absence of an electric motor is really the only difference, since it also has a drum that has a shaft where frames can be attached to for the spinning to be done. Most manual extractors can hold from two to about four frames.

Figure 2: Manual honey extractor

Size of extractors

The capacity of extractors (either manual or electrical) varies from very small ones that will extract only one frame at a time right up to the very largest extractors that can deal with over 180 frames in the same load. The size of the extractor depends on the number of hives. If you have up to 50 hives, a two, four or nine frame extractor should be suitable. The more hives, the larger the extractor is better.

2.2. Honey extraction using honey extractor

In honey extraction using honey extractor, the following activities must be carried out in the work place area. Thus, the honey processor, should identify the activities should be conducted before, during and after processing of honey.

2.2.1. Removing frames and inspecting them

The supers to be extracted are moved into the extracting area. The frames are removed from the supers and inspected to ensure they are free of brood and the honey is ripe. The moisture content of ripe honey ranges 17-21%. The ripeness of the honey can be judged by inspection (observing of the capping of honey cells i.e. ¾ or 75% of the honey cull must be capped). The other method of honey moisture content judgement is by using of refractometer instrument.

Figure 1: honey frame inspection

2.2.2. Uncapping honey cells

The first step in collecting the honey is uncapping. This involves removal of the wax caps from the honeycomb cells. Small processors do this manually. Large processors use uncapping machines that continuously scrape the wax caps off the honeycomb cells one frame at a time in a fully automated process.

The caps are removed from the sealed honey cells using an uncapping machine or a hand-held knife. The uncapping of cells exposes the honey that then can be extracted without damaging the comb. When uncapping with a hand-held knife, hold the comb on an upward projecting stainless steel screw so you can rotate the frame without lifting it to uncap both sides of the frame.

Grip the frame with the thumb lying along the end bar and use the knife to cut downward, and with a sawing motion, shave off the capping. Always cut down. If you cut up, you risk cutting your thumb if the knife slips. Not only will you hurt yourself, but you may contaminate the honey.

It is important the knives are hot (around 45°c) so as to avoid damaging the cells and frames. If they are too cold, they will tear the cells. The uncapped combs of honey then are ready to be placed into the extractor.

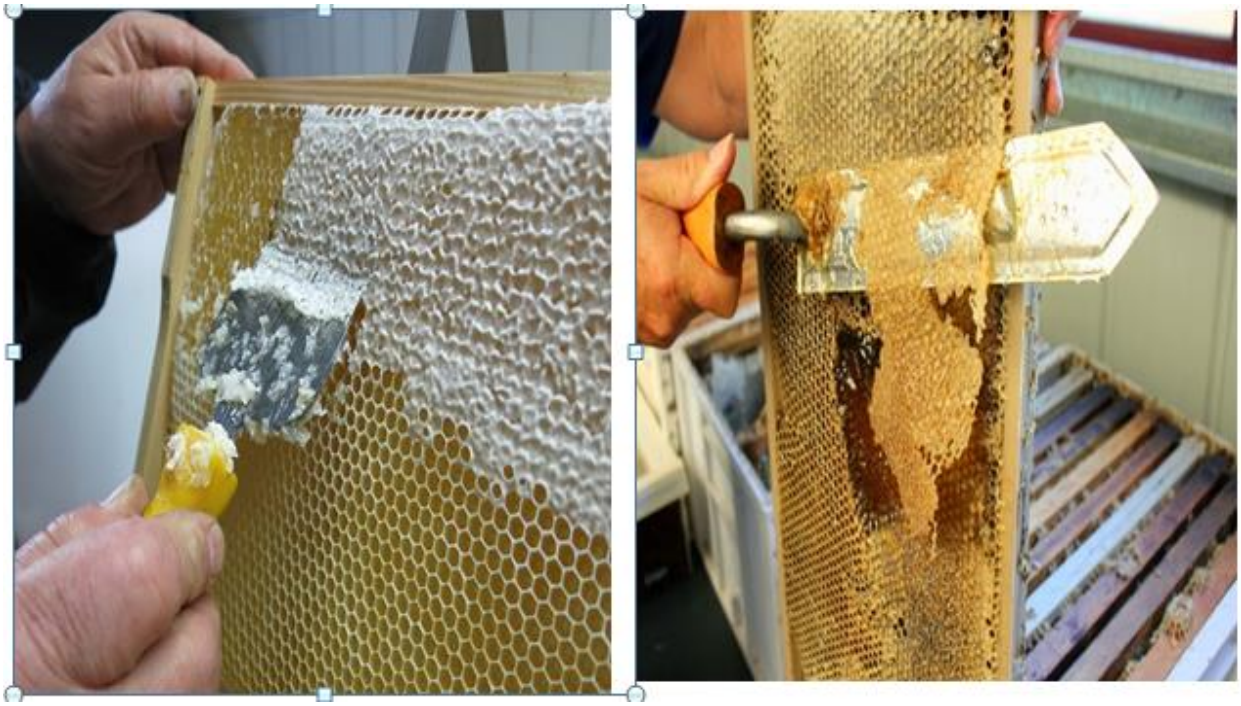

Figure 2: uncapping honey cells

2.2.3. Placing frames into extracting unit

Place the frames into the extractor. Some combs will be heavier than others, so when you are loading the frames, try to balance the load by spreading the weight evenly around the reel. If it is unbalanced, the extractor will rock too much when the reel is rotated and the honey may not be extracted completely. Then, before starting operation of extraction, the extractor must be covered.

Figure 3: Placing honey frames into extractor

2.2.4. Operating the honey extraction

The smaller the diameter of the extractor, the faster it has to be turned to extract the honey. Combs can be damaged during extracting, so start off hand extractors slowly, gradually increasing the speed until you can see the honey being extracted. After a minute, take the combs out and replace them with the other side facing the drum wall to extract some honey from the other side of the comb. Keep reversing the combs until all the honey is extracted. Doing this, in a slow but steady way will help to prevent comb damage.

Larger extractors often have a variable drive, going slowly at the start to avoid comb damage; they can speed up when most of the honey is extracted. New combs are the easiest to damage. It is important to rotate the reel at the speed recommended by the manufacturer to ensure combs are not broken.

In most situations, extracting is a straight-forward operation. On occasion, the speed time may need to be varied depending on the density of the honey but you can work this out by trial and error.

Once all the honey has been extracted, the frames are ready to be put back in the supers for returning to the hives to be refilled by the bees or stored for later use. This is a good time to cull sub-standard combs. You should remove combs with broken frames or wires, broken combs, excess drone comb and old, black combs. While removing the liquid honey after extraction from extractor, the honey jar or bucket with sieve must be placed under the outlet of extractor. The process continued up to the end of extraction.

Figure 4: extraction of honey

2.3. Honey pressing

A honey press is a machine that crushes honeycomb between two surfaces. It can use either rollers or a pressure plate, though the typical ones are those using a pressure plate also called a bucket honey press. Typical features of a bucket honey press include the pressure plate, a receptacle for comb with honey that can let honey flow through it and use of some force on the pressure plate. Application of force on the pressure plate crushes the comb placed underneath. The crushed comb releases honey from the cells. Various methods of collecting the extracted honey and putting it into a receiving container are provided for. They are usually incorporated into the design and manufacture of the device.

In this method the honey comb from harvested from traditional hive, transitional and honey bought from market are extracted by this method. In cases, if there is a lack of

honey extractor for frame honeycombs extraction honey presser can be used. The honey combs to be extracted from any hives should be prepared as suited for processing in honey presser.

Figure 5: Honey presser

2.3.1. Drawbacks of honey presser

In many countries various persons, including beekeepers and organizations have raised issues with the use of honey presses. The most common issues raised are realized when it is compared to a centrifugal extractor. These issues should be considered when making the choice of what extraction method to use on honeycomb harvested from the apiary. The major issues include:

1. **Not to everyone's taste**

The finished product from pressing honey may not be very appealing to some honey consumers. There are consumers of honey that prefer clear honey, and there are also some that want honey in comb prefer it to be unpressed. These two types of honey consumers do not enjoy honey processed using a honey press.

2. Destroys comb

This method of extraction needs crushing of combs as suitable for pressing. As a beekeeper, you cannot speed up honey production in the beehive if you crush comb during harvesting. Comb that is intact after honey extraction is placed back in the beehive to be immediately reused to store more honey. Bees clean it and quickly take to storing honey in the comb. They then re-cap the cells in which there is enough of ready honey.

3. Labor intensive

Using a honey press is sometimes too tiring for beekeepers. It is seen as being more labor-intensive than using a centrifugal extractor. This is especially true when you take into consideration that some centrifugal honey extractors are electric and do not involve any hand cranking at all. However, new developments in design and modifications are helping to overcome this disadvantage.

2.4. Storage of honey

Honey should be stored in cool, dry and dark areas. The honey should be filled shortly after extraction in glass jars with screw-on lids or food grade plastic buckets or food grade metal containers with well-sealing lids. If honey is stored in improperly sealed containers, it will absorb water from the air and ferment easily. To remove excess moisture, honey should not be heated, because heating destroys enzymes and causes deterioration in taste. Instead, if the moisture level is too high, it can be reduced by blowing air for several hours over a pan of honey using an electric fan. When honey is kept at temperatures below 24 °C, it crystallizes. Crystalized honey has the same nutritional value as liquid honey.

2.5. Beeswax extraction

Beeswax is a valuable product that can provide a worthwhile income in addition to honey. One kilogram of beeswax is worth more than one kilogram of honey. Unlike honey, beeswax is not a food product and is simpler to deal with it does not require careful packaging which this simplifies storage and transport. Beeswax as an income generating resource is neglected in some areas of the tropics. Some countries of Africa

where fixed comb beekeeping is still the norm, for example, Ethiopia and Angola, have significant export of beeswax, while in others the trade is neglected and beeswax is thrown away. Worldwide, many honey hunters and beekeepers do not know that beeswax can be sold or used for locally made, high-value products. Knowledge about the value of beeswax and how to process it is often lacking. It is impossible to give statistics, but maybe only half of the world's production of beeswax comes on to the market, with the rest being thrown away and lost.

Uses of beeswax

Overall the world beeswax is used for different purpose as industry level. Among these, the major uses of beeswax are:

- Candle making
- Metal casting and molding
- Cosmetics -body creams, hair and face creams, and other creams.
- Foundation sheet making
- Food processing. E.g. protect containers against the effect of acids from juices or honey protects corrosions.
- Industrial technology E.g. in copulating electronic and electrical apparatus for use in high temperature chemically active environment
- For embedding or electrically insulating circuits of thigh and ultra-high frequency E.g. Mixtures of 15%cersin wax and 65%bees wax and 20%ethylcellulose has high melting point.
- In textiles used to make water proofed by coating with bees wax E.g. paper, batik traditional way of colouring cloth.
- Varnish and polishes
- For printing as protective surface coating

2.5.1. How to collect beeswax

The beeswax processor gets the beeswax from the honeycombs having first extracted the honey. Beeswax can also be got from old empty combs. It can then be melted and sieved and sold as a raw commodity. However most beekeepers do not know the

benefits of beeswax and throw combs away. In Ethiopia most bees wax were collected from the local brewery (Tej) making house.

General safety rules in beeswax extraction

General Rules When Working With Beeswax

- Beeswax must never be heated with a direct flame: always heat it in a container of water.
- . Heat the wax enough to melt it: beeswax melts at 62-64 °C. Heating above 85 °C causes discoloration of the wax, and boiling will ruin it. If beeswax is heated to such a temperature that it burns it is wasted completely
- Use soft, clean rainwater. Hard water contains lime that reacts with the wax and saponifies it
- Use suitable materials when working with beeswax extraction such as containers made from enamel, stainless steel, nickel, or plastic
- Do not mix dark combs with light combs as this will lower the grade of the best wax
- Place the bucket with wax and water mixture in a heat-retaining box to cool down slowly as to obtain the purest beeswax

2.5.2. Methods of wax extraction

There are two main methods of wax extraction

1. Hot water bath method
2. Solar wax melter

1. Hot Water Extraction Methods

The crude beeswax could be socked in the water for about 24 hours then boil with water about 65 degree. Steam and hot water is the most common media used for rendering wax. Be careful not to expose the wax to live steam because this may cause partial saponification of the wax hence the calcium and other minerals react with wax and produces soap-like product, which lowers the quality of beeswax. Avoid using hard water as far as possible, or, if necessary, slightly acidulate the water using a teaspoon to a tablespoon of some acid such as vinegar per 5/liter of water depending on the circumstances. The capping wax should be drained of all Honey and then washed to remove the last vestiges of honey before processing with the rendering. The old combs, especially the brood combs should be soaked in water for 24 hrs before rendering is commenced. It is much safer than using heat alone as beeswax is very flammable. Once yellow oily liquid beeswax is seen on the top of the water, the mixture is then strained through a wire mesh or cloth bag into the second clean empty container or bucket and settling it to have an appropriate shape.

Figure 6: small scale level hot water beeswax extraction process

Figure 7: Industry level wax extraction

1.1. Settling of extracted wax

The pot should be left to cool naturally for 24 to 48 hours after which time you will have a circular cake of wax that has shrunk enough to remove easily. The wax debris should be cleaned and transferred to storage area or used for the desired objectives.

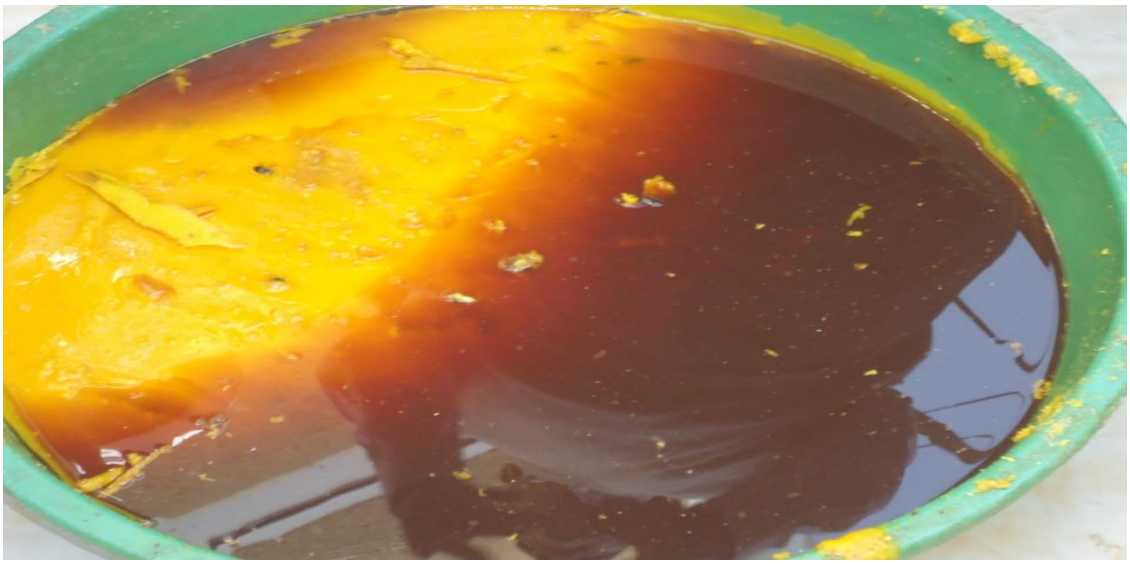

Figure 8: Wax settling

1.2. Storage of extracted wax

Wax should not be stored in the comb form. Combs should be processed quickly as they become brittle. Wax blocks must be stored in sealed plastic, airtight containers and in a cool dry place. Wax blocks should never be stored near pesticides or chemicals as the wax may absorb them. Wax should be wrapped in plastic or newspaper in order to store it for long periods of time without damage. Wax can retain its quality and shape for hundreds of years. During rendering never use iron, zinc, brass or copper containers as they discolour wax and make it loose its smell. Use un-chipped enamel, galvanized iron, and stainless steel or aluminium containers.

Figure 9: Wax settling

2. Solar extraction

The Radiant energy (heat) form the sun melts pieces of wax placed on the metal base of a shallow box, its lids consists of two sheets of glass 5mm apart. The whole is tilted so that the lid faces the sun below the base that reflects radiant heat is an insulating layer and the heat is trapped inside the box. It is completely safe and useful for rendering small amounts of beeswax. It needs no power supply or source of heat and has no operational cost and it can produce very clean wax.

This method provides a simple, safe and cheap method using the heat of the sun. It is a box with a glass lid that is tilted at an angle to catch the sun and the sun melts the wax over a period of time.

- There is a sheet of aluminium metal (or galvanized steel) that directs wax in to the container
- There is a single or double wall of glass that helps heat absorption.
- The wire mesh prevents debris from slipping into the container.
- The dark painted walls help to heat absorption if necessary.
- The melter must not have any cracks or gaps that will encourage heat loss or allow any robber bees inside.
- The smell of the wax will attract bees and ants. It must be set up in such a way that ants cannot gain access.

Figure 10: solar wax melter

Self-Check – 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is the advantage of electrical honey extractor over manual honey extractor?(6pts)
2. What is the disadvantage of honey presser?(4pts)
3. what is the method used for wax extraction(4pts)

Note: **Satisfactory rating - 3 points** **Unsatisfactory - below 3 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____
_____
_____

2. _____
_____
_____

3. _____
_____
_____

Information Sheet 3- Monitoring control points

Introduction

In honey extraction process monitoring the control points is mandatory as to maintain the quality of the products. Accordingly, there are three elements concerning products Hygiene to be considered in the processing or extraction of honey. Although honey, due to its very high sugar content, is considered a low risk product in terms of bacteriological hazards, chemical and physical hazards must be taken into account as well as general hygiene standards

Cleanness: as in any food processing the cleanliness of the area, equipment and people coming into contact with or close proximity to the product is essential; as is the availability of adequate washing facilities for all three. The exclusion of animals, pests and uncontrolled children from areas where the product is exposed is necessary. Also the exclusion of any people suffering from any transmittable illness from the handling is also required.

Honey extraction process: good practice should be adopted to avoid contamination due to bacteriological, chemical and physical contaminants. When transporting supers in vehicles, make sure that they are protected from contaminants that may have been left by previous use of the vehicle or trailer. Use polythene sheet or bags to cover the floor and wrap the supers if on a trailer. Clean equipment and the working area before and after use with suitable cleaning materials.

Any people involved in the process should wear suitable protective clothing to protect the product from contamination by clothing or body particles. Particular attention should be paid to checking filters before and after use, for damage.

Particular care should be taken when bottling in glass jars to minimize honey exposed and uncapped, keeping only the minimum number of jars of honey uncapped. Particular attention must be paid, to the critical control point action in the case of any breakage, as this is probably the most serious of hazards. Glass or plastic jars should be cleaned

before filling either in a dishwasher with a minimum rinse temperature of 85 °C or hand washed then heated in oven to 90 °C. Do not rely on being clean from the manufacturer.

Care should be taken to prevent the product overheating and potentially reducing its antiseptic qualities as well as its natural enzymes.

Table 1: Hazards and critical control points

Step	Hazard	Monitoring	Control & Corrective Action
The Hive and honey removal	▪ Contamination from paints, preservatives, soil and plant material, vermin and disease treatments	▪ Check all paints and preservatives for suitability of use. ▪ Use regular inspection to detect signs of vermin infestation. ▪ Make sure honey supers do not come in direct contact with the soil or vegetation. ▪ Check all bee treatments manufacturer's instructions for methods of use.	▪ Dispose of any honey, preferably by fire that has been exposed to any of these contaminations ▪ It may be possible to leave honey that has been exposed to some bee disease treatments for winter feed for the bees. ▪ Some bee disease treatments are recognized as safe with honey when used according to manufacturer's instructions
Transportation of honey in supers	▪ Physical and chemical contamination from transport, animals and rain water	▪ Inspect vehicle/trailers ▪ Ensure clean and free from potential contaminants such as petrol, oil, soil plant and animal material ▪ Ensure supers only come in contact with food standard coverings such as polythene sheet	▪ Dispose of any honey, preferably by fire that has been exposed to any of these contaminations.
Uncapping, extraction and settling	▪ Contamination from equipment, premises and people	▪ Inspect equipment before use for damage and contaminants ▪ Pay particular attention to non-stainless steel equipment for damage that may expose unsuitable material ▪ Ensure premises cleaning procedures have been adhered to before processing starts ▪ Ensure people are dressed in suitable protective clothing	▪ Do not commence processing before checks completed satisfactorily
Filtration	Failure to remove physical contaminants	▪ Check filters before and after use for damage.	▪ Do not use if damaged, re-filter with good filter if found damaged after use.
Storage	▪ Contamination and tainting by other substances from surroundings or containers ▪ Deterioration due to high temperatures or moisture absorption	▪ Check containers for suitability of storing food. Ensure lids seal to prevent moisture absorption. ▪ Ensure no unsuitable chemicals stored in area. ▪ Monitor maximum temperature with max/min thermometer to remain below 40 °C	▪ Check before bottling that conditions have been met. ▪ Test by taste for contaminating ▪ Test with refractometer if water absorption suspected ▪ Use only for confectionary honey if temperature exceeded or water content exceeds permitted level for normal honey

Self-Check – 3	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is the importance of monitoring critical control points?(6pts)
2. What are the critical control points to be monitored in honey extraction?(4pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____
   _____
   _____

2. _____
   _____
   _____

Information Sheet 4- Specification of pressed, extracted and mixed product

4.1. Extracted Honey Specifications

Honey is defined as “the sweet foodstuff derived from the nectar of flowers, sugary secretions of insects, sugary secretions of insects, sugary secretions of living plant parts other than flowers or from plant juices, after it has been gathered, partially converted and stored in the honeycomb by honeybees”

Extracted honey is honey that is separated from the comb by centrifugal force, gravity, straining, or by other means.

4.1.1. Physical attributes:

Honey shall:

- Be well ripened in the hive in order to contain the correct moisture content and enzyme activity
- Be free from particles foreign to its composition (such as mould, insects, debris, sand etc)
- Have a color that is associated with the source which can range from extra light amber to dark amber.
- Have a good flavor and aroma typical of the source.
- Be reasonably free of particles.
- Be crystallized or liquid

4.1.2. Chemical attributes:

Extracted honey shall not:

- Have any foreign tastes or odors
- Have begun to ferment or effervesce (bubble)

Any of the following relevant tests may be selected to determine the composition, quality and ripeness of honey and if the honey does not comply with any of these selected test, then it shall be considered as not complying with the standards for grades of honey.

Table 1: Honey Quality and International Regulatory Standards (1999)

Variable	Standards	
	National	International
Colour (mm pfund)	-	-
pH	-	3.2-4.5
Free Acidity (meq/kg)	<40	<50
Electrical Conductivity ($mScm^{-1}$)	-	0.22-1.52
Moisture Content (%)	17.5-21	18-23
Hydroxymethylfurfural(HMF)(mg/kg)	<40	<80
Ash or mineral content (%)	<0.6	0.25-1.0
Apparent Reducing Sugar (%)	>65	60-70
Sucrose Content (%)	<5	<10

Source: Codex Alimentarius and EU regulations of honey

Chemical Properties of Beeswax

Beeswax used directly and indirectly by human being as a result it is very necessary to keep its natural quality without adulteration and contaminations.

Table 2: Beeswax quality Specifications

Parameters	Minimum	Maximum
Saponification cloud point	57.9 ^{o}c	65 ^{o}c
Melting point	61 ^{o}c	63.85 ^{o}c
Acid Value	18	32.7
Ester value	66.4	98
Ratio number(ester/acid)	2.8	4

Self-Check – 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

3. Describe the physical characteristics of extracted honey(6pts)
4. Describe the chemical attributes of extracted honey(4pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____
_____
_____

2. _____
_____
_____

Information Sheet 5- Monitoring equipment

Honey and beeswax is high valued bee product among different agricultural products due to its various uses overall the world. As a result during extracting of this product care should be taken as to maintain quality and minimize waste of the honey. This means monitoring of operational equipments condition is very essential before, during and after operation of the process.

5.1. Monitoring of honey extractor

Monitoring of honey extractor condition is the key in honey extraction process. This monitoring could be implemented in terms of the identifying extractor functionality before, during and after extraction of honey. Monitoring of extractor equipment is used to identify the defected components of equipments which have a negative impact on the extraction operation and suggest it for maintenance. Monitoring involves the regular measurement of parameters such as functionality, rotation per minute, temperature and sound in and around machines and equipment. The equipment component defects are recognized at an early stage for maintenance or purchasing new and the remaining runtimes of bearings, shafts, etc.

5.2. Monitoring of beeswax extractor

Monitoring of beeswax extractor condition is the key in beeswax extraction process. Monitoring of beeswax extractor equipment is used to identify the defected components of equipments which have a negative impact on the extraction operation and suggest it for maintenance. Monitoring involves the regular measurement of parameters such as functionality equipment. The equipment component defects are recognized at an early stage for maintenance or purchasing new and the remaining runtimes of bearings.

Some benefits of performing regular equipment inspections are listed as below:

- Problem Prevention: Perhaps the most significant benefit to inspecting equipment is that the maintenance personal are able to identify potential problems before they occur.
- Encourages Proactive Thinking: Regular equipment inspection by the maintenance department can actually promote a cultural shift toward proactive thinking.
- Saves Money: Preventative maintenance steps are almost always significantly less expensive than fixing problems after they occur.
- Better Understanding of equipment: When equipment is getting inspected on a regular basis, the maintenance individuals will begin to get a good feel for how that equipment works.

Self-Check – 5	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. Describe the importance of monitoring equipment(10pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____
   _____
   _____

Information Sheet 6- Identifying, rectifying and reporting defected products and equipment

In honey extraction and pressing, identifying equipment and product defect is essential is very important for taking corrective measures.

6.1. Identifying defected equipment

Equipment procedures and maintenance guidelines should be kept in a central location for quick reference when needed. If missing, request complimentary copies from manufacturer or maintenance contractor. Malfunctions, faults, wear or damage to equipment are identified and reported in line with enterprise requirements. Since factors vary among installation sites, equipment users must work closely with each of their suppliers to ensure that proper data is being collected, that the data is being provided to the correct supplier, and that the resulting solutions are feasible.

All events (failures) that occur during inspections and tests should be reported through an established procedure that includes collecting and recording corrective maintenance information. The data included in these reports should be verified and then the data should be submitted on simple, easy-to-use forms that failures are tailored to the respective equipment or software.

Then check and report to your supervisor how much of the materials he/she provided in the list are functional and how much of them are faulty. Then are the functional tools and equipment's sufficient enough to honey pressing and extraction with the available labour power. Then after reporting the faulty and functional materials your supervisor will guide you what to do if there is insufficiency of material for that particular poultry production activity.

6.2. Identifying defected products

In honey pressing and extractions, before conducting the process identifying the defects of the honey is very important to maintain the quality of honey. In the context of honey extraction and processing, the honey is said to be defected if it has brood and high moisture content (harvesting unripe honey). Extraction or pressing of such type of honey with good quality (ripe and brood free honey) affects the whole quality of the

honey. Thus, before starting honey extraction or pressing identifying and rejecting the defected honey is mandatory as to the quality of honey for desired purpose.

6.3. Reporting defected products and equipment

A damage defect report is a report that summarizes the overall findings of damage that has occurred to a property, vehicle or equipment. It helps understand the background to a claim and also documents information regarding details of the accident and the extent of the damage.

This is essential as to identify defected equipments that need routine maintenance and complex maintenance. Those materials that need simple maintenance should be rectified without any delay with technician or instructor having knowhow about maintenance if not report. Accordingly, the equipments needs complex maintenance should be reported to the supervisors with reporting format.

Contents of the report

In damage report writing, the following contents must be used. This may include:

- Department
- Employee contact information (name, phone number, fax number and email)
- Date of incident
- Time of incident
- Description of the property
- Description of the damage
  - ✓ Cause of the damage
  - ✓ Impact of the damage
- Name of the personnel filled the form and date
- Approval personnel name and date

Self-Check –6	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List out the contents of the report (10pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____
   _____
   _____

Operation Sheet 1- Starting up pressing and extraction processes

Operational title:	**Perform honey extraction using honey extractor**
Purpose	To acquire and develop the knowledge, ability and right attitude to perform honey extraction using honey extractor in accordance with operational standards
Equipment, tools, products and materials	Honey extractor, sieve, bucket, uncapping fork, honey frame
Conditions or situations for the operation	The extraction process should be conducted at appropriate room and appropriate time In the extraction area must be clean and dry
Procedures	1. wear appropriate PPE **2.** Prepare necessary product, materials and equipments 3. Remove frames from supers 4. visually inspect frames for ripeness and free of brood and pollen 5. Uncap the sealed comb with uncapping machine or a hand-held knife 6. Place the uncapped frames into the extracting unit 7. Cover the top cover of extractor 8. Check closing outlet of the extractor 9. Operate the extracting unit 10. Take the combs out and change them with the other side 11. operate the extracting unit again 12. Place the bucket under extractor outlet 13. Place the sieve on the top of bucket or container 14. Open the outlet of extractor 15. Remove the extracted honey to a storage tank or container 16. Remove the wax and other by products and waste 17. Clean up 18. record keeping
Precautions	▪ good sanitation practices are essential ▪ appropriate time of extraction ▪ Using recommended level of heating ▪ Uncapping of the frame ▪ Using of appropriate materials and toos
Quality criteria:	▪ Using of appropriate materials and toos ▪ Proper filtration

Operation Sheet 2- Starting up pressing and extraction processes

Operational title:	**Perform honey extraction using honey presser**
Purpose	To acquire and develop the knowledge, ability and right attitude to perform honey extraction using honey pressing in accordance with operational standards
Equipment, tools, products and materials	Honey presser, sieve and bucket, honey from traditional and transitional hive, plastic container
Conditions or situations for the operation	The extraction process should be conducted at appropriate room and appropriate time In the extraction area must be clean and dry Presence of sufficient honey from traditional and transitional hive for pressing
Procedures	**1.** Wear PPE 2. prepare necessary materials, tools and equipments 3. Break the honeycombs into small pieces and put them into suitable sealable plastic containers 4. Fill the honey press with broken pieces of honeycombs or wax particles 5. Check closing outlet of the presser 6. Clamp the press and squeeze out the honey by rotating the pressing clump 7. Place the bucket under or below honey presser outlet **8.** Filter the honey through a suitable filter cloth or sieve to remove any solid particles and pollen grains 9. Fill the honey into suitable containers for consumption, marketing and for other purpose including must, mead, etc 10. Record keeping
Precautions	▪ good sanitation practices are essential ▪ appropriate conditions of extraction ▪ Using recommended level of heating ▪ Using of appropriate materials and tools
Quality criteria:	▪ Using of appropriate materials and tools ▪ Proper filtration

Operation Sheet 3- Starting up pressing and extraction processes

Operational title:	**Hot water wax extraction**
Purpose	To acquire and develop the knowledge, ability and right attitude to perform beeswax extraction using hot water in accordance with operational standards
Equipment, tools, products and materials	Water, large pan, large spoon, stove, double jacket extractor, match, fuel, bucket and crude wax
Conditions or situations for the operation	▪ Wax melting should be conducted in appropriate equipped area ▪ There must be sufficient beeswax
Procedures	**1.** Wear PPE 2. prepare necessary materials, tools and equipments 3. Break up comb into small pieces and 4. Wash or soak it overnight in clean warm fresh water **5.** Rinse the combs 2 or 3 times to get free of all the honey and dirt 6. Add water to cover the combs 7. Put the pot on the fire and heat the mixture slowly 8. Stir until the wax melts (at about 64 degrees centigrade) 9. Once yellow oily liquid beeswax is seen on the top of the water, the mixture is then strained through a wire mesh or cloth bag into the clean empty container or bucket 10. twisting and squeezing mixture 11. Beeswax is squeezed out of the combs 12. cooling the extracted wax for 12-24 hours 13. Lift the sheet of beeswax from the surface of the water and discard the water 14. Removing debris from the bottom of the wax cake once it has hardened 15. To obtain even purer wax melt the wax in a double boiler and strain again 16. Storage of extracted wax 17. Record keeping
Precautions	▪ good sanitation practices are essential ▪ appropriate conditions for extraction ▪ Using recommended level of melting ▪ Using of appropriate materials and tools
Quality criteria:	Color Odour Cleanness or absence debris

Operation Sheet 4- Starting up pressing and extraction processes

Operational title:	**Solar wax extraction**
Purpose	To acquire and develop the knowledge, ability and right attitude to perform beeswax extraction using solar in accordance with operational standards
Equipment, tools, products and materials	Solar beeswax extractor, beeswax and bucket
Conditions or situations for the operation	▪ There must be good solar radiation for extraction ▪ Availability of sufficient beeswax ▪ Availability of suitable and functional solar wax extractor
Procedures	**1.** Wear PPE 2. Prepare necessary materials, tools and equipments for the operation 3. Wash the sticky combs out in cold water and let the combs dry out in the sun 4. Place the combs on the metal sheets of the meter 5. Place the box in the direct sunshine for a few hours until the wax has melted, run into the container 6. And formed blocks 7. Strain it through a cloth into a second container 8. settle the extracted wax in appropriate container 9. scrap debris 10. store extracted wax 11. Record keeping
Precautions	▪ good sanitation practices are essential ▪ appropriate conditions for extraction ▪ Using of appropriate materials and tools
Quality criteria:	▪ Color ▪ Odor ▪ Cleanness or absence debris

LAP TEST	Performance Test

Name……. ID…… Date……..

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **12** hour. The project is expected from each student to do it.

Task-1: Perform honey extraction using honey extractor

Task-2: Perform honey extraction using honey presser

Task-3: perform hot water wax extraction

Task-4: perform solar wax extraction

LG #31	LO #3- Shut down the pressing process

Instruction sheet

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

- Shutting down the process
- Dismantling and preparing equipment for cleaning
- Collecting, treating and disposing wastes as workplace procedures
- Conducting work as workplace environmental guidelines

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

- Shut down the process
- Dismantle and prepare equipment for cleaning
- Collect, treat and dispose wastes as workplace procedures
- Conduct work as workplace environmental guidelines

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1- Shutting down the process

The honey extraction using honey extractor or presser involves several processes including honey uncapping, extraction, fltering and storing of honey. After completing the extraction, the operating equipment that is the honey extractor and presser should be shut down and all equipments used should be dismantled, cleaned and sanitized thoroughly.

The beeswax extraction also involves collection of beeswax including the wax after extraction of honey and wax from ‘tej’ houses in to extraction site. After completing wax extraction by using either hot water or solar radiation, the cleaning activities should be undertaken.

Self-Check –1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

2. What activities should be carried out in shutting down the process of honey and beeswax extraction? (10pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short answer questions

1. _____

_____

_____

Information Sheet 2- Dismantling and preparing equipment for cleaning

2.1. Dismantling equipment

Dismantling of equipment is very critical for proper cleaning of equipment as to maintain the shelf life of the equipment. In honey and wax extraction, different equipments used in the operation process should be dismantled for proper cleaning and as to simplify for simply cleaning of each components of the equipment. This activity is used to minimize or avoid contamination and increase the shelf life of the equipment.

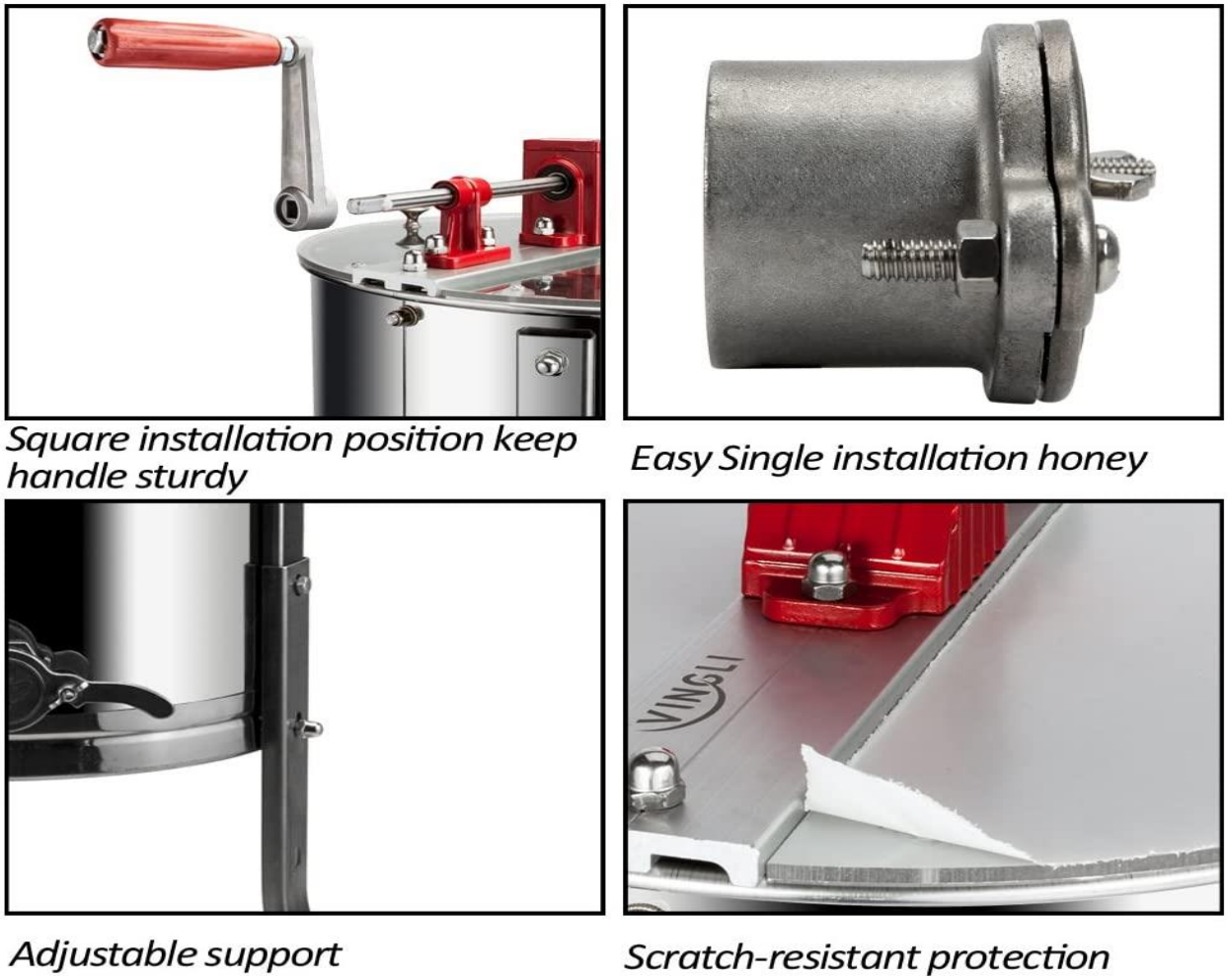

Figure 1: Dismantling of honey extractor

2.2. Cleaning of equipment and tools

Cleaning is the removal of dirt and organic substances from surfaces of tools and equipment. Through the cleaning procedures, high numbers of microorganisms (90% and more) present on the mentioned objects will be removed. However, many microorganisms stick very firmly to surfaces, in particular in tiny almost invisible layers of organic materials and will not entirely be removed even by profound cleaning but persist and continue multiplying. Inactivation of those microorganisms requires antimicrobial treatments, carried out through hot water or steam or through the application of disinfectant. Each component of the equipments should be cleaned by using either wet or dry cleaning methods.

2.2.1. Cleaning a Honey Press

After pressing honey, you should clean the honey press, which involves removing stuck bits of wax and honey. If left, they make the device quite dirty. They can also encourage bacteria and fungi growing on them. Microbial growth on the press can affect the next crop of honey if the press is not cleaned before use. The crop of honey is ruined and the loss can be injurious to the continuity of the beekeeping operation. Honey that is in the open can also attract insects. Some of the attracted insects may predate on nearby beehives and bees.

Good hygiene in beekeeping keeps the quality of beehive products out of question. Quality often determines the price that your beehive products will fetch. The highest quality products get the best prices. Clean beekeeping equipment and other beekeeping management practices help keep the good quality of beehive products. Equipment such as honey presses that are used only at some time periods in the year should be cleaned before and after use. They should also be kept covered so that dust does not settle on them. Cleaning also helps the equipment last longer and perform at its best.

You can use warm water and some food safe detergent to clean the honey press. When washed using some detergent, proper rinsing with clean water is needed. For detailed cleaning, honey presses are made to be easily dissembled so you can clean all parts

properly. Contrary to some sources, you should not boil honey in the press to make it flow out better. Some heating can be done but it ruins honey when it exceeds 104^0 F (40^0 C). Nutrients in the honey get destroyed when subject to high temperatures.

2.2.2. Cleaning a Honey extractor

Honey extractors can be quite expensive piece beekeeping equipment. Every beekeeper understands that proper cleaning and maintenance of any beekeeping equipment helps guarantee a good service and extends its useful life. The extractor is particularly delicate since that is the last place the honey leaves before being bottled for consumption. It therefore has to be meticulously clean and free from any contaminators or dirt. Some advice that this delicate equipment be left out after use so that the bees can indulge in what is left, but this is bad advice. Doing so increases the possibility of spreading bee diseases. The safest way of handling the extractor after use is proper cleaning and storage.

Ways of Cleaning the Honey Extractor

- Before cleaning, ensure the honey gate or valve is securely closed. Tilt the extractor at a steep angle such that the remaining honey flows towards the gate. Increase the room temperature and leave the extractor overnight.
- The next day you will find substantial amount of honey collected at the bottom of the extractor. Open the valve and collect this in a bottle or any other ideal container. This is for your home consumption.
- Wax and propolis will remain inside the extractor and this has to be cleaned. Following the same procedure, tilt the extractor such that what is collected is directed to the honey gate. Close the valve and fill the extractor with cold or cool water then leave it overnight.
- Empty the extractor the following day and rinse it using cool or cold water. Take a clean kitchen towel and mop up the dregs.
- Keep the extractor bearings away from water when cleaning if the lower bearings are not covered by extractor basket. Use plastic wrap as cover so as to prevent the bearings from getting exposed to rusting.
- Store the extractor in a clean dry area after cleaning.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What is the importance dismantling equipment? (6pts)
2. What is the importance of cleaning? (4pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory – below 6 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

(1) _____

_____

_____

_____

(2) _____

_____

_____

_____

Information Sheet 3- Collecting, treating and disposing wastes as workplace procedures

In honey extraction there might be a production of wastes. As to minimize the potential impacts of waste on the environment, proper collecting and handling, recycling and disposing of waste is very important. As a waste, the left beeswax after extraction must be recycled or extracted to purify for another use while the remaining of waste water should be either treated or disposed as workplace procedures.

3.1. Waste collection

Waste collection is the process of handling wastes at the workplace area according to their characteristics using appropriate containers. In Honey extraction process, wastes produced including wax left after honey extraction and waste water must be collected separately, treated and disposed of, or recycled according to workplace procedures. In this process, there might be a production of solid (wax left after honey extraction) and liquid waste water.

3.2. Recycling of left wax after extraction

Beeswax resource as an income generating business is neglected in some areas of the tropics. The valuable beeswax is not properly harvested, collected and handled by the beekeepers and `Tej` house. Knowledge about the value of beeswax and how to process it is often lacking and the large amount of crude beeswax is wasted at the beekeepers back yard and `Tej` making house. The use of beeswax, the rendering techniques and even the existence of market demand for this product is not well known. The beeswax left after honey extraction must be collected, handled and purified to make a marketable beeswax blocks.

Figure 2: recycling of left wax after extraction of honey

3.3. Disposing of sanitary liquid wastes/sewage

The waste water or sewage that is generated from honey extraction at industry level or at home based level and wastes from recycling of left wax after extraction must be collected using appropriate container. The waste from washing of equipment and hands and industrial sewage (wastes from mead industry) is said to be sanitary sewage

Waste water is one of the major wastes produced in the processing of honey extraction. Thus, the liquid waste produced in this process should be handled, managed and disposed properly to minimize environmental pollution according to workplace procedures. In turn, drinking water can be contaminated, and aquatic ecosystems can be disrupted if the waste water is discharged in the water sources and also liquid waste have a characteristics of quick seeping into the earth.

Figure 3: liquid waste trash bin

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

3. List out the type of wastes produced in honey extraction process? (6pts)
4. How to minimize the impact of wastes on environment? (4pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory – below 6 points**

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
2. _____
   _____
   _____
   _____

Information Sheet 4- Conducting work as workplace environmental guidelines

In extraction of honey and beeswax, there is various production of waste water in the workplace area. These wastes have a negative impact on environment if mishandled and managed. In honey processing, the honey processor must work in line with workplace environmental guidelines. Beside to this, in order to make the workplace environment healthy and safe from any waste pollution, prioritizing risk management strategies is essential. It is also important to maintain the personnel healthy and safety focusing on the prevention of irreversible and / or significant impacts. Favoring strategies that eliminate the cause of the hazard at its source for example, by selecting less hazardous materials or processes that avoid need for environmental health and safety controls. In addition to these, environmental guidelines restricts the leakage of liquid wastes to water sources (river, lake and etc) as to minimize its impact to human health and the environment.

Self-Check- 4	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. List out the works to be conducted in honey extraction ? (10pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____

LG #32	LO #4- Record information

Instruction sheet

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

- Recording workplace information
- Interpreting recorded Information

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

- Record workplace information
- Interpret recorded Information

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”. Try to understand what are being discussed. Ask your trainer for assistance if you have hard time understanding them.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work. (You are to get the key answer only after you finished answering the Self-checks).
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test” which is placed following “Operation sheets” ,
8. If your performance is satisfactory proceed to the next learning guide,
9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information sheet 1- Recording information

Record is document that memorializes and provides objective evidence of activities performed, events occurred, results achieved, or statements made. Records are created or received by an organization in routine transaction of its business or in pursuance of its legal obligations. A record may consist of two or more documents. Record keeping is essential, especially to comply with food safety requirements. The formats should develop for keeping records. The food safety plan of the enterprises will specify what records need to keep.

In honey processing (extraction) the following are some suggestions for records you might keep:

- Approved Suppliers list
- Batch numbers
- Cleaning and sanitizing schedule for the extracting room
- Cleaning and sanitizing schedule for each piece of equipment
- Register of date/time of checks of containers for cleanliness and condition
- Number of frames or supers extracted and their identification numbers
- Number of containers filled for each type of honey
- Samples collected, including identification numbers to link them to batches of honey and frames or supers
- Temperature test of honey at storage
- Temperature test of honey at tank or container
- Moisture content of honey
- Encountered problems in quality and safety
- Measures take

1.1. Documenting record

The following are the most common ways of information recording methods

1. Paper-based records

Examples of paper-based records include:

- Reports
- Magazines, journals and Minutes of meetings
- Business letters
- email messages and memos
- Faxes
- Forms
- Production out put
- newspapers
- Project files
- Contracts

Figure 1: File cabinet system

2. Electronic based documenting

Many organizations store records and information electronically. Storing information electronically can save space and paper. Examples of electronic records include:

- Production out put
- Customer records, sales records and financial records
- Electronic correspondence such as email and faxes computer files of letters, memos and other documents.

Information can be easier to access if it is stored electronically. You can search through records and copy information easily into other documents or files. The information in electronic records can also be updated, deleted or changed more easily than hard copy records.

Figure 2: Electronic based records

Self-Check- 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What type of information should be recorded in honey extraction? (10pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

1. _____
   _____
   _____
   _____
   ____

Information Sheet 2- Interpreting recorded Information

Information interpretation is the process of reviewing recorded information or data through some predefined processes which will help assign some meaning to the data and arrive at a relevant conclusion. It involves taking the result of data analysis, making inferences on the relations studied, and using them to conclude.

2.1. What is information interpretation?

Data Interpretation is the process of making sense out of a collection of data that has been processed. This collection may be present in various forms like bar graphs, line charts and tabular forms and other similar forms and hence needs an interpretation of some kind. Here we will learn about data interpretation with the help of many important techniques and examples. We will see how we can make sense out of the graphical data and other forms of it. We shall learn to use it to solve the most common questions that are present in this section of the quantitative aptitude.

The process by which sense and meaning are made of the data gathered in qualitative research, and by which the emergent knowledge is applied to clients' problems. This data often takes the form of records of group discussions and interviews, but is not limited to this

2.2. Purpose of information interpretation

Interpreting takes place in many settings and for many reasons:

- To identify the progress of the work
- To identify strength of the organization or enterprise
- To identify weakness of the organization or enterprise
- To identify opportunity and threat of the organization or enterprise
- To take a corrective action

Self-Check- 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Short Answer Questions

1. What is the purpose of data interpretation? (10pts)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

2. _____

_____

_____

_____

Reference Materials

Book:

1. Beekeeping, B. (2012). The National Bee Keeping Training and Extension Manual.
2. Bee Ag skills: A Practical Guide to Farm Skills, 2007, NSW Department of Primary Industries
3. The Bee Book: Beekeeping in Australia, 2nd edition, 2005, Peter Warhurst and Roger Goebel, Queensland Department of Primary Industries and Fisheries
4. Processing of Bee Products
5. Honey and Bees wax Product Processing and Research Department, Bishoftu-Ethiopia August, 2018

WEB ADDRESSES

1. Read more: http://www.businessdictionary.com/definition/record.html
2. file:///C:/Users/QZHB/Desktop/honey%20extraction/book-on-modern-bee-keeping-honey-processing-technology.pdf
3. https://www.publications.qld.gov.au/, or phone 1800 801 123.
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6. file:///honey_processing%20(2).pdf

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This TTLM was developed on September 2020 at Bishoftu, Management Institute

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