Bee product processing Level-II

Based on October 2020, Version 2 Occupational standards

Module Title: Performing bee product quality Assurance Tests

LG Code: IND BPP2 M07 0920 LO (1-5) LG (24-28)

TTLM Code: IND BPP2 M09 TTLM 0920v1

September, 2020
Bishoftu, Ethiopia

United Nations
Educational, Scientific and
Cultural Organization

Table of contents

LG #24	LO #1- Interpret test requirements

Instruction sheet

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

- Reviewing the test request
- Identifying Hazards and enterprise controls

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:

- review the test request
- identify Hazards and enterprise controls

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- Reviewing the test request

1.1. Introduction

Quality Assurance and regulations

The quality of honey is determined primarily while it is being produced in the hive. The beekeeper plays an important role in this, as well as the size of the hive and the timing of the harvest. The quality of the products can scarcely be improved once they have been removed from the hive, but their quality can be diminished during harvesting, extraction, further processing and storage.

Preserve duration can be improved during further processing but this also diminishes the quality in certain ways: the product loses its freshness and its therapeutic value is reduced. The edible products (honey, pollen, bee bread, bee milk and bee brood) all contain biologically active ingredients that can lose some of their effectiveness. Beeswax, propolis and bee venom, on the other hand, retain their original qualities much better after extraction and further processing

Quality control by the beekeepers

Beekeepers do not really need to perform complicated tests to determine the quality of their honey, because they know whether the honey is fresh and raw and whether the moisture content is good. They can see this by looking at how syrupy it is, for example. The beekeeper has also been present during production, harvesting, extraction and any other further processing and thus knows the products' production history.

Simple measurement techniques are also available for use in the field. These are recommended, especially for larger producers and beekeepers' associations, because by measuring the result the beekeeper can improve the quality of his or her production methods. This will also allow him or her to market the products better.

It is important for a beekeeper and processors to identify, harvest, grade and handle excellent Quality honey and bees wax for marketing purposes. The quality of honey can

be judged from its cleanliness, taste, smell, color and moisture content additionally analysis of quality and safety parameters.

- Honey must be clean and clear - no dirt, dead bees, wax, dust, splinters of wood or ashes.
- Honey must have a good taste. It should not be too smoky or have a fermented taste. Chemicals and insecticides can affect the smell and taste of honey.
- Honey must have a good smell. Harvesting old dark combs and brood combs can affect the smell and color of the honey. Over smoking the combs can also affect its smell.
- Honey must have a good color – this depends upon the nectar source and age of the combs. Usually dark honey has stronger flavor and light colored honey a more delicate flavor.
- The Presence of pollen can make the honey appear muddy or cloudy but is in fact highly nutritious and good for the body.

1.2. Sample test and equipments involved

Samples to be taken and tested as far as possible, using sterile techniques (wherever microbiological tests are applicable) i.e., sampling personnel should use sterile gloves, sealed sterilized bags or sterile bottles. To avoid contamination from lot to lot, the sampling equipment (microscope, refractometer and other lab equipments used) has to be clean, dry and free from foreign odours. Using sharp objects should be avoided to prevent the possibility of damage to the surface of the equipment

1.3. Methods of tests carried / laboratory/field assistants

1. **Visual tests:** is a method that is used to judge the samples through observation. This can be by their:
    - Appearance
    - Colour
    - Texture
    - Identity

- Turbidity or viscosity

Physical tests: in this method the samples are tested by their:

- Particle size
- Particle shape and
- size distribution

Chemical tests: This test refers testing of chemical compositions under laboratory analysis. His may include:

- refractive index (alcohol content and Baume/Brix
- density
- specific gravity
- compacted density
- moisture content and
- water activity

Some of the equipments for sample test

Hydrometer: This instrument measures the density (gravity) of liquid and can be used to tell us how much sugar is in our mead. This can then tell us how much alcohol will be in the finished mead

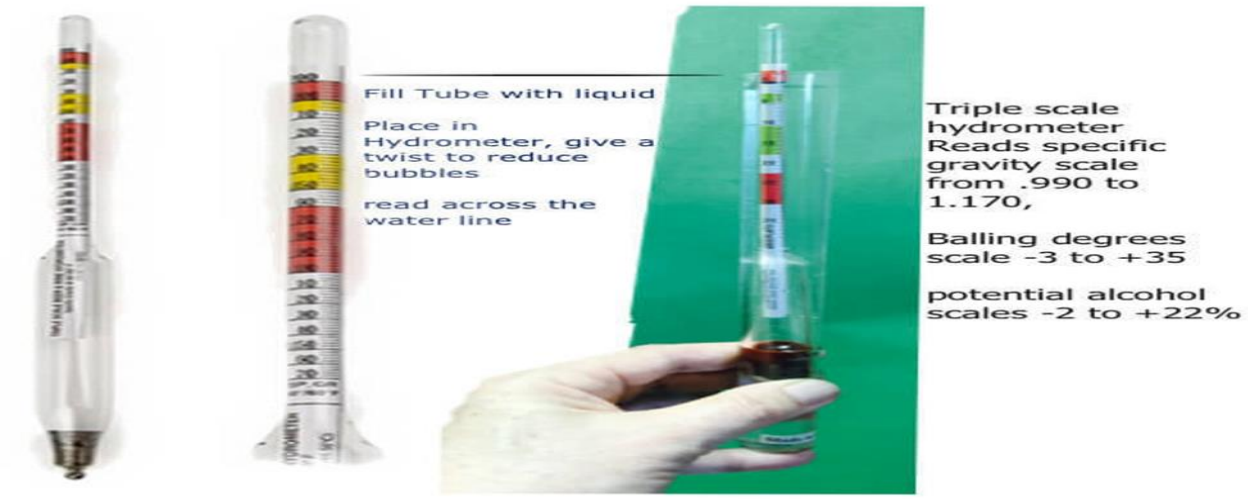

Figure 1: Hydrometer

Pfund scale: an instrument used to measure the colour of the mead in millimeter. The liquid solution of mead is immersed on to the sensory of the pfund scale.

Figure 2: Pfund scale

pH meter: is an instrument used to measure acidity or alkalinity of a solution

Figure 3: pH meter

Refractometer: an instrument used to measure the moisture content of honey

Figure 4: Refractometer

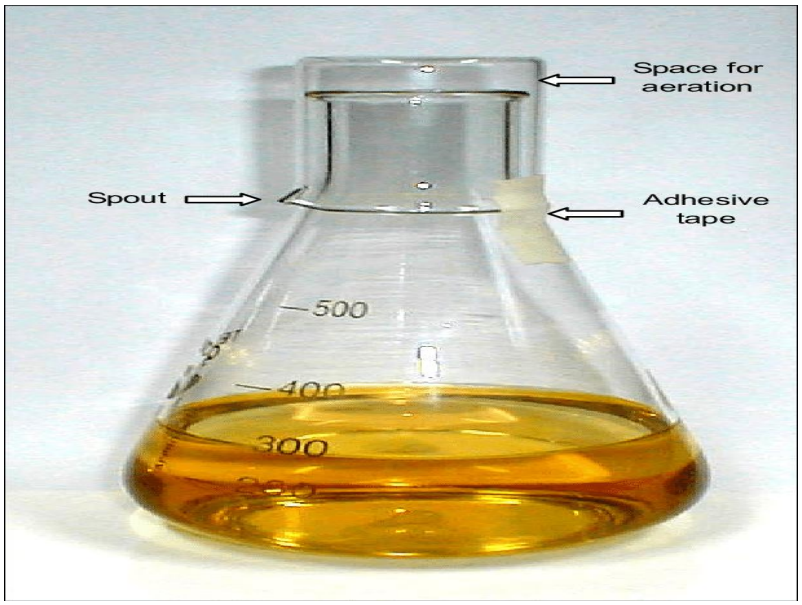

Figure 5: Measuring beaker

Figure 6: Measuring flask

Self-Check -1	Written Test

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

1. List down 3 sampling equipments (3pts)
2. The quality bee product can be diminished during extraction, further processing and storage. True/false (2pts)
3. Mention the 4 **t**ype of tests carried / laboratory (4pts)

Note: **Satisfactory rating – 9 points** **Unsatisfactory - below 9 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____

3_____

- _____
- _____
- _____

Information Sheet 2- Identifying Hazards and enterprise controls

Definition

Basically, a hazard is the potential for harm or an adverse effect (for example, to people as health effects, to organizations as property or equipment losses, or to the environment).

What is hazard identification?

Hazard identification is part of the process used to evaluate if any particular situation, item, thing, etc. may have the potential to cause harm. The term often used to describe the full process is risk assessment:

- Identify hazards and risk factors that have the potential to cause harm (hazard identification).
- Analyze and evaluate the risk associated with that hazard (risk analysis, and risk evaluation).
- Determine appropriate ways to eliminate the hazard, or control the risk when the hazard cannot be eliminated (risk control).

Overall, the goal of hazard identification is to find and record possible hazards that may be present in your workplace. It may help to work as a team and include both people familiar with the work area, as well as people who are not – this way you have both the experienced and fresh eye to conduct the inspection.

Hazard identification can be done:

- During sampling of honey and bees wax for testing(materials and equipments)
- Harvesting of honey wax(due to moisture content)
- Bees wax processing and rendering
- Storing, transporting and dispatch of bee products (due to Adulteration, contaminants , pests and chemicals) in the samples

Common workplace hazards

- Fire/Explosions
- Thermal and Chemical Burns
- Skin Absorption of Chemicals
- Inhalation of Toxic Fumes
- Cuts to the Skin

Hazard control measures

Understand and know the Occupational Safety and Health Administration's (OSHA) five types of workplace hazards and take steps to mitigate employee risk**.**

Safety Hazards: Safety hazards encompass any type of substance, condition or object that can injure workers. In many types of workplaces they can include spills on floors, walkways blocked by cords or boxes, falls from heights, machinery with moving parts, confined spaces and electrical hazards such as frayed cords.

Figure 7: Safety hazards

Chemical: Workers can be exposed to chemicals in liquids, gases, vapors, fumes and particulate materials. Chemical hazards include acids, pesticides, carbon monoxide, flammable liquids, welding fumes, silica dust and fiberglass fibers.

Figure 8: chemical hazards

Biological: Employees who work with other people, with animals or with infectious materials can be exposed to biological hazards such as fungi, mold, viruses and bacteria.

Physical: A physical hazard can injure workers with or without contact. These types of hazards include radiation, working in extreme heat or cold, spending hours under the sun or being constantly exposed to loud noise.

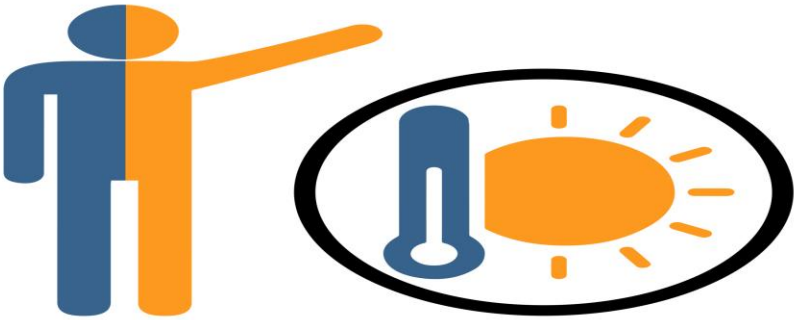

Figure 9: physical hazards

Ergonomic: Ergonomic related musculoskeletal disorders (MSDs) account for 33% of all employee injury and illness cases. These types of hazards occur when repetitive work, the type of work, or a certain position strains the body. These are the most difficult hazards to spot because problems build up over time.

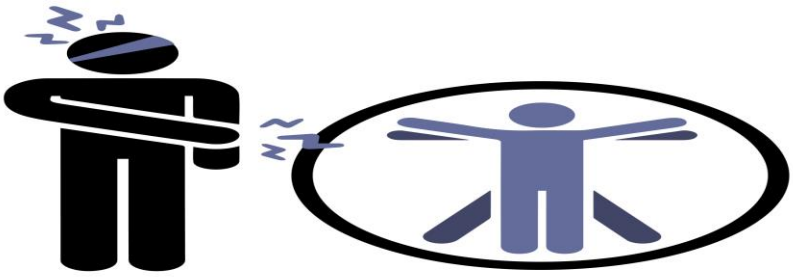

Figure 10: Ergonomic hazards

Generally, minimizing or eliminating workplace hazards need not be time-consuming or even expensive. Being aware of possible hazards can increase productivity, prevent illness, reduce days off and save lives.

2.1. Hazards (from honey product quality a point of view)

- Honey must be clean and clear - no dirt, dead bees, wax, dust, splinters of wood or ashes.
- Honey must have a good taste. It should not be too smoky or have a fermented taste. Chemicals and insecticides can affect the smell and taste of honey.
- Honey must have a good smell. Harvesting old dark combs and brood combs can affect the smell and color of the honey. Over smoking the combs can also affect its smell.
- Honey must have a good color – this depends upon the nectar source and age of the combs. Usually dark honey has stronger flavor and light colored honey a more delicate flavor.
- The Presence of pollen can make the honey appear muddy or cloudy but is in fact highly nutritious and good for the body.

2.2. Considered Food safety requirements and enterprise hazard control

- Understand food safety risks in the production and primarily processing of raw honey and to provide the minimum food safety management system and procedures.
- 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.

- Standards require the food producer to have systems in place in cause of traceability and product recall.
- 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, including how samples must be taken and stored.

Self-Check -2	Written Test

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

1. What is hazard identification (2pts)
2. When should hazard identification be done in bee product sampling?(4pts)

Note: **Satisfactory rating – 9 points** **Unsatisfactory - below 6 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

LG #25	LO # 2- Prepare sample

Instruction

Learning Instructions:

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

- Recording and reporting sample description
- Preparing sample

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 and report sample description
- prepare sample

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 and reporting sample description

For each honey and bees wax sample collected bee keeping Authorized officer should write a brief report for use by the laboratory and other interested parties. Where applicable the report should have some of the following information:-

- Sample number
- Date collected
- Product name
- Type of the Products
- Indicate analysis needed where possible
- Owner's codes
- Owner's name and address
- Size of lot from which sampled
- Date submitted to the lab
- Description of sample and method of collection (number and size of units)
- Collectors Identification
- Name of the sampler or authorized officer

The Guidelines of food sample can be used by users who can select from the recommended sampling plan the best suited for the inspection to be made depending on the purpose of sampling.

Principles of Record-Keeping Practices:

- Complete records in real time whenever possible. Recording after-the-fact (from memory) can often lead to errors.
- Have records that are as accurate as possible. Unconfirmed diagnosis or suspicion of a pest should be identified as such.
- Be aware that errors in entering information should be struck-through, dated, and initialed, rather than erased or otherwise obscured.
- Know that dated and properly identified digital camera images are a useful supplement to written records.

- File all documents such as receipts, invoices, diagnostic reports, and permits in a secure location.

Self-Check -1	Written Test

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

3. Mention some important information included in reporting when needed (7pts)

Note: **Satisfactory rating – 7 points** **Unsatisfactory - below 7 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____
- _____
- _____
- _____

Information Sheet 2- Preparing sample

Sample preparation

Sample preparation refers to the ways in which a sample is treated prior to its analyses. Preparation is a very important step in most analytical techniques, because the techniques are often not responsive to the analyte in its in-situ form, or the results are distorted by interfering species. Sample preparation may involve dissolution, extraction, reaction with some chemical species, pulverizing, treatment with a chelating agent (e.g. EDTA), masking, filtering, dilution, sub-sampling or many other techniques. Treatment is done to prepare the sample into a form ready for analysis by specified analytical equipment. Sample preparation could involve: crushing and dissolution, chemical digestion with acid or alkali, sample extraction, sample clean up and sample pre-concentration.

Sampling involves collecting, holding, sealing, storing and delivering the beeswax and honey samples to the laboratory in the manner that will reflect the condition or state prevailing at the time it is sampled. Beeswax and honey samples must be prepared, handled and dispatched in the manner that prevents change of identity, breakage or spoilage

Sampling guidelines

- Use containers that are clean, dry, leak proof, wide mouth, sterile, air tight and of a size suitable for submission. Plastic or glass jar containers that are leak proof may be used for honey.
- All samples packed for dispatch must be secured with shock absorbing materials to protect them from damage. Containers should be wrapped heavily in paper and cushioning material for dispatch.
- In order to maintain integrity, packages containing beeswax and/or honey s samples should be secured or sealed to prove their authenticity i.e. to ensure they have not been tampered with or changed, on transit to the laboratory
- Sample size should range between 250gm to 500gm depending on number of parameters for analysis.

Selection of sample preparation procedure

Sample preparation is performed for the specific purpose of modification of the sample to make it amenable for a particular chemical analysis or to improve that analysis. A number of factors are essential for the selection of a sample preparation method, and these factors are strongly interdependent. For a given analysis, there may be a number of literature-reported sample preparation techniques acceptable for the analysis, and the goal in this case is the selection of the most appropriate one.

In any case, several factors must be considered in the selection of an available procedure or the development of a new one. The most important ones are

- the purpose of analysis,
- sample characteristics,
- analyte content,
- the choice of the core chromatographic technique.

These factors determine either the selection of a preexistent sample preparation procedure when it is available in the literature or the development of a new procedure. Other particular factors may be important for a specific analysis, and it is the analytical chemist who should decide their role in the development of a new sample preparation procedure.

In bee product processing industry, the type of bee product sampling to be used depends upon a number of factors.

- The type of sampling
- The equipment available
- The environmental condition
- The nature of the toxic contaminants

Sample preparation method and Laboratory sampling procedures involve either:

- Coning and Quartering
- Riffling Method
- diluting samples

- physical treatments, such as ashing, dissolving, filtration, sieving, centrifugation and commination molding, casting or cutting specimens

1. Coning and Quartering for sample preparation techniques/method

The method which is used for sampling large quantities of material say 20kg, consists of pouring or forming the material into a conical heap upon a solid surface (e.g. Moulded bees wax) and relying on radial symmetry to give four quarters when the heap is divided by a cross. Two opposite corners are taken as the sample the other two set aside. The portions chosen may be further reduced by a repetition of the process, until the required size of sample is obtained.

Example 1. Operator skill defines the accuracy of this form of sampling.

Procedure of Coning and Quartering an approximate 50kg sample

1. Starting sample weight (approximately 50 kg)
2. Set up adjacent to work area.
3. Clean steel plate.
4. Spread out sample and mix thoroughly into conical heap.
5. Quarter.
6. Repeat quartering.
7. Bag sample – replace container to storage with excess sample.

It is expected that steps 1 – 6 should take less than 30 minutes.

Example 2. Steps or Procedure for Quartering

1. Place the original sample in the center of a clean, dry, steel plate or other hard, smooth, non-absorptive surface.
2. Thoroughly mix the aggregate and using a scoop or any suitable tool, and form a cone-shaped pile.
3. Uniformly flatten the pile until the diameter is approximately equal to four to eight times the thickness.

4. With a large trowel or other suitable tool, divide the sample in half by vertically passing the tool through the center of the pile. In a similar manner divide each of these halves into two parts, thus quartering the sample.
5. Combine diagonally opposite quarters of the material into two samples. Store one of quartering these two halves. If the remaining material still weighs too much, repeat the entire quartering process until the proper test sample size is obtained.

Notes

This method of sample reduction is employed when a mechanical splitter is not available.

- Accuracy in is most easily attained, in the case of fine and all in aggregate, with damp material.

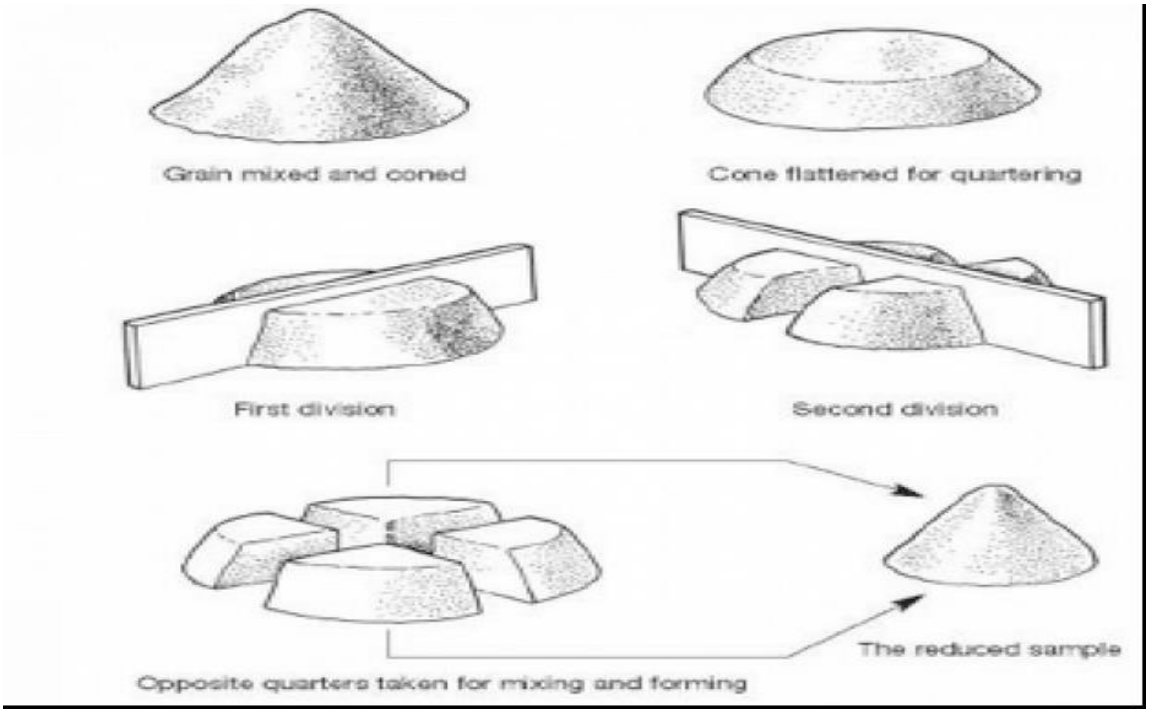

Figure 1: Quartering of samples

1. The Riffle Splitter in sample preparation techniques/method

This sample splitter is an open V-shaped container under which a series of chutes are at right angles to the long axis, giving a series of rectangular slots of equal area. These alternatively feed two collection trays. The sample whose particular size allows free movement through the slots (the largest particle being one-third the riffle opening) is

poured into the feeder and becomes split into equal portions. After repeated cycles the desired sample size is obtained.

Procedure for the Riffle

1. Set up sample and rife, ensuring that the rife is initially clean.
2. Rife once.
3. Repeat riffling, discarding every alternate sample.
4. Bag sample and label – store excess sample.
5. Clean rife.

The above sequence of steps should take 15 minutes.

Figure 2: sample splitter

Methods of Riffling

As an alternative, the gross sample can be reduced by using a mechanical quartering device, such as by a sample divider or riffler. Riffle dividers are particularly useful with large samples which are normally more difficult to sub- sample. They are available in many sizes ranging from bench to floor mounted models.

A riffler (figure 3) below can be used to divide a sample in to two approximately equal parts. The distance between the slots can vary and should be at least three times the size of the largest particle in the lot. The material to be sub divided is poured in to the top of the box or a feeder and the sample is divided longitudinally and emgres as two equal portions.

The procedure of dividing is repeated, discarding the portions from alternate slots, until a portion of suitable size obtained for analysis.

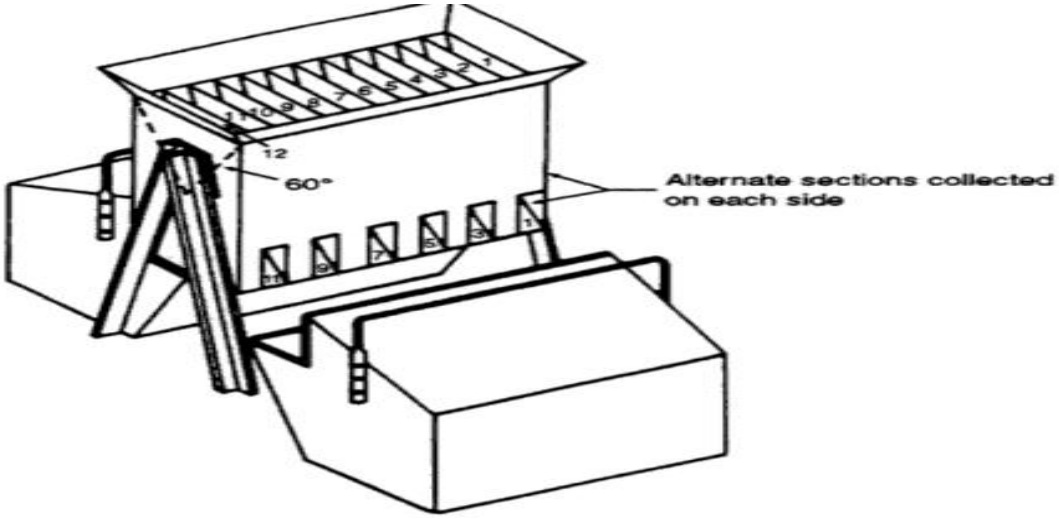

Figure 3: Riffle sample divider

Dilution: is the mixing of different samples for making homogeneity. Dilution requires the thorough mixing of a small, accurately measured sample with a large volume of sterile water, saline or other appropriate liquid called the diluent or a dilution blank. Accurate dilutions of a sample are obtained through the use of pipettes and the dilution blanks are precisely measured when prepared before the measuring experiment. For ease of calculation, dilutions are done in multiples of 10 or 100.

A single dilution is calculated as follows:

$$\text{Dilution} = \frac{\text{volume of the sample}}{\text{total volume of the sample + diluent volume}}$$

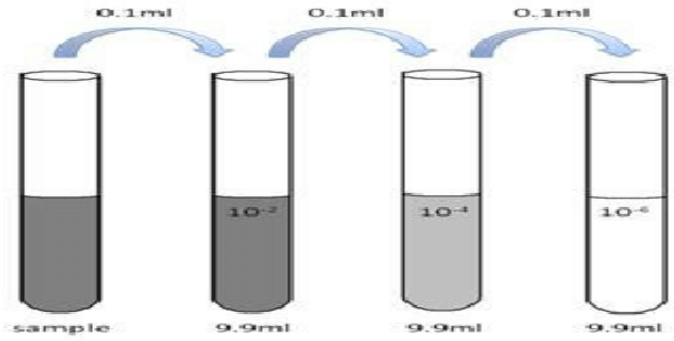

Figure 4: Sample dilution

Self-Check -2	Written Test

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

1. What are the factors considered in the selection of an available procedure or the development sample preparation techniques acceptable for the analysis (4pts)

2. Describe the procedure of Coning and Quartering an approximate 50kg sample(7pts)

Note: **Satisfactory rating – 11 points** **Unsatisfactory - below 11 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____

_____

LG #26	LO #3- Check equipment before use

Instruction sheet

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

- Setting up test equipments
- Performing pre-use and safety checks
- Identifying and reporting faulty or unsafe equipment
- Checking and reporting calibration status of 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**:

- set up test equipments
- perform pre-use and safety checks
- identify and report faulty or unsafe equipment
- Check and report calibration status of equipment

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- Setting up test equipments

Sanitizing

In order to set up test equipments of bee product, it is important to keep it cleanness and the test equipments and cleaning materials/reagents must be set first.

An approved sanitizer must be provided for sanitizing food product contact surfaces. Sanitizers must be used at appropriate strengths as specified by manufacturer. Three common sanitizers, and the typical concentrations required by manufacturers. Soak clean, rinsed items in sanitizing solution for at least 60 seconds and then air dry. An approved test kit to measure sanitizer concentrations must be available and used.

Some common test equipments for bee product processing

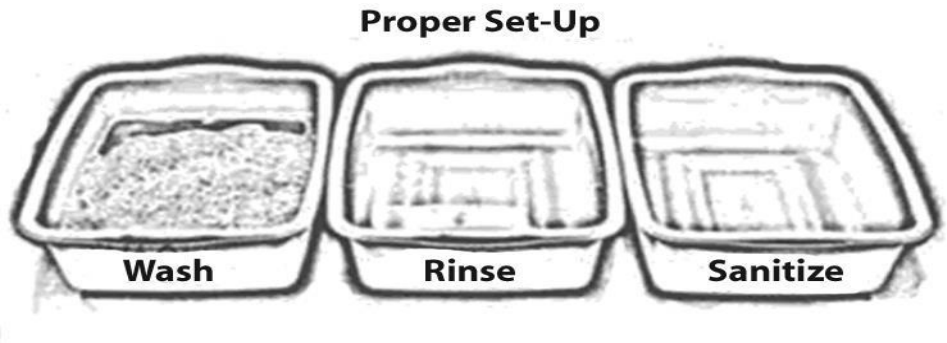

Fig.1. Common sanitizers

Honey pressing equipments: should be ready for sampling honey and wax sampling

Fig 2. Honey processing equipment

Honey manual extractor: should be ready the operation

Fig 3. Manual Honey processing equipment

Analytical sensitive weighing balance: should ready for accurate measurement of samples

Fig 4. Electric weighing scale

Digital thermometer: an instrument used to measure the temperature of sample and environment

Fig.5: Digital thermometer

Refractometer: an instrument that is used to measure the moisture content of the samples

Fig. 6: Refractometer

It is a machine used to determine the percentage of moisture in honey. It is imported readymade.

Containers: are materials and equipments that are used for handling the samples during sample collection and anaysis

Figure 7: sampling containers

Spiral screw sampler

Sampling of thick and very viscose materials such as sludge, paste-like lubricants (Vaseline) and paste-like foodstuffs such as vegetable or animal fat, jam or honey.

The sampler consists of a robust spiral body and a handle made from metal (stainless steel). Usual dimensions: lengths from 35 cm, diameter up to 3 cm.

Application: Sampling of thick and very viscose materials such as sludge, paste-like lubricants (Vaseline) and paste-like foodstuffs such as vegetable or animal fat, jam or honey.

Operation: The spiral sampler is pressed into the sampled material by pushing and twisting, which ensures the sample is loaded into the spiral. The sampler is then withdrawn and the sample is scraped off by a spatula or scraper into the wide mouth container.

Figure 8: Spiral screw sampler

Hand-drill sampler

Application- Taking samples from soft and semi-solid materials.

Operation: Insert the sampler into the material diagonally. Take care that the drill does not touch the bottom. Make a half turn with the drill and pull it out of the sample. Remove the upper approx 2.5 cm of sampled material.

Figure 9: Hand-drill sampler

Piston-tube sampler

Application: Sampling of viscous media: sludge, suspended materials, aggressive liquids and foodstuffs.

Operation: The piston-tube sampler has three different uses: (i) it can be used like a large syringe to suck in liquids of medium viscosity; (ii) it can be transformed by a slight adjustment into a pipette which is especially suitable for drawing of aggressive liquids or foodstuffs; or (iii) thick or semi-solid materials may be sampled when the end is

removed and the sampler is inserted into the material. After withdrawal the contents of the sampler are pushed out into a wide mouth container using the piston.

Typical examples: Liquids and pastes, incl. aggressive chemicals/foodstuffs (oils, emulsions, creams, etc.).

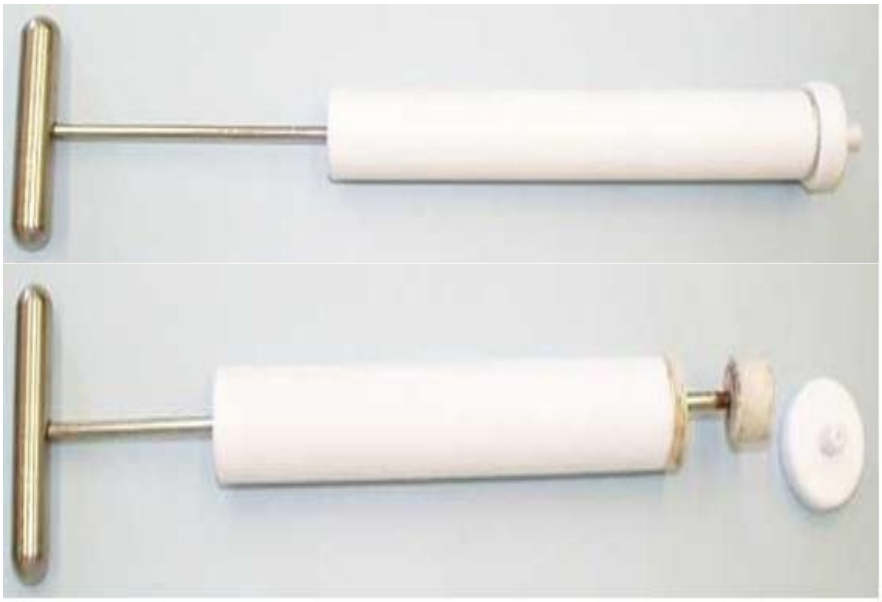

Figure 10: Piston-tube sampler

Other tools and equipment required for sampling operation should be properly set up as enterprise guidelines.

Self-Check -1	Written Test

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

1. Mention at least four different equipments (4pts)
2. Demonstrate the importance of each test equipments (3pts)

Note: **Satisfactory rating – t points** **Unsatisfactory - below 7 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet-2 Performing pre-use and safety checks

Performing pre-start/use and safety checks, service and maintenance procedures including checks of all materials, tools & equipment's using for different purposes in testing samples. For example, during loading & unloading test equipments, fuel and lubricant levels, and an assessment of tyres, wax samples, temperature controls, moisture measure warning lights and electrical systems, braking and hydraulic systems should be conducted.

Other routine checks before starting any work with a machine, including operation, maintenance or repair there are various checks that need to be followed, such as:

- The machine is suitable for the job
- All safety devices such as guards are in place and working correctly
- The operator is properly trained to do this job and use this machine safely
- The instruction manual for the machine has been provided, read and understood
- Suitable clothing is available and worn e.g. close fitting so as not to snag on vehicle and Machinery controls or be caught in moving machine components
- The right personal protective equipment (PPE) is available and worn

    - ✓ Jewelers (including watches and rings) that might snag have been removed
    - ✓ Long hair has been secured (tied back or enclosed in a hair net) in such a way that it cannot snag on vehicle and machinery controls or be caught up in moving machine parts

- a risk assessment has been carried out

- The work has been properly planned and communicated to those who may be at risk
- Everyone understands what needs to be done and has a system of communication agreed on.

Calculations may include the moisture content, weight, temperature air , and safety of the sample to be handled and dispatched

Sample testing materials and equipment is tangible personal property that is used directly in collecting, handle, process and store bee product on the farm area and laboratory used for testing. What may be involved in routine pre-operational checks or monitoring operation of tools/materials or equipment's? This may include routine safety and pre-start checks and preparatory procedures including cleaning, lubricating, and hand sharpening,, cleaning containers(plastic, glass and metal), tightening, basic repairs and adjustments.

Reason for completing pre-operational and regular checks

The reason for conducting pre-operational and regular checks is to reduce the potential for time out of the bee product processing due to maintenance issues, and to ensure the equipment system is working correctly and efficiently. Good maintenance and regular checks can help to resolve minor problems before they lead to the need for major repairs. Unexpected downtime at critical periods in the season can be especially frustrating when conditions are good for equipment. There are many things the operator should check on a regular basis. Some of these will be quick checks while using, others may be at the end of the task or the end of a day's using. The most important of all checks the operator/bee product processor can do is when the equipment is first delivered. Never assume that new equipment is ready to use when it arrives on-farm and or in product sample testing/or bee product processing.

Checks to do when the equipment is first delivered

If the equipment is not new, always clean the equipment externally with appropriate decontamination agents before doing any checks, measurements or adjustments.

- Read the equipment operation, maintenance and rate-controller manuals before operating the equipment.
- Check the manufacturer's maintenance requirements and replacement schedules for items such as filters. Note these in a prominent place or in a maintenance register.
- Check and record the current rate controller settings before doing anything else. Ideally these would be recorded in the rate-controller manual or/and electronically along with the date they were checked, before operating the sprayer.
- Do not take samples during stormy weather with electrical discharges or hail.

Safety guards*:* check the safety guards are located in the appropriate position.

Checks are conducted on all equipment with insufficient or faulty items reported to the supervisor. As the business grows and you get more clients and more assignment, you can get more tools and equipment and offer more services. Employers are also required to ensure that those using equipment have sufficient knowledge and training to use it safely.

Self-Check -2	Written Test

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

1. What may be involved in routine pre-operational checking operation of tools or equipment's? (5pts)
2. Reason out why conducting pre-operational and regular checks of equipment? (5pts)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 3- Identifying and reporting faulty or unsafe 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 for bee product sampling 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 bee product sample test

Reporting

Documents provide written information about policies, processes, and testing procedures and should be stored in the laboratory quality manual for each laboratory. This manual should serve as a basis for writing the laboratory Standard Operating Procedures (SOPs) which need to be adapted to the laboratory's role and capacity. The SOPs, QC/QA procedures, specimen testing request forms, report forms, and other laboratory forms are all important components of the quality manual, which documents the quality management system.

Why Reporting?

- Accountability
- Program monitoring
- Program evaluation
- Program improvement
- Sharing the lessons learned with other

Figure 11: Discussion on report

Self-Check -3	Written Test

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

1. Why reporting of fault equipment required to supervisor? (2pts)
2. What will be done after reporting to supervisor? (3pts)

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

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 4- Checking and reporting calibration status of equipment

What is Calibration?

- A response to a known value which establishes a relationship between the known value and an indicator and established tolerance
- I have the result, I know what it should be—what is my answer in relation to the known value and how much can I tolerate the difference?

The purpose and goal of calibration is to ensure that measuring equipment that is used to carry out critical measurements function as intended. Calibration ensures that equipment monitors a food process accurately and consistently, and controls physical, chemical or biological hazards in the food operation.

Measuring equipment includes the following:

- temperature measuring/recording devices;
- timing devices;
- scales balances;
- metal detectors;
- water activity meters;
- pH meters;
- flow meters; and other equipments

It is recommended that calibration is also applied to equipment used in monitoring GOP parameters (e.g. refrigeration temperatures) and product parameters (e.g. product weight).

Intermediate Checks

There need to be defined procedures and schedules for carrying out checks needed to maintain confidence in the calibration status of:

- Reference standards
- Primary standards
- Working standards

- Transfer standards
- Reference materials

Records

- Keep records to demonstrate compliance with the requirements
- Keep the following records for calibration
  - ✓ identification, location and calibration status of equipment
  - ✓ calibration schedules
  - ✓ certificates of accuracy or calibration and
  - ✓ In-house calibration records

Some questions to ask

- Is there a system with a procedure on commissioning equipment, verifying its performance and calibration prior to use?
- What is the plan/procedure for continuing calibration and verification of the equipment's performance?
- Are there records that show the continuing calibration and verification is ongoing on regularly scheduled intervals?
- Are there labels that a user may see immediately to determine the status of the regular checks and calibrations?
- After doing so it is important to report to the concerned body/ person in charge

DAILY CALIBRATION REPORT

CALIBRATION CERTIFICATE NO

INSTRUMENT DETAILS	
NAME OF INSTRUMENT	
MAKER	
RANGE	
LEAST COUNT	
AM IDENTIFICATION NO	

DESCRIPTION & IDENTIFICATION

FREQUENCY OF CALIBRATION	
LOCATION / AREA	

CALIBRATION DETAILS

CALIBRATION OF DATE	OBSERVATION STANDARD SIZE OF GUAGE (MM)					STATUS

DUE DATE FOR NEXT CALIBRATION :

Verified & Audited By:

Self-Check -4	Written Test

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

2. What are support equipment that require calibration (5pts)

3. Mention some of questions to be asked in calibrating the equipment? (4pts)

Note: **Satisfactory rating - 9 points** **Unsatisfactory - below 9 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

LG #27	LO #4- Perform tests on samples

Instruction sheet

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

- identifying, prepare and weigh samples
- Conducting test as enterprise procedures.
- Recording Data
- Performing data calculation
- Identifying and reporting out of specification or atypical results
- Shutting down 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:

- identify, prepare and weigh samples
- Conduct test as enterprise procedures.
- record Data
- performing data calculation
- Identify and report out of specification or atypical results
- shut down equipment

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- identify, prepare and weigh samples

In identifying, preparing and weighing samples, a thorough knowledge and care of the balances used in the laboratory is essential. Many weighing are rough and require the top-loading balance. However, semi micro quantities must be weighed using an analytical balance.

Preparing samples

Sample preparation may include but not limited to

- sub-sampling or splitting using procedures:
  - ✓ riffling
  - ✓ coning and quartering
  - ✓ manual and
  - ✓ mechanical splitters
- diluting samples
- physical treatments
  - ✓ ashing
  - ✓ dissolving
  - ✓ Filtration
  - ✓ Sieving
  - ✓ centrifugation and
  - ✓ commination
- Moulding, casting or cutting specimens

Weighing samples

Five precautions you must take for accurate sample weighing It is crucial that you take the right precautions and adhere to the standard operating procedures to ensure the reliability of your reports.

Keep the balance calibrated

First and foremost, keep the analytical balance calibrated at all times. Samples are always weighed against the standard reference weights. Therefore, the lab always has to have a set of certified standard weights.

The scales' calibration must be validated as per the requirements of a recognized national calibration laboratory. Keep the balance calibrated using the standard calibration procedures against daily, weekly, and monthly schedules. Never touch the standard weights with your hands.

Ensure appropriate environment

Use the built-in spirit level to check the horizontal positioning of the balance. Keep the balance in a vibration-free environment. Ensure that you place the balances in an area with controlled humidity and temperature. They should not be exposed to direct sunlight since it can cause temperature variations inside the weighing chamber. Don't place the balances next to doors or windows since opening or closing them will result in air drafts. This could affect the weighing process.

Ensure that you weigh the samples only after closing the weighing chamber doors. Lastly, keep the weighing chamber clean to prevent cross-contamination of samples and erroneous readings.

Handle the weights properly

Never touch the weights with bare hands as hand grease can cause errors in the readings. Always use a pair of clean forceps while placing the samples.

Place the samples gently in the center of the pan. Once you are done using the weights, do not leave them outside the workbench. Keep them inside the slots present in the weight box and keep the box closed. This helps in avoiding minimum environmental exposure.

Use wooden tweezers or tweezers covered with rubber on the tips to prevent the weights from getting scratched. Use gloves when handling heavy weights.

Don't allow the weights to slip on the balance pans as constant slipping may rub and wear down their base. This will cause their mass to decrease and affect the weighing readings. Ensure they don't bump against hard objects.

Store the weights in the right manner

Always store the weights in a room free of moisture, corrosive gases, and dust. If the weights get rusted or dust sticks to them, the mass of the weights will increase. This will result in inaccurate readings.

After using the weights, place them inside a desiccator to keep them dry.

Take the right measures to weigh the samples

Use a clean spatula of appropriate size while placing the sample. Weigh the sample quantity in a volumetric flask rather than opting for butter paper weighing. The latter can introduce errors. Before you record the readings, allow them to stabilize. If you want to weigh small amounts of sample, you need to take extra precautions. For instance, use disposable gloves and head caps to prevent hair fall and use a face mask to prevent breath from affecting the reading. Record the reading directly into the lab notebook. Avoid writing the weight measurement on scrap paper or hands.

You can even add a printer to the balance. This will allow you to print the weight slips without any transcription errors.

Figure 1: sample weighing

Self-Check -1	Written Test

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

1. Mention the two types of sampling methods (4pts)
2. Mention the five important poins used in sample weighing.(5pts)

Note: **Satisfactory rating – 9 points** **Unsatisfactory - below 9 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 2- Conducting test as enterprise procedures

Weigh by difference three samples using the analytical balance.

Clean three 125 ml plastic bottle. Make sure the external walls of the plastic bottles are completely dry. Number them 1, 2, and 3 using pencil on the white spot on the bottles.
A reminder: Throughout the weighing process you should protect the plastic bottles from your hands with a paper towel.

1) Use the plastic spoon provided to transfer about two spoonful samples into a clean dry 50 ml beaker.
2) Take the items listed below with you to the weighing room:
   - 50 ml beaker containing sample that you obtained earlier.
   - A clean 125 ml plastic bottle labeled #1. Make sure the external wall of the plastic bottle is completely dry.
   - Your report sheet.
   - A pen (not pencil).
3) You need to weigh accurately about 0.3 g of sample as follows:
   - Turn the analytical balance ON.
   - After you see a display of 0.0000 g, place the plastic bottle labeled #1 on the pan of the analytical balance.
   - Close the balance windows and touch the TARE button. “0.0000 g ” will be displayed regardless of the mass of the plastic bottle. Record this as the initial reading on the report sheet.
   - Add sample to plastic bottle #1 by holding the beaker in a tilted position and tap it gently with your forefinger. Keep adding little specs of sample until you obtain about 0.3g. Close the balance glass case windows.
   - Record this reading to the one-tenth of a milligram on the report sheet.
   - When you are finished, remove the plastic bottle, close the balance windows, touch the TARE bar, and press the OFF button.
4) To dispense a second sample into another plastic bottle labeled #2, repeat steps 2 and 3 given above.

5) To dispense a third sample into another plastic bottle labeled #3, repeat steps 2 and 3 given above.
6) Show the three samples and your data to your instructor and get his/her signature on the report sheet.
7) Wash and dry your plastic bottle and store them for your next lab period.

Self-Check -2	Written Test

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

1. Mention how we can weigh the sample (4pts)

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 _____

1

- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Information Sheet 3- Recording Data

Record is a document that memorializes and provides objective evidence of activities performed, events occurred, results achieved, or statements made. Records are created/ 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.

Data collection can be initiated when the personnel responsible for data collection have been properly trained and have reached a satisfactory level of standardization. In addition, forms, questionnaires and coding manuals must be considered operational. The description of recording forms, and the techniques and procedures to be employed should be integrated into a standard operating protocol (SOP) for the evaluation (2). In the course of long term studies, changes in procedure may be mandatory. Accordingly, it is advisable to produce the SOP in a loose leaf form for ease of insertions as may be required. However, it is essential that all changes introduced in the course of the evaluation be fully documented in terms of justification, nature of the change and date of implementation.

The general purpose of data recording is to set in writing and assure the preservation of the data collected in the course of field or laboratory studies for the bees product sample collected.

The experimental design of each study determines the types of data to be collected in terms of the objectives and resources available for the study. Whatever the nature of the types of data, however, there is need for suitable forms or questionnaires to record the information to be gathered. It is often convenient to prepare these forms or questionnaires by discipline or type of data. The use of recoded forms or questionnaires that permit the direct registry of data is to be preferred, since with proper training, their use often results in fewer errors. Additionally, only one protocol or set of forms will be used to collect and code the information to be recorded in the field or in the laboratory for each unit of study.

Record Keeping

Records should be kept on bee equipment for each of the following at a level appropriate to the operation (i.e. beekeeper operation, apiary, hive, or equipment component):

- inspection
- equipment disinfection treatments
- equipment repair
- equipment disposal
- Equipment part replacement

An annually updated inventory of hive equipment that is in storage or in use, identified by status, is useful for planning for equipment repairs, culling, and acquisition. A three- to five-year timeline is suggested.

Records should be kept to enable trace back.

Self-Check -3	Written Test

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

3. Mention the why records are kept on bee product equipment appropriate to the operation at all levels. (4pts)
4. Mention the important things considered in Data collection. (4pts)

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 4 - Performing data calculation

Sampling should be done by Food inspectors should buy samples from vendors/owners in presence of external witnesses. These samples are appropriately divided, packed, sealed. A sample pick up report, with other observations and comments is prepared and signed by the inspector, vendor/owner and the witness. As only one sample is picked up randomly, no statistical inferences can be concluded. However, based on findings for one sample test, it would be relevant to have at least 5 to 8 samples randomly picked up for reconfirmation and have some statistical inferences

Based on the vendor being inspected the location for pick up or shop should be one that is handling a large volume of business for that vendor. The generic formula should be used:

- For number packages < 100, minimum of samples has to be sampled
- For number samples > 100 in a batch, root of total number of samples need to be sampled

The number of units that comprise a representative sample from a designated lot of a food product must be statistically significant. The composition and nature of each lot affects the homogeneity and uniformity of the total sample mass. The proper statistical sampling procedure, according to whether the food is solid, semisolid, viscous, or liquid, must be determined by the collector at the time of sampling. Sampling should be done with a proper statistical design which will help cover the regulatory and monitoring issues for safe food production and maintain the transparency in the sample selection procedure. Samples should be dispatched to the Public Analyst as soon as practically possible to avoid any discrepancies in testing.

Some Examples of sample to be calculated as follows:

- Calculate the Wt. of Wax

  Wt. of Wax (g) = Wt. of Waxed Sample - Wt. After Coring or Forming
- Calculate the volume of wax knowing the relative density of the wax (0.914)

$$\text{Volume of Wax } (cm^3) = \frac{\text{Wt. of Wax}}{0.914}$$

- Determine the volume of the specimen using the formula:
  Volume of Sample (cm) = Volume of Waxed Sample - Volume of Wax
- Dry Density
- After the immersion volume is determined, remove the sample from the plastic pail and towel dry the excess moisture.
- Label and tare a drying pan. Record the weight and number of pan
- Place the specimen in the drying pan and oven dry it at 130 C ± 5 C to a constant weight.
- Break up the specimen after it has been in the oven for about a half hour, taking care not to lose any material.
- Calculate the Wet Density of the specimen in kg/m (line "I") using the 3 formula

$$\text{Wet Density } (kg/m^3) = \frac{\text{Wt. After Coring or Forming } (g)}{\text{Volume of Sample } (cm^3)} \times 1000$$

- When the sample reaches a constant dry weight, remove the sample from the oven.
- Weigh the hot sample and record as Wt. of Oven Dry Sample + Wax + Pan.
- Calculate the oven dry weight of the specimen
  Wt. of Dry Sample (g) = (Dry Wt. of Waxed Sample +Tare) - Tare - Wt. of Wax
- Determine the weight of water removed from the specimen
  Wt. of Water (g) = Wt. After Coring or Forming - Wt. of Oven Dry Specimen
- 10 Moisture Content

$$\text{Mosture Content } (\%) = \frac{\text{Wt. of Water}}{\text{Wt. of Dry Specimen}} \times 100\%$$

$$\text{Dry Density } (kg/m^3) = \frac{\text{Wt. of Dry Specimen}}{\text{Volume of Specimen}} \times 1000$$

Note. For protection, gloves should be worn when waxing the samples

Self-Check -4	Written Test

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

1. Mention the generic formula used for samples whose number of packages < 100 and number samples > 100 need to be sampled. (4pts)

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 _____

1

- _____
- _____
- _____
- _____

Information Sheet 5 - Identifying and reporting out of specification or atypical results

Sample result report

The sampling report should include the reason for sampling, the origin of sample, the sampling method and the date and place of sampling together with any additional information like transport time and conditions. Any deviation from the specified sampling procedure to be reflected in report.

Sample preservation/storage during transport

The storage condition will be determined by the temperature control required for individual products.

- Perishable. Sample storage under chilled or frozen condition as the product demands. Ice packs can be used during transportation and temperature is to be maintained between 4-6ºC.
- Non-perishable: Storage of non-perishables should maintain the originality of the sample as is during the sampling conditions. Transportation should be done at temperatures not more than 40C. Care should be taken to provide maximum protection from pilferage.

Define time

For microbiological samples analysis should initiate within 24 hours of sample being drawn. For chemical tests analysis has to be initiated within 48 to 72 hours.

Samples should be transported and stored under conditions which inhibit changes in microbial numbers and be delivered to the laboratory without undue delay. The final part to be submitted to the public analyst should be transmitted as soon as practicable after sampling, particularly where tests are to be made for substances which may deteriorate or change with time (e.g. certain pesticides, sulphur dioxide, etc). In any case where doubt exists about suitable storage or transport arrangements for samples for analysis, the public analyst should be consulted. Since retained final parts may need to be stored for several months prior to submission to the Government Chemist, it is important that they are appropriately stored

Self-Check - 5	Written Test

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

1. Mention the defined times for microbial sample and chemical tests of samples to identify out specification products (4pts)
2. Mention the information included in sampling report (6pts).

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 10 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 6 - Shutting down equipment

The sample testing involves several processes which including confirm products, materials and service or infrastructure availability, operate and monitor the extraction, melting process that is honey-water mixture and additives, heating or boiling, pasteurization, adding reagent and other ingredients as recommended level.

Carrying out Machinery and equipment shut-down procedures

Always allow an engine of wax /honey processing equipment or any machine used to cool down at a fast idle before shutting it off. This allows the valves and pistons to cool down uniformly.

- Lower all hydraulic lift equipment to the ground.
- After shutting off refill the fuel tank when the tractor has cooled a bit. Make sure that the park brakes are locked.
- Check that there is no combustible debris near the exhaust system.

Self-Check -5	Written Test

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

1. What is the importance of allowing an engine of wax /honey processing equipment or any machine used to cool down at a fast idle before shutting it off. (4pts)

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 _____

1

- _____
- _____
- _____
- _____

Operation sheet 1: identify, prepare and weigh samples

Operation title:	Techniques or procedures weighing sample
Purpose	To acquire the trainees with skill, knowledge and right attitude on weighing sample
Equipment ,tools and materials	• Graduated Beaker, spoons, digital thermometer, flask sieve, packaging and lebeling materials, glass jars, refractometer, and all necessary equipments and tools needed for the specified work
Conditions or situations for the operations	• All tools, equipment's and materials used in bee product sampling should be available on time when required. • Work station, workshop to prepare/ process bee products samples
Procedures	1. prepare yourself to use equipment 2. Turn the analytical balance ON. 3. After you see a display of 0.0000 g, place the plastic bottle labeled #1 on the pan of the analytical balance. 4. Close the balance windows and touch the TARE button. "0.0000 g" will be displayed regardless of the mass of the plastic bottle. Record this as the initial reading on the report sheet. 5. Add sample to plastic bottle #1 by holding the beaker in a tilted position and tap it gently with your forefinger. Keep adding little specs of sample until you obtain about 0.3g. Close the balance glass case windows. 6. Record this reading to the one-tenth of a milligram on the report sheet 7. When you are finished, remove the plastic bottle, close the balance windows, touch the TARE bar, and press the OFF button.
Precautions	• To dispense second and third samples into another plastic bottle labeled #2, repeat steps given above • Preparing materials, tools and equipment used for bee product sampling
Quality	• Did personal protective equipment worn while fitting and adjusting bee product sample taking and sampling • Accuracy of measurement • Good recording and reporting

Operation sheet 2	**Performing data calculation**
Operation title:	Techniques or procedures sample data calculation
Purpose	To acquire the trainees with skill, knowledge and right attitude on calculating sample datta
Equipment ,tools and materials	• Graduated Beaker, spoons, digital thermometer, flask sieve, packaging and lebeling materials, glass jars, refractometer, and all necessary equipments and tools needed for the specified work
Conditions or situations for the operations	• All tools, equipment's and materials used in bee product sampling should be available on time when required. • Work station, workshop to prepare/ process bee products samples
Procedures	1. Prepare the necessary PPE, and wear it properly 2. Identify, prepare and weigh samples 3. Conduct test as enterprise procedures. 4. Record data 5. performing data calculation 6. Identify and report out of specification or atypical results 7. Shut down equipment 8. Record and report the data acuratey to the appropriate personnel
Precautions	• Faulty calibrated equipment may bring error • Preparing materials, tools and equipment used for bee product sample data calculation
Quality	• Did personal protective equipment worn while fitting and adjusting bee product sample taking and sampling • Accuracy of measurement • Good recording and reporting

LAP Test	Practical demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 5 hours.

Task 1. Perform accurate sample weighing

Task 2. Perform testing of samples

LG #28	LO #5- Maintain safe work environment

Instruction sheet

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

- Establishing safe work practices
- Minimizing wastes and environmental impacts
- Ensuring Safe disposal hazardous wastes
- Cleaning and storing equipment and reagents

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**:

- establish safe work practices
- minimize wastes and environmental impacts
- ensure Safe disposal hazardous wastes
- clean and storing equipment and reagents

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. 9. If your performance is unsatisfactory, see your trainer for further instructions or go back to “Operation sheets”.

Information Sheet 1 - Establish safe work practice

In order to establish safe work practice it is very important to consider the basic elements of the work environment. In any industry or small scale farms where product handling, storage and transportation, the interaction of the elements are very mandatory

Elements of the work environment

The basic elements in an occupational setting such as a manufacturing plant, industry, or offices are four. These are:

1. The worker
2. The tool
3. The process
4. The work environment

2. The worker

In developing countries like Ethiopia, the work force has several distinct characteristics:-

- Most people who are employed to work in the informal sectors, mainly in agriculture, or in small-scale industries, such as garages, tannery and pottery.
- There are high rates of unemployment, some- times reaching 25% or higher. In many developing countries the rates of unemployment and under employment is increasing each year.

In general, workers are at greater risk of occupational hazards for a variety of reasons because of low education and literacy rates; unfamiliarity with work processes and exposures, inadequate training, predisposition not to complain about working conditions or exposures because of jobs, whether or not they are hazardous, are relatively scarce; high prevalence of endemic (mainly infections) diseases and malnutrition; inadequate infrastructure and human resources to diagnose, treat, and prevent work - related diseases and injuries.

- Vulnerable populations in any country are at even greater risks.

3. The Tool

Tools can range from very primitive tools like a hammer, chisel, and needle, to automated equipment.

4. The process

In the process, materials used can be toxic. The process itself can affect the potential harmfulness of the materials. For example, the particle size or physical state (solid, liquid and gas) of potentially harmful substances can determine to a large extent what ill effects in workers may develop from those substances.

5. The work environment.

Occupational environment means the sum of external conditions and influences which prevail at the place of work and which have a bearing on the health of the working population. The industrial worker today is placed in a highly complicated environment and the work environment is getting more complicated as human is becoming more innovative or inventive.

Most workers in developing countries like Ethiopia are employed in small industrial or agricultural setting. Small-scale industrial and service enterprises often have few resources, heavy workloads and multiple tasks for each worker. Work usually takes place in an environment that does not always meet required standards. Family members of the entrepreneurs and workers, including children, pregnant women and elderly people, share the work in small-scale enterprises, such as home industries, small farms and cottage industries, particularly in developing countries. In such situations, most workplace exposures also affect family members because most of the time is spent in the combined home and work environment.

The common features of these enterprises and informal sectors are:

- There is no clear boundary between the working and the living environment
- Unsafe building or work places
- Unsatisfactory hygiene and sanitation facilities
- inadequate work spaces and safety
- limited training and education
- personal protective clothing
- Inappropriate working hand tools and equipment
- Poor access to information, lack of knowledge about hazards, their effects and control measures, low degree of mechanization
- Majority of them have no permit.
- Employment and insurance policies are nil.

- Low capital resources

Self-Check -1	Written Test

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

1. Mention four (4) types of small-scale enterprises and informal sectors where the inspection, education and evaluation of the Sanitarian are needed?(4pts)
2. List down the four elements of the work environment (4pts)

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 2 – Minimizing wastes and environmental impacts

Refuse disposal

Proper solid waste management starting from the source to generation to the final disposal site is highly required in industries where different kinds of wastes are generated.

Industrial solid wastes may contain hazardous materials that required special precaution and procedures.

But combustible solid wastes except poisonous and flammable or explosive materials can be handled in the convenient manner.

Liquid waste collection and disposal

Industrial liquid wastes if not properly disposed could pollute rivers, lakes, environment and drinking water supply. Toxic liquid wastes should be diluted, neutralized and filtered, settled or otherwise chemically treated before being discharged into a stream or river or on open land. Under no circumstances should be toxic, corrosive, flammable or volatile materials be discharged into a public drainage system. So, one has to use the waste management program as to minimize the impact of waste on environment. In general, there are many management issues that affect the choice of a waste treatment system; some of these issues include:

- minimize environmental damage
- maximize nutrient value
- minimize neighbor problems
- minimize damage to the land
- minimize cost
- minimize frustration

Self-Check -2	Written Test

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

1. Among many management issues that affect the choice of a waste treatment system, mention four of them (4pts)

Note: **Satisfactory rating – 14 points** **Unsatisfactory - below 14 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

Information Sheet 3 – Ensuring Safe disposal hazardous wastes

Introduction

Hazardous waste defined as any type of waste that is harmful to both humans and the environment. This can be any waste (in solid, liquid, or any other state) that is toxic, flammable, corrosive, and reactive. The flammable types of waste include liquids with flash points, solids that can combust spontaneously, compressed gases, and oxidizers. Corrosive substances eat into containers that are used for their storage, while reactive ones are unstable and can form toxic byproducts when mixed with water.

That said, professional hazardous waste disposal, management, collection, and storage is vital for your property, whether you're a business, a community, or a private residential property owner. The disposal of your waste is the crucial element in its management to ensure that it won't have adverse effects on human and animal health, as well as the environment.

Many common industrial products are hazardous. If these products are handled or disposed of incorrectly, they can pose a threat to human health, animals and the environment. When these products are discarded, they become "household hazardous waste." In some countries it is illegal to dispose of household hazardous waste in the trash, down the drain, or by abandonment.

There should be designated containers with covers, if necessary, for collection of waste and garbage and for their temporary storage until disposal. These containers should be properly identified, and be made of durable, impervious material and maintained in a sanitary condition. There should be no leakage from waste containers. Waste collection containers located on the grounds outside of the building should be maintained so that they are not sources of contamination or pest infestation. Hazardous waste needs to be disposed of through a Hazardous Waste Management Program

Landfill Disposal

Here are the most common methods used to dispose of hazardous waste.

The oldest and most common form of waste disposal is landfill or dumpsites. Through this method, waste is collected and then simply thrown to a dumping site.

What happens to the waste next ultimately depends on the operators or local laws that regulate dumpsites. For non-hazardous waste, most landfills must simply fit within as small of an area as possible and should be compacted in volume. Landfills must then be covered in soil or any other material. These landfills will either be sorted accordingly or

Landfills designed for hazardous wastes

Landfills for Hazardous Waste are excavated or engineered, so unlike regular landfills that piles upwards, hazardous waste landfills are meant to be in the ground. These are only reserved for non-liquid hazardous wastes. Landfills are lined with a double-layered non-porous material, such as HDPE or clay, to avert the leaching of waste into the ground. These units are designed to minimize the amount of harmful waste that makes its way to the environment or human contact. Other feature it has includes a double liner, a leak protection system, and wind dispersal controls.

will be compacted to make room for more waste.

Hazardous wastes are continually dumped into this landfill and then covered to prevent rodents and insects from entering. Landfill operators have to work closely in inspecting, monitoring, and maintaining the safety features, since landfills are permanent disposal sites. Thus, maintenance is necessary to keep waste from leaking to the environment. Unfortunately, this disposal method takes a lot of space, since not much is done to reduce the amount of waste already in the landfill.

Incineration

This is the burning of your hazardous waste into an incombustible residue. Hazardous wastes are placed in enclosed devices and burned. It is generally used in areas where there is minimal space for landfills, as this can drastically reduce the volume of waste.

The waste is first detoxified to reduce the release of toxic gases into the atmosphere. Incineration is an ideal option for waste minimization and detoxification, although its operating expenses are high.

In some states, incineration of hazardous waste is used to produce steam, which drives turbines to generate electric power. This heat is recycled for use in the incinerators;

therefore, reducing the cost of waste disposal and energy production. Wastes that have nitrogen, phosphorous, chlorine, polychlorinated biphenyl, carcinogenic substances, and heavy metals are burnt in incinerators with pollution control devices.

Self-Check -3	Written Test

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

1. Mention the most common methods used to dispose of hazardous waste.(6pts)
2. List down the types of waste include in the flammable wastes (4pts)

Note: **Satisfactory rating – 10 points** **Unsatisfactory - below 10 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

Information Sheet 4. Cleaning and storing equipment and reagents

Cleaning is a complex process. To ensure it is conducted correctly a defined and systematic approach is required that takes into account a number of factors. In bee product industry the equipments and reagents cleaned in different ways. Because as mentioned in the previous learning guides the different types of hazard causing organisms and substances can be resistant to one or two methods. Care has to be taken according to the nature of equipment by sorting and the product

a. Manual cleaning

Manual cleaning using cloths, mops, brushes, pads, etc. It is normally used in small areas, equipment that is non-water proof or requires dismantling or areas which are difficult to clean by other methods. It is a labor intensive method and may limit the use of certain chemicals for safety reasons. To en-sure cleaning is effective the method must be clearly defined and staff trained to an appropriate level.

Figure 1: Brush

b. Foam cleaning

This is the common method for cleaning most food operations. A foam blanket, created using a wide range of available equipment is projected from a nozzle and allowed time to act on the soil. It is then rinsed off with the released deposits. Large areas such as floors, walls, conveyors, tables and well-designed production equipment are ideal for foam cleaning.

Figure 2*:* Foam cleaning

Foam is a carrier for the detergent. The foam should be applied in an even layer. Coverage rates are quick and chemical usage is economical. Your chemical supplier will advise on the most appropriate chemicals and equipment for your operation. The equipment itself may be mobile, centralized or satellite.

c. Spray

Spray cleaning uses a lance on a pressure washer with chemical induction by venturi. This method can be wasteful of chemical and can be slow to produce foam. It should be used where foaming properties are not essential for the cleaning action.

d. Fogging

Aerial fogging uses compressed air or other equipment to generate a fine mist of disinfectant solution which hangs in the air long enough to disinfect airborne organisms. It will also settle on surfaces to produce a bactericidal effect.

Cleaning and Waste Disposal in bee products processing

- Have an adequate water supply for pressure washing and a liquid disposal system.
- Provide leak-, insect-, and rodent-proof garbage containers with plastic liners.
- Regularly dispose of any build up of dead bees or insect pests. Use a squeegee on a smooth floor to minimize distributing allergens into the air. Use a respirator.
- Store all dead bees in garbage bags or sealed containers.

Self-Check -4	Written Test

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

1. Mention the four (4) types of cleaning ?(4pts)
3. Describe how cleaning and waste disposal conducted in bee product processing (4pts)

Note: **Satisfactory rating – 8 points** **Unsatisfactory - below 8 points**

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date _____

1

- _____
- _____
- _____
- _____

2

- _____
- _____
- _____
- _____

References

Food Safety And Standards Authority Of India Ministry Of Health And Family Welfare Government Of India, New Delhi, 2016

Gidelines for quality assuranceof bee products in Tanzania,forest and beekeping division.Dar-es-salaam, 2007

Honey and Bees wax Product Processing and Research Department Bishoftu- Ethiopia August, 2018

ISO/IEC 17025:2005

Microorganisms in Foods: Sampling for Microbiological Analysis: Principles and Specific Applications, 2nd ed. University of Toronto Press, Toronto, Ontario, Canada].

MSME - Development Institute, Ministry of Micro, Small & Medium Enterprises, Government of India 107, Industrial Estate, Kalpi Road, Kanpur-208012.

National Bee keeping training and extension manual, Uganda, 2012,

Occupational Health and Safety,. The Carter Center, the Ethiopia Ministry of Health and, and The Ethiopia Ministry of Education, August 2006

Safefood 360º Whitepaper (August, 2012)

Value-added products from beekeeping by R . krell,nfao agricultural services bulletin no. 124 united nations rome 1996

Websites

http://unu.edu

https://civilblog.org/2015/01/06/how-to-reduce-gross-aggregate-sample-to-test-sample-by-quartering-or-coning-method/

https://www.ccohs.ca/oshanswers/hsprograms/hazard_identification.html

https://www.epa.gov/hw/learn-basics-hazardous-waste

https://www.hse.gov.uk/copyright.htm for details. First published 04/20

https://www.iso.org/standard/39883.html

AKNOWLEDGEMENT

We wish to extend thanks and appreciation to the many representatives of TVET instructors and respective industry experts who donated their time and expertise to the development of this TTLM.

We would like also to express our appreciation to the TVET instructors and respective industry experts of Regional TVET Bureau, TVET College/ Institutes, Bishoftu Management institute, BEAR II UNESCO project and Federal Technical and Vocational Education and Training Agency (FTVET) who made contributions for the development of this TTLM with required standards and quality possible.

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

The trainers who developed the TTLM

No	Name	Level	Educational background	Region	College	Mob. No	E-mail
1	Alemayehu Tolera Gemeda	A	Animal production	Oromia	Bako ATVETC	0994132626	toleraalex@gmail.com
2	Ayele Mengesha Mosisa	A	Animal nutrition	Oromia	Holeta PTC	0911802467	ayelemengesha@ymail.com
3	Kebebush Tessema Beyene	A	Food science and post-harvest technology	Sidama	Hawasa PTC	0911764341	Kebebush04@gmail.com