

UNIT
10



Processing of Pineapples



LEARNING / FACILITATING MATERIALS

PINEAPPLE PRODUCTION
NATIONAL CERTIFICATE I



NEPAD
TRANSFORMING AFRICA



implemented by
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Introduction

Welcome to the start of your career in pineapple pack house management.

A career in pack house management has never been as popular as it is now; competition is strong and the standards are getting high. So you must aim higher, particularly, if you see it as opportunity to build up your lifelong career.

There have been significant changes in the pineapple industry over the years which have brought new standards, techniques, products and opportunities. Many career options are also available within the pineapple pack house management.

This unit will look at washing and disinfecting of harvested fruits, waxing, and treatment of peduncle and drying, sorting and grading of pineapple fruits, packaging materials and pre-cooling and cooling of pineapple fruits.

While training, you should make an effort on improving your personal habits, skills and knowledge in order to build competent career for yourself in achieving success in the world of bussiness.

Congratulations for making the decision to study pineapple pack house management. You have taken the first step towards a very interesting and satisfying career.

This learning material covers all the Learning Outcomes for Pack House management for the Certificate I programme.

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Demonstrate the understanding of the importance and types of value addition.

In this LO, you will learn to:

- a) Explain the importance of value addition
 - b) Explain the types of value addition.
 - c) Identify different processed forms of value addition in pineapple
-

Pc (a) Explain the Importance of Value Addition

Value addition from commodities point of view, is processing raw product into a branded product that consumers are willing to pay for than the raw product. For example, a food processor could purchase fruit from farmers and process into fruit juice. This juice has added value and becomes a branded good. Basically unprocessed raw products such as, meat carcasses, and fresh pineapple fruit and cotton bolls have no value added.

The importance of value addition in pineapple processing include:

- It allows firms to prolong the shelf life of products.
- It emphasizes strength of brand that promote commodity.
- Helps firms increase their unit selling price (USP) for extra income.
- Product achieves higher competitiveness in the market.
- It allows products to become more convenient for handling by the producer and the consumers
- It allows product to become more attractive to the consumer (buyer)
- It allows producers to make product to the specification and taste of the consumer

PC (b) Explain the types of Value Addition.

There are several types of added value that a business can employ to improve their products and services; some types of added value in pineapple are Quality, Environmental, Cause-related and Cultural.

Quality Added Value

Quality added value is basically adding convenience, ease of use, attractiveness, prolong shelf life or other desirable characteristics that customer's value. For example, turning a commodity into a branded product to attract customers, design

enhancements like packaging, pull tabs for easy opening or sipper tops on beverage bottles.

Environmental Added Value

Environmental added value employs methods or systems that do not harm the environment or are less harmful than those commonly used. For example, using less electricity, less fuel and recycled material for packaging.

Cause-related Added Value

Cause-related added value is a social marketing strategy where businesses contribute part of the revenue from a product or service to a cause. For example, a business may donate a percentage of revenue from each transaction to a cause such as an educational facility for disadvantaged children or a wildlife sanctuary.

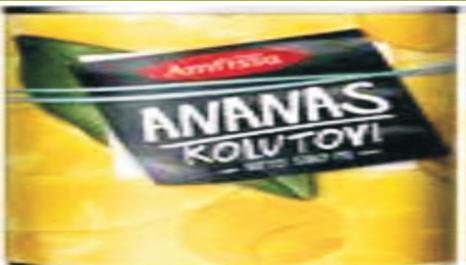
Cultural Added Value

Cultural added value is also a social marketing strategy that employs methods or systems of production involving cultural aspects or allow for the needs and sensitivities of cultural groups. For example, producing kosher food (in accord with Jewish law) or using a combination of English and other languages of other ethnic groups in a community in written communications on labels of products. This adding value can be used as a marketing strategy to differentiate a product from competing products. Such strategies should be fully researched and included in a business plan to show the potential benefits to a business.

PC (c) Identify different processed forms of value addition in pineapple.

There are several forms of value addition in the pineapple industry, some of value additions in the pineapple industry are in liquid form (bottle or can fruit drinks) solid form (can, fresh fruit) and dry form (dry pineapple fruit).

Liquid



Picture 1: Can pineapple drink



Picture 2: Pineapple fruit juice

Solid



Picture 3: Vacuum Packed



Picture 4: Vacuum Packed

Dry



Picture 5: Dry pack fruit



Picture 6: Dehydrated dry fruit

Activity

Learner will be given different processed forms of pineapple to identify.



Self-assessment

1. State three (3) type of value added forms of pineapple

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2. State two (2) forms of value addition for pineapple fruit

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Demonstrate knowledge in concentrate-juice and "not from concentrate-juice" production.

In this LO 2 you will learn to:

- a) De-crown, sort and wash pineapples.
 - b) Apply the correct procedure used in crushing and squeezing pineapples.
 - c) Apply the correct procedure used in filtration in pineapple juice production.
 - d) Apply the correct procedure used in pasteurization in juice preparation.
 - e) Apply the correct processes to make concentrate-juice
 - f) Apply the correct process of filling and storage of concentrated juice
-

PC (a) De-crown, sort and wash pineapples.

De-crowning is the process of removing the crown on top of pineapple. This can be grouped into two categories, manual and mechanical.



Picture 7: De-crown pineapple

Manual Process of de-crowning

- Hold fruit with hands, one holding fruit and the other the crown.
- Twist fruit and crown in opposite direction to brake off the crown from the fruit.

Alternatively this can be done by cutting off the crow with knife

Mechanical Process of de-crowning

Place the pineapple on a conveyer belt so as to space each fruit from the other. The fruit is transferred on to a second softly matted conveyer belt travelling in the same direction of the first belt.

This belt brings the top portion of the fruit into contact with a third soft weighted belt suspended directly above the second conveyer belt.

This third belt imparts a spin or twist to the fruit in a direction opposite to their direction of the first two belt.

A pair of conveyer belts running parallel to the second conveyer belt receives the crown and stops it from rotating while the fruit is still rotating it moves to peeling and crushing units.



Picture 8: Mechanical de-crowning

Sorting is any process of arranging items according to a certain sequence or order. Regardless of the market destination, pineapple fruit are sorted according to size, shape, firmness, external colour, insect damage and decay crown. When sorting

any visibly damaged fruit should be rejected. Different processing has different quality requirements and the fruit should be sorted to conform to the individual market

Steps in sorting are:

Prior to sorting, know the quality and the standard required and be able to:

- Identify the pineapple physical or by weight
- Group similar quality to one unit
- Re-examine your grouping to conform to similarity and quality required. Clean and pack
- Send to processing unit (if manual processing. Note; mechanical processing does all the operation in line from point of loading to finish product)

Washing - Pineapple market or processing firms requires a specific protocol to be adhered to, the stem must be trimmed very close to the base and the crown has to be cut back to a length of 10 cm. Then the fruit has to be washed in a disinfectant solution and thoroughly scrubbed on the outside with a brush to remove all live insects and dirt. This washing can be done manually or mechanically depending on the level of operation



Picture 9: Showing washing of pineapple manually

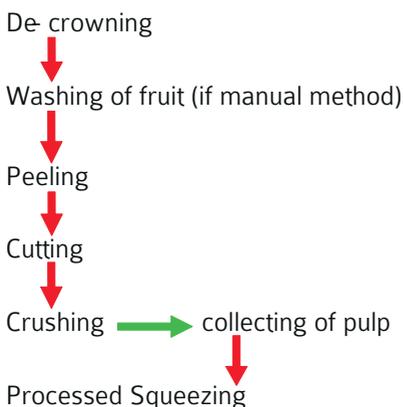
Activity

Learner will be given pineapple fruit to de-crown, sort and wash.

PC (b) Apply the correct procedure used in crushing and squeezing pineapples

Crushing is the process of breaking pineapple fruit in small pieces or particles to extract the juice from the fresh pulp. This can be done manually or mechanical.

Process for crushing fresh pineapple fruit:



Squeezing is the process of applying pressure to extract juice from fruit or pulp. e.g extracting juice from crush pineapple/pulp.

Procedure for Squeezing

Crushed pulp--- Put on sieve ---- apply pressure---- Collect juice

Activity

Learner will be provided with pineapple fruits and other apparatus to crush and squeeze.

PC(C) Apply the correct procedure used in filtration in pineapple juice production

Pineapple juice

It is the juice extracted from pineapple fruit that can be marketed by packaging into sterilized bottles or cans. By adding preservative at a specified level, the shelf life of the juice can be extended to 6-7 months.

Extract the juice using a juice extractor or a juice press and filter the juice in cheese cloth sterilized in boiling water.

Activity

Learner will be provided with required resources and made to filter juice

PC (d) Apply the correct procedure used in pasteurization in juice preparation

Pasteurize the filtered juice by warming it in deep stainless steel pan at 85° C for 10-12 minutes (the juice must be continuously stirred to ensure homogeneous temperature of 85° C.)

Activity

Learner will be provided with pineapple juice and other apparatus to pasteurize

PC (e) Apply the correct procedure to make concentrate juice

Pineapple juice is highly appreciated for its high nutritional value and its particular exotic taste. There is a high demand for this juice locally and abroad.

Concentrated Pineapple Juice is the unfermented product, which is capable of fermentation after reconstitution; concentration consists of the physical removal of water until the product has less than 27% water content .

Process of Concentrated Pineapple Juice

Fruit selection

It is desirable to use fruits which have a Brix levels above 14 and a pH 0.9-1.3 for a high quality end product.

Procedure

- Dry wash the pineapples using an air brush
- Chop the top leaves, leaving part of the crown for easy handling. Remove bottom end (tail) and peel using a short, sharp and pointed knife. (Manual and mechanical)
- Carve pineapples using a sharp knife along the longest line of 'eyes'(manual and mechanical)
- Wash under running water
- Cut fruits into pieces

- Reduce microbial load by dipping the fruits in chlorinated water (10 mL 3.25% chlorine Javel in 3 L of water) for 3-5 minutes. Rinse thoroughly under filtered water to remove any surface chlorinated water
- Extract the juice using a juice extractor or a juice press,
- Filter the juice if necessary
- Pasteurise the filtered juice by warming it in deep stainless steel pan at 85°C for 10-15 minutes (the juice must be continuously stirred to ensure homogeneous temperature of 85°C), eliminate or reduce water to not more than 27%.
- Hot fill the juice in sterilised glass bottles or in food grade plastic bottles (white High Density Polyethylene –HDPE),
- Cool the plastic bottles rapidly under cold water (glass bottles should not be placed immediately under cold water after pasteurisation as the bottles may crack)
- Label the bottles, store in a cool and dry place away from direct light

Activity

Learner will be provided with the required resources and to make concentrated juice.

PC (f) Apply the correct procedure of filling and storage of concentrated juice

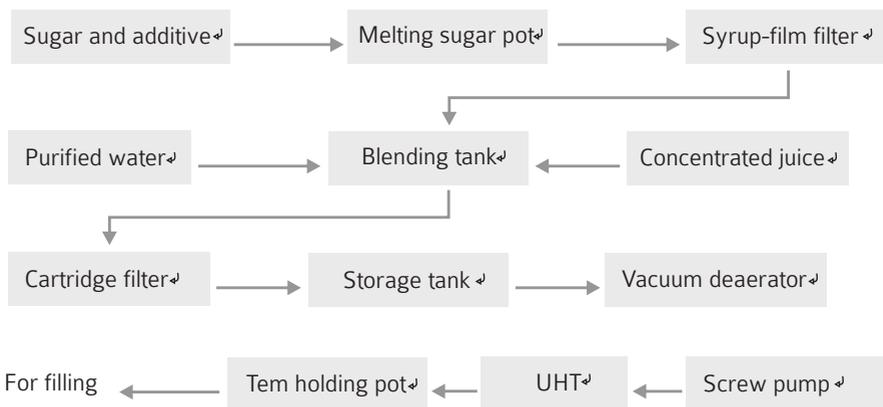
Disinfection and filling of bottles

- After purchase, empty bottles should be stored in plastic bags in a clean location
- Wash the bottles and caps thoroughly under running water to remove any dirt and dust
- For disinfection of HDPE bottles, dip the bottles and caps for 30 minutes in a chlorinated water (30 ml in 5 litres of water).
- Rinse the bottle under filtered water or using boiled and cooled water.
- Prior to filling the product in the bottles, ensure that the bottles are free from water droplets by inverting the bottles mouth down and shaking them slightly
- Wash the jars thoroughly with disinfectant , rinse well and place them in the container
- Fill the container with water until the water level is about 5 cm above the jars
- Cover the container with a lid and boil the water at 100°C for at least 5 minutes
- Leave the jars in the container until use
- Prior to filling, remove the jars with a pair of tongs and place them (the opening facing down) on white clean sheets

- Fill bottle with juice to required volume leaving minimum space of 1.5 cm for gas exchange.
- seal bottle with seal
- Label with the required information.
- pack into storage box and store at clean and dry place.(ideal storage facility)

Note: The lids and the seals should not be sterilized with boiling water because they will be damaged. They have to be washed and placed under water at room temperature. Just before use, the lids and the seals are immersed in boiling water for 1 minute.

Below is diagrammed for industrial bottle filling in the mechanized industry



Activity

Learner will use concentrated juice to fill, bottle and store.



Self-assessment

- 1 State three (3) benefits of washing pineapples to producer and to the customer

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- 2 Explain the following:
 - a. De-crowning of pineapples
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 - b. Sorting of pineapples
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 - c. Washing of pineapples
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- 3 State the two (2) methods of de-crowning pineapples
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.....
- 4 Explain crushing and squeezing of pineapples
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Demonstrate knowledge in Individually Quick Frozen (IQF)

In this LO, you will learn to:

- a) Demonstrate the procedures involved in de-crowning, sorting and washing pineapples.
- b) Peel and cut pineapples using correct procedure.
- c) Freeze and pack pineapples using correct procedure.

PC (a) De-crown, sort and wash pineapples.

De-crowning is the process of removing the crown on top of pineapple. This can be grouped into two categories, manual and mechanical.



Picture 10: De-crowning by cutting

Manual Process of de-crowning

Hold fruit with hands, one holding fruit and the other the crown.

Twist fruit and crown in opposite direction to brake off the crown from the fruit.

Alternatively this can be done by cutting off the crown with knife

Mechanical Process of de-crowning

Place the pineapple on a conveyor belt so as to space each fruit from another,

The fruit is transferred on to a second softly matted conveyor belt travelling in the same direction of the first belt.

This belt brings the top portion of the fruit into contact with a third soft weighted belt suspended directly above the second conveyor belt.

This third belt imparts a spin or twist to the fruit in a direction opposite to their direction of the first two belt.

A pair of conveyor belts running parallel to the second conveyor belt receives the crown and stops it from rotating while the fruit is still rotating it moves to peeling and crashing units.

Sorting is any process of arranging items according to a certain sequence or Order. Regardless of the market destination, pineapple fruit is sorted according to size, shape, firmness, external color, insect damage, decay crown shape or size. When sorting any visibly damaged fruit should be rejected. Different processing has different quality requirements and the fruit should be sorted to conform to the individual market.

Step in sorting are:

- Know the quality and the standard required and be able to identify them physical or by weight
- Group similar quality to one unit
- Re-examine your grouping to conform to similarity and quality required
- clean and Pack send to processing unit (if manual processing. Note; mechanical processing does all the operation in line from point of loading to finish product

Washing - Pineapple market or processing firms requires a specific protocol to be adhered to, the stem must be trimmed very close to the base and the crown has to be cut back to a length of 10 cm. Then the fruit has to be washed in a soap solution and thoroughly scrubbed on the outside with a brush to remove all live insects and dirt. This washing can be done manually or mechanically depending on the level of operation



Picture 11- Washing of pineapple fruits

Steps (Manual)

- Clean fruit from dirt, dust and any insect pest using soft brush
- Wash fruit with clean water and recommended disinfectant
- Use extra water to re-clean the fruit
- Clean with soft tissue to remove excess water
- Air dry under room temperature
- Inspect for required quality
- Send to processing unit.

PC (b) Peeling and cutting pineapples.

Cutting a fresh pineapple isn't just simply cutting the top, the bottom and cutting the peel away. It should be done with great skill to make it attractive to consumers.

Using a good knife, start by cutting the top and then the bottom off.



Picture 12: De-crowning



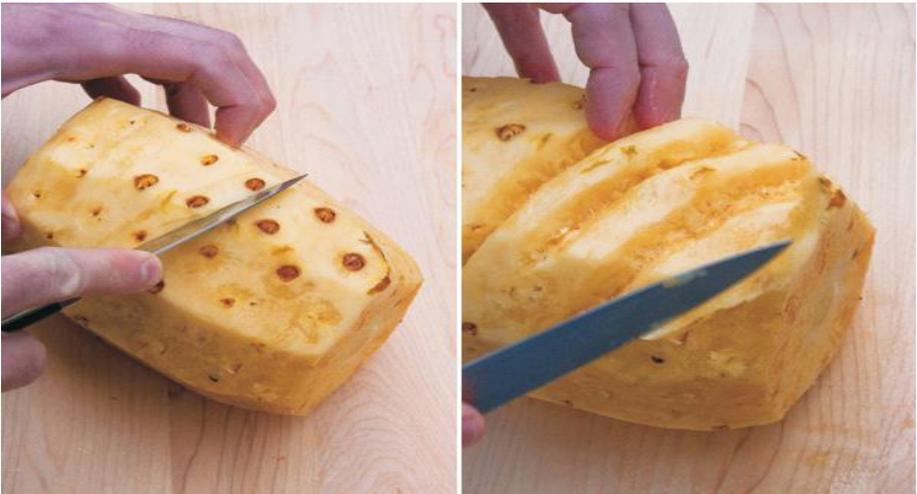
Picture 13: De- crowning with knife

Let the pineapple stand with the bottom flat on the cutting board. Hold the top and cut the peel away from the top down. Most people would cut too much of the fruit away to remove the “eyes” of the pineapple, but there's a better way to scup the “eyes” off and keep as much of the fruit intact as possible.



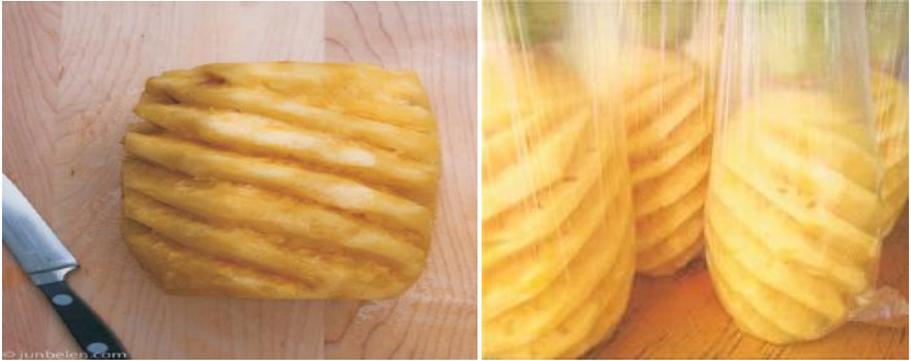
Picture 14: Peeling of pineapple

Using a paring knife, cut out the “eyes” in a shallow v-shape trench that spirals around the pineapple.



Picture 15: Sculpting of fruit eye

The result is a beautifully sculpted fruit. Slice the pineapple crosswise into discs and cut the core using a paring knife or a corer to form pineapple rings.



Or slice them lengthwise into quarters, then cut off the core, and cut each section crosswise into thin slices or thicker chunks.



Picture 16: Sliced pineapples

PC (c) Freeze and pack a pineapples using the correct procedure



Cut up the pineapple. You can cut the pineapple in any way you like, really. First, cut off the tops and bottoms with a sharp knife, and then shave off the skins and cut out the core. You can dice the pineapple, cut it into large circles, or cut it into smaller squares.



Place wax paper or parchment paper on a cookie sheet. Either one will do. Make sure the sheet is large enough to hold all of the pineapple chunks if not, you may have to use two sheets.



Put the pieces of pineapple on the wax or parchment paper. Make sure they don't touch or else they will freeze together.



Place the cookie sheet in the freezer overnight. You can do this for less time if the pieces of pineapple become completely frozen earlier.



Put the pieces in a freezer bag or any airtight container. You can use a zip-seal bag, Tupperware, or any other storage container that has a seal. Make sure you get all of the air out of the bag first so that the pineapple chunks don't suffer from freezer burn. You should label the bag with the date so you know when it is still safe to eat it -- frozen pineapple can last in your fridge for up to six months.



Eating the Frozen Pineapple

Eat the pineapple raw. Just take it out of the freezer and take a bite into the tasty, frozen fruit.



Self-assessment

1 Explain what is meant by Peeling of pineapples?

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2 Explain why it is important to cut pineapples for eating?

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3 Explain why it is important to freeze pineapples?

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4 Explain why it is important to pack pineapples?

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Demonstrate knowledge in fresh cuts and drying

In this LO, you will learn to:

- a) De-crown, sort and wash pineapples using correct procedure.
 - b) Peel and cut using correct procedure.
 - c) Sort and pack using correct procedure.
 - d) Apply basic hygienic principles in fresh cutting and drying
-

PC (a) De-crown, sort and wash pineapples using correct procedure.



De-crowning is the process of removing the crown on top of pineapple. This can be grouped into two categories, manual and mechanical.

Manual Process of de-crowning

Hold fruit with hands, one holding fruit and the other the crown.

Twist fruit and crown in opposite direction to brake off the crown from the fruit.

Alternatively this can be done by cutting off the crown with knife

Mechanical Process of de-crowning

Place the pineapple on a conveyor belt so as to space each fruit from another, The fruit is transferred on to a second softly matted conveyor belt travelling in the same direction of the first belt.

This belt brings the top portion of the fruit into contact with a third soft weighted belt suspended directly above the second conveyor belt.

This third belt imparts a spin or twist to the fruit in a direction opposite to their direction of the first two belt. A pair of conveyor belts running parallel to the second conveyor belt receives the crown and stops it from rotating while the fruit is still rotating it moves to peeling and crashing units.

Sorting is any process of arranging items according to a certain sequence or order. Regardless of the market destination, pineapple fruit is sorted according to size, shape, firmness, external color, insect damage, decay crown shape or size. When sorting any visibly damaged fruit should be rejected. Different processing has different quality requirements and the fruit should be sorted to conform to the individual market.

Step in sorting are:

- Know the quality and the standard required and be able to identify them physical or by weight
- Group similar quality to one unit
- Re-examine your grouping to conform to similarity and quality required
- Clean and Pack
- Send to processing unit (if manual processing. Note; mechanical processing does all the operation in line from point of loading to finish product)

Washing - Pineapple market or processing firms requires a specific protocol to be adhered to, the stem must be trimmed very close to the base and the crown has to be cut back to a length of 10 cm. Then the fruit has to be washed in a soap solution and thoroughly scrubbed on the outside with a brush to remove all live insects and dirt. This washing can be done manually or mechanically depending on the level of operation

Steps (Manual)



- Clean fruit from dirt, dust and insect pest using soft brush
- Wash fruit with clean water and recommended disinfectant
- Use extra water to re-clean the fruit
- Clean with soft tissue to remove excess water
- Air dry under room temperature
- Inspect for required quality
- Send to processing unit

PC (b Peel cut and dry using correct procedure

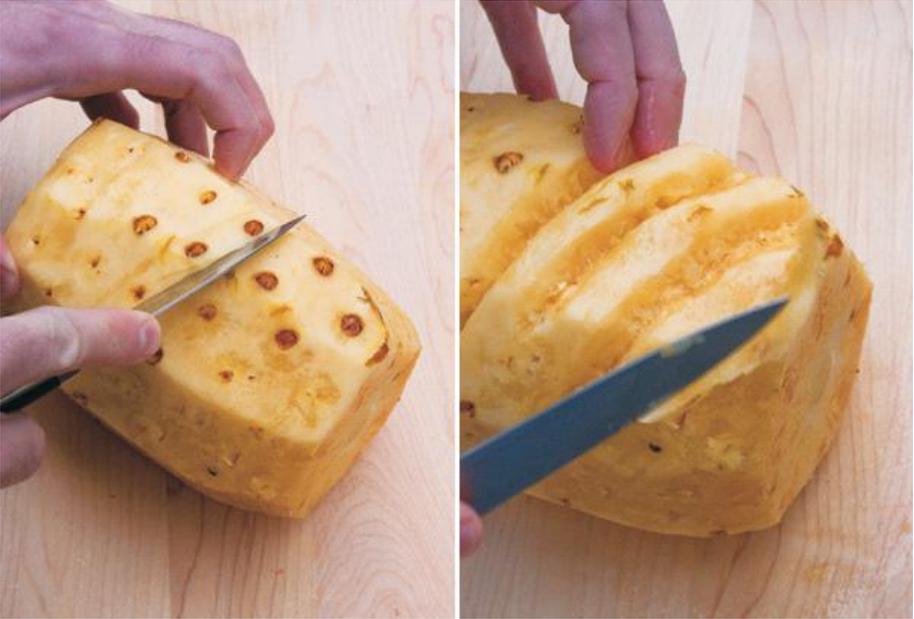
Cutting a fresh pineapple isn't just simply cutting the top and the bottom and cutting the peel away. but it should be done with great skill to make attractive to consumers Using a good knife, start by cutting the top and then the bottom off.



Let the pineapple stand with the bottom flat on the cutting board. Hold the top and cut the peel away from the top down. Most people would cut too much of the fruit away to get remove the “eyes” of the pineapple. But there’s a better way to sculpt the “eyes” off and keep as much of the fruit intact as possible



Using a paring knife, cut out the “eyes” in a shallow v-shape trench that spirals around the pineapple.



The result is a beautifully sculpted fruit. Slice the pineapple crosswise into discs and cut the core using a paring knife or a corer to form pineapple rings.



Or slice them lengthwise into quarters, then cut off the core, and cut each section crosswise into thin slices or thicker chunks.



Drying

- Make a drying platform with a plastic screen or using cheese cloth stretched on the floor
- Crisscross string on the back of the frame and staple it in the corners to prevent the plastic from removing.
Place a piece of glass above the frame to intensify the sun on the fruit, but make sure there is enough space above the fruit for good air circulation
- Cut pineapple fruit thinly-sliced fruit will dry more quickly uniformly.
Prevent oxidation, or darkening of the fruit, after slicing, by dipping the fruit in salt water. Use 6 tablespoons of salt to 1 gallon (4.5 liters) of water. Drain and dry the fruit.
- Arrange the fruit on the drying tray with spaces between, so that the pieces don't touch each other.
- Set the tray in the frame in the sun for fruit to dry to a minimum of 7% moisture content

- Take the fruit indoors if it is raining and at night to prevent moisture from collecting on the fruit.
- equalize the drying by allowing moisture from the fruit to dry for 5 hour under room temperature(25oC)
- Store the dried fruit in a container with a tight-fitting lid or in a zipper-seal bag.
- If the containers are kept in a cool, dark place, the fruit will last for at least 6 months. Check the fruit regularly for mold during the first few weeks of storage and discard any doubtful pieces.

PC (c) Sort and pack pineapple using correct procedure

Dried pineapple fruit is sorted into uniform size, shape, firmness, external colour, insect damage and decay. Visibly damaged dried fruit should be rejected. Different markets have different quality requirements and the fruit should be sorted to conform to the individual requirement

Steps in sorting and packing are:

- Know the quality and the standard required of dried fruit and be able to identify physically or by weight
- Group similar quality to one unit
- Re-examine your grouping to conform to similarity and quality required
- Pack dried fruit
- Label dried fruit



PC (d) Apply basic hygienic principles in fresh cutting and drying.

Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards. The tracks within this line of thought are safety between industry and the market and then between the market and the consumer.

The following Basic hygienic principles must be observed: -

1. Changing room: Undertake regular cleaning, disinfecting, provision of hangers for cloths
2. Washroom : Undertake regular cleaning, disinfecting, provision of hangers for cloths, soap, paper tissue,
3. Proper waste management: provision of dust bins at appropriate points, regular collection and disposal of waste.



Self-assessment

- 1 State two (2) reasons for making fresh cuts in pineapples.

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- 2 State two (2) reasons for drying in pineapples.

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- 3 Explain why basic hygienic principles must be applied in fresh cutting and drying.

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Demonstrate understanding of by-products

In this LO you will learn to:

- Identify types of by-products
- Explain the importance of by-products
- State the uses of various by-products
- Convert by-products into other products
- Apply basic hygienic principles

PC (a) Identify types of by-products,

A by-product is a secondary product derived during manufacturing; it is not the primary product or service being produced. In the context of production, a by-product can be defined as the 'output from a joint production process that is minor in quantity and/or net realizable value (NVR) when compared to the main products.

Types of pineapple by-products:

Some by-products from pineapple are, the Peel, Pulp and Bran

Activity.

Learner will be given some by-products of pineapple to identify each type

PC (b) Explain the importance of by-products

The following are the importance of pineapple by-products

- Generation of extra income
- Employment opportunist
- Reduces environmental pollution
- Use as animal feed
- Use as soil amendment

PC (c) State the use of various by-product

There are different uses of pineapple by-products as indicated below:

Peel	Vinegar , compost ,medicinal
Pulp	Animals feed
Bran	Animal feed

PC (d) Convert by-products into other product

A. Converting crown leaves and peels into compost.

The following is the procedure for converting crown leaves and peels into compost.

1. Chop the pineapple's crown, leaves and peel into pieces between 1 and 3 inches long. (Smaller pieces break down faster.)
2. Mix pineapple scraps and other green materials such as grass clippings, vegetable peels or weeds with an equal amount of brown materials such as dry leaves.
3. Make compost pile in layers with green and brown materials in 3-inch layers or mix green and brown materials together before adding to the pile.
4. Keep the compost area evenly moist. Moisture is crucial to aid microorganisms in breaking down the organic materials into the end product - compost.
5. Periodically mix the pile with a pitchfork or a garden spade, this helps to aerate the pile. Observe for heat and moisture and adjust according.
6. Pick, fell it and observe for a period of 6-8 week when compose will be ready for use

B. Converting pineapple peel for vinegar

This product enables the utilisation of pineapple peels, which are usually discarded during the processing or consumption of the fruit. The product has a distinct, very light pineapple flavour and has the same uses as any commercial vinegar.

Raw material preparation

The peels should be from very well washed ripe pineapples (damaged, rotten or infected fruits should not be used as a source of peels).

Use only the peels, not the leaves or stems.

The water used should be potable water, boiled if necessary.

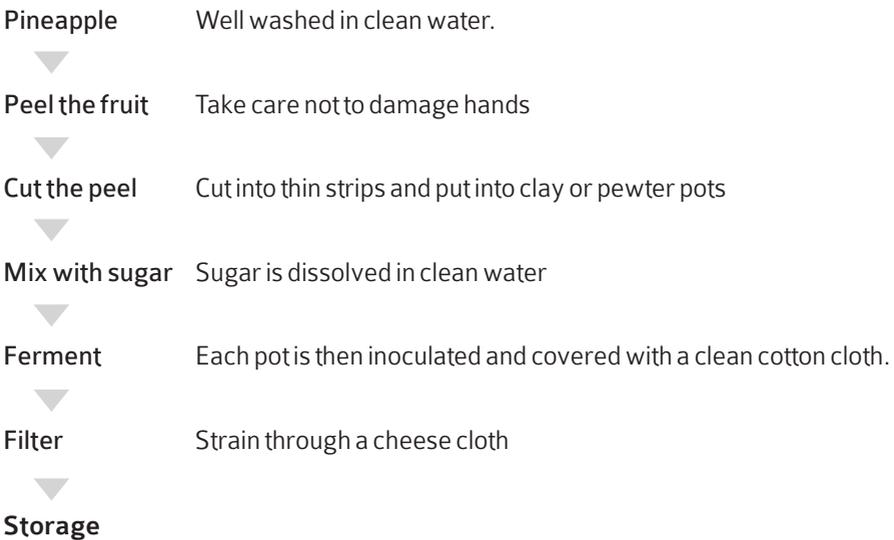
All the equipment should be well cleaned, as well as the bottles, which should also be steam-sterilised before use.

Process

1. The peels should be cut into thin strips and put into clay(or plastic pots. Aluminium or iron pots should not be used.)
2. Add Sugar and clean water.
3. Inoculate each pot and cover with a clean cotton cloth held around the pot with an adhesive tape to prevent contamination by insects or dust.
4. Ferment the inoculated pineapple peel at room temperature (about 20-22°C) for about eight days. The acidity should be checked daily.

5. Maintain the water level during the period of fermentation.
 - **NOTE:**
The product should be increasingly acid and by the eighth day it should have the required concentration of 4 per cent acetic acid in vinegar.
- If higher acidity is desired the product is left to ferment for another one or two days.
- The development of acidity should be checked by tasting the product during fermentation.
- The residual bacteria removed may be reused as a residue inoculum two or three times more.

Flow Diagram Pineapple Peel Vinegar



Activity

Learner will be provided with pineapple by-products and required resources to make one product.

PC (e) Apply basic hygienic principles

Apply basic hygienic principles in fresh cutting and drying. Food safety is a scientific discipline describing handling, preparation, and storage of food in ways that prevent food borne illness. This includes a number of routines that should be followed to avoid potentially severe health hazards.

The tracks within this line of thought are safety between industry and the market and then between the market and the consumer.

The following Basic hygienic principles must be observed: -

- 1. Changing room: Undertake regular cleaning, disinfecting, provision of hangers for cloths
- 2. Washroom : Undertake regular cleaning, disinfecting, provision of hangers for cloths, soap, paper tissue,
- 3. Proper waste management: provision of dust bins at appropriate points, regular collection and disposal of waste

Activity

The learner will apply basic principles at the factory production site.



Self-assessment

Q1 State three (3) benefits of washing pineapples to the producer and to the consumer.

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Q2 State three (3) importance of by-products.

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Q3 State two (2) uses of pineapple by-products

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Q4 State two (2) types of pineapple by-products.

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