Editor's note

Learn from Netherlands

A group of 11 best farmers are set to spend a week (June 2 to 9) touring their farming counterparts in the Netherlands. For most of the farmers in the group and the visitors from the previous three teams, it was a farming cultural shock, after they realised that agriculture in the Netherlands no longer belonged to man and his hand hoe, but to machines and automation.

They were shocked to realise that for every one litre of milk produced by the Ugandan dairy sector, the Dutch produce over 100 litres. They were shocked when they saw robots handling key farm aspects such as harvesting and feeding animals, when they saw greenhouses owned by 'small farmers', when they saw co-operative groups that have been in existence for over 200 years. They were stunned to learn that even 'small farmers' have got at least three tractors on their farms. Everything was shocking and revealing to the extent that some of them wondered if they were really farmers.

However, beyond the cultural shock, they learnt thousands of lessons that can be applied in Uganda. Comparatively, Uganda has less natural challenges than the Netherlands. For example, while the country faces winter for many months of the year, which means that they have to plan and innovate for it, Uganda's weather is fine all year round. This means that as the Ugandan farmers apply the newly learnt innovations, they are not worried about the weather issues.

For crops, the basic they can do is use good seeds plus fertilisers, carry out proper harvest and post-harvest handling practices and add value.

For the animals, it is about getting the right feeds and feed them very well. That way, production will obviously go up. For those farmers who want to visit the Netherlands, simply get nominated for the 2018 best farmers competition and you never know, you might travel next year. Send your nomination to harvestmoney@newvision.co.ug or SMS to 0789353585

Joshua Kato
Editor

How to harvest,

Last week, we looked at setting up a coffee farm, propagation of seedlings and general management of a coffee shamba. Today, we focus on harvesting and storage of coffee. These tips were provided by Lutakome Ssentamu from Uganda Coffee Development Authority (UCDA) Dr Pascal Musooli and Dr Godfrey Kagezi from the National Coffee Research Institute

A woman harvests red coffee cherries at UCDA demonstration garden in Bushenyi

By Joshua Kato

Coffee starts yielding after three years. Thereafter, a farmer will harvest twice a year, in July and in December.

One of the biggest challenges facing the sector is poor harvesting. Farmers harvest immature coffee and mix it with mature beans. This kills the quality of the produce. During harvesting, most farmers *kuwuluka* (harvest everything on the twig) and yet, coffee should be 'picked'. That is only pick the ripe beans and leave the rest. Mature coffee beans are cherry red.

The green beans should be left on the tree to ripen further. Always pick, do not strip. When you pick immature coffee, you lose on two sides.

On one hand, you lose at least 30% of the weight you would have got if you harvested them when mature since immature coffee weighs less. On the other hand, you also lose customers if they discover that you harvest immature coffee. Immature coffee is not only light, but also tastes different from the one that is mature.

- Do not let coffee beans drop on the ground during harvesting to minimise contamination. Tarpaulin or other soft sheets must be spread on the ground below the coffee tree to avoid coffee beans from dropping to the bare ground. If the coffee beans drop to the bare ground, they should be picked carefully.
- Remove all green beans, leaves, twigs and foreign matter from harvested beans. Pick the coffee regularly, that is every two weeks, to get good yields and better quality.

Processing

The ripe coffee fruits (cherries) go through a number of processes to extract the beans from their covering of pulp, mucilage, parchment and film to improve their appearance.

The resulting clean coffee can then be roasted and ground to obtained the coffee powder fit for human consumption. There are two main techniques used to obtain clean coffee, that is, wet and dry processing.

Wet processing

The process includes

- Removal of pulp and mucilage followed by washing to obtain clean wet parchment
- Drying of the parchment coffee
- Removal of the parchment and film by hulling followed by grading to obtain the desired grades (sizes) of the clean coffee.

Wet processing can be done for both Arabica and robusta coffee. Arabica is produced at high altitudes (over 1,500m above sea level) in the Mount Elgon areas in the East, the highland areas of Nebbi in northern Uganda and the mountainous areas of Kisoro and Rukungiri in the Southwest. The coffees produced are generally described as 'mild'.

The harvest often includes unripe, immature cherries, dried cherries, twigs and leaves. These are lighter than mature ripe cherries and can, therefore, be removed by a floatation process. The process can be done in a simple vat or mechanically in a washer separator, which floats off the impurities and also washes the ripe cherries.

Pulping

The cleaned cherries are then pulped – a process in which the wet beans are squeezed from the cherries leaving the pulp. Pulping can be done using a hand-pulper with a capacity of 300kg/hr of fresh cherries. The capacity may be increased by the incorporation of an electric motor or a diesel/petrol engine. Larger units of up to 4.0 tonnes per hour are available at central pulping stations. The wet parchment beans have a mucilage layer around them that is still removed by bio-chemical enzyme activity through controlled fermentation to give 'fully washed' coffees.

If the mucilage is mechanically removed, the coffees produced are referred to as semi-washed.

Washing

After the mucilage is degraded, it is removed by washing in a channel or vat filled with water. The density of the parchment coffee is slightly higher than the water and the beans will sink to the bottom of the vat. It is, therefore, necessary to continuously stir the beans using rotary stirring rods or manually using spades in the washing channel.

In a mechanical mucilage remover, mucilage degradation and washing are done in a single operation.

Mechanical drying

The wet parchment free of mucilage at moisture contents of 50 – 60 % is then dried on suitable raised drying tables to the required 12 % to ensure their conservation. Mechanical driers can be used to hasten the drying regime after draining off some of the water.

Dry processing

This takes place in two stages:

- Drying of the cherries (usually under the sun)
- Removal of the dried coverings (husks) in a mechanical operation (hulling).

Smallholder farmers can accesshullers from local artisans around the country for as low as sh450,000. Motorised [illegible] hullers cost over sh1m, depending on the [illegible] capacity.

Harvesting

The harvested cherries are usually not sorted before commencement of the drying regime.

Careful harvesting to exclude immature cherries and extraneous matter e.g. stones is essential. Further, do not leave twigs and leaves in the harvested coffee because they are also considered contaminants.

Sun drying

The drying regime should begin immediately after harvest to avoid the development of undesirable taints and moulds. The cherries are spread out to dry in the sun on suitable drying surfaces, for example, raised trays or tarpaulins.

- The coffee must be frequently stirred to achieve uniform drying. The coffee should not be rewetted at any time during the drying regime. Do not dry your coffee on bare ground because this causes contamination and lowers the quality of the product.
- Drying will be complete when the dried cherries (*kiboko*) have attained moisture content of between 13% – 14%.
- Stop drying when the coffee makes a rattling sound when you shake it. This can take one week to 10 days depending on the amount of sunshine.
- Do not heap wet or partially dry coffee for more than 12 hours because this creates heat that seems to 'cook' the coffee rather than dry it. This affects the aroma. Spread the coffee on a flat surface, with a thickness of not more than four inches.

add value to coffee

Grading

The real implications of poor postharvest handling are seen at the grading stage, when good quality coffee is separated from the poor quality one. Coffee is graded in different ways, however, the best grade is 18 and above.

The process involves the use the colour and smell of the green coffee to give an indication of the botanical species, age of the crop, husbandry, handling and processing conditions.

The sizes of coffee beans range in descending order from screen 18, screen 15, screen 12, screen 11.9 and B.I.P (broken half pieces). The bigger the size, the higher the quality of the coffee. For example, if your coffee is screen 25, then that has a higher quality compared to screen 12.

The bean size is a product of the botanical species, age and husbandry practice. The bean size and weight also determines the out-turn at processing level. If a farmer selected the right variety, nurtured it well and harvested only mature, ripe beans, then he is likely to get a higher grading, which also fetches more money.

The amount of moisture is measured by a moisture metre which is calibrated in percentages. Moisture metres can be bought from shops at sh50,000. The moisture content is a function of drying, storage and transportation conditions. This is when farmers who never properly dry their coffee realise their folly. If the coffee beans are stored when they are not properly dried up, that also affects the final flavour of the product.

The final grading involves the liquor content of the product. The liquor content is determined by carrying out cup-tasting. The liquor quality is a function of the coffee variety and crop husbandry, especially soil management.

Putting coffee in a sack for storage

Storage

Coffee is packed in standard sacks of 60kg before it is stored. Coffee must be stored in a well-aerated, covered area, once it is dried properly. The structure should not have water leaking through it. If you store your coffee is a leaking shelter, then it will get mouldy and loose the flavour.

Big buyers such as Kyagalanyi, Kawa com etc have got big stores for storing coffee. However, by the time it reaches their stores, it has passed through several other smaller stores, starting right from the first producer, the farmer.

It is not expensive to create a good storage facility for your coffee at homes. All you need is the space, depending on the volumes that you harvest, plus the jute/gunny sacks to put it in. The floor of the storage facility must be free of any other contaminating elements such as soil and stones. Use pallets at least a feet above the ground to rest on the sacks.

In some instances, farmers store coffee in the same shelters with animals. This is bad because it affects quality. For instance, coffee dealers have received coffee beans mixed with goats droppings. Do not keep coffee in houses shared by animals because they will contaminate the beans. Others elements to avoid include;

- Products such as beans, soya etc
- Oily elements in the storage area
- Keep fumes, for example generators away
- Well-dried coffee can be kept for a year

A huller removes the parchment skin

Hulling

In the wet method, the dried coffee beans have a parchment covering while in the dry method, the beans are covered with the husk. These are removed in a mechanical operation known as hulling.

Hullers usually rotate at a speed of 450 – 800 rpm. Higher speeds result into a polished appearance, but also increase the breakages. There are about 250 active hulleries operating throughout the country.

The resulting clean dry coffee beans are in both cases referred to as FAQ (Fair Average Quality). The FAQ is then sorted according to size using coffee screens or sieves.

Value addition

Uganda, like most other coffee producing countries sees limited value addition through roasting and soluble coffee manufacturing mainly because there is limited consumption yet the investment is high. This is why the bulk of the coffee, nearly 90% is exported.

An economical investment in a soluble plant is approximately above $20.0m which is high for some multinational companies that would be interested.

The effort to attract multinationals is constrained by low level of domestic consumption and the fact that they already have excess capacity in the traditional consuming countries.

However, there are other forms of value addition being done at farm level which directly improve the incomes of the farmers such as production of specialty quality, organic and other certified coffees which can double the income.

Low level of coffee roasting is now done mainly in the urban areas such as Kampala to serve the upcoming coffee shops/cafe culture. As consumption grows there is no doubt the value addition through roasting will also grow.

Roasting

The final flavour of coffee is heavily dependent on how coffee beans are roasted.

Roasting is a time and temperature dependent process. The roasting temperature needs to be about 2000C. The degree of roast is usually assessed visually and one method is to watch the thin white line between the two sides of the bean. When this starts to go brown, the coffee is ready. It is always important to find out the locally acceptable degree of roast in any market.

Coffee beans can be roasted in a saucepan as long as they are continually stirred, but an improvement is roasting the coffee in sand as this provides a more even heat. Use of a coffee roaster is preferred as it produces a high quality product. The simplest roaster is a tin can with a handle so that it can be rotated slowly over a fire. There are various other roasters suitable for larger scale units.

Grinding

Grinding is a key value addition process. It underpins the preparation of beverage coffee and other coffee by-products. Grinding is best done by use of grinding mills, manual or motorised.

There are many manual grinders that can be used to grind coffee. Manual grinders can be attached to a bicycle or treadle to make work easier and increase output.

It is always important to find out the degree of fineness consumers want and the grinding mill adjusted to deliver the desired ground product. Motorised grinding mills involve the use of a hammer plate, vertical plate or hammer mills and are required for large scale production of 100kg of ground product per day.

Apart from exporting green coffee beans, coffee can also be roasted, ground to make coffee powder which is in local coffee shops to prepare coffee drinks. Encouraging of local coffee shops and local people to consume coffee could also help on value addition.

Additional tips from Ugandacoffee.org

INSTANT COFFEE

Production of instant coffee is unsuitable for small-scale enterprises as it requires very expensive machinery such as an extractor, a freeze and a spray drier.

Presently, the smallest economically viable instant coffee factory is 1000mt/year. Machinery can be obtained from countries such as India, China and other European countries. To produce instant coffee, the soluble coffee solid and other compounds have to be extracted and then dried it to powder or granules.

The extraction of the soluble coffee solids is done using different methods that include use of percolation batteries, countercurrent system or slurry extraction. The extracts can then be dried in a spray drier, freeze drier or a drum drier.