



Photo: TOF

Heifers are one of the most neglected animals in many Kenyan farms. Farmers instead concentrate on feeding their milking cows and leave heifers to feed on poor quality pastures. Poor feeding of heifers results in stunted growth and poor milk production later when they mature into dairy cows. *Page 7*

Demand for organic food up in East Africa

Peter Kamau and Samuel Ndungu

A consumer survey has established that demand for organic food is increasing in East Africa. The survey conducted in five East African countries that is Kenya, Uganda, Tanzania, Rwanda and Burundi shows that awareness on the benefits of eating healthy is gradually growing among urban con-

sumers in all the five countries. Increased awareness is also expected to drive the demand for fresh and naturally grown organic food.

Awareness has increased

The results of the consumer survey supported by IFOAM Organics International and released last month shows that awareness on the benefits of organic food has increased from 35 per cent in 2013 survey to 39 per cent in this year's survey; an increase of 4 per cent. Awareness on the benefits of organic food was highest among men at 42 per cent compared to women consumers at 36 per cent.

Higher income groups eat more organic foods

Consumption is also higher among the higher income group (44%) compared to lower income group (24%). Internet, mobile phones and social media were found to be the main channels for awareness creation compared to a similar survey conducted in 2013 survey where most respondents indicated they received information about organic farming by word of mouth.

Most respondents in the survey say that they got their

information about the benefits of organic foods from teaching in schools, colleges and TV. The survey shows that there has been a marked increase in awareness across the region in the last 10 years. For example, in Rwanda, the awareness of organic standards has improved from 6 per cent in 2006 to 75 per cent this year.

Kilimohai Organic Mark

The awareness of the Kilimohai organic certification mark has also increased from 17% in 2013 to 23% in 2017. As in earlier surveys, consumers interviewed indicated that taste, health, nutrition and safety are the main factors that motivated them to go for organic food. Key to the expansion of organic trade is availability of organic produce. Price and affordability would help more consumers to choose organic foods over conventionally grown substitutes. The study established that more collaboration between stakeholders in the organic sub-sector traders and governments is required to increase consumer awareness and uptake of organic foods. *More details on the survey will be covered in upcoming issues of TOF magazine. See also page 8*

Dear farmer,

As we approach the end of the year, farmers across the country are preparing to harvest various crops they grew in the season now coming to an end. Every year, the harvesting season brings with it a lot of uncertainty to farmers. They do not know what the pricing of various commodities will be. Going by past experience, periods of good harvest almost always come with poor prices because agricultural goods usually flood the market sending prices tumbling down.

The inability of the government to pay farmers for maize delivered to the National Cereals and Produce Board (NCPB) last year is still fresh in their minds. Indeed, most maize farmers who delivered their maize to NCPB at the beginning of the year got their payment last month. Uncertainty of agricultural commodity prices is a problem the world over, but in Africa where the markets are not well-structured, the farmers are left at the mercy of middlemen or companies who exploit them by buying at low prices and stocking the produce and sell at exorbitant prices when the market prices improve.

In developed countries farmers manage to break even due to subsidies which reduce their production costs. Farming in these countries is better organised, complete with the integration of production, processing and marketing functions.

Although farmers have benefited from a few initiatives such as subsidies on some of the farm inputs such as fertilizers and seeds, marketing problems persist with much of what they produce being subjected to free market forces of supply and demand.

As we have mentioned many times in this column, salvation for our farmers will only come when more agro-processing industries are set up to use the various crops produced as raw materials for industries.

Unless such initiatives are put in place, farmers will continue with subsistence farming and low earnings from what they take to the market, which has led to the sector contributing very little to the economic development of the country.

On a positive note, the good rains this year have provided farmers with adequate fodder if well conserved, the fodder can see the farmers through the dry season that is about to start in January next year. We hope farmers will conserve the excess pasture grasses and crop residue to feed animals during the dry spell. *Page 6*

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It is easy to establish a seedling nursery

As the dry season approaches, farmers can make some good income from selling vegetables that are in short supply during this period. They can start by establishing seedbed for various vegetables.

Miriam Nasiano | Establishing a nursery seedbed for crops such as tomatoes, cabbages, *sukumawiki*, indigenous vegetables such as amaranth, spider plant, black nightshade etc is a great way to start gardening earlier as we approach the dry season. To have a successful and healthy seedling nursery the following must be put into consideration:

Prepare the 'potting soil': Choose potting soil that is made for growing seedlings. Do not use soil from the garden or re-used potting soil from houseplants. Start with a fresh, sterile mix that will ensure healthy, disease-free seedlings. Before filling the containers, use a bucket or tub to moisten the planting mix.



A well prepared seedbed: It is easy to set up your own nursery

The goal is to get the soil moist but not soggy and also crumbly. Fill the containers and pack the soil firmly to eliminate gaps. Remember that most mixes contain few, if any, nutrients, so you will need to feed the seedlings with liquid organic fertilizer a few weeks after they germinate, and continue until you transplant them into the garden.

Start planting: Check the seed packet to see how deep you should plant your seeds. Some of the small seeds can be sprinkled right on the soil surface. Larger seed will need to be buried.

After you have dropped a seed in each hole, you can go back and cover the seeds. Moisten the newly planted seed with a mister or small watering can. To speed up germination, cover the pot with plastic wrap or plastic dome that fits over the seed-starting tray. This helps keep the seed moist before they germinate. When you see the first signs of green, remove the cover.

Water, feed, repeat: As the seedling grow, use a mister or a small watering can to keep the soil moist but not soggy. Let the soil dry slightly between watering. Set up a fan to ensure

good air movement and prevent disease. Remember to feed the seedling regularly with liquid fertilizer, mixed at the rate recommended on the package.

Light: Seedlings need a lot of light. Rotate the pots regularly to keep plants from leaning towards the light. If you are growing under lights, adjust them so they are just a few inches above the tops of the seedlings. Provide seedlings with light for at least 15 hours a day.

Move seedling out gradually: It is not a good idea to move your seedlings directly from the protected environment of your home into the garden. You have been nurturing these seedlings for weeks, so they need gradual transition to grow in the open. The process is called hardening off. About a week before you plan to set the seedling into the garden, place them in a protected spot outdoors (partly shaded and out of the wind) for a few hours. Bring them in at night. Gradually, over the course of a week or 10 days, expose them to more and more sunshine and wind. A cold frame is a great place to harden off plants.

A simple way to test seed germination rate

Rachael Wangare | When growing any crop, a farmer needs to be sure that the seeds they are planting are viable and healthy. Seed viability can be enhanced by purchasing seeds from reputable seed companies. For farmers who may have saved some seeds from the previous season(s), it is important to carry out a simple germination test.

Material needed

To carry out the test, the farmer will need a piece of newspaper, a transparent plastic bag that can be sealed and 100 seeds of the variety to be planted and clean water.

Procedure for germination test

- Place one half of the plastic bag on a flat surface where it is easy to spread the seeds



Always test your uncertified seeds to determine the germination rate

in a warm environment away from direct sunlight.

- Fold the newspaper twice and ensure it is of even thickness. Place it on top of the polythene bag ensuring that it covers all the edges.
- Sprinkle a sufficient amount of clean water on the newspaper until it is uniformly wet but not dripping water.
- Drop the seeds on the wet

newspaper evenly ensuring they are not very close to each other.

- Fold the other half of the plastic paper over the seeds to sandwich them. One can use a piece of stick to lift the plastic bag a little bit so that it can hold some air that is necessary for germination.
- Seal the plastic bag tightly using an adhesive tape to

avoid air from entering and also avoid loss of moisture.

- Monitor the seeds regularly to check the seed quality and germination rate. Most seeds will germinate within 3-10 days. Healthy seeds will have a uniform germination and will also not have any fungal or bacterial growth on the outside of seed coat.
- After about 7-10 days, open the plastic with the seeds and count those that have germinated to determine the germination rate. For example, if there are 90 seeds that have germinated out of the 100 seeds, the germination rate is 90%.
- If the germination rate is less than 60%, you should buying new seeds or increase the number of seeds you plant to compensate for the low germination rate.

The Organic Farmer is an independent magazine produced monthly for the East African farming community. It promotes organic farming and supports discussions on all aspects of sustainable development. The articles in the *The Organic Farmer* do not necessarily reflect the views of ICIPE nor Biovision Foundation or Biovision Africa Trust (BvAT).

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You can control fall armyworm naturally

Many farmers rush to buy chemicals when their crop is affected by the fall armyworm. But a farmers group in Central Kenya has discovered various natural methods to protect their maize including the use of predators of the pest.

Amina Day Ojijo | Fall armyworms feed on the leaves of more than 80 different crops, which leads to heavy losses for farmers. But when farmers spray chemical pesticides, many beneficial insects such as bees ants, wasps and ladybird beetles are killed. Fortunately, there are methods which farmers can use to kill this pest naturally.

"We sprayed chemicals and the caterpillar was not dying. We were helpless. People were saying the caterpillar was very difficult to control because it was not dying even after spraying chemicals. I first sprayed three times and I could see that what they were saying was true," says John Fundi a farmer from Embu County.

At the farmer field schools, members of his farmers' group were later trained to recognise the many beneficial insects in their fields; "from the training, we found that it is important for farmers to join a farmers' group so that they can get access to extension services," he says.

Beneficial insects are effective

Some of the beneficial insects which can help in the control of fall armyworms include the Rove beetles and earwigs which feed on the eggs and young of the fall armyworm. Earwigs like to hide in maize husks. You can attract earwigs by leaving maize husks or other dry leaves in the field.

Ladybird beetles also eat the eggs and larvae (caterpillars) of the armyworms including all the stages of the ladybird beetles. Ants are also particularly effective because they are present all the



A fall armyworm infested maize

time and there are many of them. Ants hunt and kill fall armyworms, even when the worms are hiding inside the whorl (funnel where maize leaves attach to the maize stem).

By keeping trees, hedges and wild flowering plants around your field you give the beneficial insects a place to live and feed. By the time your maize crop starts to grow, these good insects will move into your field to help control fall armyworms and other insect pests.

Farmer uses cooking fat

Mr Fundi, an innovative farmer from Embu County talks of how he attracts ants in his maize field.

Says John, "When my mother was drying maize I saw that ants were eating the caterpillars in the maize. And wherever she placed cooking fat, I saw ants, since they like cooking fat. This is when I realized that if I put cooking fat on the maize, the ants will eat any caterpillar that comes.

"I apply when the maize is knee high and when it is about to flower. I smear with my finger plant by plant, but where the ants

are I do not apply because they are already there."

At first, Mr. John smears the fat at the base of the stalk, but when the ears develop, he smears the fat at the base of the stalk and one metre high on the stalk.

Field scouting important

Just like people, armyworms can also get sick from diseases. In the field, you may find armyworms killed by fungus. The armyworms become rigid and turn white or light green as the fungus matures and the worms die.

As the beneficial insects may not kill all the fall armyworms, check your field twice per week. Use your hands to destroy any armyworms or their egg masses. Do this at least until the plants are 6 weeks old, as that is when they are most vulnerable.

"I saw the importance because when I hand-picked the fall armyworms in the field near my house I got a harvest, while the other fields that I did not bother with did not give any harvest. In our group, we teach one another about this and people agree to do it because they have experienced loss of crops from fall armyworms," says Mr. Fundi.

Using plant extracts

Some farmers also use locally available plants that do not cost them anything. Mr Aaron Njagi prepares a local concoction to spray his half hectare maize field.

He says that he starts by collecting a handful of wild marigold, a handful of young tephrosia shoots and some aloe vera leaves. Also pick a handful of ripe chillies.

Says Njagi, "I decided to put aloe vera because it is very strong. I also add wild marigold because its smell repels the moth. And the hot pepper adds bitterness, which gives extra strength to the mix."

How to prepare plant extracts

Mr Njagi advises farmers to do the following :

- Start by chopping all the plants up on a clean bag and put the plant parts in a pot with 6 litres of water.
- Boil all the plants for about an hour and let the mixture cool down a little before sieving it.
- While the mix is still nicely warm, add a small package of more chillii powder and

stir for about five minutes.

- Sieve the mix several times so that there are no more particles left that could block the nozzle of the sprayer.
- After filling a 5-litre jar with the mix, close the jar and place it in the shade.
- Check it the next day and if the jar is bulging, it means fermentation has started.
- Pinch a small hole in the lid so that any gas can escape. Leave it to ferment for a week
- Now it is ready for spraying. But be careful, the mix is very powerful so you have to dilute it.
- To one litre of the mix, add 20 litres of water.
- Mr Njagi also adds a small amount bar soap, "soap is added because it is a sticker. If you don't want to use soap, the mixing alone will also work," Mr Njagi says.
- Make sure to wear long trousers, long sleeves and gloves as the product can irritate your skin.
- You can make your own mixes from local plants and try to see if they work.

Another farmer Nephath Njagi, from the same village modified an old pest control method whereby farmers controlled caterpillars with ash and pepper. He mixes a small amount of pepper powder (some farmers use tobacco but it is not recommended in organic farming) in a bag of ash, and then adds half a bag of sand to it.

How to apply

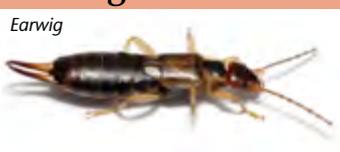
With a used canister of Vim® powder or any other container Mr Njagi sprinkles a small amount of the mixture in whorl of damaged plants.

"We sprayed with chemicals and they were not working. As the armyworms did not die, I decided to use pepper, ash and sand. The sand helps the mixture go deep down in the plant where these worms hide. Then the caterpillars started dying. Where I applied, the crop matured well and where I did not apply there was fall armyworm damage," says Mr. Njagi.

You can watch a video *Killing Fall Armyworms* at <https://www.accessagriculture.org/killing-fall-armyworms-naturally>

For additional reading http://www.infonet-biovision.org/natural_pest_control

Biological soldiers against fall armyworm



Earwig



Rove beetle



Lacewing



Ant

IPM methods effective in *Tuta absoluta* control

The pest has developed resistance to many chemicals used to control it. However, ICIPE has developed several Integrated Pest Management methods that have managed to control the pest.

Beritah Mutune | Thousands of tomato farmers in Kenya have suffered huge losses in the past after a devastating pest infested and destroyed their valuable tomato crops. The invasive pest, *Tuta absoluta* that originated from South America and commonly known as the tomato leaf miner the pest is considered a serious threat to tomato production worldwide.

The pest also affects other solanaceous crops such as eggplants, potatoes and pepper. *Tuta absoluta* can destroy an entire tomato farm, whether in the open field or in a greenhouse, if effective control measures are not employed.

It is in this regard, that ICIPE in collaboration with other external partners has worked together in a project to help control this pest in tomatoes in affected regions.

The aim of the project is developing a holistic eco-friendly Integrated Pest Management (IPM) package for management of the pest through mass trapping using new methods of attracting and killing the pest, biopesticides based on entomopathogenic fungi (*Metarhizium anisopliae*) and introduction of co-evolved natural enemies from the same pest. In addition, the project seeks to enhance and facilitate knowledge exchange and dissemination whilst building the capacity of farmers, agricultural extension officers and other stakeholders.

Chemical pesticides not effective

What many farmers may not know is that pests like *Tuta absoluta*, which have a short generation time and high reproduc-



Infested tomato fruit



A Deltatrap is useful in trapping fall armyworm moths for monitoring and the pest control purposes



tive potential, are at an increased risk of developing resistance to insecticide use. In many countries that were affected by the pest before, for instance South America, pesticide use has already proven to be an unsustainable management option.

Integrated Pest Management (IPM) approach

The ICIPE project aims to provide tomato farmers with potent and environmentally friendly pest control solutions and validate the use of this IPM strategies that employs a holistic integrated approach. This is likely to enhance the control of *Tuta absoluta* in tomatoes to increase production and income for tomato growing farmers.

Achievements

A number of strategies are being developed to control the pest, which include the identification of natural enemies of the pest (also called parasitoids) that are indigenous to East Africa and exploration for a more efficient from the pest's aboriginal home of Peru. Among the measures being explored is the use of the attract and kill strategy that targets the male of *Tuta absoluta* moths in an effort to reduce the population of the pest and their rapid multiplication.

Tuta absoluta control measures

ICIPE advises farmers to take the following measures to reduce the pest population in their farms:

- They should remove all infested plants and fruits in their *shambas* and destroy them.
- All tomato, potato, night-shades and eggplants that

grow on their own should be removed and buried or burnt.

- Farmers in the affected areas should practise crop rotation in order to reduce the pest population in their farms. They should avoid planting any crop in the tomato family during the rotations in order to reduce the danger of transferring the pest to the next crop. These crops include potatoes, eggplant, capsicums bananas etc.
- Farmers can also practise intercropping (planting other crop with tomatoes) in order to reduce *Tuta absoluta* population while increasing the population of the natural enemies.
- Farmers in the affected areas can work together, for example by spraying their crops at the same time to reduce the possibility of the pest moving to the neighbouring farms where no control measures are taken.
- Tomato fields should be kept clean and free of any crop residue that may harbour the pest.

Other recommendations that can help manage *Tuta absoluta*

- The local authorities such as the county governments can impose quarantines to ensure tomatoes from affected areas are not transported to other areas that are not affected by the pest.
- Educate administrators, scientists, and the public about the impending danger of *Tuta absoluta* invasion.
- Adopt quarantine measures to prevent its introduction. These would include such steps as not allowing the

import of tomatoes with stems, leaves, or a calyx (the green sepals of a flower that form an outer floral envelope).

- Set up monitoring programs in border areas using pheromone traps. Pherodis *Tuta absoluta* (sex-specific pheromone) in combination with Deltatraps and Tutasan water-traps on the other hand are crucial in monitoring and mass trapping of the adult *Tuta absoluta* male moths. This strategy helps in early detection of the pest and curbs the multiplication before they cause any serious damage.
- Explore the effectiveness of using natural enemies of *Tuta absoluta*, imported from South America, home of the moth, to control the pest.
- Form regional and global networks to inform each other and the world about *Tuta absoluta* discoveries.

Scientists in ICIPE are working to develop a comprehensive package for managing this pest using environmentally friendly methods. They are also advocating a number of biological control measures that can manage the pest population and reduce damage to tomatoes. Farmers can buy *Tuta absoluta* IPM kits from Real IPM, Thika call 0725 806 086.

For more information please contact: Dr. Samira, Project Coordinator *Tuta absoluta*-ICIPE & Dr. Fathiya. Email: sfaris@icipe.org; fkhamis@icipe.org

For additional reading <http://www.infonet-biovision.org/PlantHealth/Crops/Tomato>

Organic kitchen gardening: A fountain of health

With increasing use of deadly chemicals and raw sewage to grow vegetables, it is wise for consumers to start their own organic kitchen gardens in their backyard for production of healthy and fresh vegetables and even fruits.

Mary Mutisya | Growing your own vegetables and fruits doubles up at balancing practicality and indulgence. Nothing beats the sight and taste of a perfectly ripe juicy tomato still warm from the sun, healthy organically grown vegetables and sweet carrots pulled from the garden minutes before consumption. Fruits and vegetables start losing their nutrients as soon as they are harvested, and their quality also starts to diminish as the sugars they contain are turned into starches.

For this reason, therefore, it is advisable to try organic farming a few nutrient dense foods in one's backyard. Kitchen gardening has many advantages which range from providing nutritious foods to one being sure of what they are consuming in terms of chemicals safety to being economical.

Any space enough for vegetables

As inviting as this venture may seem, many shy away from it and one of the questions that pops up almost always is where and how to start. Many urban dwellers always complain of lack of space, capital and the knowledge of how to maintain the gardens. This is however not rocket science as kitchen gardens can be run on small yards, containers and even on hydroponics. All one needs is the will and determination to grow their own food.

Below is a guide of four commonly consumed vegetables, their nutritional value and tips of how to grow them organically:

Leaf Amaranth

Though less-commonly known and used, amaranth is an indigenous vegetable that has been used for ages by many communities around the globe. More than a thousand species of amaranth exist and its one of those crops that are increasingly gaining popularity mainly due to their nutritional value. The seeds, stem



A lot of vegetables, fruits and spices can be planted to provide fresh, healthy food for the family

and the leaves of amaranth are all consumable and for this reason it has come to be known as the "amazing amaranth."

Amaranth leaves have a sweet and slightly tangy flavour that works well alone or with other dishes. The seeds are harvested at maturity and can be added onto other foods as well. Unlike kales and spinach, amaranth the plant is heat-tolerant and does not droop easily even when the weather is very hot. Nutritionally, leaf amaranth is very high in calcium, iron, magnesium, phosphorus, potassium, riboflavin, zinc, vitamin, B6 and C.

How to grow leaf amaranth: Leaf amaranth can be grown on land but for those in urban areas and have no land, amaranth can be perfectly grown in containers. The seeds can be scattered over the soils surface in pots of at least 8 inches deep. Germination takes around 6-7 days and the total period to harvesting is about 40 to 50 days. After maturity, amaranth can be harvested two to three times before more seeds can be sown.

What to watch out for: Amaranth is easy to grow and most of the times problem free. Leaf miners can however be experienced and are a cause to look out for.

Tomato

Fresh, home-grown tomatoes are one of the key reasons many gardeners get into kitchen gardening. Tomatoes are incredibly good for us in terms of health. They pack plenty of fibre, iron, magnesium, vitamin A, B6 and C. They are also a great source of the antioxidant lycopene which has been found to be useful in the prevention and management

of prostate cancer. Many tomato varieties exist with the most common ones in Kenya being Eden, Kal J, Marglobe and the super money maker.

How to grow tomatoes in containers: When it comes to growing tomatoes, the container sizes vary depending on the variety being grown. If growing an indeterminate (tall) varieties, the container will need to be at least 18 inches deep. For determinate varieties, 12 inches is a good depth, and for dwarf or "patio" type tomatoes, 8 inches is perfect. One tomato plant is recommended per pot as tomato have a spreading growth habit.

What to watch out for: Tomato horn worm can be a problem in many regions and causes considerable losses. These large caterpillars can be removed by hand whenever observed. Tomatoes are highly susceptible to wilting and therefore wilt signs should be observed and management measures taken. One mistake that many people often make is growing tomatoes and sweet peppers in the same container. This should be avoided as doing so makes the crops more susceptible to bacterial wilt.

Carrots

Carrots are at their sweetest, crunchiest best when freshly harvested from the garden. They are high in fibre, manganese, niacin, potassium, vitamin A, B6 and C.

How to grow carrots: Carrot seeds can be sown in pots at least two to three inches apart and at least 1 inch (2.5cm) deep. Shorter varieties such as Thumbelina or Danvers half long can be considered in cases where containers are to be used.

What to watch out for: A key factor that determines the sweetness and quality of carrots is their harvest timing. This should be carried out when the carrots are at their perfect size and at most within 70 to 80 days for most varieties after planting. This is because they are tastiest when harvested small. Leaving them in the ground for too long can result in overly large, woody carrots. Carrots should also be kept evenly moist as letting the soil dry out oftenly can result in a somewhat bitter, fibrous harvest.

Broccoli

Broccoli is very high in calcium, iron and magnesium, as well as vitamins A, B6 and C. Research has shown that one cup of raw broccoli florets (small bunch) can provide 130 per cent of one person's daily vitamin C requirements.

How to grow broccoli in containers: One broccoli plant per pot is recommended. The pots should be 12 to 16 inches deep.

What to watch out for: Cabbage worm are the main insect pests of broccoli. If you start seeing white butterflies fluttering around your broccoli, you're guaranteed to start seeing little green worms all over your broccoli plants. To avoid this, it is recommended for one to cover their broccoli plants with floating row cover or lightweight bed sheets or shadenets. In instances where the cabbage worms are already present, one can also simply pick them off by hand.

For additional reading <http://www.infonet-biovision.org/crops-fruits-veg>

Early fodder conservation important for dry season

As we approach the dry season, farmers should start planning to ensure that each of their animals has adequate fodder to last them for the dry season that runs from January to March and sometimes up to April.

Caren Kemunto | In November and December, farmers will have plenty of crop residue after harvesting maize and beans among other crops. The good rains received this year have produced good pastures across the country, including the arid and semi-arid areas. After harvest, all crop residue are left in the fields where it is trampled on by animals, becoming unsuitable for fodder. Wise farmers can plan ahead by ensuring that any crop residue and grasses are conserved for the dry season to enable their animals get enough fodder for the lean season.

Below we provide farmers ways they can conserve the fodder for use in the dry spell when there will be no pastures for grazing:

Crop residues utilization

Crop residues constitute a major



Fodder conservation ensures animals have adequate feed at all times

source of feed for livestock during the dry season. Maize stalks are commonly collected after harvest and stored for livestock feeding. Most preferred are the maize stalks, sorghum and rice for fibre, and legumes such as bean residue that contains proteins that livestock need. Dry cereal residues are mixed with bean residue, green desmodium, and Napier to increase their nutrition and palatability.

Grains, hay and silage

These used during the early drought phases and are a substitute for paddock feed rather than a supplement. Cereal grains

are not efficient supplements when paddock pastures are dry. They slow down digestion and consumption of fibrous pastures. They are fed in small amounts every 3 days, add protein meals such as grain legumes or white cotton seed cake.

Silage is best prepared during the rainy season when there is plenty of fodder. It provides quality feed in dry seasons. Silage should be fed 3 hours before milking or after milking to avoid having silage smell in milk.

Supplementary feeding

Supplementary feeding aims to

supply animals with deficient nutrients in the pastures in the dry season. Farmers can buy these from agrovet shops.

Protein meals and seeds

Oilseed cakes and meals are rich in protein and most are valuable feeds for livestock in the dry season. They are oilseed crop by-products that are very good sources of protein. The most common high protein seeds are cottonseed cakes, soybean meal and sunflower cakes. They are fed sparingly to livestock.

Molasses

Cattle are fed on molasses-based diets integrated with protein meals or urea provided there is fodder. These diets can be used in early drought stages. Molasses boosts performance in livestock by improving feed consumption.

For a farmer to effectively gain from his animals, quality feeding is crucial. Preparedness for all seasons is also key. This will ensure that the animals remain productive and in good body condition throughout all seasons.

In the next issue: Fodder preparation.

For additional reading http://www.infonet-biovision.org/fodder_production



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Give your heifer the right feed for proper growth

Kindly let me know the raw materials and feed requirements for dairy cow home-made meal starting from a calf, heifers and a mature cow just as you did for chickens.

Dear farmer,

In the ongoing series on feeding of dairy cows (calves, heifers and mature cows), that help answer the above question, we look at the feed requirements of heifers.

Many farmers do not take good care of their heifers, they are therefore one of the most neglected animals in the farm. Yet, heifers require great care through proper feeding and management. Good care of heifers including proper feeding is very important to ensure they grow into healthy and productive dairy cows. A calf becomes a heifer after weaning (when it stops feeding on milk).

Separate heifers into age-groups

After weaning, heifers should be grouped depending on size into small uniform groups that are then fed on concentrates and forage. Farmers can prepare Total Mixed Ration (TMR or fodder mixed with concentrates). When heifers of different ages are fed as a group, the older and therefore strong ones will prevent the younger ones from taking the feed, in the process leaving little feed for the young ones. Farmers should ensure that heifers are separated into groups according to their age e.g. weaners, yearlings, those that are ready for breeding (those about to be served) and those already served (also called in-calf or pregnant heifers).

Heifer's nutrient requirement

A heifer's nutrient requirements are low because the feed they



A healthy heifer grows into a productive dairy cow

take is meant to help them grow and maintain a good body condition. Heifers should therefore be given only a small amount of concentrates equivalent or equal to 1% of their body weight (any concentrate with 12 to 14 per cent crude protein content is adequate for heifers that are being fed with legume forage such as lucerne, purple vetch or desmodium). All heifers being fed on grass should be given concentrates with 15 per cent to 16 percent crude protein content.

Protein feed important for growing heifers

Feed with adequate protein is very important for growing heifers to enable them acquire an adequate body frame size, height and growth. The heifer ration should be balanced with enough

crude protein. Farmers planning a feeding programme should know the following facts:

- Proper feeding will ensure the heifer is able to attain the right size, which enables it to reach the calving age early. Poor feeding will always lead to delayed calving and low milk production (poor feeding leads to stunted heifers which come on heat late and cause delay in calving and therefore delayed milk production.
- Farmers who give less protein to heifers and more energy feeds (grass, hay and related fodder) cause the accumulation of fat in the mammary glands (glands in the body and udder which produce milk) leading to slow development of the glands, which reduces the potential of the

heifer to produce more milk.

- Underfeeding (giving heifers less feed results in a small body (stunted heifers) which will have difficulties calving down (or difficult births).
- Good feeding results in animals with a big body frame and hence more milk production- bigger and healthier cows produce more milk.
- Over feeding heifers with feed that has high energy but low proteins (e.g. hay, maize stalks, grinded maize, cobs etc) results in heifer that are short and fat. On the other hand, heifers fed on low energy feeds, results in tall thin heifers.

Underfeeding slows heifer development

Underfed heifers grow slowly and may mature (reach puberty) without showing any signs of heat. When they ovulate, there is usually no sign that they are on heat (silent heat). For heifers in good body condition, farmers will immediately notice when they show signs of heat and be able to serve them; such heifers have a higher conception rate (they conceive easily). On the other hand, over conditioned heifers (overfed heifers) tend to gain fat and they often have problems conceiving (they may require more services) before they can conceive compared to heifers of normal size and weight.

Steaming up heifers

When an in-calf (pregnant) heifer is about to calf down (give birth), there is need to give more concentrates especially in the last 4 weeks of pregnancy. The extra concentrate should be fed at the milking shed (parlour) to get it used to the milking shed. The feeding is meant to allow the rumen bacteria to get accustomed to high levels of concentrates. The extra feeding will also help provide extra nutrients for the animal and its growing foetus (unborn calf). Steaming also allows the heifer to put on extra weight (or reserve energy) to promote maximum milk production from the very beginning of the lactation.

The tables (left) can help the farmer to determine the growth and development of their heifers:

Answers by Elkanah Isaboke

For additional reading <http://www.infonet-biovision.org/AnimalHealth/Animal-nutrition-and-feed-rations>

Table 1: Expected weight of different breeds of heifer at breeding and calving

Breed	Breeding		Calving	
	Age (months)	Weight (kg)	Age (months)	Weight (kg)
Jersey	15-16	230-275	24	350-375
Guernsey	15-16	275-300	24	375-400
Ayrshire	18	300-320	27	420-450
Friesian	18	300-320	27	420-450

Table 2: Expected weight for age at different stages of heifer development

Stage	Common name	Age (months)	Weight (kg)
Weaning	Weaner	3-4	70-80
Puberty	Bulling heifer	12	220-240
Insemination	In-calf heifer	15-18	275-300
First calving	Milking heifer	24-27	400-450
Drying		36	

Source: Feeding Dairy cattle in East Africa (Ben Lukuyu, Charles Gachuiri et al 2010)

TOF Radio answers your questions

TOFRadio is broadcast on KBC on Tuesday and Thursday at 7:30pm and Mbaitu FM on Friday at 8.30pm. Tune in and listen to farmer experiences and expert advice on agribusiness and eco-friendly farming methods. On this page, we respond to some of the issues raised by farmers in their correspondence to the radio program. Send your questions and comments via SMS 0715 422 460, email: admin@theorganicfarmer.org

Organic marketing goes online in Kenya

Charles Kimani | You are what you eat, so goes a popular saying. In the recent past the country has recorded a spike in the number of diseases that can be attributed to the foods we are eating. Some people eat organic food as a recommendation by the doctor, but the reality is that eating organic is one way of avoiding food grown using chemicals, which are detrimental to human health.

A 2014 study published in the *British Journal of Nutrition* found that organic produce is less likely to contain cadmium, a harmful heavy metal that usually collects in the liver and kidneys, thereby damaging them.

What is organic food

Organic food, is food that is obtained from farming that advocates for the use of natural methods where chemical fertilizers and pesticides are avoided, instead focuses on the use of plant, animal manure and eco-friendly farming systems such as crop rotation and use of biopesticides.

Why eat organic?

Where do you get your food supplies from? Do you know



Organic stand in a supermarket: Demand for organic produce is growing in most urban areas in East Africa

where your food is coming from? These are some of the questions that Kenyans are grappling with. An expose' by a local media showed that Kenyans are eating foods laced with chemicals as unscrupulous business men cash in on unsuspecting consumers.

Buy organic produce at the click of button

The recent past has seen the rise in the number of outlets that

sell organic produce. Kalimoni Greens is one such enterprise, the online platform offers a "one-stop" organic shop. The platform ensures that all the food sold via the platform is organic. "We ensure that all farmers who sell to us are certified," says Lillian Kanari one of the co-founders and shareholders in the business. The business makes over 200 deliveries weekly showing the rising popularity of organic foods.

Organic produce fetches a better price

Organic foods fetch better prices in the market, this is the case for both urban and rural markets. Maurice Abunanga is a farmer in Kakamega who has benefited a lot from adopting organic farming. "My *sukumawiki* stand out in the market and when others are selling a bunch at 10 Ksh, I sell mine at Ksh 20.

Getting certified

The growing demand for organically grown provides an opportunity for farmers. To tap into the market, farmers need to grow their food organically and seek certification. In Kenya, for one to get certified one has to apply to contact a certification company. The certification process entails a thorough look at the production process. It seeks to understand the process and the conditions under which they grow their

produce. It is important to note that one may fail to be certified if the surrounding farms use pesticides that may be washed into neighbouring farms, in this scenario one should create a buffer zone to separate their farm. The buffer zone can be created by planting Napier grass, trees etc. Once certified the produce will carry the certified organic mark.

For additional reading <http://www.infonet-biovision.org/EnvironmentalHealth/What-Organic-Agriculture>

Consumers of organic food less likely to get cancer

Consumption of organic food has been found to reduce the risk of cancer. According to study conducted by The Nutri-Net-Santé supported by the French Ministry of Health and French Institute for Health Surveillance among others, people who consume organic food are less susceptible to cancer compared to those who eat conventionally produced foods that contain chemicals.

Conventional food consumers more likely to get cancer

In the study that interviewed 68,946 people, a significant reduction in the risk of cancer was observed among high consumers of organic food. The study concentrated on organic

food consumption, dietary intake and consumption frequency. An organic food score was then worked out ranging between 0 to 32 points.

Conventional foods had chemical residues

The study, which took place between May, 10 2009 to November 2016 showed that people who consumed higher amounts of organic food had reduced risk of cancer. The results showed that 44 per cent of food produced conventionally had 1 or more quantifiable chemical residues that have the potential to harm consumers while food produced organically had lower toxic effects that do not predispose them to cancer.

Radio Taifa frequencies for our TOFRadio programmes

TOWN	FM FREQUENCIES	MW(MEDIUM WAVE FREQUENCIES)
Nairobi	92.9 MHZ	
Mombasa	100.8 MHZ	
Kisumu	104.5 MHZ	
Kakamega	104.5 MHZ	
Bungoma	104.5 MHZ	
Eldoret	88.6 MHZ	
Nakuru	104.1 MHZ	
Meru	90.4 MHZ	
Nyeri	87.6 MHZ	
Kisii	103.3 MHZ	
Malindi	90.1 MHZ	
Kapenguria	93.3 MHZ	
Kitale	93.3 MHZ	
Voi/Kibwezi	96.9 MHZ	
Namanga	89.9 MHZ	
Lodwar	88.6 MHZ	
Lokichoggio	89.3 MHZ	
Garsen	93.1 MHZ	
Kajiado	92.9 MHZ	
Kitui	92.9 MHZ	
Lamu	96.3 MHZ	
Maralal		1107 KHZ
Wajir		1152 KHZ
Marsabit		675 KHZ
Garissa		567 KHZ