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Thank you for your continued partnership.

High Aflatoxin levels in maize pose danger to consumers

Agatha Ngotho | Aflatoxin levels in maize, the main staple food in Kenya remains high in parts of the country. A study conducted in May this year by FAO and the Ministry of Agriculture in Meru, Tharaka Nithi, Embu, Makueni, Kitui and Machakos counties shows that aflatoxins infestation levels in maize were as high as 94-95 per cent.

The study shows that only about 4 per cent of the maize in the affected regions is free of aflatoxins. The larger percentage con-

tains *Aspergillus flavus*, a highly toxic fungus that causes cancer, suppressing the body's immune system, retarding growth in children and sometimes causing death in people and domestic animals.

Out of the 160 maize samples tested in Meru, the level of infestation was 82 per cent, while samples from Tharaka Nithi Embu, Kitui Machakos and Makueni had 100 per cent aflatoxin contamination.

Mr Gabriel Rugalema, the FAO representative in Kenya said that 94 of maize samples tested had high levels of aflatoxin above the acceptable limits of 10 parts per billion (10ppb), "There is need to put in place measures that farmers can adopt to reduce the cases of aflatoxin. Proper storage practices such as drying and proper storage of maize could prevent contamination by aflatoxins," Mr Rugalema added.

About 3 million bags of maize in the Lower Eastern region were found to be contaminated in the 2009 and 2010 harvesting season. Only 155,475 bags were destroyed leaving a large portion of contaminated maize in the food chain.

FAO is working with the government to reduce the high levels of aflatoxin contamination in maize. Aflatoxin contamination occurs in maize while it is still in the field (before harvest). In most cases, aflatoxins cannot be seen or identified. Contami-



Even clean maize may contain aflatoxins if not well managed nated maize looks normal, which encourages unsuspecting farmers to eat and sell the same maize to consumers.

Maize can easily get aflatoxin contamination in areas with high temperatures as the maize matures. Hence, complete drying before harvesting would keep aflatoxin at bay. Damage through broken grains and holes drilled by pests such as weevils enables aflatoxin contamination.

Technologies have been developed to stop contamination of maize while still in the field. One of these is to spray the maize, before harvesting, with safe strains of the fungus (*Aspergillus flavus*). One of them is Aflasafe®. *Aspergillus flavus* prevents aflatoxin contamination. It inhibits the growth of aflatoxins with safe strains of the fungus. The safe strains of the fungus compete with poisonous ones blocking them from developing into aflatoxins.

Aflasafe® is available at KALRO, Katumani.

Dear farmer,

Farmers have faced major challenges this year. To start with, the weather was not very good, as seen everywhere with the delayed onset of the long rains. When the farmers planted, there was an invasion of the fall armyworm, which attacked maize in the major maize producing regions of the country. The pest is likely to cause maize yield losses in the country this year.

However, all is not lost because farmers have another chance to grow maize from the beginning of October as they take advantage of the short rains. Most parts of the country that did not get adequate rains during the just ended long rains can still replant again during the short rains. This is likely to compensate for the losses that farmers suffered this season. Farmers must also have learnt several lessons on the control of the fall armyworm and we hope they will use the various methods that worked to ensure their maize crop is protected.

One of the best strategies is to ensure continuous spraying of environmentally friendly biopesticides, which prevent the pest from multiplying and destroying the maize crop. There has been a tendency by the government to rush to the use of chemicals in pest control whenever we have a pest outbreak.

But this does not seem to work because most chemicals do not kill the worms. This season, farmers were made to purchase more powerful chemicals to control the pest, but this is a temporary measure as the pest will eventually develop resistance against these chemicals leaving the farmer with few options for controlling it. Besides these chemicals have serious side effects on farmers and even other consumers of the maize.

The current shortage of maize flour in the country should be a wake-up call for the government to device long term strategies to address the issue of food security. It is becoming clear that the country does not produce enough maize, relying mostly on maize imports from Uganda to bridge the production gap. Whenever we have a maize surplus, the government has let farmers down by failing to offer good prices, therefore discouraging them from growing the crop the following year. The Strategic Grain Reserve (SGR) is also understocked.

The government should support and encourage farmers to produce more food for the country. If they did, the country would save a lot of money in foreign exchange that it uses to import food.

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Brachiaria helps farmers produce high quality forage

Brachiaria grass is slowly replacing Napier grass because it grows fast with less water. It produces 18 to 20 tonnes of forage per acre and has been found to tolerate dry conditions better than Napier grass.

Amina Day Ojijo | Livestock is a very important farming enterprise for small-scale farmers. It plays a crucial role in improving incomes among the rural communities, enhancing food security and easing pressure of access to manure.

Many small-scale farmers keep crossbred dairy cows which have a potential of producing 10 litres or more of milk per cow per day. However, many farmers have to contend with the challenge of inadequate quantity and quality of fodder which pushes production of milk down to 6 litres per cow per day and this can even go down further to 3 litres or even less during the dry season.

Napier grass is one of the most important forages used by more than 90% of small-scale farmers as fodder for their cows, sheep and goats. This is mainly because Napier is a fast growing grass that can grow up to 4 metres tall. Napier is favoured because it is easy to establish.

Unfortunately, Napier grass is a heavy feeder with a very high water intake. It takes up a lot of nutrients from the soils and is highly demanding on nutrients and manure. Napier is also vulnerable to diseases like the Napier stunt and Napier smut diseases. Napier is not suitable for direct grazing since stumping results in poor regeneration.

Farmers switching to Bracharia

As climate change and global warming become a reality in



Brachiaria: Farmers are slowly replacing Napier grass for Brachiaria

Kenya, CIAT scientists working closely with farmers are now shifting focus from Napier grass to Brachiaria grass following adoption of climate smart agriculture technologies.

Brachiaria grass closely resembles Napier grass but when one looks closer, the difference becomes more pronounced. The grass grows to up to 1.5 metres in height, it has dark green blades, and produces seeds unlike Napier grass.

Originally from Africa, Brachiaria has undergone improvement in South America, the repatriation of the grass back to Africa by CIAT has increasingly gained popularity among cattle farmers in Kenya.

There are two varieties of Brachiaria, Mulato and Mulato II, which are tolerant to drought, recover fast after grazing, they show high plant vigour, give good quality forage and are tasty to livestock. Brachiaria can produce between 18 to 20 tonnes of fodder per acre.

It is pest and disease resistant

The grass comes as a big relief to farmers who have had to struggle with pests and diseases affecting Napier grass. Brachiaria grass is able to defend itself by producing a chemical response that enables it to repel pests. Consequently, the grass is able to survive pest and diseases attack saving the farmer from

immense forage loss.

Brachiaria also has a well-developed root network system that enhances water and nutrients uptake from the soil, adapting well and showing resilience to climate change.

Brachiaria can be propagated by seeds, root pieces and stems. Mulato Brachiaria is best propagated by seeds, though it can also be planted from vegetative material. Seed is the most appropriate mode of establishment for farmers who want to plant large areas. When using Brachiaria seeds for propagation, a farmer needs 2.5-3kgs per acre. Seed is sown at the onset of rains in well-tilled seedbeds.

For seeds, you can visit your nearest KALRO branch and inquire from there. This is particularly important because you will also be advised on the best mulato seeds to suit your ecological zone.

It establishes easily

Farmers can also use vegetative propagation by cuttings. An important feature of the Mulato Brachiaria is that its stems are capable of rooting when they come into contact with moist soil. Farmers are advised to carry out routine top dressing after every cutting or grazing; using well-matured compost, farm yard manure and rock phosphate. The grass has thick leaves, which makes it difficult for weeds to thrive.

Do not allow heavy grazing of the field during the rainy or dry season.

Towards the end of the rain season, about four months after planting, the seeds will be ready for harvesting. You will notice that they fill grain and start to drop on their own. Harvest them and store in gunny bag, dry them ready for the next planting season.

Regenerates within a short time

Where farmers cut and carry to feed the animals, the grass is ready for the next cut in two or three weeks after the rainy season. At this stage, the grass has higher nutrient content, especially protein, than Napier grass. Allow the harvested grass to dry for two days in sunny weather before packing it and bailing it into the sizes you desire.

Graze or cut it to feed livestock

Mulato Brachiaria can be grazed or cut or fed to animals in stalls and feedlots. Where animals graze, the duration depends on the number of animals. Sufficient time must be given to a pasture to grow back after intensive grazing. Rotational grazing will give grass time to regenerate. *Mulato Brachiaria* has high production capacity of biomass; therefore, it is a good alternative for making silage and hay for use during the dry season. Its production and nutrient content depend on soil fertility and management, as well as the stage of harvesting.

Brachiaria grasses cultivars *Marandu*, *MG4* and *Mulato II* establish well in terms of germination percentage and seedling vigour. *Llanero*, another variety is excellent in spreading, covering the top- this attribute can be used to protect soil from erosion apart from use as forage. *MG4*,

Continues on page 6

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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How to control leafminers in your vegetables

Leafminers can damage vegetables if they are not controlled on time. Farmers can use environmental friendly methods to control the pest.

Berita Mutune | The leafminer larva is a pest that attacks and damages leaf tissue especially on vegetables in East Africa. Leaf miners are small flies about 5 to 10 times smaller than the common housefly (See figure 1). There are three species *Liriomyza huidobrensis*, *Liriomyza sativae* and *Liriomyza trifolii*.

The most important natural enemies of leafminer flies are small wasps that lay eggs inside or besides the leafminer larvae. Two species of these wasps are the *Opius dissitus* (fig 2) and *Diglyphus isaea* (fig 3) which are common in East Africa: The larvae stage is the most destructive stage of the insect (larvae are immature form of an insect.)

How to recognize predatory wasp

The adult *O. dissitus* is a tiny black wasp with a body length of around 1.9 mm. The wasp can be easily spotted with naked eyes in the field. The antennae are black, thin and long, almost the same length or longer than their body.

How it controls leafminer flies

Opius dissitus is a solitary (exists alone) larval-pupal endoparasitoid (parasite that lives inside the pest). The female lays its eggs directly inside the *Liriomyza* leafminer larva. The wasp's larva develops inside the leafminer's larva and pupae killing the pest. An adult wasp will emerge from the leafminer pupa. The adult wasp feeds on flower nectar only.

How to recognize *Diglyphus isaea*

This wasp can be easily spotted with naked eyes in the field. *Diglyphus isaea* is a small and black wasp of around 1.6 mm body length, with a short antenna. It is smaller and has far shorter antenna than *O. dissitus* (fig 3).

How *Diglyphus isaea* destroys leafminer flies

The female *D. isaea* stings and paralyzes the leafminer larva



Figure 1: An adult leafminer fly



Leafminer (*Liriomyza sativae*) pupa within tunnel of onion. They are oval, slightly flattened and about 1 - 2 mm long



Figure 2: *Opius dissitus*: A predatory wasp



Figure 3: *Diglyphus-isaea*: A predatory wasp



Figure 4: A yellow sticky trap



There are many biopesticides that control the leafminer as shown above and below (right)



The leafminer leaves snake-like marks on vegetable leaf surface



before depositing 1-5 eggs next to the paralyzed larva. A single female can lay up to 300 eggs. After hatching, the wasp larva feeds on the leafminer's paralyzed larvae until pupation (stage of insect life cycle between larvae and adult). Newly formed wasp pupa is green and turns black as it matures. In addition, the capacity of the adult to sting, paralyze and feed on larvae of leaf miner flies during the 10 to 32 days of lifespan, gives it the potential of quickly reducing leafminer fly populations. The adult wasp feeds on flower nectar and the leafminer larvae.

Identify and collect infested leaves from the field, place them in plastic/carton containers with sides fitted with transparent plastic containers or empty plastic water bottles, kill emerging leafminer flies and other pests emerging but recover the emerged parasitoids (natural enemies and release them into the fields.

How to protect leafminer natural enemies

Use neem-based biopesticides: Neem products reduce fecundity (reproduction) and longevity (lifespan) of the leafminer flies and disrupt the development of the larvae. They can be applied as drench or as foliar sprays. Neem-based pesticides are less toxic to the parasitic wasps (Nimbecidine® from Osho chemical is an effective neem extract).

Maintain flowering weeds around field borders: After crop harvest, leaf miner flies move to the wild habitat where they reproduce. The parasitic wasps follow the pest as well into the wild habitat. Flowering weeds around field borders are a good reservoir of parasitic wasps in the field.

Trapping the leaf miner adult flies: The use of yellow sticky trap in the field can attract and kill many leafminer flies (fig 4).

For more information on leafminers <http://www.infonet-biovision.org/PlantHealth/Pests/Leafmining-flies-Leafminers>

Contacts: The Real IPM Co.(Kenya) Ltd, Telephone: +254 (0)725 806 086, (+254) 0711 045 000

(Research on leafminer control has been done by ICIPE with financial support from the Germany Federal Ministry of Economic Cooperation).

Increase yield by planting maize the right way

Farmers get low maize yields due to poor planting and management practices. Maize production can be improved through organic methods that improve soil fertility and protect the crops from pests and diseases.

Beritah Mutune | Maize is the staple food in Kenya. Most maize varieties do well in short rains, warm temperatures and loamy, well-drained soils. In maize farming, the choice of the variety to use should be put into consideration. This is because maize varieties are adapted to specific agro-ecological zones characterized by differences in altitude, rainfall, soils and temperatures.

Before planting maize, initial land preparation is an essential routine which should be done before planting of the crop. Good land preparation practice involves taking care of the soil which helps improve its capacity to retain water, allow the circulation of air and improve the nutritional capacity of soil.

Steps in proper land preparation

Digging and tilling the land: When doing this, it is important to work the soil about 9-11 inches using a spade. Remember the deeper you go the easier your maize will develop roots. Digging deep also allows better water drainage. Consider using sprinklers before digging if land is too dry and hard. Consider double digging for better results. Use a cultivating fork to aerate the soil by digging holes in the land and breaking lumps.

Test the soil quality: Consider sampling the soil and testing its pH level (acidity level) preferably by use of appropriate test kits. If the pH is too low, add some lime preferably one month before planting and if it is too high add some sulfur or organic matter such as plant residue or Farm Yard Manure (FYM).

Organic matter: Most farmers destroy organic matter by burning so that the farms can be ploughed in readiness for the planting season. What farmers may not know is that this material is in fact very essential organic manure that supports a lot of life in the soil, such as



Intercropping maize with legumes improves soil fertility and provides farmers with balanced diet.

worms and microscopic bacteria, which help release food for the plants in a balanced way.

Mulching: Mulching helps the farmer to maintain the desired temperatures. Mulch absorbs water and prevents evaporation. Mulching is also a good strategy for controlling weeds.

Start composting: Composting is easy and cheap. It provides nutrients to the soil and you

can make from kitchen waste which is readily available and affordable.

Planting: Planting should be done either 2 weeks before onset of rains or immediately the rains start otherwise lateness results in reduced yields.

Planting depth: Maize should be planted at a depth that will protect the seeds from rodents and birds, and facilitate contact with warm moist soil for good germination. Planting depth of between 2.5 cm and 5 cm is acceptable.

Spacing: For maximum yield, plant to plant spacing should be 30cm apart while the rows should be between 0.5 to 0.75 metres apart. The spacing used will depend on the moisture availability, cropping systems and the planting method used. Narrow rows make more efficient use of available light and shade the soil surface, thereby reducing moisture evaporation and prevent weeds growing underneath.

Thinning: If at planting more seeds were used per hole then thinning should be done early, preferably 2 weeks after emergence. Thinning in time minimizes competition for soil moisture and nutrients by the extra

maize plants. This should be done when the soil is moist for easy pulling of the extra plants.

Intercropping maize with legumes: Maize should be intercropped with other crops preferably legumes that do not seriously compete with it. Beans are commonly used. Intercropping has economic advantage over pure maize stands.

Weed control: Weeds compete with maize for nutrients, moisture and light. It is therefore important to control them as early as possible. This should be done within the first month after germination. The field can be kept weed free by hand weeding, use of herbicides or both.

Fertilizer requirement: Use of organic fertilizers in maize farming is currently being promoted because they are environmentally friendly to farmers, non-targeted organisms including beneficial insects and the environment. When using manure, it is advisable that fully decomposed farm yard manure should be used.

Pests and diseases: Maize is attacked by many pests and diseases from seeding to harvesting. It is important to put into consideration to avoid yield losses. Bio-pesticides are preferred to control pests and diseases as they are environmentally friendly.

For more information on maize production <http://www.infonet-biovision.org/PlantHealth/Crops/Maize>



A young and healthy maize crop

Bananas are an important, healthy food for the family

Eating bananas provides the body with important vitamins, minerals and fibre that keeps the body organs such as the heart, kidneys, nerves and blood vessels healthy while preventing diseases and helping the body to digest food.

Tyson Wachira | Bananas are an important food crop to all of us. They contain mainly carbohydrates (12 %) when they are not ripe. When they ripen, the same starch is converted into sugars called saccharose, glucose and fructose. But they have little protein (1%) and fat (0.05%). Ripe bananas have very little starch (1%).

Although almost all farmers grow bananas, they may not know what health benefits they have for our bodies.

Bananas are rich in Vitamin B2- when you eat three medium size bananas in one day, they provide you with enough vitamin B6 for the day. They also give you the recommended daily vitamin C, B1, B2 and E requirements.

Bananas are also quite rich in essential minerals such as potassium, magnesium and iron. Their rich potassium content makes them one of the best fruit sources of this mineral. Among popular fruits, it is only the avocado and dates that contain more potassium than bananas. Bananas contain both soluble and insoluble fibres (2.4g per 100g). The fibres help to reduce cholesterol levels in the blood vessels and also help to soothe the walls of the intestines. They also contain serotonin that help keep the nervous system healthy while preventing pain in spinal cord and calm down the nerves.

Keeps body organs healthy

Bananas are naturally free of cholesterol, fats and sodium. They also provide manganese (3mg per 100g) and copper (0.09g per 100g) calcium and zinc.

Bananas provide important nutrients that prevent heart conditions such as those associated with coronary diseases, circulatory system disorders (high blood pressure and clogging of the arteries). They have the highest combination of potas-



Bananas play an important role in human nutrition

sium and sodium of any fruit, vegetable or meat (meat, fish or any dairy product).

One important benefit of potassium in the body is that it helps muscles and nerves to contract, keeping the heartbeat regular and reducing the effect of sodium, which is important in the control of blood pressure, reducing kidney stones- healthy kidneys, in turn, ensure that the right amount of potassium is kept in the body.

Treats diarrhoea

Bananas are important in treating diarrhoea in children as well as adults. They also help intestines to digest food much more effectively. Bananas also help to replace nutrients such as potassium which are lost when one has diarrhoea. They help make the blood more alkaline, which helps to eliminate excess uric acid that causes arthritis and gout. In addition, the magnesium and calcium in bananas helps to strengthen the bones, preventing osteoporosis (loss of bone tissue).

Diabetes and cancer control

The sugars in bananas are different from those of refined or white sugar because they are not absorbed fast into the blood causing a rise in blood sugar levels. The manganese in bananas helps to control the formation of free radicals that

can cause cancer. This helps in the control of colorectal cancer or cancer of the colon. Asthmatic people can also benefit from bananas because it contains vitamin B6, which helps to strengthen bronchial muscles.

Memory preservation

Bananas contain tryptophan, an amino acid that helps preserve memory and regulate moods. The potassium in bananas is believed to improve memory. They also help in the release of dopamine, which is a mood enhancing hormone. It also

helps in increasing energy and preventing fatigue in people.

Unripe bananas have beneficial bacteria (probiotic- bacteria which protect the body from diseases). Green bananas are especially important and help in the uptake of calcium by the human body. In addition, unripe bananas have a high fibre content that helps in weight management. Besides, the starch found in unripe bananas cannot be absorbed in the digestive system and passes through the body in the process cleaning the bowels and the digestive tract.

How to cook bananas

Recipe 1 (mashed bananas)

Ingredients

- 8-10 bananas- peeled, coarsely chopped and washed.
- 1 handful of peanuts, crushed into powder like flour (or two tablespoons of peanut butter)
- 1 teaspoon of butter (optional to make it soft)
- ½ cup of fresh dairy milk (optional)
- 2 cups of water to boil

Boil and add salt, then mash

Recipe 2 (banana bread)

Ingredients

- 4 eggs
- 3 medium overly ripe bananas
- 1/4 cup of coconut milk
- 1 tablespoon vanilla extract



- 2¼ tablespoons of almond flour
- ½ tablespoon cinnamon.

Directions

1. Preheat oven to 177°C.
2. In a bowl, mix eggs, bananas, honey, coconut milk and vanilla.
3. In a separate bowl, combine the remaining ingredients.
4. Combine both mixtures and stir until well incorporated, then bake.

TOF magazine empowers farmers group

The Upendo Support Group has learnt many farming technologies that they have applied in their farms, and this has enabled them to increase crop production and diversify into enterprises such as dairy goat farming, increasing income and general living standards.

Venter Mwongera | "I'm indebted to Biovision Africa Trust (BvAT) for continuously publishing livestock management information through *TOF* magazine freely," says Mr. Peter Magongo, Chairperson Nangili Upendo Support Group in Kakamega County.

Nangili Upendo Support Group has a membership of more than 50 farmers with at least 20 active members. Since 2011, the group has received *TOF* magazine on monthly basis. "We have learnt poultry farming, dairy goat and cow management, pig keeping and management, housing and feeding for all the livestock, farm design, preparation of farm yard manure, importance of farm residues among other topics from the magazine," says Mr. Magongo.

Group reading of *TOF* magazine

Brachiaria can help farmers produce high forage yield

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Mulato II and Xaraes are able to supply quality feed for longer periods than the rest of the cultivars. All the cultivars are available at KALRO research centres in the country.

In general all Brachiaria grass species have potential to reduce feed stress for both the dairy and beef industry in Kenya, especially in the drier areas where Napier grass does not do very well and in areas affected by the Napier stunt disease.



Lt-Rt: Mr William Makechi, TOF Magazine Distributor, Mr Morris Maima of DGAK, Ms Venter Mwongera TOF and Mkm Manager, Mr Peter Mangongo, Chairman of Nangili Upendo Support Group (in Sky-blue apron), Ms Sarah Mbochi the group's Secretary and the fellow group members

Although the group lacks land for group projects, they meet fortnightly to read and discuss *TOF* magazine. They individually apply the knowledge acquired on their 0.3 acres of land which is subdivided to accommodate poultry, dairy goats and livestock rearing and kitchen gardening.

They apply the knowledge acquired from the magazine on their small pieces of land where they have been getting a bumper harvest. "Earlier on, we lost many animals due to diseases and poor management. But, having learnt various aspects of livestock management from *TOF* magazine, we've managed to rear dairy goats donated to us by the International Fund for Agricultural Development (IFAD) through the Dairy Goats Association of Kenya (DGAK)," acknowledges Ms. Sarah Ombachi, the group secretary.

Received dairy goats

The group received a donation of 4 goats from IFAD on condition that each member would care for the goats, reproduce and share amongst themselves to ensure that each person has a goat. "Now, we are happy because at least 18 members have a goat given by a member from the four goats donated by IFAD," Ms. Ombachi says cheerfully,

adding, "We learnt silage preparation, housing and maintenance of goats and preparing different types of feeds for dairy goats, poultry and dairy cows from the *TOF* magazine."

Families have better diet

The group of 16 women and 4 men have immensely benefited from *TOF* magazine "Lack of knowledge in proper farming methods exposed us to poverty. Our children were malnourished, we could not afford school fees, most of our animals died due to poor management," Ms. Ombachi says. "Today, each of us has sufficient milk supply from our goats, eggs from their poultry and enough food for families. Our lives have changed for the better," she adds.

Mr. Morris Maima is an Officer from the DGAK. He heard about the group and he visited the group during the group's meeting day. According to the chairman of Upendo Support Group, "Mr. Maima called me to find out whether our group keeps dairy goats because he heard about our passion in farming and he wished to partner with us. I welcomed him to the members' meeting. It was after this assembly that he promised to donate four dairy goats," says Mr. Mangongo.

Proper management of dairy goats

Mr. Mangongo believes in right information, hard work and consistency for success. His hard work earned him the position of a chairperson and a mentor to Upendo Support Group.



Peter Mangongo tethers his dairy goats

He says, "When the goats were brought to us, one of them was very small and malnourished. None of the members wanted to take it but I decided to keep it. I believed that it was an opportunity for me to apply the knowledge learnt from *TOF* magazine. Today, after two years, I have more than 8 goats from a small malnourished goat," he adds.

When a farmer receives a dairy goat, they are expected to care for it and after it reproduces, the goat is given to another member. Mr. Mangongo says his goat got two does (female goats) that he passed on to other members.

"Knowledge is power and continued reading of *TOF* magazine helped me with the right information to support other group members to successfully care for their dairy goats."

Regular supply of *TOF* magazine

Upendo Support Group confesses how the magazine has helped them since 2011. Mrs. Ombachi, the group's Secretary says that practicing of organic farming technologies like kitchen gardening, how to make compost manure, tree planting, agro forestry among other technologies learnt; has improved the living standards of women through farming.

"Majority of members earn a living from organic farming methods. They sell the farm produce to pay school fees for their children, purchasing household items and their families' nutrition has improved," she asserts.

The *TOF* magazine distributor in the region Mr. William Makechi who is also an Extension Officer based at Likuyani Sub-County in Kakamega County ensures that the group not only receives every issue of the magazine, but also responds to any question the group might have. "This is one of the most active farmers' groups that I work with. I give them *TOF* magazine on a monthly basis. I receive frequent calls from the members inquiring on different organic farming technologies published in the *TOF* magazine. They are curious and they apply the knowledge acquired," he says.

According to him, organic farming methods have boosted the lives of farmers not only in Likuyani but also in the entire Kakamega County.

There are many causes to stunted growth in animals

I have a one-year old heifer that is stunted in growth? Kindly advise me what I can do to make it grow into a good dairy cow? Tel. 0713 102 780

It is very difficult for us to give an accurate cause of stunted growth in your heifer because it would require a qualified vet to examine it and give an answer as to the cause of its stunted growth, which can also be due to a number of factors. However this gives us a chance once more to show you how you can take of care of your calf. Before we do this, let us explain some of the reasons that can cause stunted growth in a calf below:

Poor nutrition of mother cow:

Poor feeding of dairy cow can affect the health of the calf. This shows clearly when the calf has low birth weight. One of the practices among farmers is to feed their incalf (pregnant dairy cow) like the rest of their herd. If the feed is inadequate, this has indirect effect on the unborn calf. It is therefore very important for dairy farmers to take extra care of their incalf dairy cows even if it means isolating and feeding them separately (See TOF No. 138, November 2016).

Poor feeding of calf: Heifers are easy to manage since their nutritional requirements are low compared to adult cows. Farmers should ensure that at all times, their calves are well fed with quality hay, sweet potato vines, lucerne, desmodium, lucaena, sesbania in addition to adequate and clean water. Heifers should also be fed with concentrates at the rate of 1 per cent of their birth weight (the concentrates should have 15-16 percent crude protein. Protein is extremely important to young growing heifers to ensure they develop the right frame size, height and growth pace. If their rations are not balanced, heifers become stunted.

Calf Care: Of all domestic animals, the calf is the most neglected by most dairy farmers. It is common to see calves tethered to a post in homesteads for a whole day after being fed with milk in the morning until evening when they are feed with milk again and taken back to their sheds. Dairy farmers should know that a young heifer at calf stage is also a future dairy cow that they will rely on for milk production when their mothers grow old and are



Many young calf are neglected through poor feeding, housing and general care.



A healthy Friesian-Fleckvieh calf

cullled. In most cases, calves and young heifers are poorly housed.

Feeding: It is common belief among farmers that calves or young heifers require only milk. On the contrary, research shows that calves or young heifers fed on solids such as sweet potato vines or any high quality forage at an early stage helps in the

development of their stomach (the rumen or first stomach) enabling it to develop to the right size needed in a healthy dairy cow. Research done by animal nutritionists Prof. Jud Heinrich and Keith Lesmeister in USA (*Farmers weekly January 5-7, 2007*) shows that calves can even be weaned at 10 weeks (two months and two weeks) if they are continuously fed with



Well managed heifers grow into healthy dairy cows

quality forage without compromising their overall performance and health.

The two nutritionists add that as long as calves are fed only on liquid feed (in this case milk or milk replacers, the development of the rumen and rumen wall and papillae (the towel-like lining of a cow's rumen or first stomach) it will remain underdeveloped, which makes the calves unable to digest grains and forage after weaning and in the process delaying their development and growth.

Animals with well developed rumen have better digestion and more milking cycles since good nutrition and digestion can increase the number of milking cycles in a dairy cow.

Diseases: A dairy affected by disease before calving down (giving birth) or calf exposed to diseases such as pneumonia has a high chance of being or remaining stunted. Dairy farmers should always ensure that their young calves are properly housed to reduce exposure to cold or winds, which can at times lead to them developing pneumonia; calves affected by pneumonia can become stunted or even die of the disease. Calves can also develop pneumonia if the milk they take ends up in their lungs (a practice of poor feeding. Farmers should try and feed their calves the right to stop them sucking milk through their noses as it ends up in the lungs, which can cause pneumonia).

Inbreeding: Serving closely related cows eg serving a cow with a bull related to it (eg its father or brother) can cause inbreeding, which is a common practice among farmers and can cause stunted growth in calves descended from such animals. Farmers can avoid this by using Artificial Insemination (AI) and keeping records of all the bulls in the AI catalogue which have been used to serve them since inbreeding can occur even for farmers using AI services.

If a veterinary examines the calf, he can give you the best way to address the problem. You can also sell it and buy a more healthier calf that can become your future dairy cow.

Answers Elkanah Isaboke

For more information on taking care of calves:

<http://www.infonet-biovision.org/AnimalHealth/calf-life-worth-living>

TOF Rad answers your questions

TOFRadio is broadcast on KBC on Thursday at 8:45pm 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 916 136.

Selling honey through farmers' groups increases income

Musdalafa Lyaga | "I drink dawa because it calms me down at the end of a hectic day," says Ms Lucy Macharia, a young urban professional who works for an international non-governmental organisation.

"Dawa" is a hot drink made from locally sourced honey, ginger and lemon. It is increasingly becoming a popular drink especially among young people in urban areas. Apart from making dawa, honey is used in so many other ways in our day to day lives.

Source of income

Honey is the most popular natural sweetener in the world and also has immense medicinal benefits. Due to its diverse use, the demand for honey in Kenya is so huge that supply can barely cope with demand with a huge amount of honey coming from Tanzania to plug the deficit.

"Before, I used to plant maize and beans, but they were performing poorly due to frequent droughts. I have since diversified to beekeeping which is now giving me very good returns and acting as a safety net whenever maize or beans fail," says Mr Munyoki Kimwele, a farmer from Waita, Kitui County.

Honey production has many challenges

Even though Honey production is an economic activity with a potential to improve household income, it still faces many challenges. Many farmers are now turning to commercial beekeeping to help improve their family incomes.

One of the biggest threats facing honey production today is the use of pesticides which not only affect the quality of honey but also bee population. Many farmers also lack modern hives and equipment required for beekeeping, which tends to reduce the production of honey and in many cases contributes to the contamination of the honey.

Observes Ms Grace Mumbi Mutisya a sales assistant at Mwingi Beekeepers Marketplace, "Many beekeepers face many challenges when they use traditional beehives like during



Honey production faces many challenges leading to poor quality and lack of markets

the rainy season, water from the rain penetrates the honey combs. The traditional hives are also susceptible to wild animals' interference forcing farmers to harvest their honey prematurely which greatly affects its quality. Some farmers also have a tendency of adulterating honey with sugar, juggery, bananas, pawpaw and water which further lowers the grade of the honey," she adds.

Groups have bargaining power

Beekeepers working individually tend to receive low payment for their honey harvest because of low quality, insufficient production and market information and high cost of collection by buyers among other reasons. They are further constrained by how much they can earn with lack of modern equipment to enable harvesting and processing of good quality honey products and poor linkages with other producers and potential buyers.

When farmers work together in groups, they have a strong bargaining power when marketing their honey products and in turn receive better returns for their produce. This is in addition to penetrating wider markets and being offered lucrative contracts

by major buyers.

Groups can meet required volumes

Farmer groups can help farmers to improve productivity and marketing by facilitating access to modern hives and other equipment and ensuring farmers maintain high quality standards by organising training for farmers in honey production best practices.

.....and value addition

In marketing, the group can also be involved in value addition, bulking and collective selling of honey. In groups, farmers are assured of stable market, higher prices, access to inputs like equipment and finance.

A good example of an organised farmer group is Mwingi beekeepers cooperative based in Mwingi town. The cooperative supports beekeepers in accessing modern equipment such as langstroth hives, queen extruders, harvesting gear and even processing machines. The cooperative also adds value to crude honey by processing and packing before selling on behalf of its members.

Established market outlet

The cooperative has established a honey Marketplace in Mwingi town where beekeepers bring their products and are certain of a market. When significant volumes of good quality honey and bees wax are available in one place, traders will be interested

Beehives for sale: We make beehives for sale. Interested farmers can make orders on any quantity they require. The following are prices for various hives: Langstroth Ksh 4,500, Kenya Top Bar Hive Ksh 3,800, Stingless bee hives cost Ksh 400 and Ksh 1,500 depending on size. Interested farmers can call Stephen on 0734 371 557.

Jersey Heifer wanted: I would like to buy a healthy Jersey Heifer preferably incalf for 5-6 months. Call 0722 357 918.

Fleckvieh bull for sale: I am selling a 1½ year old Fleckvieh bull. Call 0726 434 521.

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to travel to remote areas, being certain of the volume and quality they will be able to collect.

"When we started the project, our main challenge as beekeepers was access to markets. Middle men bought our honey at very poor prices because we lacked bargaining power as individual farmers. As beekeepers, we decided to come together back in 1999 and formed a group that will enable us to access markets collectively. Members pay a registration fee of Ksh 500 which entitles a member to a minimum of twenty five shares each at Ksh 200. Through the shares members are entitled to dividends annually," says Mr. Zaccheus Mwangangi Kikwali, the vice chairperson of Mwingi Beekeepers Cooperative.

Fair prices for honey

When farmers join hands, they are able to sell their honey together thus enhance their honey market competitiveness; easily access training as a group on quality production and value addition which can help farmers earn that much needed extra income. The added income ensures that the fair prices provide honey producers with the incentives to enhance quality production.