

## Dear Reader,

It is June and farmers are busy weeding and fighting pests to ensure that they harvest maximum yields. We hope that you will apply the easy approaches featured in the May issue to fight pests. Ensure that you harvest rainwater to cater for the coming dry season.

We thank farmers who continue to produce food to feed our people during these challenging times, when the country is fighting the Covid-19 pandemic. We urge you to maintain high standards of personal hygiene, practise social distancing and wear face masks in public places to reduce the spread.

In this issue, we explain how to establish mandala and vertical kitchen gardens, which save on space and can pro-

vide food and income for your family.

Also read about what to consider when selecting gilts and boars for your organic pig-farming venture.

There is an inspiring story on Nicholas Akoko, a farmer planting sweet potatoes and arrowroots and reaping big from his farm.

Finally, beware! Milk fever can easily kill cows, often after calving. We give you valuable tips on how to identify and deal with it.

We also welcome your feedback on what has worked and what has not, and hope that you enjoy this edition, too.

*From the editor*

## Charcoal briquettes a great energy saver

**Briquettes form a solid fuel that can be burnt for energy. A person using a 90-kilo bag of charcoal would require a 50-kilo bag of briquettes to do the same amount of cooking**

By Pamela Okutoyi

For ages, many farmers have depended on wood charcoal as their main source of energy, which contributes to the depletion of forests in Kenya. Indigenous trees, some as old as a century, have been cut down to make charcoal. This has contributed to environmental degradation, leading to an increase in perennial disasters such as drought and floods. It was not until last year when the government banned the charcoal trade that most farmers realised the need to look for an alternative source of energy. Increased fuel prices have also created a situation where many farmers can hardly afford alternative fuels.

Briquettes form a solid fuel that can be burnt for energy and may offer an alternative fuel for many of these applications. They are created by compacting loose biomass residues such as sawdust, wood chips, coffee waste or charcoal dust into blocks that can replace fossil fuels, charcoal and natu-



ral firewood at home, for institutional cooking, and industrial heating.

### Making good use of waste

Many farmers produce waste material such as charcoal dust, coffee and coconut husks, maize cobs, sugarcane bagasse, palm leaves, coconut shells and sawdust. Rather than throw the waste away, farmers can turn it into briquettes to help reduce their fuel costs, earn them some income and reduce environmental degradation.

### What is required

To make briquettes, binding materials

with plasticity are required. A binder helps to hold the other raw materials into shape. Binders are substances such as starch or molasses. Starch has been found to be the best binder and can be obtained from cassava flour and gum Arabic. To make a binder just use starch or flour to make a porridge-like solution. You can then use the sticky porridge to bind the product.

The ratio of a product which could be macadamia shells, coconut shells or rice husks and a binder should be 10:1 for production of quality briquettes.

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## Avoiding milk fever in dairy

Milk fever is a common production disease, which arises due to poor management and nutritional practices on a farm. **Pg. 7**

# Briquettes, a great energy saver gaining popularity

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A 45 kilogramme bag of charcoal dust needs 2–3 kilogrammes of starch, which will cost you Ksh200–Ksh300. A kilogram of high quality gum Arabic costs Ksh 200 in Kenya. Therefore, to process a 40kg bag of charcoal dust you will need to spend Ksh400 - Ksh600 for the gum Arabic binder. Mashed newsprint/waste paper pulp is also a good binder.

## The process:

- a) Raw material for making macadamia briquettes
  - i) 10 kg macadamia shells
  - ii) 5 kg saw dust
  - iii) 1 kg cassava starch
  - iv) 0.5 kg limestone
- b) Raw material for making charcoal briquettes
  - i) 10 kg sugarcane bagasse
  - ii) 5 kg saw dust
  - iii) 1 kg mashed newspapers/pulp

## The process

- Crush the macadamia shells into powder using a mortar and a pestle or a grinding stone.
- Mix the powder with water and stir to make an even mixture.
- Add paper pulp as a binding agent and stir until it forms dough.
- Carbonise (burn like charcoal) the dough to reduce smoke emission and to add heating value.
- Shape the resulting dough by hand, or mould in wooden or metal presses the fist-sized pellets into desired sizes and shapes.
- Leave the briquettes under the sun to dry.

Charcoal briquettes are gaining popularity in Kenya, as they are cheaper than wood charcoal. They can also be found in local markets and stores. A person using a 90-kilo bag of charcoal would require a 50-kilo bag of briquettes to do the same amount of cooking. On average, while charcoal users have to part with Ksh1,700 to Ksh2,500 for a 90kg bag, briquette users pay Ksh800 for a 50kg bag.

## Advantages of using charcoal briquettes

- **Smokeless:** They burn without any smoke.
- **Low-ash content:** They produce minimum residual ash, which is less than five per cent of the original weight of the charcoal.
- **Odourless:** They contain minimum evaporative substances, hence eliminating the possibility of odour.
- **Sparkless:** They do not produce sparks like wood charcoal.
- **Less crack and better strength:** They burn two times longer than wood charcoal.
- They are environment-friendly and when used with efficient stoves, do not only reduce overall fuel consumption, but also help to improve indoor and outdoor air quality. This also reduces health risks and diseases for farmers from the long-term exposure to burning wood fuel.



Nicholas Akoko, a farmer in Kital Village, Karachuonyo in Homa Bay County pictured after harvesting arrow roots from his farm. Akoko has adopted online selling of his farm produce, mainly sweet potato and arrow roots that has become popular with neighbours and consumers in urban towns.

## Farmer reaps from selling potatoes, arrowroots online

He left his office job to grow the tubers and today, Mr. Nicholas Akoko has no regrets

By Duncan Mboyah

A farmer in Homa Bay County is over the moon. An idea that occurred to him to grow indigenous sweet potatoes and arrowroots has brought him joy that has surpassed his expectations.

Mr Nicholas Akoko is an extremely proud farmer in Kital Village, Karachuonyo. “An educational tour to Loitokitok changed my perception of farming indigenous food crops. It was there that I saw sweet potato and arrow roots being grown under irrigation,” he fondly recalls.

He spoke during an interview on his Mewa Farm in the western Kenya lakeside region.

Following the visit to Loitokitok on the slopes of Mt Kilimanjaro that was sponsored by Kimira Oluch Smallholder Farm Improvement Project (KOSFIP), Mr Akoko started growing the crops on a 10 by 10 metre plot. He has expanded the venture to cover five acres.

“I swapped my office clothes for a T-shirt and shorts,” he says of his move to the farm.

Mr Akoko does not wait for local traders to purchase his produce anymore. Having grown his online customer base, his products have become very popular.

“I introduced online selling of sweet potato and arrowroots, which has become popular with consumers from towns far away from my farm,” the 40-year-old says.

He realised that the two crops were important for food security in Kenya and an essential for small-scale producers who would sell 80 per cent of total production and consume

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Mr Akoko started growing the crops on a 10 by 10 metre plot. He has expanded the venture to cover five acres.

## Making mandala kitchen gardens

Their beauty and functionality make these gardens an asset to anyone wishing to create a kitchen garden

By James Kamau

If you have some space in your home and have been wondering what to do with it, then you should consider creating a mandala garden. Apart from its beauty, in this kind of garden, vegetables are planted in circles on the ground, which saves on space and ensures that it is used to maximum efficiency.

The circles have small pathways in between them where a farmer can walk through as he tends to his crops without stepping onto the beds. This ensures that the soil remains soft, and well-aerated with no compaction.

Mandala gardens have been used for centuries as they provided a good place for meditation. Today, with the same concept, you can create a beautiful garden filled with a variety of vegetables that can provide food for your family, with little resources.

### How to make a mandala garden

Just like any kitchen garden, you want to locate it in an area that is not exposed to adverse weather conditions like water logging and harsh winds, and also close to your kitchen for easier harvesting.

Consider the slope, size, and run-off water patterns when designing your circular garden. Draw on the ground a plan of how you would like your garden to look. Create a circle in the middle from which paths will emerge, which will resemble the spooks of a bicycle. Depending on the size of your garden, the paths could be about four meters wide and the beds in between also be four to eight metres wide. The paths will enable you to reach both the inner and outer half of each bed from the inner and outer footpaths of the garden. Mandala gardens are sometimes referred to as key-hole gardens, as the paths mimic the shape of a door's keyhole.

Organic farming encourages less tilling. This can be done by building your beds without any tilling. Simply add mulch and compost onto the marked



out beds without disturbing the soil. This is called sheet mulching and such non-dug raised planting beds are rich in beneficial micro-organisms.

To do sheet mulching, wet the area where you want to set your garden up. Cut the weeds and plants but leave them on the ground. Add materials that will attract microorganisms to help in decomposition.

Add card boxes and newspapers, papers from old school books etc and then wet them. Follow with another layer of nitrogen-rich materials. Add about 20cm of additional mulch, for example, dry leaves, grass, and about 5cm of compost soil to top it all up. This will create an un-dug raised bed, rich in nutrients, on which you can plant your crops. Create boundaries using different materials for example wood planks, stones, or bricks to mark the edges of your garden.

### What to plant:

Give some thought to the plants that you want to establish in your garden. Practice mixed cropping to improve



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plant diversity and include natural pest repellents like herbs to keep away plant pests.

Plant vegetables like sukuma wiki (kales), lettuces, tomatoes and so forth, taking care to ensure that complimenting crops are arranged next to each other. Some crops, when grown together, improve each other's health and yields. Others will attract beneficial insects that will protect a companion.

Certain plants such as maize and beans complement each other, while plants that require similar nutrients will struggle to get enough for themselves making them less healthy. Crops such as peas and beans add nitrogen to the soil, which can be used by the crops growing next to them.

Include fruit trees for shade (usually planted in the middle of the garden) or create a small pool of water. Plant flowers on the edges of your garden to attract pollinators.

Add natural mulch plants like strawberries or legumes which will cover the soil and protect it from over-exposure to the sun and act as mulch.

Consistently water and weed your garden and ensure that you use only natural methods to control pests and diseases, and your kitchen garden will thrive.

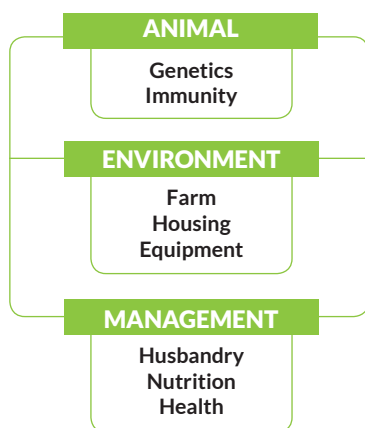
A well-planned mandala garden can provide your family with a variety of organically grown crops. Its beautiful shapes and colours are also attractive to children, an attribute that you can use to attract and teach your children more about farming.

# How to run a profitable pig rearing enterprise

The quality of the animal you choose to keep and breed will determine your level of productivity

By Nelson Barasa

There are three key production factors that you need to consider to run a profitable pig farming venture. These are the quality of animal you buy, the environment in which you raise them and the management, feeding and health system that you follow.



## ANIMAL

The quality of the animal depends on the care you give it. When choosing the animals consider how well they can adapt to the local conditions and your intended husbandry. Get your breeding stock from a certified pig breeder or a reputable farm that observes good pig-rearing practices.

### Factors to consider when selecting breeding gilts:

- Pick gilts with at least 12 teats so as to accommodate a large litter.
- Gilts from sows, which wean 9 -10 or more piglets per litter and are known to be good mothers.
- You can select breeding gilts either at the weaning period or later at 5 to 6 months. The advantage of selecting older gilts is that they are closer to breeding age and you get to see their growth rate and how their bodies have developed and formed.
- Choose fast-growing weaners. They are likely to consume less feed per unit live



weight gain and are thus less costly to keep.

- Those that have well-developed hams and comparatively light heads.
- They should also have good body conformation -strong legs and sound feet etc.
- Choose gilts from sows that can withstand the conditions or husbandry system on your farm (housing, feeding, and management).

### Selection of breeding boars

Selecting a good boar is important, since it contributes to half the quality of the herd.

### Factors to consider:

- The boar you select should have sound feet with, full hams and uniform curve at the back and should be of good length (longer bodied and bigger framed will mature later and have less back fat. However an abnormally long pig will reduce his width and depth (which should be uniform from the front flank to the rear flank), upsetting the animal's balance).
- It should have at least 12 nicely placed rudimentary teats, so as to pass on this characteristic.
- Buy boars four or five weeks before you plan to use them. This allows you to quarantine them and gives them adequate time to adapt to the new environment.
- Select them before castration at about four weeks.

## MANAGEMENT

### a) Boars

A boar can start serving at over eight months. A boar should serve only twice

a week until he is one year old. After this, he can serve up to three times per week and preferably not on consecutive days. Keep him in his own pen to avoid fighting. In organic agriculture, it is not acceptable to keep animals indoors at all times. Therefore, ensure that your boars access the outdoors regularly. When mating, transfer the sow to the boar (not vice versa).

- One boar can serve up to 10 to 15 sows.
- Considerable exercise is necessary to prevent the development of leg weaknesses. This can be ensured in a good outdoor run.
- Trim feet regularly.
- Wash boar with soap and water every four months, and spray for lice with any recommended organic spray.
- A high level of hygiene is critical. Keep walls clean, and in case of lice or mange, a suitable disinfectant should be used.

### b) Gilts/sows

- Provide enough exercise as some sows will tend to fatten. A fat sow takes longer to come on heat, and is also more likely to crush her young piglets.
- Although sexual maturity occurs as early as four to five months, the first service for gilts should not be until the age of seven to eight months. The weight should be between 100kg and 130kg, depending on the adult weight of the breed or cross. Reproductive life of a sow is four to five years.
- Keep about three to four gilts/sows per (outdoor) pen of nine to 10 square metres (organic pigs should have outdoor run too), which should be kept clean (change bedding regularly). Locate the pens of sows/gilts next to those of the boars, as this stimulates them to come on heat.

## FEEDING

When developing a regimen to guide your feeding plan, focus on the quality of the pigs rather than the maximum growth rates. Organic pigs are reared in a way that they are integrated into the farm.

Pigs require energy, proteins, vitamins, minerals, and water, and their waste can provide manure for the farm. They should be fed with homegrown, and other nutritional feeds that are organically produced.

Add grazing fodder, either dried, fresh or in silage form to the daily feed for roughage. They also require proteins from animals such as milk and milk products, as well as fish and their by-products.

Other protein sources include soya beans, cotton seed cake or meal, fishmeal, and sunflower meal. Energy sources include maize, sorghum, millet, and wheat (grain, bran or pollard, barley). Minerals and vitamins are also essential and synthetic vitamins are allowed.

- Antibiotics, coccidiostats, medicinal substances, growth promoters and any substances intended to stimulate growth or production must not be used in pig feed.
- Piglets must be suckled at least for 42 days.

### Piglets' treatment

- Disinfect umbilical cord after birth with iodine solution.
- Tail-docking, teeth-clipping and tethering are prohibited.
- Artificial insemination and castration are allowed. Castration is done between two days and eight weeks.

### Weaning

- Wean at 4-5 weeks.
- Weaning should be gradual to reduce weaning stress.
- Group weaners according to size to avoid unnecessary fights.
- Pigs can be sold as porkers when they weigh 60-70kg between 15 weeks and 18 weeks or as baconers, when they weigh 80-90 kg at less than six months.

Feed type	Class fed	Period fed	Level / mode	Remarks
Sow feed	Boar	From seven months until culling	2-2.5kg/head/day fed wet or dry	Adjust ration according to boar condition
Sow feed	Gilts	From six months until farrowing	2kg/head/day wet or dry feeding	Adjust ration during flushing. Flush feeding is when you give your gilt or sow extra feed four days just before mating
Sow feed	Dry sows	Between weaning and service	3-4kg per head/day fed wet or dry	Level of feeding helps the sow to quickly come on heat
Sow feed	Pregnant sows	Between service and farrowing	2kg per head per day. fed wet or dry	Overfeeding causes farrowing problems
Sow feed	Lactating sows	During lactation	2kg+1/2kg per piglet being nursed fed wet	Frequent feeding is recommended to encourage intake
Colostrums and ordinary milk	Suckling piglets	Birth to weaning	Ad lib (unrestricted)	Colostrum is a must for all piglets
Creep feed	Suckling piglets and weaners	Week 1-8	Adlib	Creep feeding during suckling reduces digestive problems at weaning
Grower feed	Growers	8 weeks to 60 kg	Adlib or restricted	If restricted, the pigs should be fed twice per day, for about 30 minutes each time
Finisher feed	Finishers	60kg to slaughter weight	Adlib or restricted	Same as above
Grower finisher feed	Growers & fatteners	8 weeks to slaughter	Adlib or restricted	Same as the grower
Water	All classes	Throughout life	Adlib	Water must be cool and clean

## ENVIRONMENT

Pigs are naturally active and love to scavenge in the soil in search of food such as roots, worms and insects; hence their active nature. However, since domestication, these natural traits have been restrained. Farmers need to house pigs in a place that allows them their natural expressions. Pigs do not sweat and so it is important to provide them with a place to cool down.

Pigsties should be comfortable. Protect them from harsh weather. Contrary to the belief of most conventional farmers, pigs prefer cleanliness and if space allows, allocate a toilet area. Even newborn piglets can leave the nest to urinate and defecate in another designated place. The pens should have feeding and water troughs (or nipple drinkers) with concrete floors that are neither too rough nor too smooth to allow for

easy cleaning and drainage. Good floors also ensure that the pigs do not damage their hoofs or hurt themselves. Provide adequate space for pigs, about 0.3m by 2m per mature pig. Maintain hygiene in the sty through proper waste management. Farrow piglets in a clean dry pen. Make sure they suckle a teat as soon as possible after birth. If a sow has more piglets, place the extra piglets with another sow with less piglets of same or almost same age.

NB: Health management and record keeping will be covered in detail in the next edition.

[For more information on organic pig farming](https://www.infonet-biovision.org/AnimalHealth/Pigs)  
<https://www.infonet-biovision.org/AnimalHealth/Pigs>

## Farmer reaps from selling potatoes , arrowroots online

Continued from page 2

only 20 per cent.

“These crops had become despised by the younger generation, who viewed them as ‘a villager’s food’, but with the increase of non-communicable diseases (NCDs) mainly caused by over reliance on junk foods, most health conscious people are turning to these indigenous foods,” Mr Akoko adds.

A trained accountant, Mr Akoko quit employment for farming, a move that was not received well by his siblings and widowed mother.

“I saw the potential once the irrigation project was introduced in my village and decided to follow my late father’s passion for farming,” he adds.

The popularity of sweet potatoes and arrowroots is partly because the crops are grown without any chemicals.

He sells his produce online to consumers in Malindi, Kilifi, Nairobi, Homa Bay and Kisumu and locals arriving on motorbikes.

“I use matatus and bus companies to deliver the produce. I take a photo of the receipt and number plate of the vehicle and send to the recipient online. This has worked for me in the past two years,” he says.

Interestingly, locals who see Mewa Farm products online, often visit the farm to purchase the produce.

“With the advent of social media, young people are slowly replacing the elderly in agriculture. Technology is bringing convenience, especially in reaching markets,” he notes.

Sometimes, he is not able to meet the demand. He has employed four young men.

“I want to encourage youth to see agribusiness as beneficial,” he adds.

After selling the tubers, the stems and leaves fetch good money when sold as fodder.

“I hope parents can start transferring title deeds to their children, so that they can secure loans for farming inputs,” he says.

His farm also serves as a demonstration site for other farmers.

For more information, visit <https://www.infonet-biovision.org/PlantHealth/Crops/Sweet-potato>



## Benefits of raw sugarcane and juice

**You might, at first glance, be tempted to dismiss it as a sweet stem fit only for children, which has lots of sugar and little nutrients. However, this crop, which is common in most Kenyan homesteads, is highly nutritious and provides huge benefits for both people and animals**

By Susan Njugu

Sugarcane farming has been a source of livelihoods, especially for farmers in western Kenya. Though the industry has had its fair share of challenges with cane farmers getting little or no payments, and the millers collapsing under the yoke of mismanagement, obsolete equipment, planting poor varieties and corruption, many farmers continue to grow the crop, which can be a good income earner. It is also loaded with essential nutrients.

Sugarcane (*Saccharum officinarum*) grows well in warm climates. The crop, which produces over 50 per cent of the world’s sugar requirements, can be chewed raw or processed into products with a variety of uses. Sugarcane is also used to provide motor fuel alcohol or ethanol in countries such as Brazil.

When processed to produce sugar, no part of the cane is wasted.

The by-product is used to make molasses, a popular sugary syrup that when added to animal feed increases milk production.

Molasses, when mixed with the organic product EM1 and water and left to ferment for seven days, forms an organic antibiotic that helps farmers maintain and clean the gut of all animals. This liquid has anti bacterial properties and drastically reduces random infections. (1 litre molasses + 1 litre EM1 + 18 litres water). EM1 is a liquid bacterial product comprising yeast, photosynthetic bacteria, and lactic acid bacteria that can be purchased from agrovets that stock it. Mix 10ml with every litre of drinking water and let your animals drink it.

Pressed sugarcane provides juice, which is high in essential nutrients and can be consumed fresh or fermented. The nutrients include iron, magnesium, calcium, potassium, sodium, amino acids, zinc, thiamin, riboflavin, manganese, and vitamins A, B1, B2, B3, B5, B6, and C. It also contains soluble fibre, antioxidants, and phytonutrients.

Apart from its nutritional value, sugarcane juice earns farmers more money than they can ever get from selling cane.



### Benefits of sugarcane juice:

- It increases energy levels and its unprocessed sugar makes it a healthier alternative to drinks with processed sugar, which are said to increase one's weight.
- It produces sucrose, which is used as a sweetener and preservative for other food.
- High potassium in the juice reduces the strain and tension in blood vessels and arteries, lowering blood pressure, and thus reducing the risk of heart attacks.
- It has antioxidants such as flavonoids and polyphenolic compounds that strengthen your immune system, reduce oxidative stress, clear skin inflammations, and prevent colds.
- It contains minerals such as calcium and phosphorous, which strengthen bones and teeth. Consuming a glass every day reduces the incidence of osteoporosis (weakened bones), a condition that occurs in women after the age of 40.
- It detoxifies the body, reducing the risk of kidney stones developing and urinary tract infections.
- A glass of sugarcane juice a day also helps one sleep better and reduces constipation and morning sickness in pregnant women (mix it with a bit of ginger to reduce morning sickness).
- It contains protein and folic acid, which boost both the baby's and mother's health. Folic acid is critical in ensuring the baby's bones develop well throughout the pregnancy.
- Raw sugarcane can be used to prepare a detoxifying cleanser for your body. Cut unpeeled cane into small pieces to fit in a glass and mix it with two glasses of water. Boil under low heat until the remaining liquid is colourless. Cool and consume once a day.

So the next time you want a glass of juice, choose sugarcane juice. It is loaded with nutrients and tastes wonderful.

## Hypocalcemia, common milk fever in dairy

By Dr. Nderitu Nyaga

*"Hello Daktari," a worried farmer calls. "My cow, which conceived last week, has gone down and is unable to stand. I milked her a few minutes ago, and she was fine. Please, assist me, as she is the best producer I have on my farm. Her head is tilted facing her back and I am afraid I will lose her."*

*Vet thinking to himself: "Hypocalcemia again!" (On the phone) "I am on my way, and I will be there in 10 minutes."*

The above is a conversation that many dairy farmers have had with their veterinarians. Milk fever is a common ailment that belongs to a group of animal diseases known as production diseases, which arise due to poor management and nutritional practices on a farm. Losses due to these diseases are huge, ranging from below optimum production to death of animals.

Milk fever is a metabolic disease caused by low blood calcium levels (hypocalcemia). The condition commonly affects high producers and up to 10 per cent of the animals in a herd. One out of every 20 animals affected dies.

About 80 per cent of cases occur within one day of calving because milk and colostrum production drains calcium (and other substances) from the blood, and some cows are unable to replace the calcium quickly enough. Most cases present moments after milking.

**Causes:** Even though there are age and breed predispositions (old animals and Jerseys are more susceptible), feeding a pregnant cow two weeks before calving is critical in the development of milk fever. When the amount of calcium in the diet is greater than is necessary, the efficiency of absorbing calcium from the intestine and the effectiveness of transferring it from the skeleton become very sluggish and the chances of getting milk fever are greatly increased. Many farmers make the mistake of over-supplementing calcium to pregnant animals.

**Clinical signs:** In typical cases, cows show some initial excitement or agitation and a shake in the muscles of the



head and legs. Then they stagger and go down to a 'sitting' position, often with a 'kink' in her neck (as if watching its back), and then finally, lie flat on their side before circulatory collapse, coma, and death.

A dry muzzle, staring eyes, cold legs and ears, constipation, and drowsiness, are seen after going down. The heartbeat becomes weaker and faster. The body temperature falls below normal, especially in cold, wet, and windy weather. These signs are due mainly to lowered blood calcium levels. This is because calcium is important in many body processes, especially those that involve nerves and muscles.

### Prevention and treatment:

Feeding on hay before calving and restricting access to green feed results in acidic blood, which favours calcium mobilisation from the bone and improves its absorption from the intestines, both of which are important factors in preventing the occurrence of milk fever. Farmers should also avoid over-supplementing calcium and should give their pregnant animals high-energy feeds. A farmer should also keep a keen eye on animals that are about to give birth and those that have recently given birth. If your cow has already fallen, support her so that she does not lie on her stomach and call the veterinary immediately.

Treatment is through the administration of calcium into the blood by a qualified veterinary professional. In most cases, the results are dramatic, as the animal rises immediately.

For more information, visit <https://www.infonet-biovision.org/Animal-Health/Birth-and-Reproduction-complications>



Location	Frequency
Nairobi	102.7
Kakamega Bungoma Busia	91.5
Malindi	106.3
Location	Frequency
Webuye	95.9
Garissa	88.7

Location	Frequency
Taita	107.4
Narok	102.3
Nyeri	105.7
Machakos Makueni Kitui	93.8
Meru	105.1
Marsabit	88.3

Location	Frequency
Nakuru Gilgil	104.5
Kisii	91.3
Kisumu	105.3
Mombasa	105.1
Kericho	90.5
Eldoret	91.1

Tune to Radio Maisha every **Thursday at 7.30 PM** through any of these Frequencies nearest to you to receive Kilimo Hai, TOF Radio Swahili farmer programs. TOF Radio and Radio Maisha partner to bring you these educational programs.

## Starting a kitchen garden using vertical bags

**Charles Kimani & Njeri Kinuthia**

Located near the kitchen, this garden provides the family with a variety of nutritious foods with ease. There are different ways to create kitchen gardens. Among them are vertical gardens made using bags to grow plants. This method utilises minimum space, water, labour and manure. It is ideal for urban areas and those with scarce land.

### Materials needed to set up a vertical bag garden

- Sack
- Soil
- Manure
- Seedlings
- Gravel
- Hollow can
- Water
- Gardening tools
- You can also use old basins, tyres, cement bags

### Preparation

1. Mix soil with manure (compost /farm-yard manure) <https://www.infonet-bio-vision.org/AnimalHealth/Manure>
2. Fold your sack and add a small amount of soil (6cm to 10cm according to the size of the sack) of well mixed soil as you unfold the sack.
3. Place the hollow can at the centre of the



4. bag and fill it with gravel. (Make sure your bag is well seated and firm).
4. Cover the top of the hollow can with another can to keep the soil out. (Not to mix with the gravel)
5. Add soil around the can making sure that no soil enters the gravel for effective watering.
6. As you add more soil, pull out the top can gradually to stick out of the soil. Repeat the process until you fill the whole sack with mixed soil and manure.
7. Once done remove the hollow can or leave it for planting your vegetables.

### Note

- Pour water through the central gravel column to wet the soil.
- Ensure the ratio of soil to manure is 2:1

(this ensures sustaining soil fertility for long to ensure continuous production)

- Ensure your sack is straight. You can support it using sticks to avoid falling.
- Seedlings are planted in a parallel design through pricking the sack with a pointed stick. (The parallel planting ensures equitable distribution of lighting)
- Water your seedlings daily for the first week and at least 2 to 3 days per week subsequently.
- Avoid planting head bearing crops on the sides such as cabbages but you can grow tomatoes so long as you plant varieties that can be supported with sticks.

Vertical bags available from Real IPM : <https://realipm.com/shop/large-vertical-bag-farms/> for more information text or whats app us on 0715422460

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To contact us on the "tusemezane" platform or ask a question, kindly call or sms +254 715422460

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