

Dear Reader,

The rainy season is still on even as farmers across the country get ready for planting. The past few months have been heavy with political activity and characterized by the burden of rising food prices and despite the circumstances, food producers remained resilient. With commodity prices for items such as cooking oil having shot up, families are seeking alternative ingredients to use in place of the commercial oils. This edition features an article on use of groundnuts to produce cooking oil or as paste or powder to use to add flavour and nutritional value to foods cooked without oil.

TOF readers continue to benefit from innovative ideas shared in the TOF Magazine, which not only inspire them to adopt climate smart farming technologies, but also empowers them with knowledge to solve challenges they encounter in the farm. Potato production is one of the most profitable ventures in Kenya as potato is the second staple crop after maize. This edition offers a guide to potato growers on proper timing for easier pest and disease management.

Farmers have realized the growing demand for avocados in the market as indicated by the many inquiries we have been receiving on agronomic practices for avocado farming. This edition features a step-by-step guide on how to produce quality avocados for sale both locally and in the export markets. Read on for these and many more informative articles.



Proper timing in potato planting overcomes pests and diseases manifestation

By Mellen Nyabuto

One of the most rewarding ventures is the potato farming business. After maize, potatoes are the most important food crop in Kenya. Regions known for potato production are Nyandarua, Meru, Narok, Elgeyo Marakwet, Bomet and Nakuru. Potatoes are used as vegetables in most homes to make variety of dishes. They are also used in the industries and fast-food chains to make fast foods such as chips, crisps, and potato flakes. This wide range of use has increased potatoes demand in the market and opened income doors for most large and small-scale farmers. On a good market day, one bag of potatoes of 110kgs can sell for up to 4000 Kenya shillings. One acre of land can produce about 30-100bags of potatoes. A farmer producing 100bags can get returns of up to Ksh400,000 shillings.

Another area the farmer can invest in is the potato seed production for sale. An increase in demand for potatoes directly affects the demand for potato seeds. One can buy a few seeds from a certified board of seed producers and then multiply the seeds for other farmers. In this investment, however, a high level of professionalism is required. One has to ensure the seeds bought are clean and certified and also conduct a soil test of the field before planting to ensure that the soil is free of pests and soil-borne diseases. A kilo of seeds can cost up

to about Ksh100. If multiplied in the farm, one acre of land in a good potato growing region can produce up to 80bags of seeds each weighing 100kgs. If the farmer sells a bag at Ksh2000 shillings, the farmer will end up with a revenue of Ksh200,000. The cost of production is approximately Ksh80,000 per acre. This will leave the farmer with a return of Ksh120,000 shillings per acre in one planting season, giving a profit margin of 60%. The high return can be achieved with proper management of pests and diseases.

Pest management of potatoes

Overcoming potato pests and diseases has been a challenge to most potato farmers. Potato pests such as aphids, leaf miners, whiteflies, spider mites, thrips, moths and cutworms mostly attack and cause a lot of damage to potato foliage while diseases such as early blight and late blight cause majority of tuber damage. Potato pests and diseases can cause up to 80% yield loss to the farmer.

Therefore, most farmers have been embracing various practices to overcome this loss. The most popular practices involve; application of biopesticides, using natural enemies, and cultural practices such as crop rotation and intercropping. Another technique that potato growers can use to manage pests and diseases is proper timing in planting.

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Benefits of ground groundnuts.

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For most farmers in Kenya, potato planting occurs in two seasons: March-July and September-January. During this season, there is rain enough for cultivation and most potato varieties mature within three to four months. Pest and disease occurrence also varies throughout the year. For some seasons of the year, we have the highest prevalence of pests and diseases. Potato pests such as white flies are highly prevalent during warm and humid seasons such as July and August. Red spider mites are prevalent during hot and dry season such as December-March. In such circumstances, the farmer can do proper timing for planting. The farmer's planting time for the first season should be more inclined towards the end of March and harvesting more towards the end of June or early July to avoid a time with high occurrence of whiteflies and red spider mites.

Diseases such as early blight and late blight have high prevalence in July and August. When they attack, they cause devastation to the plant within a few days. In this case it is recommended that the farmer plants potatoes at such a time that they will be ready for harvest before July and August and use a variety with a short maturity period.

Below is a table summary that can help the farmer timing during planting.

Pest and disease	Time of high occurrence
White flies	July-August
Red Spider mites	December-March
Early Blight	July-August
Late Blight	July-August

Refer to Issues 202 and 203 of TOF, for more information on potato varieties performing well in various regions and crop rotation schedule to guide you in planting.

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<https://infonet-biovision.org/PlantHealth/Crops/Potato-Seed-Production>



Best practices to embrace for profitable avocado farming

By Grace Kinyanjui

Avocado farming has gained popularity countrywide as “the Green Gold” due to a ready market for the harvest. The most popular varieties in Kenya are Hass, mainly grown for the export market, and Fuerte for the domestic market. Profitable avocado farming produces optimal yield, high-quality fruits, and a large income for the farmers. Achieving such a successful harvest requires avocado farmers to embrace good agronomic practices, as listed below, to improve crop productivity and fruit quality.

- First, avocado seedlings should be sourced only from KEPHIS-certified nurseries. Notably, healthy and clean seedlings produce healthy plants.
- Choose grafted seedlings. The benefits of grafted avocados are faster fruiting maturity, higher yields, superior fruit quality, and higher resistance to pests and diseases.
- Soil testing to determine crop nutrient levels and soil pH. Avocados grow best in well-drained soils with a pH range of 5.5-6.5. High soil acidity can be reduced by the application of agricultural lime.
- Build healthy soils to sustain crop productivity. Avocados thrive in

soils rich in nutrients and organic matter. The use of well-composted farmyard manure during planting and throughout the cropping season will maintain soil health and increase both soil fertility and crop yield.

- Proper planting and spacing to maximize productivity. The recommended spacing between trees is 9 m by 9 m, but several farmers have spaced Hass avocados at 5 m by 5m. Above all, tree spacing should ensure effective land use, while planting patterns should ease the crop husbandry practices. Planting holes should be 60 cm by 60 cm and 60 cm deep. While digging holes, do not mix topsoil with subsoil. Mix the fertile topsoils with manure/compost and cover the hole. Each hole requires 20 liters of manure/compost.
- Ensure adequate irrigation, especially for the young plants to encourage plant growth. Continued watering of mature trees increases yield and fruit quality. Avoid over-irrigation because excess water leads to water logging, root rot, increased soil salinity, and poor yields.
- Organic mulches for the young plants help to retain soil moisture and also boost the soil's organic matter content.

- **Weed control to reduce competition for soil nutrients and water.** Weed control methods include mowing, slashing, use of cover crops and organic mulches, as well as shallow hoeing and weed pulling around the plants. Legumes cover crops also help to fix soil nitrogen and improve soil health. Remember that herbicides are not recommended.
- **Protect avocados from wind damage by establishing windbreaks (hedges) around the farm.** Staking young plants also prevents wind damage.
- **Enhance cross-pollination between varieties for a bountiful harvest.** Usually, Hass avocados are cultivated with 10% Fuerte.
- **Proper plant nutrition for optimal production and quality fruits.** Nutrient uptake from the soil by growing avocado trees is quite high. Therefore, farmers should ensure that the macronutrients (nitrogen, phosphorus, and potassium) are continuously replenished by applying good amounts of well-decomposed manure/compost together with rock phosphate. Micronutrients (zinc, boron, manganese, and iron) are applied as required through foliar or soil application.
- **Selective pruning of apical buds in young plants encourages the growth of lateral buds and branching.** Lower branches growing to the ground and interfering with crop husbandry practices should be pruned. Damaged and dead branches should also be removed. Pruning provides a superior tree structure and allows proper aeration and light penetration for improved yield and fruit quality. Pruning of mature trees is usually done before flowering and upon completion of harvesting.
- **Integrated pest management.** Common avocado pests are false codling moths, fruit flies, thrips and scales, spider mites, and bugs. Although their dam-

age is not severe, these pests must be controlled for optimal productivity. Preventive measures include planting of pest-free seedlings, adequate irrigation and plant nutrition, weed control, and the use of bait and pheromone traps.

- **Promoting biodiversity and ecological balance.** Farm scaping avocado farms using insectary plants, hedgerows, cover crops, and water reservoirs encourage populations of beneficial organisms. These are natural enemies and bees useful in pest control and pollination. Beekeeping around avocado farms is also encouraged to enhance pollination.
- **Disease management.** Fungal diseases such as root rot, anthracnose, fruit spot, and scab greatly reduce productivity. They can be controlled using copper-based fungicides with either Copper oxychloride or Copper hydroxide as the active ingredient (Green copper).
- **Avocado maturity depends on the variety.** Only harvest the mature fruits and avoid dropping them to prevent damage.

In conclusion, healthy avocado seedlings together with good agronomic practices will guarantee good quality fruits with the right shape, high marketability, and good profit. Since most areas in Kenya within the range of 1500-2100 meters above sea level are suitable for avocado farming, farmers are encouraged to grow them to diversify their incomes.

<https://infonet-biovision.org/PlantHealth/Crops/Avocados>



Processed groundnuts in place of cooking oil; cost efficiency and dietary benefits

By Maria Mutisya

Seeds of groundnuts, a leguminous peanut plant, can be ground into arachis or peanut powder (flour) to be used for various purposes. Traditionally, groundnuts have been used for ages as a substitute for cooking oil especially during wars when other cooking oils were in shortage particularly in African countries such as Nigeria, Sudan, Senegal, Guinea, Ghana and Chad. The concept behind the use of this powder is that nuts are generally rich in healthy fats and oils, and their nutty savory taste also adds onto the flavor of foods. The nuts are also readily available in the regions where they are grown unlike other commercially pressed and processed oils which are most of the times not affordable by many farmers. Although the ground powder can be used to cook, some people go the extra mile of extracting the oil from the ground powder. During cooking, this powder is used in place of cooking oil and is usually mixed with the other cooking ingredients as one would when using fat or oil. The only difference is that with the ground powder, care is taken to prevent it from over burning, which can give the food a burnt taste.

Depending on how the ground nut extract is made, the cooking powder usually has a mild or neutral flavor when used in foods. When made with roasted nuts, the flavor and aroma becomes stronger. The unroasted powder is mainly preferred for general cooking while oil from the roasted nuts is used where additional flavor is desired.

Nutritionally, ground groundnuts have been proven to be loaded with mono and poly unsaturated fats, with a cupful proven to contain at least 216g total fats, 36.5g of saturated fats, 99.8g of monosaturated fats, 69.1g of polyunsaturated

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fats, 0.0339g of vitamin E and 447g of phytosterols.

The health benefits of grounded ground nut when used in foods over other oils are:

1. **Lowers the risk of heart diseases-** In comparison to other oils, ground nut oil is high in high density lipoproteins (HDL-good cholesterol) and thus reduces the risks of arteries blockage. This lowers the chances of heart diseases as the heart does not strain when pumping blood.
2. **Improves blood circulation and manages blood pressure-** The linoleic acid found in ground nut helps in the stimulation of prostaglandin glands which help in dilation and contraction of blood vessels as a result improving overall circulation of blood in the body. Also, the nuts are high in monounsaturated fats which help regulate blood pressure levels and keep heart ailments away.
3. **Relieves constipation-** Ground nut oil has laxative properties and including this powder in one's daily diet by as little as even one tea spoonful per day has shown to reduce symptoms of constipation.
4. **Improves insulin sensitivity/ manages diabetes-** Studies have shown that the use of ground nuts in place of other oils can be very good for diabetic patients. The nuts contain higher levels of unsaturated fats than saturated fats and this helps in improving insulin sensitivity thus regulating blood sugar levels.
5. **Helps prevent arthritis and cancer-** The anti-inflammatory properties of groundnut oil not only

reduce the inflammation of bones in arthritis patients but also strengthens the joints keeping the pain at bay. The antioxidants properties of the oil also help prevent various kinds of cancers by fighting the free radicals in the body hence reducing oxidative stress.

6. **Lowers signs of ageing-** Although ageing is inevitable, with proper care the process can be delayed and ground nut oil has proven capable of this. Ground nuts are rich in vitamin E and anti-ageing properties. For this reason, the frequent use of this powder in place of other oils helps reduce visible signs of ageing such as wrinkles, dark spots, and pigmentation and fine lines. Cold pressed ground nut oil is very good for the skin and a few drops applied directly to the face and neck can improve their healthy feel.

How to make ground groundnut for cooking at home

The process of making ground ground nuts for home consumption is quite easy and anyone can make it.

Ingredients/what is needed

1. 4 cups of dried ground nuts
2. 4 cups of water
3. A roasting pan
4. Motor and pestle/ blender
5. Sieve
6. Clean storage jars
7. Source of fire/heat

Method

1. Put the fire on.
2. Pour the ground nuts in the pan and toss them in the fire for around 10 minutes-this allows the peels to come off the nuts easily.
3. Remove the ground nuts from the fire and completely remove the peels.
4. Put the clean ground nuts in a mortar and press them with the pestle until a fine powder is obtained. In cases where one has a blender, they can grind the nuts using the blender.
5. Put the powder in the clean storage jars and use it as needed.

N.B/ For anyone who would want to go further and make the ground nut oil, during grinding, the groundnuts can be mixed with the water and an extracting agent and then ground together. The paste like mixture is then left to settle. The oil will float on top of the mixture and can then be sieved separately and stored in clean jars. The oil can then be used as any other oil would.

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enough to put up our house,” says the father of two.

To acquire the small piece of land, the thirty-six-year-old teacher had to focus his savings for this project that was the greatest desire of his heart, and when he finally put up a structure for his small family, they moved in with plans to gradually complete building the house. But one challenge still lingered, where would the highly enterprising Mawia grow crops to feed his family.

An outgoing teacher whose exuberant and curious personality will hook anyone to an engaging conversation, Mawia sought audience with the agricultural extension officer from Biovision Africa Trust, Antony Musili, who had made inroads into the secondary school where he taught to train students on agroecology. In one of the encounters with Musili, Mawia grasped the concept of kitchen gardens which people living within small spaces can establish and felt that that was exactly what he needed to go round his pressing need. He invited Musili to his home for a more elaborate training of the vertical kitchen gardens.

“Musili made the idea so easy to adopt as he explained that all I needed was recycled tyres and bags, and knowledge on how to intercrop variety of crops and plant using climate smart technologies such as Zai pits. He handed me The Organic Farmer (TOF) Magazines which featured clear details on how to establish the garden and I set out to transform my backyard into a beautiful garden,” says Mawia.

From the magazines, I acquired many more ideas especially the use of liquid bio fertilizers made from animal waste. I especially learnt how to make my own organic pesticides using rabbit urine, and plant extracts, which are very effective in managing pests,” he adds. In his garden, Mawia has a variety of indigenous vegetables and fruit trees, among them nightshade, amaranthus, spinach, coriander, capsicum, eggplants, lavender, pepper, onions, avocado trees, apple trees, bananas, and strawberries. He practices mixed farming as he keeps sheep, goats, and

A Machakos County farmer turns a backyard into a thriving food forest

By Caroline Mwendwa

Land ownership is a major determinant when it comes to a farmer’s options in crop production whether for home use or commercial purposes. While for some youth, land inheritance from parents provides a starting point in farming by the time they start their families, for some, such fortunes do not

naturally come by, and they must fend for themselves to acquire a piece of land on which to grow crops either to feed their families or even generate an extra income to cater for household needs. With the cost of land in most habitable areas proving to be prohibitive, it is imperative for farm families to be innovative in how they use the available piece of land at their disposal.

Charles Mawia, a secondary school teacher in Machakos knows this too well as his desire to start a family and build a home of his own was hampered by this challenge. *“I had a deep desire to have my own homestead near the school where I teach and all I could afford was a quarter piece of land, that was only*

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rabbits. Waste from the animals is used to enrich the soil. Mawia attests to the benefits of the kitchen garden as he barely buys any vegetables to feed his family. "It makes me so happy to know that my children consume organically grown vegetables and fruits," he says further explaining that he has learnt so much about healthy eating, just from reading the magazines and the constant interaction with Musili. "I ensure that my house has a variety of fruits from time to time so that my family can enjoy a healthy diet." In addition, Mawia is now producing fruit tree seedlings for sale as more farmers learn the need for producing fruits for home consumption and commercial use. "There is an increasing demand for fruit tree seedlings and to fill that gap, I have established a nursery where I produce them for sale."

Mawia's story is a clear indication that with proper knowledge, families can maximally utilize the limited resources within their reach to enjoy nutritious meals and still generate income.

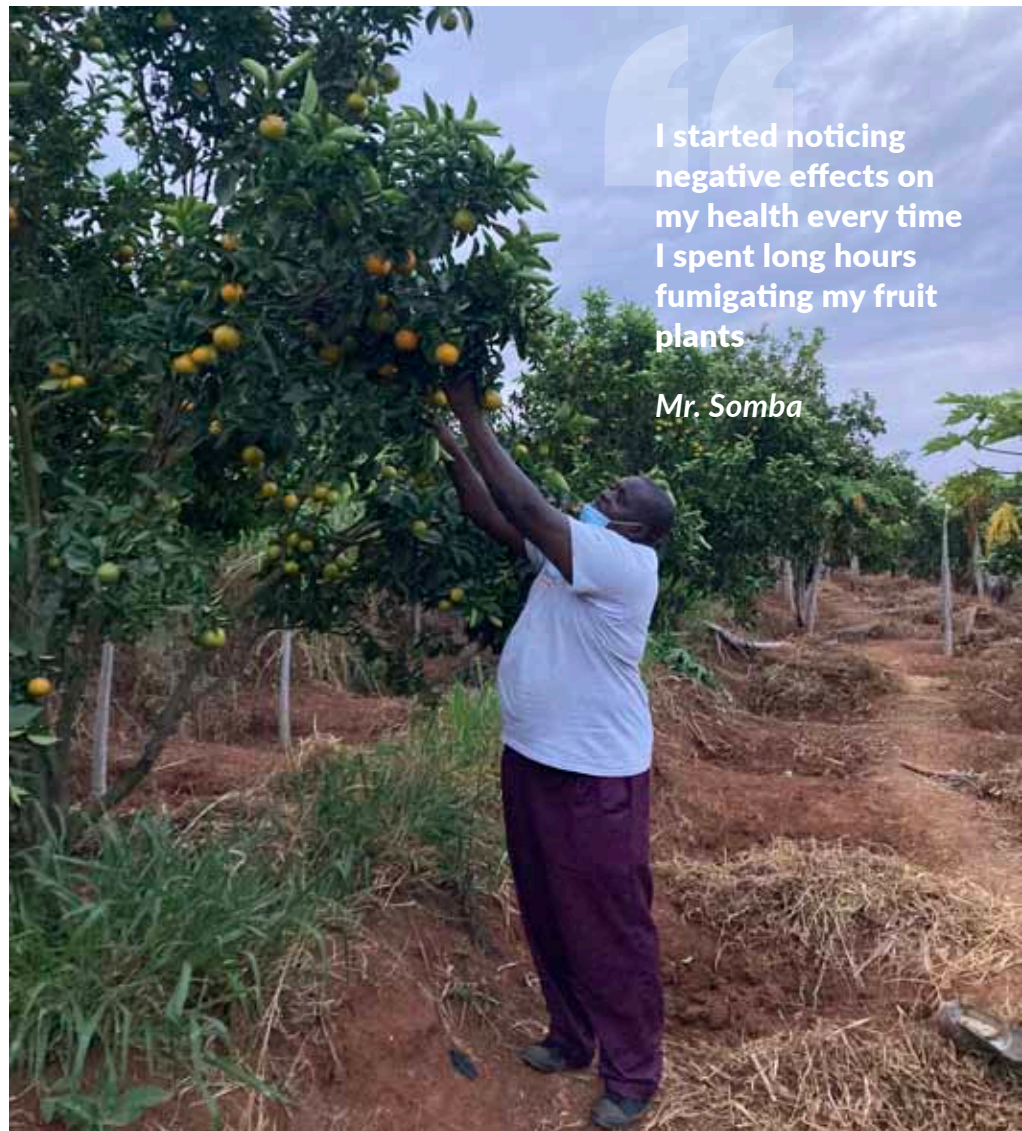
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A Makueni County farmer ditches synthetic pesticides for organic farming



I started noticing negative effects on my health every time I spent long hours fumigating my fruit plants

Mr. Somba

By Caroline Mwendwa

Mr. Alex Somba of Wote, Makueni County knows too well the benefits of fruit farming and has acquired experience on what it takes to succeed in the business of commercial fruit farming. The 45-year-old started growing fruits in the year 2011 in his five-acre piece of land. "I grow oranges, pixies and pawpaws for sale in the local market", says Mr. Somba, attesting to the profitability of the venture. He is however quick to point out that without proper knowledge of pest management, fruit farming can turn out to be very frustrating, as pests can run down the entire enterprise, because the market is merciless when it comes to poor quality fruits.

"At first, I used to invest highly in purchasing synthetic pesticides to control pests, to a point that dealers of these

pesticides had found an ambassador in me. I used to be the first farmer in this region to receive promotional synthetic pest control chemicals, as my farm is known to produce high yields," says Mr. Somba. Mr. Joseph Mbithi the extension officer, working with Biovision Africa Trust in Makueni County, had for a long-time targeted Mr. Somba with information on alternative methods of pest control, which are environment friendly, and which do not pose health risks to human health. However, as Somba explains, he always felt that the methods Mr. Mbithi was proposing could not work for a farm as large as his, and even if they did, he feared his yields would come down and this would affect the profitability of his enterprise. He therefore avoided engaging Mbithi altogether. However, with time, Mr. Somba started noticing

negative effects on his health every time he spent long hours fumigating his fruit plants. "As frequently as I did fumigation on the fruit trees, I experienced body aches, respiratory difficulties and fatigue; symptoms that would persist for as long as two days, during which I would have to take bed rest from my daily farm activities," he says.

As this cycle continued, Mr. Somba begun to feel the brunt of the frequent bouts of sickness and feared that the long-term effects of the pesticides would take a toll on his health. At that point he decided to seek out Mr. Mbithi to learn more about the alternative methods of pest control. From Mbithi, he learnt about organic pesticides and soil fertilizers, and technologies that aid in integrated pest management such as use of traps, intercropping, making pesticides at home among others. It has been a year since Mr. Somba embraced these technologies, and to his surprise, the yields have not reduced, and neither does he suffer the bouts of sickness caused by by fumes inhaled from spraying. "I have also learnt to grow vegetables organically, between the fruit trees, these have helped in supplementing the family meals," he says.

There is also the assumption that organic farm inputs are unaffordable to small scale farmers. Contrary to this belief, Mr Somba attests that it is actually much cheaper to use organic pesticides and fertilizers than the conventional synthetic pesticides. "When using the synthetic pesticides, I used to spend about Ksh50,000 per month in purchasing the inputs, but since I started applying the organic farm inputs, the monthly cost of inputs is Ksh15,000." He challenges those shunning away from embracing organic farming due to the fear that the cost of inputs is beyond their resources to try out producing organically and not only will their cost of production drastically come down, but they will also enjoy the peace that comes with knowing that the food they produce is free of chemicals.

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https://infonet-biovision.org/natural_pest_control

Treatment of abscess in goats

My name is Denis Mutuku from Makindu. My goat is suffering from abscess, how should I go about treating it?

By Nelson Barasa

Abscess is an accumulation of pus surrounded by fibrous tissue. It can be formed anywhere in the body where pus forming bacteria infect and multiply. Then pus in the abscess is over time usually replaced by fibrous tissue.

In goats, abscesses can be formed in lymph nodes of the head and neck and can also be formed in the skin as subcutaneous abscesses. The Abscesses result commonly from injuries caused by grazing prickly plants, seed penetrations or vaccination needles.

Pus-forming bacteria gain entry through these injuries. Inadequate observation of hygiene during injection of vaccine or drugs can lead to abscess formation at the injection site.

Clinical signs

There may be swelling, heat and pain at early stages of abscess formation in goats.

The abscess becomes cold firm and are covered with fibrous capsule in the later stages.

Diagnosis

Rounded, tense swellings under the skin of the neck, the cheek or under the ear are an indication of abscesses.

Abscesses of cheesy gland are common on the ventral neck and under the ear of the goats.

Abscess can burst and start to discharge pus. Intact abscess can be confirmed by incising the swelling at its most fluctuant or raised point or inserting a needle and finding pus. Doing sampling and bacteria culture of contents may indicate secondary bacteria infection rather than the primary cause.

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Kisumu	105.3
Mombasa	105.1
Kericho	90.5
Eldoret	91.1

Tuko Mbele Pamoja!

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Treatment

In the event you suspect your goats have an abscess, it is advisable to call a veterinarian to examine your animals and advise the best treatment approach.

If the abscess is small and not affecting health of the goat, no treatment can be instituted.

Antibiotics are mostly ineffective as they don't penetrate the abscess wall. The abscesses that pose health risk to the goats, can be incised and pus drained but the risk of spreading to other tis-

sues and pain after the incision of abscess calls for use of antibiotics and anti-inflammatory drugs. Abscess area should be cleaned well, sterile equipment are used during incision, and abscess is drained and flushed.

Personal hygiene precautions should be taken when dealing with abscesses as bacteria that may be present can infect human beings as well and they may be resistant to antibiotics.

Prevention

Avoid injuries to the goats. Grazing in thorny fields or providing very

coarse and prickly feeds can pose risk of abscess formation.

Employ proper administration of vaccines and other injections to avoid introduction of pus-forming bacteria into the tissue.

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