



Appropriate Housing Solutions for Dairy Goats

Proper housing ensures that goats are safe from harsh weather conditions that can lead to diseases. Proper goat housing can greatly prevent these diseases.

PAGE 04



DOE AND KID MANAGEMENT

Thus, proper management practices that ensure dairy goat well-being are necessary for optimum production. It is, therefore, imperative that the producer has the capacity needed to perform routine activities and tasks required for good management.

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Disease management in dairy goats

Rearing healthy goats is achieved by prevention, control, early detection of the disease and treatment. Producers should be able to distinguish healthy from unhealthy goats. PAGE 11

BREEDS

Dairy goat breeds

Goat farming systems in Kenya utilize a diverse range of breeds for milk production. This breed variability is influenced by the climatic conditions across Kenya's various agro-ecological zones (AEZ) and by development projects introducing exotic breeds to different regions

Milk production in arid and semi-arid environments is primarily derived from indigenous goats typically raised for meat under large production systems. In cooler regions, milk is produced from exotic dairy goat breeds and crossbred genotypes that are predominantly kept in smallholder intensive and semi-intensive systems. Alpine, Saanen, Toggenburg and their crosses with indigenous are the major dairy goat breeds kept. By adopting the appropriate production system and targeting the right ecological zones, the dairy goat breeds can significantly contribute to dairy production in Kenya.

Saanen

Saanen dairy goat is a popular breed known for their high milk production, friendly temperament, and adaptability. The breed can be kept in intensive, semi-intensive and extensive production systems. The various ecological zones in Kenya are crucial when selecting areas for raising Saanen goats, as the breed thrives in moderate temperatures with access to adequate nutrition. The breed does well in highlands zones (above 1,800 meters), medium altitude zones (1,500 - 1,800 meters) and low zones (below 1,500 meters). However, the later zones' temperatures tend to be hotter (over 30°C), which can be stressful for Saanen goats unless managed well (e.g., providing shade and plenty of water). However, the breed can still thrive with proper care and attention.



Colour: White to pale cream with pink skin pigmentation with its face straight, ears upright and alert (pricked), short fine hair and a long body.

Average body weight: 75-80 kg for males and 50-65 kg for females.

Milk yield: This breed has the potential to produce an average of 3-5 litres/day of milk depending on the management.



Colour: Brown and black but considerable variations occur, with a black backline.

Average body weight: The adult male weighs 65 kg and female 60 kg.

Milk yield: The breed has the potential of producing 2-4 litres/day of milk depending on management.

Alpine (German/French)

Alpine dairy goats (German/French) are hardy, adaptable, and excellent milk producers, often thriving in diverse climates. The breed can be kept in intensive, semi-intensive and extensive production systems. It is suitable for urban or peri-urban areas where land for grazing is limited. Ideal for small-to medium-scale farmers with access to pasture and the ability to provide additional feed. The breed can be kept in Highlands (cool and wet zones), Upper midlands (Sub-humid Zones) and Semi-Arid regions with proper management. Their adaptability and high milk yield make them an excellent choice for farmers seeking to optimize their dairy farming operations.

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Toggenburg

Toggenburg dairy goats are known for their excellent milk production and distinctive appearance. The breed can be kept in intensive and semi-intensive production systems. It does well in highlands (cool and wet zones), Upper midlands (Sub-humid zones), and semi-arid regions with irrigation support.

Colour: has a solid colour varying from light fawn to dark chocolate. With white ears two white stripes down the face and mainly white legs. The hair is short or medium in length, soft, fine and lays flat.

Average body weight: 75-80 kg for males and 50-65 kg for females

Milk yield: This breed has the potential to produce an average of 3-5 litres/day of milk depending on the management.



Colour: Black and generally short, fine and glossy. They have white or cream markings on various body parts, e.g., the legs and face. The ears are erect and point slightly forward.

Average body weight: The adult male weighs 65 kg, female 60 kg.

Milk yield: The breed has the potential average milk yield of 4.5 litres/day depending on management.

British Alpine

The British Alpine goat is a hardy, known for its high milk production and ability to adapt to various climates. However, its performance in Kenya is influenced by the ecological zones and the production system implemented. The intensive (zero-grazing) and semi-intensive are the most suitable production systems to keep the British Alpine for ensuring high milk production, especially in cooler regions. The extensive grazing system can be used in larger, lowland areas but requires careful management of heat and pasture quality. British Alpine goats perform best in highland and medium-altitude zones of Kenya, where temperatures are moderate and there is access to fertile soils and reliable rainfall.



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Management of dairy goat breeds

Proper care is crucial to ensure all the aforementioned breeds are healthy and productive. This includes the following guide:

Housing and shelter: The dairy goat house should be a dry, draft-free shelter to protect against extreme weather conditions. Allow at least 15-20 square feet per goat and ensure good ventilation.

Health care: Vaccinate dairy goats against most common diseases and trim hooves every 4-6 weeks to prevent overgrowth and infections.

Feeding and nutrition: Provide high-quality hay and offer a free-choice mineral supplement formulated for goats.

Milking: Milk the dairy goats twice daily to maintain consistent milk production

Record keeping: Maintain records of breeding, health treatments, and milk production to monitor their well-being and productivity.

DAIRY GOAT HOUSING

Appropriate Housing Solutions for Dairy Goats

Proper housing is key in dairy goat keeping. It ensures that goats are safe from harsh weather conditions that can lead to diseases such as helminths and pneumonia, which are the most common diseases affecting goats. Proper goat housing can greatly prevent these diseases.

Requirements for a dairy goats house

A dairy goat house should have a slatted floor raised to about 1 m high to allow droppings to fall and maintain a clean environment free of helminth eggs, which inhabit the wet dung. The slate width is about 70-100 mm with a slate space of 10-25 mm. The house should have sides covered to allow free aeration but prevent the flow of strong winds through the house, which predisposes goats to pneumonia. The house should not allow predators in and should be near living quarters and lockable to keep off thieves. House construction using locally available materials (tree branches, offcuts, mud for sides and grass thatch) is recommended to lower construction costs.



Dairy goat housing should be built in a well-drained area, downward from the farm owner's house if the land is sloppy, near enough to monitor the dairy goats but far enough to minimize odours (at least 50 meters). The orientation of the dairy goat shed depends on the local climate. The house should be built along the east-west axis to contain wind flow through it or along a north-south axis in humid areas to manage heating up.

A goat house should have provisions for goat cubicles (1.2 x 2.1 m for a doe and its two kids), a milking place (1.2 m x 2.1 m), feed and water troughs (0.3 m wide), and a walking area (1.8 m). The space allowance for the various goat categories is: kid (0.3 m²); doe (1.5 m²), pregnant doe (1.9 m²), and buck (2.8 m²).

A maternity paddock is necessary outside the house. It should be clean, well-ventilated, and with dry bedding, preferably grass hay.



NUTRITION

Feeding Dairy Goats

Dairy goats contribute to food and nutritional security through the direct consumption of milk and meat from cull dairy goats, and income stability through the sale of milk and dairy goats' offspring. Goat milk serves a niche market because of the unique flavor and aroma of its products, such as yoghurt and cheese. Additionally, it has therapeutic value, as it is safe for individuals with cow milk allergies and malabsorption issues. It is therefore necessary to cater for the goats' food needs for them to continue playing their essential role in human wellbeing.

In Kenya, dairy goat farming has grown significantly through community-based dairy goat improvement projects implemented by various non-governmental organizations (NGOs) in the former Central, Eastern and Nyanza provinces. The exotic dairy goats include the Alpine, Toggenburg and Saanen introduced in those areas, respectively. Their crosses with the indigenous Small East African goat and Galla also form part of the dairy goats. The current productivity of dairy goats in Kenya is 1-2 L per day against a potential of 4 L/day. The main constraints to dairy goat production include inadequate feeds in the dry season, disease incidences,

unorganized goat milk markets and inadequate breeding bucks. Dairy goats are mainly reared under the zero-grazing system (82.5%), an intensive system where the goats are confined in some form of building/house and feed and water are brought to them.

However, about 14.9% of farmers rear the goats under tethering, a semi-intensive system. A small proportion of farmers (2.6%) rear their dairy goats under the extensive/free-range system. The various classes of goats have different feed requirements according to age or physiological stage, which need to be catered for.

Feeding Kids

Feed colostrum within 24 hours of birth - absorption of antibodies declines 6 hours after birth. Feed warm milk or milk replacer at 10-12% of body weight. Kids should be fed in at least 2 portions/day. This can be done through bottle feeding, bucket feeding or suckling. Kid suckling should be done in the morning and evening. Kids can also be bottle/bucket fed according to the schedule below:

Table 1: Milk feeding schedule for kids:

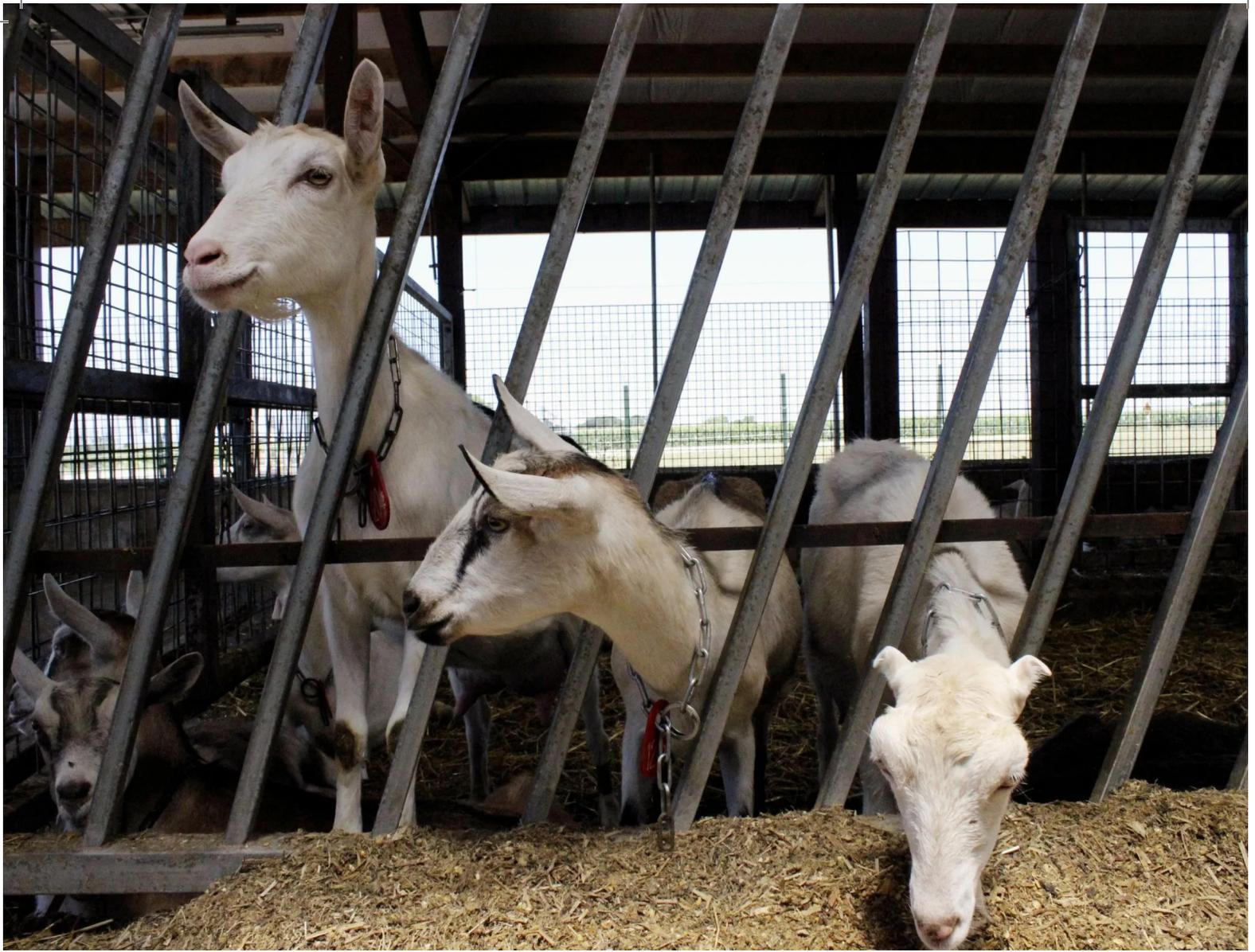
Period	Feeding (milk, solids)
Day 1	30-60 ml colostrum in first 2 hrs., then 45 ml every 4 h (total 180 ml)
Day 2	60 ml milk 4 times a day (total 240 ml)
Day 3	75 ml milk 4 times a day (total 300 ml)
Day 4 – week 2	Give increasingly 90-260 ml milk 4 times a day (total 350-1,040 ml) Introduce solid feed (e.g., grass, hay, grain) and water at the end of week 2
Week 3	Reduce milk from 260 ml 4 times (total 1,040 ml) to 3 times a day (total 780 ml) Kid can freely feed on solids such as hay and grass
Week 4 - Week 9	Feed increasingly 290-350 ml milk 3 times a day (total of 870-1,050 ml)
Week 10 - Week 11	Feed a total of 700 ml milk 2 times a day (350 ml per feeding) (with hay and grain)
Week 12 - Week 13	Give 350 ml milk once a day till fully weaned

After 2 weeks, provide small quantities of good clean feed to strengthen the stomach, such as sweet potato vines (SPV), tree legumes/natural tree leaves, or hay. The kid's rumen/gut is not fully developed for solid feeds for 2-3 weeks. Allow access to mineral lick (block) and clean water as often as necessary (1-2 liters per kid daily).

Table 2: Comparison of kid weight changes when weaned with sweet potato vines against a suckling only kid

Kid	Kid age (days)					Milk saved (kg)
	Birth	30	60	90	120	
Kid weight on Total suckle (kg)	2.9	4.9	4.6	5.6	7.3	NIL
Kid weight when weaned on SPV (kg)	2.4	6.3	6.6	8.4	7.9	87

*SPV= Sweet potato vines used as milk replacer



Feeding of Doelings

To ensure they feed correctly, provide the doelings with a variety of plants, starting with the least palatable forages first, and the most palatable ones last. Feed them plenty of grasses, legumes, tree leaves, and fresh kitchen remains and mix feed with hay, straw, or Napier. Do not feed soiled or non-fresh food – feed that has urine, faeces or which has been trampled on.

They can also be fed with leaves stripped from

- Cereal crops - maize, sorghum
- Pigeon peas
- Cassava leaves

Feed the doelings 2-3 times a day.

Feeding Pregnant Does

Provide sufficient high-quality feed, such as Sesbania, Leucaena, and SPV, for one month (4 weeks) before mating. This practice is known as “flushing.” During the first 3 months of pregnancy, continue to feed normally to maintain overall health.

In the last two months of pregnancy, feed the pregnant doe with high-quality feed due to the growing foetus and to cater for twins or triplets. At kidding, put the doe in a dry, clean, and quiet place. Ensure the goats have proper and clean housing, as goats are highly susceptible to the effects of draught, wetness, and sudden changes in weather.

Feeding of Lactating Does

Lactating does are fed above their maintenance requirements for high milk yields, good conception, and kidding rates and to avoid mobilization of body reserves. Unsupplemented does are not likely to produce milk beyond kid needs.

Dry Matter intake by lactating goats should target a consumption of 1.0-2.0 kg Dry Matter. When Napier grass is the basal diet supplemented with a concentrate in a goat's diet, feed Napier grass – 8 to 10 kg fresh per day and Concentrate (dairy meal) – 300 g per day.



In the last two months of pregnancy, feed the pregnant doe with high-quality feed due to the growing foetus and to cater for twins or triplets. At kidding, put the doe in a dry, clean, and quiet place. Ensure the goats have proper and clean housing, as goats are highly susceptible to the effects of draught, wetness, and sudden changes in weather

ANIMAL HUSBANDRY**Doe and kid management**

Dairy goats require specific husbandry practices to perform optimally. Goat care and management depend on the dairy goat's age, health status, nutrition and pregnancy status, as well as production needs, the environment, and facilities. Kids need primary care that is different from the older, mature goats. Thus, proper management practices that ensure dairy goat well-being are necessary for optimum production. It is, therefore, imperative that the producer has the capacity needed to perform routine activities and tasks required for good management.

Raising kids

Kid rearing from birth to weaning is a critical management component of a dairy goat enterprise. The kid management programme has the most significant effect on the long-term production and productivity of the dairy goat herd. The dairy goat kid at birth represents a genetic resource necessary to replenish the herd due to death, culling and sales.

Kidding areas should be clean with dry bedding (straw or hay). The doe may be kept in the kidding area for a few days

before kidding. The advantage of separating pregnant does from the rest of the herd is to ensure an undisturbed birth process and create good bonding between the doe and kid. It is essential to take good care of kids to reduce mortalities and improve their growth rate.

Kids should suckle the first milk (colostrum) within the first six hours of birth (Figure 1). Colostrum is rich in antibodies that provide immunity to the kid.



Figure 1: Kids resting in a clean housing with dry bedding

If the doe is not producing enough milk for her kid, fostering or bottle feeding is recommended.

From about 3 weeks of age, kids start nibbling grass and leaves. This is important for rumen development. To stimulate rumen development, kids should be introduced to solid feeds such as good-quality hay early in life (in the second week of life).



Figure 2: To stimulate rumen development, kids should be introduced to solid feeds such as good-quality hay early in life

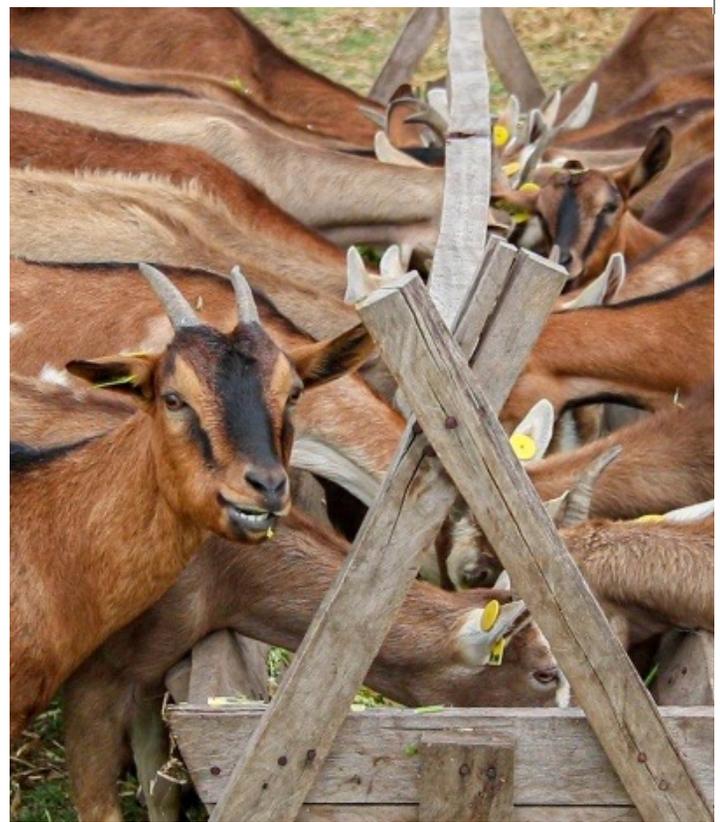
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Weaning

Weaning is the removal of a kid from its mother, and it is usually done at two to three months of age. Kids can try hay and other solids early in life to strengthen their rumen. Weaned young goats will begin to feed on solid food and, at that point, start to pick up diseases such as Coccidiosis. This is a critical time for kids and farmers. Weaners when separated from the does should be given highly nutritious feeds to avoid stress. The feeding should start before weaning by introducing them to high-quality forages.



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Management of doelings

A young doe comes into heat at 4 to 5 months of age, so she must be raised separately from bucks starting at 3 months. Mating should occur at the appropriate time, and a record of dates should be maintained. Doelings should be mated at 1 year of age.



Doelings mated at 1 year of age. A record of dates should be maintained

Management of dry does

It should be emphasized that if the doe is not bred, it should not be dried off, even if the milk production has decreased substantially. This is because, if a doe is dried off, it means it will be out of production for at least six months. For a doe that is not dried at the right time of its gestation period, the following lactation yield will be adversely affected. Thus, the quantity of milk produced is not necessarily an indicator of whether to dry off or not. The best practice to dry off a doe is to milk once a day for 3 to 4 days, then stop milking altogether.

The doe may also be allowed a dry treatment, to clear up any existing infections and to prevent new ones. At three weeks before kidding, each doe should be vaccinated against enterotoxaemia to build immunity for the foetus. It is essential to separate the dry herd from the milking group.

Routine management practices

Kidding/Parturition

The doe should kid in a clean environment; either a well-rotated pasture or stall bedded with straw or other absorbent material. Before birth, the kid as a foetus develops in a germ-free environment, and parturition represents exposure to common disease organisms to which the mature dairy goat has developed resistance but are new to the kid.

The location of the kidding stall or pasture should allow for frequent observation in case of kidding difficulties. Few adult does require assistance at the time of kidding though problems are always a possibility. Does kidding for the first time should be closely monitored, especially if mated to bucks known to sire large kids. At the birth of a kid, the first thing to check is whether or not the airways are clear.

Clean off any excess mucus from the nostrils and mouth. The following two steps are critical for the future health and survival of the newborn kid. The second step in the care of the newborn kid is to dip the navel cord in a solution of 7% tincture of iodine to prevent entry of disease-causing organisms through the navel cord directly into the kid's body. Further, if necessary, a long navel cord can be cut to 3 to 4 inches. A bleeding cord should be tied with surgical suture material. If no surgical suture is available, sterile string may be used in its place.

Dipping the cord in iodine not only prevents the entry of organisms but also promotes rapid drying and the eventual detachment of the cord from the navel. If the navel cord is not dipped in a tincture of iodine, the child may develop a navel infection.

Identification

Farmers need to be able to identify their goats so that they can keep records and easily determine each dairy goat's age, breeding, and usefulness.

Tattooing

This is done on the ear or udder using a tattooing machine, a tattooing number and a tattooing paste. The kids are tattooed within two weeks of age to allow for permanent identification.



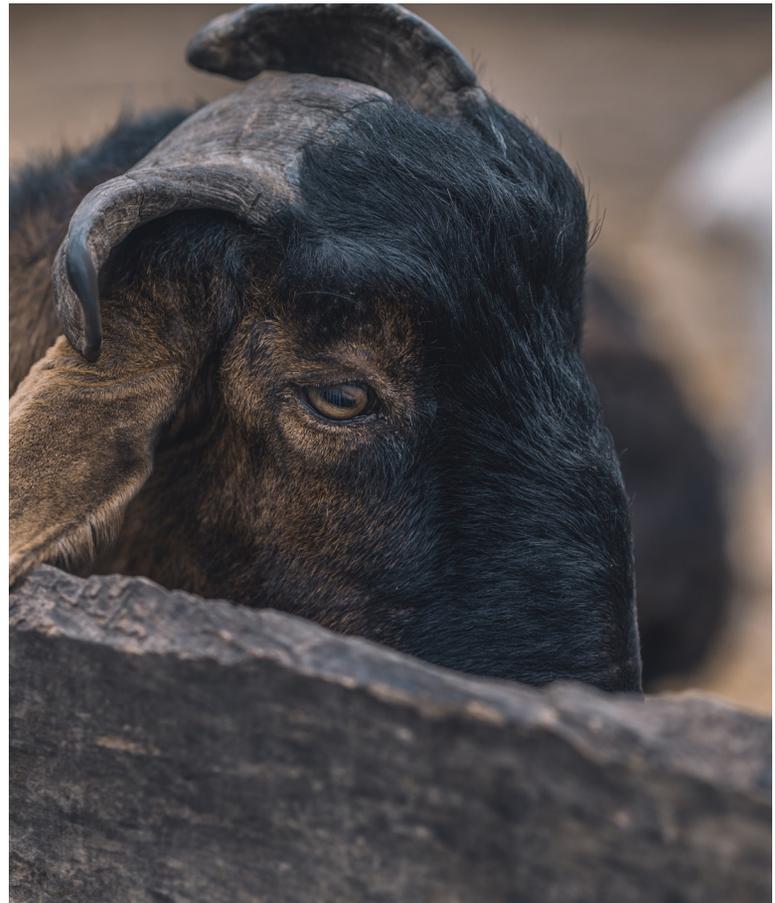
Ear tagging

This is the most common method of dairy goat identification used by dairy goat breeders' associations. Ear tagging is putting a tag in a dairy goat's ear, which enables identification of the dairy goat throughout its life.



Deworming

Deworming should be done at an interval of 2 to 3 months. In areas where worm burden is high deworming interval can be 1 month. It should be done with the advice of a veterinary doctor. The dewormers should be changed at regular intervals to reduce incidences of drug resistance. Also, the dewormer should be given according to the weight of the dairy goat. Excess or low dosage and the repeat of the same deworming drug may lead to the development of "Drug resistance". This may reduce the effect of the dewormer. Currently, there are combinations of dewormers available for multiple worms. It is better to give a combination of dewormers for multiple worms than a specific worm. The kids should be dewormed at the age of three months.



Ecto-parasite control

External parasitism results in poor health of the goat and loss of income to producers. Common external goat parasites include ticks, lice, fleas and mites. Blood-sucking parasites cause anaemia, especially in kids. Applying acaricides using knapsack sprayers is the most common method of controlling ectoparasites. Spraying is done fortnightly, but it may vary based on the severity of the infestation and season.

Weighing of goats

Determination of live weights assists in assessing dairy goat performance and the quantity of feed or medication to be administered. Weight should be taken at birth, weaning, nine months, one year (age at first mating) and the point of sale. Goats are weighed using a weighbridge or weighing tape.



Milking and hygiene practices

Milking of does

The key to producing quality milk is a sanitary environment, properly cleaned and maintained milking equipment and consumables, following the proper milking procedures (squeezing method). Milking clean, dry, and adequately stimulated teats is the most efficient way of harvesting milk that reduces the risk of udder infections (mastitis). The does should be milked twice a day (morning and evening). Milking can either be done by hand or by machines. Below are the most important requirements for hygienic milking:

Milking parlour for hand milking

- Well-constructed shed (milking parlour)
- Healthy doe
- Clean milking bucket (aluminium and stainless-steel materials are easy to clean)
- Mastitis testing (strip cup)
- Milking jelly
- Teat dip reagent
- Cotton clothes (one for each goat)
- Hot water on standby
- Protective clothing/apron
- Food-grade soap

Standard milking procedures in dairy goats in a smallholder set-up:

1. Put the doe on the milking stand or platform and restrain it.
2. Provide some dairy meal to calm the doe and keep it busy.
3. Wash your hands.
4. Wash the udder and teats with warm water and dry with a cotton cloth.
5. Milk by hand by squeezing the teats with the thumb and index finger.
6. The milking session per doe takes about 5 minutes on average.
7. After complete milking, the udder and teats are washed again with warm water.
8. Milking salve may also be applied to the teats after milking.
9. The amount of milk produced by each doe is thereafter measured and recorded
10. It is advisable to collect all the milk in a clean container and cool it.
11. Thoroughly clean the buckets and other materials used, and remember to keep the milking stand clean.

DISEASE MANAGEMENT

Disease management in dairy goat production

Disease - refers to the alteration of the cells, tissues, organs or the whole organism. Common diseases in goats are classified as bacterial, viral, tick-borne, reproductive and nutritional disorders. Diseases contribute to economic losses through the cost of treatment, premature culling, reduced productivity and mortality. Rearing healthy goats is achieved by prevention, control, early detection of the disease and treatment. This enhances productivity through increased milk production, a fast growth rate, increased reproduction, and increased availability of replacement stocks in the flock. The producer should, therefore, be able to distinguish the healthy from the unhealthy goat.

Common indicators of a healthy and unhealthy goat

Healthy Goat	Unhealthy Goat
Active and alert	Dull
Smooth hair coat	Rough hair coat
Feeding and drinking normally	Reduced appetite
Firm pelleted stool	Diarrhoea
Pink mucous membrane	Pale mucous membrane
Strong legs and feet	Swellings, lameness
Social	Isolation from the rest
Average respiration rate of 12-15 breaths per minute	Respiration rate increases

a) COMMON DISEASES IN GOATS**i. PPR (Peste des Pestes Ruminants)**

Also known as goat plague or rinderpest, this is a serious viral infection. The disease has a 4 to 5-day incubation period, followed by a high fever (pyrexia) lasting 6 to 8 days. It primarily spreads through respiratory means, particularly via nasal secretions. Mortality rates are high within the first week, and the disease can lead to secondary pneumonia. Young goats (kids) are significantly more affected than adults.

Symptoms:

- High fever
- Oral necrosis
- Catarrh (build-up of mucus in airways)
- Nasal discharge
- Diarrhoea

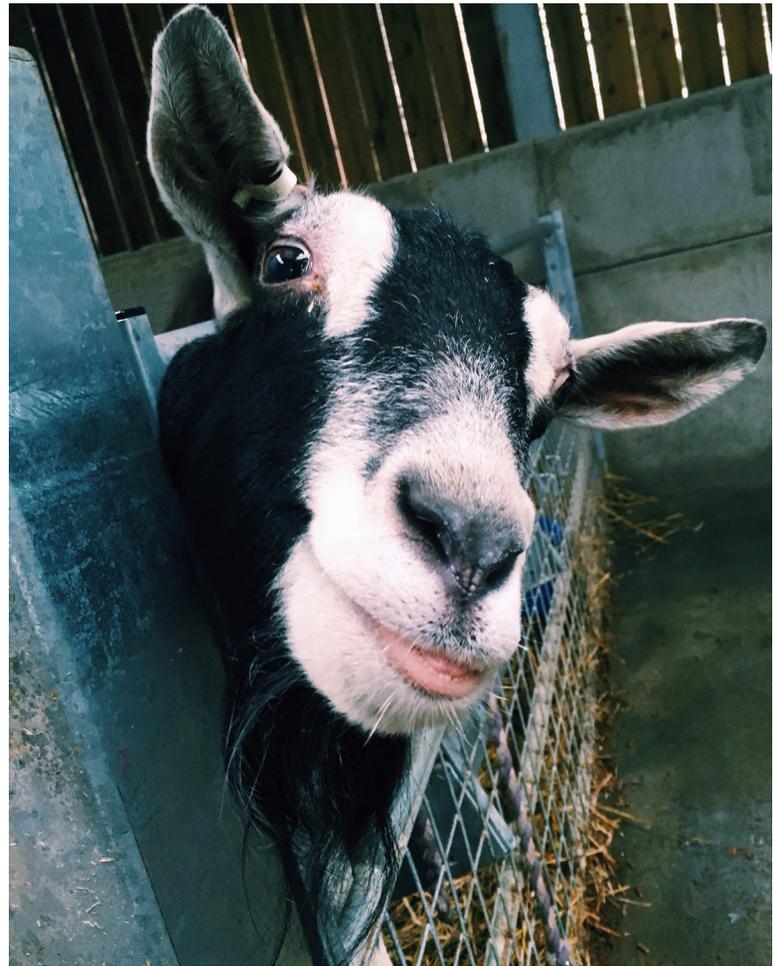
Prevention:

- Annual inoculation
- Slaughter of infected and exposed animals
- Restriction of animal movement to control spread

Treatment/Control: No effective treatment

ii. Contagious Caprine Pleuro-Pneumonia (CCPP)

Contagious caprine pleuro-pneumonia, or CCPP, is a highly contagious respiratory disease. Infected goats become very sick and often die. The disease is caused by two different



Mycoplasma bacteria (*Mycoplasma capricolum capripneumoniae* - also known as *Mycoplasma F-38* and *Mycoplasma mycoides var. capri*). Transmission is by droplet infection from nasal discharge, mainly if goats are confined. The mortality rate can be 100%.

Prevention:

- Quarantine for several weeks any animals coming new to the farm before introducing them into the herd, especially if the goats came from countries known to have the disease.
- Thorough cleaning and disinfection of the premise.
- Slaughter of infected and exposed animals.
- Restriction of animal movement to control spread.

Treatment/Control:

- Contact your veterinarian immediately.
- Antibiotics such as Tylosin and Baytil can be used.
- Vaccination is the best control.

iii. Pneumonic pastuerellosis (PP)

It is caused by two *Pasteurella* microorganisms (*p. haemolytica* and *p. multocida* type 11). It is spread by droplet infection, and outbreaks are usually sporadic. The clinical symptoms are similar to those in CCPP. The disease seems to be triggered by stress and is often referred to as 'shipping fever' as it often manifests itself after transportation.

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Treatment/Control:

- Yearly vaccination
- Elimination of stress factors in the management and handling of animals
- Antibiotics such as Tylosin and Baytil can be used

iv. Anthrax (Miltsiekte)

The disease is caused by the bacterium *Bacillus anthracis* (similar to botulism) and leads to acute death without any symptoms. Avoid cutting open the carcass. This will spread the disease, which is highly contagious, even to humans. The disease is spread by water and food contamination with blood and excretions or by wound infection (puncture wounds by thorns). The incubation period is 1-3 days.

Symptoms:

- High fever, shivering and trembling, sometimes diarrhoea.
- Sudden death.
- Rapid bloat and decomposing of the carcass.
- Rigor mortis DOES NOT occur. After death, blood appears at the natural openings (nose, anus etc.,).

Treatment/ Control:

- No treatment as the disease is noticed too late.
- Do not open the carcass. Proper disposal of carcass by deep burying or incineration
- The best prevention is annual vaccination if there are known cases in the area during the previous 5 years.
- Do not let animals graze near the infected area.
- NOTIFY THE VETERINARY DEPARTMENT IMMEDIATELY.

v. Mastitis

Both acute and chronic forms may be encountered. The disease is caused by different types of pathogenic bacteria, but *Staphylococcus* and *Streptococcus agalactia* are common. Generally caused by bad hygiene and poor management at milking time. Infected doe does have swollen, hot udders (sometimes only part of the udder is affected). It is extremely painful, and if left untreated, further serious complications may follow, and milk production will be impaired. Severe cases can be fatal if left unattended.

Prevention/Control:

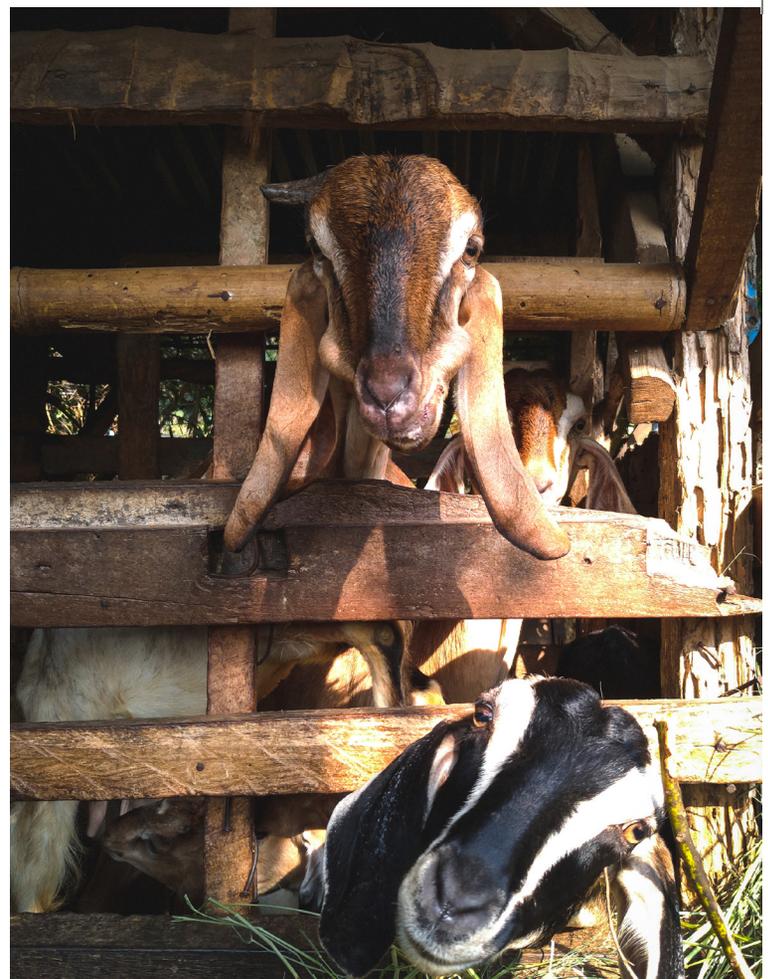
- Absolute cleanliness at milking is essential.
- Infected individuals can be treated with infusions of streptomycin or terramycin creams through the teat after milking, although this method is not very effective.
- Cull chronic does.
- Use of strip cup regularly to detect infected does.
- Dipping teats in teat dips after milking.

Footrot

It is caused by *Dichelobacter nodosus* and affects cloven-footed dairy goats. Muddy conditions and overgrown hooves predispose goats to foot rot. Symptoms include lameness, swelling of limbs, and bad odour due to dead tissues. It can be managed by hoof trimming, isolating and treating the sick dairy goats, using disinfectants in the footbath, and ensuring the goat premises are dry.

Foot and mouth disease

This is a severe, highly contagious, notifiable disease. Symptoms include vesicles in the mouth and feet, smacking of lips, lameness, and fever. It is managed through vaccination,



quarantine, isolating the sick, using disinfectants in footbaths, and using brewery waste/ Magadi soda to clean wounds.

Bluetongue

This is a viral disease transmitted by an insect called the biting midge. Affected goats have excessive salivation, nasal discharges, and difficulty breathing. To manage the disease, isolate affected dairy goats, avoid overcrowding, restrict movements, and vaccinate them as a preventive measure.

Orf

It is a highly infectious pox virus disease transmitted through contact with an infected dairy goat or equipment. Symptoms include pustular and scabby lesions in mouth and udder, emaciation due to reduced feed intake and difficulty breathing. Orf is managed by vaccination and isolating the sick to control the spread.

Rift valley fever

It is a viral disease that occurs mainly during heavy rains. It is transmitted by the *Aedes* mosquito, and symptoms include nasal and ocular discharges and abortion. Preventive measures include vaccination and controlling mosquito breeding grounds.

Haemorrhagic septicemia

This is a contagious disease caused by *Pasteurella multocida*. Symptoms include excessive salivation, profuse serous nasal discharge, difficulty breathing, frothing from the mouth and nose, and submandibular oedema. Preventive measures include quarantine, movement control, and vaccination.

b.) INTERNAL PARASITES

i. Helminths

Helminths (worms) are probably the most damaging parasitic infection in goats. Larvae build up in the herbage during the

rainy season. The extent of the infection will depend on the method of grazing management. Rotational grazing can help reduce the incidence of infection. A variety of helminths affect goats and include nematodes, cestodes and trematodes. These include *Haemonchus contortus* (barber pole worm), liver fluke, roundworms, lungworms, tapeworms, etc.

Symptoms: swelling under the jaw, diarrhoea, pale gums, thick nasal discharge, signs of worm presence in faeces.

ii. Nematodes, cestodes and trematodes

Haemonchus contortus infection is more significant in young animals. The critical period is up to 4 weeks of age. Pregnant does should be treated before birth, and young stock should be treated by 2 weeks. Adults of the major intestinal parasites live in the animal's gut where they mate. The eggs pass out with the faeces onto the pasture. When conditions are suitable the larvae hatch and are then ingested by grazing animals.

Prevention/Control: The control of infestation calls for good livestock management. Well-fed stock suffers less than poorly fed animals. Control is achieved by regular drenching with broad-spectrum anthelmintics. There is a wide variety available, and it is, therefore, advisable to alternate to ensure that all helminths are covered. Keep goats in clean houses or bomas to avoid the build-up of worm infestation.

Routinely dose adult goats before mating, all kids at weaning and all stock before each rainy season. Alternate brands to avoid resistance to management.

C.) EXTERNAL PARASITES

External parasites such as ticks, fleas, lice and mites, are dealt with by routinely dipping or spraying animals with recommended acaricides. External parasites transmit diseases between animals by feeding on their blood, making it crucial to maintain strict control over them. When fleas and/or lice infest goats, it should be dealt with promptly to avoid secondary infections of the skin, mange and, in severe cases, anaemia, all of which have an adverse effect on the animal's welfare and milk production.

D. NUTRITIONAL DISORDERS

Bloat

It is caused by the enlargement of the rumen caused by the accumulation of gas or froth. Symptoms include dysentery, recumbency, and potential death, along with an enlarged abdomen, froth from the nose and mouth, and distressed breathing. To manage bloat, gradually introduce lush pastures, avoid feeding finely ground concentrates, delay grazing, provide hay before allowing grazing, and administer antifoaming agents during high-risk periods before grazing.

Plant poisoning

A goat that eats poisonous plants shows signs of poisoning depending on how much it eats, the part it ate, the condition of the plant, and the health status of the goat. Symptoms include bloating, difficulty breathing, photosensitivity, muscle tremors, collapsing and death. To manage this, remove poisonous plants from the farm and use activated charcoal in feed.

Acidosis

It refers to a condition where there is an excess of acid in the body fluids. This can occur due to various factors such as metabolic processes or respiratory issues, leading to disturbances in the body's pH balance. Symptoms include; difficulty breathing, jaundice, increased heart rate, fatigue, sleepiness, and decreased milk production. To manage it, drench with a solution of sodium bicarbonate, treat with an antibiotic to suppress lactic acid producing bacteria and feed hay.

Ketosis

It happens when the body does not have enough carbohydrates to burn or utilize energy, and instead, it burns fats resulting in the production of ketones. Symptoms include depression, decreased milk production, lack of appetite, goat's breath has a sweet smell, and a rough coat. To manage ketosis, increase the energy content of the feed during the last six weeks of pregnancy, prevent obesity in pregnant does, ensure proper exercise for confined goats daily, provide good sanitation and ensure enough ventilation in the housing.

Hypocalcaemia (Milk Fever)

All milk goats suffer a fall in levels of blood calcium and phosphorous at the start of milking. In some instances, the fall of blood calcium is so great that milk fever results. It is common in young does and high-yielding first kidders, but it can occur in late pregnancy, during kidding and at any stage of lactation, especially in high-yielders. Milk Fever may occur soon after kidding. Symptoms include loss of appetite followed by restlessness, excitement and trembling. Incoordination will be followed by coma.

Treatment:

- Seek veterinary assistance immediately.
- It is advisable to administer 500 ml of 23 percent Calcium Gluconate IV, followed by the administration of two (2) oral Calcium bolus at an interval of twelve hours.

Vaccination program

Vaccination is a preventative treatment done in advance to pre-empt the occurrence of a disease. The vaccination program for goats is outlined in the table below.

Disease	Age at 1st vaccination	When repeated.
Foot and mouth disease	4 months	Repeat after 6 months
Orf	5-6 weeks	Annually and semi-annually in high-risk areas
Enterotoxaemia	8 weeks for the kid if dam is vaccinated. 1st week if dam not vaccinated.	Once a year before the onset of rains
CCPP	3 months	Yearly
PPR	3 months	Yearly vaccination
Anthrax	6 months	Once a year in affected areas
Haemorrhagic septicaemia	6 months	Once in a year before the onset of rains.



RECORD KEEPING

Record keeping for dairy goats

Record keeping entails collection of relevant information that can help make good decisions and to keep track of activities, production, and important events on a farm. Records should not be complex, rather, they should be limited to only necessary information. Complex records will probably increase chances of making mistakes or they may not be regularly kept because of the time required to properly fill out the records.

Types of records kept at the farm

There are numerous types of records that can be kept. The producer should keep records of information relevant to the type of enterprise he/she is operating and limited to information that can be utilized. The major types of records kept on any dairy goat farming enterprise describe information on:

- i) Identification
- ii) Breeding
- iii) Production
- iv) Feeding
- v) Health
- vi) Finances

Identification Records

Identification records include identification information of individual farms and individual goats. Keeping of identification records enables farmers to easily track their dairy goats from birth through their production life to death.

Individual farm identification;

- Name of the farm
- Farm code
- Farm location

Individual dairy goat identification;

- Animal name
- Animal ID
- Parentage records

Breeding (Reproduction Records)

Breeding records should show information on:

- Pedigree (parentage)
- Individual phenotypic performance
- Progeny (offspring)

Goat breeding records form an important basis of selection, sale and culling decisions. Breeding records for does will show information about;

- Dates of mating
- Pregnancy diagnosis
- Age at first kidding
- Kidding dates
- Kidding interval
- Kidding ease
- Sex of the kid
- Body condition score
- Type of birth
- Weaning dates

Production (Performance) Records

These are records maintained to show the flock performance. The best way of keeping production record is to maintain individual performance record. These records are later combined to give the flock performance production. Records however, differ based on the objective of the farm. For dairy production, the important records are:

- Milk yield
- Parity
- Lactation length
- Milking method i.e., hand milking or machine milking
- Milk consumed at home
- Milk sold

Feeding Records

They give information about the amount, type and quality of the feed. They are used both for day-to-day management and adjustment of the feed ration. Together with the production data, they can be used to adjust feeding regimes if a milking doe needs more concentrate, or help in decisions about examining dairy goats whose growth rates are poor.

They can also be used for planning of activities related to feed conservation and establishment of grazing areas in the following season. The important feeding records are:

- Type of fodder available on farm
- Quantity and type fed and if possible, quality of different feeds
- Concentrate supplemented
- Minerals

- Left-over (per head and per feed, if possible) and spoilage (per batch)
- Consumption /kg/day and consumption per group (kid, weaners, milkers and dry does).

Health Records

Health records comprise disease and treatment information that help to keep track of the disease events for each dairy goat during its lifetime. This can guide in better management practices by providing greater attention to repeated events or certain vulnerable groups of dairy goats over time. They provide information about the health status of each dairy goat and the whole flock, and it can help in ensuring important routine health procedures e.g., vaccinations are given at the right time. On basis of the disease and treatment records, it is easier to monitor and evaluate the progress of interventions, be they prophylaxis or treatment. Health records can for example involve:

- Disease occurrence and date
- Major signs
- Vaccination
- Dipping/spraying
- Treatment
- De-worming

Financial Records

Financial records provide the farmer with information concerning the profitability of the farm. They are important in timely decision making.

They include records on:

- Expenses (for feed, dairy goat purchase, health, labour etc.)
- Income (from selling farm products – milk, live dairy goat, meat, manure, feeds etc.)
- Profit/Loss
- Loan/Credit
- Debtors/Creditors

Why you should keep records

Records are important in dairy goat farming because they assist in;

- Keeping track of all dairy goats (identification records).
- Evaluation of dairy goat for selection (breeding records, financial records, production records).
- Taking control of inbreeding and aid in breeding planning (breeding records).
- Selecting dairy goats with the right characteristics for breeding (production, health, feed efficiency) to improve the flock.
- Rationalizing labour.
- Feed planning and management.
- Disease management; keeping track of treatment and disease control (health records).
- Assessing profitability/losses (financial records).
- Improving bargaining power on products, because you can see the investment and the cost of the production (financial records).
- Access to credit services (production and financial records).

MARKETS

Markets for dairy goats and their products

There are about 28 million goats in Kenya, with dairy goats constituting about 502,044. The dairy goats include exotic breeds like the Toggenburg, Alpine, Saanen, and Anglo-Nubian, and their crosses with the indigenous goats, which are the Galla and the small East African goat. The majority of goats in Kenya are indigenous, and are reared in arid and semi-arid lands. The dairy goats are reared in the medium and high-potential areas under intensive and semi-intensive systems, mainly under the zero-grazing system of production.

Goats contribute substantially to households' earnings through the sale of live animals, milk and meat. Dairy goat milk is an essential product in the livestock products value chains, with annual production in Kenya of about 6.3 million liters. In contrast, local goats produce 118 million liters. Challenges in the dairy goat subsector include the shortage of high-quality breeding stock, inadequate feeds, high drug costs, and low access to markets. Dairy goat farmers are organized into associations such as Dairy Goats Association of Kenya (DGAK), Meru Goat Breeders Association (MGBA), and Nyanza Dairy Goat Farmers Association (NDGFA), which can make it easier for their products marketing.

DAIRY GOATS PRODUCTS AND THEIR MARKETS

Dairy goat products include live goats, goat milk and dairy goat meat.

(a) Live dairy goats

This is the most important dairy goat product though the goats are kept principally for milk. Constraints to live animal production include: inbreeding; low quality breeds; diseases (PPR and CCPP), and climate change/environment.

Markets for live dairy goats include the following:

(i) Local and National markets

Individual farmers, County Governments, development NGOs in Kenya, Government Sheep and goat stations, and research institutions buy dairy goats for breeding.

- Prices range from Kes 15,000 to Kes 35,000 per breeding doe of one year and above.
- Prices of bucks range from Kes 15,000 to Kes 65,000 depending on the farm selling. The higher price is for bucks born from pure imported does.

Examples of the farms keeping dairy goats are shown in the Table below.





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Farms keeping dairy goats in Kenya

Farm/Station	Goat breeds
(i) Government Station/Farm	
Naivasha Sheep and Goat Station - Naivasha	Toggenburg
(ii) Private Farms	
Farm Africa – Makueni	Toggenburg
Meru Dairy Goat Breeders Association (MGBA)	Toggenburg
Egerton TDU Farm - Njoro	Toggenburg
Nyanza Dairy Goats Farmers Association (NDGFA)– Homa Bay	Saanen, Toggenburg
Dairy Goats Association of Kenya (DGAK) – Nyeri	Kenya Alpine
(iii) Others	
KALRO-Naivasha	Toggenburg, German Alpine, Saanen, British Alpine
Tharaka Nithi Goat Breeders (TNGB)	Toggenburg
Kitui-Mwingi Goat Breeders Association (KMGBA)	Toggenburg
Breeders in Kiambu, Nyeri, and Kakamega Counties	Saanen, Toggenburg, Alpine

The majority of the farmers keep dairy goats to get nutritious milk for home consumption and income from the offspring and milk.

(ii) Regional markets

In Uganda, Rwanda, and Burundi, individual farmers and development NGOs can expect the price for does and bucks over one year old to be at least Kes 35,000.

(iii) International markets

Sources of dairy goats for breeding by individual farmers or institutions include The Netherlands, Germany, France, Britain, and South Africa. The cost of importing a breeding doe is at least Kes 70,000.

Linkages among actors in live goat sub-chain

Goat producers are linked through breed societies or farmers'

associations, but the linkages are currently not very active. Buyers are not linked to one another, and there is no contract between buyers, farmers, or exporters.

(b) Dairy goat milk

Goat milk has a niche market due to its unique nutritional and health benefits to humans. Many consumers of dairy products in developed countries prefer those from goats, especially cheese. Milk as a product is mainly sold as raw milk but it has various other value-added products such as fermented goat milk (mala), milk yoghurt, cheese, ghee and baby food formulations. Markets for dairy goat milk products include the following:

i) Raw or fresh goat milk

Goat milk is sold at a higher price of approximately Kes80-150 per liter, while cow milk is priced at about Kes40-80 per liter. The market for goat milk is low in Kenya due to few buyers and inconsistent milk supplies, especially in the dry season. Goat milk consumption provides positive nutritional and health benefits that can be leveraged for promotion. These benefits include the presence of agents in the milk that are anticarcinogenic, offer cardiovascular protective effects, and assist in treating malabsorption syndromes and infant malnutrition.

ii) Value-added goat milk products

Milk is highly perishable and needs proper handling after milking (value addition) to avoid post-harvest losses. Benefits of value addition include increased shelf life, product diversification, increased income, and employment creation. The main constraint to value addition of goat milk in Kenya is the low volumes of goat milk produced, which is also related to the absence of organized markets for goat milk and the low demand for goat milk products locally due to their high cost.

(c) Dairy goats' meat

After dairy goats have completed their milk production phase or those culled from the flock, they end up in the meat (chevon) market.

(i) Local and National markets

Chevon selling prices vary along the value chain, from the producer (live animal price per kg live weight) to the retailer or butchery. Prices are different for the producer, trader 1 (primary market), trader 2 (secondary market), processor, wholesaler, and retailer (Kes/kg). The retail price of chevon currently ranges between Kes 700-900/kg.

Partner organizations



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