



Backyard grasscutter keeping



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Foreword

This Agrodok is the outcome of cooperation with authors of earlier grasscutter publications in various African countries.

Agromisa believes in the potential of backyard grasscutter rearing. Producing high-quality grasscutter meat for household use and/or for the market is easily integrated into low-input ecological agriculture. Moreover, keeping grasscutters can be profitable: after the initial investments in stable(s) and stock, care and maintenance are relatively easy and feed can be cheap; and grasscutter meat sells at good prices.

This Agrodok explains the details and hazards of grasscutter farming. Within Agromisa's overall aim of improving small-scale farming, this booklet offers an approach to make grasscutter farming a successful and rewarding enterprise.

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1 Introduction

Domestication of the grasscutter (also known as cane rat) is slowly becoming a success story in sub-Saharan western and central Africa, where grasscutter farming has proven to be a profitable business.

Because of its tasty meat – appreciated by all, regardless of ethnic origin or religion – grasscutters have been hunted locally to the point of extinction. For that reason, farmers have become interested in raising them in their backyards.

Developing techniques for domestication and rearing of some of the heavily hunted wild animal species is a sensible way to produce protein-rich food for increasing human populations.

After initial problems, grasscutter farming has now become well established, leading to a spate of booklets and guides on the subject. Some of these sources give the impression that it is an easy way to ‘get rich quickly’. Grasscutter farming can be quite profitable, but it demands good preparation, care and commitment.

1.1 The scope and focus of this guide

This Agrodok provides up-to-date information on grasscutter farming to benefit the informed farmer and extension and rural development officers.

It targets farmers wishing to diversify their farms as well as their families' diet, and those considering growing grasscutters for the market.

The name *grasscutter* is preferable to *cane rat*, which refers to the animal's reputation as a marauder of planted crops (sugar cane!). Its popular name grasscutter (or cutting-grass) better befits a species on its way to domestication.

1.2 Structure of the Agrodok

Chapter 2 briefly describes the two grasscutter species in Africa, their original geographical distribution, natural behaviour, feeding and reproduction. Chapter 3 discusses criteria for animal selection when starting grasscutter farming, natural behaviour and rules on their treatment in captivity, sex determination, domestication and handling.

Chapter 4 deals with the basic criteria for good grasscutter housing. It describes shed(s)/stable(s) and the different types and arrangements of cages within each housing unit. Possible building materials are listed and advantages/disadvantages of different designs and materials are discussed. Necessary accessories for stable and cage (for storing, cleaning, eating, drinking, gnawing) are described.

Chapter 5 deals with grasscutter reproduction: breeding groups, heat and copulation, pregnancy and parturition, suckling and weaning, and mating interval.

Chapter 6 discusses grasscutter feeding (forage, other feed, concentrates and water) and feeding habits. Daily feeding and management routines are discussed. Methods are presented for keeping an overview of grasscutter breeding and growth performance.

Chapter 7 deals with health and health care, covering topics such as disease prevention, wounds and their treatment, ailments and diseases (e.g. dental problems, intestinal infections and worms, respiratory problems, external parasites), first aid essentials, medicines and equipment.

Chapter 8 discusses administration. The two essential types of grasscutter farm administration are explained: business/financial administration and stock records. Methods to identify individual sheds/stables, cages/hutches and animals are described. Examples of record sheets are given.

Chapter 9 briefly describes grasscutter slaughtering and dressing, and meat-preserving options.

Chapter 10 discusses marketing and trade, the local market, restaurants and hotels, and grasscutter farmer cooperatives for supplying to regional and, possibly, international markets.

Chapter 11 gives indications of the profitability of grasscutter farming. An annex on concentrates, feed and feeding values, a list of useful addresses, suggestions for further reading, and a glossary conclude this Agrodok.

Note: this Agrodok uses the metric system of weights and measurements throughout; temperatures are expressed in degrees Centigrade.

1.3 Advantages and disadvantages of grasscutter farming

Advantages

- There is a good market for the animal's tasty meat. As a type of bushmeat, it is highly valued as well as pricey. It therefore offers a good source of income that requires relatively modest efforts.
- Farmers may profit from the experience of and research results on grasscutter rearing from well-established grasscutter farming ventures in Cameroon, Gabon, Ghana, Nigeria and Benin.
- Grasscutters are naturally clean animals; they urinate little and their enclosure is not smelly, so they can be kept near the house in a quiet place.
- Feeding costs can be low, since grasscutters mostly eat forage that possibly can be harvested in the wild.

Disadvantages

- *Docility.* Grasscutters are not (yet) established farm animals, though docility seems to be a heritable trait that might be improved through selective breeding. This may also be true for a number of the following characteristics.
- *Relative low productivity.* Average effective litter size is 3-4; they have a long gestation period and hence on average fewer than two litters per year.

- *Stress prone*: Stress-related injuries are a major cause of death. A frightened animal may panic and jump from one corner to the other, often injuring itself. Stress can be caused by noise and wind, to which grasscutters are very sensitive. In suburban zones, the difficulty of finding a quiet site for the grasscutter pen might be a limiting factor.
- *Choosy feeders*. They do not eat soft, powdery food and reject forage after lying or urinating on it.
- *Sensitive internal organs*. The animal may die if held with force around the abdomen; this requires the use of a catch or restrictor.
- *High initial investment*. Grasscutter farming demands a considerable initial investment, particularly for the animals' housing (see Chapter 4).
- *Expensive breeding stock*. The initial breeding stock (1 male + 4-5 females to start a breeding unit) must be bought from other farmers, breeders or poachers, and they are not cheap.
- *Slow returns on investment*. Initial returns, in the form of youngsters ready for eating or sale, will not accrue until after about one year.
- *Feeding*. Many guides advocate using the cheap 'feed (grasses) from the wild', more specifically cutting (elephant) grass from empty lots and/or roadsides. Apart from the risk that this grass may be contaminated with dung, garbage or litter, the 'would-be grasscutter farmer' is competing here with fellow farmers who use the same feed source for their cattle, goats, rabbits, etc. A farmer should consider where and how to get feed for his animals before embarking on grasscutter farming.
- *Price competition*. Grasscutter bush-meat is still (readily) available in some rural areas. Its selling price sets a maximum on the price of farm-reared grasscutters grown for the market, limiting the feasibility of grasscutter farming in rural areas.

A farmer should thoroughly consider his/her motives, objectives, resources and financial situation before starting to raise grasscutters.

Motivation

Reconsider why you would opt for grasscutters instead of other livestock before starting to invest. Did you weigh the pro's and con's of other options for using available time, space, fodder, materials and funds?

Objectives

Define your objectives before starting. Do you plan to raise a few animals for household use, to farm grasscutters for sale on the market, or to start a larger undertaking to supply specific markets, possibly under contract? Inputs and efforts obviously grow in accordance with your objectives.

Resources

Space. Raising grasscutters requires space for housing and – possibly – for growing forage to feed them.

Housing

Grasscutter housing must be sturdy, quiet, well ventilated and well protected from the elements. At least three cages are needed to start with and the number rises quickly.

Forage

If you cannot cut (enough) grass from the roadside you may have to grow your own grasscutter forage.

Time

Farming grasscutters for profit demands that time be spent on management (and on bookkeeping!) in addition to the tasks already carried out by you and your household members. Grasscutters demand a strict feeding and tending schedule every day of the year. Calculate labour needs and how and by whom they will be met. Keep in mind that total annual family labour hours are restricted!

Finance

Grasscutter farming requires an initial investment in housing and breeding stock. If you start from scratch no income will accrue for about one year. Housing, breeding stock and labour during the start-up period must be pre-financed from your own resources or through a loan.

This advice is not intended to discourage you from taking initiatives to improve your family's living conditions, but to encourage you to weigh the options before starting!

2 Biology and distribution

There are two species of grasscutters, the greater (*Thryonomys swinderianus*) and the smaller (*Thryonomys gregorianus*).

The greater species is the second-largest African rodent after the porcupine. The average adult weighs 4 to 9 kg; males (bucks) can reach up to 10 kg, and the females (does) remain less heavy. Their life span is up to 10 or 11 years. The greater grasscutter occurs in savannah grasslands, forest clearings, cultivated lands and secondary forests, where the animal is common and heavily hunted. It is found throughout western, central and south-eastern Africa.

The smaller grasscutter species with a mature weight of 3 to 7 kg, is characterised by a bulbous nose, a short tail and very deeply grooved incisors. It is mostly found in savannah areas, where it prefers slightly moister climatic conditions (mainly central and eastern Africa). Its life span is somewhat shorter than that of the greater grasscutter.

The greater grasscutter, *Thryonomys swinderianus*, is the species being domesticated in grasscutter farming. It is the subject of this Agrodok.

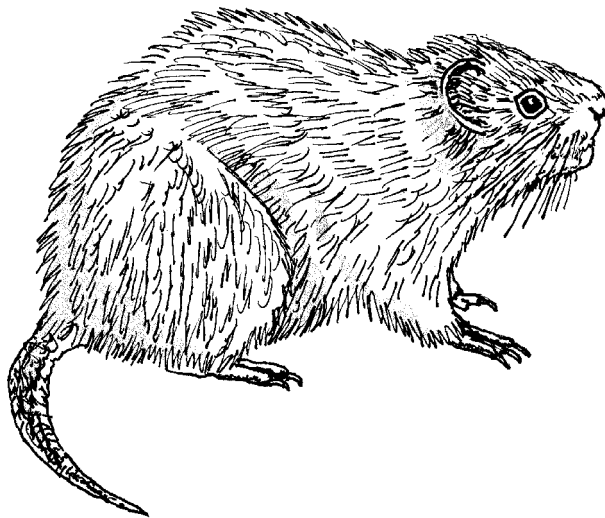


Figure 1: The greater grasscutter (*Thryonomys swinderianus*), the species commonly used in grasscutter farming

2.1 General characteristics

Grasscutters are herbivorous rodents that feed mostly on a wide variety of grasses and drink very little water. They have sharp eyesight, a good sense of smell, are smart, quick and may jump as high as two metres. They are strong and, when caught by the tail, they sometimes rotate vigorously in order to detach it from the body for escape.

Grasscutters are active at night; they are sensitive to wind and dry food, which cause respiratory problems. They do not dig holes but rather use burrows made by other animals. They consume nuts, bark and the soft parts of grasses and shrubs, much preferring elephant grass and sweet potatoes. They commonly 'raid' cassava, yam or sugar-cane plantations (hence the name cane rat!) and are then considered pests.

2.2 Reproduction

In the wild, grasscutters reproduce year-round, although births seem to peak at certain times of the year, correlated with weather conditions. One

male takes several females, and the family group has more than one generation of young. The average gestation period is 152 days. Litters normally contain from 3 to 11 young. Newborns are fully developed, their eyes are open, they weigh approximately 80-150 g, have thick fur, and quickly become accomplished runners; they can launch a biting attack an hour after delivery and start eating forage not long after.

Females may be ready to copulate soon after delivery, though an interval of 6-8 weeks between delivery and new mating is generally recommended. Captive grasscutters can be kept in cages or boxes or in open areas enclosed within walls or other fencing material. Males and females can be kept together, but not all the time. Depending on the size of cages used, stocking rates of one male to five females are possible. Pregnant females must be isolated to avoid the males killing the young.

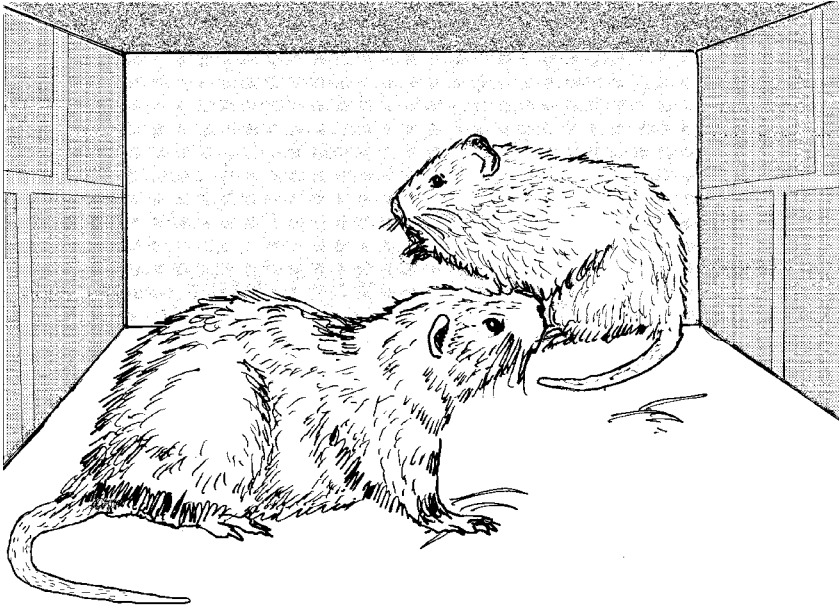


Figure 2: Male (left) and female grasscutter in a cage; note difference in size: the male (buck) is larger and heavier than the female (doe).

3 Selection, handling and domestication

Selection criteria for choosing good animals for breeding are listed below. Grasscutters have to be handled carefully to avoid internal injuries. (See the final paragraph of section 3.2 for advice on grasscutter domestication.)

3.1 Selection criteria

Animals for starting a grasscutter farm must be obtained from hunters, from other grasscutter farmers or from certified breeders. To avoid in-breeding never buy animals from a farmer who does not keep proper stock records.

Good health is the first selection criterion, obviously. Healthy animals are characterised by a smooth, shiny and thick fur, and by their habit of jumping from one corner to another if air is blown into their cages.

A good grasscutter **female** should:

- have a big body;
- have at least two pairs of teats (the number of teats determines the number of pups the doe can nurture successfully);
- be fertile (sometimes a female turns out to be infertile).

A good grasscutter **male** should:

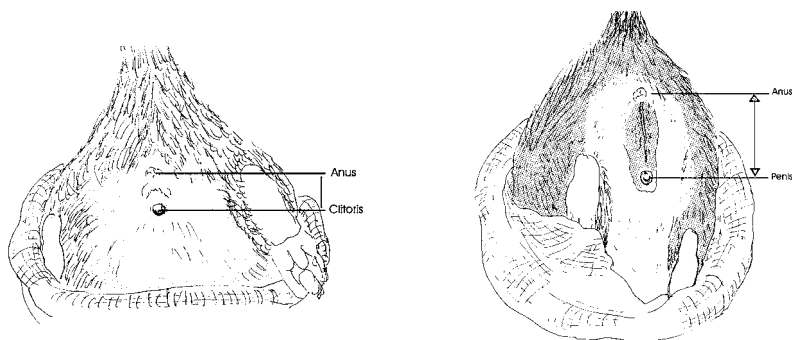
- have a big body
- have strong hind legs
- be able to stand well
- have two testicles of the same size
- be able to mate with and impregnate females without causing casualties (some males are bad-tempered and easily kill any females brought to them for mating).

Unfortunately you cannot verify a female's fertility or a male's temper when acquiring them, but such animals should be culled when their malfunctioning becomes evident.

If any symptoms are diagnosed, treat the animal immediately after buying it in order to minimise risks of introducing disease or parasites (see Chapter 7).

Grasscutter sex determination

It is easy to determine the sex of grasscutters, even soon after birth. Sexing is done through the determination of the distance between anus and genitals, which in males is over twice the distance of that in females (see Figure 3). To be sure of the sex of the male, a little abdominal pressure can be applied towards the tail to bring out the testicles, which usually lie hidden in the abdomen.



A: female grasscutter

B: male grasscutter

Figure 3: Anus - genital distance

3.2 Handling and transporting animals

Grasscutters are essentially wild animals and therefore have to be handled with care. Although some animals can be as tame as a rabbit, most frighten and panic easily.

The wild grasscutter in its natural habitat sleeps where it feels comfortable and safe, eats what and when it feels like eating, mates and plays with its group members. Imagine the animal's panic when it is caught, stuffed into a bag and transported on someone's shoulder or dumped into the back of a pick-up lorry! Wild grasscutters bought from hunters need to be handled and transported with special care to avoid casualties.

The safest way to move newly acquired animals is to transport them in a cage stuffed with grass (see Figure 4). A double jute bag – a bag with another one inside – fully padded with grass is a possible alternative. Poor handling during transportation may result in internal bleeding and serious losses.



Figure 4: Grasscutter transport box in front of a concrete + cement-brick grasscutter cage under construction

Grasscutter handling on the farm

A grasscutter farmer needs to handle his/her animals manually for a number of reasons:

- sex determination of young animals or of grasscutters brought in from outside;
- pregnancy check;
- moving grasscutters from one cage to another, for copulation, delivery etc.; or
- isolation and treatment in the event of a (suspected) disease (Chapter 7).

Handling grasscutters is both a dangerous and delicate task, because the animal has sharp incisor teeth (rarely used on their handlers), powerful claws (sometimes used to scratch their handlers) and a weak tail. They can be handled by holding the tail carefully, by holding the back of the neck or by holding the rump/ waist, again carefully to avoid damaging internal organs.

The procedure for handling a grasscutter by the tail is as follows.

- Grasp the animal's tail at the third section towards the end (with your left hand if you are right-handed).
- Lift it quickly with its hind legs above the ground while keeping its front paws on the ground (if lifted clear off the ground it may rotate quickly to break off its tail and escape).
- Grasp the fore-shoulder firmly and quickly turn the animal upside down to lift it from the ground.
- Examine it in this position (sexing and pregnancy test on tame animals), or put it into a restrictor.

The grasping/ lifting procedure is illustrated in Figures 5,6 and 7. Figures 8 and 9 show a metal restrictor in use. Figure 10 shows a netting restrainer. Both are used to move grasscutters from one cage to another.



Figure 5: Grasp grasscutter by its tail and lift hind feet off the ground



Figure 6: Clamp grasscutter behind forelegs and press it (lightly) down



Figure 7: Turn grasscutter upside down for examination



Figure 8: Grasscutter being caught in a metal restrictor

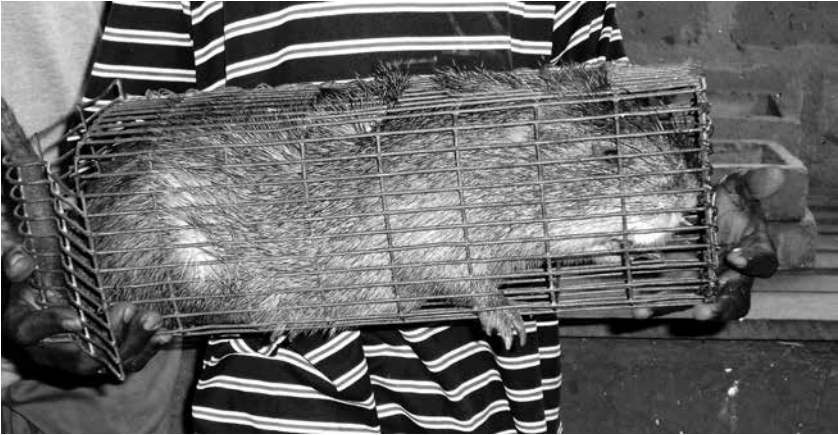


Figure 9: Metal restricter with grasscutter inside

Domestication

Grasscutters bought from another farm or a certified breeder have been born and raised in captivity, so they should quickly settle down in their new environment once accustomed to their cage and their keeper.

Wild grasscutters bought from hunters need special care after arriving at the farm. When put into cages they may race around and injure themselves. Their immediate environment should be shaded and quiet without other animals or people around. Feeding and handling should be done on a regular basis and by the same people, so the animals become accustomed to their attendants.

For domestication the grasscutter farmer should provide similar conditions as in the wild. The cage should be fully stocked with grasses before a newly acquired, wild animal is put into it. This prevents the animal from injury itself as a result of running and hitting its head against the sides of the cage. Aggressive males should be paired with matured tamed female(s), which are ready to be crossed and vice versa.

Feeding new, wild grasscutters with sugar cane, cube sugar and salted casava has proven very effective in taming them. The housing unit should be constructed to allow enough light into the cage so the grasscutter can see the attendant, especially during the day.

Domesticated grasscutters exhibit the following characteristics:

- They are able to feel at ease and eat well in the presence of the caretaker. They are docile; that is they are amenable to stroking or accepting feed from the farmer's hand.
- They are able to reproduce in captivity and to care for their pups.

Agitated grasscutters tend to run as if they are blind. If the keeper wants to catch an animal from its cage or from the ground he should set it moving and quickly block all escape routes except the one into the metal restrictor or the nylon mesh restrainer.

Some grasscutter experts prefer the netting restrainer to the all-metal restrictor, which might injure the animal if it runs in at high speed.



Figure 10: Netting restrainer for catching and moving grasscutters

4 Housing: the stable with cages

A farmer raising a few grasscutters for household use just needs a few superimposed individual cages with a thatched roof on top. Any more ambitious grasscutter farming venture requires one or more stables/sheds with *hutches* or *cages* inside.

(Note: some publications speak of ‘hutches’, others of ‘cages’. The words mean roughly the same thing: an enclosure for housing individual animals or small groups of animals. This Agrodok uses ‘cages’).

Good grasscutter housing should give the animals conditions comparable to those in the wild, while offering accessibility and easy handling to the farmer. Good housing is indispensable for animals and farmer alike. The grasscutter stable should protect the animals from bad weather (wind, rain, high temperatures), poor ventilation, noise (busy road, rumbling trucks, market, disco, etc.), predators (ants, snakes, cats, dogs) and thieves.

4.1 The stable

Main considerations:

- The size and type of stable should be in accordance with the farmer’s ambition and means.
- Construction and maintenance costs should both be taken into account.

- Local materials should be used wherever possible, such as bamboo, wood, thatch, bricks, cement blocks, mud blocks, zinc sheets, wire mesh, etc. Materials must be solid and easy to clean.
- Moist or swampy environments should be avoided because cement plastering is easily destroyed by moisture.
- The location must provide protection from noise, predators and thieves.
- Roofing must be safe from leakage. The gradient of a thatched roof should be steep. A zinc sheet roof should be laid with an adequate overlap between the sheets to prevent leaking. Zinc roofing may become unbearably hot during the dry season, in which case it should be covered with thatch.
- Good grasscutter housing should be spacey, dry, and well ventilated, maintain normal temperatures and be protected from direct wind. It should provide light during the day and darkness at night – the animals need both for metabolism and growth.
- Grasscutters are very sensitive to dust, which causes respiratory problems and mortality (see section 7.2). Stable and cage construction should restrict dust entering from outside. Stable(s) as well as cages must be kept dust-free as far as practicable.
- A corridor of at least 1 m wide is needed to allow easy passage of persons, wheel barrows, etc. without frightening the animals.
- A forage farm around the house is sometimes necessary.

The stable's outer wall should be at least 1.2 m high to minimise the risk of animals escaping and predators or thieves entering. If constructed with cement-blocks the outer wall may double as the back wall of cement-block cages.

The stable floor should preferably be plastered with cement to facilitate proper cleaning.

Cage positioning within the stable can be:

- *peripheral*: a spacey central corridor with cages on either side;
- *central*: cages in the middle and a walkway all around; or
- *combined*: cages along the outer walls and in the middle.

The stable's dimensions obviously depend on the number of cages needed. A few medium-sized stables are preferable to a single large one, to facilitate management and reduce contamination in the event of disease.

Cage arrangement

The arrangement of cages within the stable has to meet two requirements:

- It should make efficient use of stable space while providing adequate ventilation and sufficient room for allowing easy passage of a wheelbarrow and other equipment.
- It should enable farm labour to work professionally, efficiently and in a comfortable position. Labour, whether hired or your own, is expensive; it should not be wasted by working with poorly constructed and badly placed cages or poor-quality equipment.

Both cement-brick and wood + wire mesh cages are customarily constructed in layers of three or even four on top of each other (see Figure 11). This forces the attendant to stoop down or kneel when working on the bottom tier, which is uncomfortable and inefficient!

It is better to limit the number of superimposed cages to three tiers, with the bottom one raised sufficiently above the stable floor to permit easy tending. The space underneath can be used to store feed and equipment. The floor of the top cages should be below eye level, allowing the farmer to inspect every cage.

Special cage types have been developed to facilitate cleaning. Figure 13 shows a three-tiered wood + wire mesh double-room family cage arrangement, where the roof of the bottom- and second-layer cages doubles as a collecting tray for droppings and forage scraps falling through the wire mesh cage floor.

Grasscutter stable photographs often show such cages placed with their back against the outer wall, and with the waste-collecting trays slanting upwards towards the front. This makes good cleaning difficult. Dust and debris accumulating against the outer wall may easily cause respiratory problems and grasscutter mortality (see section 4.1.8 and section 7.2 on respiratory problems).



Figure 11: Two types of cages in a grasscutter stable: a single-layer, ground-level cement-block cage at right and a three-layer concrete cage with iron-rod doors at left. Note metal wire restrictors next to the attendant's leg. The cage arrangement on the right is not recommended because it uses available stable space inefficiently and all tending and cleaning (such as scooping out droppings and unused feed) has to be done in an uncomfortable position. The cement-block, iron-rod door cages at left are preferable because more grasscutters can be housed within the same stable area. For the sake of labour efficiency the bottom space should not be used as grasscutter cage, but for storage (see Figure 12); the individual cages could be lower to allow the same three-layer cage arrangement. The iron bars should be positioned vertically instead of horizontally, to prevent grasscutters from getting stuck when trying to gnaw the horizontal bars.

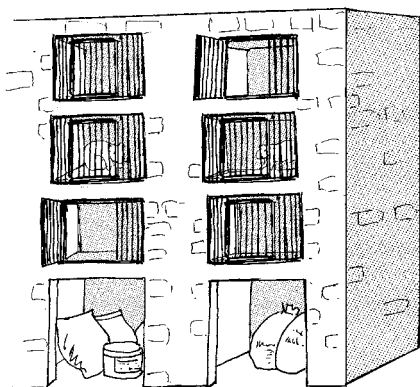


Figure 12: Three-layer, cement-block cages with the bottom level used for storage.

Figure 14 shows a similar construction: two three-tiered cages back to back in steel + wire mesh, with a metal plate underneath the top- and second-layer cages' wire mesh floors to collect waste.

Both the wood + wire mesh, and steel + wire mesh arrangements shown in Figures 13 and 14 should preferably be placed with the narrow side against - or close to the outer wall, and with cleaning trays slanting down towards the front side.

Note that the solid outside stable wall must be at least 1.2 m high in both cases.

Note also that both cage types (Figures 13 and 14) lack the solid back wall, strongly recommended in section 4.3 on cage construction. In the wood/wire-mesh cage (Figure 13) the partition between the right and left-side cages should preferably be closed. The steel/wire-mesh cage unit (Figure 14) should have solid partitions between the right and left cages as well as between the front and back ones.

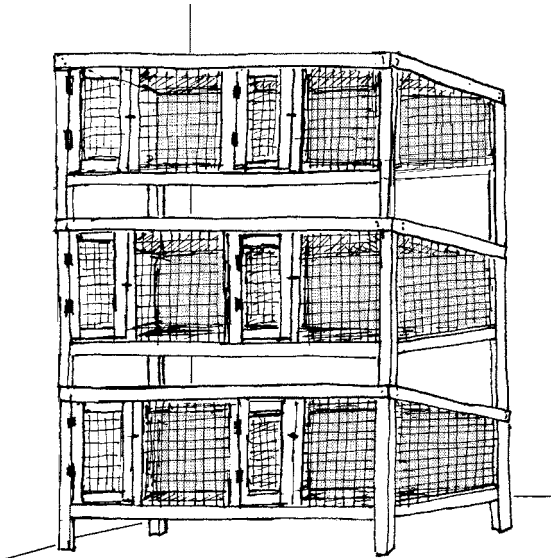


Figure 13: Three-layered wood + wire mesh cage; the slanting multiply cage tops facilitate removal of spilled food and droppings. Cages must be placed with one side against the outer wall, with adequate space between them to allow the attendant(s) to work.



Figure 14: Steel + wire-mesh cage, three-tier cage with two cages at each level, placed back to back and with their narrow side against the wall. The forward-slanting steel plates underneath the second and top tiers facilitate cleaning. Note exterior drinking bottles and boxes for concentrates. The cage doors' iron rods should be vertical, to prevent grasscutters from gnawing on them to keep their teeth filed; see Figure 15. The partitions between the right - and left cages, as well as the front and back cages should be closed, to make the animals feel at ease.

4.2 Cage types and dimensions

Cage types

A grasscutter farm needs *individual* cages and *group* cages.

Individual cages are used for:

- housing male grasscutters > 4 months old (they will fight if housed together);

- housing pregnant females about to give birth (the male may kill the young);
- isolating a sick animal from the healthy ones, for observation and treatment. Obviously the quarantine cage(s) should be situated away from the other cages.

Group cages are used for:

- housing family groups, 1 male + 4-5 females (until the females are ready to deliver);
- housing a female with her suckling pups;
- raising up to 10 youngsters until they are 4 months old (when the males have to be kept in separate cages);
- raising females until they are ready for mating.

Obviously the number of animals per cage should be reduced gradually according to their size; up to five females of similar weight may be housed together.

Cage dimensions

Cage dimensions recommended in various grasscutter booklets differ. They depend in part on the construction material used for the cages (cement blocks or wood + wire mesh).

For *individual* cages the following dimensions are cited:

- height (bottom to top) 35-45 cm
- width/ depth (front to back) 40-60 cm
- length/ width (left to right) 40-70 cm

For *group* cages:

- height as above, 35-45 cm
- depth 60 cm, up to 80-100 cm in some designs
- width 160-200 cm, usually with a partition in the middle, with an opening between the two sections, so the animals can be moved from one side to

another to facilitate cage cleaning. (In some designs the two-section cage width is just 100 cm or even less.)

Do not economise unduly on cage dimensions at the expense of animal welfare. Well-kept, well-tended and well-fed animals grow better and are less susceptible to stress and disease than grasscutters crowded into small, dark cages.

4.3 Cage construction

The following general rules apply to cage design and cage size.

Cages must be easy to clean. Grasscutters are very neat animals, so the cage should be easily cleaned or the wire mesh cage floor should allow waste to fall through.

Wire mesh cage floors of pregnant or lactating mothers must have a mesh size of 1 cm (or ½ inch) at most, to prevent newborn animals from getting stuck.

Cages must allow the animals sufficient space to move. Cages for a lactating mother or a group of growers must be bigger than a single male's cage.

Grasscutter cages should be:

- well ventilated (a factor to be taken into account in cage door construction);
- sufficiently spacious, and have at least one closed wall, to make the animals feel secure and to provide warmth during cool weather;
- made from durable materials (grasscutters are capable of gnawing through any soft building materials such as non-durable wooden boards or sticks unless protected by wire mesh, however closely fitted bamboo may also be used);
- easy to maintain and clean, and designed such that it is easy to feed and handle the animals.

Over the years two main types have emerged: brick or cement-brick cages and cages of (ply-) wood + wire mesh.

Providing a list of materials and cost estimates is beyond the scope of this Agrodok. These factors depend on the planned number of animals on the

farm. The farmer should check and compare availability and price of different building materials, and calculate cage construction costs before deciding what type of cage to use.

Cement-brick cages

Cage dimensions are more or less dictated by the customary size of the standard building block, often $10 \times 20 \times 40$ cm. Floors and roofs of multi-layer brick cages have to be constructed in reinforced concrete, because horizontal brick masonry will collapse. Cage floors and, preferably, the walls as well should be plastered with cement, to facilitate cleaning and good hygiene. Ventilation must be provided through the top lids (or slats covering) of single-layer floor cages, or by the vertically hinged steel rod doors of superimposed cages. Note that the cages' back wall should have a ventilation hole as well, fitted with nylon mesh to prevent vermin from entering. A cement-brick outer stable wall may be used as the back wall of a cement-brick cage, to economise on construction costs. Figures 12,16 and 17 show different types of cement-brick cages.



Figure 15: Two-layer concrete + cement-brick cages in a stable. Cages are constructed well above the floor to facilitate cleaning and tending. Cage height (above the floor?) is usually determined by the standard size of the cement-blocks; it could also be lower to allow three layers instead of two. Note marker tags on the cages.

Wood + wire mesh cages

Basically this type of cage consists of a wooden frame (boards or plywood) fitted with wire mesh to protect it from gnawing by the animals. Walls are made from 3 cm crimp square wire mesh; and cage floors are made of 1.5 cm crimp mesh to protect the animals' feet if the floor is not fitted with plywood underneath.

Steel wire mesh is sold in fixed heights. The farmer is well advised to adjust cage size to the dimensions of the construction materials available in the market, to avoid costly waste of material. Figure 18 shows a wood + wire mesh cage.



Figure 16: Grasscutters inside a wood + wire mesh cage. The cage can be divided into two sections by inserting a partition into the vertical slot.

Steel + wire mesh cages

Steel + wire mesh cages are sometimes used, constructed along the lines of the wood + wire mesh cages. Given the price of steel they are normally more expensive than the other two types, unless made from cheap scrap metal.

4.4 Equipment and accessories

Transporting box

The farm must have at least one transporting box (see section 3.2, Figure 4) for moving grasscutters safely to the farm, or from the farm to market.

Tools

Each stable should have the following tools:

- wheelbarrow;
- dustpan + broom;
- waste bin;
- a bucket or watering can;
- at least two catchers or restrictors, of different dimensions, depending on the size of the animal (see Figure 9 – the catcher is used for holding and restraining a grasscutter when moving it to another cage, for weighing it, in pregnancy diagnosis, or for examination and treatment in case of a disease);
- a weighing scale;
- a (small) sprayer.

Note: on a two-stable farm, the individual stables might share some equipment.

Accessories

Each individual cage needs the following accessories:

- A drinking trough (rectangular, e.g. 18 x 18 cm, 10 cm high or round) and a feeding trough for concentrates (similar dimensions). Both should be made from cement, preferably, to prevent them from being toppled over by the animals and for easy cleaning. See Figure 20, Chapter 6.
- A rack (horizontal or – preferably – vertical) for grass or vegetable feed. Drinkers and feeding racks might be placed on the outside of small cages. See Figure 14.
- A stick, bone or stone for the grasscutters to gnaw on and thereby keep their continually growing incisors under control (see Chapter 7).

Final advice

Stable(s) and cages make up a substantial part of a farmer's investments in grasscutter raising.

Remember that grasscutters resemble other farm animals in that their health and welfare are closely related. Well-housed animals that feel at ease eat better, grow better, procreate better and are less prone to diseases than poorly kept and fed ones. Better growth, less disease and lower mortality mean higher profits from the grasscutter farming venture.

On the other hand 'animal welfare' costs time and money: money for stable and cage construction and maintenance and time for tending the animals, cleaning their cages and providing proper feed.

The farmer has to balance benefits and costs.

5 Reproduction and growth

Grasscutter reproduction is one of the business objectives of your grasscutter farm: breed and raise young animals for sale or slaughter, and for replacement of your ageing breeding stock.

Obviously proper feeding is essential in making grasscutters reproduce well.

Chapter 3 lists criteria for selecting and bringing in breeding stock from outside and describes grasscutter sex determination. Reproduction terminology (copulation, conception, gestation, delivery, etc.) is explained in the Glossary.

5.1 Sexual maturity and mating

Sexual maturity

Females (does) can be mated when about 6 months old and weighing some 1.5 kg. Male grasscutters (bucks) become sexually mature at the age of 6 months, but it is advisable to start using them for copulation at 8 to 9 months or when they weigh at least 2 kg. Grasscutters show no clear signs of heat.

Mating

It is advisable to use males from different origins for mating to compare breeds and avoid incest. This provides variation in the offspring and gives the opportunity to select for desired characteristics (fertility, docility, growth rate, maximum weight, etc.).

To initiate mating first place one male in an empty group cage (see section 4.2).

One day later, when the buck feels at ease, bring 4 to 6 females – depending on cage dimensions – to the male. The buck should be larger and heavier than any doe brought to it for copulation; but small females, especially virgins, should not be given to oversize bucks.

The farmer should observe the level of aggression between male and females from a distance. Buck and does may have to be separated if serious fighting develops.

Female grasscutter ovulation is reflex, or induced, ovulation; the doe releases eggs only after a successful mating. For that reason it is usually advised that the females are left with the male until clear signs of mating and pregnancy are observed.

Mating studies at the University of Ghana showed the highest rate of female sexual receptivity, conception and parturition during the first three days. This supported the conclusion that the customary prolonged mating period is not necessary.

5.2 Pregnancy diagnosis and gestation period

Signs of mating, pregnancy diagnosis

After a successful mating, marks such as fur removal or scratches appear around the doe's ear and ribs. The vagina becomes red and swollen and the membrane on the vulva disappears and opens. Blood secretions may be observed on the tip of the clitoris 30-45 days after mating as a result of the implantation of the foetus.

Pregnant females can be differentiated in the following ways:

- *Observation.* The pregnant doe's belly increases in size.

- *Handling.* Gentle palpitation of the abdomen can reveal a pregnancy.
- *Weekly weighing.* An above-normal weight increase indicates a pregnancy.
- *A pregnancy test.* By inserting a clean end of a cotton bud half-way into the vagina, rotating it a bit and removing it the nature of the secretion can be observed (see Figure 17). Dirty or blood-stained mucus indicates a positive test. Testing still-untamed animals may be difficult.

Pregnant females should be separated from the male to prevent further copulation, fighting and possible harm. The test should be repeated on the other does every two weeks until they prove to be pregnant. A female can be considered sterile after three unsuccessful tests; an infertile doe should be culled.



Figure 17: Pregnancy test on a female grasscutter being held in a wire mesh restricter.

Pregnancy, gestation period

The average gestation period (the time from successful mating to delivery) is around 152 days (140-160), or about five months. The pregnant female should be given production rations, including minerals and vitamins in its feed and drinking water.

Several females at the same stage of pregnancy may be kept together in a group cage, though each should preferably have its own separate cage towards the expected delivery time.

After four months of pregnancy sufficient clean grass should be left in the cage for the expectant mother to make a nest.

Do not disturb females showing strange behaviour (e.g. not eating) just before delivery.

5.3 The litter

Delivery, litter size, suckling, weaning

The young are born at an advanced state of development, weighing from 80 to 150 g and not requiring any intensive care. They start suckling and eating succulent grass a few hours after birth. Obviously both mother and pups should be fed good forage and supplements.

If a doe dies during or soon after delivery her young could be suckled by another doe with pups of approximately the same age.

Litter size (number born at one time) ranges between 2 and 11, averaging 4 at birth (in Ghana), and fewer at weaning, because of pup mortality. The *potential* litter index (deliveries per year) is 2, though the average is around 1.8 because most females deliver less frequently, especially young does.

To maximise the litter index the young should be weaned at 4 weeks preferably, or when they have attained a weight of 500 g, which may take up to 6 weeks.

The doe can be crossed soon after giving birth, but it is advised to allow her some 10 days' post-weaning rest before she is brought to the buck for the next mating.

This brings the (average) minimum interval between successive deliveries to $152 + 28 + 10 = 190$ days (4 weeks suckling to weaning), or less than 2 deliveries per year.

Tests with shorter suckling periods to increase the litter index are being conducted in Ghana (see Richmond and Nyalemegbe, 2006, Further reading).

Observations on grasscutter growth and reproduction

The farmer's objective in feeding and caring for grasscutters is for them to grow and reproduce.

Studies on grasscutter growth and reproduction show the following statistics:

Minimum age and weight of <i>does</i> at first copulation	6 months, 1.5 kg
Minimum age and weight of <i>bucks</i> at first copulation	8 months, 2 kg
Number of <i>does</i> per buck	4-6
Fertility rate	85%
Average duration of pregnancy	152 days
Age of <i>doe</i> at first delivery	11 months
Average interval between successive deliveries	211 days \pm 70
Potential <i>maximum</i> number of annual deliveries	2
Average litter size	about 4 pups
Still-born rate	1.5%
Average weight of newborn pups	about 130 g
Optimal pup weaning age	6 weeks
Average weight at weaning (6 weeks)	about 500 g
Mortality rate up to weaning (6 weeks)	11%

Noteworthy points in the above overview:

- Fertility rate is currently only 85%. This is certainly something to improve through careful selection of breeding stock.

- There is generally a long interval between deliveries. This is also a point for improvement through selection.
- Litter size ranges from 2 to 11 pups, with an average of 4. Though the still-born rate and pup mortality probably increase with the number of pups a doe has to suckle, average litter size may well be increased through doe selection.
- The pup mortality rate of 11% between birth and weaning is high. In this respect too, some does turn out to be better-than-average mothers; these should be selected for breeding.

6 Nutrition and feeding

For a farm to be profitable the animals should reproduce well, remain healthy, and put on weight at a steady rate with the lowest possible input of feed and concentrates. Good nutrition is essential for good health, vigorous growth and high fertility.

Note: this Agrodok uses the following terminology (see Glossary):

- Feed is whatever animals eat, in the wild or in captivity ('food' usually refers to what is eaten by humans or their pets).
- Fodder is feed brought to animals in captivity.
- Forage is feed containing more water and fibre than digestible material when green. Grasses, legumes, leaves and crop residues are all forage. Forage may be dried (hay) or otherwise conserved (e.g. by silage) for use in the dry season(s) when green forage becomes scarce.
- Roughage is the indigestible portion of plant feed (some texts use 'roughage' and 'forage' as equivalents).

In the wild, grasscutters collect their feed by foraging. They consume a wide variety of grasses (both fresh and dry), tubers, leaves and fruit. They ingest soil when digging for tubers to get essential minerals. Although

basically herbivores they are known to consume insects and small rodents. Even cannibalism is not uncommon.

In captivity grasscutters need feed (forage and concentrates), water and minerals/vitamins.

A grasscutter is a rodent; it holds its food in its paw/hand before eating it. Therefore, its feed should be solid and not powdery. Powdery feeds tend to block the animal's respiratory tract due to the closeness of its nose to its mouth.

Maintenance and production ration

Animals need water and feed to live, grow, work and reproduce. Even at rest an animal needs energy and protein to stay alive. If these *maintenance requirements* are not covered, the animal will lose weight, it might fall ill and it will not reproduce. For instance: a grasscutter pregnancy might disappear through embryo resorption if the pregnant doe is underfed.

The farmer wants grasscutters to grow, reproduce, carry a pregnancy, produce milk to suckle pups and to put on weight. These production steps require proportionally more protein and other nutrients than maintenance. Therefore the grasscutters' *production requirements* include the addition of extra nutrients.

Incisor control (see also Chapter 7 on dental problems)

The grasscutters' incisors grow continuously and will overlap and cause wounds on the gums if not controlled. In the wild, the animal will gnaw hard objects such as sticks, stones and bones to file its teeth. Such items should be available in their cage.

6.1 Water

Grasscutters drink very little because fresh forage supplies them with some of the water they require. Nevertheless clean water should be available in the cage at all times, its quantity depending on the number of animals housed together. Pregnant or suckling females need more water.

Water should be provided in small troughs that should be emptied daily and washed before being refilled with fresh water from a clean source.

6.2 Forage

Grasscutters are mainly herbivores so about 70%-80% of their feed should be forage. Other types of feed, including fruits, cassava and maize, should be given in smaller quantities.

Grasses, legumes, leaves and crop residues may all serve as forage. Forage may be dried (hay) or otherwise conserved (e.g. by silage) for use in the dry season(s) when green forage becomes scarce.

Grasses

A wide variety of grasses can serve as forage (see the list below). Grass may be harvested from a forage farm lot and/or from 'nature': roadsides, vacant plots, etc.

Forage must be cut well above the ground from around noon, when insects have moved downwards. It should be allowed to wilt in the shade for at least 24 hours to prevent grasscutters from developing stomach problems. Before being fed to the grasscutters, the wilted grass must be shaken well to make insect eggs and larvae, bacteria and some worms fall off. It should then be tied into boats (bundles) of about 30 to 90 cm in length to minimise the space it will occupy in the cage. Putting the bundles against the cage wall prevents the animals from lying or urinating on the forage, which they will then reject.

Forage must be free of dry leaves and flowers and it should be replaced daily.

Grasscutters prefer the basal parts (stem) of grasses even though they are less nutritious than the leaves. Therefore the caretaker should feed more leaves than stems.

In many cases forage grasses will be harvested along roads and other common places. There may be a shortage of such grasses in areas where many farmers keep grasscutters or other grass-eating animals, e.g. near villages. A farmer could grow his own grass for feeding on a small plot or in hedges.

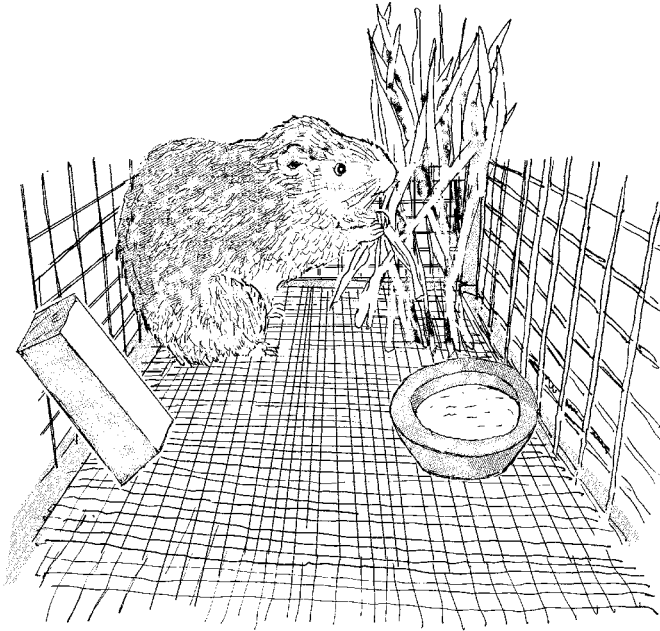


Figure 18: Grasscutter eating grass put upright against the cage wall. Note the sturdy drinking vessel and (empty) trough for concentrates.

Dried forage

In the wild, grasscutters consume both dry and fresh grass; and some grasscutter farmers obtain favourable results by feeding them both fresh and dried forage. Checking for insects and worms remains necessary.

Feeding dried forage is an option in the dry season, when fresh grasses are not easily available. Hay, supplemented with other feed and concentrates, is a good replacement for fresh forage. According to information from Ghana (Richmond and Nyalemegbe, 2006), grass silage is rarely used, though grasscutters will probably eat it if they are hungry and some salt is added to it.

Changing to other types of grasses

The grasscutter farmer could introduce his/her animals to new, non-poisonous grasses that are common in the locality or easily grown on the farm. Starving is the best way to have your animals accept new feeds. Pregnant

or lactating females should never be starved. The best time to start training the grasscutters to eat local feeds is when they are very young. The following types of grasscutter forage could be used:

Grasses (Poaceae)

Elephant grass (*Pennisetum purpureum*), also known as napier grass

Guinea grass (*Panicum maximum*)

Maize (*Zea mays*): cob, leaves, husk

Sugar cane (*Saccharum officinarum*): leaves

African giant star grass (*Cynodon sp.*)

Gamba grass (*Andropogon gayanus*)

Sheep grass (*Brachiaria decumbens*)

Bamboo (*Oxythenanthera abyssima*): young shoots

Rottboellia (*Rottboellia exaltata*)

Wild sorghum (*Sorghum spp.*)

Other plants and weeds

Stylo (*Stylosanthes spp.*)

Spurge weed (*Euphorbia heterophylla*)

Growing elephant grass

If annual rainfall in your area is 800 mm or over and you have access to some good land, growing elephant grass for fodder might be a worthwhile investment. It has high potential productivity in terms of total dry matter and TDN (total digestible nutrients) and CP (crude protein) per ha if harvested young.

Agrodok 14, Dairy cattle husbandry, describes a way to grow, tend and harvest elephant grass for continuing high yield. Note, however, that it suggests fairly high fertiliser dressings that might lead to soil degeneration and groundwater pollution, besides being expensive. For maintaining a healthy, well-balanced soil, regular applications of manure and/or good compost seem preferable.



Figure 19: Elephant grass growing beside a grasscutter stable

6.3 Other feed

Because forage is relatively poor in nutrients, the captive grasscutters' diet needs to be balanced by the daily intake of carbohydrates, proteins, fats, minerals, salts and water. For that reason, the animals should be provided with a variety of feeds other than forage every day, such as fruit, tubers and grains. In addition, carbohydrates, proteins and minerals are often provided in the form of concentrates.

Some of these additional nutrients can also be provided in the form of meal leftovers and agro-industrial by-products that are safe for consumption.

Recommended fruits and tubers

Fruits

Banana, plantain (*Musa spp.*): leaves, stem

Oil palm (*Eleis guineensis*): young shoots

Mango (*Mangifera indica*)

Paw paw (*Carica papaya*)

Pineapple (*Ananas spp.*): leaves, peels

Tubers

Cassava (*Manihot spp.*): tubers, stem

Sweet potato (*Ipomoea batatas*)

Taro (*Xanthosoma sagittifolia*)

Yam (*Dioscorea sp.*)

When feeding the animals fruit, make sure it is hard enough for the grasscutters to hold in their paws.

According to several manuals, fruits should be fed preferably in the afternoon. Train your animals to accept fruits of high nutritional value common in your locality.

Concentrates

Grasscutters in their natural habitat eat not only grasses but also other feeds like fresh groundnut hull, plantain pseudo stem, sugar-cane, cassava tubers/stem, oil palm and cocoa-nut seedlings, shells and rice (leaves, stem and grains) to obtain extra protein, minerals and vitamins that their bodies require for growth and reproduction. Therefore, grasscutters in captivity should be given these nutrients in the form of concentrates to supplement those obtained from grasses in order to enhance productivity.

Concentrates contain more digestible material than water and fibre. They are fed to the animals in the form of grains, chips or pellets placed in the feeders; large lumps should be sliced into chips. Concentrate must neither be dusty nor pasty. Whatever is left uneaten by the grasscutters should be collected so that the feeder is completely empty before new feed is introduced. The leftovers can be fed to chickens. Feeding should never be done during resting/sleeping periods.

You can formulate your own concentrate from locally available ingredients like (roasted) groundnut, maize, wheat bran, shells, salt and minerals and vitamins. Compact the concentrate into small pellets before feeding it to the animals. Annex 1 describes the ingredients and procedure for making concentrates.

Concentrates should be introduced tactfully to grasscutters that have never eaten them before to avoid putting unnecessary pressure on the animals, especially on pregnant or lactating mothers:

- Add sugar or some salt to the concentrate to make it more appetising.
- Starve the animal from morning and give it only the concentrate and water. Never starve pregnant or lactating does.
- Pair grasscutters used to the concentrate with those being introduced to it.
- Introduce concentrates early to very young grasscutters from two weeks old and above.

Never feed mouldy concentrates.

Note: *Concentrates can replace grasses to some extent during the dry season(s). On the other hand, it is not advisable to feed concentrates only, because the grasscutters' digestive tract is structured for breaking down grasses. Never feed too much concentrates (see Table 1).*

Minerals

As explained above, captive grasscutters need minerals in their feed, specifically:

- salt
- calcium, from ground egg shell, ground oyster shell, or burnt snail shell (*Achatina* spp.)

Minerals can be given through the drinking water or in the form of pelleted concentrates in a separate trough.

Coprophagy

Coprophagy is a special form of grasscutter feeding. During its sleeping time, especially around 4.00 in the morning, the grasscutter recycles its droppings, moving them directly from its anus to its mouth. This peculiar practice recycles a part of its intestinal bacteria that is indispensable for cellulose breakdown and protein synthesis. It also provides the animal with vitamin B.

6.4 Feed quantities

Table 1 shows the recommended quantity of feeds per animal per day depending on the physiological state of the animal and the type and nutritional value of the feed.

Table 1: Recommended feed quantities

Age	Forage / grasses (twice daily)	Supplement / supplementary feed in pellet (solid) form
Young (1-3 months)	100-150g (1handful)	10-50g (1milk tin of concentrate)
Adolescent (4-6 months)	150-250g (1.5 handfuls)	50-100g (2 milk tins of concentrate)
Adults (6 months and older)	250-400g (2 handfuls)	100-200g (3 milk tins of concentrate)

(Source: Grasscutter training manual MoFA & SFSP, 2002)

6.5 Feeding schedule; the grasscutters' daily rhythm

The feeding schedule should be adapted to the grasscutters' daily rhythm. Different authors cite different daily activity rhythms, but all agree that strict feeding regimes are essential. Grasscutters spend about 13 hours a day resting or sleeping, 6-7 hours eating, about 2 hours grooming themselves, and the remaining time playing.

According to research, grasscutters eat intensively from 8.00 to 12.00 in the morning and intermittently between 18.00 and 22-23.00 hours in the evening. They sleep (deeply) between midnight and 6.00 in the morning and groom themselves between 8.00 and 10.00. This would indicate a twice-daily feeding schedule: once in the morning and once in the late afternoon or at nightfall.

Other grasscutter manuals advocate three or even four daily feeding times, for example: 8-10.00, 16.00, 21.00 as well as at 4.00 in the morning; or 7-8.00 (grass + water), 13-14.00 (supplementary feed), 17-18.00 (grass + other forage, fruit).

Grasscutters are wasteful feeders, regardless of whether they are eating forage or pelleted concentrates. To minimise waste, they should therefore not be fed more than twice, or at most three times, a day.

A strict schedule is in any case essential; all work in the grasscutter stable, whether feeding, cleaning or tending, should be carried out at set times, in a regular sequence and by the same attendant(s). No one should be in the stable in between these set times.

Summarising:

- Always give feed during fixed feeding hours.
- Remove leftovers of the previous feeding before giving any new feed.
- Allow harvested grass to wilt in the shade for 24 hours before giving it to the animals in order to prevent diseases. Fresh grass must also be inspected thoroughly for insects and worms before being fed to the animals.

6.6 Weight gain and feeding profitability

Observations on the monthly weight gain of grasscutters in captivity show that *bucks* rapidly grow to about 2.5 kg by the recommended first mating age of 8 months and to 3.5 kg by 12 months. Monthly weight gain continues until the animal weighs more than 4 kg at around 16 months, before slowing down rapidly. *Does* reach around 1.5 kg by the recommended first mating age of 6 months, growing to around 2 kg at the age of 10 months and 3 kg at 24 months.

Daily weight gain of *bucks* rapidly rises from 8 g at birth to just below 10 g per day at around 11 months. The profitability of feeding them starts to decline from that age, so they are at this time ripe for sale or slaughter unless they are considered essential breeding stock.

Daily weight gain of *does* is stable at about 7.5 g per day from birth to around the first mating age of 6 months, declining from then onwards (to around 4 g per day at 24 months of age). Since does are kept mainly to produce offspring this reduction in daily growth is less important than that for bucks. Infertile does should be culled.

7 Health

Grasscutters are naturally clean animals in the wild and they are less susceptible to disease than most other farm animals. Nevertheless crowding animals on a farm always increases the risk of ailments or diseases.

This chapter categorises the various types of ailments a grasscutter farmer might be confronted with, describing symptoms, cures and preventive measures.

Note: antiseptics and antibiotics are regularly mentioned. Farmers should consult their local veterinary officers to select the best and cheapest medicine while keeping in mind the general caution on indiscriminate use of antibiotics, which can lead to multi-resistant bacteria (see box at the end of this chapter).

7.1 Prevention

Prevention is better than the cure! Some general measures to prevent disease and trauma are the following:

- Always give your animals adequate and complete feed.
- Make sure the feed is clean and free of dust or mould, and that forage has been allowed to wilt in the shade for at least 24 hours.

- Fresh forage must also be inspected well for insects (eggs, larvae) and worms before being fed to the animals.
- Inspect your animals visually every day.
- Regularly check their excrements (dry excrement in the form of coffee-like grains indicate that the animal is healthy; wet excrement or excrement that is not in pellet form indicates that the animal is sick).
- Separate a sick or wounded animal immediately from the healthy animals and put it in the quarantine cage for observation and treatment.
- Provide a healthy environment by cleaning cages daily, and by disinfecting eating and drinking troughs once weekly and the cages once monthly with products like alkali or soda.
- Prevent fights by not overcrowding your animals in the cages, and by separating young bucks into individual cages from the age of 4 months.
- Disinfect any cage occupied by a sick animal.
- Thoroughly disinfect the quarantine cage after use.
- Install an antiseptic foot bath at each stable entrance. (Note: Ghana grasscutter expert T.E. Richmond considers this a good idea, though he has rarely seen it applied in Ghana).
- Construct a perimeter fencing around the entire grasscutter compound to prevent unauthorised visitors or stray animals from entering.

Only one general preventive treatment is currently known, namely a sugar-lemon-water mixture. It is prepared by squeezing 4 lemons in 2 litres of water containing 8 cubes of sugar. It is provided as drinking water during periods of stress, including after changes in season, environment or feed, when an animal has a mild infection, or when it is experiencing pain caused by wounds.

Main causes of disease and mortality

Studies on grasscutter disease and mortality in captivity show an average monthly mortality of 2.5%. Trauma is the main cause (wounds caused by

fighting, or panicking animals hurting themselves by trying to escape), followed by ‘unknown causes’, blood poisoning and respiratory problems, in that order. Mortality is highest in the sub-adult group (animals between weaning age and first mating).

Stress seems to be an important predisposing factor in grasscutter diseases.

This underlines the need to: provide a clean and quiet environment for your animals; avoid overcrowding;

- separate young bucks;
- follow a strict daily feeding and cleaning routine carried out by familiar attendants; select and breed your grasscutters for docility!

7.2 Ailments, symptoms, treatments and preventive measures

Trauma: wounds, fractures, abscesses

Trauma is a frequent cause of mortality. Wounds are often caused by fighting, by animals panicking and hurting themselves or from grasscutters struggling while being handled.

Symptoms

Wounds and abscesses are easily diagnosed. Fractures are diagnosed by observing the animal’s movements or by gentle palpitation.

Treatment of wounds

- Treat light wounds affecting only hairs and skin with an antibiotic aerosol spray, e.g. Pedospray or an antibiotic powder.
- An animal with deep wounds that affect its muscles will need to be isolated. The services of a veterinarian may be necessary as well.
- In situations where suturing is necessary, anaesthesia is required.
- In the event of serious wounds, like exposure of the viscera, slaughter is recommended.

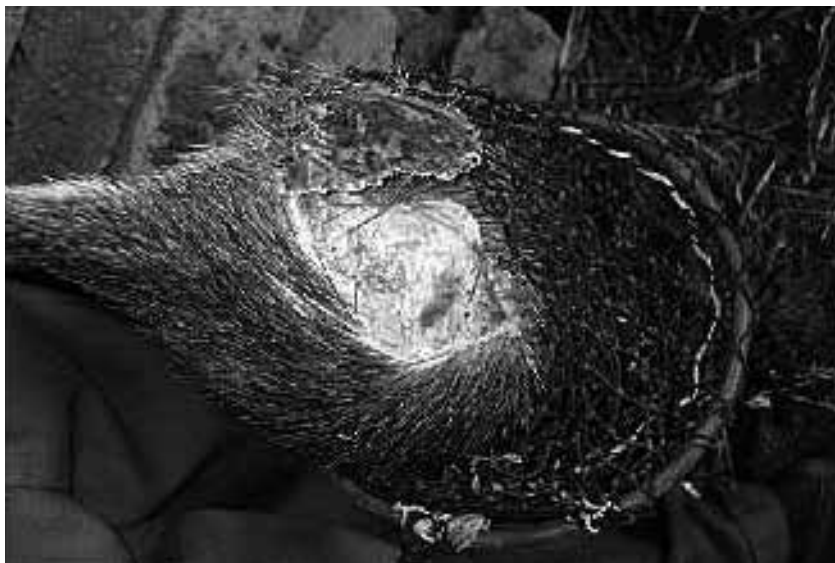


Figure 20: Serious cut resulting from a fight between buck and doe during copulation.

Treatment of fractures

- Isolate young animals to restrict their movement. Let them grow to slaughter weight if they eat. If they lose appetite slaughter them.
- For (nearly) fully grown animals slaughter is recommended.
- A veterinarian may treat and heal the fracture; the farmer will have to decide whether benefit outweighs cost.

Treatment of abscesses

- Abscesses may result from wounds or from influences like blood-poisoning. Hygiene is important in their prevention.
- Incise them when they are ripe; apply any antiseptic afterwards.

Prevention

- Avoid overpopulation in the cages.
- Constitute groups of animals of roughly the same weight.
- Separate males, from each other and from females, when 4 months old.
- Maintain a calm attitude when feeding or cleaning.

- Be careful when handling a grasscutter to prevent it from getting fractures or losing its tail. Lifting by the tail may cause the animal to start rotating rapidly to break its tail and escape. If this happens, quickly let the grasscutter's forelimbs touch the ground, or release the animal completely. It is advisable to catch the grasscutter in a metal restrictor or a netting restrainer (see Chapter 3) before examining, treating or transferring it.

Respiratory problems: cough, pneumonia

Symptoms

Cough, nasal discharge, sneezing, heavy, slow breathing; diarrhoea may be present as well. Cough or aspiration pneumonia may be caused by inhalation of dust from forage or feed. Bacterial pneumonia may result from exposure to cold and wind during the rainy season.

A high concentration of ammonia gas emanating from the excrements may also cause respiratory problems.

Treatment

Cough can be treated with the sugar-lemon-water solution, or by giving the animal small chips of ginger and garlic in its feeder.

Bacterial pneumonia possibly requires antibiotic treatment, e.g. Oxytetracycline or Tylosine (at the recommended dosage). Put the affected animal into the isolation cage.

Prevention

Avoid dust, both in the forage/feed and in the environment.

Do not give spoilt or mouldy feed to your animals. Cut and dry forage in the way described in Chapter 6, to prevent the animals from ingesting insects, harmful plants and worm eggs. Regular de-worming every four months is recommended by injecting an Ivomec solution (e.g. *Ivermectine*, against roundworms and parasites).

Stable construction must permit fresh air circulation, while avoiding cold, dust and moisture from entering the stable. The stable may even have to be heated during cold nights with a kerosene lantern. Covering a stable or cages with polythene sheeting might be preferable, to avoid noxious

kerosene fumes. Prevent grasscutters from coming into direct contact with the polythene sheet. Clean out the cages regularly.

Digestive/intestinal problems

Symptoms

Diarrhoea, constipation, loss of appetite, eating but still becoming increasingly weak, weight loss. The cause might be (1) eating spoilt or mouldy feed, (2) a protozoa infection (Coccidiosis), (3) bacterial infections like *E. coli*, Salmonella, etc., or (4) intestinal parasites: worms, nematodes. Worms may be suspected or seen in the faeces; feeding insufficiently dried grass is often the cause.

Treatment

Diarrhoea caused by eating spoilt or mouldy feed may be cured by feeding dried paw paw seeds of unripe, but matured paw paws. The same cure is recommended for worm infections. Coccidiosis can be cured by applying coccidiostats-containing Amprolium at the recommended dosage.

Prevention

Do not give spoilt or mouldy feed to your animals. See recommendations on cutting and drying forage and on regular de-worming above.

Skin problems: ticks, mites

Symptoms

Ticks can be observed in the animals' fur. Mites cause mange, resulting in loss of hair and scaly skin.

Treatment

Ticks are treated with a 0.5% Bromocycline bath rubbed on the affected animal's skin against the grain. Usually the other animals within the same cage must be treated as well. Mange is treated by rubbing the whole body with Ascabiol powder mixed with palm oil. All in-contact animals and those suspected of having had contact with the affected animals should be rubbed in as well.

Prevention

Tick infestation can be prevented by drying and shaking forage before feeding it to grasscutters.

Dental problems**Symptoms**

An affected animal grips feed, then drops it. General lethargy and loss of weight are other symptoms. Dental fractures do occur; and they are easily noticed.

Treatment

Grasscutter incisors grow continuously and would overlap and cause wounds to the gums if not controlled. A hard object, e.g. a bone or stone, in the cages allows the animals to control incisor growth by gnawing. Incisor filing may be necessary in severe cases. Treatment of fractures: if healing is considered possible, feed young forage and provide soft moistened feed, e.g. boiled cassava or potatoes. If the fracture is inside the gums requiring a long period for regrowth, slaughter is recommended.

Prevention

A stick, bone or stone in the cage is the first line of defence against dental problems. Providing correct forage and feed and stress-free conditions are essential as well.

Loss of appetite, loss of weight

Loss of appetite is rare for a healthy animal. It may result from dental problems, diarrhoea or internal bacterial infection (*Staphylococcus aureus* and others in the lungs and other internal organs). Dental problems and diarrhoea have been discussed. If bacterial infection is suspected and the cause cannot be identified, veterinary services may be necessary if the affected animal's qualities outweigh the cost. Otherwise slaughter is recommended. Weight loss is indicated by visible spine and ribs. It is common with gestating and lactating females due to poor feeding. Females that are emaciated after weaning should be allowed to regain weight before the next copulation.



Figure 21: Injecting a medicine under the grasscutter's tail

7.3 First aid box

The grasscutter farm's minimum first aid box

Note: the anti-stress sugar-lemon-water solution (see section 7.1) should always be the first line of defence in most situations.

Pharmaceutical products

- Betadine as a local antiseptic
- Antibiotic aerosol spray for wounds
- Piperazine against worms
- Broad-spectrum antibiotic, e.g. Banoecine (in powder or injectable form)
- Oxytetracycline 20% (in powder or injectable form)
- Imalgine as an anaesthetic

Equipment

- A sharp blade for incising abscesses, etc.
- Gauze for cleaning wounds (cotton would leave fibres in the wound)
- Pliers
- Teaspoon for administering medicaments orally, or for mixing
- Syringe for administering medication orally or intra-muscular

Injectable antibiotics should be administered around the base of the animal's tail on the underside (see figure 21).

Anaesthesia may be required for easy manipulation during treatment. It consists of 20 mg xylazine2% (Rompun) + 100 mg ketamine (Imalgine 1000), administered intra-muscular at a dose of 0.35-0.2 ml/kg live weight of the animal treated. The injection takes effect after five minutes and the effect lasts for about one hour. Regulate the position of the animal's head to ensure good respiration while it is unconscious.

Caution!

Be careful and restrictive in the use of antibiotics. Indiscriminate use of antibiotics on farm animals has already resulted in multi-resistant strains of bacteria in many parts of the world. These potentially dangerous bacteria may easily pass into the human food chain if the animal's meat is not thoroughly cooked/heated before consumption.

Final advice

Chapter 7 systematically describes ailments, their prevention and cure. As underlined in the final paragraph of section 7.1 stress or trauma is a major cause of grasscutter disease and mortality. Animal welfare experts speak of 'grasscutter signals' – the animal shows that it is under stress by panicking, running around or cowering in a corner of its cage. Stressed animals grow slower or die more easily than animals that are content and at ease.

The advice provided at the end of Chapter 4 is repeated here: animal welfare and animal health are closely related. Investing in good housing, good feed and good care will repay itself.

8 Administration

Accurate records are indispensable in running and improving any business, farms included. Good records are the key to successful farming and they help a farmer to access commercial bank loans. Farms with livestock in whatever form, from grasscutters to cows, need to keep stock records as well as financial records. Stock records are necessary to prevent inbreeding and to improve the offspring by crossing the best male animals with the best females.

8.1 Financial administration

All farm activities are aimed to provide an income for the farmer and his/her family (or, in the case of part-time farming, to augment an income from other sources). Whether or not they actually do yield a positive return can only be ascertained by keeping track of income and expenditure.

On a grasscutter farm money flows in from the regular sale (or household use) of live animals or their meat, and incidental sales of live animals as breeding stock. Expenditure comprises two distinct elements, *fixed costs* and *variable costs*.

Fixed costs

Animal sheds, cages, durable equipment and tools, building up the grasscutter stock, land for growing forage, etc., are *fixed costs*. They demand

care, regular maintenance and, possibly, payment of land rent and/ or interest on a loan. Annual maintenance costs of buildings and cages are usually calculated as a fixed percentage (e.g. 5-10% for buildings) of the original investment. Fixed costs continue, whether your grasscutter farm provides any income or not!

Variable costs

Direct or *variable costs* are directly linked to running the farm; they increase or decrease with the level of production. Labour, whether hired or your own, forage and concentrates, cleaning chemicals, hand-tools, drugs, veterinary services, etc., are examples of variable costs.

A sound financial administration is essential for keeping track of expenditure and income – not just for knowing ‘where the money goes’, but also for taking management decisions on where and how costs might be reduced and income improved.

For more information on farm administration consult your local extension service or study a handbook on the subject (e.g. Agromisa publications Agrosource 3, *The farm as a commercial enterprise*, and Agrosource 4, *Farm accounting*. Both were published in 2006 and can be ordered from Agromisa.

8.2 Stock administration

Grasscutter farms need a good stock administration that records data on each individual animal. This is essential to *improve breeding* and *avoid inbreeding*.

Some animals are more disease resistant than others. Some does deliver and raise two healthy litters a year, whereas others reproduce less well. Docility is a heritable trait. Of course you want to select the healthiest, most productive and most docile animals for breeding replacement stock. Accurate stock records indicate which grasscutters to keep and which to cull.

Inbreeding, i.e. bucks copulating with their own siblings or their own female offspring, is a proven cause of increased morbidity and mortal-

ity. Here again, accurate stock records will indicate when to replace your breeding bucks with fresh ones, brought in from outside (taking care not to import siblings of your own stock!).

8.3 Farm administration

Diary

Keep a daily *diary* to record all ‘events’ in the daily work routine immediately when they occur, because information is easily forgotten.

Financial events are purchases of inputs (the variable costs), and sales, each with total value and unit price.

Farm events include breeding data (copulation, delivery, litter size, etc.), information on operations (animal a transferred to cage b for reason c, etc.), feeding records, veterinary treatment, and so on.

*Be precise in recording such events in your **diary** and regularly transferring them to permanent **stock records** and **financial records** (see information on record-keeping below).*

A farmer just keeping a few grasscutters for family consumption might well argue that detailed records are not necessary. But do not forget that you need a reasonable estimate of the production cost of 1 kg grasscutter meat for the household pot, to decide if it would not be wiser to invest your labour and money in some alternative crop or livestock and simply buy meat in the market.

Identification

In order to keep track of all the different financial and farm events the farmer must be able to identify the stables/sheds, the different cages in each stable and the individual grasscutters.

Stables

Stables are simply identified by a painted letter or number near the door of each one, in order of construction, e.g. A, B, C and so on.

Cages

Cages are identified by numbering them clockwise from the stable door, from top to bottom and from left to right in the case of superimposed cages.

The numbers, e.g. A.1.1. (top cage, first column of cages on the left in stable A) can be written or painted on individual tags (made of plywood or cardboard) hanging on a nail at the top corner of each cage. They could also be written on the cage with writing chalk.

Grasscutters

Identifying individual animals is important to keep track of breeding and growing performance, and of each animal's parental lineage to avoid inbreeding. The following identification methods can be used:

- Record visual characteristics, such as the animals' size, shape, coat colour and natural marks. This is practicable only on small farms.
- Paint a specific colour on the animal's fur. This is a temporal solution as hair is lost and the mark eventually disappears.
- Tattoo the animal. A code number can be pierced on the skin with a special iron, and then rubbed with a special ink. The imprint lasts a long time, but it can be difficult to read because of the grasscutter's thick fur.
- Notch the animal's ears. This involves making 'v'-shaped cuts in the animal's ears with a very sharp, thoroughly disinfected knife or pincer (see Figure 22). Location (left or right ear) and orientation (top, side or underside of the ear) of the notches indicate a numerical code; see Figure 23. Notching is an easy and cheap identification method; however the time involved in learning to decode the notching patterns is a disadvantage. Moreover, hairy ears may make the notches difficult to see; and fighting between the animals may destroy the markings.
- Attach ear-tags. Ear-tags are metal or plastic tags with a number or other information that are clipped to the ear. This is a useful method, although it is more expensive than notching. The same disadvantages apply: the tags are difficult to read quickly, and the grasscutters may destroy their ears in a fight. Figure 24 shows ear notches and a pincer used to apply them.

Note that grasscutters may be identified by a tag on their cage provided each animal has its own cage, the tag is always kept up to date and it moves with the animals when they are transferred.

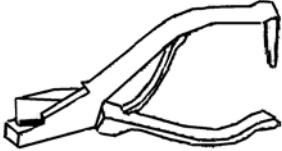


Figure 22: Pincer to make ear notches; they could be made with a sharp (disinfected) knife as well

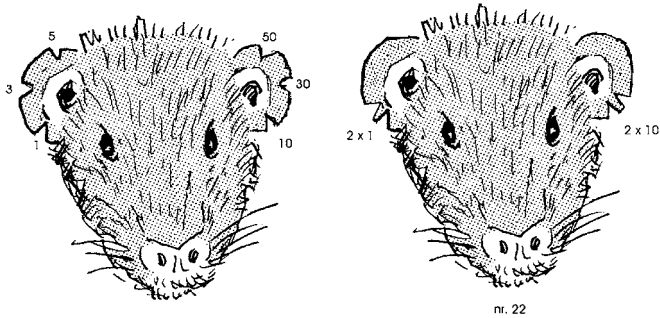


Figure 23: Grasscutter identification by ear notches: number 22 (right)

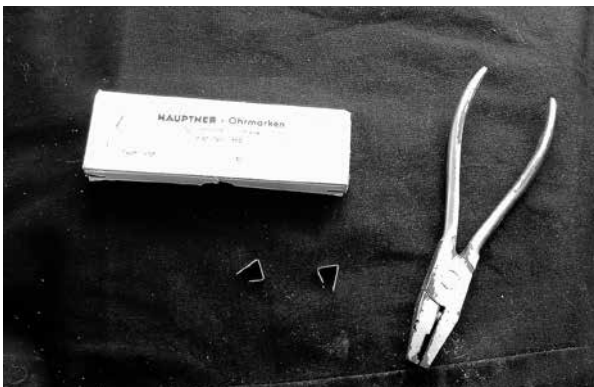


Figure 24: Grasscutter ear-tags and the pincer to apply them

Records

Stock records

Cards are a simple way to organise your grasscutter administration. Each animal has its own card with relevant information (identification number, sex, age, etc.). Cards are sorted into a box (e.g. one for each separate stable). Within each box they can be sorted by cage (or row of cages), sex, age, etc. by vertically placed sticker cards. The cards can be rearranged easily when animals are moved or sold.

Some experts recommend two types of record cards: breeders' records and weaners'/growers' records.

Breeder record cards

Breeder record cards are used for bucks and does that are kept for further breeding. They contain the following information:

- identification number (ID#)
- cage number in pencil, so it can be easily erased and replaced if the animal is moved
- sex
- origin: wild, own farm, other growers/ farms
- bucks: date(s) of mating + number and ID# of does mounted, remarks on mating behaviour (aggression, fighting), litter size (by sex) of each female mounted
- does: date(s) of mating + delivery date and litter size by sex, number and sex of young successfully weaned
- remarks

Note: data on mating behaviour and breeding performance are essential for selecting the best animals for further breeding.

Weaner/grower record cards

Weaner/grower record cards are used for young animals after weaning.

They contain the following information:

- identification number (ID#)

- ID# of parents
- date of weaning
- sex
- cage number (in pencil, see above)
- date of and reason for removal, e.g. dead, sold or kept as grower
- remarks

Samples of such record cards are shown at the end of this chapter. They can be modified to suit your wishes.

Operational records

Some booklets suggest that separate operational records be kept, for example of animal transfers on the farm (date, reasons, observations, etc.). Since this information should be registered on the animals' record cards a separate register seems unnecessary.

Financial records, cash book

A grasscutter farm cash book should be kept up to date to register:

- cash out for purchases (feed, equipment, concentrates, medicines, etc.), wages (including for the farmer's own work), land rent, interest payment on loans, etc.
- cash in from sales of live animals and/or meat

Calendar

Keeping an up-to-date, single page-per-month *calendar* is sometimes suggested to keep an overview of upcoming activities on the grasscutter farm. Such a calendar lists the expected/necessary events in the coming months, such as mating, kindling, weaning, vaccinations, etc.

This makes sense for fast-breeding animals kept in larger numbers, like rabbits (see Back-yard rabbit keeping in the tropics, Agrodok 20).

In view of the slower growth and longer pregnancy period of grasscutters, a single-page-per-month calendar seems less useful. All of the necessary information is on the animals' record cards. If a calendar-type overview of upcoming work is required or expected, 'farm events' like copulation, gestation and weaning might be registered on any ordinary household calendar.

8.4 Record-keeping for selection

The records on grasscutter growth and productivity are essential for drawing up a selection plan to identify your best future breeders.

For *does* the size and weight of the first litter at weaning is a selection criterion. If the litter is small and/or of low weight at weaning, the breeder doe should be replaced. Littering interval is an additional selection criterion for older does, besides litter size and litter weight at weaning. Keep does with good litter size and weight and short littering interval as breeders.

For *bucks* docility and weight gain from weaning to first mating are the main selection criteria. Docility is first tested when bucks are separated at the age of 4 months. If they fight or are difficult to handle they should be replaced. First mating at the age of 8 months is the next docility testing moment; bucks that fight with or wound the does brought to them for mating must be culled. The same applies to bucks that have failed to put on sufficient weight while growing to maturity. Keep the most docile and fastest-growing bucks as breeders.

Breeding males have to be replaced after a few copulation rounds with fresh bucks from outside to avoid inbreeding. Bucks bought from another farmer must be well-documented to make sure you do not bring in siblings of your own grasscutter stock!

Identification number (ID#)

Keeping track of the paternal lineage is essential in grasscutter keeping to prevent inbreeding. For that reason the ID# should carry information on the animal's parents. Since each male copulates with 4-6 females at a time the male lineage is especially important. For that reason it is recommended naming the animals according to their parental lineage.

Bucks might be named A, B, C, etc., does a, b, c, d, e and so on. The offspring of buck A with does a-d would then carry the ID#s Aa, Ab, Ac, Ad; the young of buck B would be Be, Bf, Bg and so on. The youngsters, if kept on for breeding, could have a simple number, e.g. Ab1, Bf3 etc.

In that way the farmer keeps track of the parental lineage and can easily avoid mating buck Ac2 with doe Ad4, etc.

8.5 Use and examples of records

With good records the farmer should know or be able to verify the following:

Farm

- expenditure on housing, forage/feed, labour
- diseases and periods of incidence
- productive output of the grasscutter farm as a whole

Animals

- copulation, delivery, weaning
- reproductive ability
- final weight

What to tell a new caretaker or technician in case of a change.

*Always keep in mind that **comparing the past with the present in order to improve the future** is the main objective of keeping accurate records!*

Examples of breeder cards (female and male) and weaner/grower cards are shown below.

Breeder card female		Stable no.:			Cage no.:		
ID#	Origin	Date mated	Male ID#	Date of parturition	Litter size by sex	Number successfully weaned, by sex	Remarks

Breeder card male		Stable no.:			Cage no.:		
ID#	Origin	Date mated	No. and ID of females mounted	Date of parturition	Litter size by sex	Number successfully weaned by sex	Remarks

Weaner/grower card			Stable no.:			Cage no.:	
ID#	Date of birth	Origin	Sex	Date removed	Reason	Remarks	

9 Slaughtering and processing

Note: slaughtering and the subsequent dressing and processing are needed only if your farming objective is to sell grasscutter meat in the market or to restaurants. The subject is of little interest if you plan to market mainly *live animals*.

9.1 Slaughtering and dressing

Slaughtering weight

Farm-grown grasscutters are usually slaughtered when they have attained a weight of 1.5-2 kg (does that have to be culled for some reason) or 3-3.5 kg (bucks). Daily growth rate of does slows down from the age of around 6 months when they have attained an average weight of around 1.5 kg. They attain their maximum weight of around 2 kg at approximately 10 months of age. The daily growth rate of bucks starts declining from around 10 months, when they weigh about 3 kg on average; at 12 months they have grown to around 3.5 kg.

Apart from your prime breeders it does not pay to keep grasscutters once their daily weight increase starts declining, because the return on their

feeding and tending costs will start declining as well. The only exception is if the market demands larger animals and is willing to pay for them!

Slaughtering

Slaughtering grasscutters resembles slaughtering rabbits, but grasscutters are usually heavier and stronger and therefore potentially more dangerous.

Preparation

Arrange (a) a clean working area, (b) a bucket with scalding hot water, or a fire, to skin the grasscutter or burn off its fur, (c) a bucket or bowl to catch blood, intestines, etc., and another one for the carcass, (d) a sharp knife and (e) a way to hang the grasscutter during slaughtering and cleaning, plus a string to hang the carcass.

Stunning

Stun or kill the grasscutter by a heavy blow to the head with a machete or club. Make sure the animal is thoroughly stunned (or dead) before proceeding, otherwise the next steps could be hazardous.

Killing

Hold the animal by its hind legs or hang it immediately if possible, and cut its throat and jugular veins with the knife. Allow it to bleed; eventually cut off its head to allow further bleeding. Press the bladder empty to prevent the urine from spoiling the meat.

Skinning

Skin the carcass with hot water or burn off the thick fur over a flame.

Dressing

Hang the grasscutter from its hind legs. Cut off its front paws. Cut open the abdomen starting from the navel, first moving up and then downwards. Be careful to avoid puncturing the stomach and intestines whose contents could spoil the meat. Carefully pull out the lungs, stomach, intestines and bladder. Then remove the edible organs: heart, liver and kidneys and keep

them separately. Finally cut off the animal's tail and the hind paws, leaving the clean carcass. The dressing out percentage (weight of carcass plus edible organs as a percentage of live weight) is around 64%. The tail is usually considered edible as well, so its weight should be included.

The meat is now ready for preparation, sale or preservation by drying, smoking or freezing.

9.2 Nutrient value of grasscutter meat

Bush-meat is an important protein source for African rural populations. In West Africa grasscutter, crested porcupine and giant rat are the most popular bush-meats. Their meat is lower in moisture content and higher in protein and essential minerals than beef, mutton or pork. Grasscutter bush-meat is fatter than the two other bush-meats and the three domestic ones. Whether this holds true for farm-grown grasscutter meat is uncertain.

10 Marketing

Grasscutter meat is highly appreciated, and around population centres the market is virtually unlimited. Bush-meat may restrict the profitability of grasscutter farming in rural areas.

Section 10.1 sets out the basics of marketing. Consult advisers or books for more information on the subject (e.g. Agrodok 26, *Marketing for small-scale producers*). Section 10.2 outlines the need for coordination and co-operation in grasscutter marketing, setting out strategies and procedures for achieving them.

10.1 Place, product, promotion and price

Four Ps have to be considered in successful marketing:

- Place – where to sell, where is your product in demand
- Product – what to sell and what quality
- Promotion – how to attract buyers
- Price – at what price to sell

Place

Grasscutter meat is in high demand as people know and like it. When starting a business it is advisable to focus on the local market where there are a

range of outlets, such as the village/town market(s), roadside stalls, restaurants and even wholesalers. Demand in the local market is a known factor. This is an advantage, as it enables farmers to prepare the right quantity of grasscutter meat for sale, avoiding the risk of unsold produce. You might prefer to run a roadside stall yourself, selling prepared grasscutter meat, smoked or in the form of tasty dishes. Of course you must adhere to the general and/or municipal regulations (by obtaining a permit, adhering to sanitary regulations, etc.) when starting and running a grasscutter kitchen. Once your local business runs well, you might explore more distant market outlets, starting in a nearby town and spreading out from there. Keep in mind that meat is a perishable product, so transportation entails risks of quality deterioration, spoiling and financial loss. (Of course this applies equally to long-distance transport of other perishables like fruit, vegetables, fish or chicken/ goat/ rabbit/ etc. meat). For that reason you should thoroughly explore the marketing potential before starting. Once you have decided to go ahead and start deliveries, meat quality maintenance is of the utmost importance. This may imply refrigeration or preservation by drying or smoking.

Product

There are three product options:

- selling grasscutter meat
- selling live animals, to be slaughtered by the buyer
- selling live animals as breeding stock

A combination of several product options is also possible.

When selling **meat**, quality is important, meaning that the product must be well processed, clean and fresh. There are national regulations for the trade in meat which you must adhere to.

Selling **live animals for slaughter** by the buyer might be an option for small farms or for members of a cooperative.

Selling **live grasscutters as breeding stock** to other farmers is a third product option that might provide you with a good living. Quality breeding stock results in healthy, well-selected and well-documented animals.

(Note: specialised farms that only raise chicks for sale to other farmers are well-known in the poultry sector.)

Promotion

Promotion means attracting clients. Finding buyers is probably not difficult at the local level. But you may be competing with other suppliers, for example in the case of supplying local restaurants; so you have to promote your product. Consider how to make a restaurant prefer your grasscutters to those from other suppliers. Apart from delivering a good-quality product, you have to look at the quality of your service, your communication with the client, etc.

Price

Price is determined by consumer demand and quantity of supply. The price will be known in a market where others sell grasscutter meat; however, an increased supply may lower it. If you find an outlet where supply is limited you may get a better price.

You can use price setting in your business strategy. When you are new in a market, you might consider lowering the price slightly to attract clients. Once you are known as a reliable supplier of quality meat you may raise prices gradually. You may offer a discount to regular clients to tie them to your business, e.g. a restaurant ordering a certain quantity periodically. Regular sales at a modest price might be preferable to irregular sales at a higher price. Finally: whatever your business strategy, make sure that important clients do not play off you against your fellow farmers by forcing you and them to sell a product below the cost of producing it. Cooperation is in this case preferable!

10.2 Getting organised

Grasscutter farmers are strongly advised to form or join farmer groups (associations or cooperatives). Groups have a stronger position than individual small farmers in price setting, negotiations with suppliers and buyers, and in dealing with the local authorities.

There is a solid demand for grasscutter meat in local and regional markets. To serve such markets well the grasscutter meat should be produced in commercial quantities and under good hygienic conditions. This is achieved best when individual farmers join forces in production groups, or if they set up or join a certified cooperative.

Organised producers need to follow a series of steps for certification:

- registration of the organisation (cooperative, business venture, etc.);
- setting up quality criteria (feeding, health, slaughtering and dressing, etc.);
- creating a common label;
- contacting potential markets with high demand for the products;
- building capacity to ensure uninterrupted supply.



Figure 25: Spiced grasscutter meat dish ready for sale

Supplying larger clients

The last point above is of paramount significance: large-scale consumers (wholesalers, larger restaurants, supermarkets) – whether local or overseas – are willing to sign contracts only if a steady and uninterrupted supply of good quality meat is assured. And remember that a signed contract is legally binding!

It is strongly recommended that farmers seek advice on building up a healthy, sustainable organisation.

The following aspects merit special attention when starting a new organisation:

- It should be democratic.
- It must have a capable and trustworthy leadership.
- Its members should feel involved.

(See, for example, Agrodok 38: *Starting a cooperative*)

11 Profitability of grasscutter farming

Reliable information on the profitability of grasscutter farming is hard to find. The first section of this chapter summarises *indicative data* derived from grasscutter publications on five selected subjects: initial investments, breeding data, labour requirements, grasscutter selling prices, and viable size of grasscutter farms.

Section 11.2 presents a grasscutter production profitability forecast from Ghana.

Prices in FCFA, naira or other currencies have been converted into euros (mid-2010 rate). Fluctuating exchange rates therefore contribute to the uncertainty of the cost and profit data presented. Would-be grasscutter farmers should thoroughly check local costs and prices before starting.

11.1 Profitability data in various reports

Investment in stables/cages/stock

All authors stress the importance of using local materials as much as practicable in constructing stable(s) and cages.

Widely different investment costs in construction are cited by various authors; ranging from 5 euros per animal housed (Gabon, 1999), through about 32 euros per animal (Nigeria, 2007) to more than 50 euros per animal (Ghana, 2006/2010; see section 11.2 below).

Quoted acquisition costs of the initial breeding stock range from about 24 euros to 48 euros per animal.

Data on breeding results

The number of pups successfully weaned and subsequently successfully raised to maturity *per breeding doe per year* is all-important in profitable grasscutter farming. Some grasscutter farming guides assume that a breeding doe is capable of littering twice a year and raising (at least) four pups to weaning age each time (see section 11.2).

Weaning data of more than 1900 grasscutter litters in experimental stations in Benin and Gabon showed the following results:

- Male – female sex ratio was roughly 1 – 1 at birth.
- The number of weaned young per breeding doe per year ranged from 6.8 down to 5.5. In private grasscutter farms in Gabon it was even lower. Mortality from weaning age to sexual maturity is not included in this data.

It should be possible to eventually increase doe productivity to a higher, more profitable level through continued breeder selection, good feeding and good farm management. However, this has not yet been achieved on ordinary, private grasscutter farms.

Labour requirements

Labour in grasscutter farming should not be underestimated. A BBC report on Ghana grasscutter farming states that tending each animal requires only 10 minutes a day. This may seem like a small effort for a farmer raising some animals for household consumption, but it compounds quickly to sizeable labour requirements on a semi-commercial farm. A grasscutter family of one buck plus four does would require 50 minutes of care per

day, or one man-hour, while a 10-family grasscutter farm would demand full-time labour.

The tending time per grasscutter per day cited above agrees well with the section 11.2 profitability forecast that calculates labour costs of 4 man-hours a day for a 20-animal farm. Obviously 'economies of scale' may reduce labour time per individual animal, but the conclusion remains the same: calculate your labour requirements before starting!

Grasscutter selling prices

Different sources mention grasscutters selling at around 5 euros per kg live weight. The average of 5 euros per kg live weight in urban centres drops to some 2 euros in rural areas, because of bush-meat competition. Reproductive animals sold as breeding stock fetched around 7 euros per kg live weight.

Viable size of grasscutter farms

A World Bank study conducted in Ghana, found that a grasscutter farm with 40 reproductive does was the most profitable system of animal exploitation, followed by poultry and rabbit farming. However, a farm of this size in Gabon, with average production performances as observed, would obtain a profitability threshold of 350-450 US\$/ year. This production level would therefore not be sufficient as a main source of income in Gabon. Other African authors agree that a grasscutter farm of 40 reproductive does is the most profitable scale of production, enabling the farmer to make a living if high standards of housing, feeding and management are maintained.

Feasibility reports on grasscutter farming ventures indicate that the long-term profitability is comparable to that of poultry farming. However, the relatively high costs of initial inputs (cages, breeding stock), slow returns and limited technical expertise have hampered the adoption of back-yard grasscutter farming by peri-urban households, as well as the development of large-scale commercial ventures.

Research by national extension services should develop cheaper methods of grasscutter production and facilitate the transfer of appropriate technologies to small-scale farmers.

11.2 Case study - profitability of grasscutter production in Ghana

(A contribution by Tegbe Enyonam Richmond, University of Ghana. Source: Guide for commercial grasscutter production. Prices have been updated to the 2010 level and converted into euros.)

The relatively high cost of initial investment in grasscutter production makes it quite difficult to make a profit in the first year of production. Its profitability is realised starting in the second year of production. The cost of constructing the main housing unit and the cages discourages most interested peasant farmers from venturing into the business. However, with proper management coupled with the availability of grasses all year round, the farmer can make up for the initial investment as well as make a modest profit by the end of the second year.

As a commercial venture, it is not profitable to employ a full-time worker to manage 20 grasscutters or below. If you have 20 animals or fewer, you could pay someone on an hourly basis, for instance a wage of 1.60 euros (US\$2) for 4 hours of work per day. With 40 animals and above it will be profitable to employ a full-time labourer.

(Note: a farmer tending his own animals saves wage payments, earning the money himself instead).

Table 2 below shows the estimated cost of establishing a simple grasscutter housing unit and stocking it with 20 grasscutters – 3 males and 17 females.

Table 3 shows expected output over five years.

The table below shows the estimated output over five years based on an average litter size of at least four surviving pups at weaning age. It is assumed that all output is sold either as breeding stock or for consumption. Only 20 grasscutters are kept for multiplication.

Table 2: Estimated costs for starting a grasscutter farm: 3 males and 17 females

Costs and benefits in euros			
Budget item	Quantity	Unit cost (€)	Amount (€)
Main housing unit	1	-	640
Cages (Three-tier cage**)	3	110	480
Breeding stock	20 (17 Females)	24	480
Feeding (labour in man- days)	92 (4hrs/day=\$2 = 1.6 euros)	1.60	147
Concentrate feeds (feeds other than grasses)	-	-	80
Veterinary care	-	-	80
Miscellaneous Expenses	-	-	80
Total (€)			1,987

* The cost of the housing unit and the cage will depend on the materials used. Use local materials available in your community to cut down cost.

** Each tier of the three-tier cage can be divided into four compartments, making 12 compartments in all.

Table 3 shows that the farmer can make enough money and thereby pay off his initial investment cost at the end of the second year of production. The venture is profitable if feed/grasses are available and easily accessible all year round, coupled with good breeding stock and good management.

Grasscutter rearing is profitable if:

- the housing unit is situated close to a permanent source of feed (grasses) at no cost to the farmer;
- good breeding stock is used with an average litter size of six, or at least four at weaning age;
- pups are weaned at six weeks after birth; two litters per doe per year are achieved, by using good breeding stock and careful selection;
- durable local materials are used in the construction of housing and cages;
- the grasscutter farm is well managed.

Table 3: Expected output per year over five years.

Year	No. of females	Output (Sales) (€)	Unit price (€)	Revenue (€)
1 (litter once=4 /doe)	17	68	24	1,632
2 (litter 2x)	17	136	24	3,264
3 (litter 2x)	17	136	24	3,264
4 (litter 2x)	17	136	24	3,264
5 (litter 2x)	17	136	24	3,264

This case is based on a farm unit keeping 20 grasscutters and selling the rest at the end of the year.

The author adds that a would-be grasscutter farmer is well advised to situate the farm near a source of free access to grasses and/or other forage. Consequently it is most economical to rear grasscutters in the village and sell them in the city.

Appendix 1 Growing elephant grass for grasscutter fodder

(adapted from *Agrodok 14 - Dairy cattle husbandry*)

Elephant grass (*Pennisetum purpureum*), also known as napier grass, is recommended as grasscutter forage because it:

- is high yielding; remains green during the dry season and withstands drought better than most grasses; is suitable for cutting.

Types

Types of elephant grass differ with respect to the presence or absence of hairs, differences in resistance to diseases and in stem thickness. Experience gained by grasscutter farmers in your area is the best indicator of which types are best as fodder for grasscutters.

Where it grows

Elephant grass requires high, well-distributed rainfall of at least 800 mm annually but preferably more. At altitudes above 2100 m, growth is slow because of low temperatures. It thrives best on deep fertile soils supplied well with manure, and prefers well-drained soils, but can grow on almost any soil. Without good nitrogen and potassium fertilisation (or, as an alternative, regular dressings of good compost), yield and persistence will decrease after 1-2 years.

Plant elephant grass in well-prepared, weed-free land at the beginning of the rains. It can be established from root splits, which is the more labour-intensive method, or from cuttings. Root splits from an uprooted plant without leaves establish rapidly if there is enough rain. For cultivation from cuttings, cut a well-matured cane into pieces with 3-4 nodes. The leafy top part should not be used. Cuttings can give good results, even if rains are irregular.

How to plant

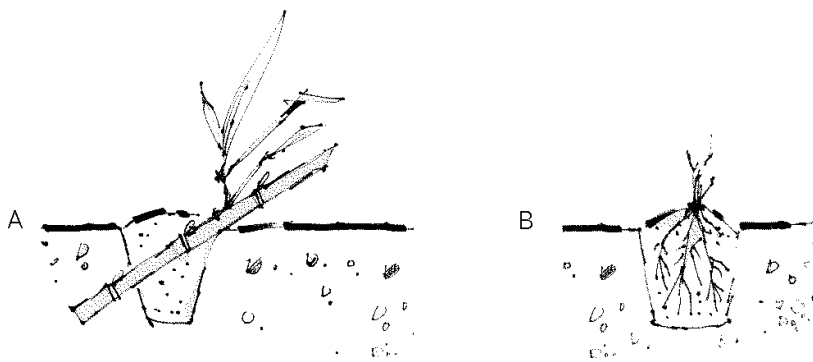


Figure 26: Elephant grass can be established from A: cane cuttings or B: root splits

Cuttings or splits have to be spaced properly. A row distance of 90 cm and a spacing of 60 cm within the row is commonly used in favourable areas. Row distance should be wider in drier areas.

How to achieve a high yield

Elephant grass grows well on fertile soils, but very poorly in fields full of weeds. Weeding during the dry season will control vigorous weeds like couch grass. Proper weeding combined with manure and fertiliser (or compost) application should be carried out after every cut.

It is important to return the grasscutter droppings with good compost to the grass to sustain high production. Dig small ditches in between the rows, put in manure and compost and cover with soil.

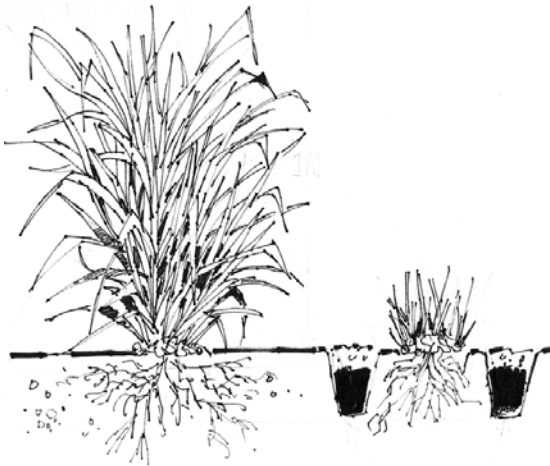


Figure 27: Apply fresh manure after every cut

To obtain high yields, the grass will also need additional fertiliser. How much and when depends on soil, climate, cutting management and the amount of manure. For example, in the case of adequate rainfall in two consecutive rainy seasons, 250 kg of NPK fertiliser (20-10-10) can be applied per ha, during the middle of the long rains and at the start of the short rains. In between the long and short rains, a top dressing with 50 kg of CAN (or 25 kg urea) per ha should be applied after each cut. Applying compost instead of artificial fertiliser is preferable in the long run, to prevent gradual deterioration of the soil structure and groundwater contamination.

When to cut

The optimal cutting interval in the rainy season is about 6-8 weeks at a height of 60-90 cm. Fodder quality of the grass declines if it grows to over 1.20 m.

Appendix 2 Preparation of concentrates for grasscutters

Formulation of concentrate

Some commercial grasscutter producers who cannot formulate their own concentrates buy concentrates meant for goat and sheep in pellet form from commercial feed producers. The composition below could be fed to grasscutters when prepared in pellet form.

Protein	%	14
Energy	Kcal	2520
Fibre	%	12
Calcium	%	1.5
Phosphorus	%	1.0
Lysine	%	0.6
Methionine and cystine	%	0.5
Trytoplanm	%	20

Source: GAFCO (Ghana Agro Food Complex), 2009

Farmers can also formulate their own concentrates locally by following the steps below.

- Acquire the following ingredients:

Ingredients	Quantity
Groundnut (roasted)	1 kg
Maize	10 kg
Wheat bran	15 kg
Oyster shell	2 kg
Salt	0.1 kg

- Grind and evenly mix all ingredients together.
- Add clean hot water as you mix until the whole mixture can form a ball. Roll the dough on a clean board into a pen-like shape and cut into pellets of about 3-5cm long.
- Preferably, bake the pellets in an oven immediately to prevent them from getting contaminated. You can also roast the pellets on a well-regulated fire to prevent them from burning to charcoal.

Do's and don'ts in the preparation and use of concentrate

Do's

- Use disease-free ingredients in preparing your concentrate.
- Concentrates should be placed in a feeding bowl that is solid and heavy in order to prevent the bowl from being gnawed or toppled.

Don'ts

- Concentrates should never be given in a powdered state in order to prevent respiratory diseases and feed wastage.
- Do not feed grasscutters only concentrates; they should be given as a supplement to grasses.
- Never feed your animals mouldy concentrates.

Further reading

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Useful addresses

BEDIM

Bureau for exchange and distribution of information on minilivestock.

Is a non-profit making international organization devoted to identification, processing and diffusion of information and data concerning animal species related to minilivestock and their products.

Faculté universitaire des Sciences agronomiques de Gembloux, Unité de Zootechnie

Passage des Déportés 2, B-5030 Gembloux, Belgique

W: www.bedim.org E: bedim@fsagx.ac.be

CERUT

Centre for the Environment and Rural Transformation. Cameroon. Seeks to provide practical solutions to local problems by applying participatory approaches involving all stakeholders and based on existing local, national and international policy frameworks.

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INRAB

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ILRI

The International Livestock Research Institute works with partners worldwide to enhance livestock pathways out of poverty, principally in sub-Saharan Africa and Asia. The products of these research partnerships help people in developing countries keep their farm animals alive and produc-

tive, increase and sustain their livestock and farm productivity, find profitable markets for their animal products, and reduce their risk to livestock-related diseases.

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CSIR

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Glossary

Abdomen:	Belly
Buck:	Male grasscutter
Cages:	Individual housing units that are situated inside a house or stable
Catcher, restrictor:	A small wire-mesh cage to hold a grasscutter for transport, inspection or treatment
Coccidiosis:	Intestinal parasites which occur quite frequently in grasscutters but cannot be seen without a microscope
Concentrates:	High-quality feed, like grains, tubers or mixed meals
Copulation:	Mating, the coming together of male and female
Coprophagy:	Eating droppings in general
Delivery:	Giving birth, another word for kidding, kindling
Doe:	Female grasscutter
Drenching:	Giving medicine to the animal by pouring it down its throat
Ecto-parasites:	Parasites like lice or ticks in the animal's fur
Feed:	Whatever animals eat, in the wild or in captivity
Fodder:	Green plants or plant residues eaten or used as feed
Forage:	Forage refers to feed which, in its green state, contains more water and fibre than digestible material. Grasses, legumes, leaves and crop residues may all serve as forage. Forage may be dried (hay) or otherwise conserved (e.g. by silage) for use in the dry season when green forage becomes scarce.
Gestation:	Pregnancy
Inbreeding:	The mating of close relatives (e.g. father and daughter, mother and son). Inbreeding may result

	in abnormalities such as reduced litter sizes, weak young, deformed animals.
Kidding, kindling:	Giving birth to young
Lactation:	Period during which the doe produces milk for her young
Litter:	All young born after one gestation, whether alive or dead
Palpation:	Examination to check for pregnancy or injury
Pup:	Young grasscutter (from birth to weaning)
Reproduction:	The ability of a male and female to produce young
Roughage:	Grass, leaves and other greens, as well as hay, straw and stover. (Note: according to the dictionary definition 'roughage' refers more specifically to the indigestible portion of plant foods/feeds that ease defecation.)
Scabies:	Mange, a small mite causing the skin to become flaky and crusty
Stable:	Building containing several or many cages
Stover:	Standing crop residues (e.g. bean stalks, straw, etc.) that can be used as fodder
Stress:	A condition in which the animal is pressured by negative factors. In this situation diseases can easily attack the animal.
Suckle:	Feeding the young with milk from the mother's tits
Trough:	Feeder or water container in the cage
Viscera:	Intestines, guts
Weaning:	Separating the young from their mother permanently; stopping them from drinking their mother's milk

The Agrodok series

The AGRODOK-SERIES is a series of low-priced, practical manuals on small-scale and sustainable agriculture in the tropics. AGRODOK booklets are available in English (E), French (F), Portuguese (P), Kiswahili (K) and Spanish (S). Agrodok publications can be ordered from AGROMISA or CTA.

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