**THE FEDERAL UNIVERSITY, KASHERE**

 **FACULTY OF AGRICULTURE**

 **DEPARTMENT OF ANIMAL SCIENCE**

ANS: 5213

Course Code: ANS 5213

Course Title: Micro livestock production

No of unit: Two

Course Duration: Two hours

Status: Compulsory

Prerequisite: Nil

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**Course description**

This course is very important for profitable Micro livestock production. This stems from the fact that a Good understanding and judicious use of knowledge acquired from this course would lead to huge increase in protein required and the demand.

**GRADING SYSTEM FOR THE COURSE**

This course will be graded as follows:

Class Attendance In form of random quizzes 10%

Assignments 10%

Test(s) 20%

Final Examination 60%

**TOTAL 100%**

***Attendance:*** It is expected that every student will be in class for lectures and also participate in all practical exercises. Attendance records will be in the form of random quizzes to determine each person’s qualification to sit for the final examination. In case of illness or other unavoidable cause of absence, the student must communicate as soon as possible with the instructors, indicating the reason for the absence.

***Academic Integrity:*** Violations of academic integrity, including dishonesty in assignments, Examinations or other academic performances are prohibited. You are not allowed to make Copies of another person’s work and submit it as your own; that is plagiarism. All cases of Academic dishonesty will be reported to the University Management for appropriate sanctions in Accordance with the guidelines for handling students’ misconduct as spelt out in the Students’ Handbook.

***Assignments and Group Work:*** Students are expected to submit assignments as scheduled. Failure to submit an assignment by certain student as at when due will earn such student zero for that assignment. Only under extenuating circumstances, for which a student has notified the instructor in advance, will late submission of assignments be permitted.

***Code of Conduct in Lecture Rooms:*** Students should turn off their cell phones during lectures. Students are prohibited from engaging in other activities (such as texting, watching videos, *etc*.) during lectures.

**Introduction**

The domestication and rearing of rabbits in Nigeria dates back to the colonial era when rabbits were introduced through missions and the agricultural service (FDLPCS, in 1991). Rabbit production is well established in Nigeria and rabbitries can be found in locations scattered throughout the country. The national Livestock Population estimates for rabbits indicate 1.4 million rabbits in the villages. 2,44409.00 in urban settlements and a total population of 1.7 million in the country.

 Rabbit keeping is an easy occupation to learn and adopt. The animals are quiet friendly and can be raised in the backyard or in an empty room. They also do not bite and therefore do not constitute health hazard to raisers. Children find rabbit raising a great fun. Rabbit rearing does not involve heavy capital outlay, therefore. With a little capital a pair of rabbits (male and female) can be bought and multiplied to supply meat for the family and also cash).

**Rabbit Productivity**

 The advantages offered by the rabbit in comparison with other livestock species for alleviating animal protein shortages. Make it a potential animal for development in the country. The high rate of reproduction of the rabbit its short generation interval, easy eating habit and low initial capital outlay requirement makes it amenable to small or large scale production. The caress production capacity per doe/year is 25 to 35 times the doe’s weight (Scholaut, 1985).

 The rabbit has the potential of producing between 50-120 kits/doe/years depending on the production system used with a replacement rate of 25% and age at mating of 5-6 months. It is possible for a farmer generate even more rabbits for sale in a year from a pair of rabbits.

**Breeds**

Several breeds of rabbits exist in the country. The more dominant among these are the New Zealand White , California, Chinchilla and Dutch. These breads are medium size rabbits weighing 2.5-3.5kg adult weight.

1. **New Zealand White:** These have mainly white coat color in the pure state.
2. **California:** These have white coat and black color in the extreme such as the nose, toes and tail.
3. **Chinchilla:** These have black or grey coat color.
4. **Dutch:** The rabbits have two colour coats made up of either black or brown with a white belt around the shoulder region.

**Housing**

 Rabbit houses should be simple, well ventilated and easy to manage. The house must protect rabbits against rain, excessive sunshine and predators such as rats, cats, snakes, dogs and ants. The house could be made with cheap available materials such as bamboo, mud or hard wood. Rabbits love to gnaw and chew; they can therefore quickly eat their way out of hutches made of soft wood. It is important to construct suitable houses for rabbits as this makes for easier management and better production. The standard of housing determines the level of production in a rabbitry and how successful the venture would be. Rabbits kept in comfortable, well ventilated and easy to clean houses are usually healthier and more productive than those kept in poorly constructed houses. Well-constructed rabbit houses will also protect both the kittens and the adults from predators.

**Site for Building**

 The building should be located on well-drained soil. The land should be level or sloppy and in area well protected from strong wings. The land could also have some tree cover to serve as wind brakes and for temperature regulation.

**The Building**

 The building should be well ventilated to prevent dampness. The floor should be well compacted and preferable made with concrete for durability, easy cleaning and disinfection. The house should have a good drainage system (gutters) inside and outside, to allow for proper evacuation of effluent from the rabbitry. The floor should slope gently towards one end of the building for easy drainage. The house could have a store for storing equipments that are not in use in the rabbitry. The size of the building would depend on the type of cages to be used as well as the number of rabbits to be raised. The building can be partitioned into sections when the rabbits are to be raised on the floor for ease of management.

**Types of Houses**

 There are several types of housing available for rabbit raisers. They may be categorized into the following:

1. Completely walled house
2. Open-side house
3. Shed
4. Cages/hutches
5. Underground house/hutch

**Completely Walled House**

 This is built walls that extend to the roof. The materials used could be cement blocks, clay, wood or zinc sheet etc. the windows are usually large and placed opposite each other on sides of the house for proper ventilation. The windows could be covered with poultry wire mesh or mosquito netting.

**Open-side House**

 This house is made up of low walls constructed with clay, cement blocks, or wood. The wall is usually about 1-2m in height. The rest of the wall to the roof is covered with wire mesh. The house should however be strong enough to protect the rabbits from rainstorms, sun, predators and thieves.

**Shed**

 This is made of pillars of either wood or iron rods and roofed with corrugated zinc sheets, palm frond, or grass thatch. The shed should provide adequate protection for the rabbits from rainstorms, sun, wind etc. a cover for the sides of the shed could be provide with grass or mats during harsh weather conditions.

**Cages or Hutches**

 The construction of rabbit cages determined by the type of house, production method and number of rabbits to be raised. There are basically two types of cages depending on where they are kept. These are indoor and outdoor cages.

1. **Indoor Cages:** Indoor cages be constructed with wood, wire mesh, bamboo etc. these cages are normally simple, the cages may be of a single tier or have double tiers. The legs should be about 50-100cm above the ground. With doors at the middle of the front of the cage for easy access to rabbits, ease of cleaning, feeding and handling of rabbits. They could be made of wood and wire mesh or entirely of metal. The cage should provide adequate ventilation for the rabbits. Cage dimension of 100cm by 60cm by 50cm or 12cm by 60cm by 50cm are adequate for raising rabbits.
2. **Outdoor Cages:** By virtue of the fact that outdoor hutches are kept outside the house, it is important that they are constructed not only to meet the space requirement of the rabbits, but also to ease management and protect rabbits from predators and the weather (sun, rain cold etc). Outdoor rabbit hutches should be made with durable materials such are hard wood, bamboo and combinations of these and wire mesh. The hutch should be roofed either with slated bamboo, wood, and thatch or zinc sheets. The roof should slope to one end to allow for proper drainage. Father using wire mesh for the front or boring small ventilation holes into the solid materials should provide proper ventilation. The length of the legs from the ground should be about 1m high and rat guards should be installed about 50cm above the ground. Where there is a high incidence of soldier ants. A water trench should be made around the legs of the hutch. The length hutch should be 100-300cm or more depending on the number of rabbits to be kept. The hutch could be divided into individual cages or colony cages. The hutch should be provided with a sturdy padlock and the area fenced to deter thieves.

**Underground hutches**

 Rabbits by virtue of the natural habitat live in holes dug in the ground. The provision of underground hutches is therefore very adaptable to rabbit farming. He underground hutch could be made inside the house, in which case, it is a hole dug into the floor of the house and cemented with a concrete slat for cover and an opening for the rabbits too go in or out. The hutch can be inspected from time to time by moving the concrete slat.

 The underground hutch could also be made outside the house digging trenches in the ground, which are cemented and openings made at intervals for ease of management and harvesting. The openings could be concrete slat or metal sheets; the area is then enclosed with a wall for security. The advantage of this method is that the rabbits might burrow out of the area through the fence and management of the rabbits is very tedious and difficult. It is important to supply bedding materials such as straw, wood shaving s in the hitch to absorb the urine and this should be removed from time to time and replaced with fresh materials. Feed and water are usually provided outside such underground hutches.

**Cage Dimensions for Rabbits:**

 Cage dimensions that have been found to be useful for raising rabbits under tropical conditions are shown in table 1.

Table 1: Cage dimensions for various groups of rabbits.

 Measurements (cm)

|  |  |  |  |
| --- | --- | --- | --- |
| Groups of Rabbit | Length | Width | Height |
| Breeding doe with inner nesting box | 120 | 60 | 50 |
| Breeding doe with outer nesting box | 100 | 50 | 50 |
| Adult buck or doe | 100 | 50 | 50 |
| Weaners (colony)  | 100-120 | 50-60 | 50 |

**Stock Acquisition**

 For the project to be viable good rabbit stock should be carefully selected and purchased. Stock with proper pedigree records should be obtained from reputable establishments. Criteria for selecting male and female rabbit vary.

1. **Selection of Male Rabbits:**
2. Males with high libido and aggressiveness who attempt to mount females on introduction should be selected.
3. Fast growth rate
4. Large well formed testis.
5. Two descended testis and fertile.
6. **Selection Criteria of Female Rabbits**
7. Females from large litter size should be selected.
8. Females with 8-10 normal teats.
9. Fast growing rate.
10. High mothering ability

**Flock Classification**

 There are various types of rabbit’s flocks in rabbitry based on their physiological state. Flock classification is done based on whether they are young (kits/weaners). Growing (frayers), pregnant, lactating not pregnant (open) does or adult bucks. These groups of rabbits require different management or handling procedures. Their requirements for feed and water are also different.

**Feeding**

 There are three system of feeding rabbits namely:-

1. **Extensive System:** - These involve total dependence on forages and kitchens wastes. The advantages of this system are: (a) it is cheap and (b) forages are available. The disadvantages include (a) high labor requirement to obtain forages. (b) The disease and the health problems from improper handling of feed (c) forage availability vary with season and (d) rabbits grow slowly.
2. **Semi-intensive System: -** This is the use of forages supplemented with concentrate feeds. The concentrate is usually fed in the morning and forages in the evening. Advantages include- (a) it is cheap because of forages used. (b) Ensures availability of feed throughout the year and (c) inclusion of concentrates makes for better performance. The disadvantages include: (a) high cost of concentrates (b) uncertainly of nutrient quality of the concentrate and (c) high labor input.
3. **Intensive System: -** This involves total dependence on concentrate diet. Advantages are: (a) requires little time for feeding (b) ensures higher level of production and (c) reduces risk of disease being brought in with the feed. Disadvantages include: - (a) it is very expensive (b) depends on supply of feed which is not always available and (c) risk of diarrhea is high.

The semi-intensive is more suitable for rabbit feeding because it makes good use of concentrate and forages therefore meets the nutrient requirement of rabbits. Concentrates used for rabbits include broiler starter chick mash, grower mash and rabbit meal or pellets. Forages fed to rabbits include *stylosanthes spp; centrocema spp; tridax procumbens.* Groundnut haulms. *Lablab spp,* carrot tops, potato vines, pawpaw leaves etc. other feedstuffs include maize offal, sorghum offal, yam peels, potato peels and other kitchen wastes.

**Management of the Rabbitry**

 Rabbit management is a total package, which includes all husbandry practices performed on the rabbits and their environment. This helps to create a comfortable habitat for the rabbits to grow and reproduce. Management involves routine and general practices in the rabbitry (environment) handling and care of the rabbits and feeding.

 Management of the rabbitry involves practices aimed at making the environment conducive for rabbits while it separates the rabbits from disease organisms. This helps to keep the animals healthy. This falls into two categories.

1. Daily or routine management practices
2. Occasional management practices

**Daily Management Practices**

These are management practices to carry out on daily basis in the rabbitry, these included:-

1. Sweeping of the house, cages and outside the house.
2. Washing drinkers thoroughly with or without detergent and sponge.
3. Supplying enough feed in feeders to last the day. If feed is dusty, it should be moistened slightly with water. Rabbits usually contaminate feed that has stayed overnight with faces of urine. The would also not eat stale feeds.
4. Supplying clean water in the drinkers. Ensuring that the rabbits have enough water to last the day.
5. Checking rabbits for sign of ill health (dullness and crouching in one place) and mortalities.
6. Supply wilted forage or hay to rabbits in the afternoon about 3.30pm cut fresh forage in the morning but supply in afternoon when the leaves would have wilted. This is to prevent diarrhea through feeding of freshly cut forages.

**Management Practices that Come Occasionally**

 These are generally practices carried out from time to time (weekly, bi-weekly, and monthly) in the rabbitry. These include:

1. Cleaning out all cobwebs from the house and cages.
2. Sweeping the house and removal of feeding materials from the house every months or when wet.
3. Scrapping out all dirt and faces from the house. Nesting boxes, feeders and drinkers.
4. Washing and disinfecting the house, cages, nesting boxes, feeders, drinkers etc. with a detergent and disinfectant such as Izal or Dettol and drying in the sun. This allows for further sanitation as the ultraviolet rays of the sun also aids in killing disease organisms a cheap way of disinfecting equipment.
5. Weighing the growing rabbits at weekly or monthly interval for those who keep good records. Record keeping is however, every important and this should include records of feeds offered, maturity and medications administrated.

**Management of the Bucks and Opens Does**

 Adult bucks and does should be fed restricted quantity of feeds to prevent them from growing fat. Excess fat lowers the reproductive performance of bucks and does. It also reduces their ability to withstand heat stress under tropical environment especially during the hot season.

1. About 100g concentrate diet should be fed to the bucks and does daily.
2. Clean water should be provided in clean drinkers daily.
3. Freshly cut but wilted forage or hay should be provided in the afternoon and evening to meet their fiber and vitamin requirements.
4. Adult bucks should be kept in individual cages and not allowed to run with the group as the dominant bucks will fight and injure the others. Isolation of bucks also prevents indiscriminate breeding.

**Management of Pregnant Does:**

 Pregnancy for rabbits for 30-32 days, therefore, the does should be well fed and protect from noise, predators (cats and dogs) that may cause stress to the does.

1. Stress in pregnant does could cause fetal resorption and embryo mortality resulting in stillbirths. Protect does from loud noise.
2. Provide the does with clean water enough to last for the whole day and in excess to avoid cannibalism (doe eating the young) after kindling.
3. Make sure that the drinkers are washed before supplying water as rabbits will drink very little or not at all from a dirty drinker.
4. Provide adequate feed for the does, it is recommended to provide 100g of concentrate feed in early pregnancy. This amount of concentrate feed should be increased to 150g during late pregnancy. Also provide good quality forage.
5. Dry disinfected nesting boxes should be placed in the cage or house at about the 24th day of pregnancy. This would enable the does to get accustomed to the nesting box and prepare it for kindling. This practice reduces mortality due to the incidence of does kindling on the floor.
6. Place clean litter material or cotton wool in the nesting box to keep the kits dry and warm especially if the dies did not remove her hair in the nesting box.
7. The does should be allowed t kindle in peace without any disturbance, normally, little assistance is required from the attendant during kindling.

**Management of Lactating Does and their Litter**

 The first 2-3 weeks after kindling is critical for the doe because of the demand for milk production. The doe will nurse her kits for 4 to 6 weeks.

1. Lactating does should ideally be kept in individual cages for ease of identification and to reduce kit mortality as a result of trampling by other does in fright.
2. Lactating does should be provided enough water for the day and in excess for milk production varies during lactation with peak production at 3 weeks into the lactation period. It is therefore very critical to give enough water at this stage.
3. The doe and kits should be protected from predators (cats, rats, dogs, snake) and noise to prevent cannibalism of the young by the doe.
4. Enough concentrate feed should be provided daily, it is recommended that 150g for the dam plus 25g per kit up to a maximum of 8 kits (350g concentrate) and good quality forage or hay be provided for the lactating does.
5. Clean the cage or hutch regularly.
6. Check the kits daily and remove stillbirths and dead kits promptly to prevent the spread of infection. NOTE land gloves or fresh polythene bags should be used when removing stillbirths or dead kits and when handling other live kits until they grow their hair as the doe might reject the kits and also cannibalize them.
7. Place the kits in the nesting box if the doe kindled on the floor of the cage/hutch. Use a hand glove or polythene bag.
8. Keep the kits together in cold weather. This would help them keep warm in the centre of the nesting box.
9. Where the doe refuses to feed the young. She should be restrained in the nesting box in the morning for about four to five minutes daily to allow the kits to suckle.
10. The nesting box should be deep enough to prevent the kits from leaving the nest too early. Place them back in the nest if they leave.
11. A doe that is poor milk producer even with good nutrient (i.e. produces low litter weights) should be called and her offspring’s should not be used as replacement stock.

**Management of Weaned/grower Rabbits**

 In rabbit production, kits are usually weaned between 4 and 8 weeks. During weaning the doe is taken out as a cage to another cage to reduce stress on the kits.

1. Weaned kits required attention as they are yet to fully acquired their own immunity and therefore easily succumb to disease such as enteritis diarrhea.
2. Weaned kits should be protected from predators such as cats, rats, dogs and snakes.
3. Growing rabbits should properly fed with concentrate and forages. They can be fed rabbit pellets, broiler mash. They will require about 50-70g concentrate meal daily.
4. Ample supply of clean water should be provided for the grower rabbits daily.
5. Check growing rabbits daily for signs of ill health special diarrhea, ear canker and skin mange.
6. Wash the cages regularly and disinfect to keep the rabbits healthy.
7. At about 12-16 weeks, separate the males from the females if not done at weaned.
8. Do not keep males together as they would fight and injured is over. They should be kept separated in individual cages.

**Husbandry Skills**

 Husbandry skills required in rabbit management include: -

1. **Mating:** rabbit should be mated when they are about 5-6 months old for small to medium breeds (New Zealand White, California, Dutch, Crosses) and 7 months for heavy breeds (Flemish giant). The doe should be introduced to the buck in his cages for mating. If done the other way around, the does may attack the buck and cause injury to him or the buck would spend most of the time exploiting the cage instead of mating.
2. **Weaning:**  this is done when the kits are 4-8 weeks old. The kits are transferred to a colony cage where they are raised. The best method of weaning however is to transfer the doe and her kits to the colony cage before removing the doe after some days or simply remove the doe from the kits gradually over a period of time. This reduces stress on the kits and their chance of survival is greater. It is also important to administer an ant diarrhea drug such as Ivax veterinary at this time to reduce kit mortality.
3. **Fostering:** This is done when a doe kindles more kits than she had teats to nurse. Or when a doe after kindling leaving her kits live. The kits are then transferred to another doe with kits of similar age. Transfer of kits is normally to a doe with small litter and about 2-3kits is added to her litter. The kits should be added when the doe is not in the cage. This is achieved by removing the doe from the cage for one to two hours. The kits to be fostered should be rubbed with the litter of the foster doe or litter material in the cage to imbibe her smell. This reduced the risk of refusal by the doe.

**Health Management**

 Rabbits should be checked routinely for diseases or unthriftness. It is important provide a relaxed environment for rabbits.

1. Check rabbits routinely for enteritis, ear canker, skin mange and sore hock.
2. Check daily for signs of illness such as diarrhea, dullness, eating or not eating etc.
3. Develop rapport with the rabbits to reduce stress as a result of farm operations.
4. Give antis tress drugs such as vitalyte or vitamin c from time to time.
5. Deworm rabbits from time to time.
6. Wash and disinfect house and/or cages routinely to reduce ammonia build-up.
7. Sun equipment after washing to disinfect.
8. Remove bedding materials regularly.

**Common Disease**

 Rabbits are susceptible to certain diseases. Diseases result from attack by parasitic agents or poor surroundings. Common diseases of rabbits include coccidiosis, ectoparasitism and enteritis.

**Coccidiosis:** This is the most common internal parasitic disease of rabbits. Young rabbits are most susceptible to the disease after weaning. It develops quickly and is characterized by high mortalities. In older rabbits, the condition may be chronic resulting in dullness, poor growth and death. The common symptom shown is generally diarrhea leading to dehydration and/or sudden death. It is controlled by the use of coccidiostats in water or feed.

**Ectoparasitism:** This is caused by external parasites called mites. When the mites infect the ear (ear canker), they form crusty scab which causes a lot of discomfort to the rabbit. When the mites infect the skin (skin mange), crusty scabs from there is loss of hair and unthriftiness resulting in poor growths. This condition is controlled by the use of acaricide, palm oil.

**Enteritis:** This is generally manifested by mucoid diarrhea or watery stool, it results in dehydration of rabbits. Death rate is high for all categories of rabbits. It usually is a symptom which indicates a problem. It is controlled by a proper weaning of kits and addition of adequate forage in the diet.

**Processing and Marketing**

 Rabbits are sold for meat or breeding. Rabbits are slaughtered for meat from 16 to 24 weeks old in the tropics. In temperature regions however, rabbits are sold as fryers at 8 weeks old. Rabbits for breeding are sold as weaners, growers or adults. The unit price of each category varies.

**Slaughter:** Rabbits are slaughtered either by neck dislocation before bleeding (cutting the neck with knife to remove the blood) or hitting the back of the head with a club before bleeding.

**Processing:**

1. Skinning: The skin is removed from the carcass after slaughter. This reduces carcass yield (55-60%).
2. Burning: The hair is bunt off with fire leaving the skin on the carcass. This increases carcass yield (70-80%).
3. Scalding: This involves scrapping off the hair using hot water and knife or razor blade. This also increases carcass yield (70-80%).

**Carcass Yield:**

1. Carcass yield varies with the breed of rabbit. The larger the breed the higher the yield.
2. Carcass yield increases with age of the rabbits.
3. Fast growing rabbits have higher yield than slow growing rabbits.
4. Rabbits fed balanced diets have higher yield than those haphazardly.
5. Too much roughage in the diet lowers yield by overdeveloping the digestive tract at the expense of the muscles.

**Meat:**

1. Rabbit meat is clean delicious, tender and low in fat. The meat is rich in protein and certain minerals and vitamins.

Table 2. Carcass quality of rabbit, chicken and beef

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Rabbits** | **Chicken** | **Beef** |
| Protein (g) | 21.0 | 19.5 | 20.0 |
| Fat (g) | 8.0 | 12.0 | 12.0 |
| Calcium (mg) | 20.0 | 10.0 | 12.0 |
| Phosphorus (mg) | 350.0 | 240.0 | 195.0 |
| Nicotine acid (mg) | 13.0 | 8.0 | 5.0 |
| Vitamin B1 (mg) | 0.10 | 0.05 | 0.10 |

1. Fat in rabbits contain less stearic and oleic acid and higher proportion of essential polyunsaturated linolenic and linolcic fatty acids. The proportion of oleic acid in the fat increases while palmitic acid decreases with age.
2. Rabbit meat is comparable in flavor to chicken; meat tenderness varies with muscle age while the flavor increases with age.
3. Rabbit meat is good for convalescing patient or low fat diet people.
4. Rabbit carcass is roasted and sold as dried meat or bush meat. It could also be cut into parts and sold.

**Skin:**

1. Rabbit skin can be tanned into leather for shoes, bags, belts of decorations.
2. The skin is also used for making stuffed toys.
3. Used for making glue and fertilizer.
4. Used by textile industry for making hats and coats.

**Intestines:** Rabbit intestines are used in the food industry for stuffing sausages.

**Droppings:** Rabbit droppings could be sold as manure to crop farmers. Droppings that are mixed with feed and forage orts could be sold to cattle rearers for feed.

**Conclusion**

 Rabbit rearing is a combined manipulation of factors that affect the animal such as the environmental factors, nutrition, reproduction etc that makes life easy for the rabbit raiser and the rabbits themselves. It is important that the rabbitry be kept clean at all times. The rabbit attendant should familiarize himself with the rabbits by talking to them while he works. This reduces a lot of stress as rabbits respond very well to this kind of treatment.

Production and management of Grass cutter:

**Production and management of Grasscutter**

**Grasscutter** (*thryonomys swinderianus*) is a micro livestock and it is recently introduced into animal husbandry, Grasscutter is adaptable to most tropical vegetations. It is found in the mangroves, swamps, rainforest and derived Guinea Savanna, grasscutter loves to dwell in farmland, sugarcane plantation, oil palm plantations and the creeks. Grasscutter is classified as manogastric herbivore; also known as cutting grass or cane rat (Oya in Yoruba, gafia or gouza, or guahia in Hausa, Nichi in Igbo). They are harmless animals of fleeing in danger. They live in groups they do not burrow but can use holes dug by other animals. Grasscutter in the wild is more active at night. Grasscutter is acceptable to most people. A large proportion of the grasscutters consumed are hunted in the wild.

**Description of Grass Cutter**

 Grass cutter is a heavy animal species, although small in size. It is animal covered with coarse bristly fur. The upper fur is brown while the under is light brown and that of belly is white, the body length is between 20 and 75cm. the adult body length is 60 to 75cm while that of day old is 20-25cm. the tail easily fractures and breaks loose if not properly held at the base. The average dressing percentage of grass cutter is 68%, the edible meat in grass cutter is about 80% (including the heal and entrails which are usually eaten). Like rabbit the grass cutter is coprophagus that is eats its soft faeces directly from the anus.

**Housing for Grasscutter:**

 Housing is very important for production and management of grasscutter the types, size and quality of housing are important factors, the housing consist of roofed building containing wood with wire hutches. The housing must be well illuminated and properly aerated. The housing must be installed with feed trough, drinker, holding cages and transfer cages. For family cages, the dimension should be 1.6 m x 0.6 m x 0.45 m in length, breath and height. For individual grasscutter the dimension should be 0.5 m length, 0.5 m width and 0.4 m height, for holding cages, the dimension should be 12-14 cm length x 12-14 cm width and 34-38 cm height. In the transfer cages, the dimension is 80 cm (length) x 40 cm (width) x 30 m (height). In constructing a typical housing for grasscutter, an apartment should be created with a small opening of 20 cm x 20 cm in order to permit grasscutter to move from one apartment to the other. Parent animal i.e. (doe) and (buck) with four offspring can also be kept in one hutch. Generally grasscutter of the sex and about the same age can be reared together in the house.

**Feeding Grasscutter:**

 The young grasscutter feed on milk from the doe until six weeks when it is weaned. The young grasscutter however, shortly before weaning, nibbles at the feed given to adult grasscutter. Unlike in rabbit where the young ones are born blind, the young of the grasscutter is born with eyes open.

**Feedstuff and Feeding of Grasscutter:**

 Important forages eaten by grasscutter are elephant grass ( *Pennisetum spp).* Guinea grass (*Panicum maxmum*) sugarcane (*Sacharum spp),* giant star grass (*Cynodon spp*), Gamba grass (*Andropogan gayanus),* blue stem, (*Andropogan tectorum),* maize stem (*Zea, mays*) wild rice (*Orzya brevigulata*) etc, the few crops that are consumed by grasscutter include cassava root, maize grain, Guinea corn, millet and rice. Grasscutter can be fed with supplement including growers mash, concentrate pellet and salt lick. Grasscutter can be fed twice or thrice per day. Clean and cool water must be provided always. Mouldy feed must be avoided.

**Breeding of Grasscutter**

 Breeding of grasscutter should be based on the following considerations:-

1. Grasscutter for stocking and the subsequent replacements should be docile, healthy and well developed.
2. Breeding stock should not be directly from the wild but must be from a reputable and well established grasscutter farm.
3. The live weight records of the grasscutter to be used for breeding should be between 5 and 8 kilograms.
4. The production records of the mother including mean litter size mean weaning weight and mean generation intervals should be considered.

**Mating Methods in Grasscutter:**

1. Female grasscutter should be mated at 6 months old while male should not be less than 8 months old.
2. Females should be taken to the male hutch for mating (pen mating).

**Sign of Pregnancy in Grasscutter:**

 Gestation period in grasscutter is 152 days, after three months, the pregnancy will became visible because the abdomen will bulge out when she lies down the teats will be longer and bigger than in the non-pregnant female. When palpated, one would feel the presence of developing embryos. Pregnant grasscutter urinates frequently and sometimes there is increase in the body temperature.

**Parturition in Grasscutter:**

 About one week to parturition, the female grasscutter will look nervous and restless. Also, her movements within the hutch will be slow and her hair coat will be stand erect. The offspring are born with eyes opened and well developed teeth. At birth male grasscutter is always bigger than female. The litter size always voids between 1 and 11 with are average of 5 per litter.

**Disease of Grasscutter:**

1. **Enterotoxaemia:** This is caused by bacterium *Clostridium perfringens*. The sign of the disease is the paralysis and pedaling of the hind legs. Prevention is by clean environment and vaccination.
2. **Staphylococeamia:** This disease is caused by a bacterium-*Staphylococcus aureus*. The signs of the disease are discharges from the nostrils and vigina.
3. **Coccidiosis:** It is caused by protozoa of *Emirian* family signs include diarrhea, loss of appetite, weakness and isolated.

**Parasites in Grasscutter:**

 Worm infestation come from the feeding of wet contaminated grass and foliage of sugarcane. This can be prevented by avoiding feeding wet forage and by allowing forage to wild. Regular doworming should be carried out to get rid of the worms. Ticks, lice and fleas are common ectoparasites of grasscutter. Dipping and giving dewormers are common practices of removing the parasites.

**Useful hints for rearing of grasscutter:**

 Adult and young males should not be kept together in order to avoid fight for superiority. Two mature should not be kept in same compartment to prevent fighting, overcrowding should be avoided to prevent fighting for space and feed. For easy handling, grasscutter should be held by the middle of the tail and then lifted up gradually. Keep the grasscutter dry not being moved frequently from cage to cage? Cages must be far away from bushing environment to prevent snakes and other pests. The cages must be thoroughly cleaned on regular basis.

**Snail production and management**

 Snail is classified as monogastric but it’s generally known as macro livestock. Snail is nocturnal animal being active in the night or in the dark at day time. It is usually found in cool secluded areas.

**The Significance role of snail production**

 Snail production and management is not capital intensive. At present snail rearing contributes little to environment pollution when compared with other livestock species. Snail is noiseless and the meat has good biological value. The feeds and feedstuffs are locally available and cheap to obtain.

**Breed of snail**

 The common breeds are:

1. **Archachatina:** This is African giant land snail. As the name implies, it is the larger of all snails in nigeria. The shell has no define coloration and it is wider at the posterior end compared to others. The mortality is very low and old mature adult can grown to the size of 600-800g. The snails lay between 4 and 6 eggs per clutch.
2. **Achitina achitina:** This breed of snail is common in Ghana, in some parts of Nigeria. The mortality rate of the breed is higher than Archachatina marginata. It thrives well in humid environments and the shell is broadly ovate at the posterior end. Old nature Achatina achatina grows to 600g size. The snails lay between 150 and 450 eggs per clutch. The foot is dark with white patches.
3. **Achatina fulica:** This breed of snail is of smaller size, mature adult weight between 20 and 35g. The fleshy part could be whitish or dark-brown. It lays 10-15 eggs per clutch. The economic value of snail is low when compared to Archatina marginata, Achatina achatina.
4. **Limicolaria ssp:** It is the smallest species in comparison to other edible laid snails, it lay between 25-35egg per clutch. The breed thrives well in humid rain forest areas.

**Housing for snail production**

 Housing for snail must be characterized with well ventilate, well specious, affordability, durability and protection from inclement weather, predator and insect attack. The housing types include the use of abounded vehicle tyre, plastic or metal drum, basket, cage, fenced pen etc.

 The housing for snail should be filled with appropriate soil. However, snail can also do well in a house without soil. Snails thrive well in a medium to light soil. Clayed and sandy soil should not be used as breeding in the snailery. Sandy loamy or garden soil is recommended since they are rich in organic matter content and easy for the snails to burrow.

**Selection of snail for foundation stock:**

 The fleshy part which is the foot should fill its shell completely. The foot must not be dry but slimly with salvation on the surface. Snail with nodules or patches on the surface of the foot must not be selected. The snail with intact shell should be stocked. Snails must not be exposed for sun when transported and should be kept in a cool container.

**Feeds and Feeding of Snail:**

 Snail, feed mainly in the night, at dusk or by day when there is rain or if there is dark cloud. Snail consume small amount of feed when compared to other farm animals. Since snail is active at night feed should be supplied fresh in the evening between 6:30 to 7:30. Snail eats when the relative humidity is 85%. Young hatchings readily accept succulent leaves such as pawpaw and cocoyam that fruits and tubers generally, snail feed more on a high moisture content diet.

**Breeding and reproduction in snail:**

 Snail is hermaphrodite but there must be cross-fertilization between two sexually mature snails before fertilized eggs are laid. Snails start laying eggs at 8-12 months old where soil is provided, snail will dig small hole and lay it eggs in quick succession and cover them with soil. The incubation period varies from 24-35days the young hatching or badly snail has thin, transparent shell and it will remain in the soil for 2-5days before coming to the surface or the soil. The hatchings should separate from the adult immediately they come to the surface. Hatchings require more humid condition than the adults and thrive well under the decayed leaves. A well balanced diet for defined with calcium should be given to the hatchings.

**Management Practices in Snail Rearing:**

 Housing units should be checked regularly for rodents, insect and dead snails. Remove the left over feeds, clean the house and supply fresh feed and water. Ensure that the soil is well covered with dry leaves and wet the soil appropriately. Checked to make sure the wire netting is not worn out. Checks the water into legs of the containers increase of cage system, to ensure adequate protection against soldier ants. Feed the snail at the going down of sun since they are nocturnal animals. Provide adequate bio security by discouraging visitors from entering the snailery without permission.

 The use of chemicals such as insecticide, herbicides, fumigant and other agro-allied fluids should be avoided. Adequate shade must be provided preferably the housing should be near a tree or in a plantation. The feed and the water must be served in a shallow container. Aestivation and hibernation are common phenomena for snails especially when the environment is dry and therefore should be prevented from happening. During this period, the will be loss of weight but the snail my not diet.

**Sign of Sickness in Snail**

1. There will be reduction in feed intake or a complete loss of appetite.
2. The snail will be inactive as it will be evident in folding upon even at night.
3. There will be emaciation of the feed.
4. The foot or fleshy part is with drawn into the shell.
5. Annual molt.
6. Death my ensure after some days and start to rot producing and offensive odor.