



# COMMUNITY LIVESTOCK EXTENSION OFFICER MANUAL

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Paul Waweru( Ol Pejeta Conservancy)

## TABLE OF CONTENTS

<b>INTRODUCTION</b>	<b>3</b>
Focus area	3
The Manual	3
<b>PART 1: CATTLE MANAGEMENT</b>	<b>5</b>
Challenges associated with current nomadic pastoralism in the landscape	5
Coping with the drought	5
Recommended Supplementation options	6
Right feeding for optimum Livestock Production	11
Disease Management and Herd Health Management	12
Accessing the health of your cattle.	13
Internal Parasites control	14
External parasites control	14
Disease prevention and management	15
Breed improvement	17
Livestock marketing	17
<b>PART 2: SHOAT HUSBANDRY</b>	<b>19</b>
Shoat housing	19
Shoat nutrition	20
Health management	22
Breeding Sheep	
<b>PART 3: POULTRY PRODUCTION</b>	
Production systems	
Breeds	
Housing management	
Housing design	
Feeding	
Poultry Common Infectious diseases and management	
Vaccination methods	
Non infectious diseases	

# INTRODUCTION

## Focus area

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This manual is designed to target pastoral and agro pastoral communities adjacent to Ol Pejeta Conservancy and Mutara Conservation Area in Laikipia County. It is a semi-arid ecological zone with low and unpredictable rainfall averaging 400-900 mm per year. Water and pasture are key resources for livelihood development yet are increasingly becoming scarce. Collaborative planning and action is required to improve feed security for livestock. The area is dominated by East African Zebu breeds and Sahiwal. Superior breeds such as the Northern Boran breed have been doing well in the conservancies and ranches therefore seen as a potential breed that can perform well in the area. There is a large number of small stock especially sheep that are mainly responsible for overgrazing witnessed.

The area has a wide range of resistant external and internal parasites due to the presence of wildlife in the community such as the gazelle, deer and antelope among others that transfer the resistant strains of parasites. Livestock mortality as a result of drought and diseases is high in the communities.

## The Manual

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The manual addresses challenges identified in the targeted communities on livestock disease, feeding and breeding management. The outlined training is targeted at building the capacity of local communities to address existing and emerging challenges in livestock production and rangeland restoration through tested approaches and strategies. The manual has three parts informed by farmers' identified needs and environmental challenges: Livestock husbandry, goat husbandry and poultry farming. It is a living document which will be reviewed and updated continually to capture the changing community needs.

## Training methodologies

### I. Group discussion on:

- a. Challenges associated with current nomadic pastoralism in the landscape(2 hours)
- b. Coping with drought / recommended supplementation options (2 hours).
- c. Management of diseases-2 hours
- d. Parasite control-1hour
- e. Breed improvement( 30 minutes)
- f. Livestock marketing( 30 minutes)
- g. Shoaat housing (30 mins)
- h. Shoaat nutrition (1 hour)
- i. Sheep breeding (1 hour)
- j. Poultry production systems / breeds(1 hour)
- k. Poultry housing management(1 hour)
- l. Poultry feeding(1 hour)
- m. Poultry Common Infectious diseases and management(1 hour)

### II. Demonstrations on -

- a. making livestock supplement using maize stoves( 1 day)
- b. Making livestock supplement using hydroponics(1 hour)
- c. Silage making(2 days)
- d. Ration formulation(2 hours)
- e. Weight estimation-30 minutes
- f. Drug administration -30 minutes
- g. How to grow homemade maggots to feed poultry(2 hours)
- h. How to grow termites to feed poultry( 1 hour)

### III. Field visits to a feedlot for farmers to learn on livestock maintenance during drought periods(1 day)

### IV. Field days to :

- a. link livestock farmers with commercial supplements suppliers and service providers (1 day)
- b. Organize field days to link livestock farmers with livestock drugs suppliers and veterinary service providers. -1 day

## PART I: CATTLE MANAGEMENT

### Challenges associated with current nomadic pastoralism in the landscape

The grazing spaces in community areas are shrinking. Rise in private investments and increased settlements on the land previously used for nomadic pastoralism is posing a negative impact to the pastoral livelihoods. Livestock is migrated further and into newer environments where they are not adopted leading to livestock losses.

#### Distance

- The distance covered by cattle in search for pasture and water results in loss of energy.
- Animals are lost along the journey due to general body weakness as migration often starts when the condition of animals has deteriorated.

#### Destination changes

- Animals get to a new environment when very weak, mostly in the outskirts of Mt Kenya and Abrades ranges where pasture and water is available but very cold.
- The East African Zebu, the main breed within pastoral communities suffer heat stress on temperatures below 18 degrees.
- In cold environment lot of energy is used to regulate body temperature. This weakens the immunity of the animals and they become vulnerable to diseases.
- High livestock mortalities in the past despite the availability of quality forage in the areas migrated to because of the cold.

#### Change in parasites and diseases strains

- Animals are exposed to new strains of internal and external parasites such as worms and ticks in the new areas they are migrated to.
- Most livestock diseases are transmitted by ticks; East Coast Fever, Anaplasmosis, Red water, Rift valley fever and Heart water.

#### Gastrointestinal tract constriction

- The gastrointestinal tract constrict when forage consumed is low.
- Continuous constriction and abrupt distention when pasture is in plenty leads to rupturing of the intestines leading to internal bleeding which may lead to death.

### Coping with the drought

- A healthy animal can withstand drought for a longer time.
- Build cattle body reserves when pasture is in plenty.
- Reserves produces energy to maintain the animal during drought.
- Avoid walking your animals over long distances in dry periods as it depletes reserves
- Provide supplementation to your animals in pasture scarce periods.
- Introduce protein feeds, energy concentrates or forage in addition to normal grazing.
- Do supplementation at 1 % body weight when forage quality is low and below 1% when the forage quality is high.

## Recommended Supplementation options

### Urea supplementation

- Buy commercial feeds with urea to provide proteins for your animals.
- Feed Urea to animals in small quantities to avoid urea poisoning.
- Use 40g of urea per day for a mature animal.
- Mixed with other ingredients such as maize germ, wheat pollard, canola, soya bean meal, to make a complete meal for livestock.
- You can purchase feeds from first choice feeds (0716146427) who produce quality Urea safe for livestock consumption.

### Cattle Fattener Supplementation

- Buy Cattle fatteners (complete ration with ingredients mixed) to obtain rapid weight gain in animals reared for meat production.
- During pasture scarce periods; feed emaciated animals with 1.5 kgs per day to maintain the animal until the onset of rainfall.

### Mineral supplementation

- Give mineral supplements other than the common Magadi to provide trace minerals to the animal.
- When purchasing, choose mineral supplements (branded as protein mineral licks) which can provide both proteins and minerals.
- Use for animals subjected to drought or animals intended for finishing to enhance rapid weight gain.
- Do a calcium injection during drought to increase calcium levels in the animal to prevent them from weakening.
- Give a Multivitamin injection to provide a sufficient level of vitamins.

### Ration formulation

- Mix maize germ, cotton seed cake/sunflower, soybean meal and dairy premix at a ratio of 6:2:1 to make a high 21% CP ration good for improved milk production.
- Mix Wheat bran, canola or coconuts, soya bean meal and beef premix to produce a quality ration for beef cattle in a ratio of 7:2:1 and 30g of beef premix

### Silage making (Dairy farmers)

- Preserve forage by fermenting green use when forage is scarce.
- Use green maize, sorghum, Napier grass, Rhode grass and Sudan grass to prepare silage.
- When fermented the forage can be preserved for a period of 2years.

### Activity 1: Step by step small-scale silage making

#### Step 1

Prepare a shallow pit on slightly sloping ground. The depth of the pit should decrease from the higher side of the sloping ground to the lower side giving a wedge-like shape. Dimensions of the pit depend on the amount of forage to be stored.

As a rule of thumb 72 cubic feet (2 cubic meters) holds 1000 kg (or 20 bags) of fresh, chopped material. 1 m<sup>3</sup> holds 500 kg of silage. Evenly apply molasses. Use 1l liters molasses for every 560 kg of fresh material (1 liter molasses per bag of 50 kg fresh material)

### Step 2.

Chop the forage to be ensiled to lengths of about 1-inch long using either a panga or a chaff cutter.

### Step 3.

Spread polythene sheets over the sides and floor of the pit so that the forage does not come into contact with soil.

### Step 4.

Empty 1 bag of about 50 kg of chopped material into the plastic lined pit and spread into a thin layer. Repeat this till the pit is filled to 1/3 (6 bags).

### Step 5.

Dilute 1 liter of molasses that is about 1 kg with 3 liters of water. Sprinkle this mixture over the layer of chopped forage. Use a garden sprayer to distribute the solution evenly.

This helps to feed the microorganisms to make the silage acid quickly, which will prevent rotting.

### Step 6.

Press the forage down with your feet or a suitable weight (e.g. a drum full of water) to force out as much air as possible. This will prevent fungi attacking and destroying the forage.

### Step 7.

Add another bag of the chopped feed, sprinkle diluted molasses and compact the forage again. Repeat this process of adding forage, diluted molasses and compacting until the pit is filled in a dome shape.

### Step 8.

Cover the pit after a final pressing with polythene sheeting to prevent water seeping into the silage and dig a small trench around the sides of the pit.

### Step 9.

Cover the pit with soil: a layer of 24 inches (in the case of wet, fresh fodder) up to 36 inches (in the case of more dry forage) of soil to keep the air out and to prevent damage of the polythene by rain, birds and rodents.

### Step 10.

The conservation of the material by microorganisms takes a couple of weeks. Thereafter, it can be fed, but you better leave it until a time of feed shortage. With good sheeting and enough soil on it, the silage can be kept well for 1 – 2 years.

### Step 11.

Open the pit from the lower side of the slope. Remove enough material for one day's feeding, and then cover the open end again.

## How much to feed?

- A grade cow may eat up to 30 kg of silage per day.
- To ensure that the milk has no silage smell, feed after milking or at least 3 hours before milking.

## Step by step small-scale silage making





## Treatment of maize stoves for use as animal feeds

- Collect Maize stoves (stems) after grain harvest
- Chop stoves into 3-5 cm cuts using a chaff cutter and placed in a plastic sheet material.
- Mix four kilograms of urea with 100 liters in a plastic of water to make a solution to treat 100 kg of maize stoves.
- Mix the solution well until the urea disappears.
- Add 10 liters of molasses into the mixture. Mix the mixture until the molasses and the urea solution is completely mixed up.
- Add 100 kg of maize in small portions into the mixture and evenly mix.
- Take a polythene sack.
- Take a portion of the mixture and spread evenly in top of the polythene sack.
- Compact the treated stoves using your feet before adding the next layer until all the treated stoves are used up.
- Close the polythene sheet sack tightly then store for three weeks.
- Open polythene sheet sack from one part and remove enough amount of treated maize stoves for daily use and aerate overnight before feeding to livestock.
- Once opened use treated stoves for a maximum of 2 weeks.

**Maize** Stover consists of the residues of **maize** plants grown for grain and left in the field following the harvest. It includes stalks, leaves, husks, and cobs

## Growing hydroponics (soilless propagation of forage for livestock)

- Use maize, wheat and barley cereals to produce high density nutritious forage for both livestock and poultry.

**Note:** Put the seeds in a bucket of water mixed with bleach or wash with soap to prevent growth of fungi which is poisonous to poultry causing aspergillosis. Rinse thoroughly before following the steps below

# Making Hydroponics



**Requirements- Tray, Seeds, and Water,**

**Choose the type of seed to use eg Wheat, Barley, Oat, Maize or Sorghum**



**Soak 2kg of seeds in water, add bleach(Jik) or wash the seeds with soap until foam is observed.**

**Rinse the seed until the smell of the bleach or soap disappears**



**Drain the water and incubate the seeds in a bucket with a lid with 2 holes**

**After 36-48hrs observe the seeds for radicles.**

**Spread the seeds on the trays leaving a small space at the edge of the trays.**



**Water the barley 3 times a day.**

**Harvesting the fodder for poultry is done at day 4 and cattle at day 7.**

## 10% stock initiative

- Sell 10% of your at the onset/ during drought to source livestock input such as commercial feeds during drought to reduce livestock mortality as a result of hunger.

## Feedlot

- Graze your animal until they obtain a weight of about (290 to 320 kg), typically at about 2 year old, before transferring to a feedlot for six to eight months. Feed livestock at the feedlot to gain weight for eventual slaughter.
- Feed animals in the feedlot with specialized animal feed which consists of :
  - Corn byproducts, barley, and other grains
  - roughage which include alfalfa, corn stalks, sorghum, or other hay and cottonseed meal
  - Premixes composed of micro ingredients such as vitamins, minerals, chemical preservatives, antibiotics, fermentation products, and other essential ingredients that are purchased from premix companies, usually in sacked form, for blending into commercial rations.

## Feedlot management

- Feedlot diets are high in protein, to encourage the growth of muscle mass and the deposition of some fat (known as marbling in butchered meat).
- Marbling is desirable to consumers, as it contributes to flavour and tenderness.
- The animal may gain an additional (70-100kg) during its approximate 100 days in the feedlot.
- Once cattle are fattened up to their finished weight, the fed cattle are transported to a slaughterhouse.

## Right feeding for optimum Livestock Production

### Reproduction

- Provide right nutrition to your cows to shorten calving intervals and get optimum number of calves during its reproductive age (a well-fed cow should give you one calf per year).

### Milk production

- Ensure a balanced stocking rate of 3 heads of cattle per acre, pasture management, and supplementary feeding to optimize overall farm performance and profitability in pasture-based dairying.
- Proper feeding results in the achievement of optimum production of milk based on the potential of the animal which is 15 litres per day for Jersey, 20 litres per day for Ayrshire, 25 litres per day for Guensey and 30 litres for Fresian.

### Growth rate

- You can adjust feeding levels to manipulate growth rate or composition of weight gain (meat conversion is influenced by the available nutrients which can be provided through feeding).

### Immunity

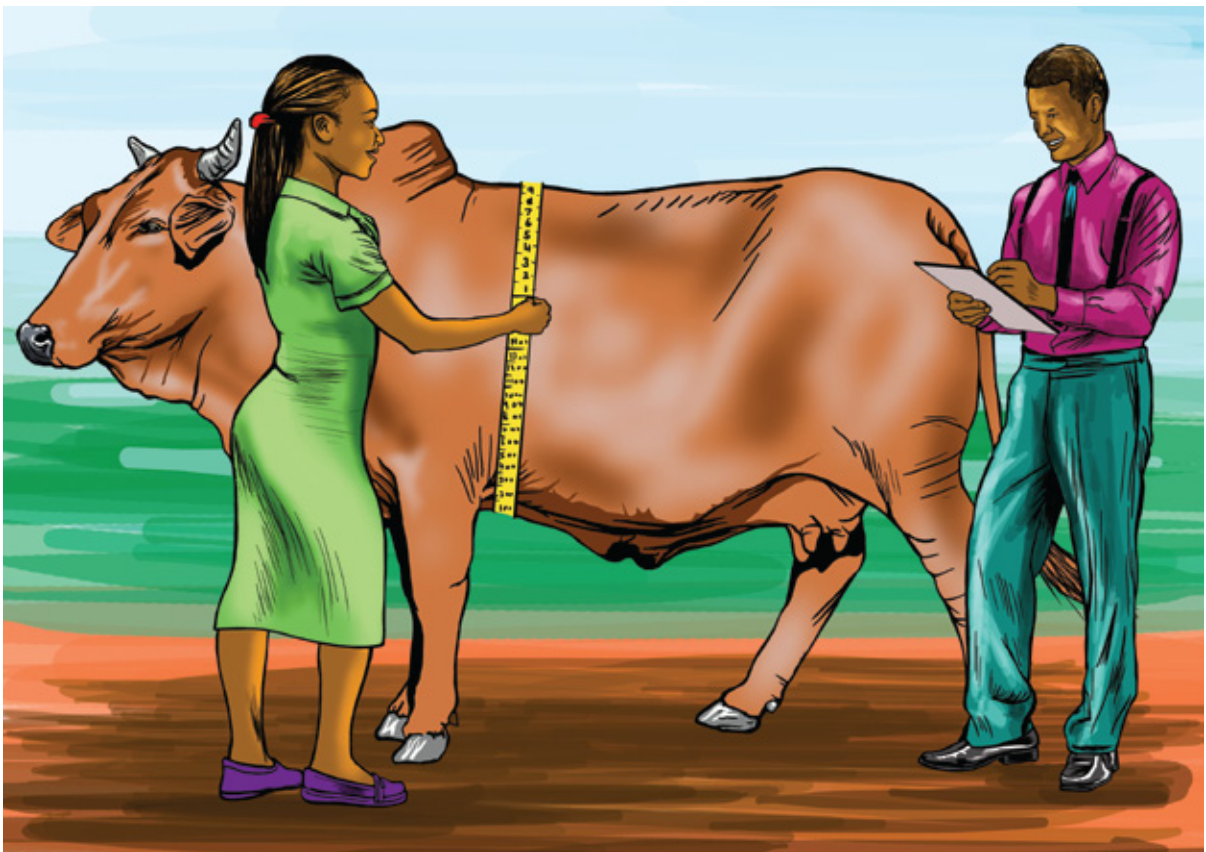
- Proper nutrition and feeding results in healthy and strong animals with a strong immunity which is able to withstand and fight diseases.

### Importance of Weight in cattle management

A weighing balance is very expensive (KS. 210,000). Weight band estimation is very crucial in daily livestock production activities. To address the cost challenge you can use a weighing which you can source in the local agro vets and livestock inputs outlets.

### How to Measure using a weigh band

- The narrowest part of the chest is the spot to measure
- Make sure that the animal has its head up-With their head down their chest expands causing an overestimation of their weight.
- Measure Immediately behind the front legs, over the heart. Read the calibration in kgs for either beef or dairy cattle on the upper side of the weighing tape.
- Do not tighten the tape too much to avoid underestimating the weight/ do not pull too lightly to avoid overestimating the weight.



Knowing the weight of your livestock is important in making the right choices on feed and diseases management as outlined below:

### Growth rate

- Monitor weight gain by estimating the weight of the animal after every 3 months.
- Keep a record of the animal weight to guide operations done to the animal.

### Breeding

- Breeding is influenced by the weight of the heifer.
- The minimum service weight is 230kgs for Boran and Jersey, 240Kgs for Sahiwal and Guernsey, 280 and 300 for Ayrshire and Fresian respectively.
- Monitor the weight to ensure that minimum service weight has been achieved.

### Feeding

- Dry matter feeding is based on the bodyweight of the animal, especially animals on zero grazing.
- Feed the animal 3% body of dry matter (roughages and grasses) which means for a 300kg animal, give 9kg dry matter per day. This will help you to achieve its optimum performance in terms of feed costs and animal production.

### Drug administration

- Every drug has a prescription that is directly linked to the weight of the animal.
- Always have a record of your animal's weight to guide you to administer drugs as prescribed.

**Note:** This training is delivered to equip on basic knowledge to administer drugs in emergency cases. Always, hire the services of a qualified veterinary officer to administer drugs.

- The veterinary Officer can determine the route of drug administration based on how critical the stage of the disease.
- Drugs can be administered through the muscle, under the skin, (on the skin (ointments), and mouth.
- The route of administration is usually instructed on the drugs commonly purchased by farmers.

### Accessing the health of your cattle.

- Below is a description of a healthy animal. Any changes from these may be a sign of sickness

#### Appearance

- Healthy animals: Are Alert and hold their heads up; have bright eyes and look around actively; move their ears when they hear a sound ; have well-rounded bodies and strong limbs and move easily; move their ears and tail to frighten flies away; have a healthy-looking coat; lick their coats and you can often see the lick marks.

#### Movement (gait)

- A healthy animal; walks easily and steadily with all of its feet taking its weight; makes regular Steps; stands up quickly when you approach an animal lying down.

## Nose and Muzzle

- Clean nose with no discharge. The muzzle should be moist, not dry.

## Mouth

- There should be no saliva dripping from the mouth. If chewing is slow or incomplete there must be a problem with the teeth.

## Droppings or dung

- The droppings of a healthy animal will be firm. Very soft droppings (diarrhoea) are a sign of ill health. If the animal has difficulty in defecating (constipation) this is also a bad health sign.

## Urine

- The urine should be clear and the animal has no signs of pain or difficulty in urinating.

## Mucous membranes

- The thin skin that lines the inner surfaces of the body is called a mucous membrane. Normal healthy animals have pink/red mucous membranes - look at some healthy animals to learn what they look like

## Internal Parasites control

### How to control roundworms in grazing livestock

- Most worms compromise livestock growth (cause diarrhoea)
- Animals usually get worms while grazing when pasture is not looked after well and there are many worm eggs and larvae on it.
- Give worm medicine to young animals at the beginning and at the end of a wet season (cattle under three years) - this will reduce the number of worm larvae inside the animal in the dry season that follows.
- Alternatively give your animals salt to eat or take animals to salty pastures at least once a year to help reduce the number of worms (Salty pastures dehydrate the young worms and different stages of their life cycle).

### How to control liver flukes

- Animals get infected with young liver flukes when they graze near water and eat plants with young liver flukes on them
- Avoid grazing animals in wet places where snails carry liver flukes.
- Put stones on wet surfaces for animals to stand on, to drink water.
- Give worm medicine at the end of a dry season to stop liver flukes developing and contaminating pasture when it becomes wet.

### How to control tapeworms

- Avoid eating meat with tapeworm cysts
- Encourage use of latrines (leaving infected human waste on the ground leads to infection through ingestion).

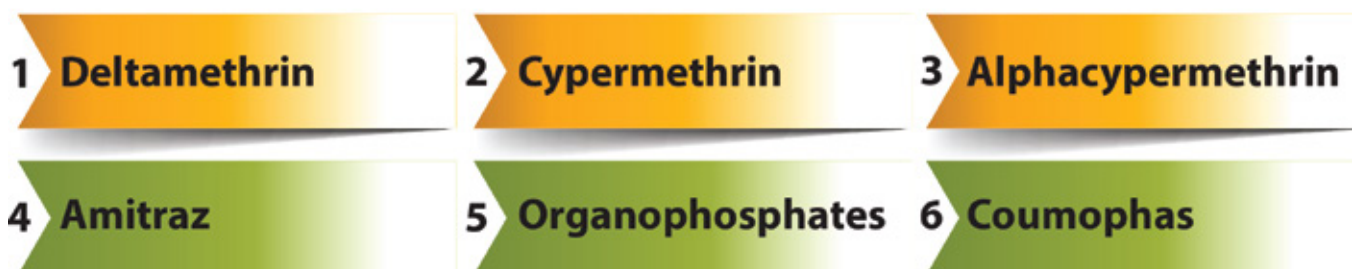
## External parasites control

Common external parasites affecting the landscape include ticks and fleas. In areas where poultry are kept the external parasites include stick fast fleas and mange.

## Tick control

- By controlling parasites you will prevent the majority of diseases caused by parasites. The common ticks in the community include :
  - blue tick ,a vector for gall sickness or red water
  - brown ear tick, a vector for East Coast Fever
  - Tropical variegated bont tick that causes Anaplasmosis
  - Tropical bont ticks cause Heart water.
- Use Acaricides to control ticks and fleas.
  - The concentration of the acaricides has a major impact on the ability of the acaricides to control ticks and also resistance exhibited in ticks.
- Rotate the acaricides you use to prevent tick resistance to the acaricides. Follow the rotation below when using acaricides :

### Acaricides Rotation



## Disease prevention and management

### Vaccination calendar

Adhere to a tested vaccination calendar for your locality for cattle, sheep and goat to prevent livestock common diseases in the locality.

Diseases	Age/ Season	Month of the year for vaccination	Animal vaccinated
Cantagious Caprine Pleuropneumonia, Contagious(CCPP) BovinePleuropneumonia(CBPP)	Wet season (Onset of rain)	March-April	Cattle, Shoats
Foot and Mouth Disease	Dry season (Onset of dry period)	Jan- March	Cattle, Shoats
Lumpy Skin Disease	Early during the Year	Jan- March	Cattle
Pestes des Pestis Ruminant	Early in the year	Jan-March	Shoats
East Coast Fever	1 month and above	Any time of year	Cattle
Brucellosis	3-8 months	Any time of the year	Cattle

## ECF Cover

- Give your calf an ECF cover to prevent infection by 95 % in the future.
- Expose the calf while 1 month old to ticks for a period of two weeks followed by injection with day 1 intramuscular injection with 10% Oxytetracycline and 30% Oxytetracycline day 2.
- ECF cover works better in indigenous breeds such as Boran, Zebus, and Sahiwal due to their ability to withstand diseases.
- On dairy cattle the cover can be placed on day 12 since they are more susceptible.

## Common drugs for farmers (Symptomatic Emergency treatment)

### Penicillin

- You should avoid using the drug without the advice of a veterinary officer.
- used to treat a broad range of bacterial and viral diseases

### Oxytetracycline 10%

- Used as an antibiotic
- It is important to have the drug but you use it in consultation of a veterinary officer in the case of an emergency.

### Enrofloxacin/ Tylosin (goats)

- Use with the instruction of a veterinary officer as an antibiotic for respiratory and gastrointestinal diseases.
- Use symptomatically to treat diarrhoea, coughing, nasal discharges in sheep and cattle.

### Wormicide rotation

- Practice wormicide rotation to ensure all worms are eliminated from the system. Among the wormicide available in the market includes the following:

### Wormicide Rotation

**1 Levamisole**

**2 oxyclozanide**

**3 Albendazole**

**4 Fenbendazole**

**5 Ivermectin**

**6 Praziquantel**

**6 Triclabendazole**

### Process of reporting a disease outbreak

- Check the animal closely for signs and symptoms associated with the notifiable disease
- Contact the nearest veterinary or livestock extension officers in the area.
- The officer will contact the sub county veterinary officer who will delegate the process of differential diagnosis and collection of samples.
- The officer will as well advise the farmer on preventive measures to be taken to save the remaining herd.
- Samples will be delivered to the regional veterinary laboratory for further examination.
- The results with recommendation will be communicated to the farmer and the department of livestock for further actions such as vaccination.



## Breed improvement

### Recommended breeds for the landscape

- The maximum potential of an animal is determined by the genetic makeup of the animal. The East African Zebu can achieve a maximum of 500kgs live weight. They cannot perform beyond a certain threshold in terms of weight gain or milk production
- Northern Boran have a higher potential in terms of meat conversion and high growth rate as compared to East African Zebu.
- Continuously carry out breed improvement from the predominant breeds such as East African Zebu to superior breeds such as Northern Boran which can withstand the local climate.
- For the dairy breeds, a Jersey and an Ayrshire will perform well in the landscape.
- Breed improvement is a gradual process and the result can be observed in a span of at least 3 years where calves have begun to exhibit their inherent genetic potential.
- You can use natural mating and artificial insemination to improve your breeds.

### Oestrous Detection

- The detection of estrus (standing heat) requires considerable effort and time yet extremely important for a successful Artificial Insemination (AI) breeding program.
- You can tell that your animal is ready for breeding by considering the following:

#### Standing heat

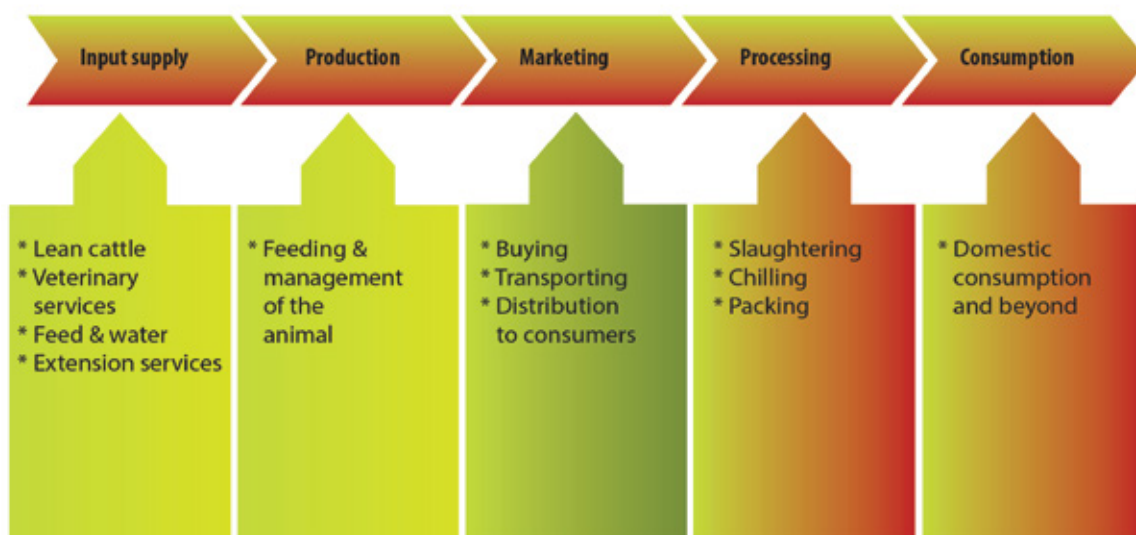
- Stands to be mounted
- Bellows
- Exhibits nervous behavior
- More cohesive discharge from the vulva

#### Insemination timing

- Standing heat normally lasts less than 12 hours, and cows ovulate 24 to 30 hours after the onset of standing the heat. After insemination, sperm can live for over 24 hours in the female tract.
- For cattle seen in standing heat during a.m. time (dawn to noon), breed in the p.m. (afternoon) the same day.
- For cattle in standing heat during the p.m, breed during the a.m. of the next day.

## Livestock marketing

### core function in beef value chain



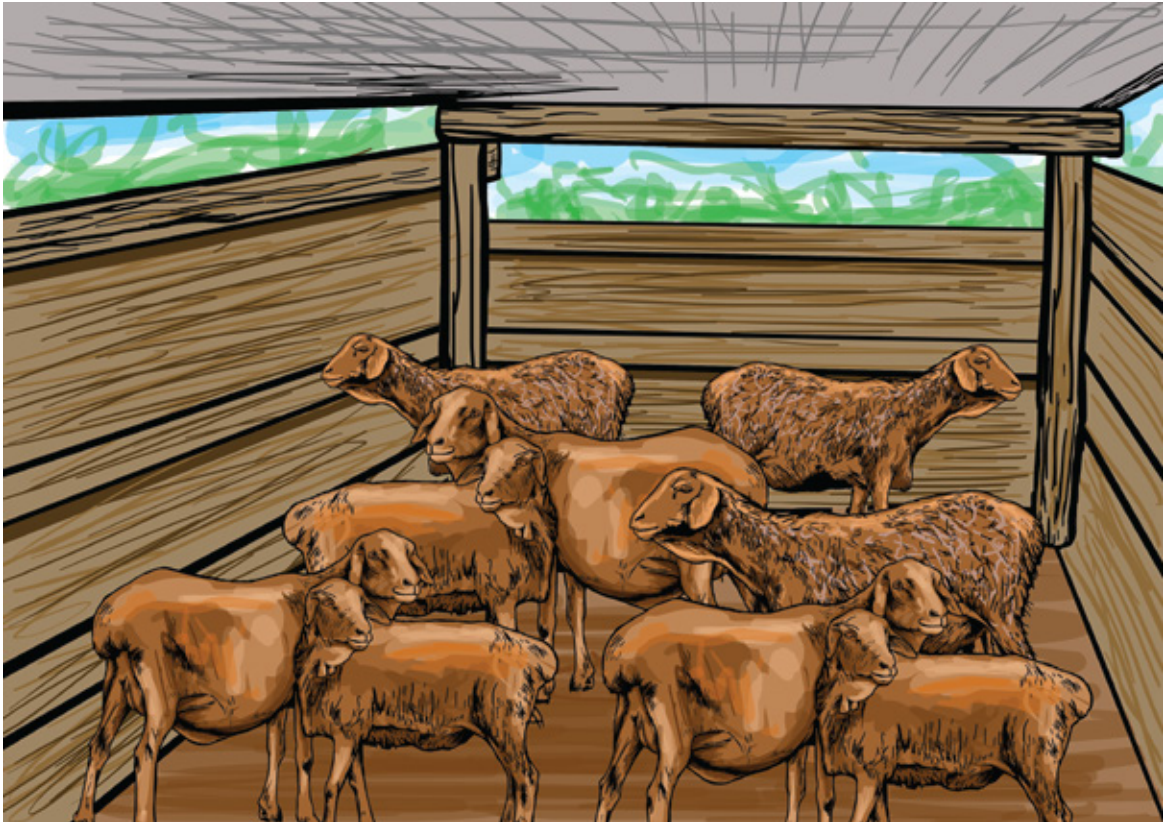
## Marketing Livestock Groups

- Join a livestock group to enhance your bargaining power during livestock sales .Form livestock groups which are market-oriented to secure a wider market and reduce exploitation by middlemen (Brokers).
- Establish linkages with fodder producers and plan on livestock food security in the dry season.
- Continually market your stock to a manageable number that cattle can graze without overgrazing.
- Time your livestock marketing at the onset of dry month to reduce the stocking densities to facilitate proper utilization of pastures and reduce mortality due to drought.

## PART 2: SHOAT HUSBANDRY

Shoats can easily be integrated into small-scale farms with cropland. Good husbandry, feeding, housing and parasite management is key for their production.

### Shoat housing



- Sheds and shelters must be spacious and well ventilated to protect the animals from rain, sun and wind.
- Elevated floors are recommended/ open-front sheds on the well-drained, slightly sloping ground
- Remove droppings every day to keep the floor clean and dry and prevent pneumonia foot rot and parasite infestation
- A simple thatched shelter is sufficient for shoats during the day.
- Give at least 1.5 square meters for each animal to prevent diseases from overcrowding.
- For cut-and-carry systems provide :
  - a dry, well-ventilated shelter with a roof (2 sq. meters/ewe)
  - Good feeding troughs to keep the fodder clean and to reduce wastage.
  - A spacious confined outside run-at least 3 square meters for each ewe-Their lambs need a lot of space for running and playing.
  - Provide clean water and mineral licks at all times.
  - Separate pens for bucks, for lambing, for lambs, and for sick animals.
  - Sheds and fences for sheep may be simpler than for goats as sheep do not climb.

## Shoat feed management

- Sheep are grazers that feed and ruminate for the most part of the day.
- Prefer herbs and grasses they are used to.
- Introduce new feeds in small quantities and in the troughs the animals are used to eat from.

### Basic feeding practices

- In a cut-and-carry system, feed your animals at least 3 times a day (early morning, noon and evening).
- Feed with clean, fresh and dry fodder on clean and elevated feeding troughs.
- Non-lactating sheep require 4 - 7 kg of fresh green fodder, depending on the stage of pregnancy (equivalent to 1 to 2 kg of good hay).  
Nursing ewes need between 6 and 10 kg of fresh, good quality fodder (or 1.5 to 3 kg good hay).
- Supplement crop residues with leguminous fodder, concentrates and minerals.

### Grazing

- Sheep and cattle are good grazing companions because: they utilize different resources on pasture; suffer from different parasites hence cannot infect each other.
- Do not leave your sheep in the same paddock for longer than 2 subsequent weeks to avoid overgrazing and buildup of parasites.
- A paddock needs to be left ungrazed by sheep or goats for 6 weeks. At least have four paddocks to rotate your sheep.
- One acre of good pasture should produce enough fodder for 4 sheep and their lambs.
- Divide the area you need for your sheep into four or more paddocks
- On poor pastures, give your flock a larger area or provide additional feeds.
- Cut excess wet season fodder and dry to provide hay for the dry season.
- Cut and dry the grass on about half of the area of each paddock one or two weeks before it is grazed.

### Cut-and-carry feeds

- Most grasses are suitable. Chop bulky fodder like Napier grass, and allow wet fodder to dry to prevent bloat and reduce worm.
- Leaves of trees and shrubs (up to 20% of the ration).
- Use protein and mineral-rich leaves of legume crops and legume trees to improve the diet when you use low-value feeds like dry crop residues.
- Legumes should be a third of the total ration to avoid bloating.

### Minerals

- Provide necessary mineral salts for your sheep buy buying special mixtures for sheep in the local agro vets.

### Water

- Provide permanent access to clean water.  
Nursing ewes have high water requirements (up to 10 litres/ day).

### Concentrates

- Avoid high quantities of concentrates in the diet (above 1.5 kg/day) to avoid health disorders.
- Increase Concentrate amounts gradually but do not exceed 1.5 kg/day.
- You can use the same concentrates as for cattle.

- Give in small quantities of not more than 250g / meal, and preferably after the roughage.
- Feed and give some grain to ewe for several weeks before and during the mating season. Rams can also be fed some concentrates during this period (0.5 kg/day).
- Do not feed concentrates during the first 3 months of pregnancy; in the last two months of pregnancy, up to 500g concentrates can be given per day. Start with small quantities only.
- Give concentrates during the first month of lactation, up to 1.5 kg concentrate feeds per ewe. Decrease this quantity gradually after 5 weeks.

## Weaning

- Wean young lambs at 3 months of age.
- Keep Weaned lambs together while graze.
- Supplement Lambs with grain to fatten them. Use maize or maize silage if available.  
Weaned lambs

## Health management

- Practice good feeding and keep the sheds clean to prevent diseases.
- Treat external parasites (ticks) at least once a year.
- Deworming your sheep monthly or every 2 to 3 months depending on infestation levels.
- Trim the hooves regularly to prevent lameness and foot rot.
- Vaccinations against contagious diseases that may affect the whole flock
- Vaccinate your flock according to the recommendation of the local veterinarian.
- Tail dock wool sheep breeds to prevent fly strike. Use rubber rings when the lambs are 7 to 10 days old.
- Ensure the vulva and anus of the lamb should still be covered by the tail stump.

## Breeding Sheep

- Select heavy animals for breeding to produce fast growing offspring.
- Prevent inbreeding and to include as many animals as possible by involving the whole community.

**Castration** After 3 months, select the fastest growing male lambs for breeding. Castrate the others using a rubber ring or the burdizzo.

## Select within local breeds

- Use Local breeds because they are hardy and adapted to the environment and climate. Red Maasai sheep, can cope much better with worm infestations or droughts than exotic breeds.

## Grading up

- Breed Local ewes (Maasai ewes) and their female offspring with rams of a more productive breed, e.g. the Doper sheep. Then mate with non-related males and females with the same level of cross-breeding, e.g. with 50% or 25% local blood.
- Positive traits of the local breed (e.g. disease resistance) can be maintained in this way.

## Criss-cross mating

- Use purebred rams of two different breeds to mate alternately.
- A local ewe is first mated with a ram of an improved breed.
- The female offspring are mated with a local ram.
- The next generation is mated with a different ram of the improver breed
- Positive traits of both breeds are maintained.

## Breeding records

- Keep breeding documentation for each animal to prevent inbreeding which compromises the health, performance and the effect of upgrading.
- Never allow a ram to mate with his sisters, daughters, and granddaughters.
- The records system should guide you to tell at least the mother and father, grandmother and grandfather of each animal.
- Never allow a ram to serve one flock longer than one year.
- Try to rotate rams regularly with other farmers within the community.

## Mating

- Sheep mature between 6 and 12 months of age subject to feeding and breed.
- Feed your Sheep with quality forages, grain and mineral supplementation to speed maturity.
- Mate ewes when they achieve at least two thirds of their mature weight
- Keep rams together with the ewe flock to ensure high pregnancy rates. A ram will be sufficient for 20 to 50 ewes.
- The average gestation period for sheep is 148 days.

## PART 3: POULTRY PRODUCTION

### Production systems

#### Free range

- Birds are not confined and scavenge for food.
- Provide basic shelters for them to roost at night.
- Flock contains birds of different species and varying ages.

#### Backyard extensive

- Housed at night and free range during the day.
- Provide a handful of grain in the morning and evening to supplement scavenging.

#### Semi intensive system

- Confine birds in an enclosed area outside during the day and housed at night.
- Provide Feed and water in the house to avoid wastage by rain, wind and by wild animals.

#### Intensive systems

- Birds are fully confined in a shelter
- Require more capital
- Provide all the birds' requirement within the shelter
- High production if all needed requirements are provided.

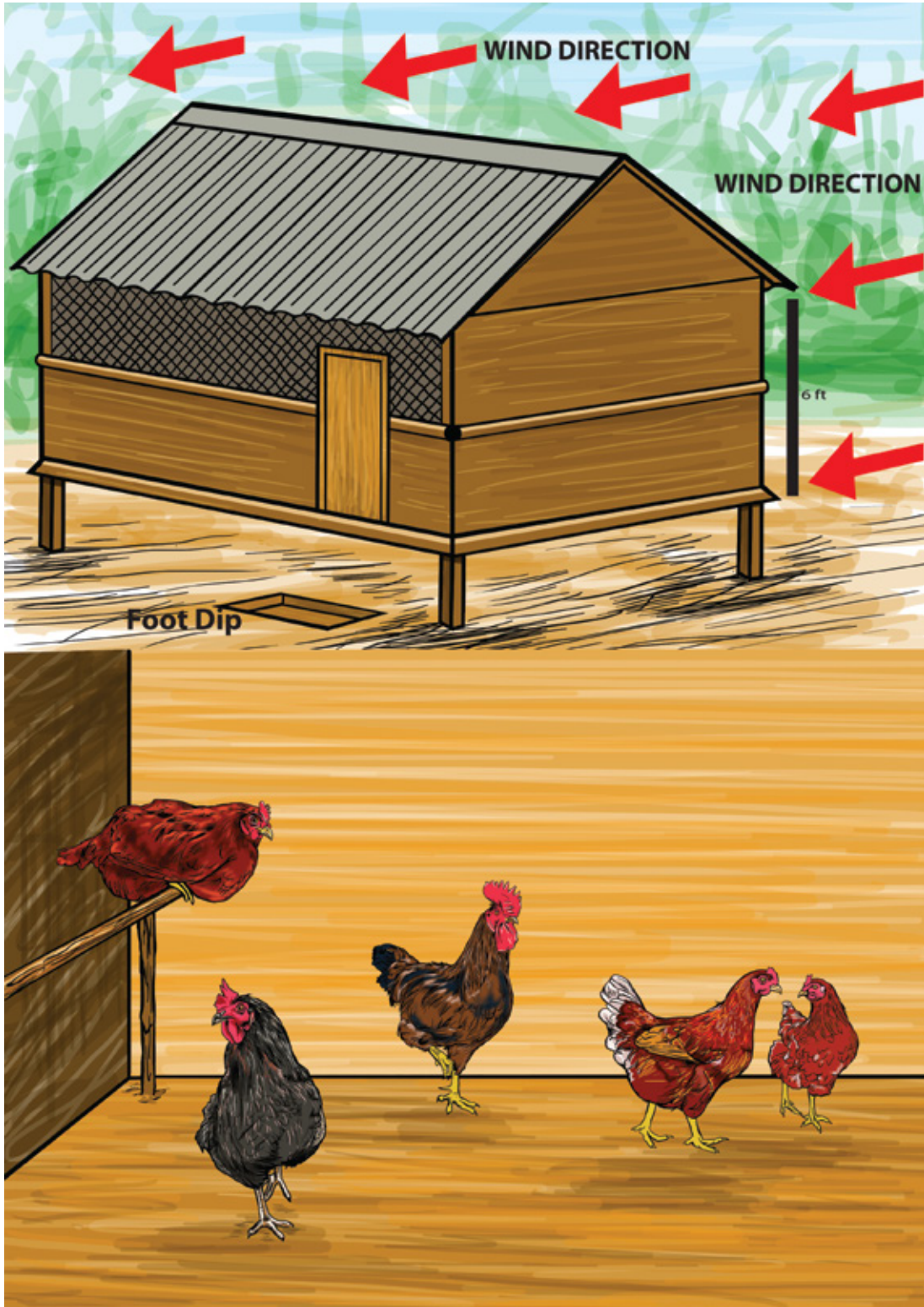
### Breeds

#### Hybrid

- Selected and specialized for meat or eggs production.
- unsuitable for breeding because they have low mothering ability
- More expensive to manage :
  - You need to purchase day old chicks
  - To hatch chicks you will need artificial brooding and special starter feeds
  - Need high quality balanced feed for optimum meat and egg production
  - High veterinary hygiene and strict diseases management
  - You should provide egg laying hybrid hens with light (need light length for up to 17hrs per day) for peak profitable production.
- It fetches higher market prices as many traditional consumers prefer its products.

#### Indigenous (kienyeji chicken).

- Product of centuries of cross breeding with exotic breeds and random breeding within the flock.
- Hard to standardize productivity performance of indigenous chickens.
- Attain sexual maturity at an average age of 7 months (214 days) and lay about 36 eggs within 2 months.





## Space

Ensure right spacing to reduce diseases vulnerability, cannibalism and competition for food.

The recommended floor and perching space for the 3 common main types of chicken is shown below.

Chicken type	Floor space birds/m <sup>2</sup>	Floor space ft <sup>2</sup> /bird	Perch space per bird
layer	3	3.6	25cm (10 inch)
Dual purpose ( Layer and meat)	4	2.7	20cm (8inch)
meat	4-5	2.1 -2.7	15-20cm (6-8inch)

## Ventilation

- Build the chicken structure with open sides / ensure cross-ventilation at bird level through the floor level inlets.
- The structure should not be over 8m (26ft) wide to allow air movement
- Protect chicken from heat stress (cannot withstand temperatures over 40°C) which can compromise production or cause death by: building houses to face prevailing winds, covering the ground to reflect heat and providing shade.

## Light

- Provide light to promote feeding and accelerate sexual maturity to and increase egg production.

## Protection

- Design the house of your chicken to protect them from the effects of climate and predators

## Housing design

### Free range

- Provide Spacious, clean and well aerated house
- It can be fixed or mobile based on your needs.
- Raise the floor on a solid platform to provide ventilation to cool them in cool weather and avoid flooding.
- You can make walls using mud, eucalyptus sticks, rafters, thatching grass, tree twigs and shrubs



## Semi intensive and intensive

- Confine your chicken to; predation in chicks under 2 months of age, to improve production of growers by managing feed, and supervision of production in laying hens
- Ensure the chicken confinement is accessible, well drained, and at ample distance from residential areas and woodlands.

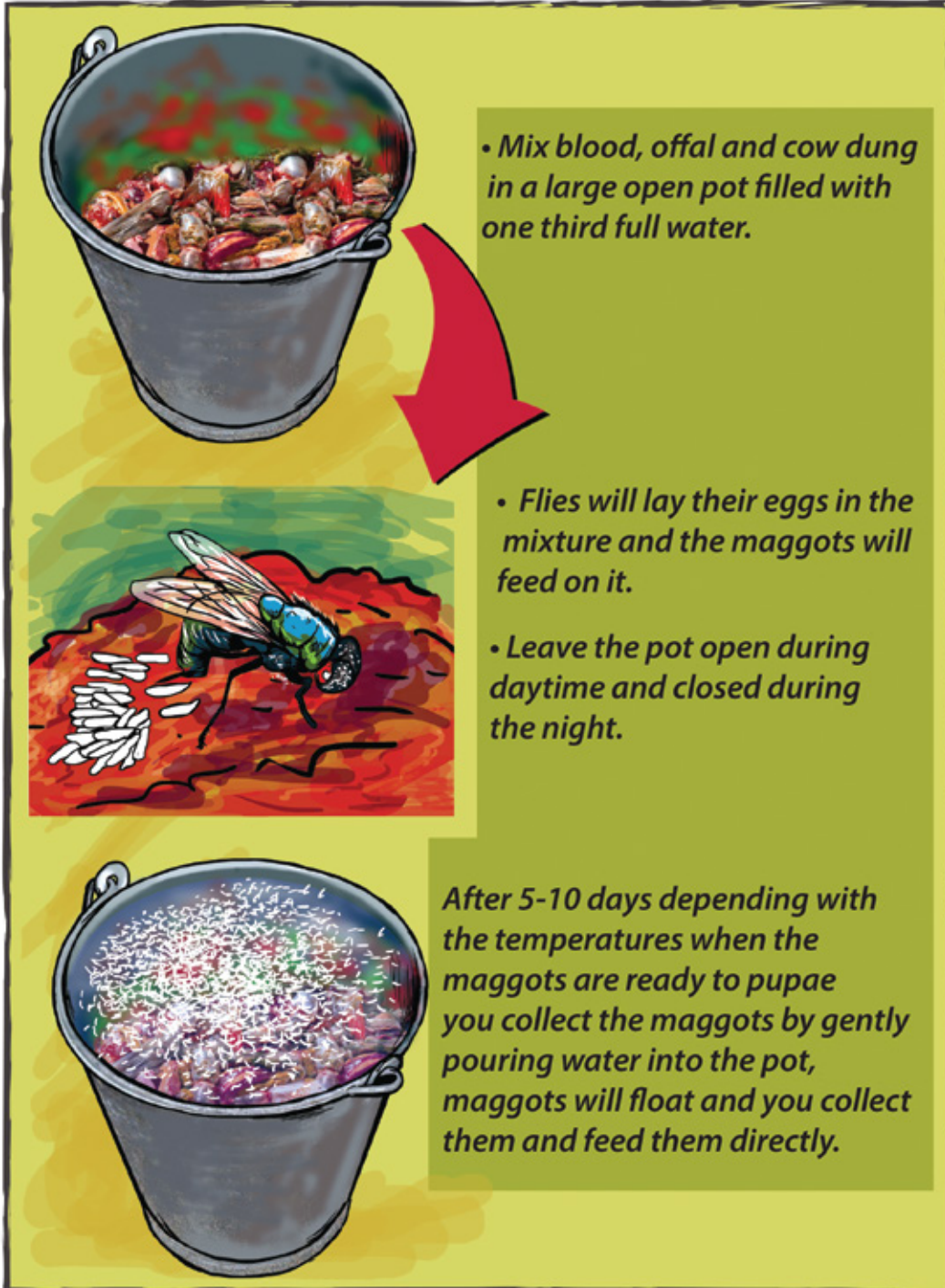
## Perches and roosts

- Provide a Perching space of 15-20 cm per bird for chicken to roost at night
- Ensure the perch bar is 2-3 cm and the length depends on the number of birds.
- Line up your perch parallel to the wall and horizontally with a sliding removable platform of about 20 cm below the perches to catch the manure droppings.
- Place the first perch bar 20-25 cm from the wall and subsequent ones at 30-40 cm intervals.
- Let the droppings board touch the back wall and extend 30 cm in front of the front perch bar.
- Droppings board should be a maximum of 75 cm from the floor of the house and the perch bars should be about 20 cm above the droppings board.

## Housing design

- Provide constant feed distributed evenly throughout the chicken house for laying chicken in intensive and semi intensive systems.
- Allow chicken to scavenge during the day mostly for protein i.e insects, worms, larva in semi intensive systems
- Minerals are obtained from stones, grit and shells while vitamins are obtained from leafy vegetables such as cabbages, kales, spinach etc and palm oils and nuts, energy supplements like maize, sorghum, millet and wheat are important for higher production

## How to grow a homemade maggots



- Mix blood, offal and cow dung in a large open pot filled with one third full water.
- Flies will lay their eggs in the mixture and the maggots will feed on it.
- Leave the pot open during daytime and closed during the night.

After 5-10 days depending with the temperatures when the maggots are ready to pupae you collect the maggots by gently pouring water into the pot, maggots will float and you collect them and feed them directly.

## How to grow termites

- Take a pot with a short neck and at least 10litres of water in it.
- Fill it up with cow dung and straw and sprinkle it all with a little water.
- Set the pot upside down with the opening on sandy soil.
- After one day and one night the pot will be full of termites and you may empty them leaving contents in front of the hens.

## Feeders

- Ensure your feeder is; Durable enough to withstand frequent cleaning ,Stable enough not to be knocked over ,Of correct height and depth , equipped with a lip to prevent birds from spooning feeds out onto the floor.
- Use creep feeders to enable baby chicks to have access (by creeping through a small doorway) to a high quality (high in energy and protein) feed while blocking access to large sized birds

Age (weeks)	Daily feed consumption(kg)	Suggested feeder depth(cm)	Feeder space(m)
1-4 weeks	1.4-5.0	5	2.5
4-6 wks	3.2-7.3	8	3.8
6-9 wks	5.0-9.5	9	6.1
10-14 wks	7.3-15.9	12.5	9.6
15 and above	9.1-11.4	15	12.7

## Hygiene

- Provide good ventilation to prevent spread of diseases and pests
- Keep the floor warm and dry, sweep daily to break house fly breeding cycle
- Never keep chicken and ducks together to prevent fowl cholera and Newcastle to chickens caused by wet surfaces.

## Types of incubation

### *Natural incubation*

- Select fertile eggs- 4 days after the rooster has been introduced to the hens.
- Select a large, healthy, and vaccinated, with good brooding and mothering record hen for brooding.
- The incubation period for chicken is 20-21 days
- Consider the following when selecting eggs for incubation:
  - Do not keep eggs for more than 7 days
  - Use fertilized eggs( eggs produced 4 days after the rooster is introduced)
  - Free from external parasites
  - Keep temperatures between 120c and 140c and high humidity between 75 and 85%
  - Test for fertility after one week of incubation using a torch to observe the embryos

### Artificial incubation

- Uses eggs incubator machine- computer controlled, uses electricity, gas or kerosene for heat production.
- Has a thermostat switching device to maintain the temperatures constantly as required within a one Celsius degree.
- It also uses a predetermined surface area tray of water appropriate for each incubator chamber for usually maintain the correct humidity levels needed.
- Automatically turns the eggs several times a day to prevent the embryo from sticking to the shell membranes of the egg.
- Do egg candling between days 5 and 7 to check on the fertility of an egg through observation of the embryo development. This is done by placing the egg on top of a candling lamp and observing the embryo.
  - Very clear situation-indication of infertility
  - Pattern forming-indication of fertile egg
  - Opaque substance-indication of a dead embryo.

## Poultry Common Infectious diseases and management

- Keep chicks dry and warm –for temperature above 20 degrees Celsius using fireplace or electric heat bulbs
- Maintain good house hygiene
- Follow the recommended vaccination programme.

disease	symptoms	control/treatment
Newcastle disease (ND)	Dullness, coughing, sneezing, gasping, rapid breathing accompanied by a gurgling noise in the throat, twisting of the neck.	vaccination
fowl pox		vaccination
marek's disease (MD)	High mortality from visceral tumors, nerve paralysis in the legs and wings of birds aged from 15 weeks to early in the laying period.	vaccination
fowl cholera (avian pasteurellosi)	gasping, coughing, sneezing, diarrhea with grey yellow or green droppings, lameness and swelling of legs or wing joints ,comb change color to dark red or purple/pale, twisted neck sometimes observed swelling around eyes and discharge from the back or nostrils.	vaccination add antibiotics to water (Oxytetracycline)
pullorum (bacillary white diarrhea)	White diarrhea from 3 days to several weeks of age, loss of appetite, tucked in head, wings hanging down, huddling together and making a beeping sound, 20-80 % mortality in the acute cases.	Doxycycline
fowl typhoid	Dark red comb and wattles, droppings are yellowish, loose eyes and keeps head down. affected chicks die within 3-6 days	Doxycycline
avian salmonellosis (paratyphoid)		Doxycycline

aspergillosis/airsaculitis		
gumboro (infectious bursal disease, IBD)	Diarrhea chicks' younger than 6 weeks and in large flocks kept in confinement.	vaccination
chronic respiratory disease (mycoplasmosis)	Runny or blocked nose, swollen face, closed eyes, acute drop in production but rare deaths.	add antibiotics(Oxytetracycline) in water
coccidiosis (internal parasites).	sickly posture, tired, head down, ruffled feathers, bloody diarrhea ,death in young chicks , survivors are thin and emaciated and thus late laying	Regular and careful cleaning of troughs and poultry houses. anticoccidiostatics in drinking water or feeds Avoid crowding birds together and putting different ages together.
mycotoxicosis (fungal poisoning)	general weakness, pale combs, etc	Amplorium, suphonamide treatment; supplementary vitamins Prevention; proper storage of feeds to prevent growth of the fungi producing mycotoxins.

## VACCINATION

- Vaccination is done to poultry when the birds are very young mostly preferably before laying
- Vaccines should only be given to healthy birds for vaccinating a sick bird may be suicidal
- Anthelmintics against internal parasites should be given two weeks before vaccinating just to improve the effects of the vaccine.

NOTE: Always have a disease prevention calendar-for you to be able to treat diseases according to their occurrence just before their onset, for example Newcastle Disease and Fowl pox.

Day/Week	Vaccination	Mode	Remarks
Day 1	Mareks	Subcutaneous	Done at the hatchery
Day 10	Gumboro	Drinking water	Avoid chlorinated water
Day 18	New Castle	Eye drop/Drinking water	Avoid chlorinated water
3 Weeks	Gumboro/Newcastle/	Eye drop/Drinking water	Avoid chlorinated water
3 Weeks	Fowl pox	Wing stab	Use skilled personnel
8 Weeks	Fowl Typhoid	Intramuscular injection	Use skilled personnel
18 Weeks	Newcastle 3rd dose	Eye drop/Drinking water	Avoid chlorinated water
19 Weeks	Deworming	Drinking water	Repeat every 3 months

Table 2: Kienyeji chicken vaccination schedule

Parasite	Effect	Control/ treatment
<b>Lice</b>	Reduced production	Permethrin
<b>Mites</b>	Anaemia and low production.	Ivermectin
<b>Stickfast fleas</b>	Anaemia, low production	Vaseline (Topical)
<b>Helminthes (worms)-</b>	Low production	Piperazine
<b>Protozoa</b> (coccidiosis)	Causes coccidiosis	Amplorium

Table 3: parasitic disease management

## Non infectious diseases

### Deficiencies

- Insufficient feeds or feed deficiencies.
- High mortality rates among chicks during hatching may be due to nutritional problems like salt deficiency.
- Poor growth and rickets is caused by calcium deficiency.

### Toxicities

- Excess minerals can cause abnormalities
- Excess common results in deformed eggshells and increased water consumption (toxicity when water is not available)
- High carbohydrate and low fat with; lack of exercise; high temperatures and stress can cause fatty liver syndrome which can lead to high mortality
- Ingestion of toxic plant parts

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