Improved Dairy production

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1. Introduction to improved dairy production

In Uganda, Livestock is an important component of the agricultural sector and economic development. Among all livestock types, by far the dairy sector was identified as a high potential to enhance food and nutrition security, accelerate economic development and eradicate poverty in rural and urban families (NPA, 2010, MAAIF, 2010). There is an increasing trend in livestock growth estimated at 4% because of the competitive endowments of favourable climate and fertile soils which provide good grazing conditions. The demand for livestock and livestock products is increasing in the developing countries as result of human population growth, urbanization and incomes. Currently, livestock products are predominantly supplied by the small scale producers in the rural communities. As such livestock production presents a unique opportunity for poverty reduction, food security and development in the rural communities and for the urban populations.

LVEMP II project is designed to contribute to the sustainable management and enhance conservation of the biodiversity and natural resources of Lake Victoria and its basin. Under the watershed management component, various institutions were selected to backstop sub project (CDDs and strategic interventions) activities which received funds from LVEMP II through the districts. Premised upon this back ground, NARL is backstopping implementation of LVEMPII sub projects including livestock projects in various districts. It is envisaged that support of livestock enterprises as livelihood projects would reduce stress on the water bodies translating into sustainable conservation of biodiversity and management of natural resources in the Lake Victoria basin.

Objective of the trainings

- Equip the community or farmers with appropriate knowledge and skill for dairy production and management.
- Enhance the farmer's ability to increase their livelihoods through poverty alleviation using dairy production.

Key learning outcomes:

- Farmers should be able to identify and select better dairy breeds and breeding options
- Farmers should be able to feed their animals.
- Farmers should be able to identify, prevent , control diseases and condition in dairy farm
- Farmers should be able to design and constructs a cow shed for dairy animals
- Farmers should be able to carry out routine management practices
- Farmers should be able to manage calves as replacement stock

2. Importance of keeping dairy cattle

Why keep Dairy cattle?

Dairy cattle are reared to realize the following benefits:

1. Milk (for sale)
2. Income to meet family expenses including education for children
3. Milk and Meat for nutrition and Food security(home consumption)
4. Manure
5. Biogas/ Energy

3. Dairy breeds in Uganda

The common dairy breeds in Uganda comprise the indigenous, exotic breeds and the grades. The indigenous have many attributes namely; heat tolerant, adaptable to a wide range of climatic conditions and resistant to diseases. The East African Zebu is a dual purpose animal, the cows provide milk while the steers, surplus bulls and culled cows provide the meat (beef). Physical characteristics of Zebu include; short horns, pronounced hump, small dewlap, small, stocky, and multicolored (black, black-white, gray extra). Other local breeds used for dairy production include: Ankole long horn (Sanga) – These have well developed horns as the most outstanding feature; somehow less resistant to diseases especially tuberculosis. The Nganda are intermediate

between Ankole and zebu. Their horns are not pronounced like that of the but bigger than the Zebu.

Inspite of the fact that indigenous breeds have the ability to survive under harsh condition, relative disease resistance and good mothering ability; their low productivity is a function of low genetic potential. Subsequently, farmers have been encouraged to improve dairy production and productivity using exotic breeds, such as Friesian (dual purpose breed), Jersey, Guernsey, Ayrshire, Sahiwal (dual purpose tropical Zebu)-originated from India-Pakistan border which is reddish brown with white on neck, underline and their grades. However, the exotic breeds have opposite characteristics of the indigenous breeds.

4. The key management (husbandry)principles for dairy cattle

Management of the improved dairy cattle covers the following:

- Proper feeding / nutrition
- Proper hygiene and housing
- Proper record keeping
- Proper disease control / Animal health
- Proper breeding and breed selection
- Proper care of the replacement stock

5. Feeding of dairy cattle

Feeding is a process of utilizing feed stuff to provide nutrient requirements for the animals. Nutrient is defined as substance that is absorbed and utilized by the animal body. In addition each nutrient fulfills specific roles in growth, production or metabolism.

i) Purpose of proper feeding.

Animal should be fed properly to cater for the following:

1. Body maintenance
2. Production
3. Reproduction

ii) Proper feeding

Proper feeding aims to provide animals with a balanced ration. The component of a balanced ration comprises of various nutrients, such as energy source, protein, vitamins, minerals,

fats/lipids and water. **It** is important to appreciate that animal feed requirement is based on the need for specific amounts of various nutrients.

Energy:

This is the nutrient required by cattle in the greatest amount and it usually accounts for the largest proportion in a balanced ration. It is measured as percentage Total Digestible Nutrients (TDN); which is used for: growth, lactation, reproduction, movement and feed digestion. The digestion of energy is mainly done by rumen microbial digestion of cellulose and hemicelluloses (from roughages) and starch (from grains) resulting into the production of energy-rich byproducts called volatile fatty acids (VFA's) which are fundamentally the main source of energy to animals.

Proteins:

These are the main building blocks of the body usually measured as percentage Crude Protein (CP). They are composed of chains of amino acids and fundamentally important in the maintenance, growth, lactation and reproduction of the animals. Protein digestion involves the crude proteins which are normally the true protein and non-protein nitrogen (NPN) such as urea and ammonia. The activity of the rumen microbes in breaking down and reforming dietary protein has important implications for the ruminant:

- Ruminants can thrive on diets containing low quality, low cost protein (relative to mono-gastric) since rumen microbes upgrade the protein quality by manufacturing limiting amino acids
- Ruminants can utilize some inexpensive non-protein nitrogen (such as urea) in their diet as a protein substitute.

Digestion depends on protein solubility in rumen fluids to enhance microbal utilization of nitrogen to make own proteins. Later microbes and not soluble proteins are digested by enzymes in lower GIT and absorbed.

Vitamins:

These are biological compounds which are active in extremely small amounts. The most important vitamins of concern in animals are: Vitamin A, D and E. These vitamins are readily available in fresh forages. While in the conserved forage , vitamins are higher in silage than hay.

Importance of Vitamins:

Vitamin A is essential for normal growth, reproduction and maintenance of animals. Insufficient Vitamin A is associated with lowered fertility in both bulls and cows. Vitamin D is required for proper development of bones. Vitamin D deficiency in calves results in bowing of the leg bones (rickets). In older animals bones become weak and easily fractured. Vitamin E, along with selenium, is required for proper development of muscle tissue. Lack of Vitamin E and/or selenium causes nutritional muscular dystrophy, commonly called white muscle disease. It is most common in young calves. Prevention of white muscle disease may be achieved by injecting calves with Vitamin E/selenium at birth, injecting pregnant cows with Vitamin E/selenium, or feeding cows with supplementary Vitamin E and selenium.

The level of B vitamins in dairy cattle diets is not usually of concern, although some special situations exist. The rumen microbes manufacture large amounts of these vitamins, which are then available for absorption by the animal. The B vitamins are of importance in young calves which have not yet developed a functional rumen. Cattle which have been severely stressed have a depleted rumen microbe population and may benefit from supplementation of B vitamins.

Minerals:

Minerals are classified into two namely; the macro-minerals and micro-minerals. The macro-minerals include: sodium (salt), calcium, phosphorous, magnesium and potassium. While the micro or trace minerals include: iodine, copper, zinc, sulphur and selenium. Mineral content is affected by the type and quality of the feedstuff. As such, supplementary minerals to the ration

are usually required to ensure that the proper amounts of these elements are available to the animal. The deficiency of these minerals results in malfunctioning of the body systems. For example;

- Calcium – poor growth, bowed leg bones, brittle bones
- Phosphorous-poor growth, craving for wood, hair and soil, poor conception rates
- Magnesium-muscle tremours, staggering, convulsions (grass tetany)
- Sodium (salt)-poor growth, chewing or licking of wood
- Selenium-weakness, inability to stand.

Water; Water is a very important nutrient and should be given to animals adlib**.** In dairy animals 80-87% of the milk is constituted of water. It is a solvent, regulates body temperature and also useful in body metabolism.

6. Major Sources of nutrients in the dairy production:

1. Energy source:
    - Maize
    - Forages
    - Banana peels, potato peels and other crop residues
    - Conserved forage (hay, silage and haylage)
2. Sources of proteins(body building feedstuff) mainly from;
    - forage legumes
    - Soy beans
    - Cotton seed cake
    - Sunflower cake/ groundnut cake
3. Sources of fats/lipids are mainly agro-industrial by-products such as Cotton seed cake, groundnut cake and sunflower cake. However, they are also noted to be high energy and protein sources for animals.
4. Sources vitamins
    - Pastures
    - Premix
5. Minerals:
    - Pastures
    - Premix

Table 1: Categories of forages for dairy cattle

Pasture grasses	**Legumes**	
Napier grass	***Tree legumes***	***Herbaceous legumes***
Kikuyu grass	Calliandra	Centrosema
Bracharia	Luceana	Lablab
Chloris gayana	Glilicidia	Mucuna
Panicum maximum	Sesbania	Stylosanthes
Hyparrhenia rufa	Albizia	Desmodium and Silatro

Quantity of feed to give an animal in a day

It is recommended that a dairy animal eats 3 % of it body weight as DM, when 100kg of fresh pasture are dried, they give you 25% DM.

Illustration: Suppose a farmer has heifer with estimated body weight of 250kg. What would be the quantity of fresh forage required for this animal?

The total dry matter required by the heifer is = 3/100 x 250 = 7.5 DM, but 7.5 x 100/25 = 30 Kg fresh grass. However it is recommended that 2/3 of daily ration should comprises of pasture grass and 1/3 pasture legumes for better performance.

The amount of water required for dairy cattle per day is equivalent to 15% of its body weight. Therefore an animal of 250kg of body weight would require 37.5ltrs of water which is equivalent almost to two jerrycans of water.

7. Digestive system of ruminants and function

- **Digestive system and feeding plan (regiments) for a lactating cow.**

Full understanding of the ruminant digestion is significant for managers of dairy cattle. Cattle belong to a class of animals called ruminants. This group also includes sheep and goats (shoats). Ruminants have a digestive system (Fig.1) which allows them to utilize roughages (e.g. hay and grass) as a major source of nutrients. These animals have a large fluid filled digestive organ at the beginning of the digestive tract called the rumen. The rumen contains a large population of

microbes (bacteria and protozoa). Much of the initial digestion of feed is done by microbes in the rumen.

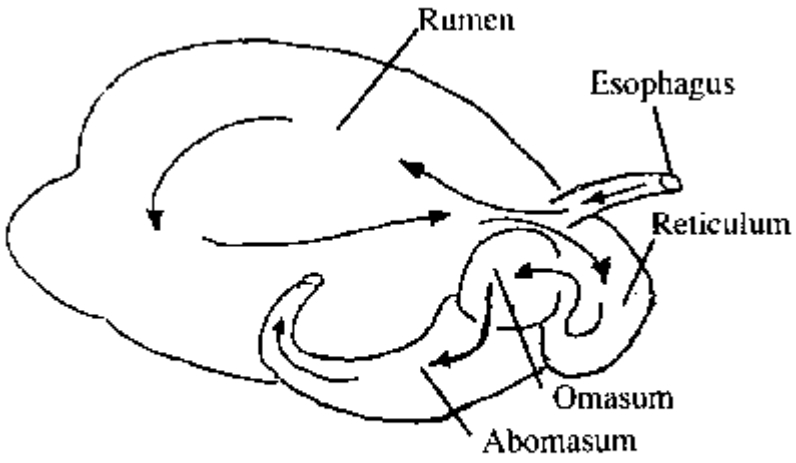


Figure 1. Ruminant Stomach
⟶ Flow of Digesta

These microbes have the ability to break down cellulose and hemi-cellulose, which are main components of roughages. Rumen microbes also break down other components of the animal's diet such as protein and starch.

Rumination process involves five steps;

- ✓ Regurgitation-a bolus of food brought backup to mouth
- ✓ Re-insalivations-mixed with saliva
- ✓ Re-mastication-re-chewed
- ✓ Re-swallowing-bolus is then swallowed back into rumen
- ✓ Fermentation-in rumen, bolus is fermented

The reticulum is a smaller organ which acts as a holding area for feed after it passes down the esophagus. The omasum is an organ which absorbs water from the digesta (mixture of feed and fluid) before it flows into the abomasum (true stomach). The animals own digestive enzymes break down food in the abomasum and small intestine. Absorption of these nutrients occurs

mainly through the small intestine. Thus the *regiments of feeding* **(**feeding and or grazing pattern/plan) a lactating cow for optimal production is essential as illustrated below:

6.00 a.m-10.00 a.m- Feeding time

10.00am-2.00 p.m- Rumination (chewing curd and taking water)

2.00 pm-3.00 p.m- Milking time

3.00 pm-7.00 p.m-Feeding time

7.00 p.m-12.00 p.m-Rumination (chewing curd and taking water)

5.00 a.m to 6.00 a.m-Milking time

8. Dairy grazing systems

- *What are the main grazing systems practiced in Uganda?*

There are various dairy grazing systems including zero grazing, semi-intensive (fenced grazing), tethering, and extensive (communal and nomadic or migratory). However, for improved dairy production zerograzing, semi-intensive and tethering are commonly practiced while the extensive system is mainly for grazing of local breeds.

Zero grazing system:

In purely zero grazing system the animals are continuously confined in enclosed shed or stall under intensive feeding. In stall feeding farmers practices cut and carry method for feeding their animals. The fodder is chopped into small pieces of material before it fed to the animals. This Chopping of the grass maximizes feed utilization and also increases surface area for digestion. They are sometime supplemented with crop-residues (banana peels, potato vines). However, the major constraint is pasture availability in the dry season.

Semi-intensive system

This is a feeding system where animals are left to graze in paddocks (on planted pastures) or fenced grazing. Although more often given supplement too.

The disadvantages of zero grazing and semi-intensive include high level of management, labour, technical skills and high cost of inputs.

Tethering system

In this system, cattle are tethered on pegs or tree stump in the pastures during day. Generally, it is characterized by:

- Animals are usually tethered where there is a source of pastures.
- Feeding on non-conventional feeds –banana peeling, sweet potato peelings and vines
- Few animals kept and water is always provided when they are brought back home.

The main constraints include unavailability of pastures, low returns and poor management

Extensive system

This is a method commonly practiced in communal land tenure system and in the pastoral communities.

Communal –the animals graze in an area that is shared with herds belonging to other people, but they return to the farm each night

Migratory/nomadic-the animals move to different locations for some or all of the year to graze and this is shared with herds belonging to other people.

Generally, the extensive system is on the decline because of increasing land pressure due to increased human population. In this system cattle contributes over 50% of household incomes in terms of hides, meat and milk production.

The system is constrained by lack of water and pasture- This is majorly influenced by climate change, communal tenure land system which does not observe the carrying capacity, cultural attitude-resent new technology, marginalized –low development priorities and markets are far from areas of production

9. Common dairy cattle diseases:

What is a disease? Disease is the deviation from normal health

Common causes of diseases:

a) Organisms
   - Bacteria
   - Virus
   - Fungus
   - protozoa
b) Poor feeding
c) Trauma/physical injuries
d) Chemical substances
e) Error in management

Disease can be detected through observable structural and functional malfunctions expressed as symptoms or clinical sign. The following are the common signs of diseases in cattle:

- Floppy ears and standing hair
- Wounds in hooves and mouth
- Lameness
- Cough
- Sneezing or discharge from nose
- Diarrhoea
- Drolling saliva or salivation
- Lacrimination (tears)
- Swelling under jaws or sub-mandiblar oedema(water like sac below the jaws)
- Swollen abdomen/ bloat
- High temperature
- Swollen lymph nodes
- Mourning/bellowing/crying
- Running (mad cow)
- No movement or abnormal movement ie moving in circles
- lethargy/weak
- Bad breathing like fast breathing(dysponea) or laboured breathing or difficult breathing
- No chewing cud
- Reduction in milk production
- White in eye/eye opacity
- Grinding of teeth
- Red urine, loss appetite
- Hard dung or constipation

Table 2: Some of the diseases/conditions common in dairy production system, their vectors and the cardinal sign.

Name	**Causative agent / vector**	**Cardinal signs**	**Prevention/control**
East cost fever	Protozoa/Brown		Spraying of animals,

	ear tick	Floppy ears, Loss of appetite, Drooling saliva, Labored breathing(difficult breathing) in advanced stages of disease, Whitish colouration of the eye or eye opacity, Cough and swollen lymph node, Swelling under mandibles (sub-mandibular oedema), High temperature(above 41°c), Bloody diarrhea in advanced stages of the disease, Now chewing cud and no movement	Treatment with antibiotics and Butalex
Anaplasmosis	Protozoa/Spotted tick	High temperature(above 41°c), Constipation or hard or dry cow dung, loss of appetite, Reduced milk yield	Spraying of animals, treatment with antibiotics and Imizol
Heart water	Protozoa/Spotted tick	High temperature(above 41°c), Circling gait or cow moves in circles, loss of appetite, Reduced milk yield	Spraying of animals, treatment with antibiotics
Red water/ Babesiosis	Protozoa/Blue tick	Red urine, High temperature(above 41°c), loss of appetite, Reduced milk yield	Spraying of animals, treatment with antibiotics, diminazene aceturate and Imizol
Trypanosomosis (Nagana disease)	Protozoa/tsetse fly	Standing hair, rough hair coat, Diarrhoea, Loss of weight/ emaciated, Intermittent high temperature(above 41°c), swollen lymph nodes, bloody discharge from ears	Spraying of animal, treatment with diminazene aceturate or sodium isometamidium, ethidium
Mastitis	Bacteria due to poor hygiene(dirty sheds, milkers) and milking practices like incomplete removal of milk	Abnormal milk (Clotted milk, sometime westerly, bloody in colour and contains flakes), Reduces milk yield and animal is off feed, High temperatures(above 38˚c, Kicks on milking because it feel pain, The udder is swollen, painful and hot, There could be diarrhea if it is caused by bacteria that release toxin in blood like E.coli, Loss of appetite	Good milking hygiene, environmental hygiene, use of antibiotics and intramammary tubes

Pink eye disease	Bacteria (*Moraxella bovis*)/house fly-from the cow dung	The colour of the eye lid and eye is pinkish red at start of disease, eye discharge, eye opacity ad loss of sight, Loss of appetite, Reduced milk yield	Good hygiene practices, antibiotics and eye ointments-opticlox^{R}
Worms (helminthosis)	Lung worms, stomach worms and liver flukes	Diarhoea, loss of weight, cough, Dull/rough hair coat, sub-mandibular eodema, Pot belly (distended abdomen)especially in calves, Reduced milk yield	Regular deworming, clean water
Lumpy skin disease	Virus/ insects	High temperature, lumps on the skin, loss of appetite	Vaccinations, use of antibiotics
Foot and mouth disease	Virus/infectious	Drooling saliva, wounds between hooves and in the mouth, blisters on the mammary teats and in the mouth, loss appetite, lameness and reduced milk yield, high fever, abortion in pregnant cows	Vaccinations, use of antibiotics to control secondary bacterial infections
Milk fever	Low blood serum calcium level	Fall in body temperature and unsteadiness, Animal recumbent or lying down due to partial paralysis and is unable to raise, the neck and head is twisted or turned backwards towards her side or in “s" position	Mineral supplements, use of calcium bologluconate i/v
Bloat	Excessive accumulation of gas in rumen due excess legume pastures and heavy grain feeding	Swollen abdomen, Kicking at the belly, Difficult breathing/laboured breathing	Use of trachor and canula, avoid use of lush fodder
Chronic laminitis and sole ulcer	Hard surface(concrete), Over grown hooves and	Over grown hooves, reduced milk yield, loss of weight and lameness	Use of antibiotics, hoof trimming

	carbohydrates diet		
Plant poisoning	Toxic plants	Watery diarrhoea, bloat, sudden death	Remove weeds from fodder

Recommended management practices for prevention and control animal diseases/condition

- ✓ Provide adequate nutrients
- ✓ Control internal and external parasites
- ✓ Breed heifers at proper size
- ✓ Immunize animals against diseases that are common in the area
- ✓ Make sure new borne calves receive adequate amount of colostrums
- ✓ Provide clean water and feeds
- ✓ Treat animals promptly
- ✓ Provide adequate nursing for diseased animals
- ✓ Separate age groups as soon as possible and never mix species ie goats/sheep and cow to avoid spread of diseases like Foot and mouth disease
- ✓ Isolate diseased animals
- ✓ Separate incoming animals from the ones you have at least for 2 weeks before mixing
- ✓ Official animal health certificate should accompany incoming animal
- ✓ Provide adequate space and ventilation
- ✓ Keep the environment hygiene;
    - disposal of infected materials
    - disinfect the premises
    - water supply control
    - feed protection and inspection
    - sewage and other waste management

Note: many disease outbreaks could be minimized or totally prevented with proper management

10. Record Keeping

What is record keeping?

- Efficient management of resources (ENTREPRENEURSHIP) premises on gathering and analysis of performance information for decision making.
- This call for record taking/documentation and management

Definition of records:

- Documents or source of information kept by farmer about the farming business

Why keep records?

- Data on cash flows help you prepare financial statement for analysis, evaluation and monitoring of progress of business towards your goal or business plan

- The best way to measure progress in a project is with record keeping!

- Based on analysed data you can plan improvement of the business- improve standard of farm management and performance monitoring: health, reproduction, production rate etc.
- Record provide information- basis of decision making and planning
- Managing the farm- keep track of things like
  - ✓ How many animals you have?
  - ✓ What is their health status?
  - ✓ What you are feeding, how much/how often?
  - ✓ Also track income and expenses
  - ✓ Help you measure physical and genetic progress of each animal
- Provide information (financial statements) for farm budgeting, preparing business plan and basis of accessing credit/loans/grants
- Develops historical data bank of farm performance information for future planning

Golden rules in records keeping system

- Take accurate record-necessary data
- Keep the records simple – saves time and make simple design and easy to keep
- Keep the records up to date- provide necessary information
- Regularly analyze your record (data)
- Record should be useful tool-provide necessary information when needed for decision taking

Types of records

- Financial records- cash book/incomes, bank book, purchase orders, goods received and payment vouchers/expenses
    - Necessary to calculate profitability of business
- Production/productivity records:
    - Breeding records-date of service, calving date,
    - Feeding records-feed cost, type of feed, amount
    - Performance records - weight gain
- Health records - treatment, vaccination
- Inventory records and administrative records - livestock cards/, Identification records - everything owned at farm

11. Basics of breeding on dairy farm

- **Breed selection and breeding**

What is breeding?

- Animal breeding is the controlling of conception and hereditary of animals for the purpose of maintaining a given standard or development of new and better types.

What is selection of breeding stock?

The basic method of genetic improvement of dairy enterprise is selection. Selection is act of choosing offspring from high yielding stock before first mating or simply choosing the parents of the next generation, so that the genetic merits or genotype of the next generation is improved in the desired traits. However, in breed selection, the farmer should know the products he/she wants ie dairy or beef because the cattle are genetically designed to produce a given product.

Key output of breeding:

- Increased productivity
- Genetic progress

Qualities of a good dairy cow

-A good dairy cow is shaped like a barrel (wedge-shaped) which widens from shoulders towards the tail

-Should have a wide (bowl -shaped) and deep udder with four well placed teats

- It should not have supra-mammary teats

- The udder should be firmly attached high in the back and far forward underneath

- The udder should not be pendulous or hanging loosely and not too low below hocks

- A dairy cow should have strong legs and hooves and the backline should be straight

- The rear end should be wide and square to allow easy calving

- The mouth should be wide to allow consumption of adequate feed which is necessary for milk production

-Generally dairy animals are boney

Breed selection is crucial for the profitability of dairy enterprise

Target reproductive efficiencies

The target reproductive efficiencies in any profitable dairy production include:

- Heifer served between 14-15 months, calving by 24 months (90%) but latest calving 27 months.
- Calving interval 365-540 days(from one calving to next)

- Non return rate (days spend without coming into heat/oestrous after calving or post-calving) – Not exceeding 60 days
- Pregnancy rates/conception rate-60%
- Calving rate >85-90% calve after service
- Calving interval (interval between two calvings) – not exceeding 12 months because in good dairy production calf per year is the desired reproductive efficiency for profitable enterprise
- Target weight of 65%- heifers reach puberty early, more conceive, calve earlier but high cost
- Cycle-heat every 18-22 days until she becomes pregnant

Heat detection and behaviour signs

- *Cow behaviours*:

✓ Cow mounts others and stand still if you touch rump

✓ Decreased milk production and feeding

✓ Sniffing and flehmann lip curl

✓ Clear-thin mucus discharge hanging

✓ Vocalizing/bellowing and bull seeking

✓ Lifting tails and increased walking/restlessness

Breeding options in dairy cattle

Natural service –cow on heat is exposed to the bull for coitus

- Advantages:- simplicity, reduced cost and good timing
- Disadvantages-difficult to manage, no variety, increased risk of venereal disease, infertility incidences particularly inbreeding.

Artificial insemination– frozen semen from the selected bull is mechanically introduced or deposited into the female genitalia (cervix) of cow on heat by a trained technician. This method has been employed greatly in upgrading our local breed of cattle by semen from suitable exotic bulls.

- Advantages –variety(proven quality), easy to synchronize, saves management cost of keeping a bull and reduced risk of venereal diseases
- Disadvantages- high cost, repeat breeders, timing is critical and unavailability of technicians

Embryo transfer-mechanical introduction of freezed embryo into the cervix of cow on heat (surrogate dam)

- Advantage – variety(proven quality), easy to synchronize, saves management cost of keeping a bull and reduced risk of venereal diseases,
- Disadvantages- high cost, unavailability of embryos and unavailability of technicians.

12. Care for the breeding animals

- **Feeding and management of heifer**

The objective is to reduce age at first calving, lower looses due to death and fast growth rate.

Why manage heifer well?

Puberty is related to size, milk production is also related to weight at first calving, under feeding affects fertility and overfeeding leads to difficulty in calving.

- **Gestation and lactating –cattle**

During this phase the following should be noted and precautionary measures taken;

- There is continued growth and health of the cow therefore the animal should be in good condition.
- Essential for development of the foetus, preparation of cow for calving, lactation and rebreeding.
- Keep monitoring the nutrition and health
- Supplement with 2-3kg concentrate (steaming for foetus and milk which is accumulating in udder) but avoid overfeeding-abortion, dystokia, neonatal mortality
- Increase water availability by 30%
- Similarly poor nutrition may lead to metabolic disorders such as milk fever.
- Dry-cow therapy – prevention of mastitis

- Cow with calf (lactating)- extra allowance be made for milk production using value added feeds

What is the lactation cycle?

The knowledge of strategic feeding of dairy cow is necessary for increased productivity

Cows must calve to produce milk

The cycle is from one calving to the next calving (365-540 day)

Cycle is split into 4 phases; early, mid , late lactation and dry period

Each lactation phase is about 100 days long

Early lactation is the most important because:

–Cows must have high peak milk yield

–Cow's appetite is limited

–Cows must get back in calf

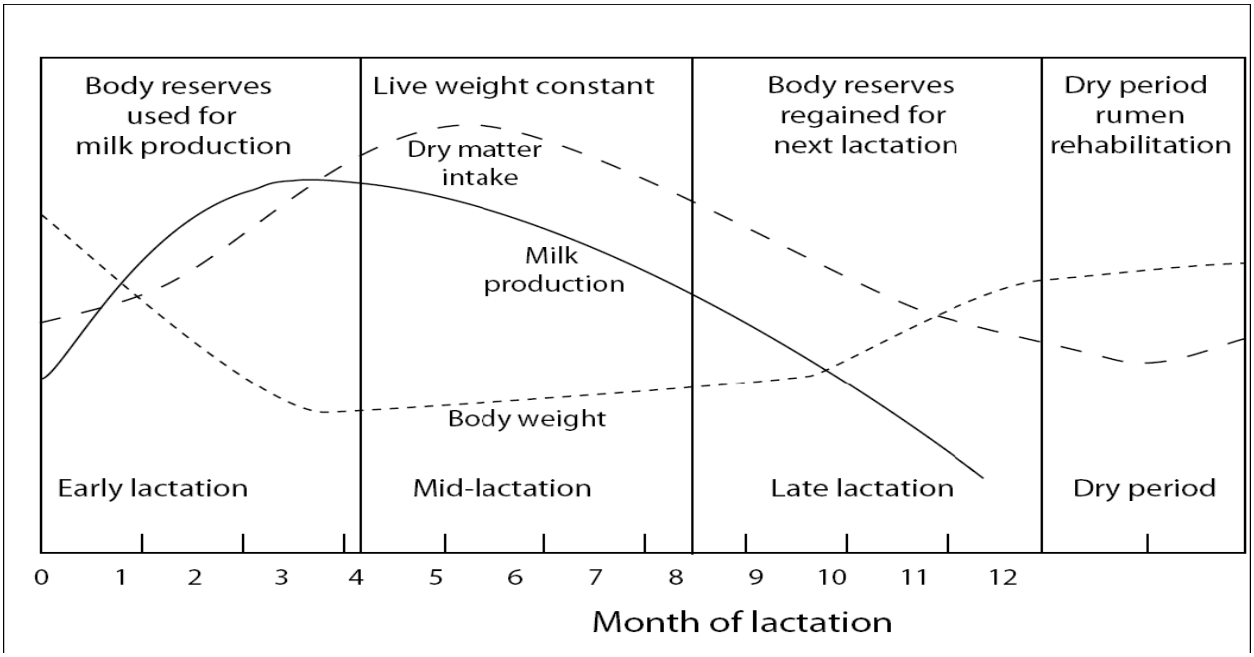
–Good cows lose live weight & body condition

Mid lactation: continue with good milk yield

Late lactation: good milk yield, regain lost condition, grow calf

Dry period: grow calf, prepare for calving (regenerates the udder, build energy reserve)

Phases of lactation cycle in cow - A must know if you are to manage dairy cow!



Stages of parturition /labour

Labour stages are three namely;

- First stage (lasts 1-10 hr)-signs of abdominal pain and external appearance of water bag
- Second stage(20-90 minutes-breaking of water bag, expulsion of fluids and birth of foetus
- Third stage (20 minutes to 4 hrs)- expulsion of foetal membrane, onset of uterine involution and even longer

➢ **Management of parturition and care at birth**

- Put bedding in maternity room for cow
- Keep watch on the expectant cow
- No disturbance and after calving allow active lick of calf-about 10-30 minutes
- Immediately remove the placenta once it drops –would cause indigestion
- Remove the calf-adopt bucket feeding and clean the hind quarter of animal and remove the dirty beddings

➢ **Calf management**

- Immediately remove mucus from nose, apply disinfectant (spray navel with iodine or spirit) on umbilical cord of calf
- Ensure feeding of calf from birth to 8-12 hrs of life, should be helped to take colostrums as soon as possible. Colostrum is the first milk produced cow after delivery and should be taken by calf the 3-4days as a must.
- Ensure that the calf drinks approximately 5% of its body weight.
- There are two calf feeding systems namely; bucket feeding or artificial and natural feeding systems
- Bucket feeding of calf or artificial feeding the calf is given milk after milking the dam/mother. The calf is removed from its mother/dam and taken it to clean pen with beddings. This is the desired method because the farmer is sure of the quantity of milk given to the calf.
- Natural feeding is where the calf is left to suckle its mother. However, wash udder and teat of mother before calf suckles. Farmers are discouraged to use this method because of difficult in estimation of the quantity of milk left in the udder for the calf to suckle. In many insistences the calf is starved because little milk is left in the udder for it to suckle.
- Colostrum is important for protection/body immunity for the first 2-3 months. However, it is cleanses the gut of meconium (first yellowish feaces of the calf), thus opening the Gastro-intestinal tract (GIT) and also is the main source of food for the calf.
- After 3-4 days of colostrums feeding, continue feeding calf (10% of its body weight milk)
- While calf is on milk, introduce some soft grass-2/3 weeks to initiate rumen growth
- Weaning could be 3-4months

13. Structural design and layout of Zero grazing unit

Zero-grazing is a form of centralising all your cow husbandry activities such as feeding, watering, and milking and health management. Proper planning is therefore, necessary before starting a zero-grazing system.

- **Key components and their specifications:**

Each cow has a resting place known as the cubicle, which should be high enough and spacious measuring a length of 210cm (7ft) and a width of 120cm (4ft) that is separated from each other by two timbers

The resting floors should be raised and filled with murrum, or you could provide a cow mattresses if you can afford it, but not made of concrete

The walking area is about 3 metres wide between the resting area and feeding area (feed and water troughs). This area is also known as the sunning and dunging area. There should be no roofing here but the floor should be made of concrete for easy collection of urine and manure. The surface of the floor should be rough so that animals cannot slip, and it should slope from the milking place towards urine and dung collecting pit.

Along one end of the walking area are the feed troughs with a water trough in the middle. The inside measurements of the feed trough should be 60cm (2ft) wide at the bottom and be raised at least 15cm (1/2 ft) above the ground level of the walking area. Shallow feed troughs allow for feed spillage hence wastage. At the centre of the walking area should be the mineral box, for easier reach by animals.

Next to the resting cubicles is the milking parlour. The floor here should be made of concrete sloping towards the walking area. A feed trough should be fitted at the head of the milking parlour for feeding the cows during milking. A head yoke should also be constructed to restrain the animal during milking.

The calf pen is normally constructed with measurements as 120cm by 150cm (4x5 ft) floor. This floor should be slatted and raised at 0.5-1ft above the concrete floor. Beddings are not encouraged as they can keep parasites and cause disease conditions to the calf. The crush can be made outside the unit for health and spraying activities.

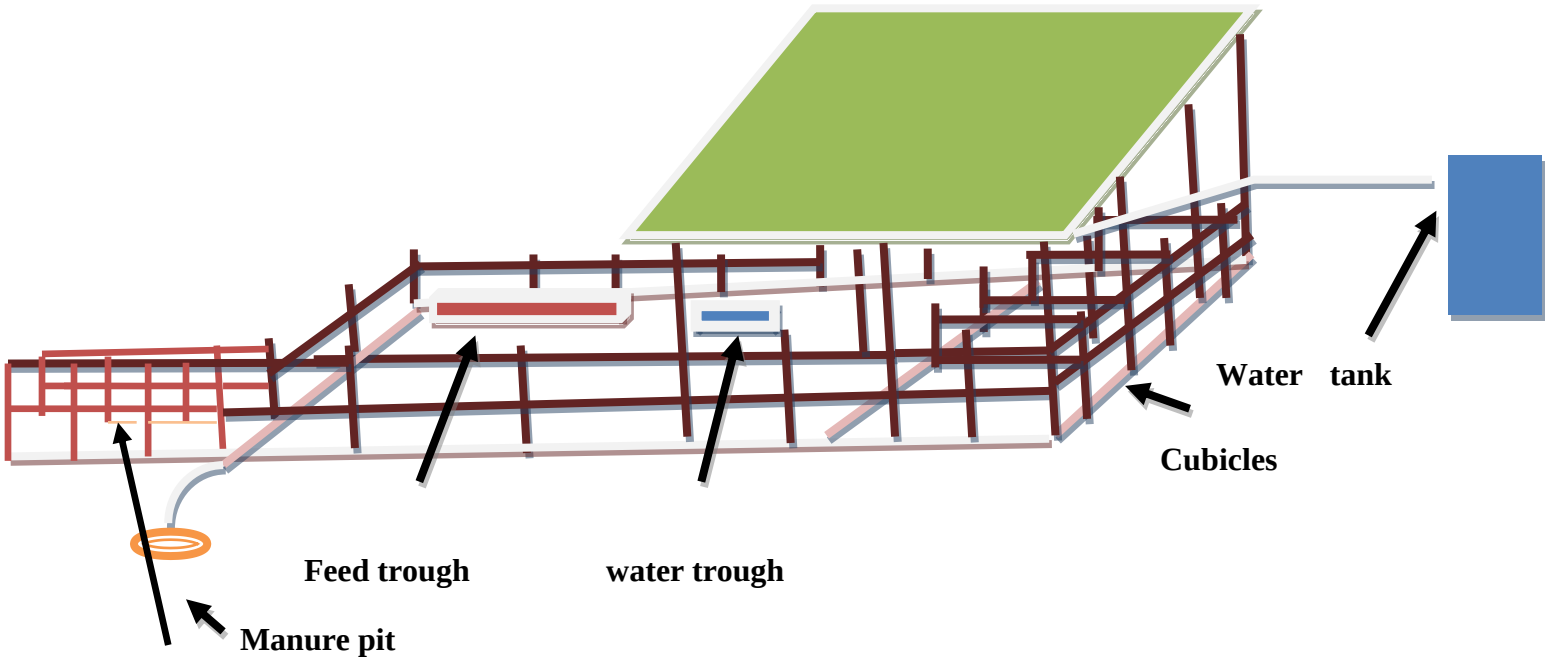


Fig 2: Side View of Cow Shed: 4LU = 2 COWS, 3calves

14. Animal waste management

Livestock production is greatly associated with manure production because 3% of what the animal feeds is manure per day. Manure is simply the product of feaces and urine in ratio which inevitably becomes a problem if not properly managed. Animal waste occupies space, pollutes environment, harbours infectious agents and is a threat to animal health.

What are the approaches to animal waste management?

- ✓ Stock pilling
- ✓ Construction of manure pits(basins)
- ✓ Recycling into feed
- ✓ Bio-gas production

Why animal waste management?

- ✓ Promote animal health and efficiency of production since manure causes stress through hoof problems, mastitis, over standing, reduced feed conversion and increased mortality
- ✓ Prevent environmental pollution
- ✓ Utilise the nutrient maximally through use of manure a product of stock piling and bio-slurry in crop –production
- ✓ Bio-gas technology, bio-slurry and energy production

Our focus will be on bio-gas technology, bio-slurry and energy production. In line with the project objectives of reducing stress on the water sources (Lake Victoria) and sustainable maintenance of the lake biodiversity; bio-gas technology and energy production was promoted as mitigation for tree-cutting for fuel. Similarly, water harvesting technology was promoted in households to support projects intended for improvement of livelihoods of the community particularly households.

What is bio-gas?

Biogas is produced by processing residual waste from livestock which is used as fuel (energy source) in households. In addition the bio-slurry was envisaged to be used as source of manure to enhance soil fertility in the crop-gardens.

15. Routine animal husbandry and management practices

As good management practice, routine procedure must be implemented on the farm.

Definition routine procedures: routine procedures are those husbandry practices a producer has to do regularly on the farm.

These practices increase farm productivity resulting into higher profits. The good management includes the following:

1, Health management tasks- ensure good health animal is maintained and improved quality of the animal products namely; oral drenching, hoof trimming, identification measures, dehorning, wound dressing and treatments, vaccinations and bio-security measures

2, Reproductive health management- ensures achievement of calf per year namely; synchronized breeding, ascertain reproductive herd health problems and control breeding through castration

3, Nutrition management- ensures proper feeding namely management and development of pastures, supplement animals with good rations

4, Financial management tasks- aim at gauging the financial performance of the farm (gross margins- costs)

5, Monitoring production performance- weight measurent to assess growth performance, aging and culling for market and health care purposes

Insight into the various management tools implemented is as below:

Castration:

This is a preventive surgery as a managemental tool. It involves the removal of testes or crushing of the blood and spermatic cord to the testes using burdizzo which results into withering/shrinkage of testicles.

This procedure causes the animal to be sexually sterile, less aggressive and reduces sex drive. Normally castration is done in early age to avoid stress.

There are basically two approaches to castration in cattle namely;

- ✓ Surgical approaches using knife- this can either be open or closed castration.

  Open castration the scrotum and turnica are both incised using surgical scapel and sharp knife to remove the testicles by cutting through the spermatic cord under hygienic conditions. While the closed type, the scrotum is incised and the tunica albugnia is left intact. The testicle is removed by cutting through the spermatic cord under hygienic condition.

- ✓ Burdizzo method-bloodless method and the technique involve drawing the testicles into the scrotum and crushing the spermatic cord by clamping it between the jaws. The testicles degenerate and wither due to lack of blood supply to the areas.

Strategic treatment (deworming):

This is intended to control internal parasites and normally done through a strict strategic plan in the year, the animals are dewormed especially before start of the prolonged rainy season and also at start of the dry period. However, some routine or regular interval like every three months could be followed regardless of the season. The drenching is done using the drenching gun and much emphasize is on accurate body weight measurement. Otherwise, you risk overdose which could translate into death. Another care is during dosing avoided pulling the tongue as this predisposes to chocking and death when the oaesopagus is temporary closed and the dewormers is headed to the lungs.

Dehorning:

More often horned animals inflict injuries to others or during fights especially at time of eating. Furthermore, horned animals could also harm the workers especially the aggressive type resulting into physical injury, heamatoma and hernia as result of trauma and death. Although the presence of horns has its advantages during animal restraint; dehorning is a routine practice to many farms.

Dehorning can be done at early age by removal of buds using dehorner or other caustic agents.

However, in older animals dehorning is done by use of saw or embryotomy wire. The process of dehorning is painful and can lead to shock or death, however when anesthesia is used it reduces the pain.

Identification and branding:

This procedure augments effective recording of animals on the farm. It involves giving animals marks using branding machine or numbers (ear tag) using tag applicator.

Weight estimation:

Weight measurement is a pre-requisite for monitoring nutrition and animal health care. However, it is good practice to know the weights for easy drenching to avoid overdose. Further, for market selection grading based on weight and body conformation is also crucial. Normally girth width measurement approach is preferred for weight estimation for purposes of treatment and

drenching. The important weights taken are birth weight for proper feeding, growth weight and slaughter weight.

Hoof trimming:

Hoof trimming is intended to mitigate stress from overgrown hooves. Hoof growth results into poor health associated with laminitis. Laminitis causes pain and difficult movement reducing the animal performance. Therefore, trimming of overgrown hooves using hoof trimmer and hoof knife to remove surplus wall horn is commonly practiced. This practice keeps the hooves short to the same height and in good condition.

Physical dressing and treatment:

This approach applies to dressing of wounds and dislocations. Normally dairy animals are encountered with physical injuries which lead to wound and dislocations. Besides, the routine practices like castration and dehorning could cause wounds that require dressing and treatment. The wound are dressed using topical and injectable antibiotics, hydrogen peroxides and antiseptics. After you can dress wound with bandage and gauze. However, cases of dislocation and incomplete fractures plaster of parice (POP) may be used to immobilize the affected site.

Ageing:

This is a common practice to ascertain the age of animals especially incoming or procured for stocking at the farm. Various methods can be used, namely; dentition, horn rings and use of records. Let us focus on dentition approach. The dental formula and structure estimates the age of animals premised on the fact that temporary teeth (delicious teeth) are replaced by permanent type after certain period. However, wearing is also common as age advances.

Estimation of age using eruption of permanent teeth is as follows:

1 pair of permanent teeth-1½-2 years

2 pairs of permanent teeth-2-2½years

3 pairs of permanent teeth-3 years

4 pairs of permanent teeth-3½-4 years

Above 5 years-permanent teeth wearing out

Vaccinations:

The control of economically important diseases such as FMD, Lumpy skin diseases, Anthrax, Black quarter name it requires regular vaccinations. This is normally done annually and in cases where a booster dose ie required during incursion.

Dipping and spraying of animals:

Prevention and control of vector borne disease on dairy farm is achievable through regular dipping or spraying of animals with acaricides. Most of the diseases namely tick borne diseases, trypanosomosis, anaplasmosis and heart water strike especially when there is laxicity in the vector control.

Biosecurity measures:

It is equally important that effective biosecurity measures are in place to control entry and spread of pathogens on the farm. This is done through establishment of bath containing disinfectants at the entrance into the farm to cleanse the vehicle tires, veterinary personels and other visitor before allowed in. However, bio-security measure on farm also prevent spread of diseases on-farm and out of farm like isolation of aborted animals or any sick animals, proper disposal of infected materials on farm etc.

Supra-mammary teats

It is always a good practice to remove extra-mammary glands to avoid cases of mastitis when the cow becomes productive. The most common approach is to use surgical procedures under local anesthesia and hygiene conditions to remove the teats.

16. Pasture and fodder establishment and management

Appendix (i): Common Questions normally raised by Farmers

No.	Question	Answer
	Where can we get the pasture materials for planting?	Livestock Research Institutes e.g. NALIRRI at Tororo and Namulonge(Nakyesasa)
	Do I cut a lot of grass and put in the box for animal to eat?	It is advisable to half fill the feed trough to avoid spillage, hence wastage
	Do you mix salt with water when giving?	No, mineral salt is in a form of block, animal just lick it. It is advisable to suspend it on string annexed to the feed trough or place in a special box fitting its size besides the feed trough. Lack of minerals leads to cows to suffer from milk fever

	How do we spray the animals?	Strategic spraying-we spray the ears, udder, tail and hooves. This approach would allow you to use 2 litres/animal
	Do you also spray the cow house?	Normally we spray animal in special structure called crush and there after allow animal stand in free yard or collecting yard for about 30 minutes. Cow house normally is not sprayed.
	When do you serve the heifer?	Serve at the right weight recommended after it has attained 65% of the mature breed weight
	How do we pierce animal with swollen stomach?	We normally use trachor and canula or improvise with nail in the left side in the lumbar region just in the loin region next to the pin bones of the pelvic girdle
	Do I apply fresh cow dung direct to the farm?	We discourage direct application of cow dung to the farm. Normally allow cow dung decompose into manure before it is applied in the garden.

Appendix (ii): Pictural view of clinical signs of diseases/condition(s)



Calf with Lumpy skin disease lesions (lumps all over body)



Typical lesions of Foot and mouth disease in cattle with wound on tongue (left) and drooling saliva (right)





Typical East coast fever case-cow with swollen parotid lymph node(left) and ticks (ticks)



Typical case of sub-mandibular oedema East Coast Fever



Overgrown hooves as predisposing factors Referred to as “slipper foot”