

**TRAINING COURSE FOR COMMUNITY BASED
ANIMAL HEALTH WORKERS IN KAZO
16 – 22 APRIL 2000**

Organised by

**Faculties of Agriculture
and
Veterinary Medicine,
Makerere University.**

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A training course was conducted in Kazo from 16th to 22nd April 2000 for community animal health workers. The course attracted 47 participants drawn from the cattle keeping community in Kazo.

The course included the following

- 1. Introduction to farming enterprises**
- 2. Feeding of farm animals**
- 3. Farm hygiene and minor surgical operations**
- 4. Common diseases in farm animals and ethnoveterinary practices**
- 5. Breeding and reproductive disorders**
- 6. Animal restraint, drug administration, zoonoses and public health**
- 7. Range and pasture management**
- 8. The role of women in livestock production**
- 9. Socioeconomics and administration**
- 10. Water harvesting and management.**

This manual contains some of the papers presented and discussed during the course.

Thereafter the course was closed by Hon John Nasassira, MP for Kazo county.

IMPROVING FEED RESOURCES IN AGRO-PASTORAL SYSTEMS FOR RANGELANDS DEVELOPMENT IN UGANDA

BY

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INTRODUCTION

In Uganda, rangelands occupy approximately 84, 000 km² (35%) and are important for livestock production. About 85% of the total marketed milk and beef in the country are produced from indigenous cattle which thrive on natural pastures in the rangelands. The cheapest source of feeds for livestock is natural pastures. However, pastures in the rangelands, like all tropical pastures, are of low quality because of the fast growth rate that occurs during the wet season. The quality decreases very fast with maturity and so cannot meet the nutritional requirements of the livestock. The nutritional problem of livestock in the rangelands is exacerbated by environmental hazards such as drought/water shortage and overgrazing due to large numbers of livestock populations which has led to range condition deterioration. The major indicators of rangeland degradation are shrub/bush encroachment, galleys as a result of water erosion and bare ground along cattle paths and resting grounds. All these indicators especially shrubs/bushes affect livestock nutrition mainly by reducing the size of grazable land and suppressing palatable grasses like *Brachiaria spp.*, *Setaria spp.*, *Themeda triandra* and *Hyparrhenia rufa*

and legumes like *Glycine spp.*, *Desmodium spp.*, Siratro, and Centrocema. In order to rehabilitate the deteriorating rangelands for increased crop and livestock production, there is, therefore, need to :-

- (i) improve the management of the existing natural pastures by (a) introducing improved and drought resistant forage species, especially legumes and (b) establishing ley pastures on the existing farms within the rangelands.
- (ii) practice proper grazing systems applicable to the rangelands in different areas for increased livestock production
- (iii) sensitize the agro-pastoralists on the use non-conventional feedstuffs especially during the time of feed shortages (severe dry season).

A. PASTURE MANAGEMENT TECHNOLOGIES FOR RANGELAND REHABILITATION

1. Improvement of Natural Pastures

These are a natural resource asset with a mixture of high quality grasses like *Panicum*, *Brachiaria*, *Chloris* and *Setaria* and low quality grasses like *Sporobolus*, *Imperata*, *Ergrostis*, *Loudetia* and other types of weeds. Proper management techniques capable of improving the overall productivity of these natural pastures include:

Fencing

Perimeter fencing to exclude unwanted animals and to allow the farmer know which area is to be developed should be done first. If resources are available, the fenced area should be paddocked to allow rotational grazing for efficient pasture utilization. Materials to use in fences include:

(I) barbed.

(ii) live hedges e.g. *Euphorbia tirucalli*.

Bush Control

Dense bushes and lots of trees reduce grass productivity through shading and competition. The trees should be cut down except where they allow vegetative growth below and can allow for shade.

Fire, manual cutting and herbicides could be used until the bush population is brought low.

Weed Control

When bush is cleared, annual and often perennial weed growth is encouraged. Notorious weeds include *Cymbopogon afronadus*, *Imperata cylindrica*, *Sporobolus pyramidalis*, *Solanum incanum*, *Lantana camara*. Manual slashing and hoeing can successfully control these.

Provision of Watering Points

This is important to provide drinking points on the farm so that soil erosion is not encouraged around the watering point.

Soil Conservation

This may be caused by rain, wind or overgrazing. Planting of Rhizomatous grass species (like Kikuyu grass, *Cynodon dactylon*) can be used to stabilise the soils. Terraces and soil bands along the contours should be constructed and planted with elephant grass or *Chloris gayana* or any of the leguminous shrubs (*Leucaena*, *Calliandra*, Lucerne) which will be used as supplementary feeds later. Cut branches thrown on overgrazed patches will stimulate rest and vegetation growth.

Over sowing

This has the following advantages:-

- (I) less seed is needed
- (ii) reduced cost of land preparation.
- (iii) reduced danger of soil erosion.

This could be done by digging strips across the paddock or planting patches. In natural pastures, legumes are usually sown in the well dug patch/strip. This should be preceded by slashing or hand grazing to reduce as much foliage as possible. Where SSP fertilizers are available, they should be used because phosphate enables legumes to nodulate properly.

Management of oversown pastures

Management following over sowing is important. Heavy stocking for a short period will reduce grass competition but this may have negative effect on the establishing legumes. It should otherwise be practiced very carefully. Where this is not possible, the paddock should not be grazed until the legumes are well established and have set seed. At this point, the grazing pressure may be increased to open up the stand.

2. Establishment of Sown Pastures

Seedbed preparation

It is important that preparation of a Seedbed will aim at:-

- (I) providing conditions for rapid seed germination and seedling emergence.
- (ii) eliminating/reducing competition from unwanted plants.

Pasture seeds, both grasses and legumes are small in size; and so

need a fine but firm Seedbed. The first 10-15 cm depth ensures that only topsoil which contains more organic matter and which retains moisture better should be worked.

Time of Sowing

The first rains are good if planting can be done immediately; so that the seedlings receive water for the first two months; and have good seedling vigor. Sowing in the shorter second rains has the advantage of being followed by a shorter dry period and seedling if well established will do well. Therefore, time of planting, which ever season is chosen, should plant immediately on the onset of the rain.

Seed Quality and Seed Treatment

Poor quality seed will give poor establishment. Seeds of high quality should therefore be sought. Scarification of legume seeds improves germination by breaking hard seededness. Scarification can be done using sand paper; concentrated sulphuric acid or hot water. Water is boiled, removed from the fire. Seed is added to the water and left to stand overnight. The water is drain off and planted the next day. Inoculation, where available, will promote good legume establishment. Different legume species have different inoculum strains and consultation with the Soil Science Laboratory of the Faculty of Agriculture and Forestry of Makerere University will get you the right strain.

Seed Rates

The quality and viability of the seed will determine the seed rate to be used. The smaller the seed, the lower the rate. In Uganda, grass seed rates used are 10-15 kg/ha and legumes are sown at 4-5 kg/ha.

These seed rates are high because of the poor quality of our seeds and in most cases, poor seed bed preparation.

Method of Sowing

Sowing should be done as soon as seedbed moisture is adequate. Without planters, the practical method widely used is broadcasting.

Even sowing can be achieved by dividing the area into equal parts and the seeds into equal weights. All grasses and small seeded legumes are planted at a depth of 1.2-1.5 cm. Light covering can be done using a rake or a bushy branch.

Management after sowing

By end of two weeks after sowing, with good moisture conditions, germination should have begun. Weeds will also germinate, and if dense should either be slashed or hand pulled.

Light grazing, preferably with calves, could be done 8 weeks after sowing. This helps in weed control; stimulates tillering of the pasture species and reduces the shading effect created by the grass over the legumes.

Weed control in the early stages of pasture growth is important. This should be done as soon as the weeds appear preferably before flowering.

Pasture Establishment by vegetative Propagation

This is recommended for fodder crops. Forage grasses like Kikuyu grass, Panicum, Chloris, Setaria can also be planted vegetatively where there are no seeds. This method is however expensive because it requires a lot of labour. Root splits of the chosen species should be planted into cultivated land. Where unrooted stolons are used, these should have at least three active bud sites each.

3. Managemnt of Improved Pastures

High yielding pastures are expensive to establish because of clearing costs, seed costs and the reactively high level of fertilizer usually required to maintain pasture productivity. Whatever expenses are incurred, the one end in view is a high quality pasture which will give a return on the investment.

Pasture management is a rather complex field which rests on the interaction of the following factors:-

- (I) knowledge of the growth rhythm of individual species.
- (ii) Competition between pasture plants for light; water and nutrients.
- (iii) The effects of temperature and occasional fires and flooding on the pasture plants
- (iv) The response of pasture plants to defoliation by the different grazing habits of animal species.

Therefore management can hereby be said to be the intelligent manipulation of the above factors in order to increase out put in the most economically advantageous way.

Early Management

An improved pasture is a mixed legume/grass pasture where the legumes are the key components. For the long term pasture productivity, grazing and other defoliation methods should be aimed at favouring the legume.

During and immediately after the rainy season, weed growth is as vigorous as pasture growth. Therefore, seed-bed preparation (if available) used will be quick establishment that will help in early weed control; and better still preplanting herbicides should be used.

In tropical pastures, in grass/legume mixtures, the grass is usually more vigorous and indeed the pasture may be ready for grazing before the legume is well established. A light grazing will remove the shading effect the grass has on the legume allowing more light into the legume. This particularly applied to the prostrate legumes and in this case, grazing should be frequent enough to keep the grass reasonably short.

With the climbing legumes associated with tall grass pastures, the pasture should be kept at between one quarter and one half of the mature height of the associated grass. Grazing management to suppress the grass should be aimed at encouraging the stoloniferous growth of the legume and maintain a balance of species - especially the preservation of the legume component.

Legume-based pastures have continually failed because certain management practices are adopted and these favour grass growth to the detriment of the legumes. The practices include:-

- (i) mixing legumes and grasses which are not compatible with each other.
- (ii) using seed mixtures which contain too much grass seed and insufficient legume seed.

- (iii) burning or slashing to get rid of uneaten grass and to promote more palatable regrowth.
- (iv) using nitrogenous fertilizers on legume/grass pastures to increase grass yields.
- (v) failure to supply elements like P, S and Mo which are essential for legume growth.
- (vi) overstocking during the growing season to try to utilize as much of the grass as possible before it becomes over mature.
- (vii) rotational grazing systems which are designed to force cattle to eat all of the pasture on offer.

Therefore, judicious grazing should be practiced involving early but relatively light grazing aimed at topping the young grass to reduce grass competition to the legume. The cattle should be removed before they damage the legumes.

Early in the life of the pasture, stock should be removed or at least lightened to allow the pasture to seed, especially the legume component.

Mechanical slashing can also control tall growing grasses and weeds, but this should not be lower than 15 to 20 cm as damage may result.

Spot spraying of weeds with herbicides can be used if the herbicide will not affect the pasture species or the grazing animal. If labour is cheap, hand grubbing of individual bushy species may be more efficient and economical.

Restoring the Legumes

If the legume component declines to less than 30% of the pasture, animal production will decline markedly. Locking the pasture up for various periods interspersed with judicious grazing will encourage legume

revival.

B) GRAZING SYSTEMS AND MANAGEMENT RESTORING DEGRADED RANGELANDS

Grazing management is a compromise between plant and animal needs: there is skill in knowing when to sacrifice pasture for the sake of the animals; and when to accept immediate detrimental effects on the stock for later benefits from the pasture. The overall objective of grazing systems is to achieve higher level of animal production commensurate with maintaining or improving pasture productivity. Both the animal and the plant should benefit from each system of grazing. Good grazing management should therefore aim at:-

- supplying nutritious grazing throughout the year at low cost,
- minimizing physical waste and inefficient utilization of herbage,
- maintaining the productivity of the sward,
- grazing systems and pasture utilization are to be covered later during the workshop.

There are 8 grazing systems that can be applied to a pasture depending on the level of management by the farmer and the type of animal breeds.

Continuous grazing

This is the type of management whereby grazing animals at an appropriate stocking rate are confined within a single enclosed pasture area for the entire grazing season, which may be a full year.

Cows under continuous grazing system are able to select more palatable materials. In a grass/legume mixture cows would select grass in preference to legume and this would maintain proper legume content in the pasture.

However, there may be dangers of parasite build-up under continuous grazing if the farmer does not practice parasite control.

There is limited fencing in continuous grazing and this might be economical to the farmer.

Rotational grazing

Several paddocks are needed and this appears expensive because of fencing costs. This is a system where a paddock is grazed for a number of days after which the animals are moved to the next paddock. This method might ensure proper utilization of the pasture because the animals are usually moved to the next paddock when the farmer considers that all pasture has been utilized. Both stem and leaf are utilized and selection is minimized. During the rest period, the pasture is allowed to regenerate. Also this method does not allow build-up of parasitic worms in the pasture. This method is commonly used by farmers who have exotic breeds of livestock.

Deferred grazing

This is when part of the pasture is left ungrazed either because it is not fully established or it is to be used later in the dry season.

Strip grazing

This is mostly used with dairy animals to ration the pasture. Electric fences are used to enclose the portion to be grazed and then moved to the next portion. This ensures proper pasture utilization, especially when feed is scarce or to prevent bloat.

Mixed grazing

This is used when the animals are mixed (cows, goats, sheep etc.) and this ensures proper utilization of various grazing resources.

Goats will utilize the browse while cows and sheep utilize mostly grasses. This is a prevalent method on most communal grazing lands in Uganda.

Creep grazing

This is a system first whereby the highest producing animals (e.g. milking cows) are allowed to graze the paddock. This allows maximum selection of highest quality forage. Other animals (dry cows) are then allowed to graze after and the producing cows are moved to the next paddock.

Tethering

This method is common in highly populated areas and also where animal keeping is not a culture. The cows are tethered using ropes and feed along the radius of the rope. Often forage is brought to the cow. Goats are also tethered in villages where labor is scarce and where cropping is intense.

Seasonal grazing

This is dictated over by season, e.g. during the wet season, animals are grazed in highlands or hills and during the dry season, animals are moved to lowlands (valleys or plains). This is not strictly a grazing system.

Choice of grazing systems

Other than differences in capital inputs, the productivity of each grazing system is to a larger extent influenced by stocking rates.

Rotational grazing up to a point limits selective grazing of more nutritious forage parts and this would lead to decline in production/ha. Animals under rotational grazing are forced to consume low quality

forage and especially so during periods of feed deficit e.g. in the dry seasons. During the dry season there is high opportunity for animals to select high quality forage over the whole available pasture area to maintain adequate intake.

The type of forage plant will also influence the type of grazing system employed. For example, Lucerne (*Medicago sativa*) will not persist under continuous grazing and the best management is rapid intensive grazing followed by adequate rest period for regrowth. *Leucaena leucocephala* is more productive under a simple two-paddock rotation grazing than under continuous grazing.

In rangeland management, systems of deferred grazing have been widely recommended to improve botanical composition and ground cover of pastures degradation. Introduction of improved and better adapted pasture species, use of fertilizers, weed control and efficient utilization of the forage produced.

SUMMARY

The main requisites for successful management of rehabilitated rangeland:-

1. A well adapted pasture mixture.
2. Good establishment.
3. Adequate fertilizer.
4. Correct grazing pressure
5. A smart pasture manager who is willing to observe and learn from his own and other peoples experience and modify to meet changing circumstances.

THE ROLE OF FORAGE/FODDER LEGUMES IN INCREASING RANGELANDS AND LIVESTOCK PRODUCTION

BY

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INTRODUCTION

Many people think of pastures as a grass. Although this is partly correct, it is not the full story. Pastures consist of grasses and legumes (both herbaceous and shrubs/trees), which may be grown in pure stands or together. The composition will vary depending on site and situation. An improved pasture is one which could be expected to produce more meat, or milk than have been possible before it was improved. Leguminous plants (legumes) belong to the same botanical family as beans (Papilionaceae). They have the important ability to extract nitrogen from the air and incorporate it into their tissue proteins and fix it into the soil.

Whereas non-leguminous plants rely on nitrogen supplies in the soil for their requirements, legumes are independent of soil nitrogen and can thrive on nitrogen deficient soils, provided that other nutrients are in ample supply.

THE IMPORTANCE OF HERBACEOUS LEGUMES IN RANGELANDS AND LIVESTOCK PRODUCTION

Increased animal production

For good animal production, pasture species are required which give a high yield of palatable and digestible herbage, containing adequate nutrients for the animal. Grasses and legumes vary considerably in their nutritive value and productivity, it is important to select those species which have been found suitable for the area in which the ley is to be sown.

As improved breeds of stock become more readily available provision of better nutrition and management will be even more important. Nevertheless, even improved breeds can be kept successfully on pasture alone, supplemented only by water and minerals. Pasture herbage is the cheapest form of animal feed available and expensive concentrates are only required at very high levels of production - 10 litres of milk. *Leucaena* increases the butter fat content in low butterfat content cows e.g Friesians.

Nutrient cycling

Legumes play a vital part in natural pastures by supplying much the nitrogen required for the growth and production of livestock. Nitrogen in excess of the animals requirements is returned to the soil in excreta whence it becomes available for uptake by the grass component of the ley, or, on ploughing up, to subsequent enable crops.

Nitrogen fixation in legumes is carried out by bacteria (*Rhizobium*) living in nodules, small rounded outgrowth on the roots of leguminous plants. The different types of *Rhizobium* necessary to produce successful

nodulation in the different species of legumes are normally present in the soil. However, some introduced legumes require artificial inoculation with the correct strain of Rhizobium before the seed is sown in order to bring about effective nodulation and vigorous growth.

Legumes can only function effectively if they receive adequate mineral nutrition. They are particularly sensitive to deficiencies of phosphorus and sulphur and may respond strongly to these nutrients. The response is evident in increased nodulation, leading to greater production of both herbage and protein. Adequate supply of nutrients for the legume is thus all important, and is the key to a successful grass/legume ley.

Building soil fertility

Because legumes can fix nitrogen, they are able to improve soil fertility. The organic matter content of the soil is increased by decaying plant material, and the mineral content of the top-soil may be enriched by the uptake of mineral through deeply penetrating roots like *Leucaena* from lower levels in the soil. Under grazing there is in addition, a circulation of nutrients through the animal and back into the soil via the excreta. Where legumes are present, this circulation is important in supplying to the grass nitrogen fixed by the legumes.

The improvements in soil fertility from the grazed ley persist when the ley is ploughed out and can increase the yields of subsequent arable crops.

Soil erosion occurs when the soil surface is exposed to sun, wind and rain by removal of the natural vegetation cover e.g. in cultivation or by burning, or following damage to it e.g. through over grazing. As the

physical structure of the soil deteriorates, which it does especially after periods of cultivation the risk of erosion is greatly increased. Legumes and legume covers are one of the best safeguards against erosion, since their finely branched root systems help to consolidate and hold the soil, while the rapidly-growing tufted or creeping shoot system produces an efficient above-ground protection. In addition legumes are able, over a period of years, to rebuild the physical structure of the soil.

IMPORTANCE OF LEGUMINOUS TREES/SHRUBS IN RANGELAND AND LIVESTOCK PRODUCTION

Tree/shrub species for forage production

A wide range of tree species both leguminous and non-leguminous, has been identified for feeding to animals in tropical countries. The mostly preferred species are the leguminosae family. Leguminous trees and shrubs are important for two major purposes: The first, environmental protection (including soil fertility maintenance) is conservation oriented. Water sheds, wind breaks, erosion barriers, forest reserves and planted fallows are all strategies for conservation. The second purpose is produce-oriented. This includes the harvest of trees as timber, poles, field wood and fodder. They therefore belong to the group of "Multipurpose trees and shrubs" (MPTS). Some of the species which have potential for use in the tree-based forage production system in Eastern Africa are presented in Table 1.

Of these species, the most promising are G. sepium and L. leucocephala. The suitability of Gliricidia and Leucaena as fodder trees/shrubs is because of the following prominent characteristics for any tree species to be used for forage production:

- Easily established from seed or cuttings

- Rapid growth with high forage productivity
- Good coppicing ability and tolerance to pruning
- Excellent Nitrogen fixing capability
- High foliage harvest index
- High palatability and digestibility
- High nutritive value (Nitrogen rich leaves)
- Perenniality
- Vigorous tap root development.

Nutritive value of leguminous trees/shrubs

The objective of incorporating browse into a normal farming system is to provide animals with a cheap protein-rich supplement in addition to their feed. The high yielding ability of high-protein forage possessed by most browse plants makes this type of forage has a vital role to play in the upgrading of animal production. Browse is an important source of protein-rich supplement to the coarser grasses and crop residues. All the fodders have a medium to high content of crude protein (CP) (range 120-298 g/kg DM), making them a valuable source of protein for livestock in the tropics.

Soil improvement and conservation

Tree legumes can be planted as "living fences", on steep slopes for erosion control and soil improvement. A number of species have been identified, selected and/or improved by scientists as beneficial for maintenance or improvement of soil fertility. Species with particularly high potential are:

Acacia albida Gliricidia sepium
Acacia tortilis Inga jinicuil
Calliandra calothyrsus Leucaena leucocephala

Casuarina equisetifolia Prosopis cineria
Erythrina poeppigiana

The following are the properties which made leguminous trees/shrubs suitable for soil fertility maintenance or improvement:

- High biomass production
- High rate of Nitrogen fixation
- A dense network, well-developed rooting system
- High nutrient content in the biomass, including roots
- Fast or moderate rate of litter decay
- Absence of toxic substances in foliage or root exudates.

Acacia albida (Faidherbia albida) and leucaena leucocephala are the two best known soil - improving trees (Young, 1989). A. albida is valued by farmers in the semi-arid zone of West Africa and in the subhumid zone, for example in Senegal, Malawi and Ethiopia. Increases of 50 - 100% in soil organic matter and nitrogen beneath trees, as compared with surrounding soils, have been reported, associated with higher water-holding capacity.

Leucaena is the most widely used tree in modern, scientific agroforestry particularly for hedgerow intercropping. The properties relevant to soil fertility possessed by leucaena are:

- high biomass production: 10,000 - 25,000 KgDM/ha/yr.
- high nitrogen fixation: 100-500 Kg N/ha/yr.
- high level of nitrogen in leaves (2.5-4.0%) and thus high rate of return in litter or pruning.

Addition of organic mulch in general is known to have a favourable effect on physical soil parameters. Mulching lowers soil temperature, reduces temperature fluctuation, and increases moisture infiltration and retention.

In alley farming periodic additions of prunnings have been shown to increase soil moisture retention in the surface soil.

Inclusion of woody species in agroforestry systems is generally considered advantageous for soil fertility maintenance due to their efficient nutrient cycling.

TECHNOLOGICAL PACKAGES FOR INCORPORATING LEGUMINOUS TREE/SHRUBS IN THE EXISTING FARMING SYSTEMS OF THE RANGELANDS

Alley Farming

This involves use of selected leafy leguminous fodder tree established 4-20 metres apart (depending on soil type, rainfall and associated crop) and usually annual crops planted in the alleys. The trees are pruned to avoid shading the crops and the prunnings used as mulch/fertilizer for the crop. Some of the prunnings are removed for feeding the livestock away from the crop area. Species that have shown great potential for alley cropping include: Leucaena, Gliricidia and Calliandra

Alley cropping

Alley cropping was originally developed to maintain soil fertility for food crop productions. The system began to be used for fodder productions after introducing nitrogen - fixation trees as a component. The additional amount of nitrogen added to the system helps improve the fertility of agriculture lands. Alley cropping offers many advantages to the farmers. Besides maintaining soil fertility and fodder supply, it also prevents shading and provides green manure or mulch to the arable crop.

Arable crops are normally planted in the interspace (or Alleys)

between rows (usually 4m apart) or planted trees or woody shrubs, which are pruned periodically during the cropping season. The planted trees/shrubs are mainly for fodder production. The popular species used as fodder trees include L. leucophala, C. cajan, and G. sepium.

Trees are pruned at the end of 1st year and subsequently managed through periodic prunings of the regrowth. This is to ensure that food crops are not shaded.

Protein banks or intensive feed gardens

Trees and shrubs can be grown in dense plantings in single or multiple rows to produce high quality forage. This forage can be harvested regularly and fed to animals for dry season supplementation. However, harvests may continue throughout the year depending on need and availability of the supplement.

In such system, perennial tree species are required that can maintain high regrowth rates, high leaf production, high leaf nutritive value, and strong perenniality under repeated cutting. This system may also involve livestock having access to a portion or all of the paddock on a rotational basis with other native pastures on established grass crop. Deferred use for periods of critical nutritional stress is most often the practice.

Live fences

Fodder trees are planted around homesteads to act as fences and their branches are pruned and fed to livestock. The trees in this system are used not only for fodder but also for fuel wood and food. The use depends on the priority and need of the particular area. Trees also act as windbreaks and protection for wildlife.

Common species used in live fences include L. lencocephala, G. sepium, E. poeppigiana, other species like Acacias form good live fences since they are thorny and their pods are highly nutritious for livestock. Gliricidia poles are used in fencing where they regenerate easily thus forming permanent fencing poles which are cheaper and the trees provide shade to livestock. Table 9, gives a list of potential species for Eastern Africa.

Hedgerows for fodder production and soil erosion control

The popular species used is Leucaena where it is grown around the crop gardens and the mulch may be used for livestock feed or as soil fertility improvement through decomposition and nutrient release to the mulched crops.

The use of contour hedgerows is a technology that is gaining ground especially on slopping land where they are used among others to produce fodder, green manure, stakes and firewood in addition to their important role of controlling soil erosion. Contour hedgerows have been successfully used to control soil erosion in several countries. This is a technology where hedges of coppiceable trees or shrubs are grown closely together on contours to control erosion. Fodder, green manure and wood fuel are some of by-products from the technology. Similarly grasses can be planted on the contour instead of the trees for the same purpose. They can also be harvested for fodder. However, in terms of erosion control, grasses have proved to be more efficient than the shrubs, mainly due to their growth habit.

Advantages associated with using hedgerows for soil erosion include:

- They take less space compared to terraces
- Hedgerows with time develop their own terraces thus reducing on

construction expenses

- Many hedgerow species are also nitrogen fixing
- In addition to soil erosion, hedgerows produce fodder, green manure and fuel wood

Fodder production from contour hedgerows

Fodder is a very important by-product from hedgerows and grass strips on contours which can contribute greatly to livestock production. However, many other hedgerow species are not good fodder species. Preferred agronomic characteristics for a good hedgerow fodder species would include being leafy, deep rooted, vigorous in growth, good seed producer, palatable, high in nitrogen content, highly digestible and void of or low in toxic factors. In addition, if it is to be planted in association with crops, then it should have minimal negative effects to the crop.

Hedgerow fodder species

Most of the currently used fodder shrubs are also good hedgerow species. However, some of the species may not be able to grow in all parts of the country. Find out those that grow in your own environment.

The common species in Uganda today include

- Leucaena leucocephala (will not grow well in high altitude areas like Kabale) - but the Psylid?
- Leucaena diversifolia (does well at high altitude)
- Other Leucaena species
- Calliandra calothyrsus (recent introduction showing remarkable growth)
- Gliricidia sepium
- Sesbania sesban (is short lived with continuous pruning)
- Cajanus cajan

Fodder grasses include:

- Elephant grass (Pennisetum purpureum)
- Guatemale grass (Tripsicum laxum)
- Giant setaria

Establishment and management of hedgerows

- **Establishment** using inoculated seedlings gives better results than direct seeding. Plant at the on set of rains. The trees are established at closer intra-row spacing of about 25cm. Grasses are established at slightly wider spacings because of their faster growth and colonizing nature.
- **Cutting heights:** allow the trees to grow for 9-12 months before initial pruning to allow for good establishment. Thereafter pruning can be done as required. Hedges have been pruned at 50 cm high. Many trials have indicated that pruning or cutting at higher heights results in more biomass yield. However, if the trees are to be associated with crops, higher cutting heights may result in shading of the crop.

CONCLUSION

The value of legume shrubs and trees as fodders for livestock in the tropics has been given to systems of livestock production which are based on either natural grazing or the feeding of improved grasses without fully realising the need to have available another source of fodder that is rich in protein. Because of their multipurpose role, leguminous tree/shrubs if

properly incorporated in our present farming systems, are likely to improve the animal's intake and digestibility of diet, which will lead to improve animal production and protect our environment. Soil erosion is already a major problem in the rangelands of Uganda. Contour hedgerows seem to have a potential in reducing soil loss on slopes. In addition fodder can be a major product which on cut and carry basis can contribute to animal production. These should therefore be encouraged on very sloping lands in the rangelands.

Table 1: Potential multipurpose shrubs and trees for forage

Potential Species	Potential uses
<u>Calliandra calothyrsus</u>	Fertility/fodder/fuelwood/ poles
<u>Leucaena leucocephala</u>	" "
<u>Sesbania grandiflora</u>	" "
<u>S. sesban</u>	" "
<u>Cassia siamea</u>	Fertility/fuelwood/poles
<u>Gliricidia sepium</u>	Fertility/fodder/fuelwood/poles
<u>Dichrostachys cinerea</u>	" "
<u>Morus alba</u>	Fertility/fodder/fuelwood
<u>Tephrosia vogel</u>	" "
<u>Flemingia congesta</u>	Fertility/fodder/fuelwood/poles
<u>Acacia siberiana</u>	" "
<u>Albizia lebbeck</u> (Lebbeck)	" "
<u>Cajanus cajan</u> (Pigeon pea)	" "
<u>Desmanthus virgatus</u>	" "
<u>Erythrina variegata</u>	" "

**“THE ROLE OF WOMEN IN LIVESTOCK DEVELOPMENT
WITHIN THE PARTORAL AREAS OF UGANDA”**

I PASTURE IMPROVEMENT

By

**Mrs. Sandra M. Mwebaze
Principal Pasture Agronomist
M.A.A.I.F**

1. INTRODUCTION

Women play a vital role in all aspects of pastoral production. These include herd management, milk processing, marketing, carrying feed and watering the animals.

The dry land husbandry project realises that in most pastoral communities, women are not fully involved in development activities. The DHP notes with concern that women and children are a rich human resource which when fully tapped, can be a major source of labour in most households and can yield considerable results for development. For this reason, therefore the project would like to empower women, along with men, with technical skills that will enable them improve and sustain livestock production through improved natural resource base.

2. POSSIBLE AREAS FOR WOMEN/CHILDREN INVOLVEMENT

2.1 FENCING

This is important for ear marking household land owned; and for keeping out neighbours cattle and goats from encroaching on your pasture; and where tick-management is followed' from getting ticks from other people's herds.

Perimeter fencing using live hedges is recommended. Trees like *Euphorbia tirucalli* (oruyenje) and *Erythirna abyssinica*(omuko) can be used. The cost of barbed wire is high, but would have been ideal. Where the live hedge is planted, planting should be close. Vegetative material should be used.

2.2 BUSH CONTROL

Dense tree cover and bushes reduce grass productivity and so livestock will not have sufficient feed. Milk production can be increased by fighting of the shrubs and bushes in order to increase the grazeable pasture.

The following methods have been successfully used, hence are recommended:-

2.2.1 FIRE

Government has in place a ban against using fire as a tool for bush control. This may be partly the reason why bush encroachment has increased. Fire doesn't work if the area is overgrazed, hence leading to little grass fuel that would otherwise be used to burn the bushes.

However, if the area to be burnt is not grazed for about one year, this will allow accumulation of sufficient grass fuel, which gives an effective burn. The area should be burnt towards the end of the dry season. This

method destroys the bushes completely and they would take long to regenerate. Periodic fires can, therefore, be used to control bush encroachment.

2.2.2 MECHANICAL REMOVAL

Hoes and Pangas can be used to control shrubs and bushes. This method, however, opens up the land and favours germination of seeds of invading weeds. This method will be effective if:-

- i) The cleared area is left ungrazed for at least six months so that the pasture regenerates through natural reseeding
- ii) The cleared area is oversown with pasture seeds
- iii) An optimum stocking rate is maintained on the fully regenerated pasture.

2.2.3 GOATS

Most bushes and shrubs in the grazing areas are palatable to goats. Keeping of goats should be useful for that purpose. The goats should be sprayed at the same frequency as cattle to control ticks that would be dangerous.

2.3 OVERSOWING/RESEEDING

This is the introduction of improved pasture types in natural pastures. Natural pastures contain a very low legume component, which should be increased so that the quality and quantity of pasture is improved. The legume may be sown in cultivated strips or patches after bush clearing or

after close grazing. The dung patches can also be good spots where the pasture legumes can be put during oversowing. Good pasture legumes that can be sowed include Centrosema, Siratro, Desmodium and Stylo. The success of improving natural pastures through oversowing will depend on the availability of improved forage legume seed. The legume should be allowed to reseed before grazing.

2.4 PASTURE SEED PRODUCTION

2.4.1 Seed bed preparation

This requires full land preparation that will produce a very good seed bed.

2.4.2 Sowing

i) Sowing rate

Avoid high plant populations, which depress yield. The recommended species can be sown at the given seed rates:-

Siratro	2kg/ha
Centrosema	3kg/ha
Stylo	3kg/ha
Labala	10kg/ha

ii) Row spacing

This is the best method of planting because:-

- It allows use of a lower seed rate
- Eases weed control

- Eases harvesting

In areas like Kazo, row spacing of up to 2.4 metres can be used to improve the moisture status of plants and increase seed yields.

iii) Seed treatment

Siratro and Centrosema have hard seed coats. For seed crop establishment, rapid even germination is required. Before sowing, the seeds should be soaked in boiling water and left off the fire in the hot water overnight.

2.4.3 Seed crop management

i) Fertilisers

Phosphorus and sulphur can limit seed yields and these are generally low in our soils if these are applied, at least once a year, seed yield will increase.

ii) Weed control

The seed crop should be kept weed free. This can be achieved through regular weeding using the hoe.

iii) Insect control

Siratro and lablab must be regularly sprayed to protect the pods from aphids and thrips; using recommended insecticides on the market.

2.4.4 Harvesting the seed crop

i) Time of harvesting

When legume seedpods are ripe, they shatter easily and this requires daily hand harvesting. The seedpods change from green to brown at seed maturity.

ii) Method of harvesting

The ripe seed pods should be picked and put in a polythene bag and dried in there to avoid seed loss when the pods shatter.

2.4.5 Seed drying and cleaning

Hand harvested legume seeds from pods usually require very little cleaning. However, the seeds in the polythene bag can be dried in a shed, using a stick, gently beat the bag to detach all seeds from the pods and then winnowed to remove the chaff.

2.4.6 Seed storage

Dry seeds should be kept in bags in moisture-free areas and protected from being eaten by rats. Seeds could also be dressed with insecticides to protect them against weevils.

2.4.7 Seed marketing

All pastoralists in the Project area and dairy farmers in Uganda are a good market for pasture legume seeds. The DVO's office or the Sub-county Headquarters can be used as the contact area.

**“THE ROLE OF WOMEN IN LIVESTOCK DEVELOPMENT
WITHIN THE PASTORAL AREAS OF UGANDA”**

II CALF REARING

by

**Mrs. Sandra M. Mwebaze
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M.A.A.I.F**

1.0 INTRODUCTION

One aspect of pastoral production in which women play a vital role is herd management. Women and children, if given a chance, will go a long way in fulfilling the adage that “TODAY’S CALF IS TOMORROW’S COW”. Calf mortality or death is a result of difficult calving, poor feeding and diseases and the remedy to all this is good management.

2.0 “STEAMING UP”

This is a term used to mean the extra care given to cows before they calve down. This is very important because it helps the cow to improve its body condition and reduces problems associated with difficult calving while encouraging birth of healthy aggressive calves.

This can be done by separating those animals that look “heavily pregnant” from the rest of the herd and keeping them around the homestead. These cows should then be fed well with a good mixture of grasses and legumes.

3.0 CALVING

Under normal circumstances, the calf is expelled with a simultaneous rupture. In difficult calving, however, a gentle traction may be applied on the calf limbs. This should be done with great care to avoid rupture of the uterus.

As soon as the calf can stand, allow the calf to suckle. Colostrum, the first milk of the cow, is rich in antibodies which help the calf to have immunity to diseases. The calf should have colostrum for the first three days.

4.0 FEEDING A CALF

A calf is the future cow or herd, and should, therefore be fed properly and adequately. As soon as the calf can nibble grass (about 2 weeks) a good dry grass and legume mixture should be fed to allow rapid development of the rumen, and prevent diarrhoea (calf scours). A calf that is eating the grass/legume mixture should be given at least 10 litres of clean drinking water at all times.

5.0 WEANING THE CALF

In a pastoral set-up, calves may run with the mother from two months to six months and weaning should take place then. Weaned calves should have free access to drinking water, good grass/legume feed and mineral salt.

6.0 CONCLUSION

Women, with the children, will ensure that calves do survive when properly managed.

“THE ROLE OF WOMEN IN LIVESTOCK DEVELOPMENT WITHIN THE PASTORAL AREAS OF UGANDA”

III SUPPLEMENTARY FEEDING, CLEAN MILK PRODUCTION AND MILK CONSERVATION

By

**Mrs. Sandra M. Mwebaze
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1.0 INTRODUCTION

In pastoral production systems, women are responsible for the pottage of feed and water for livestock. It is, therefore, imperative that the right kind of feed is given to livestock. Good feeding will increase milk production and the milk should be so handled that it will not be rejected by the consumer; and if excess, can be converted into high value products like ghee.

2.0 SUPPLEMENTARY FEEDING

Livestock in pastoral systems live on a maintenance ration and to a large extent this contribute to low milk production in the area. It is important, therefore to supplement the basic animal feed (natural pasture) in order to enable the animals meet all the necessary body requirements like body building, energy, protection against diseases and production.

2.1 SUPPLEMENTARY FEEDS

2.1.1 These include crop residues like banana peelings, maize store, banana stems, sweet potato vines and peelings. These should be given to these categories of livestock: - cows before calving; young heifers; cows that have just calved and any other livestock as the farmer chooses.

2.1.2 Fodder crops

These are crops specifically planted and managed in same way as arable crops. They are a good source of supplementary feed and should be grown around the homestead to ease harvesting and feeding. The most useful fodder crops include:

- Elephant grass (*Pennisetum purpureum*)
- Guatemala grass (*Tripsacum laxum*)
- Lablab

2.1.2.1 Crop establishment

i) Elephant grass & Guatamala.

Elephant and guatamala grass can be established vegetatively using cuttings. Canes with 3-4 internodes can be used. These are inserted in the soil leaving one internode uncovered. The cane planting materials should be obtained from plants about to flower, where the stems are still green. Planting should be done in a fine seedbed.

ii) Spacing.

Row planting at 1-2 meters apart can be used. Spacing between plants should be 1 metre and planting should be done during the rainy season.

iii) Intercropping.

Legumes like Centro, Siratro and Desmodium can be planted in the elephant grass/guatamala to improve the fodder feeding value. The legumes should be planted near the grass rows.

iv) Weeding and Inter-row cultivation.

Weeding is essential during the establishment phase and also later, so that the grass is maintained in a productive condition.

v) Manure application.

Both elephant grass and guatamala are highly sensitive to soil fertility. Cow dung is a very good and cheap source of Nitrogen. The manure should be added after cutting.

vi) Cutting and feeding management.

Cutting is best done when plants are 1-1.5 metres tall at a cutting height of 2-5 cm above the ground. A cutting interval of 12-16 weeks is recommended depending on the soil moisture and soil fertility. Animals should not be allowed into the fodder garden. The grass should be cut and carried to the livestock – those that have been identified and set apart as needing the extra feed.

2.1.2.1 Establishment of lablab

i) Varieties.

The best variety is Rongai with white and brownish seeds. It produces a lot of feed.

ii) Sowing and management.

The seeds should be planted at 1.0 x 1.0 metre at a seed rate of 10kg/ha. Sowing should be done in a weed free and fine seedbed.

iii) Cutting and feeding management.

Cutting should be done as lablab begins to flower at a cutting height of 30cm above the ground and should be the branches should be fed after wilting to avoid off-flavours in milk.

3.0 CLEAN MILK PRODUCTION

After good supplementary feeding, milk production will increase. To maximise profits, therefore, farmers have to ensure that clean milk is produced which will have a wide market. And this can best be done by women.

The following factors have to adhere to in order to produce clean milk: -

3.1 The animal

The animal to be milked should be healthy and free from diseases. This is achieved through following regular vaccination programmes

3.2 The milker

This should be a clean person without communicable diseases like T.B. and Typhoid. The hands should not have sores and the clothes should be clean.

3.3 The milking utensils

These should be clean. Pastoralists use utensils made of wood or gourds; the disadvantage of these is that they are not easy to clean and as such trap bacteria which can cause milk spoilage. Stainless steel utensils or plastic can be used and should be regularly cleaned; while avoiding any perfumed soap.

3.4 The milking place

This should be dust and mud free; and located away from toilets and rubbish pits.

3.5 Milk handling

To ensure removal of any broken hairs, dirt and other foreign bodies in the milk, milk strainer or clean cloth should be used to filter the milk.

4.0 Milk conservation

The price of liquid milk fluctuates depending on the level of production.

Many farmers do not have coolers and milk is likely to spoil if not and milk is likely to spoil if not attended to.

Milk conservation, as ghee is one way of increasing the shelf life of the milk. Women should form marketing groups and be able to sell their

product. This should be when there is excess milk and the price is so low (Shs. 100/= per litre), milk could be converted into ghee which will fetch lots of money.

FARM HYGIENE

By Biryomumaisho Savino

Farm hygiene concerns conditions or practices necessary to maintain health and prevent disease especially through cleanliness. In order to maintain health and prevent disease on a farm, precautions must be taken to keep both people and animals in a state of acceptable hygiene requirements. A hygienic source of water is necessary.

1. Hygiene of humans at a farm

People residing or visiting a farm should:

- Not dispose off waste anywhere. In the vicinity of farmhouses, there should be a **waste disposal pit**. Any refuse can be deposited in these pits. It is necessary to have more than one pit: one for waste which is biodegradable (refuse can later be used as fertiliser) and the other for non-biodegradable refuse (e.g. polythene bags, metallic scrap, etc).
- There should be a proper facility for disposing human faeces and urine. In this case, a **pit latrine** and a urinal should always be available at the farm. Human waste is associated with important diseases.

Examples:

- i) Tapeworms.
- ii) Cholera, which is spread by ingestion of water and foods contaminated by the excreta of persons with the disease (both symptomatic and asymptomatic). To ensure that your farm does not get unwanted visitors, fencing may help in this aspect.
- iii) Hookworms (*Ancylostoma*) and roundworms (*Ascariasis*) are transmitted from faecal contamination of soil and contaminated vegetables.
- iv) Amoebic dysentery (*Ensheshe*) from *Entamoeba histolytica*.

Sources of infection are contaminated food and water by faeces. Transmission by unwashed hands is common. Always, implement this slogan "*wash your hands every time you leave the latrine*"

2. Hygiene of farm animals and animal products/waste

Increased productivity of the animals depends on good nutrition of the animals and their health among other reasons. Unhygienic conditions may lead to disease and spread of disease to other animals. In the agro-pastoral setting, the hygiene of the young animals (calves) is very important. Those who have seen zero-grazing units appreciate animal hygiene better. However, housed calves should be in a clean environment and ventilated units/pens.

There are scientific implications to this: dirty, damp poorly ventilated premises promote multiplication of disease-causing organisms. In addition, houseflies are attracted by dirty environments and hence increased spread of disease. Such diseases include those of the respiratory tract. Other diseases which may develop are abscesses of the navel, and skin affections.

Hygiene of milking cattle is very important. Dirty environments lead to quick multiplication of disease-causing organisms especially of the mammary gland, leading to (MASTITIS). Bacteria come from dirt and faeces on the legs, udder and teats, dirty floors and even dirty water. Dirty pails, stringers and churns are all sources of bacteria. When milk is contaminated with bacteria, it will have an unpleasant smell and will easily go bad. Before milking your cattle, the place where the exercise is going to take place should be cleaned first. The milker must wash hands with warm water and soap. A mild antiseptic (e.g. Diptex[®]) is good for both cleaning hands, udder and milking utensils. Milk into clean, dry containers.

Dispose animal waste properly: cow dung and urine should be put in pits to make compost manure or even biogas.

Aborted fetuses and membranes (placentas) must be buried immediately and of possible do not handle them with unprotected

hands. Use gloves. This will help in avoiding diseases especially Brucellosis (*Obutorogye*) which is prevalent in your communities. This disease affects humans, causing undulant fever.

Do not buy and eat meat that has not been inspected by a veterinarian or a trained community health inspector. Some of the diseases have already been outlined above, but include tuberculosis and tapeworms.

Likewise do not drink unboiled milk because of the dangers associated with raw milk

especially brucellosis and tuberculosis.

3. Care of milk instruments

These should be cleaned with warm water and soap. Dry them in an upside down position in a dust-free environment. After washing them, dry them in sunlight. Avoid drying your containers on the ground. Instead use wooden or metallic racks. These racks should be placed away from waste/water gutters and away from reach of your animals. Better drainage of water is obtained by placing racks in an oblique/sloping angle to the ground.

BREEDING AND REPRODUCTIVE DISORDERS.

By: Biryomumaisho Savino.

Introduction

Breeding in simple terms can be defined as the reproduction of species through reproduction. It can be natural or artificial. The very first breeding practices began when man domesticated animals. But serious and modern animal breeding practice has developed in the temperate zone during the last two centuries. These advances, however, have been based on acute observations and limited records and were still very much a result of trial and error until the modern genetic theory came in the 20th century. In addition, there are several reproductive disorders in day to day animal husbandry.

Breeding

Through centuries, the majority of farmers have allowed their animals to breed more or less haphazardly and a number of factors have contributed to the evolution of the different breeds seen today in the tropics. In order to promote a rapid improvement in the productivity of tropical livestock, we must first understand the basic factors of reproduction and inheritance of characteristics, then be able to apply suitable animal breeding practices. But before any sensible breeding is done, development priorities should be established. For instance, if a region still has major epizootic diseases still prevalent, disease control should be given priority. In Europe, for instance, where major epizootics have been brought under control, improved feeding and management should be accorded priority.

Animal breeding practices

In order to improve the average level of a livestock population for any trait by genetic means, the population must be subjected to selection for the specific trait or a combination of traits required. Remember that some traits are strongly inherited more than others. Here are some examples of some inherited traits in cattle.

Dairy cattle:

- milk production
- butter-fat percentage of milk
- reproductive performance
- protein percentage of milk

Beef cattle:

- meat tenderness
- daily liveweight gain
- birth weight
- efficiency of feed conversion
- bone percentage of carcasses
- weaning weight

Note:

- that selection acts by allowing selected individuals to contribute more traits to the next generation than other individuals in the same population.
- record keeping is very important for any sensible breeding programme.

Methods used in selection of breeding animals

- i) Pedigree selection: this method is based on performance of ancestors. It is very useful if for instance the selected animal is very young.
- ii) Selection basing on relatives: it is suitable when a family is large, traits highly inherited and generation interval is short, e.g. in poultry.
- iii) Progeny testing: this is assessment of the breeding value of an animal basing on performance of its offspring. Note that progeny tests are usually applied to males.

Aids to selection

Artificial insemination

This method can be used for every species of livestock, but can only be practised successfully under quite specific practical conditions.

Benefits

- allows maximum exploitation of the best sires.
- minimises spread of venereal diseases
- reduces breeding costs
- reduces the number of sires to be maintained
- useful when farmers wish to use different sires simultaneously
- is economic where there are many smallholders
- livestock owners are brought together and stimulates interest in farming

Disadvantages

- involves close handling of animals so wild livestock or too dispersed animals may pose an economic problem.
- it is not economic to serve widely separated farms with poor infrastructure
- involves accurate detection of heat by the farmer; short and silent heat periods may hinder efficiency of the programme.
- requires skilled manpower and equipment: insemination guns, liquid nitrogen tanks, semen straws etc.

Modern breeding techniques

1. Embryo transfer

In this method, you do not transfer only semen to a cow but the **receiving** dams receive fertilised embryos.

Steps.

- i) Oestrus synchronisation / superovulation
- ii) Artificial insemination
- iii) Collection of embryos
- iv) Transfer of the collected embryos to SURROGATE mothers which are also prepared. You can also achieve this by oestrus synchronisation, or you can freeze the embryos in liquid nitrogen and transfer your embryos. One of the methods an embryo is transferred to the womb (uterus) of the dame is by uterinepuncture.
The technique can be used in humans.

2. Cloning

This is a controversial technology to reproduce exactly the individual in question.

- Breeding techniques require that there is overall raise in the overall productivity.

Inbreeding

Is mating of close relatives. The closer the individuals, the more similar characteristics they will contain. The system concentrates both the bad and good characteristics.

Effects

Decrease in size and vigour, decline in fertility and increased mortality of offspring. But it is used to fit a specific trait in a particular group of livestock. This practice has been useful in maize production and in poultry, crossbreeding or specific inbred lines have been successful.

Crossbreeding

When unrelated livestock are mated. First cross-bred progeny are usually superior parent in production traits and often of the parents. This phenomenon is known as hybrid vigour.

Upgrading.

This method is preferred when a livestock owner wishes to change radically the characteristics of his animals. F1: 50%, F2: 75%, F3: 87.5% etc.

Conclusion

Efforts should be made to improve the productivity of indigenous breeds by intense selection.

Warning: It is vitally important that at least limited numbers of all indigenous breeds should be conserved in their specific environments as a source of genetic variation. Serious errors have already been committed by some countries whereby through crossbreeding, all the indigenous breeds have been eliminated.

Reproductive disorders.

Female disorders

A: Disorders of the ovary.

1. Anoestrus: Is absence of cycling. Causes may be related to:
 - Hormonal imbalances
 - Poor nutrition
 - Lactation
 - Freemartinism
 - Cystic ovaries

2. Silent heat

The heat is there but is not detected. It can be a serious problem in AI programmes. Remember that you need a calf every year.

B. Fertilization failures

- The ova may be released but no fertilisation takes place.
- Poor quality ova may be released, e.g. large or misshapen ova.
- Defects of spermatozoa.

C: Conception failures

- Early embryonic death
- Hormonal imbalances
- Too much heat and obesity
- Nutrition-related factors
- Infections e.g. vibriosis.

D: Fetal death / abortion

Abortion is death and expulsion of a recognisable fetus during pregnancy.

Causes

- Infection: Leptospirosis and brucellosis
- Hormonal imbalances
- Use of some drugs and artificial hormones

E: Disorders at calving/birth

- Dystocia
- Foetal exortion

F: Post-term disorders

- Retained placenta
Causes: Uterine inertia and membrane inflammation.
- Prolapse of uterus
- Metritis/pyometra
- Infertility

Male disorders

- Lack of production of spermatozoa, e.g. in the testes
- No testicles in the scrotum (cryptorchidism).
- Production of too few spermatozoa
- Defective spermatozoa
- Lack of libido
- Physical defects like lameness
- Obesity.

DAIRY MANAGEMENT

By

C.D. Waiswa

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FEEDING OF A LACTATING COW

While feeding a dairy herd is old hat to some, the challenge of how to feed high producing cows properly in early lactation still remains to many farmers.

As production climbs feeding strategies and diagnosing nutritional problems become critical concerns. At high production levels feeding management is critical for profitability, optimum reproductive performance and minimum heat stress.

To design economic and efficient feeding strategies for a milking cow requires knowledge of how DM intake, milk yield and body weight changes as lactation progresses. The figure below illustrates typical changes of these parameters over the lactation cycle in dairy cattle.

Feeding management during the lactation period should be phased to fit the characteristics of the influence of lactation on feed intake and body weight in a milking cow.

EARLY LACTATION (9 - 10 weeks duration)

Characteristics:

- Milk production is high with peak yield occurring 7 - 9 weeks after calving and the method of feeding should anticipate this.
- Nutritional demands are very high. High milk production drives high DM intake, as evidenced by how cows react to being milked 3 times a day and to bovine somatotropin treatments. During this period, however, cows may consume 18% less dry matter than they require. Cows in early lactation can mobilize body reserves to meet some of the nutritional requirements. This emphasizes the importance of the cow's body condition at onset of lactations.
- There is high response to concentrate feeding. Each additional kilogram of DM a cow consumes may support up to 2.0 - 2.4 more milk.
- Body weight loss of up to 45 kg may occur due faster increase in milk production relative to feed intake.

Feeding aim:

- To maximize DM intake because body reserves may be low and milk production is tremendously high.
- To avoid excessive body weight loss.
- Developing the milk production potential of the cow for a long-term effect. Cows poorly fed in this phase have a lower yield at peak production and a shorter lactation duration. The amount of milk produced at peak yield and the

subsequent management.
of the cow (feeding and milking practice) will determine the
total quantity of milk produced in the
whole lactation

Feeding strategy:

- Feed the animal generously (CHALLENGE FEEDING). Cows producing about 40 kg of 4% FCM should ingest DM not less than 3.5% of their live weight. Hence cows should be fed for what they might produce (**Lead feeding**), but care should be taken since this can produce fat cows without increasing milk yields.
- Due to limited capacity of the rumen the cow can't get enough nutrients for high production from bulky feed, thus to compensate for this concentrate supplementation is indispensable in top cows.

Feeding practice:

- The amount of concentrate fed should be according to the amount of milk the cow produces. Level of concentrates should be increased gradually by not more than 1 kg/day from $1\frac{1}{2}$ - $2\frac{1}{2}$ kg it had been eating during "steaming up" before calving. This allows the rumen to adjust to high concentrate feeding to avoid problems such as acidosis, depressed milk yield or appetite. However, increasing the level of feeding should be done as long as milk yield is increasing.
- Good quality roughage should be offered to maintain milk fat level and for proper digestive function.

- Clean water should be supplied generously. Most specialized dairy breeds have daily water requirements of around 10 -5% of live weight, or 3 - 4 litres/kg DM feed consumed or 3 - 4 litres/kg milk produced.

MID LACTATION (11 1/2 weeks duration)

Characteristics:

- Yield declines at about 2.5% per week after the peak of lactation. Yield of high producing cows falls faster and the yield of heifers more slowly.
- The animal attains maximum feed intake level during this period. Although nutritional demands are still high there is a decreasing response by the cow to heavy feeding.
- The cow's efficiency of feed conversion into flesh becomes higher than for milk production as lactation progresses, and as a consequence body weight increases. A good rate of body weight gain from mid lactation onwards falls around 0.5 - 0.75 kg/d.

Feeding strategy and practice:

- Feeding must be turned to support the milk production level developed in early lactation and provide nutrient for some weight gain.
- Concentrate feeding should be adjusted to milk yield and body condition and the proportion of roughage in the ration increased.
- The plane of nutrition is important at this stage if cows

are to become pregnant again at the optimum time.

LATE LACTATION (24 weeks duration)

Milk yield and nutritional demands fall steadily. There is body fat accumulation (**fattening**). The animals should be in mid pregnancy during this phase.

Feeding strategy and practice:

- The feeding should be geared to build the cow's reserves in readiness for the next lactation. Cows must replace weight lost earlier to ensure a good condition at calving. Lactating cows build body reserves more efficiently than dry cows and this can be exploited in the later part of lactation. If feeding is done properly, the need for high feeding levels in the dry period will be decreased.
- Feeding of concentrates should be very minimal unless the quality of roughage is poor. Provision of supplementary minerals salts is important during this period. In the tropics, are often at their most vulnerable in the late stages of lactation, since this often coincides with the dry season when feed resources are poor.

CARE AND FEEDING OF DRY COWS

A dry cow is one which is no longer in milk and the period between the cessation of milk production and the subsequent calving is known as the dry period. The length of the dry period varies from cow to cow and may be influenced by the farmer himself. Ideally, a dairy cow should be in milk for 10 months (305 days) and is dry for the next 2 months prior to the next calving.

GOALS OF A DRY COW PROGRAM

- To maintain the cow in a sound body condition, ensure adequate opportunity for rest and be fed in a way that will ensure a strong appetite after calving so as to consume large amounts of feed required for high milk production in early lactation.
- To get a healthy and strong calf at birth. This is because much of the success in calf rearing depends on its condition at birth.

Ideally length of the dry period should be 60 days.

Importance of the dry period

- It enables the cow to maintain high levels of milk production in the subsequent lactations. A cow not given a dry period may produce as much as 25% less milk in the following lactation.
- It enables the cow to restore udder tissues before the next lactation.
- The period gives the cow chance to replenish and build up nutrient reserves which were depleted by the preceding lactation. This will prevent excessive weight loss after the next calving.
- A strong and health calve will be born since drying-up the cow allows nutrients to be used for foetal nourishment rather than for milk synthesis as the foetus grows most rapid during this time.
- It allows application of management practices such as administration of intra-mammary infusion to treat or minimize occurrence of mastitis in the next lactation; and treatment of other health conditions.

FEEDING OF IN-CALF DRY COWS

Where possible, dry cows should be separated from the milking herd to avoid free choice consumption of high quality feeds which will provide nutrients in excess of amounts required which can be conducive to severe conditioning.

The kind of feeding will depend on the condition of the cow at the point of tuning dry and also on the quality of the basic forage. Good quality pasture will supply sufficient, sometimes more than adequate nutrients for the dry cow. Corn silage based rations may require additional protein and minerals.

STEAMING-UP

This is the practice of stepping up the quantity and quality of feeding of in-calf cows/heifers in the last 6 weeks of gestation. It is particularly important in the tropics because of constraints related to forage availability and quality. Grazing is supplemented with concentrates and minerals.

The importance of steaming-up is thus to:

- Build the cow's appetite and accustom it to consuming larger quantities of feeds, both of which attributes are important after calving.
- Prevent milk production diseases such as ketosis and milk fever (i.e. due to insufficient energy and calcium intake, respectively)
- Ensure high milk production and persistency in yield for next lactation as stored nutrient reserves can be mobilized to support high milk yields (1 kg of body weight loss can

yield up to 7 of milk)

- Provide extra nutrient required to condition the cow and nourish the rapidly developing foetus so that the calf is fully-grown and strong at calving.

Cows in poor condition at cessation of milking can be given 2¹/₂ to 3¹/₂ kg of dairy meal per day and those in relatively sound condition 1¹/₂ to 2 kg. For large herds a uniform steaming up schedule is applied for all the dry cows as below:

Steaming-up schedule for dry pregnant cows

Weeks to calving	Amount of dairy meal to be offered, kg
6	2 ¹ / ₂
5	2
4	2
3	1 ¹ / ₂
Last 2 weeks*	1 ¹ / ₂

* In addition 1 kg maize bran is offered as a laxative in the last 2 weeks

- Tail held high and back arched.
- Appearance of the water bag (amnion) which bursts to release copious quantity of water just before the calving process begins.
- Part of the calf comes out (usually fore legs first).

Assistance at calving difficult calving only be assisted when it is necessary and pulling out of the calf is done when it has presented a normal birth position (fore legs our first).

MANAGEMENT AT BIRTH

Poor care of calf at birth may lead to poor subsequent growth and resistance to diseases. Soon after the calf has dropped, mucus in the nostrils and mouth should be removed using ones fingers and clean water. Nilo-hamitic pastoralists usually suck out the mucus using their mouth. It is important to ensure that the calf is breathing normally, or else should be stimulated by compressing and relaxing chest walls, lifting it by its hind legs and swung gently to and fro, or pour water on the calf's nostrils to make it sneeze.

The navel is dressed with an antiseptic such as iodine solution, copper sulphate or carbolic solution to minimize infection and hasten healing of the umbilicus. The calf's body can be dried using a clean sack if the dam is not up immediately to lick it.

The calf may be allowed to nurse the dam for a few hours, after which it is housed an well bedded pen. Leaving the calf with the dam has shown to give a beneficial effect of early expulsion of the after-birth by the dam. Foetal membranes and the after-birth should be removed from the calving area so that the cow does eat them, otherwise this may affect the appetite of the cow hence milk yield in early lactation.

HOUSING OF CALVES

Calves should be housed at least for first four weeks of life when they are most susceptible to the vagaries of the environment. During the first 2 weeks after birth, the calf's thermo-regulatory mechanism is still under-developed and can therefore succumb to excess heat or coldness. In the humid tropics, cows often conceive towards the end of the dry season when grass growth permits a good body condition and thus calving also takes place in the following rains. Precautions

should therefore be taken (through proper housing) to avoid chilling which reduces resistance to infections.

- Calves should be housed in individual pens to reduce disease transmission and injury of others or problems of blockage of the gut resulting from accumulated hairs ingested by licking other calves. Individual pens also ensure that each calf receives a fair share of meals.
- A good calf house is one which gives protection against weather extremes; provides ample space, ventilation and draught-free conditions; and facilitates management/cleaning operations.
- A floor space of 3 square metres or $2\text{m} \times 1\frac{1}{2}$ is adequate for each calf, up to a weight of 150 kg. Partition walls separating the pens should be solid and at least 1 m high to minimize draught from one end of the cubicles to the other. The open end of the house should face away from the direction of the prevailing winds/driving rains. A bountiful entry of light, but not direct sunrays, in the calf house is desirable since it is a natural disinfectant, will minimize fly problems and hastens drying of the pens.

MANAGEMENT OF THE YOUNG STOCK

RAISING A CALF

- Calves make tomorrow's herd on most dairy farms. They replace old cows.
- Losing a calf today is equivalent to losing about 30 - 40 animals over a ten-year period.

Success of a calf rearing program strongly depends on its vigour and health at birth. Good calves are born when in calf dams are well-cared for. Thus it is logical to say that management of a calf begins even before it is born.

1. CARE OF THE IN-CALF DAM

The in-calf cow or heifer is accorded good care to ensure proper development of the foetus. Greater emphasis should be in the last 2 months of pregnancy when the developing calf demands a lot of nutrients and grows most rapidly. Proper body conditioning and nutritive status of the practice of "STEAMING UP" (See chapter 6).

2. PREPARING FOR CALVING

A few days before calving is due, the cow can be separated from the rest of the herd and confined near the homestead or milking parlour to permit regular inspection. Prior erection of a calving stall or maternity paddock is advised. A clean calving place is necessary to minimize infection of the calf at birth. In pastoral herds calving during daytime often takes place while cows are grazing and at night it may occur in night kraals which are usually un-hygienic. This may be lower or predispose the new born to infections. The farmer must be conversant with the signs of labour, for which he should observe regularly.

Signs of calving

Initial stages (1 - 2 weeks to calving)

- Distension of the udder and teats (full and firm to touch) and may have some milky fluid.

- Increase in the size of the abdomen, especially the right hand side
- Enlargement of the vulva
- Appetite for food may drop, though not always

Terminal stages

- Loosening of the ligaments at the side of the tail head (as soft hollow forms when pressure is applied between the pin bones and the tail head).
- Flow of mucus or blood from the vulva
- Restlessness and isolation from the rest of the herd (when kept with other cows or seeks corner when housed).
- A solid or hardened floor for the pens is desirable and should be given a slope (about 1:40) to facilitate drainage. Alternatively, as slated floor may be used. Slated floors improve sanitation and ventilation of the pens. Providing bedding material (preferably chaffed dried grass) ensures more sanitary conditions and warmth in the pens. However, the bedding should be freshly replaced regularly.
- A loafing area in form a paddock adjacent to the house is required for the calves to exercise and bask especially after the first 3 weeks of age. Older animals should not have access to this area to minimize worm infestation and the grass should be kept young and growing by regular slashing.

FEEDING AND WATER

The major concern in calf feeding arises when calves are offered milk by means other than direct suckling from the cow.

Colostrum feeding

Colostrum is a thick yellowish substance that comes out of the cow's udder for 4 - 7 days after calving. It contains immunoglobulins (antibodies) which when consumed by a newborn calf imparts passive immunity to the calf against early infections. It also acts as a laxative in the expulsion of calf's first faeces (FOETAL DUNG or MECONIUM).

For the antibodies to cause the desired effect of protecting the newborn, the in must be absorbed wholly into the body without being altered, say by digestion. This is only possible during the first 72 hours of life and after this the intestines become impermeable to the antibodies and their digestion begins. This is why colostrum must be fed within the first 3 days of life.

It must be ensured that calves receive colostrum in the first 2 -4 hours of life and feeding is continued for 3 - 4 days. Even if the calf is seen suckling, it is advisable to drench 5 kg of colostrum in two splits within the first 12 hours after birth. This increases its chances of survival.

- For bucket fed or hand reared calves, 2 kg of colostrum per day is sufficient for heavy calves and 1.5 kg for small ones. Splitting the ration into 3 meals may be required for weak calves but 2 meals are normally administered since in most systems the milking is even more conveniently done twice in a day.
- Where facilities are available, colostrum in excess of what the calf can not take is drawn from the cow and kept under frozen state for future use in case a cow dies at calving. When this is not practical, artificial colostrum can be made.

Making artificial colostrum:

This is made by mixing the following:

- 1/2 litre of fresh milk (to provide essential amino acids)
- 1 fresh egg (egg white contains the immunogloblins)
- 1/4 litre of warm water (to provide for water requirements)
- 1 teaspoonful of cod liver oil (to provide vitamins and energy)
- 1 teaspoonful of castor oil or any vegetable oil (a laxative).

Castor oil/vegetable oil can be excluded when the calf starts passing out faeces normally.

Whole milk feeding

In artificial calf rearing systems colostrum is discontinued after the third day and replaced with whole milk. Milk is fed at a rate of 1kg/day for every 8 - 10 kg live weight of calf.

The ration can again be split into 2 Or 3 feedings depending on the size, condition and appetite of the calf.

To avoid digestive upsets and diarrhea feeding times, quantity and composition of the milk should not be altered abruptly.

The milk is fed as soon as it is drawn from the udder when it is still warm. A high level of hygiene is also required to minimize problems of scouring. Feeding utensils must be cleaned thoroughly between uses and allowed to air-dry.

Methods of calf rearing in milk producing systems

Two methods are commonly used where milk is considered to be

the primary out-put of the enterprise. These include restricted suckling and artificial rearing and they take many forms as influenced by the demand for milk, level and nature of management and availability of alternative feeds for calves.

Restricted Suckling

The calf feeds naturally by suckling from the udder but is given limited access to the cow. In this method, the calf may suckle until the cow dries up or may be force-weaned at a time its thought to be old enough for pasture. Many variations of this method exist, hence other names: Calf-at-foot, Semi-range, Dual purpose, Partial or Limited suckling. The following are often practiced by dairy farmers:

1. The calf is allowed to suckle for 2 -3 minutes to stimulate milk before each milking. During milking the calf is restrained by a helper or tied with a rope on the fore leg of the cow. After milking the calf is allowed to suckle for 30 minutes or until the cows are returned to pasture to graze. Thus during the times when the cows are grazing and at night the calves are restrained. This method is typical of the extensive (tethering) and pastoral systems.
2. The other systems the calf remains with the cows during daytime and separated over-night. This is done where milking is done once a day (in the morning) as with dairy ranching (Dual purposes).

Advantages of restricted suckling:

- In cows, there is better milk letdown, yield and persistency

in yield; and less risk of mastitis.

- Calf growth can be better when supplementary feed are given during the time the calves are denied access to their mothers.
- Calf mortality related to feeding management and hygiene are minimized
- No expensive housing structures are required and added labour due to cleaning as in artificial rearing is avoided.

Disadvantages of restricted suckling:

- A strong attachment of some cows to their calves will affect milk yield when a calf dies. However, for some farmer when a calf dies, they go round this problem by presenting the skin of the dead calf for the cow to lick during presenting the skin of the dead calf for the cow to lick during milking.
- Adequate restraining facilities are required to separate the calf from the cow until milking is done.
- The suckling stimulus delays re-conception in cows as they take longer to come back to heat after calving.
- There is a danger of consuming too much milk by the calf because some cows withhold their milk during milking to save it for their young
- This method may leave the calf hungry if other feeds are not provided when the cows have gone for grazing or during restraint.

Foster suckling

The practice adopted by dairy farmers is to foster more than one calf to a cow yielding just enough to sustain the calves.

However, this can be achieved when such cows do not have a poor attitude towards calves of other cows. The practice can

be a good method for utilizing milk from certain cows which has a low utility value for the market (e.g. milk from cows in late lactation).

Artificial Rearing

This is commonly practiced in intensive commercial systems where calves are fed whole milk replacer for 4 - 13 weeks from a bucket (BUCKET REARING), artificial teat dispenser or a soda bottle (HAND REARING). After birth the calf is initially left to suckle for the first 12 hours and then removed from cow. However, leaving the calf with the cow for too long, may present some difficulty in teaching it how to drink from a bucket.

Although artificial rearing can be a good way of ensuring intake of a fair share of their meal, there are a number of important aspects to be heeded.

- Good management and hygiene of housing and during feeding is pre-requisite for good health of the calf. Poor hygiene and stress predisposes the calf to diseases.
- Preferably, the calf should be fed 3 times during the first month.
- Too much or cold milk will lead to diarrhoea. Cold milk however, can be used provided its temperature does not fluctuate from day to day.
- Bucket fed calves often do not grow as well as suckled calves.

When scouring is eminent, the milk may have to be diluted particularly if it contains a lot of fat.

Teaching a calf to drink from a bucket

- Place bucket containing milk in front of the calf
- Secure the calf by standing over its shoulders and by pressing your legs firmly against its body
- Offer to the calf two fingers which have been dipped in milk. The calf will begin to suck the fingers.
- With the fingers still inserted in the calf's mouth gently lower its head into the bucket.
- Withdraw the fingers slowly when the calf starts sucking the milk. After a few attempts the calf will start drinking by itself (See figure below).

Roughage and Concentrate feeding

From 2 weeks of age roughage is introduced gradually as the calf's appetite builds. Preferably, roughage should be in form of good quality hay and a handful of green fodder. This stimulates rumen development and function, provides bulk and reduces problems of scours. Roughage for calves under 2 months of age should not be in form of silage as this will cause diarrhoea.

Concentrate (calf starter/pencils or young stock meal) is introduced at about the same time roughage feeding begins. The concentrate supplies additional nutrients required by the calf because as it grows milk will no longer be sufficient to meet the requirements. Feeding level is gradually increased so that by 12 weeks of age the calf is receiving 1 - 1¹/₂ kg per day.

Any change over of feed type(s) should allow a gradual adaptation to new feed for at least over a period of 3 - 5 days.

Feeding schedule for artificially reared dairy calves in the tropics

Age (Weeks)	Whole Milk (kg/day)	Concentrate (kg/day)	Roughage
1	2.5 - 3.0	-	-
2	3.5	0.1	*
3	4.0	0.2	*
4	4.5	0.3	*
5	5.0	0.4	**
6	5.0	0.5	**
7	5.0	0.6	**
8	4.0	0.7	***
9	3.0	0.8	***
10	2.0	1.0	***
11	1.5	1.25	****
12	1.0	1.5	****
13	0	1.5	*****

(1 handful 0.1kg)

This feeding schedule can support a calf of 30 - 40 kg at birth and gaining $\frac{1}{2}$ - $\frac{3}{4}$ kg/day to weaning.

In other systems, a constant amount of milk is offered throughout (4 kg/day) for 11 weeks and halved (2 kg/day) in the 12th week. This way the calf is encouraged to eat more of

the solid feeds in order to satisfy its appetite. Using a constant amount as the calf grows or for calves of different ages.

Calves kept for so long on an exclusively milk diet may begin to show signs of some mineral and vitamin deficiency, milk begin deficient in many of these vital elements and the calf is born with negligible body reserves. Thus to maintain proper growth of the calf, early supplementation with vitamins and minerals is advisable.

Water

It is essential to provide cool and clean drinking water at all times, especially from 2 weeks of age when the calf begins eating solid feed. At least 5 litres per day up to 3 months of age will be adequate to meet the requirements.

WEANING

Prolonged feeding of milk to calves reduces profits for the dairy farmer especially when the calf is able to obtain the required nutrients from solid feeds. The time to wean however, varies from farmer to farmer. Some guidelines can be used to determine when to wean:

- I. **Age of the calf:** In the tropics the calf will not be able to go to pasture until an age of 13 weeks (3 months).
- II. **Physical body condition:** This is even a better index to use than age. Well-grown, healthy and strong calves recover faster from the transition between a mainly milk diet to solid diet (Roughage and concentrates).
- III. **Body weight:** Weight may be used to score body condition

e.g. friesian calves at weaning should be at least 55 kg.

IV. Feed consumption: Calves that consume about 1 kg of starter diet within 30 minutes are considered big enough to rely on a solid diet.

With good management a calf should be able to score highly in all these indices at the optimum time. Weaning is initiated 2 days before by halving the milk ration, which is fed twice warm water, and this is continued for 2 - 3 days. The water should be offered at the same times when milk was being fed.

CALFHOOD HEALTH PROBLEMS

Common or nutritional scours

This is non-infectious type of diarrhoea caused by feeding too much or fatty milk; irregularities in feeding times and milk composition; cold milk and dirty feeding utensils. The typical symptom is a putty-like and yellowish-brown to greyish faeces with very bad smell. Treatment of the conditions involves removing the cause and severely reduce milk or instead provide warm saline water. The saline solution can be made by mixing:

- 4 litres of lukewarm water
- 2 teaspoon of common salt
- 2 teaspoon of sodium bicarbonate (or Magadi)
- $\frac{1}{2}$ teaspoon of potassium permanganate (Kabiriti)
- 2 cups of glucose

The solution is fed at a rate of 1 litre/10 kg body weight in 3 - 4 doses over 24 hours. When scouring stops feeding of milk is returned but gradually to normal.

Infectious Scours (White scours or Acute septicemia)

It commonly occurs during the first 3 - 5 weeks and is due bacterial infection especially by *E. Coli Salmonella spp*; Rotavirus and Coronavirus. Diarrhoea is white to light tan and the disease can be fatal if not treated. Treatment is by use of antibiotics with increased fluid intake as with common scours. For prevention, cows can be vaccinated 2 - 6 weeks before calving to increase maternal antibodies.

Pneumonia

This is common in intensively managed calves of 3 - 16 weeks old. It is caused by bacteria and viruses and often complicated by other secondary infections. Predisposing factors include scours, contact with older or infected stock, overcrowding, poor ventilation, cold with draft, sudden temperature changes, poor feeding conditions, etc.

Navel Infection (Navel ill)

Common in the first week of birth and infection occurs via the navel. This can be avoided by ensuring that calving does not occur in a filthy area, the umbilicus is disinfected and good hygiene maintained in calf housing. Navel becomes purulent and joints become swollen. The pus should be drained and the navel dressed in a copper sulphate solution.

Internal parasites

Intestinal worms can be acquired when calves are let out on an unprotected pastures or when the grass brought to them is cut from the general herd pasture. Symptoms include fluffy hair coat, inappetence, pot belly, loss of body condition and

occasional fever. Although a number of anti-helminthics are available on the market, the practice should be to minimize exposure of calves to worms by denying access to their paddocks by older stock.

RAISING HEIFERS

Female calves after weaning are called heifers. Raising ones own heifers for replacing old cows is important in dairy enterprises than in beef production for two reasons:

- Purchased replacements tend to be of poor quality since farmers can only sell animals predicted to be of low breeding worth.
- Poor management of heifers between weaning and conception grossly reduces their lifetime production.

The goal in raising heifers is to maintain acceptable and steady growth rate without over-fattening and maturing precociously. Weight gain should be around 600g/day. This results in optimal future milk production and breeding.

General post-weaning practices

To minimize cross-infections with older stock heifers are kept separate from the general herd until about 2 months to their first calving. Pasture is the basic feed. Continuation with the calf starter supplement may be necessary up to 4 months of age to enable the calf overcome the weaning stress and maintain steady growth. Thereafter this is gradually replaced with grower ration until 10 months of age when forage alone should be adequate. The level of concentrate feeding will depend on whether the calf was weaned towards the beginning of the dry season or wet season. About 2 kg of concentrate will be adequate per day. Additional sources of roughage such as

cut forage, tree foliage, hay or silage will also be important.

During the pre-breeding period heifers should be vaccinated against endemic disease. Other problems like deformed/overgrown hooves, poor growth and parasite infestations are also corrected.

Mating and pregnancy

The best age for first mating will depend on the weight of the animal. The suitable condition for breeding will be attained at different ages and weights in different and is also influenced by the level of management and nutrition. Puberty in heifers is attained at 40 - 45% (14 months of age) of mature weight in temperate dairy breeds and 60 - 68% tropical breeds (25 - 30 months of age). Under the tropics temperate breeds can be bred for the first time at about 55 - 60% mature weight (15 and 18 months of age). However this should be done when the animal has good body condition. However this should be done when the animal has good body condition. Heifers attaining the condition that permits serving at a lower age which reduces space requirements (mainly grazing land) and maintenance costs for young stock.

For specialized dairy breeds checking for signs of oestrus should begin at 15 months of age and served 2 - 3 months later. To avoid calving difficulties resulting from an oversized calf, heifers should be bred to bull (or semen) known to sire calves with a small size at birth. During pregnancy, particularly from the 6 month, there is high demand for nutrients by the in-calf heifer since it is still growing and must maintain the developing foetus. Some form of concentrate feeding will be required even when pasture quality is good. Depending on the quality grazing and the condition of the in-

calf heifer up to 2 kg of dairy meal will be adequate in late pregnancy. Mineral feeding is also important during this stage (See chapter 6).

Palpating the udder and feeding the concentrate in the milking parlour for heifers in late pregnancy will accustom them to being handled before they calve down.

MINOR SURGICAL OPERATIONS/CONDITIONS

Dr. E.S. Bizimenyera

1. Abscess

A localised accumulation of pus. Area usually hot and painful.

Incise with blade or hot knife at the lowest point for easy drainage. Press out all pus. Leave as open wound without bandaging.

2. Castration

Usually done on:

- (i) unwanted males (for breeding purposes)
- (ii) aggressive males to calm them for subsequent handling
- (iii) purpose for fattening steers

When done too early, retards rate of growth but minimises complications.

Technique

- (i) Razor blade
- (ii) use of Burdizzo, the bloodless castration
- (iii) Emasculator

Complications

- Bleeding (ligate vessels or knot them)
- Sepsis or infection (antiseptics and clean instruments)
- Tetanus (use disinfectant and sterile instruments)

3. Dehorning

Usually done

- (i) to ease handling of aggressive animals
- (ii) cosmetic when one horn has been injured or damaged
- (iii) protect injury to other animals and people

Technique - depends on age and size of horn. Better done in young animals before horns develop cavities. Requires restraint or anaesthesia.

- (i) paste (caustic soda) - used in calves less than 1 week.
Paste applied to horn bud and kills off horn tissue
- (ii) debudding iron - hot iron used to burn the horn bud.
Better used before two months.
- (iii) sheers, wire and hacksaw blade used on big horns.

Complications - bleeding (need cauterising with hot iron)

- sinusitis (avoid dehorning in rainy season or plug holes with sterile gauze)

4. Tail Docking

Usually done in dogs or in calves with severely injured tail.

Use anesthetics if done on animals over one week old.

- Complications: - bleeding (cauterise with hot iron)
 - paralysis) sterile instruments and disinfectants
 - tetanus)

5. Episiotomy

Used to enlarge opening for oversized foetuses or calves at birth when there is difficult birth (dystokia)

Technique - cut must not be above vagina to anus. The cut has to be tangentially or at an angle to vaginal lips. May require veterinary assistance for anesthesia or stitching.

Complications - Anal-vaginal fistula, - Sepsis, Infertility

RESTRAINT

DR. E.S. BIZIMENYERA

1. Definition

Application of physical or chemical measures to an animal to stop/inhibit voluntary muscle movements"

2. Why/when is restraint needed?

- (a) Facilitate
 - physical examination
 - application of medication
 - operations
 - other animal husbandry procedure
- (b) **Safeguard operator himself**
 - e.g. when handling painful conditions
 - dehorning
 - castrating
- © **Safeguard life of animal**
 - e.g. when animal put on lorry for transportation so that it doesn't jump off.
- (d) **Prevent wastage of product**
 - e.g. milk at milking time
 - skin at time of slaughter
- (e) **Law requires it (Prevention of Cruelty to Animals Act)**
 - e.g. anaesthesia for castration of dogs or dehorning adult cows
- (f) **Modern Farming**
 - e.g.
 - Crush for treatment
 - Halter to lead animal on show

3. When restraint is bad

- (a) Inflicting damage on animal
 - e.g. - rope wounds on legs
 - bruises by stick
- (b) Tearing off of part of body or organ
 - e.g. - horn
 - tail breaking off
- © Killing of animal
 - e.g. - excessive anaesthesia
 - blow on head
 - rope around neck on goats
- Abortion in pregnant animal
 - e.g. - Rompun (xylazine) inj.
 - Rope badly tied around abdomen

4. Methods of restraint

- Vary, depending on
 - age
 - size
 - temperament /disposition

- procedure to be carried out
- breed
- facilities available
- operators

A. PHYSICAL

Cattle:

(a) Crush -

Wooden/metalic structure for holding one or more animals for treatment, vaccination, examination etc.

(b) Hands

- (i) Pinching nasal septum
- (ii) Tail hold
- (iii) Flank skin flap hold

© Instruments

- (i) bull lead
- (ii) mouth gag
- (iii) kick preventor (anti-kick device)

(d) Rope

- (i) Halter
- (ii) Rope side line
- (iii) Halter and lead rope

(e) Casting with rope

- (i) Two half-hitch method
- (ii) Burley method

Pigs

Pig-holder - rope tied behind upper canine teeth

Dogs:

Tape muzzle

B. CHEMICAL

(a) Anaesthetics (i) local e.g. lignocaine
(ii) general, e.g. ketamine, thiopentone

(b) Analgesic, e.g. phenylbutazone

(c) Tranquilizer, e.g. (I) zylazine
(Rompun/Chanazine)

(ii) Chlorpromazine
(iii) Acepromazine

MARKETING (FARM PRODUCE & PRODUCTS

Dr. E.S. Bizimenyera

1. Definitions

- (i) Marketing through - "Social and managerial process which individuals and groups get what they need and want through the process of exchange or through creating and delivery of services and value"
- (ii) Customer placed - "Anyone with a need and who has money in his or her pocket"
- (iii) Competitor- "Anyone that takes the customer shilling that would have come to you or your pocket"
- (iv) Product- "Any item that can be given out to a customer."

2. Difference between marketing and selling

	Starting Point	Focus	Means	End-result
Marketing	Market	Customer	Co-ordinated marketing	Profitability through customer satisfaction
Selling	Factor y/farm	Product, e.g. milk	aggressive selling *	profitability through sales volume

N.B. *Selling concept rests on convincing

3. Marketing mix (eight/four P's)

- Product
- Place
- Promotion

- Price
- Process
- Physical facility
- Personnel
- Politics

4. Market focus

Rests on four pillars:-

(i) **Pareto's rule** (the 80:20 ratio)

80% of your sales/business/profits come from 20% of your customers. Try to identify who those 20% are.

(ii) **Customer satisfaction -**

A dissatisfied customer grumbles and tells 25 others; a satisfied customer tells only 5 others. Keep customers satisfied. Talk to your customer.

(iii) **Team work**

Synergy is needed. Good coordination between produce, management, employees and customers.

(iv) **Profitability**

The business or enterprise must be profitable. The business has to grow.

5. Market plan

(a) **Product**

- Seasonal (or according to region/zone)
- Perishable
- Highly nutritive for growth and health

(b) **Customers**

(i) **Identify them**

- Get to know them
- Know their behaviour/tendencies
- get to know their feelings (about

product, employees, politics, etc.)

- Geography (location, climate, etc.)

(ii) **Buyer motivation**

- Dependable production or service
- Price quality
- Delivery schedule (on time or as needed)
- Guarantee
- Safety
- Credit/discount on bulk purchase
- Customization (specific to customer taste)

(iii) **Customer satisfaction**

- Good quality
- Good quantity/size
- Complaints addressed
- Good timing - at the time its needed
- Zero defects

(iv) **Why Customers quit**

- 3% moved away to other areas or died
- 5% develop other acquaintances (OB, relative, friend etc.)
- 9% competitive (usually price) reasons
- 14% dissatisfied with product or service
- 68% bad attitude/indifference by owner, manager, employee or family member

(v) **Overwhelm customers**

- Know customer by name
- Pay attention to customer needs and complaints
- Do not take customers for granted
- Use employees to advantage
- Provide guarantee (e.g. return or replacement of defective item)

© **Competitors**

(i) **Identify them**

- who are they
- where located
- talk to their customers
- know about their product or services
- their strength and weaknesses
- become their customer

(ii) Fight the competition

Marketing is a civilised warfare in which battles are won

with ideas, innovations and creative thinking (not with bullets or witchcraft)

- Frontal attack
- Flanking attack
- By-pass attack
- Encirclement attack
- Guerrilla attack

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