SWAZILAND DAIRY BOARD

(Established in terms of the Dairy Act No. 28/1968)

DAIRY FARMING HAND BOOK

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Foreword

Swaziland is a net importer of dairy products from neighbouring South Africa.

This therefore means Swaziland should make efforts to foster dairy development plans wherever the potential exists. In so doing the gap between production and consumption of dairy products in the country will be narrowed.

Modernization of the dairy industry along the lines of large scale enterprises found in developed countries is the best strategy for assuring increased milk and dairy products. However this model may not be adaptable under our conditions. Rather consideration should be accorded to the peculiarity in our livestock production systems to determine how to modify and adopt the model in order to ensure its successful application under our condition.

This dairy handbook tries to identify some of the fundamental issues in a profitable dairy enterprise.

Not all relevant information on dairying is contained in this handbook, but that the farmer should source more detailed information from elsewhere.

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INTRODUCTION

Dairy farming needs a hard working, determined and patient person. The aspiring dairy farmer must know there are no holidays throughout the year. Dairy cattle have to be fed, watered, cleansed, their health monitored continuously and milked everyday at specified times. Milking intervals must be kept constant (adhered to).

A dairy farmer must have basic training in bookkeeping and keep records on the running of the dairy and artificial insemination (A.I.). Dairy cattle have to be loved and treated carefully for if a farmer treats them roughly, they will retain their milk, which will result in mastitis.

The dairy manager or farmer should have a very good working relationship with his farm workers. Where possible a dairy farmer should produce his/her own fodder because 75% of the farms income is spent on feed.

Unproductive cattle should be culled, as it would be costly to keep them on the farm. There should be constant supply of milk, therefore dairy cattle oestrus (heat) should be desynchronised and 75% of the herd should be in milk at any given time.

Milking machines must be serviced regularly to ensure efficient and effective operations failing which the cow's udder will be lost through inflammation of the udder given the high pressures. Strict hygiene should be kept at all times in the open cow sheds (kraals) in the milking parlour and the cows should be kept clean.

After milking the cows udder should be disinfected and kept standing for at least five (5) minutes to enable closure of the sphincter muscle in the teat canal.

When hand milking is practiced, milkers should always be clean and to wash hands thoroughly with soap before milking and after using the toilets. Milkers should not have cuts on their hands and should not be suffering from any contagious disease.

Dairy cattle should be stall-fed and not to move distances grazing because the energy they use to move long distances grazing could be used for milk synthesis.

DAIRY BREEDS

The term dairy breed is used to differentiate those cattle that are bred primarily to produce milk against those that are used for meat production. Dairy cattle may be defined as a particular group of animals developed in a certain area for a definite purpose and having the same general characteristics such as colour, conformation and quality of product i.e. milk. A purebred dairy cow is one whose ancestry traces back to the same breed. A registered dairy cow is a purebred that has been registered by a particular breed association. There are six (6) major dairy breeds found in Botswana as follows: - Friesians/Holsteins, Jerseys, Guernseys and Aryshires. Dairy cattle not common in Swaziland are Dairy Swiss (Braunveih) and Dairy Shorthorn etc.

Common dairy breeds in the world

Ayrshire: The first cows of this breed were thought to have arrived in New England from Scotland's County Ayr in the early 1820's. Well adapted to rocky farms and harsh winters, the Ayrshires thrived, eventually spreading to dairy farms all across the country. Average output is 7,711kg of milk per 305 day-cycle/year, with 3.9% butterfat, 3.3% total protein.

Brown Swiss: Believed to have originated in the Alps of Switzerland, these hardy animals are tolerant of harsh climate and produce large quantities of milk, close behind the Holsteins. Officially recognized as a breed in the U.S. in 1906, the first small group of cows arrived here in 1869. Though few animals were actually imported, this hasn't stopped their steady growth in number, and today, the Brown Swiss are very important members of the dairy industry. Average output is 9525kg of milk per cycle with 4.0% butterfat, 3.5% total protein.

Guernsey: As their name suggests, these cows hail from the British Isle of Guernsey in the English Channel. Well-bred by monks from select French Norman/Breton cattle lines (Alderneys from Normandy, Froment du Leons from Brittany), the first to arrive in the U.S. were brought by ship in 1840. Guernseys are small, about three-fifths the size of a Holstein, but produce up to 6,350kg milk with 4.5% butterfat, 3.5% total protein each cycle.

Holstein-Friesian: Originally bred in Northern Germany, and the North Holland/Friesland regions of the Netherlands. These familiar black and white cows were selectively bred to make large quantities of milk from the area's most abundant natural food source- grass.

First brought to the U.S. in the late 1850's, their ready adaptibility, and economic production of large volumes of milk relative to other cows has made them common on dairies worldwide. Figures for average milk output range up to 12,700kg per cycle, with 2.5-3.6% butterfat, 3.2% total protein.

Jersey: Developed on Britain's Isle of Jersey, close to the Isle of Guernsey just off the coast of France. With a history as a pure breed that dates back several hundred years, they are descendants of stock from the French region of Normandy.

The 1850's saw the arrival of the first Jersey's in the U.S. Like the Guernsey, they, too, are small, but produce relatively large amounts of milk- on average,7,260kg per cycle, with a high butterfat content of 4.9%, total protein 3.7%.

provided by Hoard's Dairyman

Milking Shorthorn: Part of the Shorthorn cattle breed originally developed for beef in Britain, descendants of these moderate producers were bred and selected for milk rather than meat. Arriving in the U.S. in 1783, the first mult-purpose Milking Shorthorns provided the early settlers with not only milk, but meat and pulling power as well. A typical cow produces 6,990kg of milk per cycle with a butterfat content of 3.8%, total protein 3.3%.

DUAL PURPOSE DAIRY BREEDS

Dairy Swiss (Braunvieh) Breed:

The Dairy Swiss breed was bred in the rugged hills and valleys of Switzerland. The breed was developed over a period of many centuries. The Dairy Swiss was brought about through selection within the Brown Swiss, which was kept for three purposes milk, meat and draft.

The Dairy Swiss (Braunveigh) produces on average 18 – 20 litres/day of milk whilst the Brown Swiss produces 10 -15 litres/day. The Brown Swiss is common in Botswana and performs very well under our weather conditions provided they are managed well. Their colour varies from fawn to brown. The nose and tongue black and a light coloured bond extend around the nose. Spotting is seldom found and undesirable. Calves are light in colour at birth but darken with age.

Brown Swiss are rugged heavily muscled and lack the refinement of dairy cattle.

Picture of a Dairy Swiss (Braunveh) cow and Bull

Red Poll Breed:

Commonly found in Norfolk and Suffolk – United Kingdom. The breed has a deep red colour and no horns. Has a long head, short limbs with a heavy body. Live weight 556 Kg on average produces 19 litres/day milk. Not commonly found in Swaziland.

(Picture of a Redpoll Cow/Bull)


The Pinzgauer Breed:

The bred originates from Austria. It was first imported into Republic of South Africa and South West Africa in 1902. The breed was bred under harsh conditions and extreme mountainous grazing caused the breed not only to be well known for its good ability to walk but also its high production potential even under difficult conditions.

Produces on average 15 – 18 litres milk/day. The basic colour varies from light red to very dark chestnut brown with a characteristic white that stretches from the withers along the top and bottom line as far as the brisket.

Picture of a Pinzgauer cow and Bull


Dairy Simmentaller:

Originates from Germany and was also bred over generations. Produces an average 10 –17 litres of milk a day under good management. It is a hardy animal and performs well under Botswana conditions. The colour is either yellow and white or red and white. It has a refined dairy conformation unlike a beef Simmental that is muscular and rectangular in conformation. The Dairy Simmentaller has a developed udder and is triangular in conformation.

Picture of Dairy Simmental cow and Bull

South Devon:

It is a dual-purpose animal with a live weight of about 713 kg and milk yield of 10 –15 litres/day.

Picture of South Devon Dairy cow and Bull

DAIRY CATTLE FEEDING.

This is the intake of nutrients to satisfy body needs.

The animal can be satisfied in terms of quantity, quality and consistency.

The definition is deemed incomplete without the inclusion of water.

Why plan feeding in dairy.

1. To maintain feeding level throughout the year.
2. To maximize dairy productivity through proper feeding.
3. To be able to calculate feed required in the dairy over a specified period.
4. To minimize disease occurrence in the dairy as a result of poor feeding management.

Determinants for planning feeding in dairy.

1. Know the actual size of grazing area if there is a provision of pasture.
2. Be knowledge about the weght of the animals.
3. Know the dairy intake of roughage of the animals.
4. Be well versed about the nutritional content in the feed you plan to provide.

Daily feed intake of dairy cows.

- Theory states that an average intake of dairy cows is 2.5% of its body mass
- Intake varies with the age of the cow, productive stage and gender.
- Dry non-pregnant cows can eat up to 2.5 but highly productive lactating cows can eat up to 3% of its body mass.
- To avoid underestimating feeding we normally say a cow eats up to 3% of its body mass.
- Once the cow has taken the feed it needs it will lie down or stand and start regurgitating.

Nutrients required in the feed.

Carbohydrates (CHO).

- These are energy source. They are responsible upon digestion to provide energy to the cow.
- The energy produced enables the cow to do all fundamental processes in its body.
- Their source: grass fresh or dry - ground maize -
  Maize stalks.

Symptoms of carbohydrates deficiency.

1. silent heat
2. Liability to ketosis.
3. Impaired resistance to uterine and udder infection.
4. Anorexia

Proteins (CHON).

- These are growth boosters.
- They are responsible for growth, productivity, hormonal production and speeding other essential activities in the cow.
- Source: beans stover, ground nut stover, lurcene. Lurcaena, soya beans, dairy meal, fish meal, bone meal, desmoduim and sunflower cake.

Symptoms of proteins deficiency.

1. Lack of appetite.
2. Slow or failure to show estrus signs.
3. Less milk production.
4. Delayed sexual maturity.

Vitamins.

- They are mainly for immune boosting and immune and facilitating other physiological processes.
- They are categorized as water soluble and fat soluble.
- Water soluble B (made in the rumen), and C (made by the cow in its body).
- Fat soluble: a,d,e,k. these are all obtainable in green herbage.

Minerals.

1. **Sodium Chloride:** Lactating cow often require additional salt as milk contains high amounts of sodium.
2. **Calcium:** Must be added to the diets of lactating cows. Milk fever can occur when calcium levels in the blood drop.
3. **Phosphorus:** Deficiency may occur with cows grazing on range lands if the forage is deficient in this

FEEDING LACTATING COWS.

This are milking cows. The lactation period is 305 days. During this time the animal draws more from its body and feed to produce milk needed by the farmer.

As calving process

2 weeks or more out:

@ Udder fills out, "makes a bag." Can be even more gradual in first-calf heifers;
@ Vulva will noticeably relax and enlarge, "springing";
@ Cervical or mucous plug may dislodge and be excreted.

12 to 24 hours out:

@ Pelvic ligaments will relax, resulting in "lank" appearance around tail and pins.

12 hours out:

@ Possible behavioral changes; trying to isolate herself, not coming to feed, etc.

1. ***Early lactation. (Day 1 to day 100).***
    - The cow does not have appetite.
    - The animal still smell blood from after births.
    - The rumen of the cow is still regaining its normal size.

How to feed. Day 1-day 3. (cow)

Feed concentrates that have high nutrient e.g. dairy meal.

Don't feed poor quality feed during this period e.g. maize brane?

Enough clean water should be provided about 10 meters from the birth site.

Day 1 to day 3 (calf)

Make sure the calf get colostrums its dam within 6 hours from calving.

If calf cannot suckle on its own, try to help it.

Milk the cow after the calf has suckle to empty the udder (mastitis prevention)

Making artificial colostrums.

It can happen that a cow dies immediately after calving before the calf gets colostrums. So one has to formulate artificial colostrum and make it available to the calf.

Formula =1 litre warm fresh milk

3 fresh eggs (preferable from indigenous chickens)

2ml caster oil

Mix the above and give the calf one liter in the morning one litre in the

Afternoon for three days.

From day 3 to day 42

This is the period when the cow starts producing milk that can be supplied to the market. Milk production starts to increase gradually daily because the animal secretary cells are becoming more active. This is accompanied by high feed and water intake. During this period the cow should start showing signs of heat, first at 21 days post calving (don't breed) and 42 days post calving (can breed).

Try to provide high feed good in proteins and roughage.

Proteins stimulate milk production.

Roughage provides energy to keep the cow actively producing milk.

Mineral leaks should available too.

Note a properly established pasture provides all of the above.

During the winter season pastures cannot supply enough to meet cow demand so

Provide hay bales= Rhodes grass, tuff grass, guinea grass or any other nutritious grass.

Protein source = lurcene hay, beans stover, groundnut stover, cowpeas stover, brewers bran.

Mineral leak= purchase mineral block.

Mixing ratio = roughage 60% to 75%.

Proteins 20% - 35%

Minerals and vit 5%t

Day 42 to day 250

During this period the cows maintains its highest production level called the peak of lactation. Feeding is the same as in day 3 to day 42. The ingested feed starts to splits to support more function in the cow's body; to maintain its body, to provide for its activities, to provide for growing embryo and to produce milk. Milk production level is maintained during this period. Cows producing milk above 15 litres should be supplemented with dairy meal during or immediately after milking. In every 3 liter produced after 15 litres give a bonus of 1 kg dairy meal.

Example= 15 litre production = no bonus

16 -18 litres production = 1 kg dairy meal bonus

18 – 21 litres production = 2 kg dairy meal bonus

21-24 litres production = 3 kg dairy meal bonus

Day 251 to day 305

The calf in the cow is complete in this period, it then start growing in size. This causes the cow to diverts more feed to support the growing foetus hence milk production starts to decrease gradually until day 305 when it is recommended that you stop milking the cow (drying it). The stomach of the cow is pressed forward and downwards by the growing foetus causing a decrease in feed consumption.

How to feed.

Try to provide highly digested feedstuffs, e.g. fresh grass or hay mixed with molasses.

Protein level should be maintained to support the demand of the growing foetus.

FEEDING DRY COWS

This is the group of cows that are no longer milked because they are at most two months before calving. These cows are always isolated from the milking herd because they are fed differently. The foetus is then complete and big in size, pressing against the stomach of the cow.

How to feed.

1. Decrease the plane of concentrate feeding.

2. Avoid calcium diet.

3. If the animal was thin please increase the plane of feeding until you can only see the two last ribs of the cow.

4. The rate of concentrate supplementation should decrease in these animals to decrease feeding costs.

5. Avoid mixing the cow with milking herd.

Note. Bulls are fed similar to dry cows with the exception of a calcium free diet.

DEFINITIONS

Anorexia – stop feeding.

Cervix – birth canal

Crepitation – gas filled

Cytotoxin – toxin that kill cells

Dystocia – difficulty in calving

Dyspnoea – difficulty in breathing

Edematous – swollen and water filled

Emaciation – weight loss

Fetus – unborn calf

Fever – increase in temperature

Gestation - pregnancy

Gynaecology - This is the scientific study and treatment of diseases and disorders affecting the reproductive system.

Hypothermia – cold

Haematogenous – through blood

Inappetence – lack of appetite

Lethargic – tired

Lymphatogenous – through the lymph fluid

Mortality – death

Obsterics – this is the branch of medicine that is concerned with giving birth

Parturition – giving birth

Placenta – fetal membranes

Septicaemia – generalized infection

Torsion - twising

Unthrift – poor doer

HOW TO IDENTIFY A SICK ANIMAL

Once animals are sick, they tend to do the following:

1. They stand apart from the group (animals in labour also isolate themselves)
2. They are restless and lethargic.
3. They usually hold their head down.
4. Their eyes are dull and they show very little interest on their surroundings.
5. They often have a rough coat, they look weak and tired.
6. They do not like to feed.

BACTERIAL DISEASES

CALF DISEASES

INTRODUCTION

"A calf today, a cow tomorrow" for this reason, take good care of them.

Calves must:

1. Be born in a clean dry place

2. It must be in a warm environment.

3. Clean and disinfect the navel with iodine

4. Feed it with colostrum. It must have received the first feeding within the first six hours of life. The first feeding must be ad libitum and atleast 10% of its body weight

Why feed colostrum?

- Calves are born without immunoglobulins, therefore they have no immunity. They get this from immunoglobulins contained in colostrum.
- They need colostrum within the first 6 hours of life. This is when the intestines are pourous and can be absorb large particles.
- Immunoglobulins start to drop in calves after 4 weeks (1 month) depending on the amount of colostrums absorbed, amount of bacteria absorbed and the medication that has been given to calves.

At times calves fail to absorb the immunoglobulins from the colostrum. This is called **failure of passive transfer**. There are several reasons that cause failure of passive transfer. Some causes of failure of passive transfer are:

Reasons for failure of passive transfer

1. Calf related - weak cannot suckle therefore absorbs very little immunoglobulins.

    - premature calves are weak and cannot suckle.

2. Dam - low colostrum immunoglobulin especially young ones.

    - calf can't suckle because the dam is too short

3. Calf Management - late feeding of calf

    - feeding with tube and not a teat, this can lead to aspiration pneumonia & failure of closure of esophageal groove.

Failure of passive transfer lead calves that are poor doers (weak, easily attacked by diseases, slow growers etc.)

If there is no colostrum, consider fostering, get from colostrum bank or give milk and eggs (Two eggs in one litre of milk).

Common causes of calf mortality

1. **Respiratory failure** – to avoid this, remove the fetal fluids from the nostrils and mouth.

2. **Hypothermia –** wipe the whole body of the calf with a clean dry cloth and always provide warmth in the calving pen.
3. **Diarrhoea (calf scours)**
4. **Starvation**

COMMON CALF DISEASES

CALF SCOURS (DIARRHOEA)

This is a term that is used to describe diarrhea that affect young calves.

Causes of diarrhea

Age	Cause	Signs	Pre-disposing factor
3-5 days	E. coli	-watery diarrhoea, sudden onset - Death in 12-24hrs	- poor management - dirty environment
2wks	Salmonella	-bloody, smelly diarrhoea with mucus	- stress (no food, water, transport, overcrowding)
Few days	Cl. pefringes	- Bloody and smelly diarrhoea - Evidence of abdominal pain - The large and most active affected	- not known
3 wks	Diet	Lot of pasty diarrhea	-lot of milk consumption, poor milk constitution.

1. SALMONELLOSIS

This is a diarrhoea caused by the bacteria S***almonella***. This disease is common calves but older cattle can also be affected.

Aetiology

Salmonella typhimurium, S. dublin – cattle, sheep and goats.

S. typhimurium, S. enteritidis – horses

Mode of infection

- Ingestion of contaminated feed and water
- Drinking milk and ingestion of meat.

Epidemiology

- ingestion of bacteria with water, food and milk
- multiplication in the intestines
- penetration of the lamina propria
- production of cytotoxin
- damage of the gut
- septicaemia

Predisposing factors

- Feed deprivation
- Water deprivation
- Long transportation
- Recent calving

- Mixing and overcrowding in feedlot.

Clinical signs

- fever upto 41.5 degrees celcius
- soft faeces
- Inappetance
- Dehydratyion
- Abortion
- Diarrhoea

Diagnosis

- clinical signs
- Laboratory examination of affected animal tissues and faeces

Treatment

- rehydration salts
- antibiotic

2. PASTEURELLOSIS (ENZOOTIC PNEUMONIA)

Pasteurella is a bacteria that is present in the upper respiratory system of healthy animals. This bacteria will cause disease once the animals are subjectecd to some form of stress. Pasteurella can either be localized and cause pneumonia or be septicemic and cause pulpy kidney like signs and mastitis.

Common causes of pasteurella pneumonia(enzootic pneumonia)

- stress due to bad weather such as strong winds, heavy rains, extreme cold and sudden changes in temperature.
- Transportation of animals over long distances

Clinical signs

- calves over the age of 3 weeks are commonly affected
- anorexia, increase in temperature, decrease in production.
- Rapid breathing /difficulty in breathing/ gasping for air.
- Coughing
- Mucous discharge from the nose.

Post mortem signs

- The lungs will look patch, with red patches over the normal pink areas.
- Large part of the lung may be firm and red in colour.
- The lungs may be covered with a yellowish white layer which sticks to the inside of the ribs.
- There may be froth in the windpipe.
- The affected part of the lungs may sink in water.

Treatment

Terramycin LA

Prevention

- provide shelter during bad weather
- during long trips, allow the calves to stop, drink water and give them some hay to eat.
- Vaccination.

3. JOINT ILL

This is also called the navel ill. It is a non specific bacterial infection of several joints of calves and kids. It commonly affect animals that are three to four months old.

Aetiology

Corynebacterium sp, Erysipelothrix sp, Staphylococcus and Streptococcus bacteria

Predisposing factors

- Lack of dipping of navel in iodine after birth
- Poor sanitation in calving pens
- Calving in overcrowded dirty environment.
- Calving in pens that do not have bedding and the soil is exposed.

Pathogenesis

- Bacteria are normal residents of the soil.
- These gain entry into the body of the calves through the navel
- Bacteria gain entry into the blood via the navel opening.
- Once in the blood it causes the disease.

Clinical signs

- More than one joint is hot, swollen and painful.
- The affected limbs will not bear weight. If more than one limb is affected, kids will fail to stand.
- Sometimes the navel area is inflamed. At times an abscess will form on the navel long after recovery.
- If disease is chronic, the limbs are stiff and the overall growth of the car is slow.

Treatment

- Inject with penicillin for one week
- Provide bedding
- Frequent turning of the kid once it is down.
- Frequent massaging the affect ted joints

Those that recover will remain unthrift for the rest of their lives.

BACTERIAL DISEASES

BRUCELLOSIS

Contagious disease primarily affecting cattle, sheep, goats and dogs caused by bacteria of the genus brucella. This disease is characterised by abortion and to a lesser extent orchitis and hygromas.

Aetiology

i) *Brucella arbotus* – cattle (also implicated in sheep and goats)

ii) *Brucella melitensis* - in sheep and goats (also implicated in cattle)

iii) *Brucella suis* – implicated in cattle

Infectious organs

- Uterine discharge
- Fetal membranes
- Aborted fetuses
- Milk
- Contaminated genitals

Modes of infection

1. ingestion of infective organism either directly or with feed.
2. contact of organism with wound or conjuctiva or mucus membranes.
3. venereal transmission (infected rams are the ones that spread the diseases).
4. Artificial insemination (AI) – Use of contaminated semen

Clinical signs

In Cows, goats

Abortions in the last trimester

Still born calves and kids

Retained placentas

Reduced milk production

In Man

Undulating fever

Testicular abscesses

Arthritis

Hygromas

Control

i) Vaccination of calves when they are between 4 months and 8 months. (less than 9 months).

ii) Regular testing and culling of infected cattle and rams in the herd.

NO TREATMENT

Brucellosis is not the only cause of abortion in cattle. Other causes include:

- Chlamydia
- Hunger/ starvation
- Septicaemia

***BOVINE TUBERCOLOSIS (TB*)**

This is an infectious disease caused by a bacteria of the genus mycobacterium. It is a chronic debilitating disease, occasionally it can be acute. This disease affects all vertebrate species.

Causes

i) *Mycobacterium tuberculosis* – human

ii) *Mycobacterium avium* – avian (birds, chickens, turkeys etc)

iii) *Mycobacterium bovis* – bovine

All three may cause infection in host species other than their own.

*Mycobacterium bovis can cause progressive disease in most vertebrates including man***.**

Pathogenesis

- Infection is through inhalation.
- This will lead to formation of foci in the lung (cattle and man) and intestinal tract in birds.
- Caseous lesions will form in adjacent lymph nodes from the primary foci as a result of lymphatic drainage.
- These lesions will grow forming tumor-like masses called tubercle.
- Tubercles will spread to other tissues and organs by lymphatogenous and haematogenous spread.

Inhalation_____ primary foci _____ Tubercles in LN _____ lesions in

In lungs

_____ lymph nodes _____ Other organs

Clinical Signs

- Intermittent hacking cough

- Enlarged superficial lymph nodes

- Weakness, anorexia, dyspnoea

- Emaciation

- Fever

Reservoirs

-Man and cattle

Control

-Test and slaughter all the positives

NO TREATMENT

BLACK QUARTER

Also called Blackleg, Quarter evil

This is an acute disease of cattle and goats caused by *Clostridium chauvoei*. It is characterised by emphysematous swelling in the heavy muscles ie, forelimbs and hindlimbs.

Pathogenesis

Clostridium occurs naturally in the intestinal tract of animals. This bacteria is passed onto the soil with faeces. It remains viable in the soil for many years. Once the soil is disturbed, spores are activated and they become infective.

Spores in soil _____ Ingested _____ Spores in big muscles

Black quarter is a disease that affects cattle or goats with the following characteristics:

Breeds in excellent health

Cattle with a high body condition score (fat)

Young cattle, cattle between 6 months and 3 years are affected

Disease is common in Summer and Autumn

Clinical signs

Sudden onset

Few cattle found dead without showing signs, with the affected limb lifted

Acute lameness

Marked depression

Edematous and crepitation of affected limb

Slight swelling of affected muscle.

Black blood oozing out when cutting the affected muscle.

Control

Vaccination of cattle (calves between 6 months of age up to 3years). This is done once a year.

Prophylactic treatment with penicillin

When the disease has been confirmed it can be treated a with high dose of penicillin

TETANUS

Tetanus is caused ***Clostridium tetani***

Almost all mammals are susceptible

PATHOGENESIS

- C. tetani is found in the intestinal tract of animals and the soil
- introduced into the tissues through wounds
- absorbed by the nerves
- to the central nervous system

Clinical signs

- Seen 2 weeks infection
- Localized stiffnes of the masseter muscles, neck and the hindlimbs
- The head is extended
- The tail becomes stiff
- Sweating
- Temperature is increased
- Death due to respiratory failure

Treatment and Control

- Because the signs are so sudden, usually treatment is futile.
- Vaccinate the animal before performing an invasive procedure**.**

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BOTULISM

This is a disease characterized by rapid fatal paralysis caused by ingestion of the toxin of ***Clostridium botulinum*.**

Sources of infection

- decomposing animal tissue and sometimes in plant tissue

Pathogenesis

- ingestion of Clostridium toxin together with plant/ animal tissue
- toxin in blood
- toxin absorbed by the nerves
- Toxin in the central nervous system

Clinical signs

- Muscle paralysis
- Disturbed vision
- Difficulty in chewing and swallowing
- Generalized progressive weakness
- Death is due to respiratory and/or cardiac paralysis

Treatment and control

- correction of any dietary deficiencies
- proper disposal of carcasses
- removal of decaying plant material or silage from the diet

MASTITIS

This is the inflammation of the udder. It is characterized by a swollen, red, hot and painful udder. Mastitis can be clinical or sub clinical.

Sub-clinical

Cow normal

Udder normal

Milk normal

Clinical

Painful Udder

Hyperaemic

Swollen

Has temperature

Milk clotted

Causes of mastitis

1. Infection anywhere in the body
2. Chemical irritants (Antibiotics and teat dips)
3. Trauma / physical irritation – Malfunctioning machine
   - Poor hand milking
4. Stress – Heat
   -Transport
   -Mud

Economic Importance

1. Poor quality milk is produced
2. Decrease shelf life of the milk
3. Adverse milk off flavours

Aetiology

- *Streptococcus. agalatia*
- *Staphylococcus. aureus*
- *Streptococcus non-agalatia*
- *Coliform (E. coli, Klebsiella, Pseudomonas)*
- *Corynebacteria*

Control of Mastitis

1. Routine clinical Inspection
    - California mastitis test (CMT) tells if quarter is affected.
    - Udder quality – teat shapes and lesion
    - lab culture – antibiotic sensitivity test
2. Data Inspection, especially when buying new cattle
    - Mastitis chart
    - Herd clinical mastitis report
3. Farm Inspection
    - Milking procedures
    - Milking environment
    - Milking system
    - Management practices

Treatment

1. Penicillin - for gram positives such as Strept agalactia , Strept non-agalactia

2. Cloxacillin – for Gram positive Staph aureus

3. Potentiated sulphur - for coliform mastitis

4. Supportive treatment such as NSAIDS and IV fluids

TICK BORNE DISEASES

Ticks

Ticks are obligatory blood sucking ectoparasites most types of terrestrial veterbrates. Ticks transmit a large number and variety of infectious agents. Tick feeding activity produces **host** reactions such s toxicosis (sweating sickness, tick paralysis), skin wounds, anaemia and death.

Because of the above mentioned reasons, there is need to control ticks. This is done mainly by dipping. This is done once a week or once every 2 weeks. Dipping is divided into:

- Spray
- Plunge
- Pour on

Life cycle

Pathogen ____Parasite in host ____ Parasite multiplies ____ parasite gets into

In tick blood when & breaks red plasma and invade

Tick feeds blood cells other cells

Once other cells are invaded, clinical disease is seen.

1. BABESIOSIS

Also called red water, biliary fever, tick fever

This is a tick borne disease caused by a protozoan haemoparasite called babesia. Babesia is transmitted by the tick Boophilus decolaratus.

Aetiology

Babesia bovis and Babesia bigemina

Young animals are protected in endemic areas. This protection is usually up to 2 months. Infection is usually seen when these calves are put onto pasture.

Clinical signs

Infections can be peracute, acute, chronic or inapparent**.**

B. bigemina

- Fever up to 42 degrees C
- Malaise, inappetence
- Haemoglobinuria (red urine)
- Amaemia

- Liver and kidneys are enlarged and dark
- Spleen is swollen and pulpy
- Subcutaneous and Intramuscular edema, yellow gelatinous fat, thin watery blood.

B. bovis

- Vascular congestion of organs

- Central Nervous System signs

    - Inco-ordination

    - Teeth grinding

    - Coma

    - Death

Treatment and Conrol

- Berenil
- Forray 65
- Tick control

2. ANAPLASMOSIS

Per acute to chronic infectious diseases of ruminants characterised by anaemia, icterus and fever.

Aetiology

Anaplasma marginale – pathogenic

Anaplasma centrale – non-pathogenic

Anaplasma ovis – in sheep and goats

Transmission

Transmitted by ticks, boophilus and dermacenter spp

Clinical signs

- Anorexia, depression, reduced milk production
- Fever 41degrees Celsius
- Marked anaemia
- Weight loss
- Dehydration is noticeable
- Marked icterus
- Most affected animals succumb to hypoxia when moved or handled.
- Constipation then diarhoea or vice versa
- Aggressiveness
- Some animals will recover on their own; these will then be carriers of diseases for life.
- The severity of the disease varies considerably with age.
- Calves undergo mild infections with little or no mortality
- In adult cattle, the disease is more severe and mortality is high

Treatment and Control

Control – dipping

Treatment – Tetracyclines – oxytetra

Hitet

Terramycin

HEART WATER

- Also called Cowdriosis

This is a non-contagious infection of ruminants transmitted by Amblyomma ticks

Clinical signs

- Fever, anorexia, depression, reduced milk production
- Hyperaesthesia
- Lacrimation
- Convulsions
- High stepping gait
- Exaggerated blinking of eyes
- Chewing movements

Post mortem:

- hydrothorax

- Hydropericardium

- Edema

- Congestion of lungs

- Enlarged spleen

- Petechia

- Ecchymoses on mucosal + serosal surfaces

Treatment + Control

- Tick Control
- Treatment – tetracyclines

GASTROINTESTINAL PARASITISM

Worm problem occurs most frequently in young cattle from time of weaning and several months thereafter (from time they start grazing up to 3 years) but some older cattle are affected. Immunity to helminthes is acquired slowly and usually requires 2 grazing seasons before a significant level is attained.

Life Cycle

- Eggs passed out in faeces
- 2wks later they develop into larva which is infective
- Larva ingested with feed/ grass
- Larva remain in the abomasums for 4 days
- On the fourth day they mature into adults and migrate to their predilection sites.

***Eggs can remain dormant in the environment for a long time if the conditions are not favorable.**

Favorable climatic conditions for worm development

- High temperatures of about 24 degrees celcius
- Wet weather

Drought and cold weather delays moulting of eggs to larva.

Clinical signs

1. Profuse watery diarrhea
2. Anaemia of varying degrees
3. Hypoprotenaemia and edema (bottle neck)
4. Progressive weight loss
5. Weakness
6. Anorexia
7. Rough coat
8. coughing
9. Death can result without CNS in cases of heavy infection

Control and Treatment

Deworm calves/cows from the time they start grazing until they are 3 years old. At times older cattle are affected, so when they show these signs, they must also be dewormed. Deworming is done once every four months using one of the following drugs:

- ivomec
- cevamec
- dectomax
- valbazen
- panacur

METABOLIC DISEASES

These are diseases that are not caused by a pathogen but are a result of poor management, or any other factors.

MILK FEVER

This is also called parturient paresis or hypocalcaemia. This disease mostly occurs at or soon after parturition. It is caused by the sudden fall in plasma calcium levels.

Predisposing factors

1. Breed- Jersey, Channel Islands, Swedish red and white are more prone to disease.
2. Age- as age increases so does the disease incidence.
3. Parity-as parity increases so does milk production.
4. Diet-feeding high calcium diet 2weeks before partuirition.
5. Management- increasing the body condition of the cattle before calving.
   - treatment with tetracyclines before calving

Diseases that are associated with milk fever

- **Matitis** – if the teat sphincter is open before calving, then the cow is most likely to have mastitis.
- **Dystocia** – the contractions will deplete calcium levels in blood.
- **Retained placenta**- no contractions therefore low plasma calcium levels.

Clinical signs

1. History- period, high producing cattle (20L and above)
2. weakness and depression, temperature is normal

3. Recumbency after some time
4. S-shaped neck (looking at its flank)
5. dilated pupils
6. muscle twitching

Treatment

Give calcium using both the intravenous and subcutaneous route.

BLOAT

This is the abdominal distention due to excessive gas accumulation.

There are two types of bloat.

a. Primary bloat (frothy bloat) -Caused by ingestion of highly fermentable feed which forms a layer that traps gas.
b. Secondary bloat – caused by obstruction of the esophagus. This will interfere with eructation leading to accumulation of gas in rumen.

Clinical signs

i. abdominal distention especially on the left flank
ii. depression, temperature is normal
iii. respiratory discomfort
iv. frothing on the mouth
v. increased respiratory rate
vi. restlessness, kicking the abdomen, treading on hind limbs
vii. self isolation
viii. teeth grinding

Management

1. Push a stomach tube- gas will come out in primary bloat, nothing will come out in secondary bloat. Tube will not go through in secondary bloat.
2. Withdraw animals from offending feed.
3. Oral administration of liquid paraffin, bloat guard or cooking oil
4. In cases of respiratory distress, use trocar and canula or pocket knife.

TRAUMATIC RETICULOPERITONITIS

This is also called hardware disease or wire disease or traumatic gastritis. This is a disease of cattle resulting from perforation of the reticulum by a wire or nail. Cattle commonly have forign objects in their stomachs because they do not discriminate against hard material in feed and they do not completely chew their food before swallowing. This disease is common in cattle that are fed greenchop, silage and hay that is made from fields that contain old and rusty fence or when pastures are on sites where buildings have recently been constructed or use of baling wire.

Aetiology

- Metallic object is swallowed by cow
- object in rumen
- contraction of the rumen
- peforation of rumen and stomach walls

This will lead to leakage of ingesta and bacteria causing contamination of the peritoneal cavity. There will be adhesions in the peritoneal cavity.

Clinical signs

i. Sudden onset of ruminal atony
ii. A sharp fall in milk production
iii. Rapid and shallow respiration
iv. Arched back, reluctance to move with elbows abducted
v. Reduced faecal output
vi. Lying down, getting up, stepping over berriers
vii. Grunting sound

Prevention

- Avoid the use of baling wire

- keep cattle away from sites of new construction.

- Administration of magnets orally preferably after 18-24hours of fasting.

NO TREATMENT

OBSTETRICS AND GYNAECOLOGY

Gynaecology - This is the scientific study and treatment of diseases and disorders affecting the reproductive system.

Obsterics – this is the branch of medicine that is concerned with parturition (calving)

DISTURBANCES OF PREGNANCY

The gestation period of a cow is nine months.

During this period, there are several disturbances that can occur leading to failure of the pregnancy to reach full term. These disorders are:

I. **Abortion** – this is the expulsion of the fetus before time. Abortion can be caused by diseases, starvation, any infection in the body or even stress.

II. **Fetal maceration** – this condition results when the fetus dies inside the uterus, the cervix will open and bacteria will gain entry into the uterus. The fetus will decompose and all the soft fetal tissues will be absorbed leaving only the skeletal part in the uterus.

III. **Fetal mummification** – in this case, the fetus will die and the cervix will remain closed. Absorption of fetal fluids will take place leaving a very hard mass of fetal muscle and bones.

PARTURITION

This is the act of giving birth or calving. Successful parturition depends on the ability of the uterine muscles to contract and the capacity of the cervix to dilate. The whole process takes between 13hrs and 34hrs.

Signs of approaching parturition

- Slackening of the pelvic ligaments.
- Mammary secretions change from transparent to opaque.
- Drop in body temperature by about 0.6 degrees.
- Occasional straining and restlessness of the cow.
- Partial anorexia and colic signs are evident.
- Standing and lying down frequently.
- Increase in heart rate
- Protrusion and rupture of the water bag.
- Most cows are recumbent till calf is born.

Stages of larbour

First stage: Cervical dilatation (**6hrs to 24hrs**)

- Onset of myometrial contractions (contraction of uterine muscles)
- Cervix begins to dilate
- Fetus rotates and extends its limbs
- The cow is restless and has partial anorexia.

Second stage: Fetal expulsion (**30min to 4hrs**)

- Appearance of abdominal contractions
- Uterine contractions are now stronger.
- Protrusion and rupture of the water bag.
- Cow is straining and fetal parts are seen in the vagina.
- Cow is staring, lying down, standing up and kicking its belly.

- Expulsion of the fetus.

Third stage of labour: Expulsion of placenta (**up to 6hrs**)

- Uterus contracts faster than before but with very little force.
- Fetal membranes are expelled.

DYSTOCIA

This is difficulty in calving. It is commonly seen in heifers that are calving for the first time, can be hereditary or it can be caused by hormonal imbalances.

Causes

Maternal

- Failure of the cervix to dilate.
- Torsion of the uterus
- Insufficient contractions to expel the calf

Fetal

- Abnormal presentation of the fetus
- Oversized Fetus – when the fetus is much mach bigger than the dam
- Fetal monsters

When to intervene

- Cow has been in the first stage of labour for more than 8 hrs.
- Cow has been in the second stage of labour for more than 2 hrs and there is very little progression.

- The fetal membranes and or fetal tissues are observed hanging out for more than 2hrs and delivery is incomplete.
- Fetal membranes are not passed out in 8hrs to 12hrs after delivery.

What to do

- Get a complete history.
- Use lubricant before examining the birth canal.
- Evaluate the size of the dilatation of the birth canal.
- Assertain the vitality of the fetus.

POST- PARTUM DISORDERS

i. Retained placenta

Failure of expulsion of the placenta up to 12hrs after calving. This is common in cases of abortion, premature birth or in cases of hypocalcemia.

Management

- Manual removal of the placenta, preferably on the third day of calving. Then give an antibiotic preferably trimethoprim sulphur.
- Give hormones such as oxytocin, or prostaglandins

ii. Vaginal/ uterine prolapse

protrusion of the uterine mass through the vulva. This can be caused by too many attempts to extract the fetus or hypoclcemia.

Management

- Thoroughly clean the protrusion using water.
- Reduce the swelling by using either salt or sugar.
- Lubricate the mass and push it in.
- Stay sutures can be used to keep the uterus inside.

iii. Pyometra

This is the accumulation of pus in the uterus. In this case, the cow will fail to show heat signs. This condition is caused by invasion of bacteria into the uterus when there are:

- Retained fetal membranes
- Injuries in the calving canal
- Calving happened in a dirty environment
- Hormonal imbalances

Management

- Use chemical disinfectants when cleaning the uterus.
- Antibiotics eg trimethoprim sulphur, tetracyclines
- Hormonal therapy.

DAIRY FARM WORKFORCE:

A reliable workforce is essential to a successful dairy enterprise. Dairy farm labour is required in looking after the dairy cattle, cleaning the milking parlour and in production of fodder in the field. The farm labour force should be skilled in their undertakings, motivated, dedicated and as much as possible satisfied. Notwithstanding that the farmer should consider his needs first. If the main responsibility of the employee is milking he or she should be calm, reliable, sober minded, healthy and have a passion for animals. Training or re-training a farm worker is very important.

As and when you have determined your needs you do not necessarily employ someone who knocks at your door, but try to get the right skilled people. To get the right people you may need to advertise in a local newspaper. If the applicant for example claims to have done A.I. or can mix animal feed allow him/her to prove himself.

When you have decided to employ a person he/she should be told that work he/she is to perform. The new employee should be told her/his job description in front of the supervisor. Farmers should always send their workers for training courses arranged by dairy extension officers from the Ministry of Agriculture. If the farm workers know how to perform their duties they will need less supervision and hence the farmer will have more time to manage his/her farm.

In fodder production, there is need in planning to choose a sequence of crops which give an even spread of labour during the growing season. Where labour is employed solely on the dairy unit, it is possible for one man to cope with the every day tasks:- milking, feeding, dung disposal – of running a 50 cow unit. As the herd becomes larger so do the tasks of marshalling groups of cows, breeding management and group feeding take a greater proportion of time. If the dairy unit is to be profitable, these tasks must not be skipped. Where the dairy unit is on a large farm, the

provision of grass, grass conservation and supply of fodder crops tends to be the responsibility of the arable specialists. The arable specialist should appreciate the importance of producing good quality fodder on the farm and how important their efforts are in securing these quality end products.

REPRODUCTIVE CYCLE

A dairy farmer should aim to have a cow calve every year. If a cow fails to calve every year losses due to decreased or no milk during the longer calving intervals from the culling of infertile cows and from lack of herd replacement. Reasons for low fertility are:

i. Anatomical or physiological malfunctioning of the cow.
ii. Reproductive diseases.
iii. Failure of correct heat detection and other failures in reproductive management.
iv. Infertility and malfunctioning of the bull.

Modern dairy farmers use artificial insemination (AI) to breed their cows. Semen from bull studs or imported semen are usually genetically superior and disease free.

Heat detection is essential if artificial insemination (AI) is to be carried out. Spotting a cow standing to be mounted is the crucial sign to look out for as it is the most useful indicator to use to decide when to serve a cow.

i. Cows generally show heat signs by being receptive to a bull or A.I. every 21 days. A cow's oestrus cycle can range from 12 – 30 days. Heat behaviour lasts for two to three days as follows:-i. Aggressive bunting and rubbing by pairs of cows.
ii. Sniffing around the tail head.
iii. Chin resting.
iv. Orientation as if to mount.
v. Disorientation mounting without standing.
vi. Licking.
vii. Disorientated mounting.
viii. Standing to be mounted (the key sign)

A cow on heat should give you a sign of standing to be mounted. She will stand firmly, no signs of hostility nor aggression nor escape from the mounting cow. Occasionally she will mount another cow head to head. A cow on heat stands around longer, walks more, eats less and milk yield drops but picks up the next day. Additional signs for a cow on heat are:-

i. The cow's vulva appears moist, red and more swollen than usual and secrets clear mucus.
ii. The cow is restless and does not lie down cuddling.
iii. The cow encourages others to mount her by looking around at them and raising her tail known as soliciting.

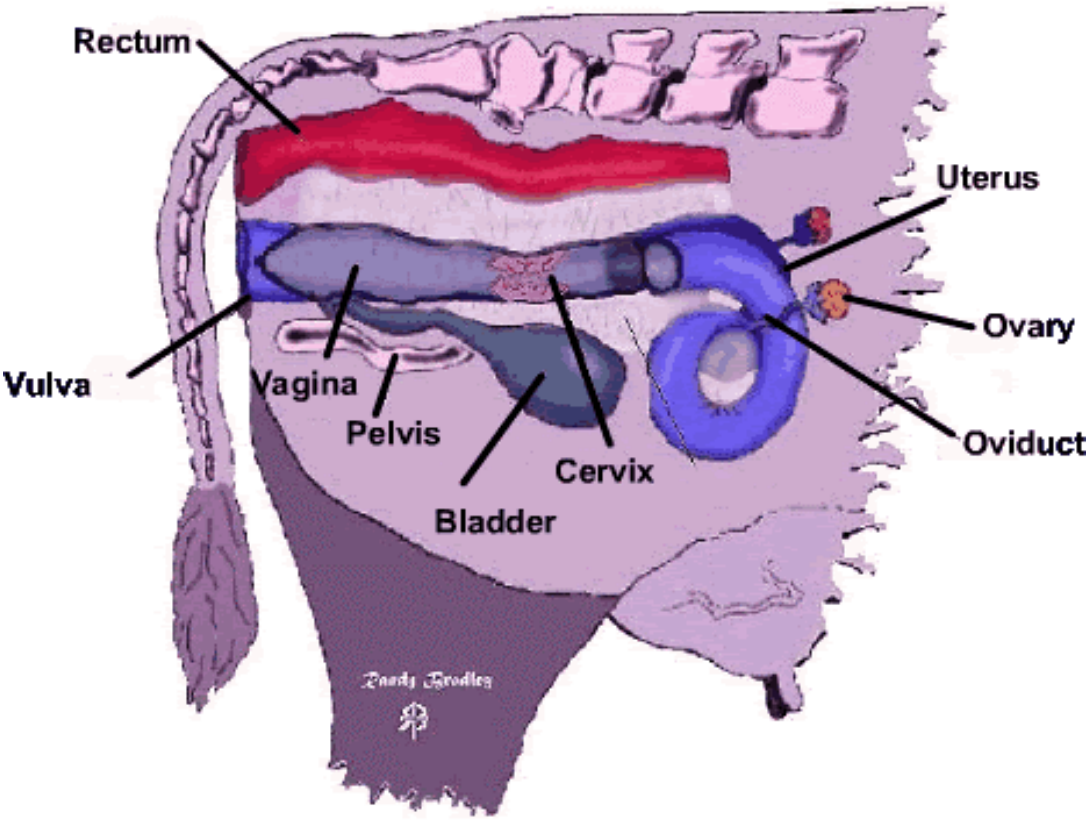
To time insemination accurately, it is important to know when the follicle will ovulate and release the egg from the ovary into the oviduct. Normally a cow ovulates 24 to 30 hours after she first stands to be mounted. A cow normally remains on standing heat for about 12 to 15 hours. For the average cow, ovulation occurs 10 - 16 hours after it goes out of heat. It is important to inseminate a cow at least 8 - 10 hours before ovulation because it takes time for the sperm to

reach the oviducts and also to undergo the essential process of activation which takes six to eight hours which is technically called capacitating fertility.

Guidelines for timing insemination are as follows: -

i. A cow seen on heat before 6am - inseminate today
ii. A cow seen on heat after 6am - inseminate tomorrow.

Diagram of a cow's reproductive system



Advantages of A.I. are the following:

i. It is the only form of mating that allows efficient control of venereal diseases.
ii. It is the most economical method of mating which can be applied. It eliminates purchase of expensive bulls and maintenance costs and prevents possible losses of bulls.
iii. It is the most efficient technique of cattle improvement. One bull can procreate 500 to 8000 progeny per annum while natural servicing provides a mere 30 to 40 progeny per annum.
iv. Adequate progeny is procreated for a reliable evaluation to be made of the breeding value of a bull at a relatively young age.
v. It necessitates accurate record-holding and a high level of management, resulting in a high degree of efficiency.
vi. Proven bulls are seldom sold, and their frozen semen can be distributed world-wide.

vii. The semen of outstanding bulls can be stored for years and thus used for subsequent breeding programmes.

Disadvantages to A.I. are as follows:

i. Venereal diseases can be distributed rapidly as a result of incorrect or negligent handling with A.I. because more cows are involved.
ii. Undesirable characteristics and heritable deficiencies are transferred to more progeny and
iii. The possibility of in-breeding is much greater than with natural servicing.

BULL MANAGEMENT

When selecting dairy cattle to be used for certain mating in a breeding program a breeder usually rates a bull on the basis of milk production of the dam of the bull type and pedigree. In determining the overall value of the animal the importance attached to each trait depends on the breeders experience and what he is trying to accomplish. The only accurate method of identifying superior bulls is by progeny testing. When purchasing a dairy bull the rating of its progeny is evaluated based on;-

i. Milk yield litres
ii. Butterfat %
iii. Protein %

For 305 days lactation period. The production record for daughters of the bull being used is compared with production record of daughters of other bulls within the same herd and within the same year. The bulls pedigree "parentage of the bull", should also be considered when selecting a bull. The bulls parentage i.e. dam should be known to calve with ease and to be resistant to diseases such as mastitis. Only proven bulls should be used by a dairy farmer.

Bulls should be handled with care from the calf hood until they reach maturity. A bull should be dehorned as bulls can be dangerous.. The bull should be exercised regularly to keep it in shape. A young bull can only be used to serve from 18 months old. Mating should be increased gradually to three times a week because more than this can exhaust and shorten the reproductive life of a bull. A bull should be kept in its own paddock and lead to female cows for maturing only during a planned period.

Bulls that are allowed to roam with the female cows is that cows on heat are served without the farmer's knowledge. Notwithstanding that, record keeping becomes virtually impossible. In breeding is bound to take place if proper management is not done. The bull is likely to serve young heifers that are not fully developed.

The disadvantage of using bulls is that sterility goes undetected as the bull could be seen servicing cows yet no calves at the end of the year. Wasted time as no cows conceive. If the bull was not selected properly the progeny would be of poor quality. To avoid inbreeding bulls have to be changed every to (2) years, and are very expensive. Heavy bulls should not be allowed to service young heifers for fear of injury. Bulls infected with the reproductive disease spread the disease quickly.

Bulls are still used by majority of dairy farmers in Swaziland because the bull will never miss a cow on heat. Dairy farmers should use artificial insemination (A.I.) as it is advantageous and cheaper so long as the farmer can master the technique, detect heat in time, keep proper records and manage his herd well.

CALF REARING

Some of the major reasons for mortalities in very young calves are disorders of the intestinal tract and the respiratory tract. The casual organisms responsible for these conditions are pathogens (organisms causing disease) bacteria and viruses. Such mortalities can largely be prevented through natural immunisation of the calves by consumption of colostrum.

The offspring of cattle and other livestock gain immunity through ingestion of the first mothers milk immediately after birth. The antibodies are taken orally and are transmitted from the calves' digestive tract to its bloodstream via the lymphatic vessels. This transmission of the immunoglobulin takes place through the intestinal wall and is closely related to the prevailing acidity.

Composition of Colostrum

The composition of colostrum (milk during the first 24 hours after calving) makes it clear that it is a more concentrated liquid than whole milk. The extra protein in colostrums is Gama globulin which is the antibodies. Colostrum also contains nearly double micro and macro minerals contained in whole milk. It is a richer source of all vitamins particularly vitamin A and E and many of the B group. In addition colostrum contains a variety of cell like components some of which promote passive immunity i.e. macrophages. Colostrums therefore has an antibiotic effect.

Although colostrum has a mild laxative effect with the initial function of setting the calves digestive tract in motion, it only leads to looser faeces if it is fed to older calves. It does not course diarrhoea, colostrum must never be thrown away as this would be a waste of calf feed. It can be frozen in small quantities and stored for six month without getting spoiled.

Substitute for Colostrum

If colostrums is not available the following procedure can be followed to keep the calf alive (i) one beaten egg in 300 ml water mixed with the one (1) teaspoon caster-oil and 600ml whole milk. The mixtures must be fed to the calves at body temperature 39ºc. A farmer should always ensure that the calf gets colostrum within six (6) hours and enough thereof, within 22 hours of birth. Cows with big udders are often milked shortly before calving. If stripping is carried out intensively for 3-9 days before calving such cows will normally have little or no colostrums at calving. Calves therefore would receive fewer or no antibodies.

For the first four (4) days a calf should receive colostrum. When remove from their dams within 24 to 48 hours they are fed 2 litres milk in the morning and 2 litres milk in the afternoon (evening).

Care of the calf from day 4 to weaning

Whole milk or milk substitute (milk replacer) should be fed to claves until they are 5-8 weeks old. During that time before the calf is weaned, each calf should receive 2 litres of milk in the morning and 2 litres in the afternoon and 2 litres in the evening. Weaning in dairying means stopping to feed milk to a dairy calf.

It has been stated that fresh milk or milk substitute should be fed to a calf according to specification. The feeding of both fresh whole milk and milk substitutes to calves has both advantages and disadvantages. The main disadvantage of feeding a calf whole milk is that the 6 litres fed to a calf per day could be sold and thus increase a farmer's income.

Whilst high quality milk substitute contains a large proportion of milk products, the temperatures of the re-constituted milk substitute is very important. The temperature of the reconstituted milk should be around 39ºc. If the temperatures are not maintained according to specifications calf intestinal disorders is a probability and or diarrhoea. Calves normally start eating dry starter mix when they are a week old. To teach them to start eating some small amount of the mix should be rubbed onto their mouths or a small quantity of the mix could be dropped in their milk feeding buckets.

As calves normally start eating when they are a week old, good quality hay could be introduced to them.

The feeding of good quality leguminous crops, Lucerne and or Dolichos Lablab stimulates rumen development. Drinking water should always be available.

Care of the Dairy Calf from Weaning to 3 Months

After calves have been weaned at 5 or 8 weeks old, calves can be fed a maximum of 3 kilograms of calf starter a day and good quality hay should be available ad-lib to stimulate rumen development. Milk ration can be reduced correspondingly, this eliminating growth breaks.

Housing of Calves

The calf box should be light, dry and draft free and if possible separated from the cowshed in order to diminish the risk of infection.

During the colostrums period i.e. 4-5 days, the calves are preferably kept in littered single boxes which should be a minimum of 120cm long and 90cm wide. The single box has its undeniable advantage for the colostrum period. Only here the calves can be individually taken care of during this important start phase.

However farmers become more and more aware of the fact that, from the second week of life calves are by far suitably kept in group boxes. The recommendations of the new calf keeping regulation point in this direction.

Group Keeping

The calves can move freely. Skeleton musculature and vitality are strengthened. The animals have social contact and young calves learn from older calves e.g. intake of concentrates and hay. The utilization of feed is improved. It is strongly advised to keep the calves on straw, especially from 2 to 4-5 weeks of age. If animals are kept on straw cleanliness through regular changing of straws should be maintained.

Drinking and feeding space should be made available for all calves.

When bucket feeding, the natural sucking instinct of the calf is reduced by half. To ensure that the calves do not suck each other, they have to stay longer behind the catcher grating which affects the working routine.

Computer Controlled Feeding

(Feed the calves optimally). Each calf has a transponder. When a calf enters the feeding box, the calf is recognized and a present milk ration is fed.

A computer the brain of a plant supplies the calf with the allocated ration and ensures the calf receives its milk in small portions over the day. In addition it reports calves which have not taken or only partly taken their rations. The feeder prepares the ration for each calf and is:-

- always fresh and in correct quality
- always in correct concentration
- always at optimum temperature
- and in all variations; as powder drinks, as liquid milk drinks or mixture of both

Additional Advantages

i) Feed costs saved due to accurate rationing of milk, concentrates and hay.
ii) Satisfy the natural sucking instinct of the calves. The problem of calves suckling each other is minimized.
iii) No mixing of milk by personnel, no carrying of buckets, no scheduled feeding jobs.
iv) Feeders can easily be built into old buildings, or in the open ground plan design.
v) No catcher granting, reduced feeding space.

REARING OF DAIRY HEIFERS

A heifer is defined as any female calf up to her second calving. Dairy replacement heifers are usually separated from their mothers (dams) within two days of birth and managed to achieve specific growth rates throughout the rearing period until calving at the planned age, weight and body condition.

The progressive dairy farmer of today realises more and more that heifers have to receive the correct type and amount of feed if a high quality dairy cow is to be produced at a relatively early stage. One can only hope that the practice of leaving weaned heifers in the veld until near the end of gestation period is something of the past.

The progress of the herd depends largely on the way in which heifers are raised for replacement purposes. A sound herd cannot be establishment by the continual purchased of new heifers of whose history not much is known. The costs are relatively low when compared with prices at which heifers are sold.

The best way in which the dairy farmer can determine the efficiency of his managerial programme is by measuring the performance of his heifers in accordance with accepted standards.

Rearing replacement heifers has not always been seen as a fundamental part of the dairying enterprise but, when correctly planned and when specific feeding programmes have been used overall improvement in herd longevity and farm profitability results. Feeding and managing replacement heifers must be given as much priority as dealing with the milking cow. Rearing heifers must be seen as an investment in tomorrows profit generators. They represent the highest genetic potential in the herd, so the opportunity for continued productivity should not be wasted.

Objectives of Rearing Heifers

The ultimate aim of dairy heifer rearing is to produce well developed heifers able to express full yield potential at the desired calving age, with minimum costs, losses and health problems, and with the potential to milk for at least 6 lactations.

Rearing replacement heifers allows for: -

- Replacement of culled cows
- Increase in herd size
- Introduction of new blood lines
- Increase of genetic base
- Improvement of disease control

AGE FOR BULLING

The age for bulling depends upon the breed and also upon the requirement of the desired calving pattern. Certainly the smaller breeds tend to become mature earlier than the larger breeds but this has to be correlated to the practical demands of the annual milk production cycle.

It is generally suggested that heifers should not calve before twenty three (23) months old but should calve as soon as possible after that age.

A basic ration for bulling heifers

For small framed animals like jerseys

- 3.4kg hay (or hay equivalent in silage)
- 1.0-2.5 concentrate
- plus straw

For large framed animals like Friesian/Holsteins

- 7kg of hay (or hay equivalent in silage)
  1.0-2.5kg of concentrate
- plus straw

Water should be always be available.

Heifers require both protein and energy for optimal growth. After the feed in take and daily requirements of the heifer have been calculated accordingly, the producer should ensure that all the necessary nutrients are present in the right proportions. This is what is meant by a balanced ration.

With improved feeding and management practices, heifers often develop too big body mass before being serviced for the first time. This frequently leads to reduce fertility and is caused by selection of heifers for the first service on the basis of body mass rather than age. It therefore seems evident that overfeeding and late breeding will lead to inefficient reproduction. The age of the heifer at first calving apparently has no influence on calving problems.

Gestation will increase the feed requirements of heifers particularly during the last two or three months of the gestation period.

Heifers should not be allowed to become too fat. Fat deposits in the udder may infer with the development of the milk gland tissues and this may result in reduced milk production after calving.

Minerals and vitamins supplements should not be left out of consideration. The two most important minerals affecting fertility are phosphorous and cobalt. Phosphate supplements can be given in the form of dicalcium phosphate as a lick or by including it in the concentrate mixtures.

Vitamin A deficiencies in heifers can lead to abortions, prenatal death of foetus, weak calves at birth and retentions of the afterbirth. Good quality hay, green pastures and yellow maize willbe sufficient to satisfy vitamin A requirements of the heifer. The vitamin content of a feed can nevertheless be reduced by climate, heat or storage.

Too early breeding at an immature stage may lead to the restriction of growth as a result of the additional nutrients requirements for gestation. A further disadvantage of too early breeding is the incomplete development of the skeleton which may lead to calving problems. Furthermore, the lactation following on a too early calving may have very detrimental effect on the growth of heifers.

Feeding the In-Calf Heifers: entails steady increase in condition from the relative learners of the bulling heifer to the well conditioned down calver. From the fifth month of pregnancy onwards, the demands of the developing foetus and udder rapidly increase. In good grazing this demand on bodily reserves is usually adequately met from grazing.

Where the bulk feed is not good enough quality, then it may be necessary to feed some concentrates to ensure that the heifers attain their target calving weight. When in-calf heifers are out on grass and sufficient grass is available this should be sufficient to maintain the required growth rate. If the grass becomes scarce then immediate steps should be taken to supplement the ration so that the animals continue to gain weight as required. Animals must be brought to calving in a fit but not fat condition.

Feeding First Lactators: Heifers in their first lactation are still growing animals and it is important to ensure that feeding management is good. They must be able to milk, gain in weight, Conceive successfully and remain as productive members of the herd for 6 or more lactations.

Milking heifers feed in competition with cows are likely to produce less milk in their lactation, thus having a higher chance of being culled before calving for a second time. However since it is not often practical to feed heifers separately, it becomes important to ensure that they are well grown prior to calving. One way to reduce the effect of competition is to allow easy access to silage by ensuring adequate trough space. Regular observation of farmer is also important to help ensure that the heifers maintain adequate feed intake. Notwithstanding that more research work is needed to identify the precise nature of diets recommended for heifers throughout the rearing period.

FACTORS INFLUENCING MILK PRODUCTION IN LACTATING COWS

The heritability of milk production is around 30% i.e. one third, whilst 70% i.e. two thirds is attributed to environment. The extend to which the genetic production potential depends on the ability of the dairy farmer to control environment factors to the advantage of the cow by creating a conducive environment for a cow to reach its potential.

Stage of Lactation: After calving milk production usually rises rapidly until the peak is reached 30 to 60 days later. The production peak reached influences the total production considerably. The period before peak production is usually longer with highly productive cows. Once the peak has been reached, production gradually starts to decrease at about 5% to 6% per month if the cow is not pregnant. When a cow is five monthspregnant the tempo of milk reduction starts to increase. Heifers that are first calvers the tempo of decrease after peak production is 3% to 4% per month.

Feeding: For optimal milk production the ration must contain sufficient energy, protein, crude fibre vitamins and minerals cows produce approximately half of their total milk yield during the first 100 days of lactation. For this reason it is essential to feed cows roperly during the early days of lactation.

Feed intake is poor at the beginning of lactation but improves as lactation increases. As feed intake is not proportional with milk production requirements the cow possess the unique ability to utilize her body reserves for milk production.

The lactating cow usually losses weight at the beginning of lactation as a result of withdrawal of her body reserves until a point when she reaches her peak. Cows can even under good feeding conditions lose as much as 66kg in body mass during the first three months of lactation. From 120 days after calving the body mass gradually increases until calving.

In order to exploit the potential milk production of a cow the feeding of a dairy cow should be divided into four stages as follows: -

(a) Feeding stage before calving

(b) Feeding stage during early lactation (0-100 days after calving). At the beginning of lactation the dairy cow does not have the appetite or the capacity to take in sufficient forage according to her feeding requirements and it is therefore essential that feeding concentration of dry material be considerably increased during this period, while poor quality roughage is undesirable. As already mentioned body reserves are now utilized for milk production. If a highly production cow does not have sufficient body reserves she will not reach her production peak, consequently milk production will be adversely affected.

(c) Feeding stage during mid lactation (100 to 240 days after calving). If a cow is not fed well during early lactation, maximum production will not be obtained by feeding them extremely well during mid lactation. Sharp increase in feeding in mid lactation will result in an increase in body

mass (fattening) rather than in an increase in production especially in poor productive cows. High quality hay should be fed during this period.

As a result of good feeding during early lactation extra milk can be produced during mid lactation at relatively little expense.

(d) Feeding stage during late lactation 241-300 days after calving. Late lactation must be regarded as a period of recovery and preparation for the next early lactation research results indicate that body reserves are accumulated more effectively during this period than during the dry period.29

Age: Milk production rises slowly up to age of eight years, depending on the breed and reduces fast. Mature cattle produce about 25% more milk than two years old heifers. Heifers must be inseminated at such a time that they calve when 24 months of age or earlier.

Size of Cow: Longer cows generally produce more milk than small cows but milk yield is not related to body mass.

Breed: Milk production is partly a hereditary characteristic. This explains the different breeds as indicated below: -

Number of Milking/Day: Cows milked twice a day at intervals of 10 hours and 14 hours or 8 hours and 16 hours produce approximately the same amount of milk as those milked at intervals of 12 hours. Three milking per day increases production by 10-25% and four milking further increase of 5 to 15%.

Oestrus: When oestrus occurs milk yield may temporarily decrease for a day or two but is negligible.

Dry Period: A dry period of 60 days between lactation is essential for fair milk production during the ensuring lactation.

Climate: Milk production drops when the environmental temperature rises to 28ºc of 30ºc. This is due to a drop in feed intake in an attempt to prevent overheating. Heat stress influences high milk producers more than low milk producers and are especially harmful during peak production. Small breeds are more resistant to heat stress than large breeds. An increase in temperature is more harmful than a drop. The provision of shade e.g. planting trees or shade nettings cannot be over emphasized.

Exercise: Moderate exercise for dairy cattle promotes production highly. Cows on grazing use 50 to 100% more energy for maintenance than cows in non- grazing system (zero grazing).

Diseases: Diseases such as mastitis, ketosis, milk fever and digestive disturbances can cause a decrease in production. The occurrence of such-clinical mastitis causes 10% decrease in production.

Management: High producing cows are usually highly strung and excitement causes a decrease in milk production. Good supervision before and during milking is absolutely essential for

optimal production. Cows should never be driven to the milking parlour quickly. Regularity should be maintained in milking and feeding times. Care should be taken that the cows are milked dry. Incomplete milking occurs when the milkers are inefficient, when the milking machine hurts the cow, and this can cause mastitis through inflammation.

Dairy Nutrition: (Feeding Dairy Cattle)

Dairy cattle use feed for the following purpose: -

i) Maintenance
ii) Growth
iii) Milk Production
iv) Pregnancy

Maintenance: Maintenance is the sum of those needs for food for keeping the body functioning properly, replacing worm-out tissues, maintaining body temperature, and supplying energy for muscular activity. When the maintenance requirements of a non-pregnant, non-lactating animal are met exactly, the body stores of protein, fat and mineral matter are held constant. Approximately one half of the feed consumed by a lactating cow is used for this purpose. The maintenance requirements of a cow are roughly proportional to body size. Cows are individuals, and may vary.

Growth: Growth requirements, which are need for increase in body size, can be met only after maintenance needs have been satisfied. Growth requirements vary with age, breed, sex and stage of development. In relation to body weight, young animals have much higher requirements than mature animals for protein, energy, vitamins and minerals. Also young animals suffer earlier and more severely from nutritional deficiencies.

Milking Production: These requirements depend on both the amount of milk that a cow is producing and the butterfat content of milk. A cow which produces 20 litres of milk daily requires twice as much protein and energy above her maintenance requirements as the cow producing 10 litres contain the same butterfat content. If the nutrient requirements for milk production are not met, the cow will draw on her body reserves when the reserves have been used up production will drop to the amount that can be produced from the nutrients that she receives in excess of maintenance.

Pregnancy: Pregnancy requirements are relatively low, but they should not be ignored. Pregnant cows should be fed adequate amounts of all nutrients. During the last two months before parturition, the recommended energy allowance for the pregnant heifer is 50% to 60% higher than for a non-pregnant heifer of the same size.

Feed Nutrients: The nutrients of feeds are classified into water, carbohydrates, protein, fat, minerals and vitamins.

Water: Is a constituent of all body tissues and fluids. A large amount of water is needed for the digestive process. Water also helps to carry nutrients to the various parts of the body, to control the temperature of the body and to remove waste products. The body of a mature cow contains 70% water and milk contains 87% water.

Proteins: Protein is a part of a feed which contains nitrogen. Protein is essential for growth, tissue repair and milk production. Because milk is rich in protein, high producing cows need relatively large amounts of this nutrients.

Fat: The principal value of fat in the ration is that is it a more concentrated source of energy than carbohydrates or protein. Most feed rations meet the requirement.

Minerals: Minerals are needed for the skeletal growth and normal body functioning. Those elements which are needed in relatively larger quantities such as calcium, phosphorus, magnesium, sodium chlorine etc. are called the macro elements or major elements. Those that are needed on relatively small quantities such as iron, copper manganese, zinc and cobalt are known as the micro elements, minor elements or trace minerals.

Vitamins: Vitamins are also needed by dairy cattle. Vitamin supplementation is of great importance. Vitamin A, Vitamin D, Vitamin B complex, Vitamin C, Vitamin E, and Vitamin K.

CHARACTERISTICS OF FEEDS

Concentrates: The term concentrate refers to that group of feeds which are relatively high in total digestible nutrients and low in crude fibre. Feeds falling in this group of feeds are the cereals, grains and their by products. The term concentrate is used because the nutrients are in a concentrated form as compared to those in the forage crops.

Forages: Forages refers to those plants which are feed to livestock in the form of hay, silage or pasture. Forages generally are lower in total digestible nutrients and much higher in crude fibre than the concentrates. Forages are divided into legumes and grasses. Legumes are those plants which have nodules on their roots. Legumes generally have higher protein and minerals than the grasses.

Characteristics of a ration: There are several characteristics of a feed or ration that affect its consumption and utilization. Among these are palatability variety, bulk and laxativeness. Both forages and concentrate should be palatable. If forages are not palatable cows will eat less of it and larger quantities of concentrates. Corn stover, late cut hay and spoiled silage are not palatable. Corn silage, early cut hay, Lucerne hay and well kept hay crop silage of quality is palatable and will be eaten by cows.

It is usually easy to provide a palatable concentrate mixture for dairy cattle. Dairy cows enjoy common grains and its byproducts concentrated. Feeds such as linseed oil meal, cottonseed cake, molasses, bran etc improve the palatability of a concentrate mixture.

Greater variety frequently improves the ration nutritive value and the amount that the animals will consume. A combination of hay and silage frequently results in greater dry matter consumption than either one feed as the sole forage. A combination of several concentrates is often more palatable than a simple mixture. If cows eat normal amounts of forage bulkiness of the concentrate mixture is not a problem. Bulkiness of the concentrates mixture is desirable however the ration must also contain some forage. Laxative feeds are desirable. Feeds such as linseed cake molasses etc counteract the constipation nature of mature hay, corn stover and straw. Liberal amounts of legume hay and good silage will produce the desired laxative effect in a balanced ration.

DRY COWS MANAGEMENT

A dry period of approximately 60 days between lactation is essential for fair milk production in the ensuing lactation. In short the dry period is the time from the end of lactation until the cow calves again. Many farmers have a tendency to neglect their cows during the dry period.

During the dry period the cows udder gets the opportunity to recover after the 305 days of the lactation period. This is essential because if the cow is not allowed this rest period the next lactation could result in a loss of at least 30% in milk production. It is estimated that the calf (foetus) gains 60% of its birth weight during the last six (6) weeks before calving. This therefore means that the cow should be well fed during this critical growth phase for the foetus. The feed conversion of a dry cow is less effective than that of a lactating cow. When a cow is milking the cows mineral reserves are depleted and cannot be stored unlike energy reserves. The cows mineral reserves can only be replenish when the cow is dry.

The cow should be dried off 224 days from the last service even if she is producing milk well. This can only be monitored when records are kept.

Concentrates fed to drying cow should be stopped followed by stopping milking. At the time a cow is dried up the farmer should administer dry cow therapy by injecting a syringe of dry cow treatment into each quarter followed by teat dip. After the cow is dried off she should be watched closely for a week at least for signs of mastitis i.e. red and swollen teats.

FEEDING A DRY COW

Dry cows need nutritious food for growth of the foetus and the replenishment of her body reserves. Dry cows should be fed the same feed as lactating cows i.e. roughage of good quality. Dry cows should not be fed concentrates. Good roughage fed to dry cows should be supplemented with only minerals.

Dry cows should not be fed Lucerne hay because it contains high levels of calcium. To high concentration of calcium in the cows body can cause her to suffer from milk fever after calving.

When a cow is about to calve she should be moved to the quieter place with no disturbance. The cows appetite at this stage is depressed and should not be fed concentrates. Concentrates should be fed from the day of calving and increase at the rate of kilogram until the desired maximum is reached. This feeding strategy allows the microbes in the rumen to adjust to the change in the cows diet.

MILK SECRETION

Milk production is a process of synthesis which under normal conditions occurs continually by the lactation in the alveoli of the udder of the mammal.

Milk which is the product of this synthesis process has a composition which varies considerably in the case of different mammals. The cows udder is formed from four mammary glands. The udder should be reasonably large, posses a level floor and be neatly attached both front and rear. The teats should be squarely placed, hang perpendicularly and be of good size. Defective udders may be pendulous or pear shaped, cut up between the quarters or halves or may lack one or more quarters. The teats may be short and or hard to milk.

The udder is composed of two principal types of tissue, secreting and connective. A limited amount of connective tissue is necessary for support of the glands. The desirable udder is one which contains a minimum amount of connective and fatty tissue and a maximum amount of secretary tissue. It shrinks away to nothing after milking and upon massage feels soft and pliable without the presence of lumps or knots. Fibrous growth may be caused by bruises or mastitis. Sometimes entire quarters become diseased and fail to secrete milk.

Milk is formed in the epithelium cells of the alveoli and deposited in the alveoli lumen where it is stored between milkings. A certain amount of the milk also flows from the alveoli and gathers in the udder tubes. In order to prevent all the milk from following out of the alveoli to the lower parts of the udder, there are constrictions and pleats in the tube system keeping the milk back. About 40% of the available milk is stored in the udder, teat cisterns and large tubes of the udder, while 60% is kept in the small tubes and alveoli lumen.

In order to recover the available milk, the cooperation of the cow is essential and it is therefore of great importance that the mechanism of the process of milk letting be thoroughly understood.

When the udder is stimulated by the regular routine of mastitis test, washing and drying, the stimulation message is sent to the brain the stimulus goes to the hypophysis (a gland situatedunderneath the brain). The hypophysis secretes the hormoneoxytocin into the blood.

The oxytocin is carried in the blood through the heart to the udder where it stimulates the fine muscle fibres (myo-epithelium cells) on the outside of each alveolus to contract. This contraction causes the milk to be forced out of the alveoli.

Consequently the milk flows down into the tube system where it is recovered by the milking process. A period of about one minute expires from the induction of stimulation to the contraction of the alveoli.

If the milking machine is attached without any effective stimulation only, the little milk which is present in the teat and udder cisterns is recovered (milked out.) The sucking and pressing action of the milking machine may also have a stimulation effect on the hypothesis which expedites oxytocin secretion. However after the first milk has been removed within 10 to 15 seconds, the

vacuum and pressure on the empty teat cause pain or irritation which causes the cow to keep back her milk.

Should a cow experience pain first before milking, be frightened and or be restless the hormone adrenaline is secreted by the adrenal glands and nerve ends. Adrenaline is also carried in the blood through the heart to the udder where it narrows the fine veins which should transport the oxytocin to the alveoli. This narrows the small veins causing the oxytocin not to reach the alveoli and consequently the contraction of the alveoli is prevented.

If a cow has been frightened before milking and does not want to let her milk flow, she must be allowed to rest for 15 to 20 minutes during this period the adrenaline will disappear.

Contact stimulation such as massage encourage teat action, the washing and rubbing of the udder for at least 20 seconds and the drying of the udder with disposable paper towels stimulates the necessary oxytocin secretion. Some cows react to secondary stimulation such as noise made by the vacuum pump, milking machines or the smell of concentrates fed during milking.

Some cows milk even flows from the teats before stimulation through contact is undesirable as the oxytocin is wasted before milking. Cows should be used to regular routine of contact stimulation only.

It is also of great importance that milking machines not to be attached to the teats to long after stimulation because the optimal action of the oxytocin has duration of about 5 minutes after which it decreases gradually.

CLEAN MILK PRODUCTION

The producer must first of all ensure that his animals are free from diseases and are in a health condition. Any cow showing or suspected of ill heath should at once be isolated from the heard, and its milk should never be mixed with the general supply. This milk should never be fed to calves unless it has previously been boiled.

The condition of the milking parlour or milking shed should receive special attention. A good well-constructed milking parlour is an undoubted inducement towards the production of clean milk. When a milking parlour is easily cleaned, well lighted and ventilated, and has a good and sufficient water supply, less labour is required and the milkers take more care and interest in their work.

It is necessary to consider the cleaning of the animals and other measures essential in the milking parlour for clean milk production. It is also necessary to clean out the milking parlour or milking shed prior to milking. Particles of manure should be removed from the flanks and tail of the animals.

The Milking Parlour

Should be used for milk production only and not for tools or any other articles. When bottled milk is sold from the farm directly the milking parlour should have at least two separate rooms, one for handling the milk and the other for washing utensils. The milk bottling room should have a concrete floor with ceramic tiles, smooth walls with tiles, ceiling and kept strictly clean.

Fly control: There are two major reasons for fly control:-

(i) Flies may annoy to an extent that milk production is decreased.
(ii) Flies are a source of large numbers of very undesirable bacteria. Flies breed rapidly in filthy conditions

It is therefore obvious that all important steps in fly control is to practice sanitation in the dairy farm and milking parlour. Manure to be removed daily to the fields. Milking parlour should be screened. Waste disposal containers should be kept covered and cleaned after emptying.

The Health Of A Cow

All cows should be in good physical condition. Good herd management demands that the dairy herd be kept free from diseases. Studies have shown that the monetary profits from diseased herds are decreased from 15% to 25%. Dairy cows should be tested every year for TB and Brucellosis and kept free of such common diseases. The herd should also be kept free and tested regularly for such diseases such as mastitis. Before dairy cattle are bought they should be tested and found free of these diseases.

Dairy cattle should be kept free of venereal diseases such as vibriosis, trichomoniasis and infectious pustular vulvo-vaginitis (IPV) can cause havoc in the herd. As a herd problem these diseases seem to be most important in that they increase the number of services per conception and thereby lowering the breeding efficiency. New animals to be purchased should be certified free from these diseases or should be segregated and tested before being mixed with the herd. By means of A.I. most venereal diseases can be effectively controlled and eradicated.

Non-infectious or functional infertility includes congenital as well as acquired physiological aberrations which lead to infertility or reduced fertility.

Congenital Conditions: This includes hereditary defects like hypoplosia (under-development) of the sex organs.

Acquired Functional Infertility: This condition which often occurs in over-fed cows and heifers which are serviced to late, may be prevented by good managerial practices.

Deficiencies: The role of mineral, trace elements and vitamins deficiencies and malnutrition in functional and even infectious infertility is often underestimated.

Anoestrus (absences of oestrus as a result of a phosphate or vitamin A deficiency and poor conception figures with a copper deficiency are some of the more well known examples of this role.

Machine milking

The interest which has been taken by many farmers in clean milk production and prevalent shortage of labour has led to a more general use of milking machines. The difficulty experienced in obtaining skilled milkers is one which most likely to increase than to decrease. Farmers have naturally been seeking some way of overcoming this obstacle and those who are keen on clean milk production are consequently installing milking machines. Apart from assistance afforded in the production of clean milk, there is also reasonable ground for contending that the uniformity of mechanical milking results in a higher milk yield, but it must be pointed out that no mechanical milking can be absolutely uniform unless positive control is fitted to ensure that the pulsations on every unit operate regularly and at the same speed. It should also be noted that whilst machine milking enhances clean milk production, nothing can contaminate milk more quickly than an improperly cared for milking machine. Two definite advantages of machine milking are:-

(i) Cleanliness of the milk
(ii) Saving of production costs.

(i) **Cleanliness of Milk Production**:- That is possible because milk is transmitted direct from the cows udders to the churn or milk cooling tank entirely untouched by hand and free from air-borne contamination.

(ii) **Saving of Production Cost:-** The saving in labour costs is largely a matter decided by the size of the herd, but as a general rule, little advantages may be gained from the use

of a milking machine unless the herd consists of at least 30 cows in milk. A herd of 30 to 35 cows can be machine milked by two (2) men to perform this by hand in a similar time would require four (4) milkers.

The milking process can be carried out effectively if all available milk in the udder is removed with the minimum of labour, rapidly and without causing injury to the udder.

To ensure optimal oxytocin action it is essential that cows be rounded up to the milking parlour calmly and slowly. They should under no circumstances be hit or shouted at or driven with dogs. Cows awaiting milking should be treated calmly. Noise and rough handling of milking cows in the milking parlour should be avoided. Any treatment of a cow in the milking parlour, which is coupled with irritation, pain or fright, is thus undesirable. The cow should associate a milking parlour with a milking process, which is carried out in a peaceful and silent atmosphere.

If these golden rules are not adhered to not only will the process of letting down milk be delayed or even prevented, but the flow of cows through the milking parlour will be hampered as the cows will be afraid of entering the milking parlour.

Facilities for feeding concentrates should be outside the milking parlour. Feeding concentrate outside the milking parlour eliminates dust conditions and wasting in the milking parlour. Each quarter (teat) should be tested for mastitis before milking. One or two jets of milk are milked out of each teat into the mastitis - testing beaker. Visible clots, flakes watery milk or festering milk are abnormal and indication of mastitis. A cow with mastitis may under no circumstances be milked with the machine among other cows.

Cows tested negative for mastitis should have the lower third of the quarter washed with clean running water from the pipe. A rag, sponge or cloth/sack should not be used as the material transmits mastitis bacteria from cow to cow. Milkers preferably should wear smooth cloves, which are dipped in a disinfectant between milking of different cows. A disinfectant such as chlorinated lime added to water is useful for this purpose. Washing the udder, which should last at least 20 seconds acts as stimulation. Very dirty udders are usually washed a little longer.

After washing the udder is dried with a disposable towel. Removal of the dirty water running down the udder to the tip of the teat ensures hygienic milk with a low bacterial count.

The process of testing of mastitis, washing and drying lasts approximately a minute, after which the teat cups are applied to the teats. The claw piece and one teat cup should be held in preparation to apply the teat cup to the teat.

During the milking process care should be taken that air does not enter between the teat and teat cup liner. Any flow of air will cause irritation and promote mastitis. As soon as the milk flow decreases at the end of milking the teatcups are stripped (removed) by using the hand to exert slight pressure on the front on the claw piece. Stripping (removing) the teat cup should not last longer than 15 to 30 seconds. If the process is not carried out carefully the teat canal will be injured which can give rise to mastitis.

The vacuum is cut off as soon as the milk flow stops. Air is then let into one of the teat cup linings by pressing the teat in such a way that air can enter next to it. No force should be necessary and the teat cups are then easily removed.

After the teat cups have been removed each teat should be dipped into a gentle disinfectant (usually with either iodophor or hypo chlorite solution). It is important the solution (disinfectant) is replaced regularly and is not left in the open to the air between milkings as it may go flat (lose effect).

Milk clinging to the rubber teat-cup linings should be rinsed off with clean running water or disinfectant in the water. Teat cups should not be dipped in water, as the milk of cows with invisible mastitis will infect the water in the pail and the bacteria are thus transmitted from cow to cow.

Dipping teat cups quickly into a pail of water with disinfectant will not rise in the teat cups. Although it is not practical, time consuming and expensive, the best way to disinfect the teat cups between cows milking is to dip the teat cups in hot water that is 85°C for 30 minutes.

After milking the cows are left to leave the milking parlour peacefully, and not hit to make them go. Where cows are given concentrate in the parlour during milking sometimes it is difficult to induce the cow to leave the milking parlour. Cows become used to a certain routine in the milking parlour. Milkier should be trained to use the same routine every day with all milking cows. A single person can handle three units with ease in the case of a herringbone and or tandem milking machines. Milking machines are the best labor savings aids in the dairy industry. Where the maintenance and handling of milking machines are neglected this can cause injuries to the udder thus leading to mastitis and eventually low milk production.

The training of milkier and their supervision largely determine the effectiveness of machine milking machines. Injuries to the udder, bacterial infection and a decrease in milk production can in nearly all cases be ascribed to milking techniques in the milking parlor.

Mastitis and Prevention

The term mastitis means “inflammation of the udder”. The actual form it may take is highly variable and the infection can be caused by a large variety of microorganisms. For this reason the actual cause of mastitis is difficult to assess and specialized procedures are necessary to establish the causative agent. The National Veterinary Laboratory (NVL) can accurately determine the causative microorganism. Most farmers use the strip cup and Californian milk tester to detect mastitis and then treat the affected quarter or quarters. Any treated animal should be milked and treated separately or last because mastitis is a contagious infection.

Milk from mastitic quarters should be discarded and not feed to calves and or pigs as is common practice. Mastitis infected quarter/quarters should be hand milked and not machine milked to avoid spreading the disease

Somatic Cell Count: Should be done every fortnight. Somatic cell counts also determine the grade of milk for the farmers to be paid for their milk. The cell count is made of white blood cells in the milk. These cells are part of the animals defence mechanism and they tend to increase

dramatically when an infection is present. It is however unwise to place more emphasis on the cell count results of a milk sample as an increase in white blood cells (leucocytes) also occurs at the start and towards the end of any lactation. The number of cows in early and late lactation as well as mastitis cases as taken of a bulk milk sample, therefore influences the overall somatic cell count. The following are the normal standards applied to cell counts: -

300 000 to 500.000 = normal

500 000 to 750 000 = moderate

750 00 to 1 000. 000 = high

1,000.000 and high = very high

A farmer who does not carry out mastitis - control programme may find that 50% or more of his herd is carrying mastitis in the sub-clinical form. As mentioned above early and late location can influence the somatic cell count. Sub-clinical mastitis cases carry mastitis causing microorganisms and do not produce their potential maximum causing the disease to be seen with a naked eye. These animals may rid themselves of the diseases or may deteriorate into clinical cases.

Under these circumstances the cell count can carry between 500,000 and 1,000,000 and a cause for concern to the farmer. Under these circumstances the cows will not realize their full production capacity.

There is no single treatment that will remedy this situation overnight. Strict hygiene will produce the desired results.

California Mastitis Test: - This test is more sensitive in detecting mastitis than the strip cup but needs experience for accurate interpretations. The test indicates presences of white blood cells concentration but as with the other methods of ssessing cell counts it can give reactions to cases of early or late lactation. It is therefore essential to distinguish positive reactions. It is essential that cows quarters (teats) are tested before each milking and positive reactions treated before too much uddertissue damage is done.

Dry Care Therapy: This treatment is given to cows that are being dried off. An antibiotic is administered in a form, which produces a slow release of the drug over a period of three weeks. This presence of antibiotics over this period is considered highly beneficial, as it is often at this stage that cows are infected. At the end of this period the udder should have dried out and out of the danger.

Clinical Mastitis:- If a sound mastitis control programme is used it is unlikely that a mastitis outbreak of any proportion will occur. The farmer can always expect a small percentage of his milking herd to contract mastitis. The mastitis control programmes is aimed at keeping sub-clinical mastitis cases at a low and easily manageable level and eventually reduce it to a minimum. The results of a programme may become evident after two (2) to three (3) years. Farmers usually keep antibiotics and may remedy the mastitis if it is not too serious. Cases of bacterial resistance to specific antibiotics are fairly common and can lead to a far serious

problem. Should a cow not react to treatment a veterinarian should be consulted. Mastitis may already have become chronic and on closer inspection, a few hard lumps can be felt deep in the udder tissue. Chronic mastitis cases should be eliminated from the herd, as such animals are frequently important sources of infection. Mastitis is usually localized and affects only the cows udder, but the more serious infections can lead to rise in temperature and loss of appetite. In such cases the udder usually becomes swollen and very painful. Acute infection which can be caused by a number of bacteria often results in the death of a cow or in production of polluted milk if expert advice is not sought in time. A dairy farmer should understand that mastitis can only be controlled by efficient, hygienic control measures to prevent mastitis infection outbreak must be traced as a matter of urgency and or priority for it will be useless to treat individual cows and not remove the cause of the problem "mastitis ". A farmer should be aware of what mastitis is and how to control it under normal circumstances. When complications occur a veterinarian should be called in, it will be a saving in the long term.

DAIRY HERD RECORDS

The operation of a modern dairy farm requires the keeping of records just like any other progressive business. Records are particularly important as far as the dairy herd is concerned, as well as the operations of a dairy farm. If records are kept and properly used they can serve as the basis for developing a profitable enterprise. Lack of records can result in mediocre success or business failure. There are various types of herd records as follows:-

Identification of Cattle: Herd records depend first of all on the positive identification of each and every animal in the herd. In the case of registered animals, each breed association has very specific requirements. With Ayrshire, Guernsey and Holstein cattle a sketch of local markings on both sides of the body must be shown. In the case of the Jersey, Brown Swiss, Dairy Swiss (Braunvieh) breed's animals must be given a tattoo number in the ear.

Because tattoos are hard to read and the use of coat marking depends primarily on memory, the day-to-day operations identification of cows in larger herds requires that other methods be used. The most common method of identification is the ear tag. Other methods used are the neck chain and the neck strap, all of which carry a numbered metal or plastic plate with numbers.

Breeding Records: The ideal calving interval for the dairy cow is 12 to 13 months. In other words it is desirable to have every cow in the herd freshen every 12 months. In order to approach this goal as closely as possible dates of freshening (parturition), heat periods, breeding, abnormal conditions etc must be recorded. Such records serve the following:-

(i) Indicate when to start breeding
(ii) Aid in feeding programme
(iii) Indicate feeding efficiency
(iv) May suggest disease problems or need for veterinary service
(v) May suggest infertility of a bull being used
(vi) Indicate when to turn cow dry
(vii) Indicate approximate date of calving
(viii) Show parentage and calving date.

Through record keeping a dairy - man has a complete reproductive history of each cow in the herd. He knows when she is due to be bred, when she is bred, the sire used, and when she is due to freshen. If the cow does not come into heat or does not conceive in the normal period of time, the dairyman has the information readily available. Breeding normally should be started 60 to 90 days after calving. This timing gives the fresh cow a better chance to recover from any uterine infection and generally results in conception with fewer services. With such records a breeding problem usually can be detected before it has done serious damage and the veterinarian can identify the cause of the problem much more readily. The cow can be turned dry on the proper date so that there will not be an excessively long wasteful dry period or a period so short that the cow does not get adequate rest. A dry period of 60 days is considered ideal. A breeder of purebreds has to maintain accurate breeding records for purposes of registering animals and writing pedigrees. In fact he is normally obligated to do so.

Additional records are kept for: -

(i) Purebreds verses grades
(ii) Sale of breeding stock
(iii) Milk Production indicating milk production per cow per day and total milk production for the total herd in the farm.
(iv) Type of milk market
(v) Size of herd
(vi) Financial resources of dairyman
(vii) Milk quality control tests results
(viii) Financial records i.e. expenditure/income records

DAIRY HERDBOOKS

It is desirable that dairymen and women use a dairy herd book to maintain the necessary records on their cattle. Such books vary from complex expensive types to inexpensive notebooks. A substantial and fairly complete handbook is particularly useful for the breeder of purebred cattle. It also can be used to advantage by the breeders of grades (not purebred). Some breeders carry a pocket size herd book, which is particularly useful in discussing the records of animals with prospective buyers.

A good herd book should provide for recording such information as the name and registration number of the animal, names and numbers of sire and dam, date of birth, breeder, breeding record including name, number, sire and disposition of each off-spring, daily monthly and lactation period of (305 days) production of milk, the age of cows at which the records were made, a health record form and pedigree of three generations. Such records when kept over a period of many years are of great help in herd improvement.

OBJECTIVES OF THE SWAZILAND DAIRY BOARD

The objectives of the Board are: -

(i) To direct the development of the dairy industry in the Kingdom of Swaziland.
(ii) To facilitate the production and consumption of quality dairy products in the Kingdom of Swaziland.
(iii) To ensure the provision and sustainability of a technical capacity for the furtherance of the Board's mandate.
(iv) To advise and consult the stakeholders on issues and matters which are related or incidental to the dairy industry

CONCLUSION

It is worth to note that dairy farmers should use expert advice from dairy extension officers and veterinarians. A dairy farmer must be a good manager who keeps records and manages his finances amicably. Milk production is highly dependant on good quality feed and therefore dairy cattle of good dairy genetic potential should be fed well balanced rations to produce good quality milk and good yields.

Dairy farming has no holiday and it is worth the farmers taking a break but leave a good manager in charge of the running of the dairy in his absence. A dairy farmer should have passion for dairy cattle farming and not to take it as a hobby but as a business enterprise. A dairy farmer should enjoy his/her work.

Hygiene must be strictly adhered to at all times for a good farm gate price. Some of the basic guidelines for a profitable dairy enterprise are as follows:-

(i) The dairy farmer should ensure his cows calve every year and heifers calve at 2 years old.
(ii) Good calve rearing managements practices and reduced calve mortality.
(iii) The farmer should set targets and methods to achieve them.
(iv) Produce good feed either through irrigation or rain fed. The farmers should ensure there is always ample feed for the cows and clean water daily for watering the animals and cleaning equipment.
(v) The farmers breeding programme should achieve high fertility and reduced calving difficulties and mortality
(vi) The farmer must monitor the heifers growth as replacement stock.

"You Are Now a Good Dairy Farmer Committed To His/Her Daily Work with Passion"

BUSINESS PLAN PREPARATION
MODULE

BUSINESS PLAN PREPARATION

MODULE OBJECTIVES

By the end of this session, you should be able to:

- **Define what a business plan is.**
- **Understand the role of the business plan.**
- **List several reasons for developing a business plan.**
- **Identify the type of information to include in the business plan.**
- **Prepare an outline for a business plan.**
- **Identify items that go into a cash flow projection.**
- **Construct a simple cash flow forecast.**

DEFINITION

A **business plan** can be defined as a description of your business. It is a document that describes what you want to do and how you plan to do it.

The Executive Summary

The executive summary is the most important section of your business plan. It provides a concise overview of the entire plan along with a history of your company. This section tells your reader where your company is and where you want to take it.

The executive summary should be the last section you write.

USES

A business plan is a tool with three basic purposes:

1. Communication Tool

The business plan is used to secure loans, attract investment capital and assist in attracting strategic business partners. The development of a comprehensive business plan shows whether or not a business has the potential to make a profit.

2. Management Tool

The business plan helps you track, monitor, and evaluate your progress. The business plan is a living document that you will modify as you gain knowledge and experience. By using your

business plan to establish timelines and milestones, you can gauge your progress and compare your projections to actual accomplishment.

3. Planning Tool

The business plan guides you through the various phases of your business. A thoughtful plan will help identify roadblock and obstacles so that you can avoid them and establish alternatives.

BUSINESS PLAN OUTLINE

Below is an outline for a business plan. Use this model as a guide when developing the business plan for your business.

Elements of a Business Plan

1. Cover sheet
2. Statement of purpose
3. Table of contents

I. The Business

A. Description of business
B. Marketing
C. Competition
D. Production information
E. Personnel/assistance
F. Business insurance
G. Financial data

II. Financial Data

A. Loan applications
B. Capital equipment and supply list
C. Balance sheet
D. Breakeven analysis
E. Pro-forma income projections (profit & loss statements)
- Three-year summary
- Assumptions upon which projections were based

F. Pro-forma cash flow

III. Supporting Documents

- Tax returns of principals for last three years if any
- Copy of proposed lease or purchase agreement for building space

- Copy of licenses and other legal documents
- Copy of resumes of all principals
- Copies of letters of intent from suppliers, etc
- Copies of letters of authorisation

WHAT IT INCLUDES

What goes in a business plan? The body of the business plan can be divided into **four** distinct sections: **1)** the description of the business, **2)** the marketing plan, **3)** the management plan and **4)** the financial management plan Addenda to the business plan should include the executive summary, supporting documents and financial projections.

DESCRIPTION OF THE BUSINESS

In this section, provide a detailed description of your business. An excellent question to ask yourself is: "What business am in?" In answering this question include your products, market and services as well as a thorough description of what makes your business unique. Remember, however, that as you develop your business plan, you may have to modify or revise your initial questions.

The business description section is divided into three primary sections. Section 1 actually describes your business, Section 2 the product or service you will be offering and Section 3 the location of your business, and why this location is desirable (if you have a franchise, some franchisors assist in site selection).

1. Business Description

When describing your business, generally you should explain:

a) Legalities - business form: proprietorship, partnership, corporation. The licenses or permits you will need.
b) Business type: farming (milk production) or service.
c) What your product or service is.
d) Is it a new independent business, a takeover, an expansion, a franchise?
e) Why your business will be profitable. What are the growth opportunities?
f) When your business will be open (days, hours)?
g) What you have learned about your kind of business from outside sources?
h) What you understand as key in the business?
i)

A cover sheet goes before the description. It includes the name, address and telephone number of the business and the names of all principals. In the description of your business, describe the unique aspects and how or why they will appeal to consumers. Emphasize any special features that you feel will appeal to customers and explain how and why these features are appealing.

The description of your business should clearly identify goals and objectives and it should clarify why you are, or why you want to be, in business.

2. Product/Service

Try to describe the benefits of your goods and services from your customers' perspective. Successful business owners know or at least have an idea of what their customers want or expect from them. This type of anticipation can be helpful in building customer satisfaction and loyalty. And, it certainly is a good strategy for beating the competition or retaining your competitiveness.

Describe:

a) What you are selling.
b) How your product or service will benefit the customer.
c) Which products/services are in demand; if there will be a steady flow of cash.
d) What is different about the product or service your business is offering.

3. The Location

The location of your business can play a decisive role in its success or failure. Your location should be built around your customers, it should be accessible and it should provide a sense of security. Consider these questions when addressing this section of your business plan:

a) What are your location needs?
b) What kind of space will you need?
c) Why is the area desirable? The building desirable?
d) Is it easily accessible? Is public transportation available? Is street lighting adequate?
e) Are market shifts or demographic shifts occurring?

It may be a good idea to make a checklist of questions you identify when developing your business plan. Categorize your questions and, as you answer each question, remove it from your list.

THE MARKETING PLAN

Marketing plays a vital role in successful business ventures. How well you market you business, along with a few other considerations, will ultimately determine your degree of success or failure. The key element of a successful marketing plan is to know your customers -- their likes, dislikes, expectations. By identifying these factors, you can develop a marketing strategy that will allow you to arouse and fulfil their needs.

Identify your customers by their age, sex, income/educational level and residence. At first, target only those customers who are more likely to purchase your product or service. As your customer

base expands, you may need to consider modifying the marketing plan to include other customers.

Develop a marketing plan for your business by answering these questions. Your marketing plan should be included in your business plan and contain answers to the questions outlined below.

a) Who are your customers? Define your target market(s).
b) Are your markets growing? Steady? Declining?
c) Is your market share growing? Steady? Declining?
d) Are your markets large enough to expand?
e) How will you attract, hold, increase your market share? How will you promote your sales?
f) What pricing strategy have you devised?

1. Competition

Competition is a way of life. We compete for jobs, promotions, scholarships to institutes of higher learning, in sports -- and in almost every aspect of your lives. Nations compete for the consumer in the global market place as do individual business owners. Advances in technology can send the profit margins of a successful business into a tailspin causing them to plummet overnight or within a few hours. When considering these and other factors, we can conclude that business is a highly competitive, volatile arena. Because of this volatility and competitiveness, it is important to know your competitors.

Questions like these can help you:

a) Who are your five nearest direct competitors?
b) Who are your indirect competitors?
c) How are their businesses: steady? Increasing? Decreasing?
d) What have you learned from their operations? From their advertising?
e) What are their strengths and weaknesses?
f) How does their product or service differ from yours?

2. Pricing and Sales

Your pricing strategy is another marketing technique you can use to improve your overall competitiveness. Get a feel for the pricing strategy your competitors are using. That way you can determine if your prices are in line with competitors in your market area and if they are in line with industry averages.

Some of the pricing strategies are:

- retail cost and pricing
- competitive position
- pricing below competition
- pricing above competition

- price lining
- multiple pricing

The key to success is to have a well-planned strategy, to establish your policies and to constantly monitor prices and operating costs to ensure profits. Market place because these changes can affect your competitiveness and profit margins.

3. Advertising and Public Relations

How you advertise and promote your goods and services may make or break your business. Having a good product or service and not advertising and promoting it is like not having a business at all. Many business owners operate under the mistaken concept that the business will promote itself, and channel money that should be used for advertising and promotions to other areas of the business. Advertising and promotions, however, are the life line of a business and should be treated as such.

Devise a plan that uses advertising and networking as a means to promote your business. Develop short, descriptive copy (text material) that clearly identifies your goods or services, its location and price. Use catchy phrases to arouse the interest of your readers, listeners or viewers.

4. SWOT/PESTLE Analysis

This sections looks at the strengths, weaknesses, the opportunities and the threats. It may also look at the socio-politico situations

THE MANAGEMENT PLAN

Managing a business requires more than just the desire to be your own boss. It demands dedication, persistence, the ability to make decisions and the ability to manage both employees and finances. Your management plan, along with your marketing and financial management plans, sets the foundation for and facilitates the success of your business.

Like plants and equipment, people are resources -- they are the most valuable asset a business has. You will soon discover that employees and staff will play an important role in the total operation of your business. Consequently, it's imperative that you know what skills you possess and those you lack since you will have to hire personnel to supply the skills that you lack. Additionally, it is imperative that you know how to manage and treat your employees. Make them a part of the team. Keep them informed of, and get their feedback regarding, changes. Employees oftentimes have excellent ideas that can lead to new market areas, innovations to existing products or services or new product lines or services which can improve your overall competitiveness.

Your management plan should answer questions such as:

- How does your background/business experience help you in this business?
- What are your weaknesses and how can you compensate for them?

- Who will be on the management team?
- What are their strengths/weaknesses?
- What are their duties?
- Are these duties clearly defined?
- Will this assistance be ongoing?
- What are your current personnel needs?
- What are your plans for hiring and training personnel?

THE FINANCIAL MANAGEMENT PLAN

Sound financial management is one of the best ways for your business to remain profitable and solvent. How well you manage the finances of your business is the cornerstone of every successful business venture. Each year thousands of potentially successful businesses fail because of poor financial management. As a business owner, you will need to identify and implement policies that will lead to and ensure that you will meet your financial obligations.

To effectively manage your finances, plan a sound, realistic budget by determining the actual amount of money needed to open your business (start-up costs) and the amount needed to keep it open (operating costs). The first step to building a sound financial plan is to devise a start-up budget. Your start-up budget will usually include such one-time-only costs as major equipments, utility deposits, down payments, etc.

The start-up budget should allow for these expenses.

Start-up Budget

- infrastructure
- dairy cattle
- legal/professional fees
- occupancy
- licenses/permits
- milking equipment
- machinery
- advertising/promotions
- utilities

An operating budget is prepared when you are actually ready to open for business. The operating budget will reflect your priorities in terms of how you spend your money, the expenses you will incur and how you will meet those expenses (income). Your operating budget also should include money to cover the first three to six months of operation. It should allow for the following expenses.

Operating Budget

- feed and supplements
- veterinary drugs and services

- insurance
- rent
- depreciation
- loan repayments (including interest)
- advertising/promotions
- legal/accounting
- transport
- fuel
- miscellaneous expenses
- consumables
- salaries/wages
- utilities
- dues/subscriptions/fees
- taxes
- repairs/maintenance

The financial section of your business plan should include any loan applications you've filed, a capital equipment and supply list, balance sheet, breakeven analysis, pro-forma income projections (profit and loss statement) and pro-forma cash flow. The income statement and cash flow projections should include a three-year summary, detail by month for the first year, and detail by quarter for the second and third years.

The accounting system and the inventory control system that you will be using is generally addressed in this section of the business plan also. If this is the case, he or she should have a system already intact and you will be required to adopt this system. Your financial advisor can assist you in developing this section of your business plan.

Other questions that you will need to consider are:

- What type of accounting system will you use? Is it a single entry or dual entry system?
- What will your sales goals and profit goals for the coming year be?
- What financial projections will you need to include in your business plan?
- What kind of inventory control system will you use?

Your plan should include an explanation of all projections. Unless you are thoroughly familiar with financial statements, get help in preparing your cash flow and income statements and your balance sheet. Your aim is not to become a financial wizard, but to understand the financial tools well enough to gain their benefits. Your accountant or financial advisor can help you accomplish this goal.