

Dairy

This section will give you detailed and exhaustive information about the animal husbandry topic you have selected. The information is categorised into various subheads. Depending on the nature of the information you require, just click on the relevant link. This will open out a set of sub-links to further narrow down your selection.

For example 'Diseases in cattle' in dairy section contains a list of sub-links that give you information on a whole host of topics concerning that topic, like : Anthrax, Black quarter, Cow pox, Bovine abortions and many others.

Important breeds of cattle

- The domestication of cattle appears to have taken place before 4000 BC. In India there are 26 well defined breeds of cattle.
- They are classified into 3 different categories based upon their utility.

Milch breeds



Gir



Hallikar



Godavari

- Gir, Sahiwal, Red Sindhi, Tharparkar

Draught breeds

- Amrit Mahal, Nagori, Malvi, Hallikar, Khillari, Kangayam, Krishna Valley

Dual purpose breeds

- Ongole, Nirmari, Haryana, Deoni, Kankrej, Dangi
1. Among buffaloes the important breeds include Murrah, Nili - Ravi, Surti, Jaffara badi, Mehsana and Nagpuri. In Andhra Pradesh a new breed known as Godavari was evolved through grading up of local buffaloes with Murrah over generations.
 2. India shares 50% of the total buffalo population of the world.
 3. The contribution of buffalo milk towards the total milk production in our country is nearly 60% even though the buffalo population is 1/3rd the cattle population.

Important breed of cattle in India figures

1. Sahiwal
2. Gir
3. Kangayam
4. Red Sindhi
5. Tharparkar
6. Hallikar
7. Kankrej
8. Amrit Mahal
9. Ongole

- Breeds of cattle in Andhra Pradesh and their development:
- In Andhra Pradesh the important breeds include Ongole, Malvi, Deoni, Hallikar

and Krishna Valley.

- In Telangana and Rayalaseema 95% of the buffaloes are of non-descript type, whereas in coastal Andhra Pradesh the cross breed Murrah buffalo population is high.
- The production performance of indigenous cattle can be enhanced by 3 different methods.

Improvement of cross breed cattle

- By cross breeding local animals in telangana and Rayalaseema regions with Jersey and by Holstein Friesian in coastal areas, significant improvement has been done in the performance of these animals

Improvement of indigenous cattle

- By using good quality Ongole semen, the ongole breed is being improved in its breeding tract.

Grading system

- The bulls of Murrah breed are being used for grading up of non-descript animals to enhance their milk production ability.
- An artificial insemination centre is located for every 4-5 villages. Pedigreed bull semen is being used to produce calves in these centers.

High yielding dairy breeds

Holstein Friesian



- This is by far the best dairy breed among exotic cattle regarding milk yield. On an average it gives 25 litres of milk per day, whereas a cross breed H.F. cow gives 10 - 15 lts per day.
- It can perform well in coastal and delta areas

Jersey



- Dairy milk yield is found to be 20 lts whereas cross bred jersey, cow gives 8-10 lts per day.
- In India this breed has acclimatized well especially in the hot and humid areas

Murrah



- On an average the daily milk yield is found to be 8-10 lts, whereas a cross breed murrah buffalo gives 6-8 lts per day.
- It performs well in coastal and slightly cold climatic areas.



Selection of dairy cows

- Selecting a calf in calf show, a cow in cattle show by judging is an art. A dairy farmer should build up his own herd by breeding his own herd. Following guidelines will be useful for selection of a dairy cow.
- Selection should be done based upon breed characteristics, fertility and milk producing ability.
- History sheet or pedigree sheet which are generally maintained in organized forms reveals the complete history of animal
- So, whenever an animal is purchased from a cattle fair, it should be selected based upon its breed characters and milk producing ability
- The maximum yield by dairy cows are noticed during the first five lactations. So generally selection should be carried out during I or II lactation and that too are month after calving.
- There successive complete milkings has to be done and an average of it will give a fair idea regarding production by a particular animal
- A cow should allow anybody to milk, and should be doile it is better to purchase the animals during the months of October and November. Maximum yield is noticed till 90 days after calving.

Breed characteristics of high yielding dairy cows

- Attractive individuality with femininity, vigour, harmonious

- blending of all parts, impressive style and carriage
- Animal should have wedge shaped appearance of the body
 - It should have bright eyes with lean neck
 - The udder should be well attached to the abdomen
 - The skin of the udder should have a good network of blood vessels
 - All four quarters of the udder should be well demarcated with well placed teats.



Selection of she-buffaloes for milk production

When you purchase buffaloes for milk production we have to select healthy animal known for economic milk production. We have to take following steps in selecting a dairy animal

Breed characters

- Body confirmation
- Body weight
- Ancestors performance
- Reproduction capacity
- Health condition
- Age
- No. of lactations
- Past performance of the animal
- Free of chronic disease
- Cleanliness of teeth Legs and toes free of injuries
- Good eye site
- Whether animal is dry or lactating
- Date of delivery
- Month of pregnancy
- If non-pregnant, how many times it came in to heat
- Animal should follow owners instructions
- The udder should be in good shape and easy to milk

The animal should not have the following

- Poor growth
- Late maturity

- Not coming into heat
- Repeat breeder
- Long gap between two lactations
- Uncurable chronic diseases
- Retained placenta
- Low milk production
- Unable to give milk without calf



Housing of Dairy Cattle

- The basic justification for animal shelter is that it should alter or modify the environment for the benefit of animals enclosed in it.
- The animal shelter should normally buffer the extremes of climatic conditions to reduce peak "stress" on the animals housed.

Design considerations for animal houses

- Animal houses should be located in an elevated area with good drainage facility
- Direct sunlight shouldn't fall into the shed
- Sufficient green cover should be there around the sheds
- Sufficient open area should present around the animal shed for free movement of animals

Construction of an ideal cattle shed

- Each animal should be provided 1-1.2 mt width and 1.5 - 1.7 mt length as standing space.
- Sufficient space should be provided for each animal in the shed or else it may lead to fighting among them. For e.g. For 5 cows the length and width of the shed should be 6 mt and 2.5 mt respectively.
- It should have an open area of about 8 mt length and 6 mt width. Fencing or compound wall can be constructed around the shed.

Floor

- It should be impervious, non-slippery free from holes and crevices. It must have proper slope.
- The material of the floor should preferably be of cement concrete.

Roof

- The roof should be small and simple.
- The roofing materials should preferably be asbestos sheet or galvanized iron sheets.
- The roof should be 8' high at sides and 15' high at center. The height at eaves is 3'.
- If iron sheets are used as roofing materials then cover it with grass during summer season.

Manager

- A continuous manger is constructed so that it can accommodate all the animals.
- The height, depth and width of the manger should be 60, 50 and 40 cm respectively for each animal.
- It can be constructed by using cement and brick or by cement concrete.

Gutter

1. The width and depth of the gutter should be 30 cm and 7.5 cm respectively.
2. Generally the drainage should directly be connected to the fodder plots.

Record keeping

- It helps to know the financial position of the dairy farm.
- Different records like milk production register, feed register, health register, mortality register etc should be maintained in a dairy farm.



Management of dairy cattle

Normal temperature, pulse rate and respiration rate in some domestic animals

Animal	Normal rectal Temperature (°C)	Pulse rate per minute	Respiration per minute
Cattle	37.8 (100° - 102° F)	- 40 - 50	38.9 20 - 25
Buffaloes	37.2 (98.8° F, in summer up to 40 (104° F)	40 - 45	16

General principles of animal management:

The basic requirements for the welfare of livestock are

- Provision of readily accessible fresh water and nutritionally adequate food as required
- Provision of adequate ventilation and suitable environmental temperature
- Adequate freedom of movement and ability to stretch the body
- Sufficient light for satisfactory inspection
- Rapid diagnosis and treatment of injuries and diseases
- Emergency provision in the event of breakdown of essential mechanical equipment
- Flooring which neither harms nor causes undue stress
- The avoidance of unnecessary mutilation.
- Good stockmanship is the key factor in the welfare of all livestock.
- To derive the maximum benefit, the domestic animals must be kept in a state of perfect health. Domestication and rearing of animals for raising their productivity causes considerable strain on the body resources of animals.
- It is therefore essential that these animals should be looked after well and are provided the required necessities of management, housing and nutrition.

Housing

- Considerations of economy, productiveness and protection from inclement weather necessitate the confinement of a large

- proportion of Indian cattle in houses, sheds and byres.
- The cattle-sheds need not be expensive. When designing them consideration must be given to the comfort and health of animals, the economic use of labour in milking, feeding and cleaning, and hygienic conditions for milk production. The level of lighting, natural or artificial, should be such that all the cattle can be seen clearly.
 - A stall measuring 1.5 m in length and 1.2 m in width is considered suitable for Indian cows. Mangers and gutters should be 0.75 m and 0.45 m wide, respectively, with all corners rounded up in cement.

Plan

- The general layout of dairy farms should be planned depending on the number of animals to be housed, facilities to be provided for feeding the animals economically collection of manure, and cleaning and washing.
- The cow-shed may be constructed in a single row if the number of animals is 16 or less, or in two rows if the number is more, with the heads of the animals facing outside, the so-called 'tail-to-tail' arrangement, so that the manure can be removed from the common central gangway between both the ranges of the stall.

Ventilation

- The objective of ventilation is to replace by pure fresh air from outside, without producing draught, the air in buildings rendered impure by pulmonary or cutaneous exhalations, products of combustion, industrial processes, and affluvia arising from fluid and solid excreta, refuse, etc., so that at no time the amount of carbon dioxide present exceeds six volumes per 10,000 volumes of air.

Keeping milk clean

- Milk is a highly perishable substance, and its flavour and keeping qualities are readily destroyed. Great care should be exercised to prevent its pollution by dust and dirt, and its flavour being lost on account of the smell and taint from dung heaps, rubbish and filth.

Record keeping

- Complete and accurate herd records are a valuable asset to the

management of cattle, buffalo and other livestock.

- Herd records are essential in the operation of purebred herds when the management expects to register the animals in the herd-books and for other purposes. The progressive farmer must therefore maintain information on date of birth, sex, colour, tattoo and other individual identification marks of the animals.
- In addition to these, records of breeding and performance including productivity of all animals in the herd should be maintained. These should include date / dates of services, dates of calving, calves born, number weaned, weaning weight, mothering ability of cows, rate and efficiency of gain in body weight and production, such as lactation yield, lactation length, dry periods, diseases and treatment given including diseases resulting in regard to breeding sires should be maintained.
- These particulars provide valuable information when selecting herd replacements and aid in culling the animals. They are important in determining the net income from livestock enterprise.

The common feedstuffs of India

- Livestock feeds are classified as concentrates and roughages. The concentrates have a low fibre-less than 18 percent and possess a high total digestible nutrient value.
- They include cereals, oilseeds, oilcakes, and cereal and animal by-products. The feeds having a fibre content above 18 percent and a low total digestible nutrient value are classed as roughages, e.g. cultivated fodders, silages, hays and straws.

Cereals, pulses and their by-products

- The cereals are rich in starch, with a low percentage of crude fibre, and are greatly relished by livestock. Their protein content is low and they lack in essential amino acids.

Oilseeds and oilcakes

- Oilseeds and oilcakes are protein-rich feeds. They are highly palatable, easily digested and are generally used to balance rations of farm stock in respect of protein. They are rich in phosphorus but poor in calcium content.

Legumes

- Among the green forage crops, legumes occupy a place of particular importance. Of all the common roughages, they are the richest in carotene, calcium and protein. They contain high-quality protein, which can supplement effectively the deficiencies of protein in cereal grains.

Straws

- Of all the foodstuffs, straws are perhaps the poorest in protein and have the largest percentage of crude fibre. They are comparatively poor in phosphorus, in available calcium and also in trace element, but are rich in silica.

Hay

- The nutritive value of hay depends upon the stage of maturity at which the herbage is harvested for conversion into hay. While the early cuttings are more nutritious, late cuttings yield a larger weight.

Silages

- The most economical method of raising livestock is to feed them on grasses and legumes directly from the fields.



Fodder for cattle

Conservation of fodder



Napier grass



Para grass



Jo war grass

- Preservation of fodder without much loss of nutrients is the main aim of conservation.
- Fodder is cut before maturity ensuring optimum availability of nutrients.
- Fodder could be preserved by sun drying (HAY), in artificial driers (DRIEDGRASS) and in airtight chambers (SILAGE) SILAGE is a fermented green forage product prepared under anaerobic conditions.
- Good silage is yellow-brown color, with a characteristic acid fruity smell and just exude moisture when squeezed.
- Jowar and maize are the best crops suitable for ensiling. All non-leguminous fodder crops except turnip and rape.
- Hybrid Napier, Sudan grass, Berseem, Oats cow pia, millets

are also suitable crops.

- They have to be wilted for 3-4 to increase dry matter to around 35% before ensiling. The crop is chaffed 2-4 cm in length and packed air tight in trench silo. A m³ of silage weighs 650 kgs.
- The forage crop from 0.3 ha in a circular silo 3m diameter and 2.5m depth is enough to feed 5 animals @ 20 kg / day for 150 days.
- To increase the sugar content of pure legume tonnage adds 2-3 gallons of molasses and water each for one ton of green forage.
- The airtight pit stacked with fodder would be ready in 90 days with a PH of 5.8 and a lactic acid % of 0.1.
- Excess of butyric acid formation would lead to more proteolysis there by reducing the digestibility and intake of silage by cattle. Best quality silage has a PH of 4.2, lactic acid 10.5% and Butyric acid 0%.



Fodder Development for higher production

- The fodder production in the State is only marginal. By and large the cattle, buffaloes, sheep and goat subsist on crop residues.
- Fodder is grown in only 3% of the agricultural land as against 8% recommended.
- As such the state is facing deficit of about 100 lakh metric tons of fodder every year and milk production is seriously constrained due to this deficit.
- The thrust of the department has therefore been on promoting nutritious fodder production by popularising the cultivation of high yielding fodder and pasture varieties and distribution of different varieties of fodder seed.
- Fodder production is also being taken up on large-scale utilising wastelands, community lands and fallow lands.
- Silvipasture and hortipasture development is undertaken by DRDA, DPAP, and Vanasamrakshana.

The following are the different preparation ratios of feed mixture using locally available feeds

S.No.	Feed Ingredients	Feed mixtures					
		1	2	3	4	5	6

2	Wheat Bran, Rice Bran	32	50	40	50	10	-
3	Ghani Cake	25	20	20	20	20	25
4	Bengal gram, green gram and black gram bran	-	-	20	-	30	25
5	Cotton seed meal	-	-	-	-	-	20
6	Jaggery	10	7	-	-	-	-
7	Mineral mix	3	3	3	3	3	3

In the above mixtures 68-70% digestible Carbohydrates and 14-16% digestible Proteins will be available.

Green Fodder, Hay and feed request for the milch cattle:

Milk production (kgs)	Green grass (kg)	Hay (kg)	Feed in kgs	
			Buffaloes	Cow
<i>When plenty of green grass is available:</i>				
5	30	4	-	-
5-8	30	4	1.5	1.0
8-11	30	4	2.00	1.5
11-15	30	4	3.00	2.5
<i>When scarcity of green grass:</i>				
5	4	8	2.0	1.5
5-8	4	8	3.0	2.5
8-11	4	8	4.5	3.0



Hay Making

- Good quality herbage at the flowering stage is cut early in the morning and left in the field.
- After 4-5 hrs the cut fodder is turned and by next day afternoon the moisture content would come down to 25% crops cut at hay making stage may contain 20-25 lt of water/ha.
- For safe storage moisture content should not be more than 15% which can be ensured by frequent turning and spreading the hay over a wide area.
- Legume and non-legume forage crops can be used for HAY making.



Feeding concentrates to mulch cows

- Concentrates are an important and integral part of a ration for a dairy cow as they supply energy (TDN) and proteins (DCP) in right proportion.

Some of the salient features are

- They should have 15% DCP and 70% TDN
- 1/3rd of dry matter (DM) requirements should be met by concentrates
- Concentrates should not constitute more than 60% of the ration. It may lead to milk fat depression
- Pregnant animals above 6 months of gestation should be given an extra 1-2 kg of concentrate mixture
- For every 2 kg of milk produced, buffaloes require 1 kg of concentrate feed
- For every 3 kg of milk produced, cows require 1 kg of concentrate feed
- Cows in first and second lactation will still be growing so they are provided 20% and 10% more ration over the maintenance allowance respectively
- NRC recommends 17% crude fibre (CF) in the total ration DM to prevent milk fat depression
- Provide an extra allowance of 1-1.5 kg concentrate mixture during first 2 months after calving
- Plenty of fresh water should be provided as its requirement is 4 times that of DM consumption
- If a dairy cow consumes 2% DM when dry, it will consume 4-5% DM while yielding 20-30 of milk / day
- If the milk yield is 15-30 kg / day then the DCP, TDN requirements are more by 10%

S.no	Characteristic	Requirement on Moisture free basis
1	Moisture (Maximum)	10%
2	Crude protein (Minimum)	20-22%
3	Crude fat (Minimum)	2.5-3.0%
4	Crude fibre (Maximum)	7-12%
5	Acid insoluble Asn (Maximum)	3-4%
6	Nacl (Common salt) (Maximum)	2%
7	Calcium (Ca)	0.5%
8	Phosphorus (P) (Minimum)	0.5%

9	Vitamin A IU/Kg	5000 IU
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First aid in cattle

- Injuries to legs and horns are common in cattle.
- Apart from this excess intake of grain rich diet, or fodder may lead to bloat and impaction.
- Necessary treatment should be done immediately or else the animal may be in danger.

Wounds

- The wounds should be thoroughly cleaned in potassium permanganate solution.
- Septic wounds should be cleaned with hot saline water.
- In case of bleeding from the wound a bandage can be applied with the help of gauze cloth or cotton after applying suphanamide powder.
- Maggot infestation can be treated by removing the maggots initially with a forceps and then camphor oil, turmeric powder or custard leaf can be applied.
- Neem oil can be used as fly repellent.

Yone gall

- It is a condition characterized by local swelling upon neck caused due to constant irritation of yoke or plough.
- Camphor mixed in coconut oil should be applied on the affected portion.
- In case of severe swelling iodine ointment can be applied. Due

to this it will rupture and then it can be treated like ordinary wound.

- The animal should not be allowed for carting until the swelling ceases.

Horn fracture

- The hanging portion of the horn should be removed.
- Bleeding can be prevented by applying a bandage with a white cloth dipped in water.
- Sugar solution should be applied on the bandage. Consult the veterinary doctor for further treatment.

Sprain

- Hot fomentations with water should be applied thrice daily on the affected portion.
- Massage the area with camphor oil
- In case if it is possible to tie a bandage then it should be done with the help of tamarind leaves

Impaction

- Due to over feeding of fodder without water intake or due to intake of grain rich diet will lead to impaction of rumen.
- Important symptoms include stoppage of rumination, dry and hard flakes of dung and severe abdominal pain.
- Stop feeding the animal with any kind of diet.
- 250 ml of castor oil can be given as a drench
- If it is not subsided in two days then consult the veterinarian

Bloat

- A mixture of 50 ml of camphor oil and 500 ml of good quality oil should be drenched.
- Stop feeding the animal till the bloat subsides
- Small quantities of rice gruel can be fed

Non-specific diarrhoea

- Animal should be drenched with half a litre oil
- A mixture of 20 gms of kaolin and 20 gms of crota should be mixed in the gruel and can be fed to the animal



Health Management



- From profit point of view and from public health point of view a herd health programme among bovines is important without keeping diseases under control, progress in dairy cattle breeding is seriously impeded and the effects of good management and feeding cannot manifest themselves.

Key points to keep the animals healthy

- Animal sheds and surroundings should be kept clean
- Provide good quality nutritious feed to the animals
- Clean drinking water should be made available to the animals always
- Elimination of mosquitoes, ticks etc from the sheds and animals

Examination of health condition of animals

- The animal should be examined at the time of milking and feeding both in the morning and evening.
- Proper diagnosis and control measures should be taken in order to prevent the spread of diseases.

Signs of health

- Eating with relish and rumination
- Muzzle and nostrils are moist
- No fluctuation in milk yield
- The normal temperature in cattle is 38.3°C to 38.8°C while in buffaloes it is 37.8°C to 39.3°C
- Dung is semi solid in consistency with dark green colour
- Urine of healthy animals are clear and straw coloured

Signs of ill-health

- Animals separating from the general herd showing weakness and lack of alertness

- Stoppage of rumination
- Fever is noticed
- Redness in the eye and lancination observed
- Hairs are raised on the skin
- Yellow colour of dung indicate that the animal is suffering from constipation and loose motion indicate that it is having cholera
- Change in quality and quantity of milk produced is an early indicator of disease
- Undigested feed particles in the dung indicate there is some disturbance in the digestive system
- Animals which are not taking feed while milking may be suspected for fever or any kind of indigestion



Vaccination schedule

- Proper vaccination should be done to the animals at appropriate age in order to prevent the occurrence of diseases.

Vaccination schedule for cattle and buffaloes

Name of the disease	Age at 1st vaccination	Booster dose	Time of vaccination
Foot & Mouth Disease	2M	Once in 6M	Mar – Apr Aug – Sep
Rinder Pest	6M	Once in a year	Jan – Feb
Haemorrhagic Septigaemia	5M	Once in a year	May – June
Black-Quarter (Black-leg)	7M	Once in a year	May – June
Anthrax	6M	Once in a year	Aug – Sep

Brucellosis	4.6M	Once in a life period	Aug
Theileriasis	After 4 M	Once in a year	Aug



Anthrax

- Anthrax is an acute, infectious febrile disease of virtually all animals and man. It is caused by *Bacillus anthracis*.
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- In India, it is well known as the cause of sudden death of cattle, sheep and goats.

Symptoms

- The disease may occur in a peracute, acute or sub-acute form. In the first, the animal dies suddenly, rarely showing any symptoms.
- In acute and sub-acute forms, there may be high rise in body temperature and signs of intense pain.

Treatment and control

- Due to the acute nature of the disease resulting in sudden death, treatment is usually not possible in animals even though anthrax bacilli are clines. Treatment is of use in cases showing sub-acute form of the disease.



Black-quarter (Black-leg)

- This disease is widespread amongst cattle in certain parts of India, particularly in Karnataka, Tamil Nadu, Andhra Pradesh and Maharashtra. Sporadic cases occur in the northern and eastern states of the country.
- The disease is common in areas with moderate rainfall and where dry-crop cultivation is common.

- Young animals in the prime of condition and six months to three years old are affected more than others. Buffaloes usually suffer from a milder form of the disease. Outbreaks generally occur with the onset of rains. True black-quarter is caused by *Clostridium chauvoei*.
- It affects mostly start and sturdy animals. Fever with redness of eye. Hot painful swelling in the affected leg. Crepitating sound on pressing the affected part of muscle. Death may occur in severe cases in 1 or 2 days

Symptoms

- The disease usually occurs in an acute form, affected animals dying within 24 to 48 hours of the onset of symptoms.
- There is high fever with a hot, tense, painful swelling usually in one of the quarters, more often a hind-quarter, although such swelling may also occur in other before death, the swelling becomes cold and painless and crepitates on pressure due to the presence of gas in it.

Prevention and control

- To prevent the spread of infection and contamination of the soil with spores of the causal organisms, carcasses of animals dead of black-quarter should be either buried deep and covered over with lime or should be cremated.
- Administration of penicillin in repeated doses may be effective if injected before muscle damage has been caused.
- Use of black-quarter vaccine protects animals against the disease for about a year. Animals should be vaccinated with this about three to one month before the onset of rains.



Contagious bovine abortion

- This disease of cattle and buffaloes, usually termed brucellosis, is caused by *Brucella abortus*, a small gram-negative coccobacillus, also known as Bang's bacillus.
- The disease occurs on most breeding farms in western countries. It is also fairly widely prevalent in India.

Symptoms

- The disease affects animals of all ages and of both sexes.
- In the initial stages it shows no symptoms and hardly any evidence of fever. As the infection progresses, the organisms

become localized at sites where they are able to persist, the most usual of these sites in the female being the uterus, the udder and the supramammary lymph nodes, and in the male the genital glands.

Prevention and control

- Introduced into a fresh herd, the disease may spread rapidly.
- It is, therefore, necessary that before purchasing animals for a disease-free herd they are carefully examined for evidence of the infection.



Bovine mastitis

- This disease is characterized by the inflammation of the udder, resulting in changes in the udder tissue and its secretion.
- Infectious mastitis results from infection with one or more of the many organisms associated with cattle in all countries where dairy industry is well developed, and the disease is of great economic importance to the milk producer.
- The disease is also widely prevalent in milch animals in India.
- Clinically, the disease may be recognized as acute, sub-acute or chronic, and these forms may depend on the type of the causal organism concerned. It may be accompanied by systemic disturbance, with a rise in body temperature of the affected animal and other febrile symptoms, but usually it occurs in the form of a localized involvement of the udder, with a progressive damage to the udder tissue.
- The milk is affected both in quality and in quantity, and as a result of permanent impairment of the function of one or more quarters milk production may cease altogether. Both cows and she-buffaloes suffer from the disease.

Treatment

- Success depends on the nature of the aetiological agent involved, the severity of the disease and the extent of fibrosis.
- Complete recovery with freedom from bacterial infection can be obtained in cases of recent infection and in those where fibrosis has taken place only to a small extent.
- Such drugs as acriflavine, gramicidin and tyrothricin have now ceased to be in use, and have given place to the more effective drugs, such as sulphonamides, penicillin and

streptomycin.



Cow-pox



- The infection, although mostly occurring in cows, sometimes also occurs in buffaloes.
- Under natural conditions the infection takes place through inoculation by the cutaneous route and readily spreads from one animal to another through the agency of milkers.
- The occurrence of the disease is not often reported since it is localized only to the teats and udder and occasionally to the hairless parts of the body.

Buffalo-pox

- Pox occurs in buffaloes, but in a considerably milder form than in cows.



Foot-and-mouth disease

- The foot-and-mouth disease is a highly communicable disease affecting cloven-footed animals. It is characterized by fever, formation of vesicles and blisters in the mouth, udder, teats and on the skin between the toes and above the hoofs.
- Animals recovered from the disease present a characteristically rough coat and deformation of the hoof.
- In India, the disease is widespread and assumes a position of importance in livestock industry.
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- The disease spreads by direct contact or indirectly through infected water, manure, hay and pastures.
- It is also conveyed by cattle attendants. It is known to spread through recovered animals, field rats, porcupines and birds.
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- Foot-and-mouth disease occurs in a relatively mild form in India and is seldom fatal. It occurs practically all the year round.

Symptoms



- Fever with 104-105⁰ F
- Profuse salivation ropes of stringy saliva hangs from mouth
- Vesicles appear in mouth and in the inter digital space
- Lameness observed
- Cross bred cattle are highly susceptible to it

Diagnosis

- Quick spread and the occurrence of lesions in the mouth and feet of affected animals are characteristic symptoms.
- It presents some similarity to rinderpest, from which it can be readily differentiated by the absence of diarrhoea and by the presence of the foot lesions.
- It can be cured by severe antibiotic therapy and topical application of ointments

Treatment

- The external application of antiseptics contributes to the healing of the ulcers and wards off attacks by flies.
- A common and inexpensive dressing for the lesions in the feet is a mixture of coal-tar and copper sulphate in the proportion of 5:1.

Control and prevention

- Heavy milch animals and exotic breeds of cattle bred for milk should be protected regularly.
- It is advisable to carry out two vaccinations at an interval of six months followed by an annual vaccination programme.
- Isolation and segregation of sick animals. It should be informed immediately to the veterinary doctor
- Disinfection of animal sheds with bleaching powder or phenol
- Attendants and equipments for sick animals should be ideally separate
- The equipments should be thoroughly sanitized
- Proper disposal of left over feed by the animal
- Proper disposal of carcasses
- Control of flies



Haemorrhagic septicaemia

- This acute septicaemic disease of cattle and buffaloes is widely prevalent in India. It occurs generally in low-lying areas periodically inundated by rainwater and in areas where irrigation facilities have developed.
- The causal organism, *Pasteurella multocida*, is a small gram-negative coccus-bacillus, commonly called bipolar organism on account of the intensity with which it stains at the poles.
- Redness of eye and laceration along with fever. Severe dyspnoea. Hot painful swelling at head, jaw region or brisket region. In severe cases sudden death may occur due to high fever and severe dyspnoea

Symptoms

- The disease generally runs an acute course. Cattle and buffaloes often develop a highly septicaemic condition and die within the course of about 24 hours of infection.
- Affected animals show a high rise in body temperature.
- The lesions comprise haemorrhagic spots in the lymph nodes,

on the serous membranes and in other organs, including the inner lining of the heart; spleen is normal in size.

- The entire gut is highly inflamed and intensely red with bloody contents.

Treatment and prevention

- Early cases of the disease are amenable to treatment with sulphonamides, notably sulphadimidine coupled with antibiotics, such as penicillin, but on account of the short course of the disease and its termination in sudden death, animals are seldom available in good time for treatment.
- Vaccination with the improved type of adjuvant vaccine, carried out about a month before the onset of rains, will protect animals against the attack of the disease for about one year. In endemic areas such vaccination should be carried out every year.



Leptospirosis

- Leptospirosis occurs in animals and man in almost all parts of the world.
- Serological evidence indicates the prevalence of leptospire among domesticated animals in different parts of the country.
- The damage done to animal industry results from the death of animals in the acute stage of illness, stillbirth, abortion, stunning, decrease in weight (loss of meat), reduced milk production and unthriftiness.

Causes and pathogenesis

- The causative organisms of leptospirosis belong to the genus *Leptospira*.

Symptoms

- In cattle it is an acute, often fatal, disease characterized by haemorrhage, haemoglobinuria and icterus.
- Non-fatal infections are often characterized by fever, anaemia, abortions, sterility, decreased lactation and mastitis.

Diagnosis

- The principal methods used for the diagnosis of leptospirosis are direct microscopical examination of tissue preparations

and body fluids, bacteriological culture, animal inoculation and serological tests.

Treatment

- In cattle treatment with antibiotics may result in considerable diminution of even temporary cessation of urinary excretion of leptospores.



Rinder pest

- Rinderpest is the most destructive of the virus diseases of cloven-footed animals, such as cattle, buffaloes, sheep, goats, pigs and wild ruminants. Its control was a major issue till recently all over the world.
- Organised efforts over half a century have brought about a total eradication of the disease in the Western Hemisphere.
- The disease still persists in the Asian countries.
- The virus is found notable in the saliva, discharge from eyes and nostrils, and in the urine and faeces.
- It is present in the circulating blood during the febrile stage and is later concentrated in different organs, especially in the spleen, lymph nodes and liver. Outside the animal body, the virus is rapidly destroyed by direct sunlight and disinfectants. Cold preserves the virus.
- The virus is usually spread by contaminated feed and water.
- Rise in temperature upto 104 – 107⁰ F. Lacrimation and redness of eye.
- Foul odour from mouth. Discrete necrotic foci develop in the buccal mucosa, inside lip, and on the tongue. Bloody mucoid diarrhoea is noticed

Treatment

- Symptomatic treatment with penicillin, streptomycin, sulphadimidine and intestinal antiseptics has no action on the virus, but may help in the recovery of less severe cases of rinderpest, as these control secondary complications caused by bacteria.



Vibrionic abortion of cattle

- This is a widely prevalent form of abortion in some countries and the causal organism is *Vibrio foetus*.
- The disease resembles Br. Abortus infection but is less severe in form. It is generally transmitted during natural service or artificial insemination with semen from infected bulls.

Diagnosis

- Diagnosis is made by the examination of uterine exudate and stomach contents of the foetus.
- The disease is usually self-limiting, infected animals developing active immunity after one abortion.
- However, hygienic measures should be adopted to prevent spread of infection.



Metabolic diseases

Milk fever

- Milk fever, also known as parturient hypocalcaemia and parturient paresis, is a disease which has assumed considerable importance with the development of heavy milking cows.
- Decrease in the levels of ionized calcium in tissue fluids is basically the cause of the disease.
- In all adult cows there is a fall in serum-calcium level with the onset of lactation at calving.
- The disease usually occurs in 5 to 10 year old cows, and is chiefly caused by a sudden decrease in blood-calcium level, generally within 48 hours after calving.

Symptoms

- In classical cases, hypocalcaemia is the cause of clinical symptoms. Hypophosphataemia and variations in the concentration of serum-magnesium may play some subsidiary role.
- The clinical symptoms develop usually in one to three days after calving. They are characterized by loss of appetite, constipation and restlessness, but there is no rise in temperature.

Care of pregnant cattle



- Pregnancy diagnosis should be made within 90 days after service
- Gestation period in cattle is 9 months whereas in buffaloes it is 10 months
- During the last 2 months of gestation the animal should be dried off. During this period it should be fed 1-1 1/2 kg grains in addition to its maintenance ration



- A daily weight gain of 0.5 kg during the dry period seems optional for better milk production in ensuring lactation
- The cow should not be frightened. It should not be taken for long distance walk.

Care of cow at calving

- All the cow approaches parturition, it should be housed in a clean shed covered with paddy straw on the floor. A period of 10-12 hr may elapse from the commencement of restlessness until the calf is born. If some trouble is suspected it is better for the unskilled farmer to seek veterinary assistance.
- The placenta is discharged within 8-12 hrs after calving. If it is delayed by 24 hrs then consult the nearest veterinarian.
- Supply luke warm drinking water. Then feed the animal with bran, concentrate mix with salt and minerals.
- Prevent the cow from eating after birth

Managemental measures of pregnant cattle

- Pregnancy diagnosis should be made within 60-90 days after service
- Give calcium injections one week prior to calving in order to prevent milk fever

- Antibiotics should be infused into the udder 15 days prior to calving in order to prevent mastitis.
- Transfer the cows to clean sheds prior to calving
- During the last 2 months of gestation the animal should be dried off and it should be fed 1 kg of concentrate in addition to its maintenance rations.
- It should be dewormed during 3rd – 6th month of gestation.



Metoestrus Bleeding (Post Oestrus Bleeding)

- Mucus discharge with blood or clots of blood observed the next day to 5 days after the day of insemination or natural service.
- Seen in well-fed cows and heifers and not in buffalo cows or buffalo heifers.
- This condition is due to sudden withdrawal of oestrogens in circulation and is considered to be physiological.

Treatment

- Inject on the day of noticing metoestrus bleeding 1 ml. of Lutonestry (Russel co) or Duogynon 1 ml (Schering) or

Duogynon Forte 1 ml (Schering) or E.P. Forte 1 ml (Unichem) intramuscularly.

- Advice to reduce the quantity of concentrates especially starch and fat but increase protein by feeding deoiled groundnut cake. Give exercise 1 to 2 kilometers per day.
- No metoestrus bleeding will be seen after this treatment. After the treatment, if udder gets enlarged in heifers do not inject any hormones subsequently; such animals if milked will give milk slowly after 6 weeks.



Metritis

- The discharge thrown by the animal in heat or 1 to 4 days after insemination is not clear.
- It may be watery with white flakes like curdled milk or thick pus like or a mixture of both. Do rectal examination and record the following
- Cervix is normal in size or enlarged. If cervix is enlarged it may be a case of cervicitis. By vaginal examination with a speculum the cervical annular folds or ridges will be seen protruding out of the external os.
- In Sindhi and Krishnavally and their cross breeds, the cervix will be large and one may get confused for a case of cervicitis.
- Broad-spectrum antibiotics are indicated and the response is good when the ovary or ovaries are round soft and smooth preferably with follicles.



Both Cervix and uterus have enlarged

- Use 10 to 15 ml of Metrogyl IV (Iflunik) and 10 ml I/u diluted or undiluted in all infected cases. Use 10 to 15 ml of broad-spectrum antibiotics and add to it 10 to 75 ml of distilled water and inject intrauterine (into both horns) with an A.L.Catheter.
- The response is good when the ovaries are soft round and smooth or when follicles are present. The medicine has to be filled into both uterine horns for 3 to 5 days.

Treatment

- As long as the ovaries are flat and non-functional the use of antibiotics, antiseptics or Lugol's Iodine will not help.

- So give the animals better nutrition (1/2 to 1 kg of concentrates extra per day along with extra mineral mixture and salt lick blocks.



Animal is in Oestrus

- If proper records are maintained can be observe animals coming into heat as follows:
- Animal had come in heat 21 days back (regular cycle or repeat breeder)
- Animal had come in heat on 10-11 days back (mid cycle heat)
- Animal had come in heat on 7-8 days back (Acute endometritis)
- Animal had come in heat on 13-17 days back (endometritis)
- Animal had come in heat after AI/after Natural service 24 to 37 days after AI/Natural service (Early embryonic death)
- Animal had come in heat on 4 to 8 days interval and is in heat for 2-3 days continuously (Cystic ovaries)
- Animal had come in heat on 42-45 days back (Missed heat or silent heat)
- Animal had come in heat on 2 days back and in heat again (Split heat)
- Animal was inseminated and declared pregnant and is in heat how (may be gestational heat or heat noticed after un-noticed abortion or foetal resorption)
- Animal has calved 10 to 27 days back and has come in heat (Post partum heat)
- Animal has aborted 30 to 45 days back and has come in heat (Post abortion heat)



Animal has come in heat

- As cattle in oestrus exhibit mounting on some other female cattle in heat, some times the owner produces the animal not in heat for insemination.
- Animal in heat mounts as well as stands still to be ridden, but an animal not in heat mounts but will not stand still to be ridden.
- Animal showing both the signs will have congested or pink, moist, shining vulval lips the under surface of the tail pasted with mucus discharge. Some times the discharge may be seen

- flowing out of the vulval lips when the animal mounts.
- Rectal exam shows uterus highly tonic. Opposite of this is seen in the animal not in heat.
- Opposite of this is seen in the animal not in heat. Animals in heat urinates repeatedly a small quantity of a urine and swings its tail too many times in early heat only mounts, in mid heat do not mount, but accepts mounting and in late neither accepts nor mounts.



Animal showing frequent Oestrus (Cystic Ovaries)

- Animals come in heat once in 3 to 4 days or once in 8 days in any case they will have long period of oestrus. Such cases should be suspected for cystic ovaries.
- The uterus will be soft and Atonic. In long standing cases the sacro-sciatic ligaments are relaxed and during rectal examination when fingers of palm are pressed against the ligament from below the relaxation is well appreciated.
- (Base of tail is raised and depressions are noticed on either side of tail at the level of sacrosciatic ligament – sterility hump).

.The Cyst or cysts may be 3 types

1. Follicular cyst may be single or multiple in number
2. Luteal cyst may be one or few
3. Luteinized cyst or cystic corpus luteum



Animal not coming to heat

- First look at the size of the animal. Breeding is possible when they have reached a certain body weight to the given breed. Then look into the general body condition.
- If poor, Anoestrus is more common. Third look for chronic severe external or internal parasitism, which is also a cause.
- Examine blood for blood parasites confirm any chronic wasting diseases by which the animals are suffering.
- Enquire whether the heifer presented for examination was born as a co-twin to male calf to eliminate the possibility of "free martinism".
- Look at the breed, if it is F1 cross of Jersey and Hostein, there is a possibility of infertility. If the animal is going for grazing there is a chance to become pregnant to Scurb bull, so enquire whether it goes for grazing.

- Enquire when the animal has calved. Enquired whether it had any pre or partum (while calving) or post partum troubles as such troubles will cause the anoestrus to be longer. Enquire how the heat is detected to eliminate the chances of silent or unobserved heat.
- In addition to the above one has to do a rectal examination of entire genitalia and confirm whether the animal has become pregnant, any pathological condition of pregnancy or non-pregnancy is existing. One has to confirm whether a C.L. (functional one) is present or not. On the above examination the anoestrus may be classified as,

1. Due to C.L
2. Due to absence of C.L

(1) the following conditions are seen	(2) the following are seen
Pregnancy	Nutrition
Pyometra	Debility due to chronic wasting diseases
Mummified Foetus	Cystic ovaries
Macerated Foetus	Freemartinism
Post partum anoestrus	Hypoplasia of ovaries
Silent heat	Dermoid cyst
Week heat	Hormonal imbalance
Unobserved heat	Old age debility
Mucometra	



Retention of Placenta in cattle and buffaloes

- After expelling the foetus if the placenta is not thrown off within 8 hours it is considered as a case of retention of placenta in cattle and buffaloes.
- Retention of placenta can be avoided if the following prophylactic measures are undertaken
 1. Giving daily for 10 to 15 days before calving 1 kg of germinated and boiled Horse gram along with the water used for boiling horse gram. If it is not possible to boil even germinated horse gram can be fed for 10 to 15 days at the rate of 1 kg per day
 2. injecting 20 mg of Sodium selenite in 10 ml of groundnut oil along with 500 mg of Vitamin E (Tocopherols) intramuscularly 20 days prior to the day of calving
 3. Shifting animals 5 to 10 days to disinfected or non infected stall or to grazing fields (the stalls should not contain saw dust or paddy husk as bedding but paddy straw or jungle grass or un chaffed waste fodder can be used as bedding)
 4. Giving daily about 2km of walking as exercise or allow the animal to move freely in an open space for about an hour.
 5. Feeding mineral mixture containing Iodine, sodium selenite and in addition feed vitamin 'A' (green grass) and vitamin 'E' (germinated grams)
 6. Injecting 100 ml of 20% glucose intravenously daily for 3 days along with calcium as injection, soon after calving.
 7. Injecting 3 to 4 mg of ergonobine / intramuscularly soon after calving.

Curative Treatment

Contraindications of manual removal of placenta

- If the temperature is more than 102.5 F in cattle and more than 101 F in buffaloes do not remove placenta manually (in such high temperatures such as septic metritis, acute metritis and in traumatic pericarditis). Such removal may lead to septic condition and death of the animal
- When the foetal cotyledons are thin and stringy
- When the animals are suffering from necrotic vaginitis and vulvitis with small dry swollen vagina
- When adhesions are very strong and firm
- Removing placenta incompletely or in a rough and in an insanitary manner
- Tying a weight to the placenta causes strain and may break

leaving part of it inside or it may cause invagination of uterus.

When placenta can be removed manually

- The placental cotyledons should be fleshy and substantial (considerably large) when cotyledons are detached the time taken to detach each cotyledons should not exceed more than 10 seconds.

Advise to owners

- Do not tie any weight to the hanging placenta
- If placenta is not expelled within 8 hours call on experienced veterinarian. In case of abortions as it usually ends up in ROP it should be got treated immediately.
- In case of twin pregnancy the animal calves 8 to 10 days earlier to normal term and may end up in a case of ROP
- If not expelled within 36 hours it may take 7 to 10 days for total expulsion after meceration by itself
- Do not breed ROP cases within 90 days after calving
- Get the ROP cases examined monthly until 4 months after calving to check the involution of uterus. Meanwhile the mucus discharge in 1 to 2 heats should be clear before doing A.I.



Abortion in cattle and buffaloes

- Abortion is the expulsion of a visible dead foetus before the age of 28 weeks in cows 31 weeks in case of buffaloes.
- Expulsion of the dead foetus after this period is called as a stillborn calf. The common causes for abortions are as follows:

Bacterial diseases

- Brucellosis
- Leptospirosis
- Listeriosis
- TB
- Vibriosis
- Other bacteria causing abortions are streptococcus, Diplococcus, Staphylococcus, E. Coli, Pseudomonas areginosa, corynebacterium pyogenes etc

Viral diseases

- Rinderpest
- Foot and mouth

Fungal diseases

- Aspergillosis

Protozoal

- Trichomoniasis
- Trypanosomiasis
- Anaplasmosis
- Babesiosis
- Piroplasmiasis

Hormonal

- Deficiency of progesterone
- Accidental ingestion or injection of large doses of oestrogens or injection of cortico steroid

Nutritional

- Deficiency of Vitamin – A
- Deficiency of Iodine

Physical

- Removal of C.L. before 5th month age of pregnancy

Other causes

- Injecting carbocol in a pregnant animal for impaction of rumen without diagnosing pregnancy, injection pendistrin S.H. in a mastitis case, injecting corticosteroids
- External violent injury
- Severe systemic diseases
- Eating some plants rich in oestrogens or some poisonous plants

Prevention of abortions

- For viral diseases like Rinderpest and Foot & Mouth, advance vaccination can be done.
- For brucellosis vaccinate with 'CALF HOOD VACCINE' when the female calf is about 6 to 8 weeks old. For pregnant animals also there is a vaccine / available from Denmark to protect against brucellosis. Listeriosis can be avoided by not feeding the silage which has been spoiled or which has got high PH.
- Avoid deficiency of Vitamin A and give mineral mixture and salt lick blocks having Iodine. By avoiding rats and rodents in the dairy animal premises and feed godowns, it is possible to avoid leptospirosis.



Prolapse of Vagina, Cervix & Eversion of Uterus in Bovines

- Prolapse of Vagina and Cervix is seen in prepartum stages more commonly while in post partum eversion of uterus is seen.

Causes

- Due to confinement to stables
- Feeding mouldy feeds or subteranian clover of plants and grasses having oestrogens.
- irritation of vagina, bladder and intestines leading to contractions of vagina and cervix.
- Over distension of abdomen or excessive amounts of loose pelvic fat causing increasing intrapelvic pressure.
- Cystic ovarian condition for a long period
- Due to secretion of oestrogenic hormones from placenta seen in the last 2 to 3 months of gestation
- Too much slope in the cow byre

Symptoms

- The prolapsed mass of vagina and cervix of a tennis ball size to that of a large football size is seen. The size will be large due to prolapsed of bladder and retention of urine.
- In eversion of uterus the placenta may be retained or the uterine cornucles are seen on the surface of the everted uterus. The everted mass if big, is seen as a hanging bag almost equal to the size of a calf.
- The animal expresses pain, anxiety, anorexia increased respiration and pulse.
- If bleeding is there from the cotyledons the animal may die due to shock.
- Deaths are recorded in 5 to 18 percent cases.

The owner should do the following in case of prepartum prolapsed

- Cleaning the prolapsed parts by washing with boiled and cooled clean water or potassium permanganate is added to water to get a light pink colour and is used for washing.
- In a clean wet cloth the prolapsed portion has to be covered and water is poured over it now and then to keep it cool and wet and should be keep clean. Alternately a plastic paper is wrapped around the prolapsed portion to keep it moist and clean.

- The hind legs are elevated by 9" to 12" when compared to front legs and tied with ropes on either side in four feet wide space.
- The prolapsed portion should be lifted up towards the base of the tail once in 2 to 3 hours to relieve and pressure due to urine in the bladder.
- Put the animal on gruel and hay water and given green or dry fodder 1/3 that of the usual quantity for the next one week. (Avoid such fodders, which have oestrogenic substances)

Line of Treatment

- Give epidural anesthesia between the last lumbar and first coccygeal vertebrae or between first and second coccygeal vertebrae (5 to 8 ml of 2% local anesthetic is used)
- Gently lift the prolapsed portion towards base of the tail to relieve the pressure of urine in the bladder
- Wash with potassium permanganate lotion and after thorough cleaning any severe lacerations are sutured with continuous sutures using chromic catgut.
- Apply M & B antiseptic cream and first push portion very near the vulval lips and finally the portion away from the vulval lips.
- If progesterone deficiency or excess of oestrogens have been suspected, inject daily 50 to 100 mg of progesterone i/m or 500 mg of prolution depot. In case of cystic ovaries with such prolapsed it is advised to give 1500 to 2000 of H.C.G.



Pregnancy diagnosis in farm animals

Cattle and Buffaloes

Physical & Behavioural changes

- Pregnancy animals will be usually docile. During 3rd month age of pregnancy commonly the skin coat becomes nice with short and fine hair.

- In heifers this may be appreciated after 1 ½ months age of pregnancy. In many buffaloes such hiar changes can be noticed in the rump region.
- Pregnant animals look more glossy and may put on fat. Most commonly after 5th month age of pregnancy a definite drop in the milk yield is noticed in pregnant animals.
- In heifers the udder development can be noticed around 7th month age of pregnancy, while in cows the udder develops 15 to 30 days before parturition.
- In few animals (both heifers and cows) a prepartum udder or umbilical oedema is noticed. During last 15 days of gestation sinking of sacrosciatic ligaments can be noticed with oedema of vulval lips.

Rectal examination

- This is most reliable method of examination for pregnancy in cattle.
- Pregnancy can be diagnosed as early as one month but has to be confirmed at 75 days (21 ½ months) age as 3-10% of pregnancies after 30th day get resorbed whether examined rectally or not.

Procedure

- The most important factors involved in uterine palpation are proper anatomical orientation and a thorough methodical approach most mistakes result from failure to adhere to these two principles.
- Do not forcibly manipulate against peristaltic waves avoid manipulating ballooned rectum. In the later reach forward and gently grasp the first peristaltic ring and pull backwards or gently stimulate the dosum (roof) of rectal wall with the finger tips to deflate the rectum.
- Depending on the age and parity the location of non-garvid uterus may be hanging at the pelvic brim.
- A left handed palpation is given below to examine the uterus after locating the cervix (land mark for genital examination per rectally) it is pulled caudally by exerting leverage against it.
- The cervix is elevated against the side of pelvis so that the tract is in a reversed configuration.
- The thumb is inserted under the upper curve of S and then fingers are extended around the left horn of the uterus for full examination of left horn or the fingers can be placed under the central intercornual ligament and horns are tilted for easy

examination.

- Alternatively the thumb can be inserted between the horns to maintain retraction and the second horn palpated like that of first.
- Another technique useful sometimes in early pregnancy is, the hand is inserted into the rectum down over the brim of pelvis, where the uterus is cupped in an angle formed by the arm and hand. The uterus can be retracted gently up and over the brim of the pelvis.

Feeding of growing calves (3-6 months)

The calf which gains about 600 g per day will weight 70 kg to 130 kg during 3 to 6 months of age, with an average live weight of about 100 kg, for which the nutrient requirements are as follows

Dry matter	2.76 kg
Total digestible nutrients	1.92 kg
crude protien	0.44g

The feeding schedule can based on non-leguminous or leguminous forage as illustrated below

Non-leguminous fodder/grass	5-15 kg
Concentrate mixture (TDN-74%, CP-25%)	1-2 kg
Leguminous fodder	10-15 kg
Concentrate micxture (TDN-74%, CP-18%)	1-2 kg

Feeding of growing calves (6-12 months)

- At the daily weight gain of 600 g per day, the calf may weigh from 130 to 240 kg during this period with an average of 185 kg. The nutrient requirements of the calf are given below

Dry matter	4.33 kg
Total digestible nutrients	2.86 kg
crude protien	0.58g

- The feeding schedule can be based on non-leguminous or leguminous fodder is

Non-leguminous fodder/grass	10-20 kg
Concentrate mixture (TDN-74%, CP-23%)	1-2 kg
Leguminous fodder	15-25 kg
Concentrate micxture (TDN-70%, CP-13%)	1.5-2.5 kg

Feeding of growing calves (1-2 years)

- With an average daily gain of 600 g, the calf during this period weighs from 240 to 460 kg with an average live weight of 350 kg. The nutrient requirements representing the average of males and females are as follows
- Males grow faster and thus require more nutrients than the female calves.
- Based on the type of the basal roughage ration, different feeding options are given below

Non-leguminous fodder/grass	32 kg
Concentrate mixture (TDN-70%, CP-22%)	2 kg
Leguminous fodder	50 kg
Concentrate mixture (TDN-70%, CP-12%)	2.0 kg
Leguminous+Non-leguminous mixed fodder	41.0 kg
Concentrate mixture (TDN-70%, CP-15%)	2.0 kg
Leguminous fodder(Berseem)	65.0
Wheat straw(ammoniated)	3.5 kg
Concentrate mixture (TDN-70%, CP-20%)	5.5 kg

Feeding of heifers and growing bulls (2-3 years)

- For 400 kg live weight, the nutrient requirements for the above category of calves are as follows

Dry matter	9.48 kg
Total digestible nutrients	5.58 kg
crude protein	1.40 kg

- The feeding schedules as per different basal rations are depicted below

Non-leguminous fodder/grass	30 kg
Concentrate mixture (TDN-70%, CP-20%)	3.5kg
Leguminous fodder	60 kg
Concentrate micxture (TDN-60%, CP-10%)	2.5 kg
Leguminous+Non- leguminous mixed fodder	48.0 kg
Concentrate micxture (TDN-60%, CP-12%)	2.5 kg
Wheat srtaw(ammoniated)	4.5 kg
Concentrate mixture (TDN-70%, CP-20%)	6.0 kg
Green fodder	4.0 kg

Feeding of growing bulls (above 3 years)

- Usually, the breeding bulls attain their adult size at 600 kg live weight. However, larger sized breeds such as Holstein-Friesian, grow beyond 600 kg live weight and continue to gain about 600 g per day. The nutrient requirements of such heavy growing bulls are as follows

Dry matter	14.16 kg
Total digestible nutrients	7.79 kg
crude protien	1.7 kg

- Based on different types of basal roughages, the various feed schedules are given below

Non-leguminous fodder/grass	50 kg
Concentrate mixture (TDN-60%, CP-20%)	4.5kg
Leguminous fodder	70 kg
Concentrate micxture (TDN-60%, CP-13%)	4.5 kg
Leguminous+Non- leguminous mixed fodder	56.0 kg
Concentrate micxture (TDN-60%, CP-12%)	4.5 kg
Wheat srtaw(ammoniated)	10.0 kg
Concentrate mixture (TDN-70%, CP-25%)	6.0 kg
Green fodder	4.0 kg

Dry matter	7.99 kg
Total digestible nutrients	4.98 kg
crude protien	0.96g



Systems of calf feeding

The system of calf feeding depends upon the type of feed material used for raising the calf. The following systems are conventionally followed:

- Raising on whole milk
- Raising on skim milk
- Raising on fluids other than milk, such as fresh butter milk, fresh sweet whey, gruels etc
- Raising on milk substitutes
- Raising on calf starters
- Raising on nurse cows

Raising calves on whole milk

- The nutrient requirements of the young calf at 0 to 3 months of age, with an average body weight of 50 kg are as follows

Dry matter	1.43 kg
Total digestible nutrients	1.60 kg
Crude proteins	315 g

- It may be noticed that the TDN requirements are larger than the DM requirements, because of high proportion of fat in the diet. At 15 days, the young calf starts nibbling some grass, about half kg per day which is increased to 5.0 kg at 3 months.
- Instead of green fodder, 1-2 kg of good quality hay can be calf meal during this period, beginning with 0.5 kg at 15 days of age, which may be raised to 1.5 kg at 3 months of age.
- From 3 weeks onwards, if the whole milk availability is less, it can be replaced partially with skin milk, butter milk or any other fluid milk substitute.

The calf mixture

- The calf mixture is a concentrate supplement for the young calf, which is being raised on milk or other fluid substitute. The calf mixture chiefly consists of grains such as maize and oats.
- Grains such as barley, wheat and sorghum also can be used in the mixture. Cane molasses can be used to an extent of 10% in the calf mixture.
- An ideal calf mixture contains 80% TDN and 22% CP.

Roughage for the young calf

- Fine stemmed leafy leguminous hay is the best roughage for the young calf. Hay can be offered from two weeks of age onwards. A legume plus grass mixed hay is also valuable.
- Sun-cured hay which possesses a fresh green colour is a good source of Vitamins A and D as well as B-complex vitamins.
- At 6 months of age, a calf eats 1.5 to 2.25 kg hay. The quantity increases with age.
- Silage can be given additionally in small quantities at 6 to 8 weeks onwards. Feeding of silage too early will cause scours.
- Silage is not the preferred roughage for the calf until it reaches 4 to 6 months of age.
- Maize and sorghum silages which are most common are not rich in protein and calcium and are also low in vitamin D.

Raising calves on nurse cows

- A cow which yields a low fat milk and a hard milker by nature can be successfully employed to nurse 2 to 4 orphan calves right from the first week of age.
- A dry calf meal is given along with hay as early as possible. These calves can be weaned at 2 to 3 months of age.

Raising calves on gruels

- The gruel is a liquid form of calf starter. It is not a milk substitute. From 4 weeks of age, milk feeding is gradually withdrawn and gruel is added to the reduced quantity of milk. After 20 days, milk is totally stopped.

Raising calves on calf starters

- In this the calves are given a good start with whole milk. They are taught to eat a dry calf starter and good hay or forage. At 7 to 10 weeks of age, they are entirely weaned from fluid milk.

Raising calves on milk substitutes

- It must be understood that there is no substitute for milk in terms of nutritive value for the young calf. However, use of a milk substitute is resorted to when the availability of milk or other fluids is extremely limited.
- The rate of feeding of a milk substitute is similar to that of whole milk, i.e. 10% of the body weight of calf after reconstitution. The total solid of the reconstituted milk

substitute make 10 to 12% of the fluid.



Calf Management

- Calves form the future dairy herd. Raising calves is by far the most difficult operation in a dairy farming enterprise which requires a great deal of management skill, application and attention.



- Feeding of calves during the first three months is very crucial.
- Improper feeding during this stage may lead to 25-30% of calf mortality.
- A pregnant cow should be fed with good quality fodder and concentrates during the last 2-3 months of gestation
- Birth weight of calf is generally 20-25 kg
- Proper feeding of calf along with regular deworming will achieve a growth rate of 10-15 kg/month.

Feeding of dairy calves

- Calf mortality in our country constitutes one of the major causes of losses in the dairy sector. Feeding management of the calf especially during the pre-ruminant period has to be specially attended to, so that a healthy herd of young calves will be available for culling and retention in the herd.

Feeding of colostrum:

- Colostrum is the milk of the cow during the first few days after the calving. Colostrum turns into normal milk in about 5 days.
- Nature has made the provision of colostrum for the calf from the mother to meet the special nutrient requirements of the delicate neonate and to equip the calf with passive immunity so that it can overcome the health problems and infections during early life, when the calf is yet to develop the capacity to generate its own immune mechanism toward off the diseases.
- The calf should be fed colostrum within first two hours of birth. Colostrum is rich in protein, fat, minerals and vitamins.

It is rich in gamma-globulins derived from the dam, to impart passive immunity to the young calf.

- If the dam is not able to provide enough colostrum to the calf, pooled colostrum from other cows can also be used. In the absence of colostrum, an artificial colostrum can be made by mixing appropriate amount of egg white in milk.

Weaning of the calf

- Weaning or separation of the calf from the cow is a management practice adopted in intensive dairy farming systems. Weaning helps in uniformity of management and ensures the availability of milk to each calf as per required amount, avoiding wastage or over-feeding.
- Depending upon the system of management adopted, weaning can be done at birth, at 3 weeks, at 8-12 weeks or at 24 weeks. Under farmer's field conditions, weaning is practiced at 12 weeks. Male calves to be reared as bulls are often allowed to be with the cow even as long as 6 months of age.
- In an organised herd, where large numbers of calves are raised, weaning at birth is advantageous.
- Weaning at birth also helps in adopting milk substitutes and calf meals at early age so that the cow's milk can be saved for human consumption.



Calf medication schedule

Age	Cholestrum /Milt (lts)	Medicine with milk	Benifits
1 st Day	2	2 Spoons of Aromycin	To control loose motions
1 st Day	2		
2 nd	2	A-Vitamin	To prevent night blindness
3 rd	2	2 Spoons of Piperzine	
4 th	1		
5 th	1	Streptomycin 0.5 gms	To prevent white diarrrohea
6 th	1		
7 th	1	2 Spoons of Piperzine	For round worms
8 th	1	Salment - 4 days	To control coccidiosis and blood motions

calf alternate feeding schedule

Age (days)	Weight (kgs)	Cholestrum (kgs)	Milk (kgs)	Feed consumption (g)
1-5	till 25	1-1.25	-	
6-15	26-35	-	1.0	100
16-25	36-40	-	2.0	250
26 and above	41-45	-	2.5	325
	46-50	-	3.0	500
	51-55	-	3.0	600
	56-60	-	2.0	1000
	above 60	-	1.0	1000



Clean milk production



- Milking is the key operation on a dairy farm; on it depends the income derived.
- Maintenance of clean condition in the milking barn results both in better udder health and production of milk that remains wholesome for longer time.
- Therefore the milk producers should strictly follow the following guidelines for clean milk production.

Cleanliness of animal sheds



- The floor should be impervious, non-slippery and revealed.
- The milking barn should be thoroughly washed and sobbed after each milking so that the barn will be clean and dry, before the subsequent milking is commenced

Cleanliness of cows

- The health condition of cows should be regularly examined. Milking should be carried out first to healthy cows followed by diseased ones.
- The hind quarters and thighs of cows should be brushed and washed if lot of filth is accumulating on them.
- Just before milking the udder should be wiped with a cloth dipped and squeezed in some weak antiseptic solution.

Cleanliness of milkers and milking pails

- The milkers should wear clean dress and cover their heads

with suitable caps, last loose hairs may fall in milk

- Milkers nails should be well trimmed and their hands clean and disinfected between each milking by washing in antiseptic solution.
- Milkers obviously ill and having filthy habits like spitting, blowing nose etc. should not be used.
- After each milking the milking pails should first be washed with warm water, scrubbed well using suitable dairy sanitizer and then rinsed well with clean cold water.



- A milk strainer should invariably be used poured into the milking can.
- The milk must be squeezed and not dragged out of teats.
- The first few strips of milk from each teat should be let on to a strip-cup to see clues in milk for possible incidence of mastitis.



Milk quality testing

- Milk forms an important constituent of diet. Regarding quality of milk certain standards have been set up in order to pass it for human consumption.
- According to it, cow milk should have 3.5% fat, 8.5% SNF whereas buffalo milk should contain 5% fat and 9% SNF.
- In order to test the quality of milk the following tests are being conducted in the milk collection centers

Tests for colour, taste and odour

Colour

- The colour of milk get changed due to adulteration.
- Milk with abnormal colour is not fit for human consumption.

Taste

- Milk should have normal taste. Milk with bitter or sour taste are generally not considered to be fit for human consumption.

Odour

- Milk should have normal odour.

Testing of fat content in milk

- Estimation of fat content is being done during collection of milk from the producers.
- Normally Gurber's method is being followed which is considered to be the traditional method. But recently Electronic milk tester is being used in many parts of the country.
- SNF can be defined as the remaining constituents of milk other than fat. They are tested by using lactometer.
- Fixation of price to milk is being done by taking into consideration both fat and SNF content of milk.

Reasons for fluctuations of fat & SNF content in milk

Breed variation

- Inversely related to the age of the animal
- Fat content of milk decreases when the animal is frightened or

- if it is suffering from any disease
- Fat content increases from 15 days after calving till 9 months.
 - Fat content increases following slight exercise.

To get the remunerative price for the producers



- Adulteration of milk with water should never be done
- Never supply milk to the societies, which follow malpractices regarding measurement.
- Supply milk to the societies, which pay according to the fat content of milk.



Economics of milk production

- The profitability of a dairy enterprise depends on the relationship between the cost of milk production and sale price of milk.
- However the producer has no control over the sale price of milk but he has steady control on cost of milk production.

Guidelines to reduce the cost of milk production

- Cultivation of green fodder in ones own land will reduce the cost of milk production to a great extent.
- Utilization of family labour for various dairy operations.
- By coinciding the green fodder availability with calvings to occur during that particular period.
- Rearing of cows which are in IV or V lactation.
- By saving the money involved in purchase of green fodder, concentrates and medicines.
- By proper maintenance of records in the farm.

Assumptions

Cost of animal yielding 7-8lts of milk per day	Rs. 10,000
Lactation length	300 days
Cost of concentrate per kg	Rs. 4.50
Cost of green fodder per kg	Rs. 0.50
Cost of dry fodder per kg	Rs. 0.70
Cost of milk per litre	Rs. 10.00

- The above rates will vary from time to time.

Fixed Cost:

Cost of graded Murrah buffalo yielding 6-7 lt/day	10,000
Cost of buffalo shed @4.0 m2 / buffalo	1,000



Composition of different types of milk

What does milk contains

- Milk mainly contains fat and solids (SNF). This solid contains Carbohydrates, proteins, vitamins, minerals etc. Milk is very essential food item, which is highly nutritious. The fat and SNF content types of milk as per food adulteration control act are given in the table of different below.

Name of the milk	Minimum fat content(%)	Mimimum SNF (%)
Buffalo milk	6.0	9.0
Cow milk	3.5	8.5
Mixed milk	4.5	8.5
Full cream milk	6.0	9.0
S.T.D	4.5	8.5
Tonned milk	3.0	8.5
Double tonned milk	1.5	9.0
Stemmed milk	0.5	8.7

Why do people adeltrate milk

- Milk contains natural high quality nutrients. So people try to adulterate these nutrients with other food items of low quality to make more money by selling the milk.

EXAMPLES

- Dalda and vegetable oil is added to increase fat content
- Sugar, maida flour, urea, salt etc are added to increase SNF.
- Water is added to milk to increase quantity.
- Removing the fat from milk.

Effect of adeltration

- We will not get the quality milk for quality we are paying.
- We will not get required nutrition from milk.
- Through contamination we may spoil our health.

Why the milk spoils

- Milk quality deteriorates very fast because the microorganisms enter the milk if milk is handles in unhygienic condition.

- These microorganisms utilize the nutrients for their growth thus spoiling the milk quality.
- The milk quality starts deteriorating from the time it is milked from the animal.

How to maintain milk quality

- The farmer should produce milk in hygienic conditions.
- Clean utensils should be used for milking.
- The milk should be chilled to below 5 C as early as possible.
- Such chilled milk should be sending for processing.
- Hear the milk should be pasteurized and kept in cold condition.
- Such milk should be packed and send to the consumer.
- By taking the above steps the milk will be infection free, clean and wholesome.
- From villages milk has to be transported long distances to reach cities, which involves lot of expenses and efforts. They will not used clean utensils, they will not handle in hygienic conditions. So the milk tends to spoil early.

How people prevent spoilage of milk

- They mix water with milk.
- To prevent growth of the micros, which entered due to un hygienic practices, they add chemicals like hydrogen peroxide.
- To avoid milk spoilage they add some alkalis like baking soda, washing soda, caustic soda etc.
- By consuming the above milk with high bacterial load we may get diseases like cholera, typhoid, loose motions etc. The chemicals, which are added to milk also, have some deleterious effect on health like intestinal ulcers, kidney stones, allergy, cancer etc.

