

Chapter-1

Cattle Feed Management

Feeding of Calves Colostrum

It will vary with the system followed, but whatever system may be practiced, the calf must receive the first milk which the cow gives after calving and is called colostrum. Be sure to feed the calf enough of colostrum between 2 to 2.5 liters daily for the first 3 days following its birth.

Any excess colostrum may be fed to other calves in the herd in amounts equal to the amount of whole milk normally fed. If possible where a cow is milked before calving, freeze some of the colostrum for later feeding to the calf. The digestibility of colostrum increases when it is given at a temperature between 99°F and 102°F. The importance of colostrum can be felt more from the following virtues.

The protein of colostrum consists of a much higher proportion of globulin than normal milk. The globulin is presumed to be the source of antibodies which aid in protecting the animal from many infections liable to affect it after birth. Gamma-globulin level in blood serum of neonatal calves is only 0.97 mg/ml at birth. It increases to 16.55 mg/ml level after first colostrum feeding at 12 hr. and subsequently on the second day shows a peak of 28.18 mg/ml. This level more or less persists till the reticuloendothelial system of the calf starts functioning to produce antibodies.

- The protein content of colostrum is 3 to 5 times as that of normal milk. It is also rich in some of the minerals, of which copper, iron, magnesium and manganese are important.
- Colostrum contain 5-15 times the amount of Vitamin A- found in normal milk, depending upon the character of the ration given to the mother during the rest period.
- Colostrum is also superior to milk in having a considerably greater amount of several other vitamins which have been found essential in the growth of dairy calves including riboflavin, choline, thiamine and pantothenic acid.
- Colostrum act as a laxative to free the digestive tract of faecal material.

Feeding whole milk

In feeding whole milk, calves may be fed as per feeding schedule. While feeding whole milk the following points should be remembered.

- As far as possible provide milk from the calf's mother.
- Feed milk immediately after it is drawn.
- The total amount of milk may be fed at 3 to 4 equal intervals up to the age of 7 days and then twice daily.

Feeding skim milk

On many farms, large quantities of separated milk are available for feeding to calves and other livestock. Excellent dairy calves can be raised by changing them from whole milk gradually after two weeks of their age. Here again the feeding schedule should be followed.

Feeding dried skim milk, whey or buttermilk

The above dried products are mixed with water at the rate of 1 kg to 9 kg of water and then it is fed as skim milk. To avoid digestive troubles the mix should always be fed to calves after warming it up to 100°F.

Feeding calf starters

Calf starter is a mixture consisting of ground farm grains, protein feeds and minerals, vitamins and antibiotics. After a calf attains the age of 2 weeks the amount of whole milk given to it may be cut down. One should then rub a small amount of starter on the calf's mouth, after each milk feeding for a few days when the calf will be accustomed to it. When they reach four months of age, one should then transfer the calves to a "growing" grain ration.

Feeding grain mixture

Better growth and greater resistance to calf ailments result from consumption of grain and milk by the calf than when the calf is fed only on milk. At the age of 7-15 days the feeding of grain mixtures may be started. In order to get calves accustomed to grain mixture, place a small handful of grain mixture in the used pail. As the calf is finishing its milk it may consume a portion, or one may offer a little in the hand immediately after feeding milk.

Excessive protein rich grain mixture is not desirable as milk is already rich in proteins. A medium protein grain mixture is most suitable when milk is fed freely. A grain mixture of oats 35 percent, linseed cake-5 percent, bran-30 percent, barley-10 percent, groundnut cake-20 percent may be fed to the calves.

Table 1. Feeding schedule for calves up to 6 months

Age of calf	Approx. body weight (kg)	Quantity of milk (kg)	Quantity of calf starter (g)	Green grass (kg)
4 days to 4 weeks	25	2.5	Small qty.	Small qty.
4-6 weeks	30	3.0	50-100	Small qty.
6-8 weeks	35	2.5	100-250	Small qty.
8-10 weeks	40	2.0	250-350	Small qty.
10-12 weeks	45	1.5	350-500	1-0
12-16 weeks	55	-	500-750	1-2
16-20 weeks	65	-	750-1000	2-3
20-24 weeks	75	-	1000-1500	3-5

Calf starter is a highly nutritious concentrate mixture containing all the nutrients in proper proportion required for optimum growth and is used as a partial substitute for whole milk in the ration of calves. Since quality of protein is very important to calves until their rumen is fully functional, animal protein supplements such as fish meal should be included in calf starters. Urea should not be included in calf starters.

Feeding of growing animals (From 6 months onwards)

For calves below one year of age it is always desirable to give sufficient concentrates in addition to good roughage so that they make optimum growth. Feeding concentrate can be considerably reduced in the

case of calves over one year of age fed on high quality roughage. A judicious mixture of roughage and concentrate is essential for obtaining optimum growth without undue fat deposition. From six months onwards, calves can be given the same type of concentrate mixture (14-16% Digestible Crude Protein and about 70% Total Digestible Nutrients) as used for adult cattle.

Table 2. Feeding schedule for calves from 6 months of age

Age (months)	Approximate body weight (kg)	Concentrate mixture (kg)	Grass (kg)
6-9	70-100	1.5-1.75	5-10
9-15	100-150	1.75-2.25	10-15
15-20	150-200	2.25-2.50	15-20
Above 20	200-300	2.50-2.75	15-20

Table 3. Feeding schedules for dairy animals (Quantity in kg.)

S. No.	Type of animal	Feeding during	Green Fodder (kg)	Dry Fodder (kg)	Concentrate (kg)
(A) CROSS BREED COW					
1.	6 to 7 liters milk per day	Lactation days	20 to 25	5 to 6	3.0 to 3.5
		Dry days	15 to 20	6 to 7	0.5 to 1.0
2.	8 to 10 liters milk per day	Lactation days	25 to 30	4 to 5	4.0 to 4.5
		Dry days	20 to 25	6 to 7	0.5 to 1.0

Feeding of lactating cow

Proper feeding of dairy cattle should envisage minimum wastage of nutrients and maximum returns in respect of milk produced.

A concentrate mixture made up of protein supplements such as oil cakes, energy sources such as cereal grains (maize, jowar), tapioca chips and laxative feeds such as brans (rice bran, wheat bran, gram husk) is generally used.

Mineral mixture containing major and all the trace elements should be included at a level of 2 percent.

Table 4. Feeding schedule for different classes of adult cows (approximate body weight-250 kg)

Category	When green grass is plenty		When paddy/wheat straw is the major roughage		
	Concentrate mixture (kg)	Green Grass (kg)	Concentrate Mixture (kg)	Green Grass (kg)	Paddy Straw (kg)
Dry cows	-	25 - 30	1.25	5.0	5 -6
Milking	1 kg for every 2.5 – 3.0 kg of milk	30	1.25 + 1 kg for every 2.5 – 3.0 kg of milk	5.0	5 -6
Pregnant	Production Allowance + 1 to 1.5 kg from 6 th month of pregnancy	25 - 30	Maintenance + production + 1 to 1.5 kg from 6 th month of pregnancy	5.0	5 -6

The total dry matter requirement of cattle is around 2-3 % of their body weight though high yielding animals may eat at a rate more than 3%. Such factors as climate, processing of feeds, palatability etc. influence the dry matter consumption. Good quality grasses (Guinea, Napier etc.) with a minimum of 6% crude protein on dry matter basis alone can form maintenance ration of a cow of average size. But it is possible to maintain milk production of up to 3-4kg with grass-legume fodder.

Feeding of bulls

Male calves to be reared as future breeding bulls, should be fed on a higher plane of nutrition than female calves.

Table 5. Feeding schedule of bull

Body weight (kg)	Concentrate mixture (kg)	Green grass (kg)
400-500	2.5-3	20-25

A bull in service should be given good quality roughage with sufficient concentrates. Too much roughage feeding should be avoided as it makes the bull paunchy and slow in service. A large concentrate allowance may make the bull too much fatty and less virile.

NUTRIENT REQUIREMENT

Tips for feeding dairy cattle

- Concentrate must be feed individually according to production requirements.
- Good quality roughage saves concentrates. Approximately 20 kg of grasses (guinea, Napier, etc.) or 6-8 kg legume fodder (cowpea, Lucerne) can replace 1 kg of concentrate mixture (0.14-0.16 kg of DCP) in terms of protein content.
- 1 kg straw can replace 4-5 kg of grass on dry matter basis. In this case the deficiency of protein and other nutrients should be compensated by a suitable concentrate mixture.
- Regularity in feeding should be followed. Concentrate mixture can be fed at or preferably before milking – half in the morning and the other half in the evening – before the two milking. Half the roughage ration can be fed in the forenoon after watering and cleaning the animals. The other half is fed in the evening, after milking and watering. High yielding animals may be fed three times a day (both roughage and concentrate). Increasing the frequency of concentrate feeding will help maintain normal rumen motility and optimum milk fat levels.
- Over-feeding of concentrates may result in off feed and indigestion.
- Abrupt change in the feed should be avoided.
- Grains should be ground to medium degree of fineness before being fed to cattle.
- Long and thick-stemmed fodders such as Napier may be chopped and fed.
- Highly moist and tender grasses may be wilted or mixed with straw before feeding. Legume fodders may be mixed with straw or other grasses to prevent the occurrence of bloat and indigestion.
- Silage and other feeds, which may impart flavor to milk be fed after milking. Concentrate mixture in the form of mash may be moistened with water and fed immediately. Pellets can be fed as such.
- All feeds must be stored properly in well-ventilated and dry places.
- For high yielding animals, the optimum concentrate roughage ratio on dry matter basis should be 60:40.

Table 6. Nutrients required for maintenance and growth heifers per head per day (Growth rate-550g/day)

Live weight (kg)	Dry Matter (kg)	Digestible Crude Protein (g)	Total Digestible Nutrients (kg)	Calcium (g)	Phosphorus (g)
250	4-5	140	2.2	25	17
300	5-6	168	2.65	25	17
350	6-7	195	3.10	25	17
400	7-8	223	3.55	28	20
450	8-9	250	4.00	31	23
500	9-10	278	4.45	31	23
550	10-11	310	4.90	31	23
600	11-12	336	5.35	31	23

Straw can form the roughage in the absence of grasses and in such cases, concentrates should be given for maintenance. For lactating cows, 1kg of concentrate mixture (compounded feed) (0.14-0.16 kg DCP and 0.70 kg TDN) may be required for every 2.5 – 3.0 kg of milk over and above the maintenance allowance. After parturition the cow should be given the same type of feed and the same quantity as before and the concentrate allowance should be only gradually increased to avoid digestive troubles like acidosis, indigestion, etc.

In the case of young cross-bred cows below four years of age to meet the needs for growth, it is desirable to give additional concentrate allowance at the rate of 1kg for animals in first lactation and 0.5kg in the second lactation over and above the maintenance and production needs. Milking animals should always have free access to clean fresh drinking water.

Table 7. Bureau of Indian Standards specification of mineral mixture for cattle

S. No.	Characteristics	Type I (with salt)	Type II (without salt)
1.	Moisture, percent by mass, Max.	5	5
2.	Calcium, percent by mass Min.	18	23
3.	Phosphorus, percent by mass, Min.	9	12
4.	Magnesium, percent by mass, Min.	5	6.5
5.	Salt (Chloride as Sodium Chloride), percent by mass, Min.	22	-
6.	Iron, percent by mass, Min.	0.4	0.5
7.	Iodine (as KI), percent by mass.	0.02	0.026
8.	Copper, percent by mass, Min.	0.06	0.077
9.	Manganese, percent by mass, Min.	0.10	0.12
10.	Cobalt, percent by mass, Min.	0.009	0.012
11.	Fluorine, percent by mass, Max.	0.05	0.07
12.	Zinc, percent by mass, Max.	0.30	0.38
13.	Sulphur, percent by mass, Max.	0.40	0.50
14.	Acid insoluble ash, percent by mass	3.00	2.50

Chapter-2

Housing for Dairy Cattle

1. Location of dairy buildings
2. Types of Housing
3. Conventional Dairy Barn
4. Cleaning of animal sheds
5. Sanitation in dairy farm
6. Other provisions

An efficient management of cattle will be incomplete without a well-planned and adequate housing of cattle. Improper planning in the arrangement of animal housing may result in additional labour charges and that curtail the profit of the owner. During erection of a house for dairy cattle, care should be taken to provide comfortable accommodation for individual cattle. No less important is the proper sanitation, durability and arrangements for the production of clean milk under convenient and economics conditions, etc.

Location of Dairy Buildings

The points which should be considered before the erection of dairy buildings are as follows.

Topography and Drainage:

- A dairy building should be at a higher elevation than the surrounding ground to offer a good slope for rainfall and drainage for the wastes of the dairy to avoid stagnation within.
- A leveled area requires less site preparation and thus lesser cost of building.
- Low lands and depressions and proximity to places of bad odor should be avoided.

Soil Type:

- Fertile soil should be spared for cultivation.
- Foundation soils as far as possible should not be too dehydrated or desiccated.
- Such a soil susceptible to considerable swelling during rainy season and exhibit numerous cracks and fissures.

Exposure to sun and protection from wind

- A dairy building should be located to a maximum exposure to the sun in the north and minimum exposure to the sun in the south and protection from prevailing strong wind currents whether hot or cold.
- Buildings should be placed so that direct sunlight can reach the platforms, gutters and mangers in the cattle shed.
- As far as possible, the long axis of the dairy barns be set in the north-south direction to have the maximum benefit of the sun.

Accessibility

- Easy accessibility to the buildings is always desirable.
- Situation of cattle shed by the side of the main road preferably at a distance of about 100 meters should be aimed at.

Durability and attractiveness

- It is always attractive when the buildings open up to a scenic view and add to the grandeur of the scenery. Along with this, durability of the structure is obviously an important criterion in building dairy.

Water supply

- Abundant supply of fresh, clean and soft water should be available at a cheap rate.

Surroundings

- Areas infested with wild animals and dacoits should be avoided.
- Narrow gates, high manger curbs, loose hinges, protruding nails, smooth finished floor in the areas where the cows move and other such hazards should be eliminated.

Labour

- Economic and regular supply of honest labour should be available.

Marketing

- Dairy buildings should only be in those areas from where the owner can sell his products profitably and regularly.
- He should be in a position to satisfy the needs of the farm within no time and at reasonable price.

Electricity

- Since a modern dairy always handles electric equipment's which are also economical, it is desirable to have an adequate supply of electricity.

Feed and fodder store

- Cattle yards should be so constructed and situated in relation to feed storages hay stacks, silo and manure pits as to affect the most efficient utilization of labour. Sufficient space per cow and well-arranged feeding mangers and resting are contributing not only to greater milk yield of cows and make the work of the operator easier also minimizes feed expenses. The relative position of the feed stores should be quite adjacent to the cattle barn. Features of feed stores are given:
- Feed storages should be located at hand near the center of the cow barn.
- Milk-house should be located almost at the center of the barn.
- Centre cross-alley should be well designed with reference to feed storage, the stall area and the milk house.

Types of housing

- The most widely practice in our county is to tie the cows with rope on a katcha floor except some organized dairy farms belonging to government co-operatives or military where proper housing facilities exist. It is quite easy to understand that unless cattle are providing with good housing facilities. The animals will move too far in or out of the standing space, defecating all round and even causing trampling and wasting of feed by stepping into the mangers. The animals will be exposed to extreme weather conditions all leading to bad health and lower production. Dairy cattle may be successfully housed under a wide variety of conditions. Raging from close confinement to little restrictions except at milking time. However, two types of dairy barns are in general use at the present time.

- The loose housing barn in combination with some type of milking barn or parlor.
- The conventional dairy barn.

Loose housing system

- Loose housing may be defined as a system where animals are kept loose except milking and at the time of treatment. The system is most economical. Some features of loose housing system are as follows.
- Cost of construction is significantly lower than conventional type.
- It is possible to make further expansion without change.
- Facilitate easy detection of animal in heat.
- Animals feel free and therefore, proves more profitable with even minimum grazing
- Animals get optimum exercise which is extremely important for better health and production.
- Over all better management can be rendered.

Cattle shed

- The entire shed should be surrounded by a boundary wall of 5 height from three side and manger etc., on one side. The feeding area should be provided with 2 to 2.5 feet of manger space per cow. All along the manger, there shall be 10" wide water trough to provide clean, drinking water.
- The water trough thus constructed will also minimize the loss of fodders during feeding. Near the manger, under the roofed house 5' wide floor should be paved with bricks having a little slope.
- Beyond that, there should be open unpaved area (40' X 35') surrounded by 5' wall with one gate. It is preferable that animals face north when they are eating fodder under the shade. During cold wind in winter the animals will automatically lie down to have the protection from the walls.

Shed for calves

- On one side of the main cattle shed there be fully covered shed "10'X15' to accommodate young calves. Such sheds with suitable partitioning, may also serve as calving pen under adverse climatic conditions. Beyond this covered area there should be a 20'X10' open area having boundary wall so that calves may move there freely.
- In this way both calf and cattle sheds will need in all 50'X50' area for 20 adult cows and followers. If one has limited resources. He can build ordinary katcha/semikatcha boundary walls but feeding and water trough should be cemented ones.

Conventional dairy Barn

- The conventional dairy barns are comparatively costly and are now becoming less popular day by day. However, by this system cattle are more protected from adverse climatic condition.
- The following barns are generally needed for proper housing of different classes.

Dairy stock in the farm

- Cow houses or sheds
- Calving box
- Isolation box
- Sheds for young stocks
- Bull or bullock sheds

Cow sheds

- Cow sheds can be arranged in a single row if the numbers of cows are small, say less than 10 or in a double row if the herd is a large one.
- Ordinarily not more than 80 or 100 cows should be placed in one building.
- In double row housing the stable should be so arranged that the cows face out (tails to tail system) or face in (head to head system) as preferred.

Advantages of tail system

- In cleaning and milking the cows, the wide middle alley is of great advantage.
- Lesser danger of spread of diseases from animal to animal.
- Cows can always get more fresh air from outside.
- The head gowala can inspect a greater number of milkmen while milking. This is possible because milkmen will be milking on both sides of the gowala.
- Any sort of minor disease or any change in the hind quarters of the animals can be detected quickly and even automatically.

Advantages of face system

- Cows make a better showing for visitors when heads are together
- The cows feel easier to get into their stalls.
- Sun rays shine in the gutter where they are needed most.
- Feeding of cows is easier, both rows can be fed without back tracking.
- It is better for narrow barns.

Floor

- The inside floor of the barn should be of some impervious material which can be easily kept clean and is not slippery.
- Paving with bricks can also serve one's purpose. Grooved cement concrete floor is still better.
- The surface of the cowshed should be laid with a gradient of 1" to 1.25" from manger to excreta channel. An overall floor space of 65 to 70 sq. feet/adult cow should be satisfactory.

Walls

- The inside of the walls should have a smooth hard finish of cement, which will not allow any lodgment of dust and moisture.
- Corners should be round.
- The open space in between supporting pillars will serve for light and air circulation.

Roof

- Roof of the barn may be of asbestos sheet or tiles.
- Corrugated iron sheets have the disadvantage of making extreme fluctuations in the inside temperature of the barn in different seasons.
- However, iron sheets with aluminum painted tops to reflect sun rays and bottoms provided with wooden insulated ceilings can also achieve the objective.
- A height of 8 feet at the sides and 15 feet at the ridge will be sufficient to give the necessary air space to the cows.
- An adult cow requires at least about 800 cubic feet of air space under tropical conditions.

Manger

- Cement concrete continuous manger with removable partitions is the best from the point of view of durability and cleanliness.
- A height of 1'-4" for a high front manger and 6" to 9" for a low front manger is considered sufficient. Low front mangers are more comfortable for cattle but high front mangers prevent feed wastage.
- The height at the back of the manger should be kept at 2'-6" to 3".
- An overall width of 2' to 2.5' is sufficient for a good manger.

Alleys

- The central walk should have a width of 5'-6' exclusive of gutters when cows face out, and 4'-5' when they face in.
- The feed alley, in case of a face out system should be 4' wide, and the central walk should show a slope of 1" from the center towards the two gutters running parallel to each other, thus forming a crown at the center.

Manure gutter

- The manure gutter should be wide enough to hold all dung without getting blocked and be easy to clean/suitable dimensions are 2" width with a cross-fall of 1" away from standing.
- The gutter should have a gradient of 1" for every 10' length.
- This will permit a free flow of liquid excreta.

Doors

- The doors of a single range cowshed should be 5' wide with a height of 7' and for double row shed the width should not be less than 8' to 9'.
- All doors of the barn should lie flat against the external wall when fully open.

Calving Boxes

- Allowing cows to calve in the milking cowshed is highly undesirable and objectionable.
- It leads to in-sanitary in milk production and spread of disease like contagious abortion in the herd. Special accommodation in the form of loose-boxes enclosed from all sides with a door should be furnished to all parturient cows.
- It should have an area of about 100 to 150 sq. ft.
- With ample soft bedding, it should be provided with sufficient ventilation through windows and ridge vent.

Isolation boxes

- Animals suffering from infectious disease must be segregated soon from the rest of the herd.
- Loose boxes of about 150 sq. feet, are very suitable for this purpose.
- They should be situated at some distance from the other barns.
- Every isolation box should be self-contained and should have separate connection to the drainage disposal system.

Sheds for young stocks

- Calves should never be accommodated with adults in the cow shed.
- The calf house must have provision for daylight ventilation and proper drainage.

- Damp and ill-drained floors cause respiratory trouble in calves to which they are susceptible.
- For an efficient management and housing, the young stock should be divided into three groups viz., young calves, aged up to one year, bull calves and female calves.
- Each group should be sheltered in a separate calf house or calf shed.
- As far as possible the shed for the young calves should be quite close to the cow shed.
- Each calf shed should have an open paddock or exercise yard.
- An area of 100 square feet per head for a stock of 10 calves and an increase of 50 square feet for every additional calf will make a good paddock.
- It is useful to classify the calves below one year into three age groups, viz. and calves below the age of 3 months, 3-6 months old calves and those over 6 months for a better allocation of the resting area.
- An overall covered space of:
20-25 sq. feet/calf below the age of 3 months.
25-30 sq. feet/per calf from the age of 3-6 months.
30-40 sq. feet/per calf from the age of 6-12 months and over and
40-45 sq. feet/for every calf above one year should be made available for the sheltering.
- A suitable interior lay-out of a calf shed will be to arrange the standing space along each side of a 4 feet wide central passage having a shallow gutter along its length on both sides. Provision of water troughs inside each calf shed and exercise yard should never be neglected.

Bull or bullock shed

- Safety and ease in handling a comfortable shed protection from weather and a provision for exercise are the key points while planning accommodation for bulls or bullocks.
- A bull should never be kept in confinement particularly on hard floors.
- Such a confinement without adequate exercise leads to overgrowth of the hoofs, creating difficulty in mounting and loss in the breeding power of the bull.
- A loose box with rough cement concrete floor about 15' by 10' in dimensions having an adequate arrangement of light and ventilation and an entrance 4' in width and 7' in height will make a comfortable housing for a bull.
- The shed should have a manger and a water trough.
- The bull should have a free access to an exercise yard provided with a strong fence or a boundary wall of about 6' in height i.e. too high for the bull to jump over.
- From the bull yard the bull should be able to view the other animals of the herd so that it does not feel isolated.
- The exercise yard should also communicate with a service crate via a swing gate which saves the use of an attendant to bring the bull to the service crate.

Cleaning of animal sheds

- The easy and quick method of cleaning animal house is with liberal use of tap water, proper lifting and disposal of dung and used straw bedding, providing drainage to the animal house for complete removal of liquid waste and urine.
- The daily removal of feed and fodder left over in the manger reduces the fly nuisance.
- Periodical cleaning of water trough eliminates the growth of algae, bacterial and viral contamination and thus keeps the animal healthy.

Sanitation in dairy farm

- Sanitation is necessary in the dairy farm houses for eliminations of all microorganisms that are capable of causing disease in the animals.
- The presence of organisms in the animal shed contaminates the milk produced this reducing its self-life, milk produced in an unclean environment is likely to transmit diseases which affect human health: Dry floorings keeps the houses dry and protects from foot injury.
- Similarly, the presence of flies and other insects in the dairy farm area are not only disturbs the animals but also spreads deadly diseases to the animal.

Sanitizers

- Sunlight is the most potent and powerful sanitizer which destroy most of the disease producing organism. Disinfection of animal sheds means making these free from disease producing bacteria and is mainly-carried out by sprinkling chemical agents such as bleaching powder, Iodine and Iodophor sodium carbonate, washing soda, slaked lime (calcium hydroxide) and phenol.
- Bleaching Powder – this is also called calcium hypo chloride. It contains up to 39% available chlorine which has high disinfecting activity.
- Iodine and Iodophor – this is commercially available as Iodophors and contains between 1 and 2% available Iodine which is an effective germicide.
- Sodium carbonate – A hot 4% solution of washing soda is a powerful disinfectant against many viruses and certain bacteria.
- Slaked lime - white washing with these agents makes the walls of the sheds and the water troughs free from bacteria.
- Phenol- phenol or carbolic acid is very disinfectants which destroy bacteria as well as fungus.

Insecticide

- Insecticides are the substances or preparations used for killing insects.
- In dairy farms ticks usually hide in cracks and crevices of the walls and mangers.
- Smaller quantities of insecticide solutions are required for spraying.
- Liquid insecticides can be applied with a powerful sprayer, hand sprayer a sponge or brush, commonly used insecticides are DDT, Gammaxene wetttable powders malathion.
- These are highly poisonous and need to be handled carefully and should not come in contact with food material drinking water milk etc.

Precautions

- Remove dung and used bedding completely.
- Avoid spilling of dung and used bedding while carrying it out.
- Avoid the use of dirty water in cleaning the sheds.
- Never put the fresh fodder over the previous day's left-over fodder in the manger.
- Prevent algae to grow in the water troughs
- Use proper concentration of disinfectant/insecticide solutions to avoid any toxic effects poisoning.

Procedure for cleaning

- Remove the dung from the floor and urine channel with the help of a shovel and basket (iron) and transfer it to the wheel- barrow.

- Remove the used bedding and leftovers from the mangers in a similar way.
- Empty the water trough and scrape its sides and bottom with the help of a floor brush.
- Wash the water trough with clean water and white wash it with the help of lime mixture once a week.
- Scrape the floor with a brush and broom and wash with water.
- Clean and disinfect the splashes of dung on the side walls, railing and stanchions.
- Remove the cobwebs periodically with the help of a wall brush.
- Sprinkle one of the available disinfecting agents in the following concentration. Bleaching powder should have more than 30% available chlorine. Phenol 1-2% solution washing soda (4% solution)
- Allow adequate sunlight to enter in to the shed.
- Spray insecticides at regular intervals especially during the rainy season (Fly season).
- Whitewash the walls periodically by mixing insecticides in it to eliminate ticks and mites living in cracks and crevices.

“Cleanliness is the key of disease prevention”