Dairy Worker Class XII For Punjab

Unit	Session	Topic	
Unit 1:		**Maintain Healthy Performance of Animals**	
	Session 1:	**Common non infectious diseases of dairy animals**	
	Session 2:	**Parasitic infection in dairy animals**	
	Session 3:	**Common infectious diseases of dairy animals and vaccination against these diseases and concept of 'One health approach'**	
Unit 2:		**Milking**	
	Session 1:	**Processes involved in milking**	
	Session 2:	**Clean milk production**	
Unit 3:		**Record Keeping in a Dairy Farm**	
	Session 1:	**Dairy Farm Records**	
Unit 4:		**Health and Safety Hazards at a Dairy Farm**	
	Session1:	**Maintaining hygiene and biosecurity of a dairy farm**	
		Disposal of farm waste	
Unit 5:		**Animal Welfare Legislation**	
	Session 1:	**Animal welfare legislation**	
	Session 2:	**Transportation of dairy animals and withdrawal period of drugs in dairy animals**	

Unit 1: Maintain Healthy Performance of Animals

Session 1: Common non infectious diseases of dairy animals

Milk fever

Milk fever, a metabolic disease, affects high producing dairy animals usually within one or two days after calving, resulting in a huge reduction in milk production and thus becomes economically most important. Despite its name, milk fever usually is not accompanied by fever. It is also known as periparturient paresis as there is a marked and rapid lowering of the blood calcium, which means too little calcium at calving time.

The clinical signs of milk fever include:

- Cows that are dull and lethargic
- Ears are cold to the touch
- Stiffness in the legs

In severe cases:

- The cow becomes recumbent
- Has a kink in her neck
- The rumen becomes static
- Faeces tend to bulge in the rectum

Treatment of hypocalcaemia should not be delayed. Principles of therapy revolve around restoring blood calcium levels to normal as soon as possible and for a prolonged period.

Wounds

A wound may be defined as any injury in the skin or other body tissue, which results due to a cut, blow or other impact (Figure 1.1 and Figure 1.2). Wounds may be of different types

Type of wound	Characteristics of wound
Incised wound	If the tissues are severed by a sharp instrument and the edges of the wound are smooth, it is called incised or clean-cut wound. It is common in case of operative wounds.
Lacerated wound	When the tissues are torn irregularly, the wound is known as a lacerated wound. Wound due to a wire cut is the best example of this class.
Contused wound	A contused wound is an injury caused by a blunt object. Such injuries may be superficial or deep. Superficial-contused wounds may be an abrasion to the skin or mucous surface. Deep-contused wounds may be followed by loss of tissue or sloughing and are generally irregular with swollen margins. Such injuries are commonly caused by kicks.
Punctured wounds	Punctured wounds are deeper than the width of opening or break in the skin or mucous membrane. This class is produced by sharp objects, such as nails, splinters of wood.

In farm animals, wounds frequently remain unnoticed and are allowed to heal on their own without any special care or treatment. The careful and intelligent treatment of wounds would greatly decrease the loss resulting from this class of injuries. The method of treatment varies in the different kinds of wounds.

How to control bleeding from a wound?

Bleeding or hemorrhage is the most common symptom in this type of wounds. The degree of hemorrhage depends on the kind, number and size of the blood-vessels severed. Death may occur in case of severe bleeding.

In case of bleeding wound, heat, ligation, pressure and torsion are the different methods recommended. Bathing the wound with hot water is a satisfactory method of controlling bleeding from small blood-vessels. Ligation and torsion of the cut end of large blood-vessels should be practised. Pressure over the surface of the wound is the most convenient method of controlling bleeding in most cases. Whenever possible, the part should be bandaged heavily with clean cloth or bandage. Before applying the bandage, it is advisable

to cover the wound with a piece of sterile absorbent cotton that is well dusted with boric acid. Bleeding from wounds which cannot be stopped by bandaging may be temporarily stopped by pressure with the hand or by packing the wound with absorbent cotton and holding this in place with sutures. This should be left in place for a period of twelve or thirty-six hours, depending on the extent of the bleeding and character of the wound.

Management of wound and wounded animals

Further the wound has to be prepared for healing. For this, the injured tissues should be carefully examined for any type of foreign objects or particles such as hair, dirt, gravel, pieces of wood, nails etc. The hair and torn tissues along the margins of the wound which can interfere with healing should be trimmed. Drainage for the wound secretions and pus should be provided. Suturing of wound depends on its character and location. A wound should not be closed with sutures unless it is clean and shows no evidence of sloughing. A badly infected wound should be left open unless satisfactory drainage for the pus and wound secretions can be provided. Wounds across the muscle and in parts that are quite movable should not be sutured.

Figure 1.1: Wound in hoof

Figure 1.2: Healing started in the wound

The after treatment care requires the keeping of animal in a quiet and clean place. If the wound is in a part that can be moved, it should be prevented from biting, licking or nibbling the injury. Wounds in the region of the foot can be irritated with dirt and by rubbing against weeds and grass. Thus it is advisable to keep the animal in a clean stall until healing.

Local treatment consists in keeping the wound clean by washing the part daily and applying any antiseptic ointment, lotion or powder over it.

Tympani

Tympani is an abnormal distension of the rumen and reticulum caused by accumulation of gases in the rumen. Most common clinical signs include distended left abdomen or dorsal abdomen left of the midline, pain and discomfort, animal refuse to graze, strain while urinating and defecating and rapid or difficult breathing. Mouth may be opened with protruding tongue, death in few hours if tympani is not relieved. For the treatment of early or mild cases, anti-bloat preparation available in the market can be given orally. In moderately affected animals, stomach tube can be passed to release the rumen gas and in severe cases, passage of trochar and cannula is done into the rumen high on the left flank (where the swelling is greatest) to release rumen gas. Passage of stomach tube or use of trochar and cannula requires special veterinary training. Vegetable oil (250–500 ml) or paraffin oil (100–200 ml) is being used traditionally to relieve the animals.

Diarrhoea

Diarrhoea can be defined as the passage of loose and watery faeces in increased frequency. In animals with diarrhoea, there is passage of faeces with excessive water (Figure 1.3). The faeces vary in consistency from being soft to liquid. Diarrhoea contributes to dehydration in affected animals. The affected animal shows signs of dullness, depression, lethargy, weakness with sunken eyes.

Diarrhoea can be caused due to either infectious reasons or dietary reasons. The treatment of diarrhoea should be aimed at correcting the cause of diarrhoea. If it is of dietary origin, the diet should be corrected. If it is due to infectious origin, suitable medicines should be given. Initially the digestive system should be given rest by withholding the food or offering very light, easily digestible food for first 24 hrs. For correction of dehydration, plenty of clean drinking water should be offered to the affected animal. To correct the electrolyte losses due to diarrhoea, ailing animals can be given glucose along with electrolyte solution orally.

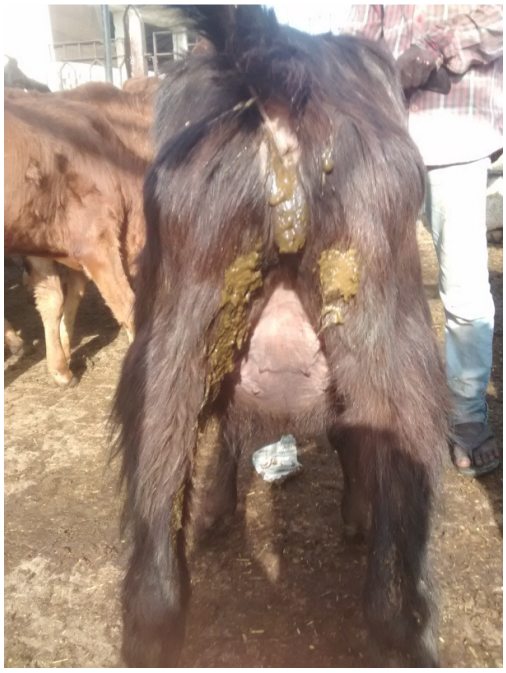


Figure 1.3: Photograph showing diarrhoea in buffalo calf

All these conditions if detected earlier, can be easily managed with the help of preliminary treatment but if the relief is not seen within few hours then these conditions may be life threatening also.

Constipation

Constipation occurs when the animal cannot defecate or it passes droppings with difficulty. Constipated animals cannot defecate or they pass very hard droppings with difficulty. Constipation is regarded as the sign of other diseases rather than a disease itself. Constipation can be treated by giving an enema. Enema is the administration of a medicine or warm soapy water into the rectum through anus. Affected animals should be offered plenty of drinking water.

Simple indigestion and anorexia

Simple indigestion and anorexia is a minor disturbance in digestive function in farm animals. It is more common in cattle and goats. Cattle and goat are a ruminant animals. Ruminants are animals with a four-compartment stomach including the rumen (largest compartment), reticulum (honeycomb lining), omasum (many folds) and abomasum (gastric compartment). Micro-organisms living in the rumen allow ruminants like the dairy cow to digest the fibrous components of feed. The rumen functions in coordination with the

reticulum to support contractions of the musculature that create the functions of rumination (cud chewing and rumen contractions) and eructation (gas release).

Simple indigestion is the failure of normal rumen movement. Rumen motility slows but does not stop. Simple indigestion is typically related to an abrupt change in the quality or quantity of the diet. It occurs due to excessive feeding of grain or silage, lack of sufficient intake of water and prolonged use of oral antimicrobials. Most common signs are that the animal is off feed either partially or completely. The ruminal contents become firm, so mild bloat or swelling on the left flank may be present. Treatment is aimed at correcting the suspected diet. Spontaneous recovery occurs when animals are fed on a typical roughage diet. Administration of about 20 L of warm water or saline orally, may help restore rumen function in adult cattle.

Burn injuries

Burn injuries mean any type of thermal injury caused by fire flames and hot solids (Figure 1.4). Injuries caused by hot fluids or steam are called as scald. The extent of a burn injury depends upon the temperature of the hot object and the duration of time for which it came in contact with the animal.

Depending upon the involvement of skin tissue, burns may be classified into three degrees i.e., first degree burn injury, second degree burn injury and third degree burn injury.

First degree burn injury	Second degree burn injury	Third degree burn injury
• Only superficial and outer layer of skin is involved. • It is a mild type of injury and recovers within few days.	• Partial thickness of the skin is involved. • Vesicles are formed and for early and complete recovery, special care should be taken to prevent secondary infection due to bacteria.	• Full thickness of skin and even underlying organs may be involved. • It is most severe form of burn injury and special attention is required for complete cure of the animal.

Common clinical signs involve pain, thirst, anaemia and loss of necessary salts from the body. There is swelling, redness and blisters in the affected areas. The recovery and survivability of the affected animal depends upon the body area involved rather than the degree of burn. For treatment, local dressing of the burn with antiseptic like betadine should

be done. The contamination of the wound should be prevented by covering the area with clean and preferably sterile cloth. Sufficient water and glucose solution should be given to the animal.

Figure 1.4: Swelling and redness in case of burn in a buffalo

Retention of placenta

The placenta (or afterbirth) is the membranes that transfer nutrients from the cow to the calf before the calf (foetus) is born. These membranes and blood vessels are made by the foetus during the process of development within the uterus and connect to the blood supply in the uterus of the cow. The thin connection between the membranes of the cow and the membranes of the calf assist to pass essential materials to the developing foetus. These essential materials include oxygen, nutrients and all the other essential components of life.

When the calf is born the placenta normally detaches within a few hours and is expelled. That is why placenta is also termed as “afterbirth”. Normally the placenta is expelled within 12 hours of the birth of the calf. If it is not expelled by 24 hours it is termed as “retained placenta”. If placenta retained for a longer period, foul smell is the sign of

retained placenta. The retention of placenta should be examined by a veterinarian and treat accordingly.

Abscess

An abscess is a tender and swelled mass which is filled with pus, often surrounded by an area of skin coloured from pink to deep red. Abscesses can develop anywhere in the body.

Causes of abscess

Abscesses can be developed due to various reasons like

i. Soft tissue damage results from improper animal handling causing muscle bruising, irritating drugs and vaccines.

ii. Infection through contaminated needles and syringes

iii. Obstruction in a sebaceous gland, or a hair follicle.

iv. Penetration of a sharp object, such as a nail or thorn

A skin abscesses grow bigger with a hard mass. Within four to eight days, the centre or tip of the swelling will become soft. At this stage the abscess is considered 'ripe', and can be drained with the help of veterinarian.

Broken horn

The fracture of horn may be caused by a blow or by striking the horn against a hard object like wall or other solid structures. The fracture may be complete or incomplete. The horn may break at the base, in its middle part or at the tip of the horn. Horn core enrich with blood vessel and nerve. Any major injury in the horn core causes severe bleeding. Along with broken horn is very painful for the animals. Therefore it should be treated immediately to relief from pain and stoppage of bleeding.

ASSESSMENT

A. **Multiple choice**

1.Passage of loose and watery faeces in increased frequency is known as ……

a) Diarrhoea
b) Impaction
c) Anorexia
d) None

2. Impaction is caused due to ingestion of large amount of…..
a) Highly fermentable carbohydrate rich food
b) Left over eatables of parties or marriages
c) Both a & b
d) None

3.Main routes of disease transmission are
a) Aerosol
b) Direct contact
c) Oral
d) All

4. Disease transmission can be prevented by
a) Avoid overcrowding of animals
b) Isolate all sick animals
c) Proper cleaning and disinfection of the farm premises
d) All

5. Abnormal distension of the rumen caused by accumulation of gases is known as
a) Tympani
b) Impaction
c) Indigestion
d) None

B. Fill in the blank

1……..is the elevation of body temperature above 104ºF.

2.Diarrhoea contributes to …….in affected animals.

3.A general rule is to change the foot bath after the passage of every……animals.

4.Most commonly used antiseptic is ……solution.

5.For disease control, isolation of ……..animals is required.

C. True or false

1.Simple indigestion is a minor disturbance in digestive function.

2.Enema is the administration of a medicine or warm soapy water through anus.

3.Fleas, ticks and mosquitoes are common vectors of disease.

4.Constipation occurs when the animal can easily defecate.

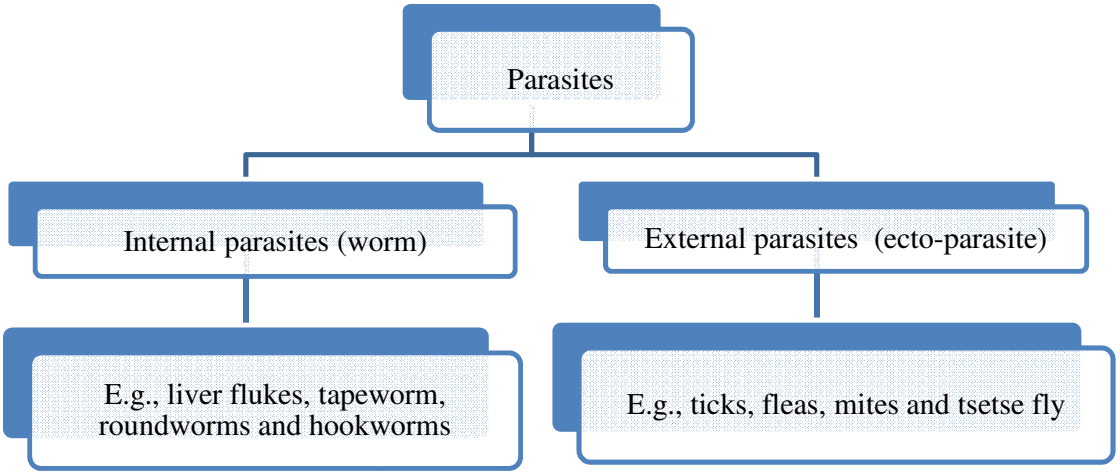
5.Animal transport trucks should not be disinfected.

ANSWERS

1. a	1. Hyperthermia	1. TRUE
2. c	2. Dehydration	2. TRUE
3. d	3. 150 to 300	3. TRUE
4. d	4. Potassium permanganate	4. FALSE
5. a	5. Sick	5. FALSE

Session 2: Parasitic infection in dairy animals

Parasites are the organism that lives on or in an organism of another species, known as the host, from the body of which it obtains nutriment. There are two types of parasites i.e., external parasites (ectoparasite) and internal parasites (endoparasite).



Parasites are responsible for significant losses in farm animals by causing various diseases. Parasite causes loss of milk production, weight loss, reproductive problem, clinical problems like roughness of skin, anemia and diarrhoea etc. Apart from this, parasites also causes significant costs incurred on treatment of affected animals. Young animals are more susceptible to parasites than adult animals. Adult healthy animals are less susceptible to parasites however, animals, reared under poor living conditions are highly susceptible.

A. Internal parasite/ endo-parasites (worm)

Worms are the internal parasites that live and prosper in the body of the farm animals and grow at the cost of health of the farm animal, which acts as a host to the worm. Internal parasites or worms are one of the greatest hazards in animal farm production. Worms are responsible for significant losses in farm animals by causing various subclinical and clinical effects. Subclinical effects in farm animals include reduced milk production, weight loss and reduced reproductive potential. Clinical effects include roughness of skin, anemia and diarrhoea etc. Apart from the losses to the health of the animal, internal parasites also causes significant costs incurred on treatment of affected animals. The principal internal parasites of farm animals are roundworms, tapeworms, flukes and protozoa. Therefore, understanding the life cycle of worms is important for a successful program of controlling the worm load in farm animals.

How animals get parasitic infection?

Excretion of the parasites through faeces of the infected animals contaminates almost all the grazing fields. While grazing on such contaminated fields, the animals could ingest these harmful parasites or worms. Due to their grazing behaviour, farm animals are more prone for worm infections. Worms live inside the body of host and rob their host for food and blood.

Deworming

It would be very difficult to completely eradicate the worms from the animal farm ecosystem. Therefore, the aim of deworming the farm animals is to prevent the worms from reaching high levels of infection inside the animal body and cause harm to the animal. Therefore, dewormers are vital to control worm infections and protect farmers against production losses.

Eliminating or lowering the level of parasites in the farm animal is an important part of animal husbandry practices. This can be achieved by deworming the animals. Therefore, deworming is the practice of giving medicines to the animals to help them get rid of internal parasites or worms. These medicines can be given either orally or through injections.

Choice and selection of dewormer

It has been observed scientifically that worms develop resistance against repeated use of particular dewormers**.** To tackle this problem of resistance, it is advisable to use dewormers selectively and wisely. It is recommended that the same dewormer should not be repeated every time rather alternative dewormers should be used. There are number of dewormers available but the choice of dewormer depends on various factors like age of the animal, weight of the animal, activity of dewormer against different parasites.

The age as well as the weight of animals is directly proportional to the susceptibility to parasites. Young animals are more susceptible to internal parasites than adult animals. Adult animals are much less susceptible to most parasites but those adult animals which are reared under poor living conditions are also highly susceptible.

The ideal dewormer should have the following properties:

(a) Broad spectrum activity of the dewormer against both adult and larval stages of parasites is desired.

(b) The dewormer should not have any unpleasant side-effects to the animal. Some drugs may cause vomiting, pain at the injection site or irritation to the skin.

(c) The dewormer should be suitable from practical and economical point of view. They should be stable and should not decompose on exposure to normal ranges of temperature, light and humidity and have a longer shelf life.

The selected drug(s) should be competitively priced and ready to use in a simple way.

Administration of Dewormer: A wide variety of formulations and preparations of dewormers are available to be used for administration by oral route or injectable route.

1. **Administration of dewormer through oral route**

The majority of dewormers are given by mouth as liquid preparations, boluses and tablets.

- Liquid preparations are usually available as ready to use. Several devices like syringes, bottles and drenching guns can be used for administration of medicine through mouth.
- Boluses and tablets can be placed deep in the mouth of the animal or can be used by making its powder, dissolving in water and administered into mouth by syringe.
- Sometime, dewormers can be mixed along with feed but in such type of administration of drug, the dosing may not be accurate because animals do not always consume the amount of drug required for efficient treatment. So it the least preferred method of administration of dewormer.

2. **Administration of dewormer by injection**

A number of dewormers are available as injectable preparations. The prescribed route of injection for a particular dewormer should be followed strictly.

Deworming schedule

1. Deworming should be started from the first week of life of animal.
2. Deworming should be done every month for first 6 months of age and thereafter once in three months. Adult cattle can be dewormed once in a year.
3. The deworming drugs and dose should be choosen under the guidance of veterinarian.

4. Over dose and under dose of deworming drugs should be prevented to control the side effects and development of resistance against that particular drug.

B. External parasites (ecto-parasites)

Ectoparasites are the organisms which live on the skin of other animals and are responsible for causing detrimental effects to the skin and overall health of the animals on which they are living. Ectoparasites are responsible for direct as well as indirect losses to the farm animals.

Direct losses result due to discomfort and damage caused by the parasites to the animals on which they reside. Discomfort due to ectoparasites causes drops in milk production and retarded growth rates in the suffering animal. In some animals, ectoparasites cause damage to skin and wool due to rubbing and scratching caused because of itching.

As per indirect losses are concerned, some diseases are carried from infected animals to other healthy animals through the ectoparasites. So these ectoparasites act as carriers for transmission of other diseases in animals.

Ectoparasites are of different types. They include mites, lice, ticks and flies.

Parasitic mites and lice: Parasitic mites and lice live on hair, on body surface and outer layers of the skin. Both lice and mites are permanent residents of the animal body and feed on skin tissues and blood of the animal.

Ticks: Ticks live on the body of animal for a short period of time (Figure 1.5). Tick feed on blood and their bites causes irritation, swelling, redness and itching on the body of the affected animal. Ticks are also responsible for transmission of a number of diseases which are having detrimental effect to the animals.

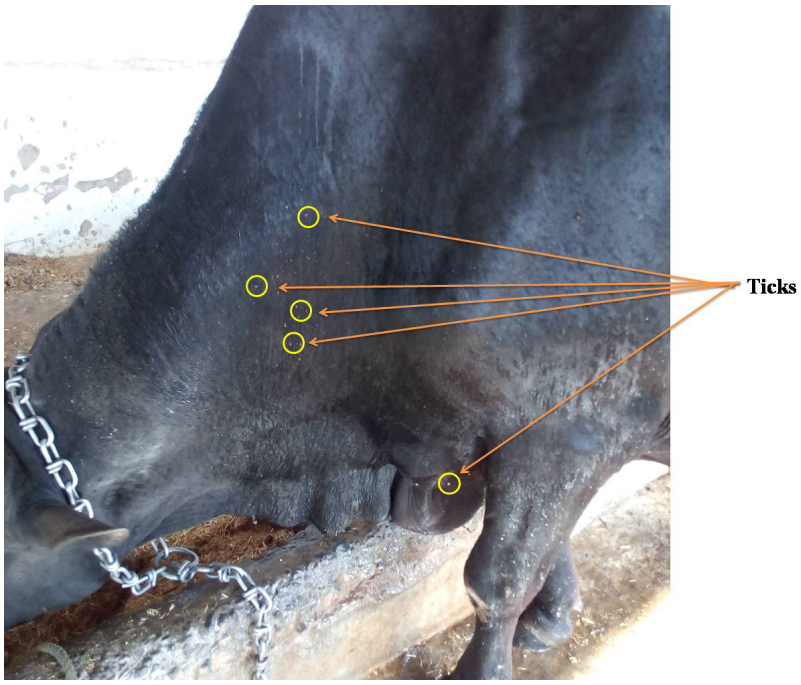


Figure 1.5: Ticks on the body of the animal

Flies: Flies feed on the blood, sweat, skin secretions, tears, saliva, urine and faeces of animals. They puncture the skin directly or infest on wounds of the animal. Flies can transmit many diseases from infected animals to healthy animals. They also cause irritation to the animal and the disturbance to the animal results in reduced weight gain and milk yield.

Heavy infestation of ectoparasites means poor health in farm animals. Several medicines for external application on the body of the affected animal are available for the control of ectoparasites.

Points to be remembered for control of ectoparasites

1. All new animals immediately upon arrival to a farm must be treated with ectoparasiticides to avoid spread of new parasites to other animals of the farm.
2. If external parasites are seen on the body of the animal, it should be treated immediately to prevent its spread to other animals.
3. A single dose of ectoparasiticidal treatment may not be sufficient for the control of ectoparasites. The first treatment will only kill the active stages of the parasite present on the animal at the time of treatment. A second treatment after 15-21 days is required to kill any eggs that might have hatched since the first treatment.

4. Besides treating the affected animals it is necessary to thoroughly clean and disinfect animal houses, paddocks or barns with suitable chemicals to destroy the parasites and their eggs on the floor, wall and corners of the animal houses.

Methods of control of ectoparasites

Ectoparasiticides may be applied to animals by several methods. The figure 1.6 shows the most common methods used for this purpose.

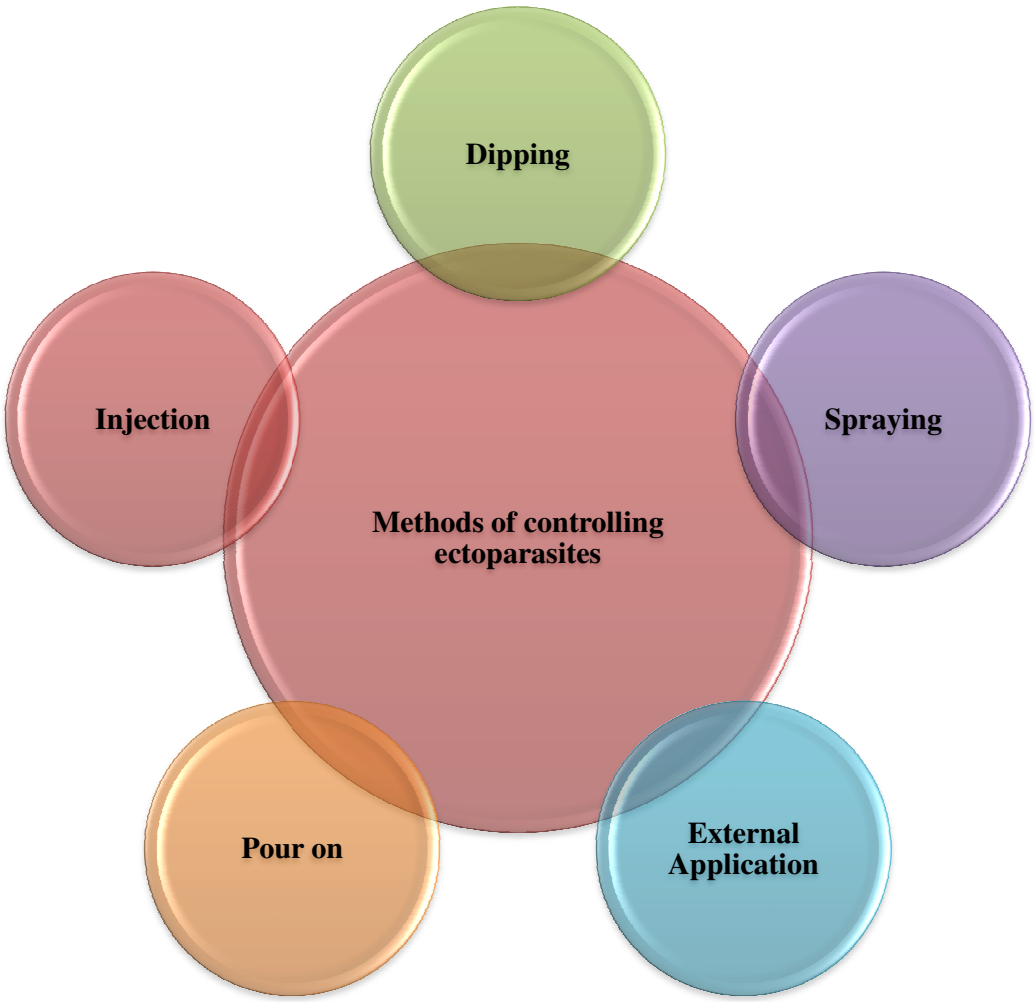


Figure 1.6: Various ectoparasite control methods

1. **Dipping:** It can be done in small sized animals. This is very effective if large numbers of animals are to be treated. The animal is lifted and dipped into a tank filled with the ectoparasiticide solution with care being taken that the head region of the animal should not be dipped into the solution. Dipping should be done in the early morning,

so that animals are not immediately exposed to the hot sun. Dipping is not recommended if heavy rain is expected, as the medicine may be washed off.

2. **Hand spraying / external application:** Using hand sprayers is the most commonly used method of applying ectoparasiticides. It is effective especially if a small number of animals are to be treated. If a sprayer is not available, then the pesticide can be applied with a paint brush or a cloth. The animal should be tied securely before external application of the medicine. The sequence of application of medicine is starting from the head and finishing at the tail covering all areas of the body. While applying the medicine, the eyes, nostrils and mouth should not be exposed to the medicine.
3. **Pour-on medicines:** A small volume of a special medicine, available as pour-on preparation is poured along the backline of an animal (Figure 1.7). It disperses over the body surface to kill the infesting ectoparasites. This is a very effective method of controlling ectoparasites. Backline of the animal on which pour-on medicine is applied is shown in the figure below.

Figure 1.7: Medicine being poured along the backline of a cattle

4. **Injections:** Some medicines can be injected into the animal through subcutaneous route. These medicines have a broad spectrum action against both internal and external parasites. These compounds are generally more expensive than the other medicines. Figure 1.8 shows subcutaneous injection being given to the animal.

Figure 1.8: Subcutaneous injection being given to calf

Methods of control of ectoparasites in animal houses:

It is impossible to eradicate all ectoparasites on the farm, so control practices are directed at reducing the population of ectoparasites to tolerable levels. Ectoparasite control can only be fully achieved by an integrated approach in which measures are followed on the whole farm. Management of ectoparasites in animals and animal houses is the key to reduce their infestation. Good farm management will be helpful in reducing the population of ectoparasites.

Good management includes general farm hygiene, maintaining healthy animals, trimming grass around animal sheds, reducing moisture in and around buildings by covering the drains, controlling water run-off, guttering and maintaining proper sewage systems. Regular removal of moist bedding, hay and manure along with preventing the accumulation of weeds, grass cuttings and vegetable refuse is very helpful.

Despite all management effort, some ectoparasites and their eggs can still be found on the ground and these ectoparasites can live on the ground for many days without feeding. So insecticides should be sprayed to the buildings/ paddocks, barns etc. every two weeks.

General precautions

1. Always use recommended dosages of medicines. Using too high concentrations will not kill more parasites but it may cause harm to the animal.
2. Spraying or application of the medicine on the animal body should not be done in a confined, non-ventilated area.

3. The animal should be provided sufficient feed and water before dipping it in the medicine solution because thirsty or hungry animals can drink the solution to be used for dipping.
4. Ectoparasiticidal medicines should be kept well secured so that they should not contaminate feed or drinking water.
5. Ectoparasiticidal medicines should not be applied to sick animals or animals under stress because the medicine in such animals may cause sickness in the animal.
6. Persons involved in handling and applying the medicine to the animals should wear gloves, protective clothing, goggles and mask to avoid any chemical splashing into the eyes and to avoid any contact with the skin. If there is any contact, wash immediately with soap and water.
7. Care should be taken that the left over medicines and chemicals should not damage the environment. So the left over or unused medicines and chemicals should not be poured into rivers or ponds. These can be drained into pits which should be at least 150 m away from water sources.
8. Sprayers should be cleaned immediately after use.
9. It is extremely dangerous to reuse an empty container of medicine or chemical. The containers should be punctured or crushed and then be buried in an isolation area at least 50 cm below ground surface.

ASSESSMENT

A. **Multiple choice**

1. Methods of control of ectoparasites are
    a) Dipping
    b) Hand spraying
    c) Injection
    d) All
2. Insecticides should be sprayed to the buildings/ paddocks, barns with a suitable chemicals every
    a) Two weeks
    b) Two months
    c) Three months

d) none

3. Dipping should be done in the
    a) Afternoon
    b) Early morning
    c) Evening
    d) Any time
4. For effective control of ectoparasites, usually second treatment is required after --------days of first treatment
    a) 7-9 days
    b) 15-21 days
    c) 1-2 months
    d) 3-4 months
5. Persons involved in handling and applying the ectoparasiticide medicine to the animals should wear
    a) Only gloves
    b) Only goggles
    c) Only mask
    d) all

B. Fill in the blank

1. …….are the organisms which live on the skin of other animals.
2. Tick feeds on ……..of the animal on which it lives.
3. Ectoparasites are responsible for transmission of……..
4. For pour on method, the preparation should be poured along the …….of an animal.
5. Some ectoparasiticide medicines can be injected into the animal through ……route.

C. **True or false**

1. Heavy infestations of ectoparasites are usually associated with poor health.
2. A single treatment with ectoparasiticide may be sufficient for the control of ectoparasites.
3. Dipping of animal can be done in all the seasons.
4. Ectoparasiticidal medicines should not be applied to sick animals.
5. Ectoparasite control can not be achieved by integrated approach.

ANSWERS

1. d	1. Ectoparasites	1. TRUE
2. a	2. Blood	2. FALSE
3. b	3. Diseases	3. FALSE
4. b	4. Backline	4. TRUE
5. d	5. Subcutaneous	5. FALSE

Session 3: Common infectious diseases of dairy animals and vaccination against these diseases and concept of 'One health approach'

A student of animal husbandry should have the knowledge of some common diseases prevalent in farm animals in our country. These diseases keep on recurring periodically. Some of the common diseases of farm animal and their distinguishing symptoms are given below.

1. **Foot and Mouth Disease (FMD):** It is characterized by high fever, formation of vesicles and blisters in the mouth, udder, teats and skin between the toes and above the hoofs. There is excessive salivation and animal becomes lame. This disease is highly communicable and spreads by direct contact or indirectly through infected water, manure, hay and pastures. The disease does not result in death in adult animals except in few cases in calves and can be prevented easily by regular vaccination of the animals.
2. **Anthrax:** Anthrax is a highly infectious and fatal disease of cattle. Often sudden death within 2 or 3 hours of being apparently normal is the most common sign of this disease. Very rarely some animals may show high temperature, difficulty in breathing and convulsions before death. Small amount of bloody discharge from the nose, mouth and other openings is visible after death of the animal.
3. **Black quarter (black-leg):** It is a highly infectious and fatal disease of cattle, buffaloes, sheep and goats. Mostly the young cattle between 6-24 months of age in good body condition are affected. Most important clinical signs of this disease are high fever, loss of appetite, dullness, crepitating swelling over hip, back and shoulders.
4. **Haemorrhagic septicaemia**: In this disease there is infection in the upper respiratory tract of the animal. There is high fever, watery discharge from nostril and the animal goes off feed. There is swelling under the neck and affected animals feel respiratory distress.
5. **Brucellosis**: It is a disease of adult animals. It causes great economic loss by causing abortions in pregnant animals. In bulls it causes swelling of testicles. This disease has got zoonotic importance as well.

Thus with the help of information received regularly about the occurrence of diseases from various sources, it would be possible to develop a disease alert system. This disease alert system would be helpful in informing the farmers and animal owners about the possible outbreak of a disease. In this way, timely preventive strategies can be formulated to overcome

the expected disease. The overall benefits of timely reporting the diseases can be summarized as follows:

a. The animal owner can follow better management of diseases for their animals.
b. It will help in the timely availability of veterinary service for preventive strategies like vaccination of the susceptible animals.
c. It helps in increasing the higher productivity of animals.
d. It helps in saving the costs that otherwise would have to be incurred for treatment of animals.

Thus the effective monitoring of the occurrence of farm animal diseases enables their early control which will results in improving the animal health and economic gains to the farmers in the country. The figure 1.9 summarizes this concept.

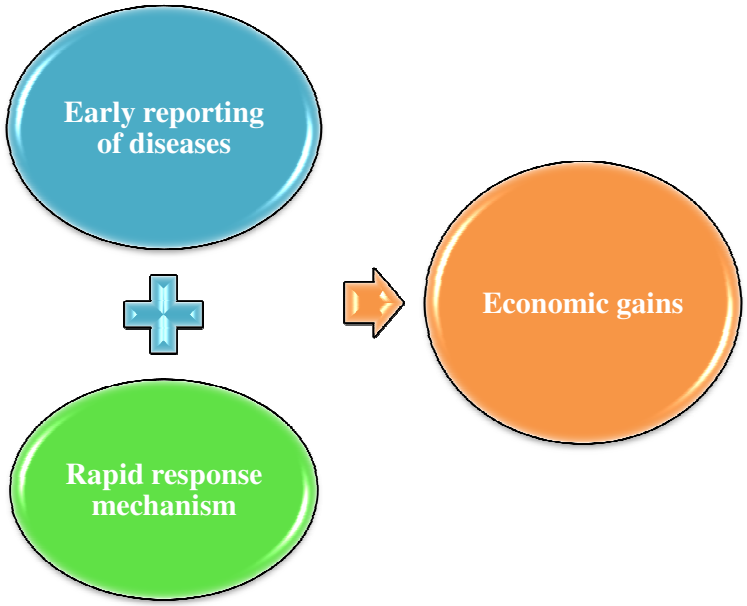


Figure 1.9: Vaccination of dairy animals

What is vaccine?

A vaccine is a fluid that helps the animal's body to become immune to a disease caused by certain germs or microorganisms. The vaccine contains some part of the germ or the poison that the germ produces. The vaccine does not make the animal sick. It rather helps the animal's body to protect itself from getting diseased in future. Vaccination is usually done in cattle, buffaloes, sheep, goats and pigs.

The practice of vaccination is very useful in the prevention and control of many diseases in the farm animals. Vaccination means the administration of a particular vaccine into the animal's body for producing immunity in the body of the animal against a specific disease. The different vaccines may be administered either subcutaneously, intradermally or intramuscularly based on standard instructions prescribed for administration of that vaccine.

In animal production, a vaccine should produce resistance in the entire herd to minimize the economic losses due to treatment of infectious diseases, which might occur in the absence of proper vaccination in the entire herd. As a thumb rule, vaccines are administered to healthy animals only.

Schedule of vaccination in farm animals

Vaccination schedule includes primary vaccination, booster vaccination and revaccination.

Primary vaccination: Primary vaccination is the first dose of vaccine administered to the animal for an initial immune response towards a specific disease.

Booster vaccination: In most of the instances, the immunity in the body of the farm animal against the disease reduces with the passage of time. To maintain the optimum level of immunity in the body of the animal, another dose of the same vaccine is administered to the animal and is called booster vaccination. Thus booster vaccination means extra administration of the vaccine already administered in primary vaccination in the farm animal.

Revaccination: Most of the vaccines once administered do not protect the animal for its lifetime. There is a certain period of time for which vaccine protects the animal. This period of time is generally one year. So administration of vaccine should be repeated on a particular date after one year. This is known as revaccination. Revaccination is important to protect the animal from diseases throughout its life.

The sequence of vaccination strategy of animals is depicted in the figure 1.10.

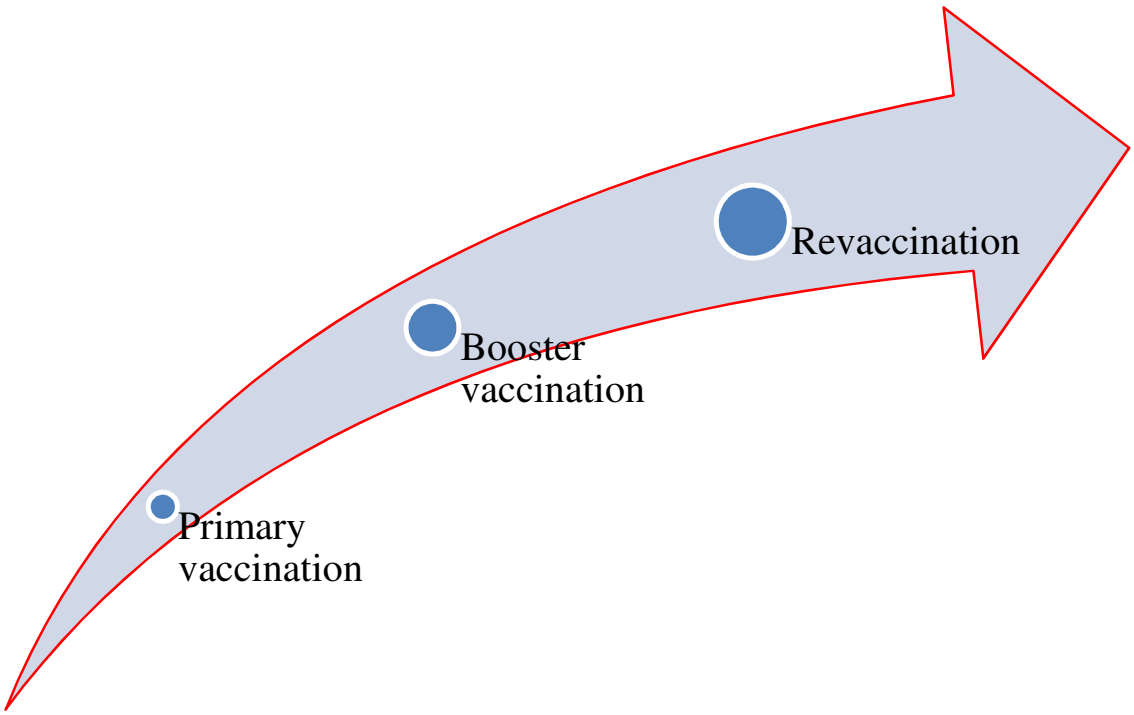


Figure 1.10: Sequence of vaccination strategy

Vaccination Schedule

The recommended vaccination schedule for important diseases in cattle and buffalo are given in the table below.

Cattle and Buffalo

Vaccine	Primary vaccination	Booster	Revaccination
FMD vaccine	6 - 8 wks of age	6 months after 1st dose	annually
HS vaccine	6 months and above	_	annually
BQ vaccine	6 months and above	_	annually
Anthrax vaccine	6 months and above	_	annually in endemic areas
Brucella vaccine	4-8 months female calf	_	_

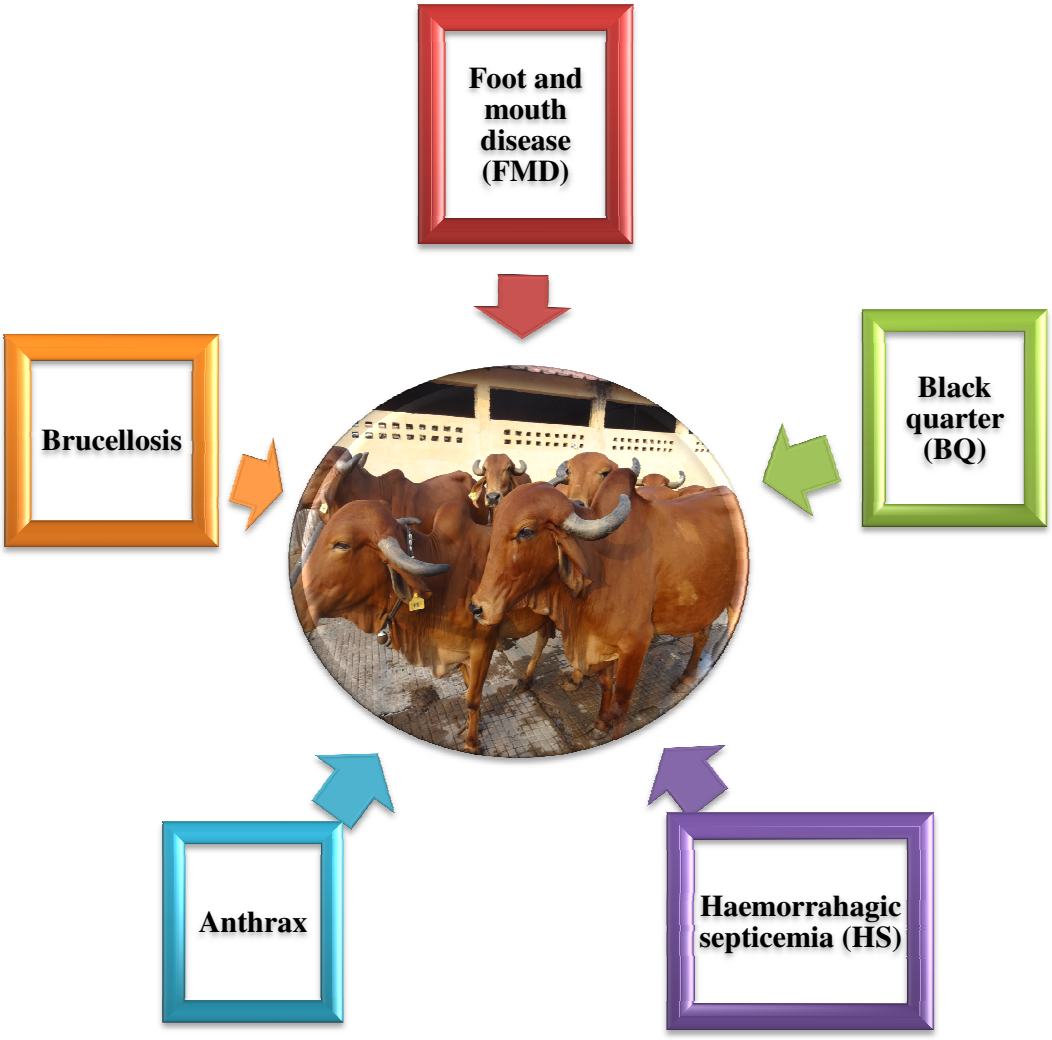


Figure 1.11: Major diseases in cattle requiring vaccination

Handling and administration of vaccines

Most of the vaccines used in farm animals are developed from live infectious organisms. Vaccines are very sensitive to temperatures variations. Proper handling and administration of vaccines is very important for its effectiveness. The following important points should be kept in mind while handling the vaccines:

1. Immediately upon receiving the vaccine through transport, the seal for intactness of the vaccine should be checked. It should be ensured that the vaccine was transported in ice packs. If the vaccine does not pass these criteria, it should be got replaced immediately from the firm. Careful attention must be paid to the expiration date printed on vaccine because if the vaccine is expired then it will

not be effective and this will rather make the animals susceptible for that particular disease against which vaccine is proposed to be administered.

2. Once the vaccines are unloaded, they should be stored at 35-45°F (2-7°C). Temperatures higher or lower than this range can result in the death of the living organisms present in the vaccine, making the vaccine ineffective. Therefore, monitoring of temperature is very essential in warmer environments. Moreover, the vaccines should never be freezed.
3. Most of the vaccines are available in multidose vials. A greater risk of environmental contamination of the vaccine exists if the stopper of the vial is repeatedly pricked with different needles to draw out vaccine for different animals. To avoid this, a single needle should be permanently inserted into the stopper of the vial and vaccine should be drawn out with fresh syringe being used for every animal. This practice will maintain the sterility of the vaccine.
4. Most of the vaccines are freeze dried and must be mixed with a sterile diluent prior to be used for vaccination. These diluents are product specific, so they should not be changed or substituted with another product or solution. The vaccine is reconstituted by mixing and thoroughly dissolving the diluent with the vaccine under sterile conditions. Once a vaccine has been reconstituted it should be administered within 60 minutes and protected from temperature extremes by maintaining the cold chain.
5. The vaccines are to be administered through the subcutaneous route (Figure 1.12), intradermal route or the intramuscular route (Figure 1.13) and for which standard instructions for the route of administration of that vaccine are prescribed by the manufacturer. Prior to administration of any vaccine, the route of administration as indicated by the manufacturer should be followed properly. Administration of the vaccine via an incorrect route can result in inactivation of the vaccine and clinical disease in the animal including severe organ damage and death.

Figure 1.12: Vaccination through subcutaneous route in a cow

Figure 1.13: Vaccination through intramuscular route in a cow

6. Cleaning the skin of the animal with an alcohol swab prior to vaccination is a bad practice. Alcohol can inactivate the vaccine if alcohol comes in contact with the microorganisms present in the vaccine while the vaccine is being administered to the animal.
7. Most of the vaccines used in farm are infectious or "live" biological products so care must be taken to clean spillages of the vaccine. If the vaccine has spilled on the body of the animal or onto the table or floor then it should be cleaned with a disinfectant. If any vaccine has spilled on the handler then it can be eliminated by thorough washing with soap and water. If the spillage of vaccine is not attended properly then it could cause illness in the animal and promote the transfer of infectious diseases throughout the farm.
8. If the animal shows any local or systemic reactions after vaccination, it should be properly documented for the subsequent booster vaccinations. If the animal has a history of reaction to the vaccine, subsequent vaccination should be undertaken only under veterinary guidance. A change in vaccine product and/or pre-medication with anti-inflammatory drugs is recommended in such circumstances.
9. Proper documentation of vaccination program is important for many reasons like legal proof of vaccination status especially whenever there is an outbreak of disease in that area and for monitoring adverse reactions in the animals in which vaccination has been carried out.

The following information should be recorded in the vaccination record of each animal:

a) Name of the vaccine administered, manufacturer's detail, lot or serial number, expiration date of vaccine
b) Date of administration of vaccine
c) Route of administration of vaccine

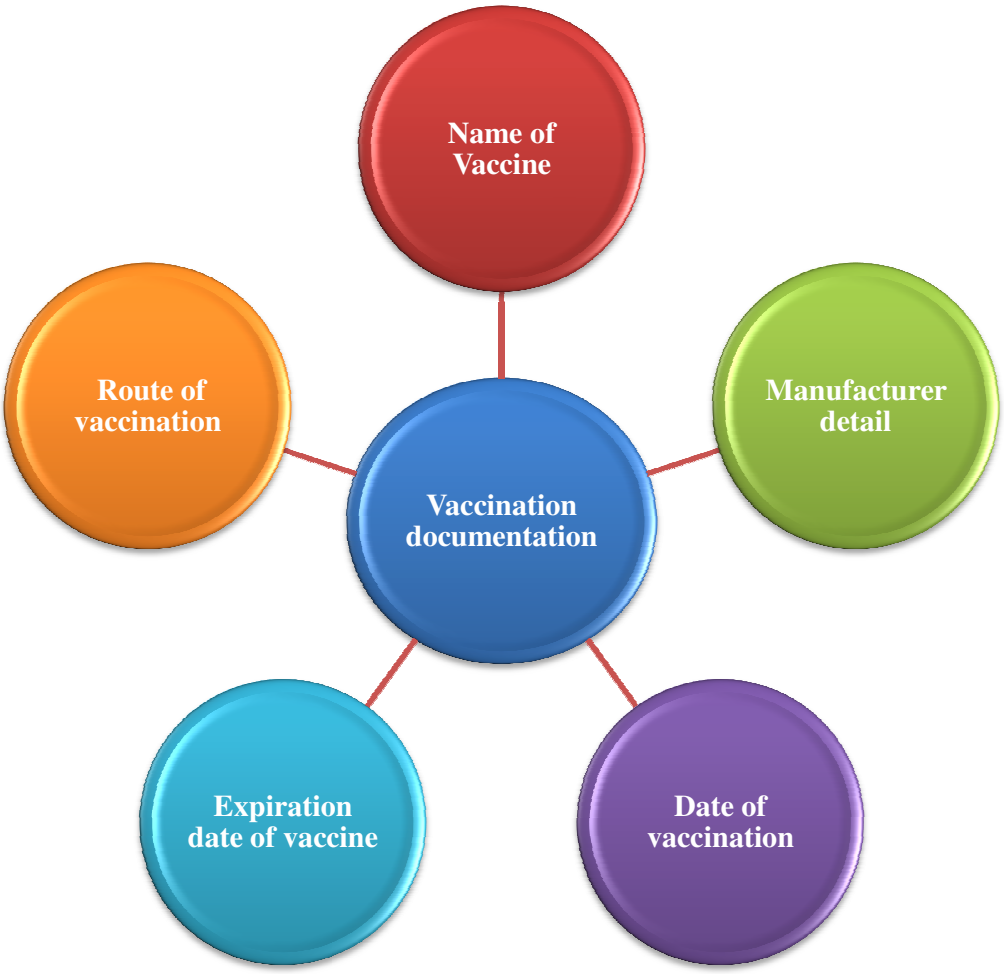


Figure 1.14: Important components of vaccination documentation

The manufacturer's label (figure 4.15) can be removed from the vaccine bottle and pasted on the register or record book. It is easier to maintain such records in a computer.

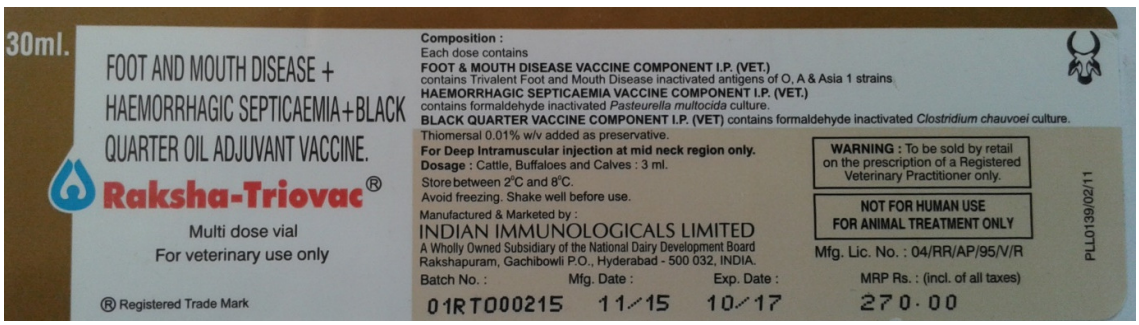


Figure 1.15: A specimen of vaccine manufacturer's label showing 1) name of vaccine, 2) route of vaccination, 3) vaccination dosage, 4) optimum temperature for storage of vaccine, 5) batch number, 6) manufacturer's detail etc.

Concept of 'One health approach'

Health of human beings, animal and plant kingdoms, and environments are interdependent. 'One Health' means taking care of health of all in totality. Because, if the animals are carrying the infection, it may be transmitted to human as well as to the environment. Similarly if environment is polluted, it may adversely affect the health of all living beings. Approximately 75% of the new emerging diseases in humans are known to be transmitted from animals to people.

Zoonotic diseases: Diseases spread from animals to humans and vice-versa are termed as zoonotic diseases. Important zoonotic diseases are Rabies, Anthrax, Tuberculosis and brucellosis. Increased population, travelling and encroachment of wild animal territories by humans are important factors for spread of zoonotic diseases.

The concept of one health is not a newone**.** One health is a fresh multidisciplinary approach to control the diseases where experts from the human medicine, veterinary medicine, environmentalist and agriculturalist work for the production of healthy food, healthy animals, healthy environment and healthy human life. The figure 4.16 illustrates the idea of 'OneHealth'.

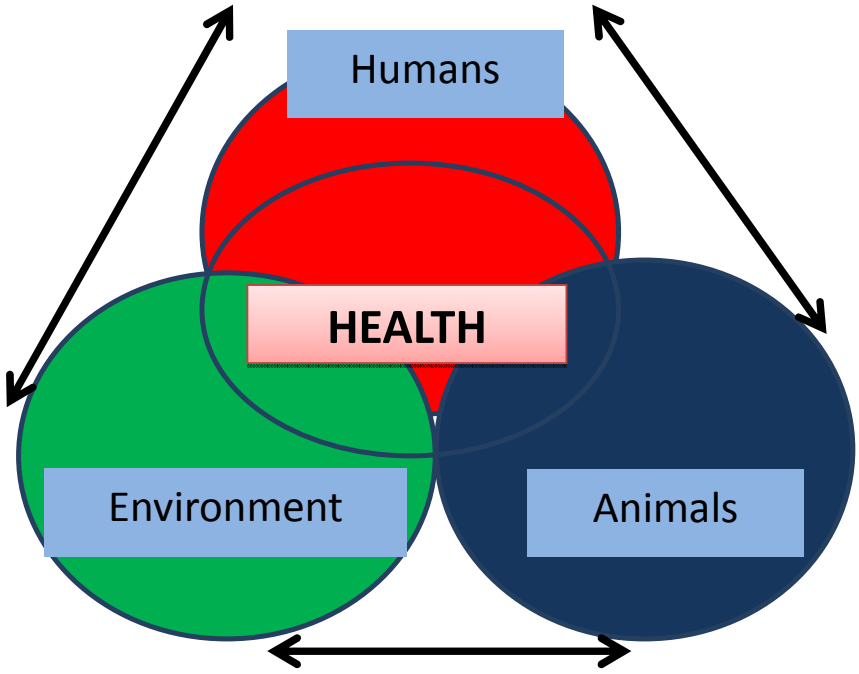


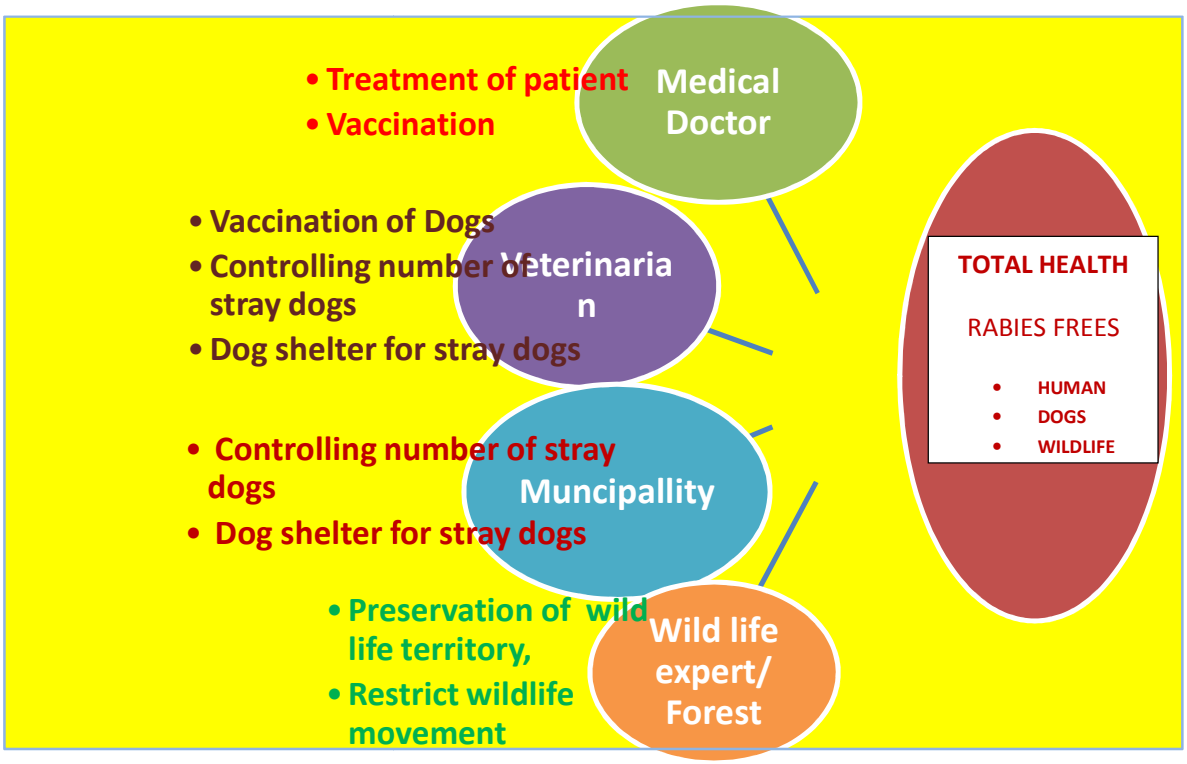
Figure 1.16: Interdependence of environment, animals and humans for optimum health.

Aims of '**OneHealth'**: The following are the broad aims of the concept of one health.

1. To have integration, cooperation and collaboration between human medicine, veterinary medicine and environmental science.
2. To expand the scientific knowledge base.
3. To accelerate drug discoveries.
4. To improve human/animal medical education.
5. To improve human and animal health.

An example of 'One Health' approach in case of the viral Rabies disease

Rabies is a viral disease affecting human, dogs and farm animals.After bite of a dog infected with rabies, human and animals show violent movements, uncontrolled excitement, fear of water, an inability to move parts of the body, confusion, and loss of consciousness and finally death. Integrated efforts by the medical doctor, veterinarian and govt. agencies are required for control and eradication of Rabies. The diagram below explains the coordinated action by multiple agencies.



The students may wonder how the wild life expert and forest personnel come into the picture to control Rabies. Actually the wild foxes, jackals and bats are the reservoirs for rabies virus. Therefore if wildlife territory is properly preserved with few movements of these animals towards human populations, the incidence of rabies will be greatly minimized, if not stopped altogether.

ASSESSMENT

A. **Multiple choice**

1. Most common mild side-effects seen after immunization include:
    a) Redness, mild swelling and tenderness at the vaccination site
    b) Decreased activity levels (fatigue)
    c) Loss of appetite, and
    d) All

2. Vaccines can be administered through
    a) Subcutaneous route
    b) Intradermal route
    c) Intramuscular route

d) All of the above

3. Do not vaccinate the animal during
   a) Adverse weather conditions
   b) Nutritional imbalances
   c) Pregnancy
   d) All
4. FMD vaccination cannot be done at the age of
   a) 6 -8 months
   b) I year
   c) 2 year
   d) Below 3 months
5. Revaccination is required in
   a) FMD
   b) HS
   c) BQ
   d) All

B. Fill in the blank

1. Once a vaccine has been reconstituted it should be administered within……..
2. Vaccines should be stored at the temperature of …….°C.
3. ……..is required to control diseases in animals.
4. ……..vaccine is done only in female calves.
5. All animals must be ……..before vaccination.

C. True or false

1. Vaccine should not be administered in weak and debilitated animals.
2. Date and route of administration of vaccine must be documented.
3. Vaccine does not require proper disposal.
4. Sick animals can be vaccinated.
5. Vaccine makes the animal sick.

ANSWERS

1. d	1. 60 minutes	1. TRUE
2. d	2. 2-7	2. TRUE
3. d	3. Vaccination	3. FALSE
4. d	4. Brucella	4. TRUE
5. a	5. Dewormed	5. FALSE

Unit 2: Milking

The profitability of a dairy farming solely depends upon the milk productivity. Every day the dairy farmers have to manage the animals and milk the animals in most efficient manners to achiever desired level of profit. The milking process requires several important steps. The purpose of these steps is to elicit proper letdown of milk, efficient milk harvesting and minimize the chances of mastitis. A detail discussion is made in this unit regarding milk letdown mechanism, different process of milking, machine milking, clean milk production etc.

Session 1: Processes involved in milking

i. Structure of udder

It is essential for a dairy farmer to understand the physiology and the processes which are responsible behind milk secretion. Therefore it is necessary to understand the functional aspects of udder and connected organs.

Milk is produced by a system of glands grouped together in udder of cattle and buffaloes. Mammary glands or udder is a modified sweat gland. Udder is usually covered by fine hairs; however the teats are devoid of hairs. Udder of cattle and buffaloes has four quarters with one teat hanging from each quarter (Figure 2.1). Each quarter is as an independent unit. The size of the two fore quarters is smaller than two hind quarters and contains less secretary tissues. Therefore, forequarters produce about 40 percent and hind quarter produce 60 percent of the total milk.

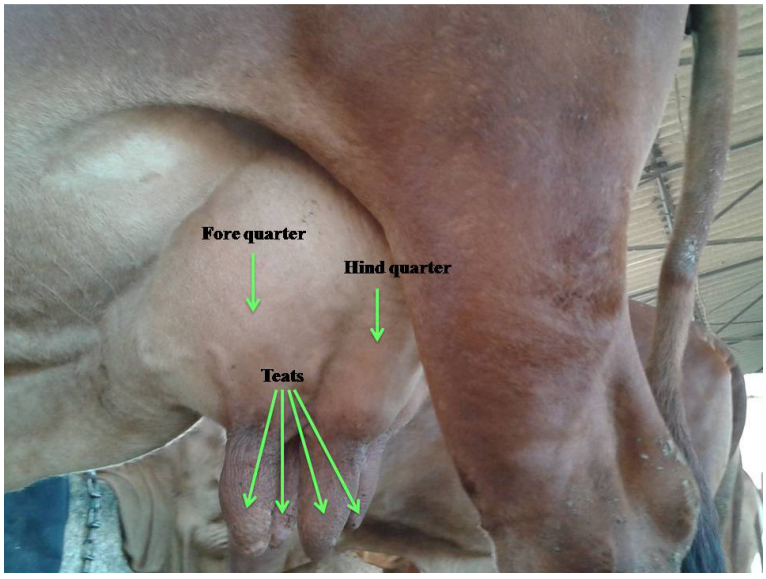


Figure 2.1: Parts of udder

ii. Physiology of milk let down

The let-down of milk is the result of a combination of neural and hormonal actions in the animal body. The milk let-down reflex starts with the activation of nerves, mediated by the brain of the animal. A single stimulus or a combination of the following external stimuli may initiate the milk let-down reflex (Figure 2.2).

a) **Physical touch**: suckling by calf, washing of udders (which are sensitive to touch and temperature) or application of the milking machine or massage of the udder by the milker.
b) The **sight** of a calf (especially in indigenous cows) and approach of the milker.
c) **Sound** of a milking machine, rattling of the milk buckets.
d) **Smell** of the milking parlour, calf etc.
e) **Feeding** of concentrates to the animals.

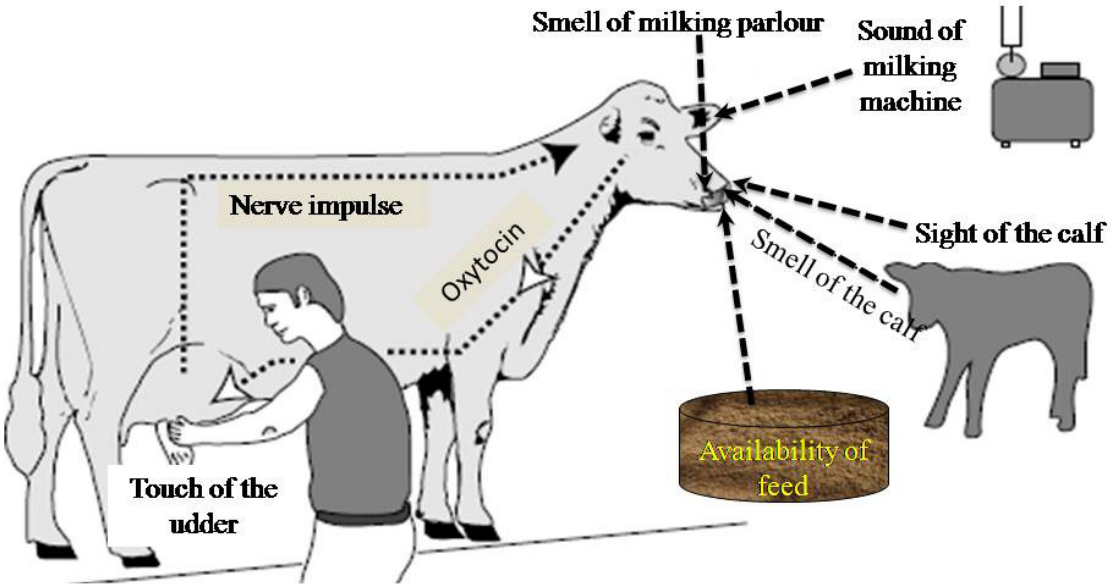


Figure 2.2: Figure showing various stimuli playing their role in milk let down

Following these stimuli, the brain sends a signal to the posterior pituitary, a gland at the base of the brain that releases oxytocin into the blood. The action of oxytocin only lasts for six to eight minutes because its concentration in the blood decreases rapidly. This means that milking should be completed within this period.

Inhibition of milk "let-down": In certain situations, the milk ejection reflex can be inhibited. Certain stimuli such as rough handling of animal, loud and unfamiliar noise, pain and irritation or fear cause release of adrenalin. Cows should be handled gently and milked

carefully at regular intervals. Milking should be a pleasant experience for the cow so that the animal is able to eject entire milk.

iii. Pre-milking activities

a) **Preparation of milking area/parlour:** Milking area should be regularly cleaned before and after milking. The area should be totally free from flies and insects. Loud noise and any kind of disturbances during milking can cause stress to the milch animals which may lead to reduction in milk production.

b) **Preparation of animals for milking:** Cattle can be conditioned for let-down reflex by strictly following a proper routine. There could be various activities in this routine such as:

i. **Brushing or bathing of animals**: Brushing or bathing of cows before milking removes the dirt from its body which may find a place in the milk (Figure 2.3).

Figure 2.3: Washing of animals before milking

ii. **Follow milking routine:** Milking routine and time should be strictly followed.

iii. **Offer concentrate**: Some amount of concentrate mixture should be offered at the time of milking. It is one of the best stimuli for milk letdown.

iv. **Use of anti-cow kicker or milk man's rope**: A few freshly calved heifers have a tendency to kick at the time of milking. This habit can be eliminated, if pregnant heifer is groomed and handled properly. Kicking can be prevented by using anti-cow-kicker or milk man's rope (Figure 2.4).

Figure 2.4: Use of milk man's rope at the time of milking

v. **Preparation of udder and teat**: Udder and teat should be washed with lukewarm water (Figure 2.5). After washing, it should be dried with a paper towel or cloth (Figure 2.6). It should be assured that the teats and udder are cleaned and dried before milking.

Figure 2.5: Washing of udder with lukewarm water

Figure 2.6: Wiping of udder with cloth

c) **Preparation of milker, milking pail and milking shed:** Nails of the milker (a person who milks cows) should be properly trimmed. He should wash his hands thoroughly before milking. Milking pail should be properly cleaned with suitable detergent. Milking shed should be cleaned and free from flies and insects.

d) **Milking of animals:** All the animals are to be milked with suitable method of milking within the stipulated period. Various types of method of milking is discussed in the next session.

iv. Post-milking activities

Post milking teat dipping

The streak canal in the teat stays open for about an hour after milking. If a cow's teat then comes in contact with mastitis-causing pathogens, they may easily enter the teat and cause an infection. One of the most effective means of controlling mastitis is post-milking teat dipping with a germicide. The purpose of the post milking teat dipping is to remove milk residues and prevent entry of organism through teat ends. It leaves a film on the teats until teat sphincter closes properly after completion of milking. It provides a barrier which gives longer protection. It is different from pre-dipping. Teat dipping does not reduce existing infection. However, the rate of new infection can be reduced by up to 50%.

Milk harvested from sick or treated animals

Milk obtained from sick animals and animals under treatment is not suitable for human consumption. Milking equipment and utensils should be cleaned thoroughly to avoid cross contamination.

Storage and transportation of milk

Milk should be stored in clean containers with a lid and kept in a cool (4°C) and shady place (Figure 2.7). It should be transported in clean containers. Milk must reach the milk collection centre quickly, ideally within 2 - 3 hours after milking and chilled as quickly as possible.

Figure 2.7: Milk chilling tank of 1000 litres capacity

Cleaning of milking utensils

The purpose of cleaning milking utensils and milking areas are to avoid the contamination in milk. The figure 2.8 describes the process of cleaning the milking utensils.

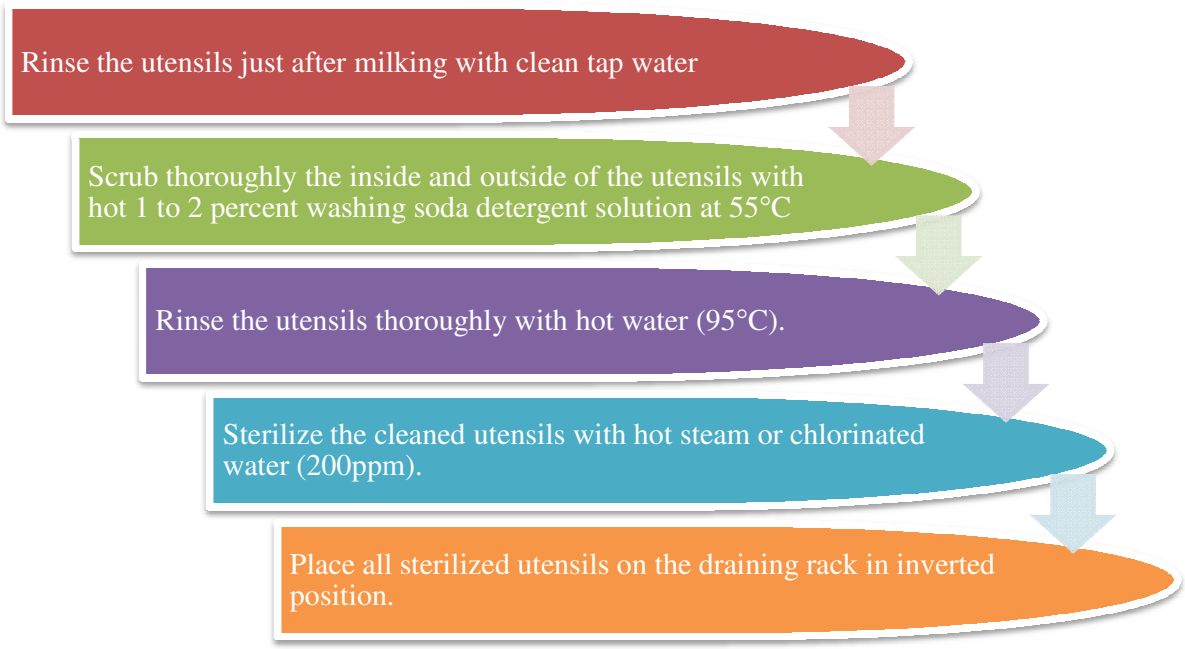


Figure 2.8: Process of cleaning the milking utensils

The Figure 2.9 summarise the entire milking process

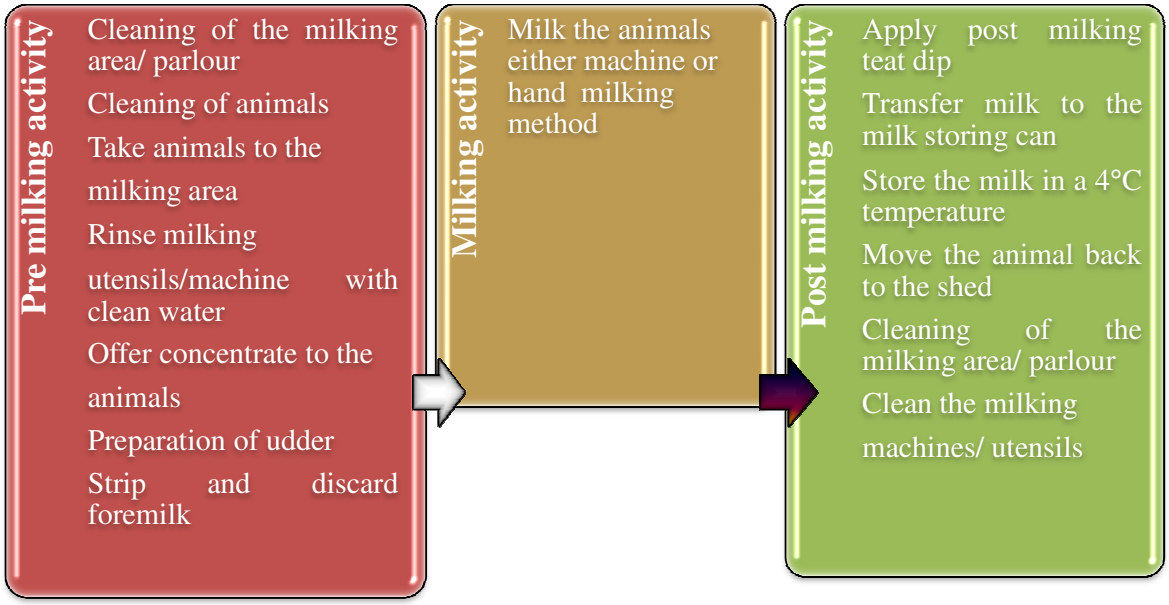


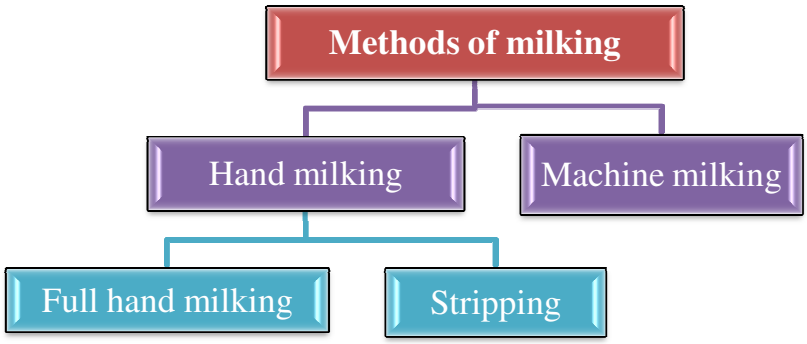
Figure 2.9: Summary of whole milking process

Methods of milking

Production of clean milk is the primary goal of a dairy farm. An efficient milking method should ensure compliance of the following:

a) Removal of maximum quantity of milk,
b) Production of dirt free milk,
c) Without injury to udder or teats,
d) Prevention of transfer of mastitis causing organisms from infected quarter to non-infected one, and
e) Efficient use of labour and equipments.

Milking methods are classified as follows:



A. Hand milking

Milking by hand is traditional way to remove milk from lactating animals for human consumption. In this system, it is also common to apply restricted suckling, where the calf is used for initiating milk ejection and allowed to suckle after milking. Dairy animal are usually milked from the left side. Hand milking is most commonly practiced in India and other developing countries, where labour is cheap and readily available. Low to medium yielding animals is suitable for hand milking. Very high yielding animals are not suitable for hand milking.

In hand milking, two methods are in practice, i.e., full hand milking and stripping.

Full hand milking: Full hand milking is best method of milking and most suited for animals having large teats. This method imitates the suckling style of the calf. This method starts with holding teats in the hand, fingers encircling the teat. The base of the teat is blocked by the fore finger and thumb which form a ring. Thus, milk is trapped in the teat cistern and milk may not return back to the gland cistern (refer to figure on internal structure of mammary gland). Concurrently, teat is squeezed between middle, ring and little fingers and the hollow palm, thus forcing milk out (Figure 2.10). Immediately after squeeze there will be complete relaxation of teat to draw the milk within the teat cistern, however the position of the hand over the teat remains same. The alternate manner of compression and relaxation of two teats (by using two hands) at quick succession take out milk at very faster rate and it sounds like a continuous stream.

Figure 2.10: Method of full hand milking

Stripping: Stripping is preferred where the teats of the animals are small. In this method, the teat is squeezed firmly at the base with thumb and fore finger. Then, drawing them down the entire length of the teat pressing it simultaneously to cause the milk to flow down in a stream (Figure 2.11). Both hands are used to milk for two different teats at the

same time, but they usually strip alternate way. The process is repeated at very quick succession. This may sometimes create discomfort to the animals. As stripping requires changing of position of hand each time, the loss of time is more than full hand milking.

Figure 2.11: Method of stripping

Figure 2.12: Method of knuckling

Faulty method of hand milking i.e., Knuckling: Knuckling is a faulty method of milking (Figure 2.12). Milker bends his/her hand against the teat. Chances of injury to the teats are very high in this method.

B. Machine milking

Machine milking is the process of harvesting milk from udder of dairy animals by milking machine (Figure 2.13). Increasing labour cost inspired the development of milking machines especially in the developed countries. It reduces the hard work during hand milking.

Principles of machine milking: Basic principle of milking machine is to pull out milk from the teat through the application of negative pressure at the teat end and to apply periodic message to the teat which prevents congestion of blood and lymph in the teat.

Parts of milking machine and their functions

The milking unit is made up of several parts

Parts	**Functions**
Vacuum pump	It creates vacuum by sucking air out of the system (pipes, receiver, etc) to create negative pressure.
Teatcups (for cows) - 4 numbers	Alternately it develops milking and message phase.
Claw	Collect milk from all of the teatcups
Pulsator	An air valve that creates ‘pulsation’ or the opening and closing of the liner

Connecting tubes

Short milk tube	Take out milk from soft rubber liner to claw
Long milk tube	Take out milk from claw to milk bucket or milkline.
Short pulse tube	Carry air from shell to air fork and vice versa to produce required pulsation
Long pulse tube	Carry air from air fork to pulsator and vice versa to produce required pulsation

Figure 2.13: Mobile bucket type milking machine suitable for medium size dairy farms

How milking machine works?

The double chambered teatcup and the pulsator allow the teats to be subjected alternately to a vacuum (milking phase) and to atmospheric pressure (massage phase). When air is removed from the pulsation chamber (area between the shell and the liner or inflation), the liner opens because the pressure inside the chamber and the pressure inside the vacuum line are the same. The vacuum at the end of the teat forces the milk out of the teat cistern into the line. However, when air is admitted inside the pulsation chamber the liner collapses beneath the teat (because the pressure inside the liner is lower than inside the pulsation chamber). During this period of "rest," the teat canal closes (but not the teat cistern), milk flow stops, and the body fluids that were "aspirated" in the tissue of the teat may leave. This

massaging action of the teatcup during a pulsation cycle prevents fluid congestion and oedema of the teat.

Advantages of machine milking

Machine milking have several advantages like

- Faster than hand milking
- Large number of animals can be milked within a short period
- Required less number of labour for milking
- Improve bacterial quality of milk

Who removes milk from udder at fastest rate? It is very interesting for the students to know that the basic processes behind hand milking, machine milking and suckling by the calves are different as explained in the Figure 2.14. You may be surprised to know that a calf can suckle more milk per unit time than even the milking machine, because the calf employs both the negative and positive pressures. The managemental implication is that the calf must be allowed to suckle for limited time.

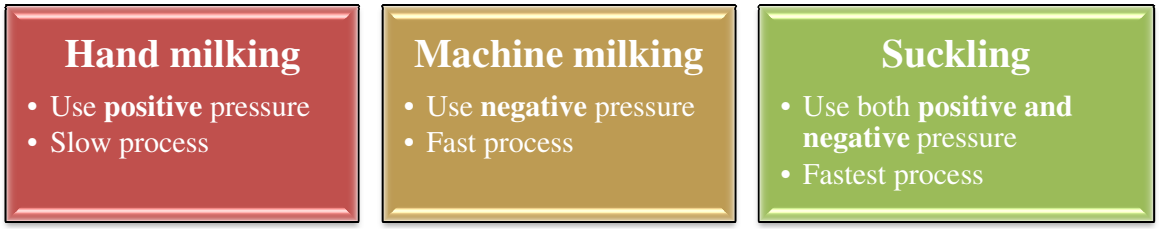


Figure 2.14: Comparison of principle of milk removal by different ways

ASSESSMENT

A. **Multiple choice**

1. In machine milking which kind of pressure applied on teat end			
a) Positive pressure	b) Negative pressure	c) Both a and b	d) None of the above
2. Milk should be stored in clean containers with a lid and kept in which temperature			
a) -4°C	b) 0°C	c) 4°C	d) 10°C
3. Which of the following stimuli initiate the milk let-down reflex			
a) Washing of udders	b) Sight of a calf	c) Smell of calf	d) All of the above

4. An efficient milking method should ensure which of the following			
a) Removal of maximum quantity of milk	b) Production of dirt free milk	c) Efficient use of labour and equipments	d) All of the above
5. Which of the following statement about knuckling is not true			
a) Fast milking method	b) Milker bends his/her hand against the teat	c) Chances of injury to the teats are very high in this method	d) Faulty method of milking

B. Fill in the blank

1. Mammary glands or udder is a modified…….
2. The let-down of milk is the result of a combination of neural and ……..actions in the animal body.
3. Secretion of ……..causes inhibition of milk ejection in spite of the release of oxytocin.
4. Dairy animal are usually milked from the ……..side.
5. The action of oxytocin only lasts for ……minutes because its concentration in the blood decreases rapidly.

C. True or false

1. Kicking can be eliminated, if pregnant heifer is groomed and handled properly.
2. The size of the two fore quarters is larger than two hind quarters
3. Basic principle of milking machine is to pull out milk from the teat through the application of positive pressure at the teat end
4. Loud noise and any kind of disturbances during milking can cause stress to the milch animals which may lead to reduction in milk production.
5. Teat dipping does not reduce existing infection.

ANSWERS

A. Multiple choice	B. Fill in the blank	C. True or false
1. b	1. Sweat gland	1. TRUE
2. c	2. Hormonal	2. TRUE

3. d	3. Adrenalin	3. FALSE
4. d	4. Left	4. TRUE
5. a	5. 7 minutes	5. FALSE

Session 2: Clean milk production

i. Source of contamination in milk

Milk is considered as the most nutritious food. In the udder of the healthy animal, milk remains in sterile condition. Milk becomes contaminated during milking, cooling and/or storage, transportation and processing. Milk is an excellent medium for the growth of bacteria, yeasts and moulds. Their rapid growth, particularly at high ambient temperatures can spoil the milk for consumption and for manufacturing dairy products. The figure 2.15 explains the major sources of contamination in milk.

Clean milk production means raw milk from healthy animals that has been produced and handled under hygienic conditions. It is free from dust, dirt, flies, manure, etc. Clean milk has a normal composition, possesses a natural milk flavour, contains only a small number of harmless bacteria, is free from hazardous chemical residues and safe for human consumption. The aim of the dairy farmers is to produce maximum milk. At the same time, it must be ensured that milk is produced in clean and hygienic condition.

Figure 2.15: Sources of contamination in milk

ii. Steps of clean milk production

Clean milk is defined as milk drawn from the udder of healthy animals, which is collected in clean dry milking pails and free from dust, dirt, flies, hay, manure etc. Clean milk possesses natural milk flavour. It is safe for human consumption. The figure 2.16 explains the advantages of clean milk production.

Figure 2.16: Advantages of clean milk production

The main sources of contamination by microorganisms in raw milk are the various objects to which milk comes in contact like udder, hands of the milker, utensils etc. The milk production steps are categorized in three steps viz., before milking, during milking and after milking.

a) **Importance of healthy dairy animal in clean milk production**

The animal itself is an important source of contamination. Milk from healthy animal is the starting point for clean milk production. The animal should be regularly (yearly) checked for tuberculosis, brucellosis and other contagious diseases. If the animal is suffering from infections such as mastitis, the milk will contain harmful pathogenic micro-organisms. Milk from diseased animals should be kept separate and disposed of safely.

The body coat of the animal provides a large surface for possible contamination. Dung, urine, uterine discharge, dirt, dust and hairs can pass millions of bacteria, when these contaminants drop from the skin and udder into the milk. Long hairs on the flanks, hind legs,

tail and udder should be clipped at frequent intervals. Grooming the animals regularly can help to keep hair and dust away from milk.

b) **Cleanliness of animal sheds and surroundings**

The sheds should be maintained in good hygienic conditions to keep the animals clean. The dung should be disposed off immediately and there should be proper drainage for the dung, urine, and waste waters going out of the sheds. The manure pit should be a little far off to prevent flies and insects entering into the sheds. Flies can carry as many as 1.25 million bacteria. They can carry typhoid, dysentery, and other contagious diseases. The milking barn should have a good floor that is easy to clean and drain. Before milking the animals, the sheds should be kept clean and dry. The sheds should be cleaned thoroughly after milking and dried and disinfected. A good supply of clean water is required.

c) **Milking sequence**

During milking there are always chances of transmission of diseases among the milking animals. To reduce the transmission of diseases among the animals, they should be milked in a sequential manner as follows.

First calver→ other healthy cows→ sick cows

First calver: A cow which has produced its first calf

The sick cows should be milked lastly and then wash and sanitize the milking system.

d) **Healthy milkers and milk handlers**

Milkers and milk handlers should be in good health and their hands should be clean and free from cuts and sores. Milker should wash hands with clean water and soap before handling milk and he/she should wear clean over-clothes and gumboots while handling milk. Persons suffering from a communicable disease or having an open sore or wound on arms, hands, head or neck should never handle milk. Coughing or sneezing near milk or milk containers should be avoided. Smoking during milking time is strictly prohibited. If the milker suffers from tuberculosis, salmonella infection, dysentery or some other disease, the risk of contamination of the milk becomes very high.

e) **Type of milking pail**

Milking pail with dome shaped top should be used instead of open buckets or vessels during milking (Figure 2.17).

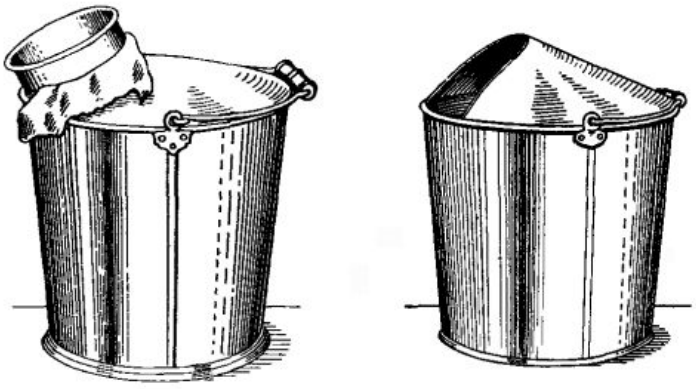


Figure 2.17: Dome shaped milking pail

f) **Discard foremilk**

It is advisable to test the foremilk at each milking with a strip cup to identifying cows with clinical mastitis. Remove 2-3 squirts of foremilk and examine with strip cup test. Abnormal milk is usually discoloured, watery and contains flakes or clots. Foremilk samples should be discarded as it has high bacteria count.

g) **Storage and transport**

Milk should be strained by strainer (Figure 2.18) and stored in container (Figure 2.19). Aluminum container is commonly used for this purpose. Milk is very sensitive to light. If exposed to direct sunlight, butterfat and some vitamins get oxidized, and the milk develops a bad, oxidized flavor. Milk should be stored in clean containers with a lid and kept in a cool (4°C) and shady place to slow or stop the growth of most bacteria. Transport milk as early as possible in clean container with minimum transport time. When milk is agitated the milk fat is destabilized and tends to oxidize easily and affect its taste. Thus, violent movement of the milk should be avoided during transportation. Milk must reach the milk collection centre quickly, ideally within 2-3 hours after milking.

Figure 2.18: Milk strainer

Figure 2.19: Aluminium cans for temporary storage of milk

Diagnose of mastitis

Mastitis is a complex disease and it may be caused by a variety of bacterial agents. Organisms invade the udder, multiply there, and produce harmful substances that result in inflammation. Mastitis cannot be eradicated but can be reduced to low levels by good management of dairy cows. Mastitis reduces milk yield and alters milk composition. In mastitis, an inflammation of the mammary gland is caused by bacterial infection, trauma, or injury to the udder.

Mastitis is one of the highest loss causing diseases for dairy farmer, as it causes various kind of losses which is described in the figure 2.20.

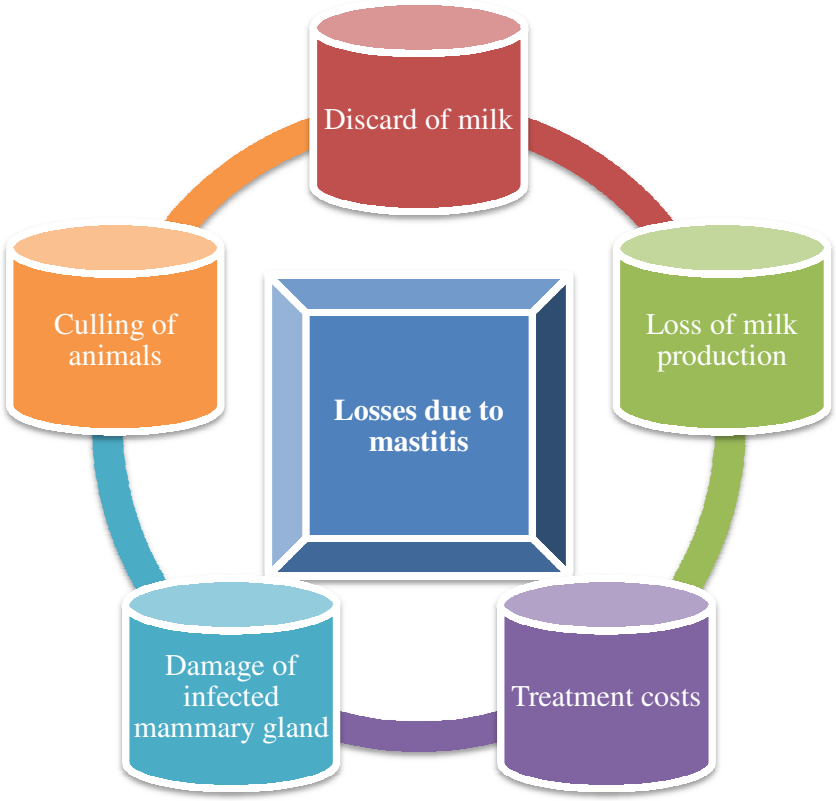


Figure 2.20: Losses due to mastitis

Mastitis is commonly classified as clinical or subclinical, depending on the degree of inflammation in the mammary gland.

Clinical mastitis

- **Clinical mastitis** is characterized by abnormalities in the milk or the udder. The udder remain hot, swollen and tender to touch The most obvious abnormalities in the milk are flakes, clots, and a watery appearance. Watery milk may produce foul smell.
-

Subclinical mastitis

- **Subclinical mastitis** is inflammation of the mammary gland that does not create visible changes in the milk or the udder. Although, the milk appears normal, subclinically infected cows will produce less milk, and the quality of the milk will be reduced. In addition, infected cows can be a source of infection to other animals in the herd.

Causes of mastitis

Mastitis is the most common and the most expensive disease of dairy cattle throughout the world. A large number of microorganisms are responsible for mastitis. They are bacteria, fungus, virus, etc. Stress, truama and physical injuries may predispose this condition.

Symptoms of mastitis

The symptoms of mastitis are described in the figure 2.21.

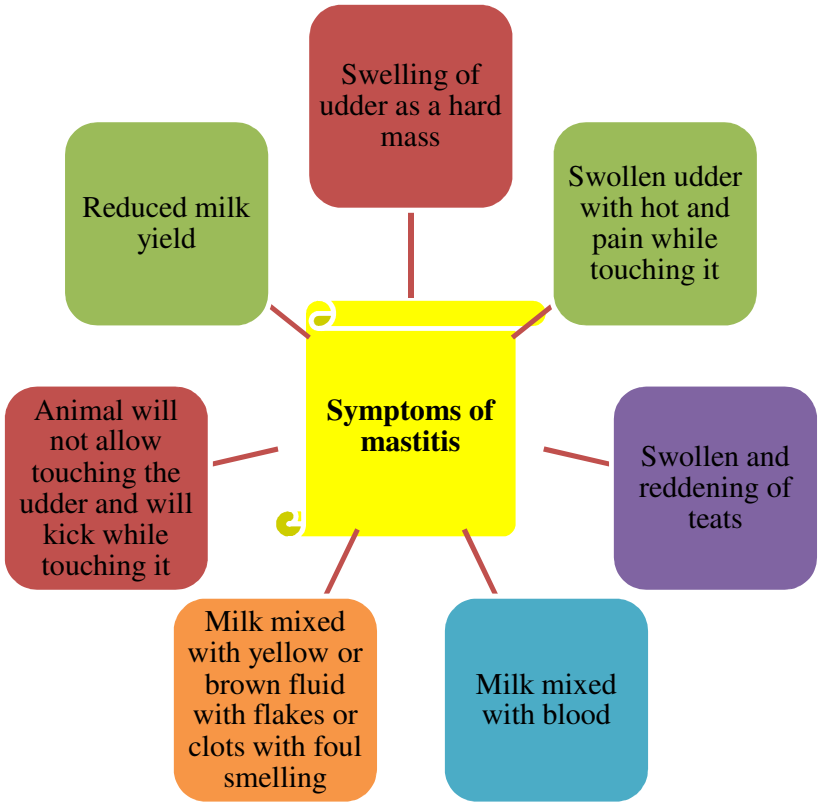


Figure 2.21: Symptoms of mastitis in dairy cattle

iii. Mastitis detection methods

1. California Mastitis Test (CMT)/ Paddle Test

The California Mastitis Test (CMT) is a simple, inexpensive, rapid screening test for mastitis (Figure 2.22 and 2.23). The test is based upon the amount of cellular nuclear protein present in the milk sample. The CMT is a reliable indicator of the severity of infection.

Figure 2.22: Empty strip cups for CMT for 4 corresponding teats

Figure 2.23: Gel formation indicates the presence of mastitis in corresponding teat after addition of CMT reagent to milk

2. Strip Cup Test

Strip cup is an instrument normally made of plastic materials, stainless steel or aluminium. The test kit is relatively expensive. It is, therefore, of high benefit to the farmers if a strips cup can be made by themselves in their farms.

3. Somatic cell counts (SCC)

Discussed in detail in the control and prevention of mastitis section.

4. Collect milk sample for culture test

For the culturing of milk, it should be collected from each of the four quarter of udder separately. Milk culturing can be done on-farm or samples can be sent to a laboratory for analysis.

iv. Control and prevention of mastitis

Control of mastitis involves a number of steps that constitute a control program.

1. Maintenance of hygienic environment

Keeping cows clean is an essential part of environmental mastitis control. The incidence of udder and skin infections increases rapidly as the cows remains in unhygienic condition. The cows should be provided with a clean, stress-free environment. Wash teats with an udder wash sanitizing solution.

2. Dry cow therapy

The udder of the dairy cow requires a non-lactating or rest period prior to calving in order to optimize milk production in the subsequent lactation. This phase of the lactation cycle is commonly referred to as the dry period. Dry cow therapy at the end of lactation is a standard part of mastitis control programs in organised dairy farm. The purposes of dry cow therapy are to treat existing infection in the udder and to prevent entry of new infection within the udder. Long-acting intramammary antibiotics administered to all quarters of all cows after the last milking of lactation is the key step in dry cow mastitis control.

3. Precaution during milking

Following precautionary measures should be adopted during milking of animals

a) Milkers to wash their hands thoroughly before and after milking each cow.
b) Use of a separate clean udder cloth or a disposable tissue for cleaning of each cow.
c) During milking constant running of water over the floor of a milking shed is recommended.
d) Regular testing for mastitis in the herd.
e) Proper sequence of milking the cows should be followed. Always start with the clean animals/herd. Cows with mastitis should be milked last and the same should apply to any infected quarter.

4. Use teat-dip with a disinfectant on all cows after every milking

To destroy microorganisms remaining on teats at the end of milking, it is necessary to use some form of postmilking teat hygiene. The most widely used procedure involves dipping teats with a suitable disinfectant soon after completion of milking.

Also offer feed to the cows so they will remain standing for a while to allow the teat sphincter to contract before lying down.

5. Proper treatment of clinically infected animals

Detect clinical mastitis early with the strip cup and use the CMT to confirm, if needed. Determine if antibiotic infusions are really needed. Once infusions are begun, complete the course of treatment as directed. Discard the milk from all quarters for the length of time directed. If response is consistently less than expected, culture the next few cases before treating. A poor response is characteristic of staphylococcus infection. Also have antibiotic sensitivities run to see what other products may be more effective. Listen to what

your veterinarian says; his experience and insight may be much more helpful than even the lab tests.

6. Applying the somatic cell count (SCC) monthly to monitor the health status of the herd

Normal milk contain large numbers of various cells like somatic cells, bacterial cell etc. Epithelial cells present in the lining of the milk secreting cells which are regularly shed-off due to natural wear and tear, and come to milk. In response to injury or infection in the mammary gland, white blood cells (leukocytes) enter into mammary gland which ultimately comes out to milk. The milk somatic cells include 75% leucocytes, i.e., neutrophils, macrophages, lymphocytes, erythrocytes, and 25% epithelial cells. Somatic cell count (SCC) of milk from a healthy mammary gland is usually less than 1lakh/ml. SCC above 10 lakhs indicates the bacterial infection and indicator of subclinical mastitis. Subclinical mastitis affects the milk quality and milk production as well as milk composition.

7. Culling of animals

Culling is the process of removing animals from a herd based on specific criteria. The treatment and retention of chronically infected cows is a threat to the production of high quality milk. Cows that do not respond favorably to treatment, and which continue to flare-up repeatedly with clinical mastitis should be culled promptly. Their continued presence in the herd may result in other cows becoming infected.

This is a vital part of a mastitis control program and should be viewed as a positive effort, rather than as a failure. Culling is especially important when the main agent involved is staphylococcus. If treated early, cases of staphylococcus can respond and heal. But once they have become recurrent they must be viewed as permanently infected carriers and spreaders. The procedures outlined above are the sort of thing that every dairyman should be doing; with few if any “shortcuts.” There are also additional recommendations for herds with specific problems.

It is very important to observe the recommended withdrawal periods for milk following treatment against mastitis. Milk containing drug residues can affect people with allergies and also cause antibiotic resistance in affected individuals.

Testing purity and fat content of milk

Milk is the single most important item of human diet. Every time we are not lucky enough to get the milk in its purest form. Recent day, adulteration in milk has been a cause of

concern for the Government, dairy Industry and consumer. The milk may have various kinds of impurities like urea, formalin, vegetable oil, starch, water, and many more. The detergent in milk can cause food poisoning and other gastrointestinal complications, the long-term effects are far more serious. Therefore, test for adulteration in milk can be done at doorstep with some common methods which does not required high end laboratory.

Milk testing using lactometer

The lactometer (figure 2.24) is a cylinder shaped glass vessel. It is made by blowing a glass tube. One side of glass tube looks like a bulb with filled by mercury and another side is thin tube which is scaled. The lactometer is also termed as hydrometer. The principle of lactometer is based on the judgment of density (also called specific gravity) of pure milk. The specific gravity of the milk varies according to the proportions of fat, SNF and water. At 15 °C (at 60°F), the normal density of the milk (g/ml) ranges from 1.028 to 1.030 for cow milk and 1.030 to 1.032 for buffalo milk, whereas water has a density of 1.0 g/ml.

The lactometer is marked with ‘M’ and ‘W’. The ideal level upto which lactometer should sink in pure milk is labeled by ‘M’. Whereas ‘W’ denotes the level of sinking of the instrument in pure water. As milk has more density than water (milk is heavier than water.), thus, in lactometer ‘W’ is above ‘M’. The length between ‘W’ and ‘M’ gives the purity of milk. When lactometer reading is closer to ‘M’, it means that the milk is relatively pure, while if the reading is closer to ‘W’ it would mean otherwise. ‘W’ which is divided in three parts and marked as 3, 2 and 1. That indicates the level of the purity in Milk. The specific gravity of milk should not be determined for at least one hour after it is drawn from the animals; else a lower than normal value will be obtained.

The advantages of use of lactometer are as follows;

- Easy to use
- Cheap and easily available
- It gives fairly accurate result.

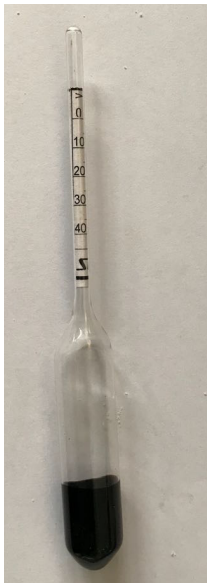


Figure 2.24: Lactometer

Milk testing using Gerber test for fat

Fat is the single most important constituent of milk as it is used as a basis for fixing the purchase and sale price of milk.

This test is a volumetric method in which fat is separated from milk by centrifugal force and accurately calibrated modified cylinder called butyrometer. Sulphuric acid is used to dissolve the protein that forms the membrane around the fat (fat globules) and amyl alcohol is added to improve the separation of fat from other solids present in the milk.

Equipment and materials required for Gerber test

a) Sulphuric acid (density 1.807 - 1.812 g/ml at 27 °C).
b) Amyl alcohol.
c) Butyrometers ((Figure 2.26) : 6%, 8% and 10% scales depending on fat content.
d) Stoppers and shaker stands for butyrometers made from a suitable grade of rubber or plastics.
e) 10 ml pipette for sulphuric acid (with rubber suction device).
f) 10.75 ml pipette for milk.
g) 1 ml pipette for amyl alcohol.
h) Centrifuge, electric or hand driven (Figure 2.25).
i) Water bath at 65 + 2 °C.

Figure 2.25: Garber centrifuge machine

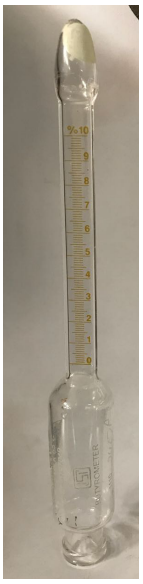
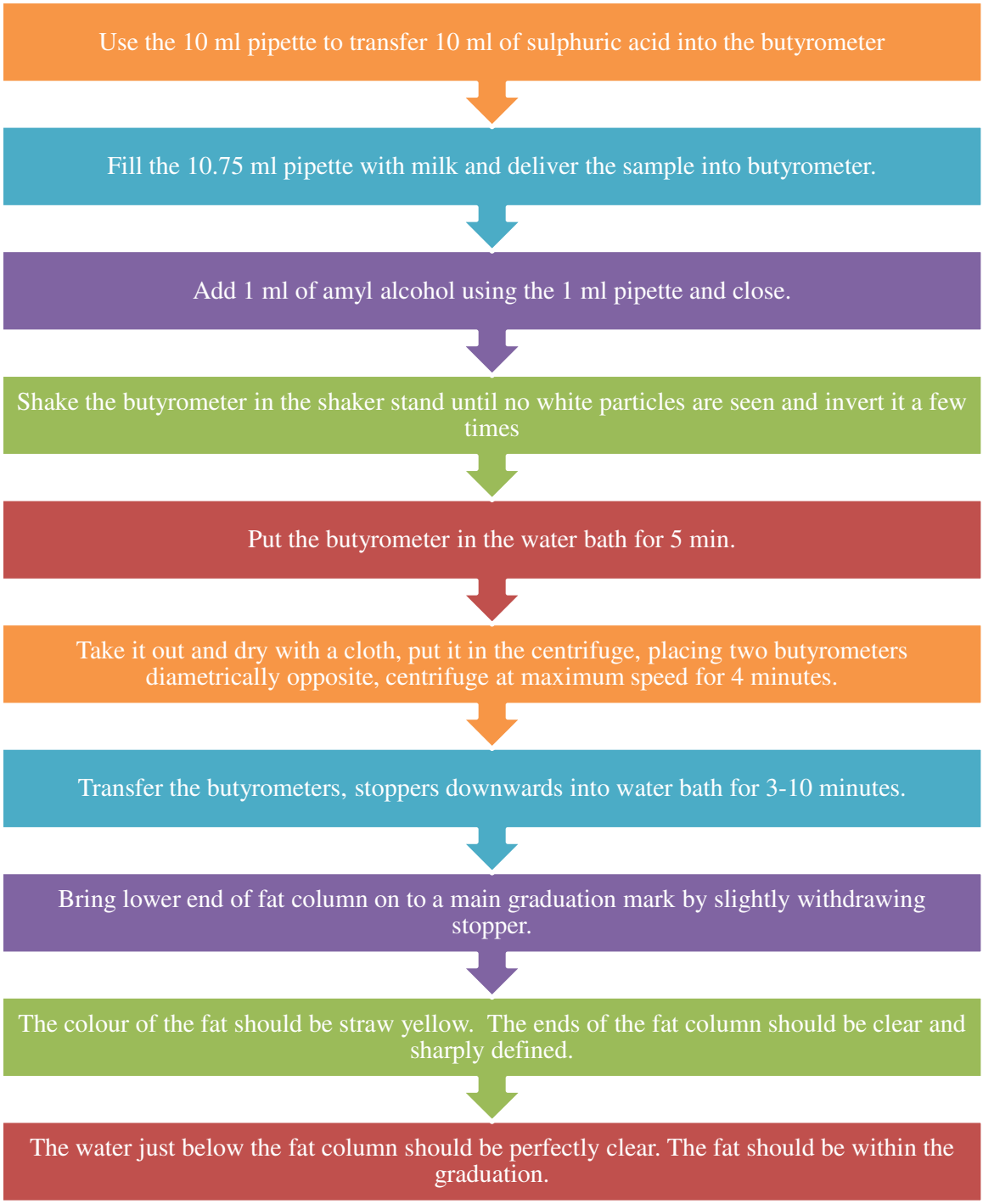


Figure 2.26: Butyrometer

Procedure

The test can be conducted with the following sequential process



The fat column should be read from the lowest point of the meniscus of the interface of the acid-fat to the 0-mark of the scale and read the butterfat percentage. The butyrometers should be emptied into a special container as it contain liquid of acid-milk which is corrosive in nature and the butyrometers should be washed in warm water and dried before the next use.

Advantages of Gerber method are as follows:

- It is very simple method
- It is very fast and accurate method
- The result can be read directly

ASSESSMENT

A. **Multiple choice**

1. Milk is not contaminated during which of the following stages			
a) Milking	b) transportation and processing	c) Cooling	d) None of the above
2. Which of the following statement about clean milk is true			
a) Normal composition	b) Possesses a natural milk flavour	c) Contains only a small number of harmless bacteria	d) All of the above
3. Which of the following diseases are not fly borne disease			
a) Typhoid	b) TB	c) Diarrhoea	d) Dysentery
4. Which of the following condition is true for clean milk production			
a) Clipping of long hairs on the flanks	b) Clipping of tail	c) Grooming	d) All of the above
5. Foremilk samples should be discarded as			
a) it has high fat content	b) it has high bacteria count	c) it is sour in taste	d) None of the above

B. Fill in the blank

1. The ……cows should be milked lastly.
2. ……the animals regularly can help to keep hair and dust away from milk.
3. ……..milk is usually discoloured, watery and contains flakes or clots.
4. A cow which has produced its first calf is termed as……...
5. Milk from ……..animals should be kept separate and disposed of safely.

C. True or false

1. Milking pail should have dome shaped top.
2. Milk is not sensitive to light.

3. Clean milk is free from dust, dirt, flies, manure, etc.
4. When milk is agitated the milk fat is destabilized and tends to oxidize easily and affect its taste.
5. Dairy animal should be regularly (yearly) checked for tuberculosis, brucellosis and other contagious diseases.

ANSWERS

1. d	1. Sick	1. TRUE
2. d	2. Grooming	2. FALSE
3. b	3. Abnormal	3. TRUE
4. d	4. First calver	4. TRUE
5. b	5. Diseased	5. TRUE

Unit 3: Record keeping in a Dairy Farm

Session 1: Dairy Farm Records

The success of livestock farming depends more on management ability rather than on hard work. Farmers can guide their workers, machines, livestock and use available resources in best possible ways. Farmers may remember important events and data but often the exact information is easily forgotten. Information about animals, inputs and prices are very useful for making farm management decisions. In India, majority of the farmers do not maintain any farm records due to lack of awareness and illiteracy. Therefore, record keeping is an essential part of livestock management. Recording can be done most easily if animals have some form of identification. Thus, animal recording and identification are inseparable. Main purposes of record keeping are shown in the figure 3.1.

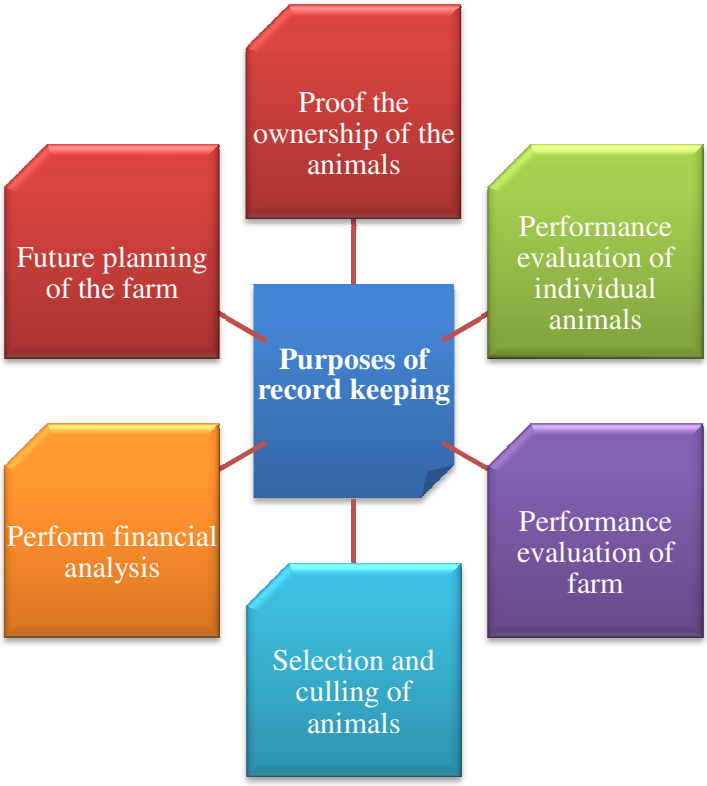


Figure 3.1: Purposes of keeping farm records

Characteristics of good farm records: A good farm record should have the characteristics as shown in the figure 3.2.

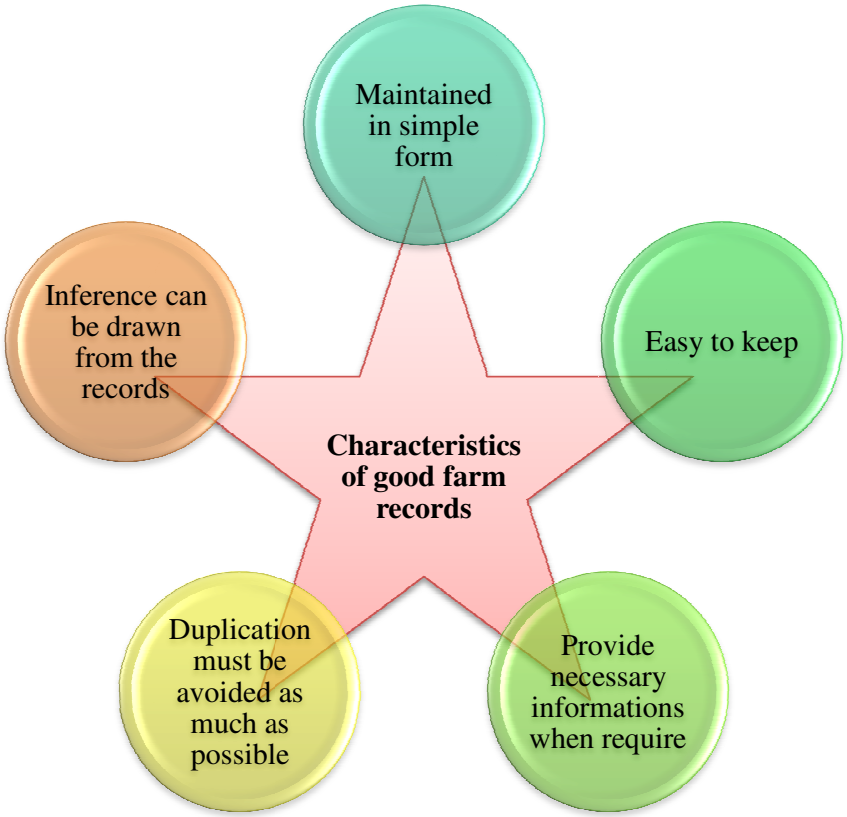


Figure 3.2: Characteristics of good farm records

Types of farm record: There are different types of records that can be kept in a livestock farm. The farmer should keep records relevant to the particular livestock farm. Records of a farm broadly classified into three basic categories (Figure 3.3).

1. Technical records

- Daily report register
- Artificial insemination register/ service register
- Calving register
- Daily milk yield register
- Feed stock register
- Feeding records
- Health records

2. Farm section records

- Fodder cultivation register
- Field register
- Labour register
- Muster roll
- Tractor logbook
- Machinery and equipment book

3. Financial records

- Store stock book
- Attendance and pay record
- Feed cost record
- Veterinary expenses,
- Cost of fodder seeds
- Equipment purchases

Figure 3.3: Classification of farm records

Ways to maintain the records

In livestock farm, records can be maintained in two ways:

- **Manual record keeping:** In manual record keeping system various forms are used varying from pocket sized cards to data register.
- **Electronic record keeping:** In electronic record keeping, farm data are maintained in the computer. Data compilation and retrieval is quite easy in electronically maintained records.

Some of the specimens of different kinds of records maintained at the animal farms are given from (a) to (j) below. The specimen records given below are not exhaustive and the animal farm may develop other records as per necessity.

a) Breeding record

S. No.	Cow tag number	Date of calving	Date of first heat after calving	First service			Second service			Third service			First pregnancy diagnosis		Second pregnancy diagnosis		Date on which further milking from cow stopped	Expected date of calving	Actual date of calving	Remarks, if any
				Date of service	Time of service	Bull tag number	Date of service	Time of service	Bull tag number	Date of service	Time of service	Bull tag number	Date	Pregnant / Non-pregnant	Date	Pregnant / Non-pregnant				
1																				
2																				
3																				
4																				
5																				

b) Calving record

S. No.	Cow tag number	Date of calving	Bull tag number	Calf tag number	Sex of calf (M/F)	Weight at birth (kg)	Remarks, if any
1							
2							
3							

4							
5							

c) Growth record of young animals

S. No.	Animal tag number	Date of birth	Weight at birth (kg)	Monthly body weight (kg)							Weight at first service (kg)	Weight at first calving (kg)	Remarks, if any
				1	2	3	….	22	23	24			
1													
2													
3													
4													
5													

d) Lactation record

S. No.	Cow tag number	Number of total calvings	Date of calving	Date of drying	Lactation yield (litres)	Peak yield (litres)	Date of peak yield	Lactation length (days)	Dry period (days)	Remarks, if any
1										
2										
3										
4										
5										

e) Daily feeding record for the month of ----------

S. No.	Dates	Number of animals	Concentrate			Green fodder			Dry fodder			Others		
			Received	Issued	Balance	Received	Issued	Balance	Received	Issued	balance	Received	Issued	Balance
1														
2														
3														
4														
5														

f) **Herd strength record maintained on daily basis**

S. No.	Dates	Cows		Heifers	Young male	Bulls	Calves		Total number of animals	Addition of animals		Deduction of animals		Remarks, if any
		Milch	Dry				Males	Females		Number of animals	From where	Number of animals	From where	
1														
2														
3														
4														
5														

g) Record of daily milk yield for the month of ….

S.	Cow tag	Date	Dates	Monthly total milk yield	Total

No.	Number	of calving	1		2		3		4		……		27		28		29		30		31			lactational yield
			M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E		
1																								
2																								
3																								
4																								
5																								

h) Vaccination record

S. No.	Dates	Name of vaccine	Route of vaccination	Number of animals vaccinated	Animal tag numbers which were vaccinated	Next due date of vaccination	Remarks, if any
1							
2							
3							
4							
5							

i) Health checkup record

S. No.	Dates	Name of test	Disease for whom test is performed	Number of animals tested	Animal numbers	Next due date of check up	Remarks, if any
1							
2							
3							
4							
5							

j) Herd health record

S. No.	Date	Animal number	History	Symptoms	Treatment	Results (cured/ died)	Name of veterinarian	Cost of treatment	Remarks, if any
1									
2									
3									
4									
5									

ASSESSMENT

A. **Multiple choice**

1. Which of the following informations are required to maintain the data of the farm			
a) Information about animals	b) Information about inputs	c) Information about prices	d) All of the above
2. Majority of the farmers do not maintain any farm records due to			
a) Lack of awareness	b) Illiteracy	c) Both a and b	d) None of the above
3. Technical records include			
a) Daily milk yield register	b) Feed stock register	c) Health records	d) All of the above
4. Farm section records include			
a) Field register	b) Labour register	c) Muster roll	d) All of the above
5. Financial records include			
a) Feed cost record	b) Veterinary expenses	c) Cost of fodder seeds	d) All of the above

B. Fill in the blank

1. .....keeping is an essential part of livestock management.
2. Recording can be done most easily if animals have some form of.....
3. In .....record keeping system various forms are used varying from pocket sized cards to data register.
4. In .....record keeping, farm data are maintained in the computer.
5. Machinery and equipment book are maintained under .....section records.

C. True or false

1. Farm records should be maintained in simple form.
2. No inference can be drawn from the records.
3. Farm records provide necessary informations when require
4. Duplication is essential in maintaining farm records.
5. The records are maintained in a farm for selection and culling of animals.

ANSWERS

1. d	1. Record	1. T

2. c	2. Identification	2. F
3. d	3. Manual	3. T
4. d	4. Electronic	4. F
5. d	5. Farm	5. T

Unit 4: Health and Safety Hazards at a Dairy Farm

Dairy farm operation is labourious and time consuming work. During the routine farm operation various kinds of risks are involved. Risks are related to the handling of animals, equipments, transmission of diseases from animal to animals, animal to human and vice versa etc. A dairy farmer must understand the biosecurity measures require to be maintained in a dairy farm.. Besides this, farm animals are suffered from various diseases. Before treating the animals by the qualified veterinarian, the farmer must know some first aid measures which can preserve life of animals, to minimize pain and suffering, to prevent the situation from deteriorating further and to promote recovery of the ailing animal. This unit deals with all these aspects.

SESSION 1: Maintaining hygiene and biosecurity of a dairy farm

i. Maintain cleanliness and hygiene at dairy farm

Cleanliness inside livestock building is not always assessed directly or evaluated quantitatively. Instead, scientists tend to focus on the animals, especially when these are dairy cows, knowing that cow cleanliness and state of the floor are closely correlated (Figure 4.1). The SCC of milk is related to hygiene of animal sheds and surroundings.

Cleanliness refers to the avoidance of dirt, whereas hygiene can have a broader meaning. In animal farming, particularly when livestock are raised in total confinement, cleanliness is of utmost importance in health maintenance, even though it is not the sole factor.

Figure 4.1: Clean animal shed

ii. Safe handling equipments and animals

Dairy farm operation is labourious and time consuming work. During the farm operation various kinds of risks are involved which are described in the figure 4.2.

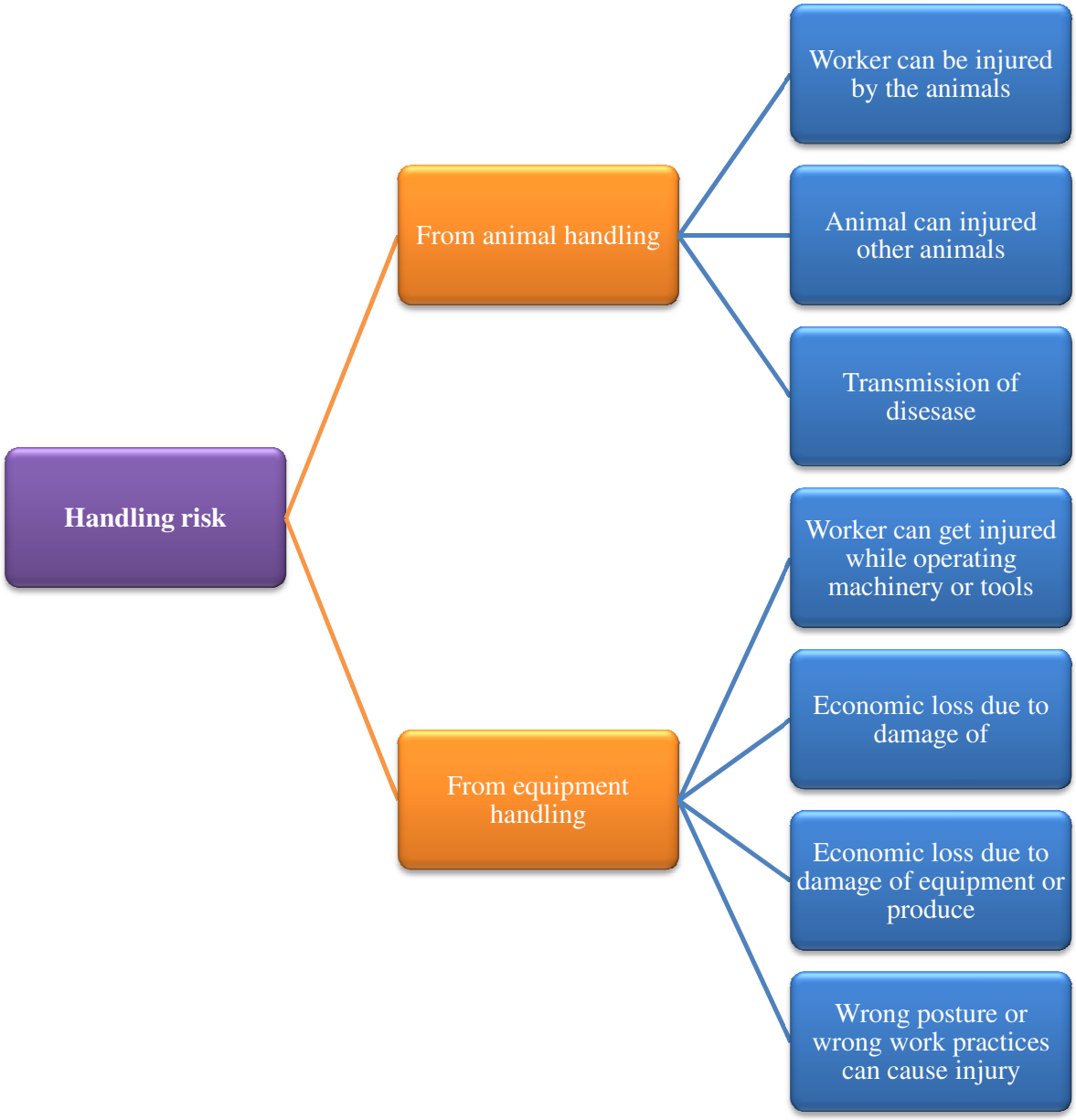


Figure 4.2: Various handling risk involve in a dairy farm

Prior to performing manual jobs, assess the risk and follow the recommended safe practice.

a) Plan and design work surfaces for safe and comfortable working.

b) Store objects for regular use safely and accessible areas.

c) Move large and heavy equipments carefully using lifts and trolleys etc.

d) Maintain yards, housing areas and milking areas clean and dry to avoid tripping and slipping.
e) Ensure gates open smoothly.
f) Avoid slippery surfaces while handling and moving animals.
g) Wear footwear with good grip.
h) Return the equipment and tools after use to its designated storage.
i) Do not leave tools and equipment unattended in the farm.
j) Reduce risk to bystanders while operating machines, tractor, moving or handling animals.
k) Use hand signals and communicate through signalling tools when working with noisy machinery.
l) Do not disturb the flora and fauna and cause damage to the environment.
m) Follow all government rules and environmental regulations.
n) Have clear work instructions and train the workers to reduce risks of accidents and problems.
o) Do mock drills to check appropriateness of emergency equipments.
p) Keep updated on government authorities, regulations and schemes for efficient working and support.

Personal protective equipment (PPE) for dairy worker

In dairy farms, it must be ensured that dairy workers are protected from injury or impairment of any bodily function that might occur through absorption, inhalation or physical contact. The dairy worker must wear protective clothing; respiratory devices; shields; barriers; and adequate protective equipment for eyes, face, head and extremities.

When considering health and safety precautions, personal protective equipment (PPE) is the last resort and should only be considered after all other means of controlling the risk have been exhausted. This is because PPE only protects the individual and does not prevent the accident from happening. Critically, it often only partially protects the wearer reducing the severity of the effects.

Common PPE used by the dairy workers

Personal protective equipment often used includes the following.

a) **Gloves**: Gloves to protect hands from contact with hazardous substances, hot or cold surfaces, stings, rough textures or sharp tools. Single-use gloves is used when treating sick animals or assisting births.

b) **Safety shoes or boots**: Safety shoes or boots - depending on their characteristics, to provide protection from materials that may be dropped, livestock that may tread on you, snake bites, weeds, slippery surfaces, sharp item penetration, water penetration.

Figure 4.3: Gumboot

Figure 4.4: Gloves

c) **Goggles**: Goggles to protect the eyes from foreign particles and fumes. Goggles should be used when weeding, welding, cutting and working in the workshop.

d) **Earplugs and earmuffs**: Earplugs and earmuffs to protect your hearing from the high noise levels emitted from some machinery, such as chainsaws, or animals, such as pigs, when housed.

e) **Face protection**: Face protection must be used while welding to protect eyes, nose and mouth from fumes, heat and stray metal. Face protection also to be worn when mixing, spraying or applying chemicals or using solvents and when grinding metal and cutting timber.

f) **Hard hats**: Hard hats to prevent injuries from falling objects.

g) **Breathing apparatus**: Breathing apparatus when working in confined spaces such as in silos.

The person should wear all necessary and prescribed protective clothing and equipment while operating machines as per manufacturer specifications. Avoid loose clothing while operating machines, tractor, etc., to prevent the clothes of dairy farm worker getting caught into moving parts.

Safety measures during the process

a) Always read instructions on labels of chemicals, pesticides, fumigants or disinfectants before use.
b) Use chemicals as prescribed by the manufacturer.
c) Use protective clothing as specified by the manufacturer while handling chemicals.
d) Appropriately dispose chemical containers and medical waste to minimise environmental damages.
e) Take immediate medical help or assistance in case of accidents due to chemicals.
f) Keep necessary emergency equipments and first aid accessible as per manufacturer's specifications while handling chemicals.
g) Keep chemicals away from reach of children and animals.

The risks associated with the dairy farm worker are as follows:

a) Problems of transmission of diseases
b) Problems related to the handling of the animals
c) Problems of the working environment

The common problems encountered in the farm and their remedial measures are given in the Table 5.6.

Table 5.6: Common problems and their remedial measures.

Common problem	Remedial measures
Damage to clothing	Wear comfortable overalls without lengthy projections that can be trapped. Wear industrial shoes or water-proof footwear
Burns and scalds	Wear hair covering. Wear gloves when handling items containing hot items, toxicants, etc.
Dust inhalations	Wear face masks to filter out dust
Cut at fingers, wrists	Wear gloves

iii. Biosecurity

Biosecurity is an institutional and personal security measures and procedures, which are used to prevent the loss, theft, misuse or intentional release of pathogens in the environment. Following are the biosecurity measures should be followed to control the spread of animals' diseases.

1. **Restricted access to the livestock farm**: A livestock farm should be secured by the fences or wall to avoid the unauthorized entry of a person and wild animal (Figure 4.5).

Figure 4.5: Figure showing restricted entry to the farm

2. **Provision of foot bath**: A foot bath of disinfectant like phenol or slake lime should be kept at the entry and exit points of animal herd to prevent the spread of pathogens (Figure 4.6).

Figure 4.6: Footbath at the entry of the farm

3. **Use of personnel protective equipment (PPEs):** while handling the animals' animal workers and veterinarian should wear the apron, gloves, mask, head mask and gumboots for their safety and security. Also frequently hand wash with soap and sanitizers.
4. **Cleaning and disinfection of farm premises**: Following steps should be followed to clean and disinfect the animal farm.
   a. Remove the used bedding and waste materials from the farm (Figure 4.7).

Figure 4.7: Farm worker cleaning paddock

b. Thoroughly dry scrub and clean the floor and wall to remove the organic matter.
c. Wet down the surfaces with the detergent and water.
d. Scrub the area and clean with the water (Figure 4.8).

Figure 4.8: Farm worker cleaning shed with water

e. Spay the disinfectant (like phenol or bleaching powder) on the surface.
f. Clean the equipment, feed tubs, buckets with detergent and water.
g. In case of a disease outbreak, additionally animal farm should be fumigated with formalin and potassium permanganate crystals.
h. Waste generated in the animal farm like manure, feeds, debris, etc. should be disposed of by burial or burning.

Disposal of carcass

Death is a normal part of any animal production. Despite our best efforts to maintain healthy animals, some still die on the farm due to diseases. Large number of animals may die as a result of natural disasters like floods, storms, heat and cold, or drought conditions. Deaths may also be attributed to chemical or toxic agents. Dead animals and other wastes (afterbirth/placenta) can be a risk to bio-security and hazardous to the environment. Putrefaction of carcass results in the gradual dissolution of tissues into gases, liquids, and salts as a result of the actions of bacteria and enzymes. They need to be disposed off in a proper manner to minimize soil and water contamination and the risk of spreading disease and attracting wildlife. Hence, prompt and sanitary disposal of animal carcasses is necessary.

1. **Carcass disposal methods**

Various methods of carcass disposal is described in figure 4.9.

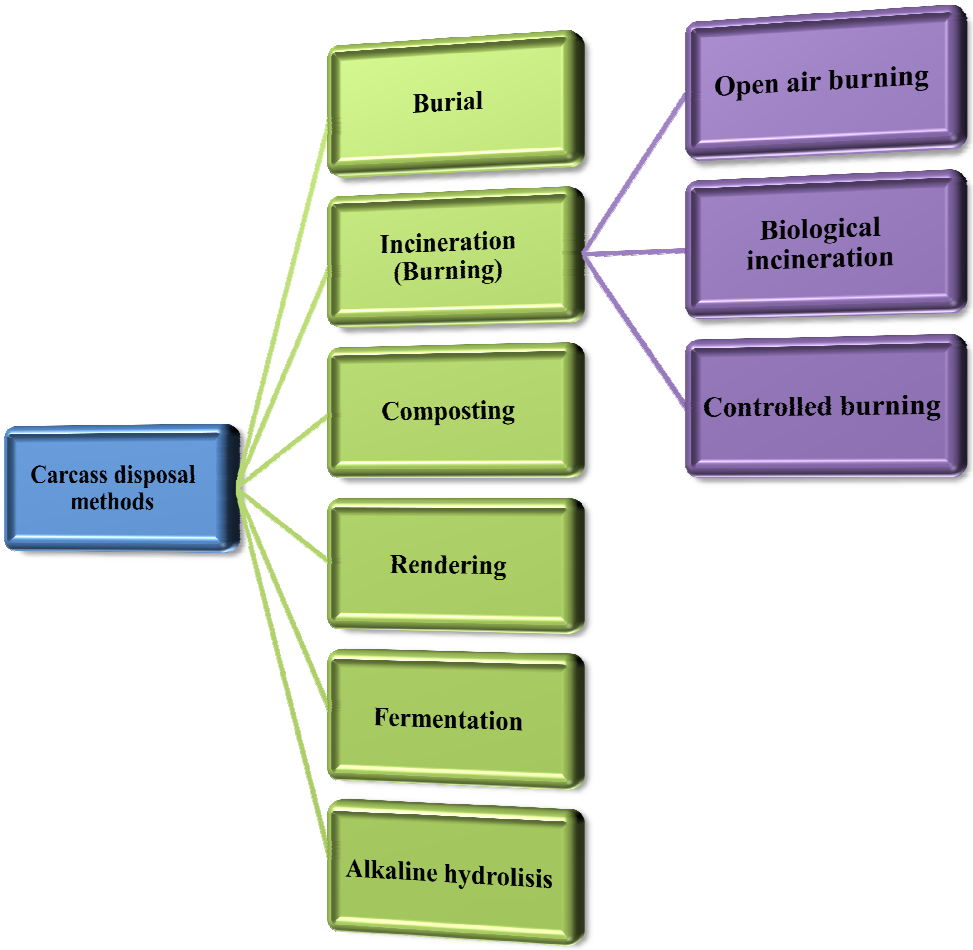


Figure 4.9: Carcass disposal methods

Among these available methods, burial and open air burning methods are commonly used for the disposal of carcass.

a) **Burial**: "Burial" means placing a carcass below the natural surface of the ground and completely covering it with soil. It is preferred because it is generally quicker, cheaper, environmentally cleaner, easiest to organize, and often the most convenient means of disposing of large numbers of livestock. It is preferred when infectious agents are involved behind the death of animals. Burial place should be about 100 meter away from the water sources (stream, pond or well). Carcasses should be covered with at least 2' of topsoil after placement in the pit.

b) **Incineration (burning):** There are three commonly used methods of incineration. They include open-air burning, biological incineration, and controlled burning.

Open air burning of animal carcasses requires addition of combustible material such as timbers and straw as fuel additives to achieve sufficient temperatures to completely consume the carcasses. Smoke from such fires can be high in particulates and/or produce offensive odors if the burn is not complete. Animals with high fat content such as pigs will burn much faster and with less fuel requirements. Other two methods are less commonly used in carcass disposal.

c) **Composting:** Composting is defined as the controlled decomposition of organic materials. This is a process of aerobic microbiological decomposition conducted in either open or closed systems. The end result of the process is the production of carbon dioxide, water vapor, heat and compost. Compost is considered to be one of the more environmentally friendly forms of carcass disposal, because end product can be utilized as fertilizer.

d) **Rendering:** Rendering is a heat driven process that boils the product between 240°F and 290°F under pressure while killing pathogens. Rendering is considered an environmentally friendly method of disposal because it recycles the animal protein from the carcasses back into a usable form as meat or bone meal.

e) **Fermentation:** This process is a closed system of anaerobic microbiological decomposition which requires prior mechanical and thermal treatment and which results in the production of biogas. This process does not inactivate pathogens, but typically uses non-dried rendered product as the input material.

f) **Alkaline hydrolysis:** Alkaline hydrolysis or tissue digestion is a relatively new technique for carcass disposal. The only by-product of the process is the mineral constituents of the bone and teeth of the carcasses. The bone remnants can be

captured and reused as calcium phosphate powder (sterile bone meal). This process requires specialized equipment and operates at 150°C for three hours.

ASSESSMENT

A. **Multiple choice**

1. Bleaching powder is a			
a) Disinfectant	b) Antibiotic	c) Antiseptic	d) Detergent
2. Steps involved in cleaning and disinfection of a farm premises			
a) Scrubbing and removal of waste	b) Cleaning with detergent and water	c) Spraying of disinfectant	d) All of the above
3. A carcass can be disposed by following method			
a) Burial	b) Burning	c) Incineration	d) All of the above
4. Following points should be followed while disposing an animal carcass			
a) Wear PPEs	b) Avoid direct contact with the dead animal's blood	c) Avoid contact with the dead animal's parasites	d) All of the above
5. Biosecurity means			
a) Security of farm premises	b) Personal security	c) Prevention of release of pathogens in the environment	d) All of the above

B. Fill in the blank

1. …… is an institutional and personal security measures to prevent the release of pathogens and infection in the environment.
2. Burial place should be about …….meter away from the water sources (stream, pond or well).
3. ……is a fixed machine fuelled by natural gas or electricity used for the disposal of animal carcass.

4. ……is a closed system for mechanical and thermal treatment of animal carcass under pressure.
5. An animal carcass should be covered with the layer of lime and soil in ……method of carcass disposal.

C. True or false

1. Incineration is a cheap method for carcass disposal.
2. A foot bath should be kept at entry and exit points of animal herd to prevent the spread of pathogens.
3. An animal farm should have more visitors.
4. An animal farm should not be secured by the fences and doors.
5. In case of a disease outbreak animal farm should be fumigated with formalin and potassium permanganate crystals.

ANSWERS

1. a	1. Bio-security	1. FALSE
2. d	2. 100	2. TURE
3. d	3. Incinerator	3. FALSE
4. d	4. Rendering	4. FALSE
5. c	5. Burial	5. TRUE

SESSION 2: Disposal of farm waste

i. Collection of manure and washing

Manure is the breeding place for a large number of pathogens and insects having parasitic importance. Under best managmental conditions, solid manure is usually collected and removed from the animal shed twice daily and flushing of the floor of the animal house. In other conditions, manure is removed from the animal house by flushing out both liquid and solid manure with water pressure by the hosepipe.

Solid waste from livestock farm is dumped in the manure pit. These wastes are gradually changed into manure by the bacterial activity after few months. The manure pit should be about 100 meters away from the animal shed and other buildings. It helps in avoiding foul smell originating from the manure pit along with safeguard against flies and insects menace. As manure is the breeding place for the flies and insects. Manure pits should be easily accessible from different parts of the farm. It should be away from the water source. A roof may be provided over the pit to protect it from rain.

Liquid manure and washing run out by the shallow drain located longitudinally to the long axis of the shed. Each shallow drain of the shed is connected to the sub-drain and subsequently to the main drain. Main drain finally connected to the liquid manure storage tank or the same can be treated by effluent treatment plant. The treated water can be reused for agricultural purposes.

ii. Method of disposal of manure

There are various methods of handing and utilization of animal waste as depicted in the Figure 4.10.

Figure 4.10: Various methods of disposal of manure

A. Utilization of Manure

There are various methods for handing and treating animal waste. Methods that are available for applying animal excreta into the soil include;

i. Farm yard manure (FYM)
ii. Conversion into compost
iii. Vermicomposting

iv. As a feed stock in biogas plants to produce gas and slurry manure.

v. Organic mulch: A layer of organic material designed to protect exposed soil or freshly seeded areas from erosion by eliminating direct impact of precipitation and slowing overland flows.

i. Farm Yard Manure (FYM)

The FYM is the decomposed mixture of dung and urine of farm animals along with litter, left over feed and fodder fed to the animals. A well decomposed FYM contains 0.7-1.3% N, 0.3-0.8% P_2O_5 and 0.4-1.0% K_2O on dry weight basis. However, composition depends on the type of animals, its ration, age, species, etc.

ii. Composting

Composting is a natural process in which organic matter is decomposed by microorganisms. This process is in practice for centuries by farmers who stock dung into piles or in pits (Figure 4.11). Composting can be either aerobic or anaerobic. The advantages of aerobic decomposing are shorter stabilization time, no foul smell and destruction of weeds and pathogens. During composting, temperatures can reach 150°F. Most pathogens that are harmful to humans can be destroyed at 131°F or higher.

Figure 4.11: Photograph showing compost pit

Composts must be handled carefully. An immature compost has a high ‘‘temperature’’ which can damage plants and in some areas immature composts created pest problems. Mature manure composts are considered the safest to use and it ranked as the best type of organic fertilizer. Older composts are best and judged by their colour and moisture. Black, dry compost is likely to be mature, whereas yellow wet compost is young and, therefore, not ready for use.

iii. Vermi-composting

The term vermi-composting means the use of earthworms for composting organic residues. Vermi-composting is the process by which earthworms are used to convert organic materials (usually wastes) into humus-like material. The goal is to process the farm waste as quickly and efficiently as possible.

Earthworms (Figure 4.12) can consume practically all kinds of organic matter and eat their own body weight per day, e.g. 1 kg of worms can consume 1 kg of residues every day. Vermi-compost is nothing but the excreta of earthworms, which is rich in humus and nutrients. The excreta (castings) are rich in various soil nutrients like nitrogen, potassium, phosphorus, calcium and magnesium. Castings contain: 5 times the available nitrogen, 7 times the available potassium and 1½ times more calcium than found in good topsoil. *Eisenia foetida* and *Lumbricus rubellus* (red worm) species of earthworms are commonly used for vermi-composting. Earthworms not only convert garbage into valuable manure but keep the environment healthy.

Figure 4.12: Earthworm used in vermicompost preparation

Benefits of vermicomposting; Vermicomposting has lot of benefits. The benefits of vermicomposting have been given in the Figure 4.13.

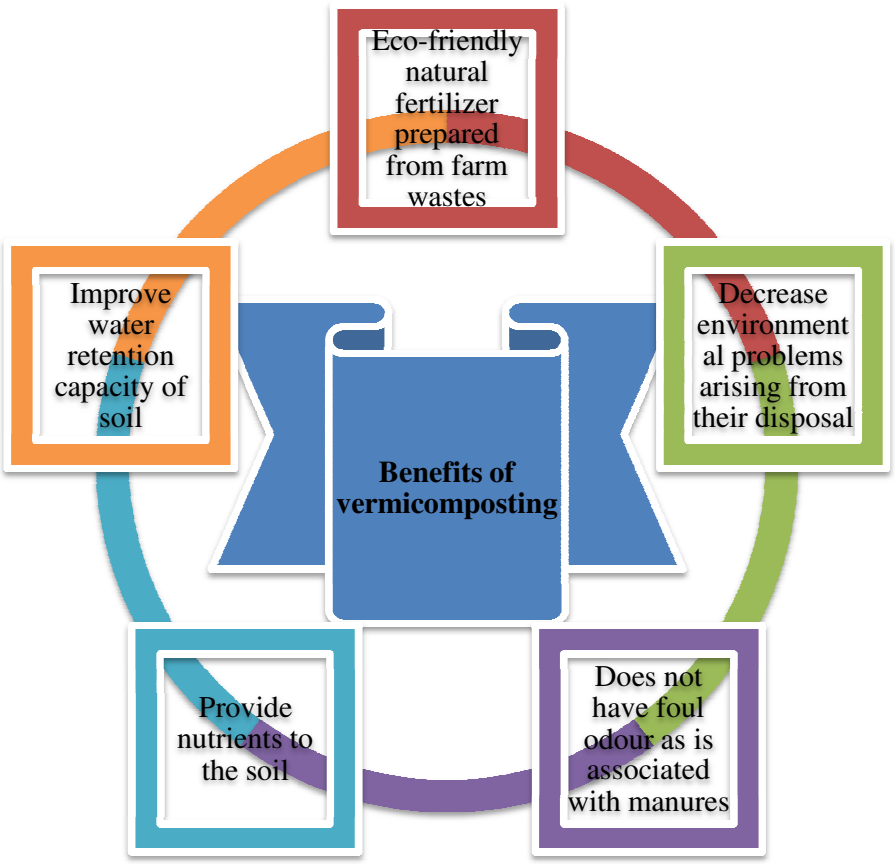


Figure 4.13: Chart describes the benefits of vermicomposting

iv. As a feed stock in biogas plants to produce gas and slurry manure

According to estimates, one kg of cattle dung produces about .073m^3 (1.3 ft^3) of biogas at atmospheric pressure. The availability of dung from a medium size cow is approximately 10 kg per day. For the smallest plant producing 1.7 m^3 (60 ft^3) of biogas, waste from at least 5 head of cattle is necessary. Biogas (1.7 m^3) produced from this small plant is considered sufficient to meet the cooking and lighting needs of a family of four. Two products are obtained from the plant, biogas and fermented slurry.

Biogas is non-poisonous, with a characteristic odour, which disappears on burning. When mixed with air, it burns with a non-luminous blue flame without producing any smoke. It has a very low level of inflammability. Biogas is used for household cooking, lighting and power. Special lamps are available for lighting where biogas can been used. For a 100 candle power mantle lamp, approximately 0.13 m^3 (4.5 ft^3) fuel gas is required per hour. Regarding the production of power, about 0.48 m^3 (17 ft^3) of biogas is required to run an engine of 1 horse power for one hour. Combustion engines, commonly available, can be run with biogas.

To do this, a special attachment is fitted to the combustion engine. Such attachments are readily available. The biogas-spent slurry is better than Farm Yard Manure (FYM) since it is well digested and has high nutrient contents.

v. Organic mulch

Mulch is a layer of material applied to the soil surface. It reduces water loss by reducing evaporation from the soil. Mulch also keeps the soil cooler, reduces weed growth, reduces run-off and reduces erosion. Manure can be used as mulch but are best mixed with other mulches, especially if the manure is fresh. Like compost, manure decomposes rapidly, so it needs frequent replenishment.

ASSESSMENT

A. Multiple choice

1. The dairy farm worker must wear protective equipments to protect			
a) eyes	b) face	c) head	d) all of the above
2. Composting is done by			
a) aerobically	b) anaerobically	c) both a and b	d) none
3. For which purpose biogas is used			
a) household cooking	b) lighting	c) power	d) all of the above
4. Which of the following condition is associated with the risk of a dairy farm worker			
a) Problems of transmission of diseases	b) Problems related to the handling of the animals	c) Problems of the working environment	d) all of the above
5. Mulch over the soil helps as			
a) soil cooler	b) reduces weed growth	c) reduces erosion	d) all of the above

B. Fill in the blank

1. PPE stands for …….
2. The manure pit is generally dug out on a dry and fairly elevated land about …….. meters away from the animals houses.
3. Manure is removed from the animal shed……. times daily

4. Vermicompost is nothing but the excreta of……., which is rich in humus and nutrients.
5. ……is the decomposed mixture of dung and urine of farm animals along with litter, left over feed and fodder fed to the animals.

C. True or false

1. Liquid waste from livestock farm is dumped in the manure pit.
2. PPE only protects the individual and does not prevent the accident from happening.
3. Slurry is obtained from FYM.
4. Black, dry is the indication of immature compost.
5. Mulch is a layer of material applied to the soil surface.

ANSWERS

A. Multiple choice	B. Fill in the blank	C. True or false
1. d	1. Personal protective equipment	1. FALSE
2. c	2. 100	2. TRUE
3. d	3. Two	3. FALSE
4. d	4. Earthworms	4. FALSE
5. d	5. FYM	5. TRUE

Unit 5: Animal Welfare Legislation

In this unit the students will learn about various forms of cruelty to animals / birds. This will help them to identify and report the same to the appropriate authority. This unit also discusses the importance of rearing of purebred indigenous animals and government projects related to the promotion of the same. Animals are worst sufferer during the disaster. Therefore, special thrust is put on the topic of preparedness for disaster to save the animals.

Session 1: Animal welfare legislation

i. Signs of healthy animal

The healthy animal is alert and aware of its surroundings (Figure 5.1 and 5.2). It is active and holds its head up watching what is happening around it. It should stand on all of its feet. If an animal stays away from other animals of the group, the same is a sign of some health problem with that animal.

A sick animal which is not interested in its surroundings and does not want to move indicating health problems (Figure 5.3 and 5.4). Following points should be considered during the examination of health of the animals.

Healthy animal	Unhealthy/ sick animal
Alertness	Lethargic/listless
Chewing cud	Ruminants not chewing their cud
Sleek coat	Rough hair coat
Bright eyes and pink eye membrane	Dull eyes
Normal feces and urine	Abnormal faeces and discolored urine
Normal temperature	High temperature
Gait steady, no limping	Limping
Normal respiration	Labored breathing/coughing
Stays in herd or flock	Separates self from herd or flock
Eats and drinks normally	Loss of appetite
Normal pulse rate	Abnormal pulse rate

Figure 5.1: A healthy sahiwal cow

Figure 5.2: A healthy murrah buffalo

Figure 5.3: A sick sahiwal cow

Figure 5.4: A sick murrah buffalo

ii. Animal well-being

Welfare is composed of the individual's health and well-being and reflects the quality of life that is lived by the individual animal. Freedom is the basic need of every farm animal and this freedom is of the following types

1. **Freedom from hunger and thirst** - by ready access to fresh water and a diet to maintain full health and vigour.

2. **Freedom from discomfort** - by providing an appropriate environment, including shelter and a comfortable resting area.

3. **Freedom from pain, injury or disease** - by prevention, or rapid diagnosis and treatment.

4. **Freedom to express normal behaviour** - by providing sufficient space, proper facilities and company of other animals of the same kind.

5. **Freedom from fear and distress** - by ensuring conditions and treatment which avoid mental suffering.

It is recommended that production systems should allow animals at least these five basic freedoms:

1) to turn around;

2) to groom themselves;

3) to get up;

4) to lie down; and

5) to stretch their limbs.

The evaluation of welfare must consider the scientific evidence available concerning the feelings of animals that can be derived from their structure and functions and also from their behaviour. Animal welfare describes how an animal is coping mentally and physically with the conditions in which it lives. Signs that an animal has a good state of welfare can include longevity, having low levels of disease, displaying normal behavior, and reproducing normally. People's concerns about animal welfare are normally based on the idea that we should take steps to maximize the well-being of animals.

iii. Animal welfare regulations

The importance that India accords to the protection of animals and their rights is reflected in the fact that the Constitution recognizes the need for their protection. Article 51A (g) enshrines and casts upon every citizen of India, the duty to have compassion for all living creatures, as a fundamental duty. In keeping with this commitment, India was also one of the first countries to enact a law on the subject of animal cruelty i.e., Prevention of Cruelty to Animals Act, 1960.

Prevention of cruelty to animals

Cruelty to animals means wilfully causing unnecessary pain or suffering to animals. Major forms of cruelty committed on the animals are of following types:

1. Beating, kicking, over-driving, over-loading, torturing etc.
2. Employing any animal for a work which that animal is unfit to perform.
3. Unreasonable administration of any injurious substance to artificially boost the performance of an animal.
4. Transporting animals in such a manner which causes pain or suffering to them.

5. Keeping animals in close confinement and overcrowded conditions.
6. Starving or keeping the animal thirsty.
7. Using animals for public entertainment.

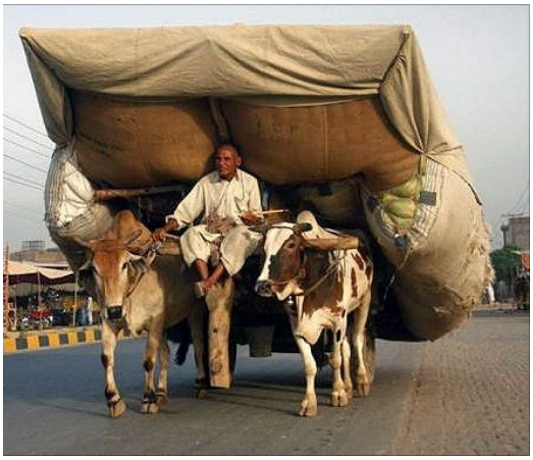
Transportation of cattle in overcrowded condition

Loading of animals to the vehicle in inhumane manners

Carrying of cattle in inhumane manners

Beating of animals

Person carrying poultry birds in unethical, stress and painful condition



Overloaded bullock cart

Figure 5.5: Various forms of cruelty to animals

The Prevention of Cruelty to Animals Act was enacted in 1960 to prevent the imposition of unnecessary pain or suffering on animals and to amend the laws relating to the prevention of cruelty to animals. After the enactment of this Act, the Animal Welfare Board of India was formed for the promotion of animal welfare. Headquarter of Animal Welfare Board of India is situated at Chennai.

The act of 1960 is a very comprehensive type of act. Various rules under the "Prevention of Cruelty to Animals Act, 1960" have been framed from time to time on the following aspects:

a) Birth control in dogs
b) Control and supervision of experiments on animals
c) Prevention of cruelty to animals in slaughter house
d) Welfare of draught and pack animals
e) Prevention of cruelty during transportation of animals

Figure 5.6: Notched ear indicating the dog is emasculated under birth control programme

Abnormal behaviour of dairy animals

Abnormal behaviour means responses that are literally 'away from the norm' or different from a given normal population. Abnormal levels of activity, abnormal posture or abnormal responses can be indicative of illness, pain or discomfort. Some abnormal responses may be harmful, maladaptive, or related to a poor environment, but there is no implication that an abnormal response is necessarily a problem for the animal.

The term 'vice' is commonly used to describe the repetitive behavour of animals in confinement which causes economic losses to producers. Certain types of abnormal

behaviour are known as vices. Vices (bad habits) may be due to a variety of causes including fear, nervousness, excessive energy, viciousness, nutritional deficiencies or boredom. Once established, vices are difficult to eliminate. Some vices lead to physiological problems, while others may be dangerous to the animal and handler, destructive to property, or just a nuisance. Therefore, it is important to be able to identify and avoid situations leading to the development of vices. Following are the typical vices observed in dairy animals.

a) Mismothering

This may be due to the mother having suffered a long and difficult birth and not being able to stand up for suckling. The calf may also be too weak to suckle. Cases of mismothering are common with cows calving in synchrony in intensively managed maternity groups.

b) Nymphomania

A cow apparently always in heat is called as nymphomania. Such cows behave like bulls, pawing and mounting but refuse to stand for mounting by other cows. It could be an inherited trait. Nymphomania is more common in high-producing dairy cows.

c) Wind sucking

It is characterized by air suckled into gastrointestinal tract and swallowed or expelled (aerophagia). Sometimes it may be seen with head nodding, crib biting and tongue rolling. Major cause of this problem is hereditary. The vices can be corrected by the application of wind sucker strap or surgical creation of fistula.

d) Kicking

Cow sometimes develops the habit of kicking. The habit may be developing due to absence of training (braking-in) of heifer prior to calving or due to improper treatment. If it is difficult to control, then “milkman’s knot” or “kicking trap” may be used.

e) Masturbation in bulls

Masturbation in bulls is common, especially in bulls on a high protein diet. The behavour can be modified by certain processes such as castration, spaying and endocrine implants to increase production and ease of handling.

ASSESSMENT

A. Multiple choice

1. Usual sign of healthy animal is			
a) Alertness	b) Bright eyes and pink eye membrane	c) Sleek coat	d) All of the above
2. Which of the following is not an abnormal behaviour			
a) Mock sucking	b) Suckling	c) Nymphomania	d) Kicking
3. Vices may be developed in dairy animals due to			
a) Fear	b) Nutritional deficiencies	c) Nervousness	d) All of the above
4. Vices lead to			
a) Physiological problems	b) Dangerous to the handler	c) Dangerous to the animal handler	d) All of the above
5. Which of the following is a not sign of unhealthy animal?			
a) Stays in herd	b) Loss of appetite	c) Rough hair coat	d) Lethargic/listless

B. Fill in the blank

1. ……..describes how an animal is coping mentally and physically with the conditions in which it lives.
2. ……..is characterized by air suckled into gastrointestinal tract and swallowed.
3. A cow apparently always in heat is called as…….
4. Masturbation in bull can be corrected by…….
5. In case of kicking habit …….. may be used to control it.

C. True or false

1. Major cause of wind sucking problem is hereditary.
2. Nymphomania is more common in low-producing dairy cows.
3. Wind sucking can be corrected by the application of wind sucker strap.
4. Clean housing improves the health of dairy animals and quality of milk production.
5. Animal welfare describes how an animal is coping mentally and physically with the conditions in which it lives.

ANSWERS

D. Multiple choice	E. Fill in the blank	F. True or false
1. d	1. Welfare	1. TRUE
2. b	2. Wind sucking	2. FALSE
3. d	3. Nymphomania	3. TRUE
4. d	4. High protein diet	4. TRUE
5. a	5. Anti cow kicker	5. TRUE

Session 2: Transportation of dairy animals and withdrawal period of drugs in dairy animals

The transport of livestock involves a series of operations including handling, loading and unloading, unfamiliar environments and in some cases, isolation, social disruption, confinement, fluctuations in environmental temperature and humidity, feed and water deprivation and other factors.

The objective of any method of transportation is to ensure the safety, security and comfort of the animal, while moving it efficiently to its destination. Transportation can result in significant stress for the animals. Transportation stress can be categorized as physical (changes in temperature, humidity, or noise), physiological (limited access to food and water) and psychological (exposure to new individuals or environments).

Purpose of transportation: Animals are transported for a number of reasons like change of ownership, marketing, re-stocking, from drought areas to better grazing, treatment, exhibitions (krishi mela) and animal fair.

Modes of transportation: The usual transportation modes are:

a) On foot (walking/trekking)
b) Road
c) Rail
d) Sea
e) Air

Loading and unloading ramps (elevators) for livestock: Ramp is the sloping surface used to allow access from one level to a higher level. It is used to load and unload the animals in the vehicle or train. Loading and unloading ramps must provide nonslip footing to prevent slippage and falling. On concrete ramps, stair steps provide good footing. The recommended angle of the loading ramp is 20° or less.

a) Transport of livestock on foot

Cattle and buffalo can be successfully moved on foot. The journey should be planned, paying attention to the distance to be travelled, opportunities for grazing, watering and overnight rest. Animals should be walked during the cooler times of the day and, if moving some distance to a railhead, they should arrive with sufficient time for rest and water before

loading. The maximum distances that these animals should be moved on foot depend on various factors such as weather, body condition, age, etc., but the distance given in the Table 5.1 should not be exceeded.

Table 5.1: Maximum distances for trekking

Species	One day journey	More than one day	
		First day	Subsequent days
Cattle/Buffalo	30 km	24 km	22 km
Sheep/goats	24 km	24 km	16 km

The specifications for transportation of animals on foot are presented in Table 5.2. No animal shall be made to walk under conditions of heavy rain, thunderstorms or extremely dry or sultry conditions during its transport on foot. No person shall transport on foot an animal before sunrise or after sunset. For short distance transport, it is the most easiest and economical method. The disadvantages of transporting by foot are time consuming; animals may expose to extreme environmental conditions and loss of body weight.

Table 5.2: Specification for transportation of animal by foot

Species	Maximum distance travel (km/day)	Speed (km/ hr)	Maximum hours traveling in a day	Period of rest, drinking and feeding	Temperature range (°C)	
					Max	Min
Cows	30	4	8	At every 2 hours for drinking and at every 4 hrs for feeding	12	30
Buffaloes	25	3	8	At every 2 hours for drinking and at every 4 hrs for feeding	12	30
Calves	16	2.5	6	At every 1½ hours for drinking and at every 3 hrs for feeding	15	25

b) Transport of livestock by road

Truck is commonly used for road transportation of livestock. The body of the truck should be cleaned with broom. Bedding materials should be provided to the floor of the truck. Sand (10-12 cm depth) or straw bedding (15 cm) can serve the purpose. The truck should be connected to the loading ramp. Open the rear door on the loading ramp and cover the gap between the door and body of the truck by a plank. Then load the animal inside the truck gently pushing the animal from behind. Inside the truck partitions should be made with

bamboo for individual animals. Make sure that the attendant is present all the time when truck moves.

While transporting the cattle, the goods vehicles shall not be loaded with any other merchandise; and to prevent cattle being frightened or injured, they should preferably, face the engine. The animals can be placed either head to head or tail to tail on the truck. Feed and water should be supplied at an interval of 8 to 10 hours. The attendant should accompany the animals to look after them during the journey. The animals should be removed from the truck at an interval of 10 to 12 hours journey and should be given rest and a little exercise on the ground. Then they should be again placed in the truck and the journey should be continued in this way.

The number of cattle per truck for safe loading is given in the Table 5.3.

Table 5.3: Number of cattle permitted per truck for transportation

Size of the truck	Average live weight (kg)				
	300	**350**	**400**	**450**	**500**
4 metre truck	11	10	9	8	7
5 metre truck	14	13	12	11	10
6 metre truck	18	16	15	13	12
7 metre truck	22	20	18	16	15

The advantages of road transport are suitability for long distance transport, freedom in choice of time of movement of the animals and direct transport of the animals at the destination. The disadvantages are that the animals are exposed to extreme stress condition, higher chance of injury and higher body weight loss due to stressful condition.

c) Transport of livestock by rail

The size of the wagon and the size of the cattle determine the number which can be loaded in a wagon. For comfort in transport the wagon should be loaded heavily enough so that the animals stand fairly close together; however, crowding should be avoided. An ordinary goods wagon shall carry not more than ten adult cattle. Following points should be kept in mind while transporting of cattle by train

1) Every wagon shall have at least one attendant.
2) Cattle shall be loaded parallel to the rails, facing each other.
3) Cattle wagon should be attached in the middle of the train.
4) Two breast bars shall be provided on each side of the wagon, one at height of 60 to 80 cm and the other at 100 to 110 cm.
5) Cow in milk shall be milked at least twice a day and the calves shall be given sufficient quantity of milk to drink.
6) As far as possible, cattle may be moved during the nights only.

The advantages of railway transport are less stress to the animals as compared to road transport, long distance can be covered in short span of time, reduced chances of bruising and other injury during handling. Disadvantages are timing of transport in accordance with the railway schedule and small number of animal transport may not be suitable.

d) Transport of livestock by sea

For centuries, animals have been transported by sea, as well as across lakes and rivers. It usually involves a long period of journey. The animals which are of high valued and to be used for breeding purposes are usually transported by sea route. About 40 square feet is required for cattle. The animals transported in crates should have dimensions like 5 feet long, 3 feet wide and 3 feet high. At every 2 to 3 hours interval, the attendant should examine the animals.

e) Transport of livestock by air

Usually highly valued animals are transported by air. Race horse, poultry parent stock are usually transported via air. But, in certain circumstances other livestock are also transported.

Animals not suitable for transport: The condition in which animals are not suitable for transport as follows:

a) Weak newborns, emaciated animals, animals with severe injuries or animals that have great difficulty walking must never be transported.
b) Animals that are nearing the time of parturition should not be transported.
c) Advanced pregnant animals should not be transported except under exceptional circumstances.

d) Pregnant animals should not be accepted for transportation when pregnancy days exceeds the number of days of pregnancy as given in the Table 5.4

Table 5.4: Species of animals and days of pregnancy restricted for transportation.

Animals	Maximum no. of days of pregnancy
Cow	250 days
Mare	300 days
Doe	115 days
Ewe	115 days

e) Animals that have given birth during the preceding 48 hours.

f) Transportation of aged animals should be avoided.

g) During very hot or cold weather or heavy rains, transportation of animals should be avoided.

Milk withdrawal period

When clinical mastitis is treated with antibiotic, milk containing drug residues can affect people with allergies and also cause antibiotic resistance in human. Milk has to be discarded during the treatment days and waiting time. In general, it is assumed that milk will be discarded for 6 days: 3 days treatment and 3 days withholding period.

ASSESSMENT

A. **Multiple choice**

1. During transportation of animals by foot, the maximum distance travelled in a single day journey for cattle should be			
a) 10 km	b) 20 km	c) 30 km	d) None of the above
2. Animals need is required to be transported for			
a) Change of ownership	b) Selling	c) Slaughter	d) None of the above
3. Which one of the following is not a vaccine			
a) Cotton strain-19	b) Rakshvac-T	c) Dewormer	d) B.Q. precipitated

4. Primary symptoms of illness in cattle are			
a) Lethargy, dull or depressed	b) Teeth grinding	c) Decreased rumination rate	d) All of the above
5. Preferable relative humidity in the animal house should be			
a) Less than 20%	b) 20-40%	c) 40-60%	d) Above 60%

B. Fill in the blank

1. ……is the sloping surface used to allow access from one level to a higher level.
2. For short distance transport, the most easiest and economical method of transport is ……
3. The recommended angle of the loading ramp is …….
4. Cattle are …… animals used to living in herds.
5. The frequency of vaccination against Black quarter is ……..

C. True or false

1. Transportation of aged animals should be avoided.
2. During transportation of cattle by rail, the cattle wagon should be attached at the end of the train.
3. Animals that are nearing the time of parturition should not be transported.
4. Vaccination is done to treat the animals.
5. Rough or aversive handling leads cattle to become frightened of people and to be stressed in their presence.

ANSWERS

G. Multiple choice	H. Fill in the blank	I. True or false
6. c	6. Ramp	6. TRUE
7. d	7. on foot	7. FALSE
8. c	8. 20° or less	8. TRUE
9. d	9. Social	9. FALSE
10. c	10. Annual	10. TRUE

Glossary

Abscess: An abscess is a tender and swelled mass which is filled with pus, often surrounded by an area of skin coloured from pink to deep red.

Adulteration: It means any material which is or could be employed for making the food unsafe or sub- standard or containing extraneous matter.

Composting: Composting is a natural process in which organic matter is decomposed by microorganisms,

Constipation: Constipation occurs when the animal cannot defecate or it passes droppings with difficulty.

Cruelty to animals: Cruelty to animals means wilfully causing unnecessary pain or suffering to animals.

Culling: Culling is the process of removing animals from a herd based on specific criteria.

Ectoparasites: Ectoparasites are the organisms which live on the skin of other animals and are responsible for causing detrimental effects to the skin and overall health of the animals on which they are living.

Hemorrhage: It means loss of blood from damaged blood vessels. A hemorrhage may be internal or external, and usually involves a lot of bleeding in a short time.

Mulch: Mulch is a layer of material applied to the soil surface. It reduces water loss by reducing evaporation from the soil.

Vaccine: A vaccine is a fluid that helps the animal's body to become immune to a disease caused by certain germs or microorganisms.

Welfare: Welfare is composed of the individual's health and well-being and reflects the quality of life that is lived by the individual animal.

Worm: Worms are the internal parasites that live and prosper in the body of the farm animals and grow at the cost of health of the farm animal, which acts as a host to the worm.