Unit 5

Health and Safety Hazards in a Dairy Farm

171009CH05

Hazard and risk are different in nature and meaning. Anything that can be dangerous or cause harm or damage is a hazard, e.g., a dairy worker harmed by an animal. A risk has the potential to cause a hazard. It is the possibility of something harmful happening at some point of time in future, e.g., a dairy worker faces the risk of being harmed by an animal. Therefore, operations in a dairy farm are labour intensive, time-consuming, and in some cases, hazardous and risky. A number of risks is involved in routine farm operations. A dairy worker, therefore, needs to be careful and understand the biosecurity measures that must be adopted in the farm. Besides, farm animals suffer from various diseases. Before taking an animal to a veterinarian, the dairy worker must be able to administer first aid to reduce its pain, prevent the situation from deteriorating further, speed its recovery and save its life. This Unit deals with all these aspects.

Fig. 5.1: A clean floor in a shed

Session 1: Maintaining Hygiene and Biosecurity in a Dairy Farm

Maintaining hygiene is the topmost priority in dairy farm operations. Lack of hygiene may cause a number of diseases in livestock, thereby, rendering economic losses to a dairy farmer and workers.

Maintaining hygiene in a dairy farm

Hygiene refers to the practice of keeping the animals, their sheds and milking area clean in order to prevent them from catching diseases and infections, thereby, leading to quality milk production. Such milk is free from substances that may cause contamination like straws, flies, microorganisms, etc.

In a dairy farm or shed, where livestock are raised in confinement, hygiene is of paramount importance. Cleanliness in a livestock building is not always assessed directly or evaluated quantitatively. Instead, the focus is on animals, especially, in case of dairy animals. But the cleanliness of a shed and dairy animals is interrelated. A clean surrounding prevents the animals from catching infections, and hence, keeps them healthy. Therefore, the milk yielded by an animal and its quality are directly affected by the hygienic conditions maintained in the shed and surrounding areas.

Safe handling of animals and equipment

Hazards and risks are related to the handling of animals, equipment and transmission of diseases from animal-to-animal, animals to humans and *vice versa*. During farm operations, various kinds of risk and hazard are involved as shown in Fig. 5.2.

Measures to check risks and hazards

Prior to performing a manual job, the dairy worker must assess the risks and hazards involved and follow safe work practices, some of these practices are as follows.

- Do not allow unnecessary visitors on the farm premises.
- Keep the housing and milking areas clean and dry to prevent tripping and slipping.

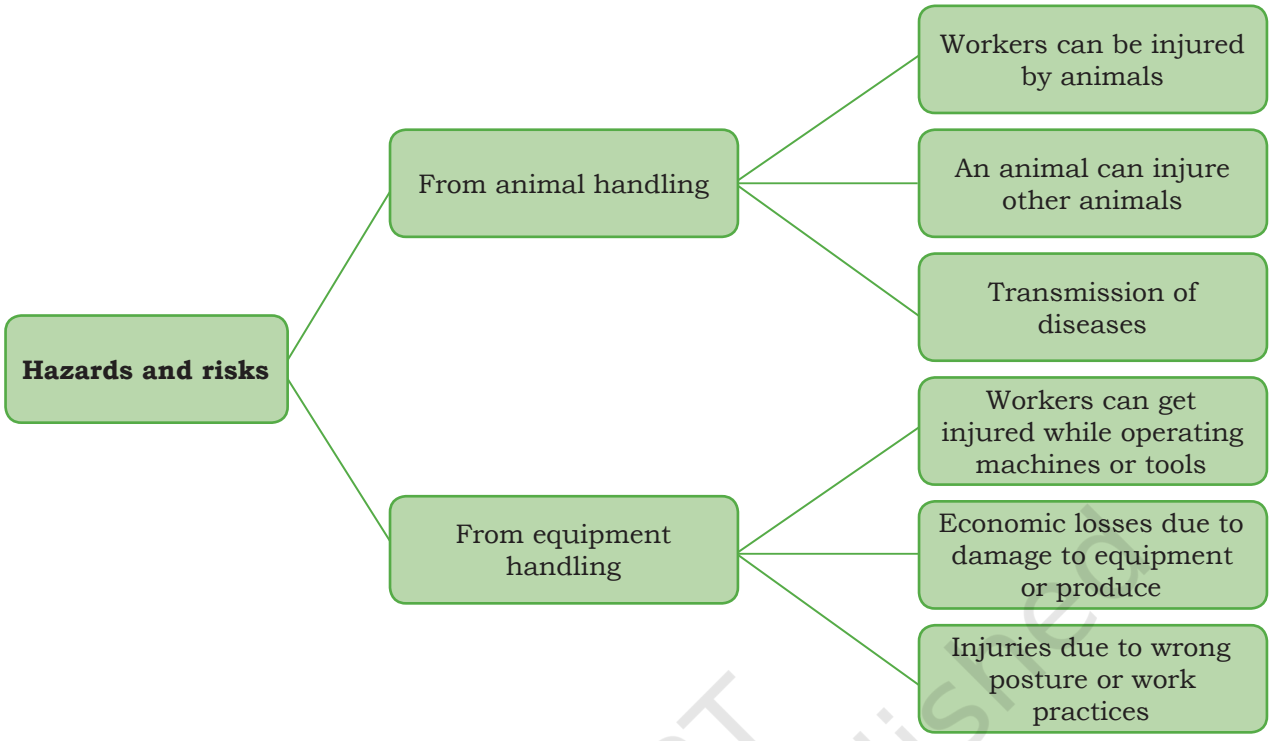


Fig. 5.2: Hazards and risks involved in dairy farm operations

- Avoid slippery surfaces while handling and moving animals.
- Wear footwear that is not slippery and appropriate for performing dairy farm work.
- Move large and heavy equipment carefully using lifts or trolleys.
- Ensure smooth opening of the farm gates.
- Keep the equipment and tools at their designated places after use.
- Do not leave tools and equipment unattended on the farm premises.
- Reduce risk to bystanders while operating machines or tractor, and while moving or handling animals.
- Use hand signals and communicate through signalling tools while working with noisy machines.
- Do not disturb the flora and fauna or cause any kind of damage to the environment.
- Check if the emergency equipment in the farm are functional.

- Keep yourself updated on government guidelines, regulations and schemes for efficient working and support.
- Follow all government rules and environment regulations.

Personal Protective Equipment

Dairy workers need to be protected from injuries that may occur due to accidents during animal handling or hazards at the workplace, such as absorption and inhalation of harmful chemicals, physical contact with an animal or machine, etc. Therefore, the dairy worker must always wear personal protective equipment (PPE) like head gear, mask, goggles, gloves and gumboots. PPE protect a person from accidents. However, it often protects the person only partially, reducing the severity of the effect(s).

The dairy worker must wear all necessary and prescribed PPE while operating machines as per the manufacturer's specifications. One must avoid loose clothing while operating machines, tractor, etc., as it may get entangled with their moving parts.

Some of the common PPE items that must be worn while performing dairy farm operations are as follows.

Fig. 5.3: Gloves

Gloves

These protect the hands from hazardous chemicals and substances, hot or cold surfaces, stings, rough textures or sharp tools. Single-use gloves are used when treating sick animals or assisting births. Such gloves must be disposed immediately after use (Fig. 5.3).

Fig. 5.4: Gumboots

Safety shoes or gumboots

Safety shoes or gumboots provide protection to the leg and feet from water, snake bites, weeds, slippery surfaces, and sharp objects like glass pieces or nails (Fig. 5.4).

Goggles

These protect the eyes from foreign particles and fumes. Goggles must be worn while welding, cutting and handling chemicals.

Earplugs and earmuffs

These protect the ears from high decibel sound or noise produced by machinery like chainsaws, etc.

Face shield

It protects the face — eyes, nose and mouth — from hazardous fumes, heat and stray metal. It must be worn while handling chemicals, grinding metal, cutting timber and welding.

Head gear

It protects the head from injuries that may be caused because of falling objects.

Breathing apparatus

It is used when working in confined spaces like silos.

Safety measures to be followed in a farm

Some of the safety measures that need to be followed in a dairy farm are as follows.

- Always read the instructions printed on the package of a chemical, pesticide, fumigant or disinfectant before use.
- Use chemicals as prescribed by the manufacturer.
- Wear protective clothing as specified by the manufacturer while handling chemicals.
- Dispose chemical containers and medical waste appropriately to minimise environmental damage.
- Take immediate medical help in case of accidents caused by chemicals.
- Keep necessary emergency equipment and first aid kit at an accessible place.
- Keep all chemicals away from the reach of children and animals.

Common risks and remedial measures

Risks associated with dairy farm operations can vary from problems related to transmission of diseases to handling of animals or the working environment. Some of the common risks encountered by a dairy worker in

a farm along with their remedial measures are depicted in Table 5.1.

Table 5.1: Common risks in a dairy farm and remedial measures

Risks	Remedial measures
Damage to the clothing and skin	Wear comfortable clothing without lengthy projections as they can get entangled with the moving parts of a machine or tool, leading to accidents and injuries. Wear PPE to avoid damage to the clothing.
Burns and scalds	Wear head gear, mask and gloves while handling hot items, toxicants, etc.
Dust and fume inhalations	Always wear a face mask.
Injury to the hand	Wear gloves to avoid injuries to the hand while working

Biosecurity

It refers to adopting strategic and integrated approach to minimise risks to animals and ensure their safety. Biosecurity in a dairy farm includes institutional and personal security measures and procedures to prevent loss, theft, misuse or intentional release of pathogens in the environment. Biosecurity is especially important for preventing the spread of infectious diseases. Apart from dairy workers wearing PPE like gloves, gumboots, face mask, etc., some of the biosecurity measures that need to be followed in the farm to check the spread of diseases in animals are as follows.

Restricted access to the farm

The livestock farm must be secured by fences, gates or a wall to avoid unauthorised entry of a person and wild animals (Fig. 5.5).

Provision of foot bath

Provision for foot bath, containing disinfectants like phenol or slake lime powder, must be ensured at the

Fig. 5.5: Restricted entry to a farm

Fig. 5.6: Foot bath at the entry of a farm

entry and exit of an animal shed or farm to prevent the entry of pathogens in the area (Fig. 5.6).

Washing the hands

The dairy workers must wash their hands with an antiseptic soap and water after cleaning animals and their sheds, and before and after milking. Besides, they must use a sanitiser at regular iuntervals.

Cleaning and disinfecting the farm

The following steps must be followed to clean and disinfect the farm premises.

- Remove used bedding and waste material from the farm immediately.
- Clean the surfaces (floor and walls) of the shed with detergent and water. Scrub the area to remove organic matter (Fig. 5.7).
- Spray disinfectants like phenol or bleaching powder on the surfaces of the farm (Fig. 5.8).
- Clean the equipment, feed tubs and buckets meant for animals with detergent and water.
- In case of a disease outbreak, the farm must be fumigated with formalin and Potassium permanganate crystals.
- Waste generated in the farm like manure, feed, debris, etc., must be disposed appropriately (buried or burnt).

Disposal of carcass

Death of an animal is normal in a farm. Dead animals and other wastes like placenta can pose a

Fig. 5.7: Cleaning a farm premises

Fig. 5.8: Cleaning a shed with water containing disinfectant

risk to the biosecurity of the farm, and therefore, be hazardous to the environment. Putrefaction of carcass results in gradual dissolution of tissues into gases, liquids and salts due to the actions performed by bacteria and enzymes.

Avoid direct contact with the dead animal's blood. Keep safe distance from the carcass to avoid contact with parasites that may be present in it. The carcass needs to be disposed appropriately and promptly to minimise soil and water contamination in order to check the risk of outbreak of diseases.

Practical Exercise

Activity

Visit a nearby dairy farm and make a note on the biosecurity measures being followed there. Also, point out any loophole that you observe in the measures being adopted in the farm.

Material required: notebook and writing material

Procedure

- Visit a nearby dairy farm.
- Observe the biosecurity measures being followed there and record them in a notebook.
- Point out if you observe any loophole in the measures being adopted in the farm.
- Draw conclusions as to what can be done to improve the farm's biosecurity.
- Give a presentation based on your observations and experience before the class.

Check Your Progress

A. Multiple Choice Questions

1. Bleaching powder is a/an _____.
   (a) disinfectant
   (b) antibiotic
   (c) antiseptic
   (d) detergent
2. Steps involved in cleaning and disinfection of a farm premises involve _____.
   (a) scrubbing and removal of waste from the area
   (b) cleaning the area with detergent and water
   (c) spraying disinfectant in the area
   (d) All of the above

3. A carcass can be disposed by _____.
   (a) burial
   (b) burning
   (c) Both (a) and (b)
   (d) None of the above
4. Which of these points must be followed while disposing a carcass?
   (a) Wear Personal Protective Equipment.
   (b) Avoid direct contact with the animal's blood.
   (c) Avoid contact with the animal's parasites.
   (d) All of the above
5. Biosecurity means _____.
   (a) security of the farm premises
   (b) personal security
   (c) preventing the release of pathogens in the environment
   (d) All of the above

B. Fill in the Blanks

1. _____ is an institutional and personal security measure to prevent the release of pathogens and infections in the environment.
2. Wearing safety boots can help avoid _____.
3. _____ use gloves are worn while treating sick animals.
4. Animals should not be taken to _____ surfaces.
5. Always use _____ signals to communicate when working with noisy machines.

C. Mark True (T) or False (F)

1. Prompt and sanitary disposal of carcass is necessary.
2. A foot bath must be maintained at the entry and exit gates of a shed to prevent the spread of pathogens.
3. Management of an animal farm can allow many visitors.
4. An animal farm should not be secured by fences and gates.
5. In case of a disease outbreak, a farm must be fumigated with formalin and Potassium permanganate crystals.

SESSION 2: DISPOSAL OF FARM WASTES

Livestock rearing generates wastes in the form of solid, liquid and gases. If not managed appropriately, these may cause pollution and adversely affect the environment. Therefore, prompt and appropriate waste disposal is important. Following inappropriate and

delayed waste disposal practices may cause several diseases and infections in healthy animals, thereby, affecting their yield and productivity.

Collection of manure

Manure serves as a breeding ground for a number of pathogens and insects, having parasitic implications.

Solid manure is, usually, collected and removed from a shed twice a day. After removing the solid manure, the floor of the shed is washed and cleaned with water and a disinfectant. In other instances, both solid and liquid manure is removed from the shed by flushing with the help of hosepipes.

Solid waste collected from the livestock farm is dumped in a manure pit. After few months, this waste is converted into manure by bacterial activity. The manure pit must be located about 100 metre away from the animal shed and nearby buildings so that the stink emanating from the pit does not reach these areas. This prevents flies and insects from finding way to the shed or nearby buildings as manure serves as a breeding ground for them. It must be ensured that the manure pit is easily accessible from different parts of the farm and is located away from water sources to prevent contamination of water. There is a roof over the pit so that it is not washed away due to rains.

Fig. 5.9: Drain parallel to the long axis in a shed

Liquid manure and washings are made to flow through shallow drains located parallel to a long axis in the shed (Fig. 5.9). Each shallow drain in the shed is connected to a sub-drain, and subsequently, to the main drain. The main drain is connected to the liquid manure storage tank. The content in the main drain may even be treated in an effluent treatment plant. The treated water can be reused for agricultural purposes. There are several methods for handing and treating animal waste.

Methods of utilising manure

Some ways of handing and utilising animal waste is depicted in Fig. 5.10.

- Farm Yard Manure (FYM)
- Compost

- Vermicomposting
- Feed stock in biogas plants to produce gas and slurry manure
- Organic mulch

Farm Yard Manure (FYM)

It is the decomposed mixture of dung and urine of farm animals, and leftover feed and fodder fed to the animals. A well decomposed FYM contains 0.7–1.3 per cent Nitrogen, 0.3–0.8 per cent Phosphorous pentoxide and 0.4–1.0 per cent Potassium oxide on dry weight basis. However, the composition may vary depending on the type of animals, their ration, age, species, etc.

Composting

It is a natural process, in which organic matter is decomposed by microorganisms. The process of composting is being practised since time immemorial

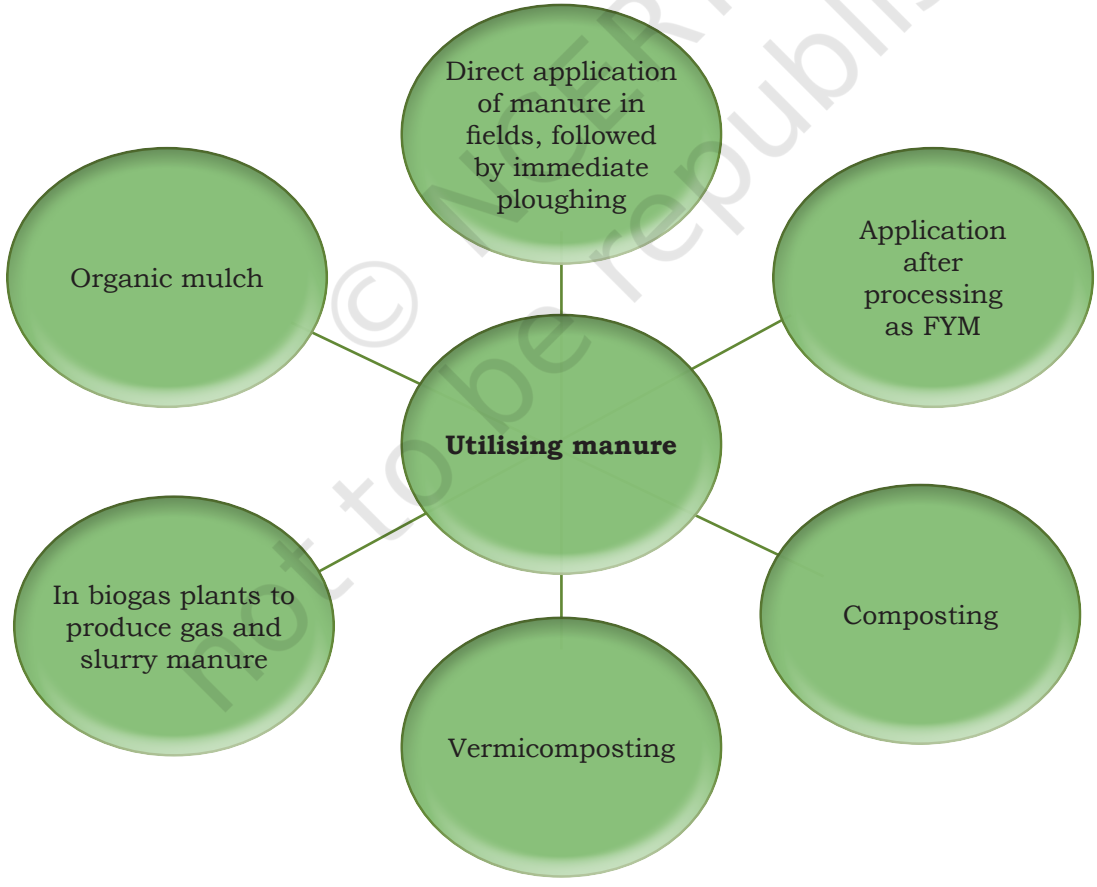


Fig. 5.10: Methods of handling animal waste

by farmers, who stock dung into piles or in pits (Fig. 5.11). Composting can be either 'aerobic' or 'anaerobic'. The advantages of aerobic composing are shorter stabilisation time, no foul smell, and destruction of weeds and pathogens. During composting, temperatures in the compost pit can reach above 500° C. Most pathogens that are harmful to human beings are destroyed at this temperature.

The compost in the pits must always be handled with caution. Immature compost has a high temperature and can damage plants. In some cases, immature composts can even lead to pest problems. Mature manure compost is the safest to use and best organic fertiliser available. Older composts are the best and can be judged by their colour and moisture content. Black and dry compost is mature, whereas, yellow and wet compost is recent, and therefore, not fit for use.

Vermicomposting

Earthworms not only convert garbage into valuable manure but keep the environment healthy. The term vermicomposting means the use of earthworms for composting organic residues. Vermicomposting is the process in which earthworms are used to convert organic waste material into humus-like material. The goal of vermicomposting is to process farm waste as quickly and efficiently as possible.

Earthworms can consume practically all kind of organic matter. One kg of earthworms can consume one kg of organic matter every day. The excreta of earthworms is called 'vermicompost'. This excreta

Fig. 5.11: Compost pit in a farm

Fig. 5.12: Earthworms used for vermicomposting

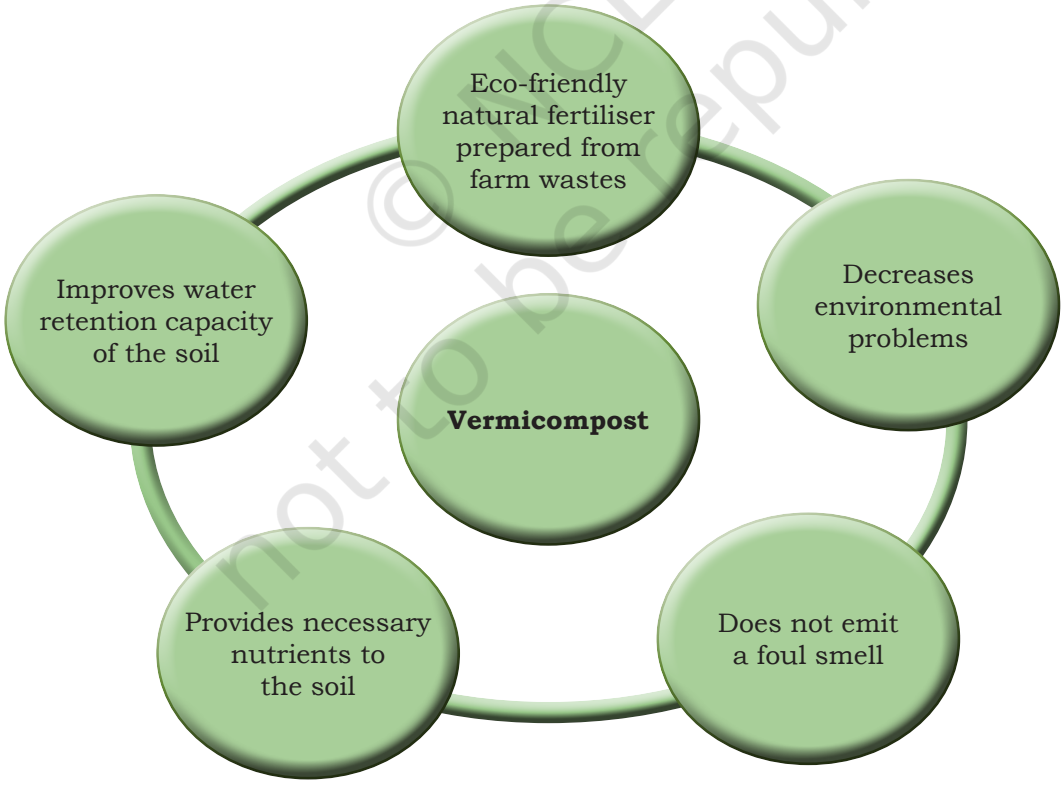
(castings) is rich in various soil nutrients like Nitrogen, Potassium, Phosphorus, Calcium and Magnesium. Vermicompost contains five times the available Nitrogen, seven times the available Potassium and one-and-a-half times more Calcium than fertile soil. *Eiseniafoetida* and *Lumbricusrubellus* (red worm) species of earthworm are commonly used for vermicomposting.

Advantages

Vermicomposting has many benefits in agricultural production. The various advantages of vermicomposting are shown in Fig. 5.13.

Feed stock in biogas plants to produce gas and slurry manure

A daily dung supply from at least five adult cows is needed for running a medium size biogas plant near a dairy farm. The plant is sufficient to meet the cooking and lighting needs of a family of four members. The plant supplies biogas and fermented slurry.



5.13: Advantages of vermicomposting

'Biogas' is a non-poisonous gas with a distinct odour and burns easily. When mixed with air, it burns in a non-luminous blue flame without producing smoke. It has a low degree of inflammability. Biogas is used for household cooking, lighting and power. Special lamps are available for lighting where biogas can be used. Commonly available combustion engines can easily run on biogas. To do this, a special attachment is fitted to the combustion engine, which is readily available. Biogas slurry is better than FYM as it is high in nutrient content.

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 and run-offs. Manure can be used as mulch but works best when mixed with other mulches, especially, if the manure is fresh. Like compost, manure decomposes rapidly, so it needs frequent replenishment.

Practical Exercise

Activity 1

Prepare vermicompost using earthworms and biodegradable waste material.

Material required: soil, water, cow dung, thatched roof, gunny bags, earthworms, organic wastes (biodegradable wastes collected from fields and kitchen), a large bin (plastic or cemented tank), straws and leaves

Procedure

- Use a plastic or concrete tank, depending on the amount of raw material being used.
- Collect waste biodegradable material in the form of a heap and place it under direct sunlight for a week.
- Prepare cow dung slurry by adding adequate water to the dung and sprinkle it on the heap for faster degradation.
- Add soil or sand at the bottom of the tank up to a few inches.
- Then, prepare a fine bedding by adding partially decomposed cow dung, dried leaves and other biodegradable wastes. Distribute them evenly on the sand or soil layer-wise. Continue adding both the chopped

bio-waste and partially decomposed cow dung layer-wise into the tank up to a depth of 0.5–1.0 ft.

- After adding all the bio-waste, release earthworms over the compost mixture and cover it with a dry straw or gunny bag.
- Sprinkle water on regular basis on the compost to maintain its moisture content.
- Cover the tank with a thatched roof to prevent the entry of ants, lizards, mice, snakes, etc., and protect the compost from rainwater and direct sunlight.
- Conduct frequent checks to avoid the compost from overheating. Maintain adequate moisture level and temperature.

Check Your Progress

A. Multiple Choice Questions

1. *Eiseniafoetida* and *Lumbricusrubellus* are the species of _____.
   (a) earthworms
   (b) roundworms
   (c) flatworms
   (d) None of the above
2. Composting is done _____.
   (a) aerobically
   (b) anaerobically
   (c) Both (a) and (b)
   (d) None of the above
3. Biogas is used in _____.
   (a) household cooking
   (b) lighting
   (c) power generation
   (d) All of the above
4. Which of the following conditions is associated with risk to a dairy farm worker?
   (a) Problem of transmission of diseases
   (b) Problem related to handling of animals
   (c) Problem related to the working environment
   (d) All of the above
5. Mulch over the soil _____.
   (a) helps as a soil coolant
   (b) reduces weed growth
   (c) reduces erosion
   (d) All of the above

B. Fill in the Blanks

1. PPE stands for _____.
2. Manure is removed from a shed _____ times daily.

3. A manure pit is, generally, dug on a dry and fairly elevated land about _____ metre away from a shed.
4. Vermicomposting is nothing but the excreta of _____.
5. _____ is the decomposed mixture of dung and urine of farm animals along with litter, leftover feed and fodder.

C. Mark True (T) or False (F)

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