

DAIRY FARMER-I | CLASS XI

UNIT 3 — Establishing Livestock within Accommodation

Easy Notes in British English | Teacher: Om Sikarwar | ClassOrb.com

■ INTRODUCTION — What Is This Unit About?

In this unit, we learn how to look after dairy animals properly on a farm. We shall study how to keep animals healthy, how to keep farm workers safe, how to remove and use animal waste (manure), and how to transport animals safely from one place to another. Good management of all these things leads to more milk production and healthier animals.

■ SESSION 1 — Keeping Cattle Healthy

Standard Practices for Maintaining Health of Cattle

The farm supervisor must observe all animals carefully every single day. Any change in an animal's normal routine — such as eating less food, behaving strangely, or appearing dull — can be an early sign of illness. Early detection helps in quick treatment and prevents the spread of disease to other animals in the herd.

Signs of Illness in Animals

- Less or no intake of feed — the animal stops eating or eats very little
- Decreased rumination — the animal stops chewing its cud (a very important sign!)
- Lethargy and dull behaviour — the animal looks sad, tired, and inactive
- Increased sensitivity — the animal reacts more than usual when touched
- Increased respiration rate — breathing becomes fast and laboured
- Teeth grinding — a sign of internal pain or discomfort
- Violent or aggressive behaviour — sudden change in temperament

Steps for Effective Supervision of Cattle Health

Step	Action to Take
Step 1	Inspect all animals for injury or illness every day
Step 2	Isolate any sick or injured animal and provide immediate care
Step 3	Call the veterinarian (vet) straight away for proper treatment

Step 4	Check all other animals for similar symptoms
Step 5	Continue monitoring the sick animal until it has fully recovered
Step 6	If an animal dies, dispose of the carcass in the correct manner

■ Vaccination — Protecting Animals Before Illness Strikes

A vaccine is a fluid containing weakened (attenuated) or killed micro-organisms. When injected into a healthy animal, it stimulates the body's immune system so the animal becomes resistant to that particular disease. Always remember: vaccines are given **ONLY** to healthy animals — never to sick ones!

Major Diseases Requiring Vaccination

Vaccine	Age of 1st Vaccination	Booster	Revaccination
FMD Vaccine	4–6 months	9 months after primary	Every year
HS Vaccine	6 months	—	Every year
BQ Vaccine	6 months	—	Every year
Anthrax Vaccine	6 months	—	Every year (affected areas)
Brucella Vaccine	4–8 months (female calves only)	—	—

■ What to Record in the Vaccination Register:

Vaccination Record Must Include:

- Name of the vaccine and manufacturer's details
- Lot / serial number and expiry date of the vaccine
- Date on which the vaccine was administered
- Route of administration (subcutaneous / intramuscular)

■■ SESSION 2 — Safety for Farm Workers & Disposal of Manure

Personal Protective Equipment (PPE)

PPE stands for Personal Protective Equipment. It refers to all the protective clothing and gear that dairy farm workers must wear to protect themselves from injuries, harmful chemicals, and diseases. Whether milking, feeding, or cleaning, wearing PPE is absolutely essential on the farm at all times.

Common PPE for Dairy Farm Workers

- Gloves — protect hands from hazardous substances, sharp tools, hot/cold surfaces
- Safety shoes / Gumboots — protect feet from animal stamps, snake bites, slippery ground
- Goggles — protect eyes from dust, straw particles, and chemical fumes
- Earplugs / Earmuffs — protect ears from loud machinery and animal noise

- Face shield — used during welding, spraying, and grinding operations
- Hard hat — protects the head from falling objects
- Breathing apparatus — essential when working inside silos or confined spaces

Risks Associated with Dairy Farm Workers

Risk Category	Explanation
Transmission of diseases	Workers can catch diseases from animals (zoonotic diseases)
Problems when handling animals	Kicks, crushes, bites, and trampling by large animals
Working environment problems	Dust, fumes, chemicals, slippery floors, loud noise

Common Problems and Remedies on the Farm

Common Problem	Remedy / Solution
Damage to clothing	Wear comfortable overalls without loose flaps; always use waterproof footwear
Burns and scalds	Cover hair; wear gloves when handling hot items, insecticides, or chemicals
Dust inhalation	Wear a face mask to filter out dust from hay, feed, and bedding
Cuts on fingers/wrists	Always wear thick protective gloves during manual tasks

Safety Rules for Using Chemicals on the Farm

- Read the labels on chemicals, pesticides, and fumigants carefully before use
- Use chemicals only as directed by the manufacturer — do not improvise
- Wear protective clothing exactly as specified by the manufacturer
- Dispose of chemical containers and medical waste in the correct manner
- Seek medical help immediately if an accident occurs
- Keep emergency equipment and a first-aid kit always accessible
- Store all chemicals well away from children and animals

■ Collection and Disposal of Manure

Proper and timely removal of manure is one of the most important tasks on any dairy farm. Solid manure must be removed from the animal shed at least twice a day. Liquid manure (called slurry) is flushed away using a water hose pipe. The manure is then transported to a manure pit located about 100 metres away from the animal house.

Important Facts About the Manure Pit

- Dug on dry, fairly elevated land — about 100 metres from animal houses
- Located away from any water source to prevent contamination
- May have a roof fitted to protect contents from rain
- Liquid manure goes to an effluent treatment plant or liquid storage tank
- Treated water from the effluent plant can be reused on agricultural crops

Methods of Disposing and Using Manure (Fig. 3.9)

Method	How It Works
Direct Application	Manure is spread directly onto agricultural fields, followed immediately by ploughing to mix it into the soil
Farm Yard Manure (FYM)	A mixture of dung + urine + leftover feed that decomposes slowly to become a natural fertiliser
Composting	Micro-organisms break down organic matter (aerobically or anaerobically) into a rich soil amendment
Vermicomposting	Earthworms consume organic waste and convert it into a highly nutritious, humus-like fertiliser
Biogas	Manure is fed into a biogas plant as feedstock to produce cooking and heating gas
Organic Mulch	A layer of organic material spread on the soil surface to reduce evaporation and suppress weeds
Organic Farming	Manure is a key requirement (prerequisite) for certified organic farming

■ Composting in Detail

Composting is a controlled process in which micro-organisms break down organic matter. It can be done in two ways: aerobically (with oxygen) or anaerobically (without oxygen). Aerobic composting is faster and does not produce bad smells. Temperatures can reach 150°F, which kills harmful pathogens and weed seeds at 131°F.

Type	How to Identify It
Mature compost	Black colour + dry texture — the BEST organic fertiliser; safe for plants
Immature compost	Yellowish colour + wet texture — NOT suitable for plants; may damage roots

■ Vermicomposting — Worm Power!

Vermicomposting uses earthworms to convert organic waste into a humus-like material. One kilogram of worms can eat one kilogram of organic matter every day! The worm excreta (called castings) are extraordinarily rich in nutrients. Common species used: *Eisenia foetida* and *Lumbricus rubellus* (red worm).

Nutrient	Amount in Earthworm Castings
Nitrogen	5 times more than in good topsoil
Potassium	7 times more than in good topsoil
Calcium	1.5 times more than in good topsoil

Benefits of Vermicomposting

- Eco-friendly and completely natural — prepared from farm waste
- Increases the water-retention capacity of soil
- Provides plants with essential nutrients
- Does not produce the foul odour associated with raw manure
- Reduces environmental pollution caused by improper manure disposal

■ Biogas — An Extra Benefit from Manure!

Biogas is a non-poisonous gas with a characteristic smell. When mixed with air, it burns with a clean, non-luminous blue flame — no smoke, very low inflammability. It is used for cooking, lighting, and power generation. The spent slurry left after biogas production is actually better than FYM as a fertiliser because it is well-digested and has a higher nutrient content.

■■ SESSION 3 — Environmental Conditions on a Dairy Farm

Farm animals are homoeothermic — meaning their body temperature stays constant regardless of the outside temperature. However, if too much heat and moisture build up inside the animal house, it causes stress, which can lead to disease and reduced milk production.

Environmental Factor	Ideal Requirement
Temperature	15°C to 27°C (any deviation reduces productivity)
Relative Humidity	40% to 60%
Ventilation	Well-ventilated to remove harmful gases
Wind Velocity	5–8 km/hr (a green belt of trees helps)
Light	Optimum natural light is preferred

Common Causes of Stress in Dairy Cattle

- Extreme heat or extreme cold

- Overcrowding — too many animals in one space
- Confinement — being kept in a restricted area
- Unfamiliar surroundings — being moved to a new place
- Unusual or loud sounds
- Sudden change in feed or fodder
- Being introduced into an unfamiliar group of animals

Remember: Cattle are social animals — they love living in herds. Isolation makes them aggressive, and rough handling makes them fearful of people.

■ SESSION 4 — Transportation of Dairy Animals

Why Are Animals Transported?

Animals may need to be transported for a number of reasons: change of ownership, marketing and sale, moving from drought areas to better grazing land, receiving veterinary treatment, attending exhibitions (Krishi Mela), or going to animal fairs and shows.

Modes of Livestock Transportation

Mode of Transport	When and Why It Is Used
On foot (walking/trekking)	Best for short distances; cheapest and easiest method
By road (truck or lorry)	Good for long distances; gives freedom of movement
By rail	Suitable for very long distances; causes less stress than road transport
By sea	Used for high-value and breeding animals travelling overseas
By air	Used only for highly valuable animals such as racehorses and poultry parent stock

Maximum Distances — Walking on Foot

Animal & Journey Type	Maximum Distance
Cattle (single day journey)	30 km
Cattle (multi-day: first day)	24 km
Cattle (multi-day: subsequent days)	22 km
Sheep / Goats (any single day)	24 km
Sheep / Goats (subsequent days)	16 km

Calves (per day)	16 km at 2.5 km/hr; max 6 hours walking
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Drinking and Feeding Intervals During Walking Transport

Animal	Care Requirements
Cows and Buffaloes	Drink every 2 hours; fed every 4 hours; max 8 hours walking per day
Calves	Drink every 1.5 hours; fed every 3 hours; max 6 hours walking per day

Animals That Should NOT Be Transported

- Weak newborns, emaciated (very thin) animals, and injured animals
- Animals close to giving birth (parturition)
- Cows pregnant beyond 190–200 days; Buffaloes beyond 210–220 days
- Animals that gave birth within the last 48 hours
- Very old (aged) animals
- Animals being transported during extremely hot, cold, or wet weather

Loading Ramp — What Is It?

A loading ramp is a sloping surface that allows animals to walk from a lower level up into a vehicle or railway wagon — and back down again when unloading. The recommended angle of a loading ramp is 20° or less. Concrete ramps must have a non-slippery surface (grooved or ribbed) to prevent animals from slipping and injuring themselves.

■ PRACTICE QUESTIONS — UNIT 3

A. Multiple Choice Questions (20 MCQs)

Q1. What does PPE stand for?

- (a) Proper Protective Environment
- (b) Personal Protective Equipment
- (c) Preventive Protective Essentials
- (d) Personal Preventive Enclosure

✓ **Answer: (b) Personal Protective Equipment**

Q2. Which of the following is a symptom of illness in cattle?

- (a) Increased milk production
- (b) Decreased rumination rate
- (c) Excessive weight gain
- (d) Very fast walking

✓ **Answer: (b) Decreased rumination rate — when a cow stops chewing its cud, it is often a key sign of illness**

Q3. Solid manure should be removed from the animal shed how many times per day?

- (a) Once
- (b) Twice
- (c) Three times
- (d) Only when the shed is full

✓ **Answer: (b) Twice daily — regular removal keeps the shed clean and animals healthy**

Q4. Where should the manure pit be located?

- (a) Right next to the animal house
- (b) Inside the milking parlour
- (c) About 100 metres away from the animal house
- (d) Near the drinking water source

✓ **Answer: (c) About 100 metres away from the animal house — to prevent disease and contamination**

Q5. Composting can be done ____.

- (a) Aerobically only
- (b) Anaerobically only
- (c) Both aerobically and anaerobically
- (d) Neither aerobically nor anaerobically

✓ **Answer: (c) Both aerobically (with oxygen) and anaerobically (without oxygen)**

Q6. Mature compost is identified by which characteristics?

- (a) Yellow colour and wet texture
- (b) White colour and powdery texture

- (c) Black colour and dry texture
- (d) Brown colour and sticky texture

✓ **Answer: (c) Black colour and dry texture — this is the best organic fertiliser**

Q7. Which earthworm species is commonly used in vermicomposting?

- (a) *Lumbricus terrestris*
- (b) *Eisenia foetida*
- (c) *Megascolex mauritii*
- (d) *Pheretima posthuma*

✓ **Answer: (b) *Eisenia foetida* (also known as the red worm or tiger worm)**

Q8. Biogas burns with which type of flame?

- (a) Luminous yellow flame with smoke
- (b) Red flame with heavy fumes
- (c) Non-luminous blue flame without smoke
- (d) Bright white flame

✓ **Answer: (c) Non-luminous blue flame without smoke — clean and efficient**

Q9. The recommended angle of a loading ramp for animals is:

- (a) 45° or less
- (b) 30° or less
- (c) 20° or less
- (d) 10° or less

✓ **Answer: (c) 20° or less — to make it easy and safe for animals to walk up**

Q10. What is the maximum distance cattle can walk in a single day?

- (a) 10 km
- (b) 20 km
- (c) 30 km
- (d) 40 km

✓ **Answer: (c) 30 km — this is the recommended maximum for a single day's walking**

Q11. Which disease requires vaccination only in female calves?

- (a) FMD
- (b) Anthrax
- (c) Haemorrhagic Septicaemia
- (d) Brucellosis

✓ **Answer: (d) Brucellosis vaccine is given only to female calves (4–8 months of age)**

Q12. What is the optimum relative humidity for a dairy animal house?

- (a) Less than 20%
- (b) 20–40%
- (c) 40–60%
- (d) Above 70%

✓ **Answer: (c) 40–60% is the ideal relative humidity range for dairy animals**

Q13. What are earthworm castings rich in?

- (a) Only nitrogen
- (b) Only phosphorus
- (c) Nitrogen, phosphorus, calcium, and magnesium
- (d) Carbon and sulphur only

✓ **Answer: (c) Nitrogen, phosphorus, calcium, and magnesium — all essential plant nutrients**

Q14. Which mode of transport is best for very highly valued animals such as racehorses?

- (a) By foot
- (b) By road
- (c) By rail
- (d) By air

✓ **Answer: (d) By air — used for highly valuable animals where speed and safety are critical**

Q15. PPE protects the worker but does NOT:

- (a) Protect the face
- (b) Prevent the accident from happening
- (c) Protect the hands
- (d) Protect the feet

✓ **Answer: (b) PPE only protects the individual — it does not prevent the accident from occurring**

Q16. Which of the following animals should NOT be transported?

- (a) A healthy young bull
- (b) A cow that gave birth 24 hours ago
- (c) A calf aged 6 months
- (d) A healthy milking cow

✓ **Answer: (b) Animals that gave birth within the last 48 hours must not be transported**

Q17. What is the optimum temperature range for dairy cattle?

- (a) 5°C to 15°C
- (b) 15°C to 27°C
- (c) 27°C to 40°C
- (d) 0°C to 10°C

✓ **Answer: (b) 15°C to 27°C — any deviation from this range reduces productivity**

Q18. Which of the following is an advantage of mulching?

- (a) Increases soil erosion
- (b) Increases weed growth
- (c) Reduces soil moisture evaporation
- (d) Makes soil hard and compact

✓ **Answer: (c) Mulch reduces evaporation, suppresses weeds, and helps control soil temperature**

Q19. Vaccines should be given to:

- (a) Only sick animals

- (b) Only pregnant animals
- (c) Only healthy animals
- (d) Any animal regardless of health status

✓ **Answer: (c) Vaccines are always given to healthy animals only — never to sick or weak ones**

Q20. Biogas-spent slurry compared to Farm Yard Manure (FYM) is:

- (a) Less nutritious
- (b) The same quality
- (c) Better quality
- (d) Not useful at all

✓ **Answer: (c) Better quality — because it is well-digested and has a higher nutrient content**

B. Fill in the Blanks (10 Questions)

1. PPE stands for _____.

Answer: Personal Protective Equipment

2. The manure pit is generally dug about _____ metres away from the animal house.

Answer: 100

3. Solid manure is removed from the animal shed _____ times daily.

Answer: two (2)

4. Vermicomposting uses _____ to convert organic waste into humus-like material.

Answer: earthworms

5. Biogas burns with a non-luminous _____ coloured flame without producing any smoke.

Answer: blue

6. A _____ is a sloping surface used to load and unload animals from vehicles.

Answer: loading ramp

7. The recommended angle of a loading ramp is _____ degrees or less.

Answer: 20

8. Cattle are _____ animals that are used to living in herds.

Answer: social

9. The optimum relative humidity in an animal house is _____.

Answer: 40–60%

10. Vaccines are always given to _____ animals only.

Answer: healthy

C. Frequently Asked Questions — Short Answers (~35 words each)

Q1. What is PPE and why is it important on a dairy farm?

PPE stands for Personal Protective Equipment. It includes gloves, safety shoes, goggles, hard hats, and face shields. It protects farm workers from injuries, harmful chemicals, and diseases whilst they carry out daily farm activities such as milking and cleaning.

Q2. What are the common signs of illness in cattle?

Common signs include decreased feed intake, reduced rumination (cud chewing), lethargy, dull behaviour, increased breathing rate, teeth grinding, heightened sensitivity to touch, and sudden violent or aggressive behaviour. Early detection is crucial for quick treatment and recovery.

Q3. Why is vaccination important in dairy farming?

Vaccination protects animals against serious diseases such as FMD, Anthrax, and Brucellosis by building immunity. It is always given to healthy animals. Vaccinated herds are more productive and require fewer veterinary treatments, saving the farmer money.

Q4. What is Farm Yard Manure (FYM)?

FYM is a natural fertiliser made from a mixture of animal dung, urine, and leftover feed. These materials decompose slowly over time. Its quality depends on the species, age, and diet of the animals. It improves soil fertility significantly.

Q5. What is the difference between aerobic and anaerobic composting?

Aerobic composting takes place with oxygen and is faster, odour-free, and kills weed seeds and pathogens. Anaerobic composting occurs without oxygen and is slower and may produce unpleasant smells. Both methods produce useful organic fertiliser for farming.

Q6. How are earthworm castings beneficial for the soil?

Earthworm castings (vermicast) are extraordinarily rich in nutrients — containing five times more nitrogen, seven times more potassium, and one and a half times more calcium than good topsoil. They greatly improve soil structure and fertility.

Q7. What is biogas, and what are its uses?

Biogas is a non-poisonous gas produced when animal manure is fed into a biogas plant. It burns with a clean, non-luminous blue flame. It is used for household cooking, lighting, and generating electricity, making farms more self-sufficient.

Q8. Why should a manure pit be located away from the animal house?

The manure pit is placed about 100 metres from the animal house to prevent the spread of diseases, eliminate unpleasant smells near the animals, and avoid contaminating drinking water sources. It is sited on dry, elevated ground.

Q9. What is vermicomposting?

Vermicomposting is a process in which earthworms — commonly *Eisenia foetida* — consume organic farm waste and convert it into a highly nutritious, humus-like material. One kilogram of worms can process one kilogram of organic matter every single day.

Q10. What is mulching and how does it benefit the farm?

Mulching involves spreading a layer of organic material over the soil surface. It reduces moisture evaporation, suppresses weed growth, prevents soil erosion, regulates soil temperature, and gradually improves soil fertility as the mulch decomposes over time.

Q11. What is a loading ramp and why is it used?

A loading ramp is a sloping surface (maximum 20°) that allows animals to walk from ground level up into a vehicle or railway wagon. It has a non-slippery surface to prevent injuries. It makes loading and unloading of animals safer.

Q12. Why should pregnant animals not be transported?

Pregnant animals near delivery are very vulnerable to stress, which may trigger premature birth, miscarriage, or injury. Cows beyond 190–200 days of pregnancy and buffaloes beyond 210–220 days must not be transported under any circumstances.

Q13. What does 'homoeothermic' mean in the context of dairy animals?

Homoeothermic means that an animal can maintain a constant body temperature regardless of the environmental temperature. Cattle are homoeothermic. However, excessive heat or cold in the animal house still causes stress and reduces productivity.

Q14. What is the optimum temperature range for dairy cattle?

The optimum temperature for dairy cattle is between 15°C and 27°C. Any temperature outside this range — whether too hot or too cold — causes physiological stress, reduces milk production, affects feed intake, and may lead to illness.

Q15. Why are cattle called social animals?

Cattle are naturally social creatures that prefer to live in herds. Isolation from the herd causes them significant stress, which can lead to aggressive behaviour. Rough handling by farm workers also makes cattle fearful and difficult to manage.

Q16. Name five reasons why animals are transported.

Animals are transported for: (1) change of ownership or sale, (2) marketing at fairs, (3) moving from drought areas to better grazing lands, (4) receiving veterinary treatment, and (5) attending agricultural exhibitions such as Krishi Mela.

Q17. Why is air transport used for certain animals?

Air transport is used for highly valuable animals such as racehorses and poultry parent stock. It is fast, reduces travel time, and minimises stress. Although expensive, it is the safest option for animals whose value justifies the cost.

Q18. What are the steps to follow when a sick animal is identified on the farm?

Inspect all animals; isolate the sick one immediately; call the veterinarian at once; check other animals for similar symptoms; monitor the sick animal regularly until it recovers fully; if it dies, dispose of the carcass appropriately and safely.

Q19. What is slurry in dairy farming?

Slurry is liquid or semi-liquid animal waste produced in the animal shed. It is flushed away using a water hose pipe. It goes to an effluent treatment plant or liquid storage tank, and treated water can be reused on crops.

Q20. What details must be recorded in a vaccination register?

The vaccination register must record: the name of the vaccine, manufacturer details, lot or serial number, expiry date, the date it was administered, the route of administration (subcutaneous or intramuscular), and the animals that were vaccinated.

D. Long Answer Questions (10 Questions)

Q1. Describe in detail the standard practices for maintaining the health of cattle on a dairy farm.

Maintaining cattle health begins with daily, careful observation of every animal by the farm supervisor or manager. Any deviation from normal behaviour — such as reduced feed intake, slowed rumination, lethargy, teeth grinding, increased breathing rate, or sudden aggression — must be treated as a potential sign of illness. The recommended six-step health supervision process is as follows: First, inspect all animals every morning for any signs of injury or illness. Second, isolate any sick or injured animal in a separate pen and provide immediate supportive care. Third, contact a qualified veterinarian without delay for proper diagnosis and treatment. Fourth, examine all other animals in the herd for similar symptoms to detect any outbreak early. Fifth, continue monitoring the sick animal at regular intervals until it has made a full recovery. Sixth, if an animal unfortunately dies, dispose of the carcass in an environmentally responsible and legally approved manner — never leave it exposed. In addition to daily observation, a structured vaccination programme is essential. Core vaccines such as those for Foot and Mouth Disease (FMD), Haemorrhagic Septicaemia (HS), Black Quarter (BQ), Anthrax, and Brucellosis must be administered at the recommended ages. Vaccination records should include the vaccine name, manufacturer details, lot number, expiry date, date of administration, and the route used. It is critically important to remember that vaccines must only be given to healthy animals — administering them to sick or stressed animals is ineffective and potentially harmful. A clean, well-ventilated animal house that maintains a temperature of 15–27°C and relative humidity of 40–60% further supports animal health by reducing environmental stress.

Q2. Explain the importance of Personal Protective Equipment (PPE) for dairy farm workers.

Describe various types of PPE and the problems they prevent.

Dairy farming involves a range of physical risks — exposure to chemicals, direct contact with large and potentially dangerous animals, inhalation of dust and fumes, and the possibility of slipping on wet or soiled surfaces. Personal Protective Equipment (PPE) is the collective term for all the specialised clothing and gear that workers must wear to protect themselves from these hazards. PPE does not prevent accidents from happening — it minimises the severity of injury when an accident does occur. Therefore, wearing PPE at all times on the farm is not optional; it is absolutely essential. The main types of PPE used on dairy farms are as follows. Gloves protect the hands from hazardous substances, sharp tools, hot surfaces, and cold temperatures. Safety shoes or gumboots (Wellington boots) protect the feet from animal stamps, snake bites, and slippery, waterlogged surfaces. Goggles protect the eyes from dust particles, straw, and chemical fumes — particularly during cleaning and spraying operations. Earplugs or earmuffs protect the ears from the high noise levels produced by milking machines, tractors, and loud animals such as pigs. A face shield provides full protection for the eyes, nose, and mouth during activities such as welding, grinding, or chemical spraying. A hard hat protects the head from objects that may fall from above. A breathing apparatus — such as a respirator — is essential when working in confined spaces such as silage silos, where toxic gases may accumulate. In terms of chemical safety, workers must always read the chemical label carefully, use protective clothing as specified by the manufacturer, keep chemicals away from children and animals, and seek immediate medical help in the event of any accident. Emergency equipment and first-aid kits must always be kept accessible on the farm.

Q3. What are the various methods of manure disposal and utilisation on a dairy farm? Explain each method in detail.

Animal manure is one of the most valuable by-products of dairy farming. If managed properly, it becomes a rich resource for improving soil fertility and generating clean energy. There are several methods of disposing of and utilising manure effectively. Direct application involves spreading fresh manure directly

onto agricultural fields and immediately ploughing it into the soil. This prevents nutrient loss through evaporation and quickly enriches the soil. Farm Yard Manure (FYM) is produced when dung, urine, and leftover feed are allowed to decompose slowly together. The quality of FYM depends on the species, age, and diet of the animals. It is a gentle, long-lasting soil fertiliser. Composting is a controlled decomposition process managed by micro-organisms. It can be aerobic (with oxygen — faster, no bad smell, kills pathogens at 131°F) or anaerobic (without oxygen — slower). Mature compost is identified by its black colour and dry texture and is the finest organic fertiliser available. Vermicomposting uses earthworms — particularly *Eisenia foetida* — to convert organic waste into a highly nutritious humus-like material. The earthworm castings contain five times more nitrogen, seven times more potassium, and 1.5 times more calcium than good topsoil. Biogas production involves feeding manure into a biogas plant. The manure decomposes anaerobically and releases biogas, which burns with a clean blue flame and is used for cooking, lighting, and generating electricity. The spent slurry remaining is a better fertiliser than FYM. Organic mulch is a layer of organic material applied to the soil surface. It reduces moisture evaporation, suppresses weeds, prevents erosion, and gradually decomposes to improve soil fertility. Finally, in organic farming, manure is an essential and mandatory input — farms cannot be certified as organic without using animal manure instead of synthetic fertilisers.

Q4. Describe the process of vermicomposting in detail, including its benefits and the role of earthworms.

Vermicomposting is a highly efficient, eco-friendly method of converting organic farm waste — including animal manure, kitchen waste, crop residues, and other biodegradable materials — into a valuable, nutrient-rich fertiliser using earthworms. The process begins by preparing a vermicomposting bed or pit. Organic waste is layered into the bed and kept moist. Earthworms — most commonly *Eisenia foetida* (the tiger worm or red worm) or *Lumbricus rubellus* — are introduced into the bed. These worms consume the organic material at a remarkable rate: one kilogram of worms can eat one kilogram of organic matter every single day. As the worms feed, they digest the organic matter and excrete it in the form of castings (also called vermicast). These castings are exceptionally rich in plant nutrients. Research shows that earthworm castings contain five times more available nitrogen, seven times more available potassium, and one and a half times more calcium compared to good topsoil. They also contain beneficial bacteria and enzymes that further enhance soil health. The benefits of vermicomposting are numerous. It is completely eco-friendly and can be prepared from waste materials that would otherwise be discarded. It significantly increases the water-retention capacity of the soil, which helps plants survive during dry periods. It provides plants with a steady, balanced supply of essential nutrients. It does not produce the strong, unpleasant odour associated with raw manure. It reduces the environmental pollution caused by improper disposal of farm waste. The final product — vermicompost — can be packaged and sold commercially, providing an additional source of income for the farmer.

Q5. Explain in detail how animals should be transported on foot. What are the guidelines for distance, speed, rest, and feeding?

Transporting animals on foot (also known as trekking or droving) is the oldest, simplest, and most economical method of moving livestock over short to medium distances. It requires no fuel, no vehicles, and no special equipment — just a competent handler and a safe route. For cattle (cows and buffaloes), the maximum recommended distance for a single day's journey on foot is 30 kilometres. If the journey spans multiple days, cattle should not travel more than 24 kilometres on the first day and should be limited to 22 kilometres on each subsequent day. The recommended walking speed is 3–4 km/hr, and the animals should not walk for more than 8 hours in total per day. During the journey, cattle must be given water to drink every 2 hours and should be fed every 4 hours. Regular rest stops are essential to prevent exhaustion and dehydration. For calves, the rules are more conservative: a maximum of 16 kilometres per day, at a speed of 2.5 km/hr, and no more than 6 hours of walking per day. Calves need water every 1.5

hours and food every 3 hours. For sheep and goats, the maximum distance is 24 kilometres per day (first day) and 16 kilometres on subsequent days. There are also strict rules about which animals must NOT be transported on foot (or by any means): very weak or newborn animals, emaciated animals, injured animals, animals close to giving birth, cows more than 190–200 days pregnant, buffaloes more than 210–220 days pregnant, animals that gave birth within the last 48 hours, very old animals, and animals in extremely hot, cold, or wet weather conditions. These guidelines exist to protect animal welfare and prevent unnecessary suffering during transit.

Q6. What environmental conditions are required in a dairy animal house for optimum productivity? How can stress in cattle be minimised?

Creating and maintaining the right environmental conditions inside a dairy animal house is essential for the health, comfort, and productivity of the animals. Farm animals are homoeothermic — they regulate their own body temperature — but adverse environmental conditions still place enormous strain on their metabolic systems. The optimum temperature range for dairy cattle is 15°C to 27°C. Temperatures above or below this range reduce feed intake, milk production, and reproduction rates significantly. During summer, shade, adequate water supply, and proper ventilation are essential. During winter, bedding material and windbreaks help maintain warmth. The ideal relative humidity inside the animal house is 40–60%. Humidity above 60% combined with heat creates a stressful environment that makes animals susceptible to respiratory and skin diseases. Ventilation is critical: the animal house must be well-ventilated to continuously remove obnoxious gases (ammonia, carbon dioxide, hydrogen sulphide) that accumulate from urine and dung. Recommended wind velocity inside the house is 5–8 km/hr. Planting a green belt of trees around the farm helps regulate wind speed. Natural light is preferred wherever possible, as it improves animal behaviour and supports normal physiological cycles. To minimise stress, farm managers should avoid overcrowding; allow animals to remain in familiar groups; handle animals calmly and gently at all times; avoid sudden loud noises; maintain a consistent feeding and milking schedule; and introduce any changes in diet or housing gradually. Remember: cattle are social animals that become aggressive when isolated. Rough or frightening handling causes long-term behavioural problems and reduces milk yield permanently.

Q7. Describe the vaccination programme for cattle in India, mentioning the diseases, vaccines, and schedules.

A structured vaccination programme is one of the most cost-effective tools for protecting a dairy herd from serious, sometimes fatal, infectious diseases. Vaccination works by introducing a weakened or killed form of the disease-causing micro-organism into a healthy animal's body, stimulating its immune system to produce protective antibodies without causing the disease itself. The key diseases requiring vaccination in Indian dairy cattle and buffaloes are as follows: Foot and Mouth Disease (FMD) is one of the most devastating livestock diseases. The primary vaccination is given at 4–6 months of age, with a booster dose at 9 months after the primary vaccination. After that, the animal is revaccinated every year. Haemorrhagic Septicaemia (HS) — also called shipping fever — is a serious bacterial disease. Primary vaccination is given at 6 months of age, with annual revaccination thereafter. Black Quarter (BQ) — a clostridial disease affecting muscles — is vaccinated at 6 months of age, with annual revaccination. Anthrax — a serious and sometimes fatal bacterial disease — requires primary vaccination at 6 months, with annual revaccination. In areas where anthrax is known to be present (endemic areas), revaccination is particularly critical. Brucellosis — a reproductive disease — is unique in that the vaccine is given only to female calves between 4 and 8 months of age. It is not repeated. All vaccination records must be meticulously maintained. Each entry in the register should include: the name of the vaccine, manufacturer details, lot number, expiry date, the date the vaccine was given, and the route of administration. This helps track herd immunity and plan future vaccination rounds efficiently.

Q8. What are the risks associated with dairy farm workers? How can these risks be effectively managed?

Working on a dairy farm involves significant physical risks that must be carefully identified and managed to protect the health and safety of all workers. The risks associated with dairy farming fall into three main categories. The first category is the transmission of diseases from animals to humans (zoonotic diseases). Dairy workers are in daily, close contact with large numbers of animals and can contract diseases such as brucellosis, leptospirosis, ringworm, and tuberculosis. Wearing gloves, face masks, and appropriate PPE at all times significantly reduces this risk. Regular health checks for workers are also advisable. The second category involves physical hazards from handling animals. Cattle are large, powerful animals that can kick, bite, crush, or trample workers — especially if they are frightened or in pain. Workers must be trained to approach animals calmly and confidently, use proper restraint techniques, and never startle animals from behind. Wearing safety shoes and gumboots is essential. The third category concerns the working environment. Dairy farms expose workers to a range of environmental hazards: inhalation of feed dust and ammonia fumes (wear face masks), exposure to slippery wet floors (wear non-slip gumboots), loud noise from machinery (wear earplugs), and risk of burns from hot water or steam during udder washing (wear heat-resistant gloves). Working in confined spaces such as silos poses the risk of toxic gas inhalation — a breathing apparatus is mandatory in these situations. Effective management of these risks involves: providing all workers with appropriate PPE; conducting regular safety training; keeping first-aid kits and emergency equipment accessible; clearly displaying emergency contact numbers; and maintaining a clean, well-lit, and well-organised working environment.

Q9. Compare and contrast Farm Yard Manure (FYM), compost, vermicompost, and biogas slurry as organic fertilisers.

Dairy farms produce large quantities of animal waste, and understanding the differences between the various forms of organic fertiliser helps farmers choose the best option for their soil and crops. Farm Yard Manure (FYM) is the simplest form — a mixture of cattle dung, urine, and leftover feed that decomposes naturally and slowly over several months. Its nutrient content varies considerably depending on the species, age, and diet of the animals. It is easy to produce but nutrient levels are relatively lower compared to processed options. Compost is a more controlled product. Micro-organisms actively decompose a wider range of organic matter — including crop waste, kitchen waste, and manure — either aerobically (with oxygen) or anaerobically (without). Aerobic composting is faster and produces no bad smell, with temperatures reaching up to 150°F — high enough to kill weed seeds and harmful pathogens at 131°F. Mature compost is identified by its black colour and dry texture and is an excellent all-round soil amendment. Vermicompost is produced with the help of earthworms. It is significantly richer in nutrients than both FYM and regular compost: five times more nitrogen, seven times more potassium, and one and a half times more calcium than good topsoil. It also improves soil structure and water retention. It is eco-friendly and produces no foul odour. Biogas slurry is the material remaining after manure has been processed through a biogas plant to produce gas. It is considered the best of all four options because it is fully digested, highly stable, and has the highest available nutrient content. It also produces no odour and is easy to apply to fields. In summary, for soil amendment quality: Biogas slurry > Vermicompost > Compost > FYM.

Q10. Explain the book exercises completely: (A) MCQs, (B) Fill in the Blanks, (C) True or False, and (D) Match the Following.

The following are the complete, solved answers to all the textbook exercises for Unit 3. SECTION A — MULTIPLE CHOICE QUESTIONS: Q1: The dairy farm worker wears protective equipment to protect — (d) All of these (eyes, face, and head). Q2: Composting can be done — (c) Both aerobically and anaerobically. Q3: Biogas is used for — (d) All of these (household cooking, lighting, and power generation). Q4: Risks associated with dairy farm workers include — (d) All of the above (disease

transmission, animal handling, and working environment). Q5: Advantages of mulching include — (d) All of these (acts as soil cooler, reduces weed growth, reduces erosion). Q6: Maximum distance for cattle walking in a single day — (c) 30 km. Q7: Primary symptoms of illness in cattle — (d) All of the above (lethargy, teeth grinding, decreased rumination). Q8: Preferable relative humidity in animal house — (c) 40–60%.

SECTION B — FILL IN THE BLANKS:

1. PPE stands for — Personal Protective Equipment.
2. The manure pit is generally dug about — 100 metres — away from the animal houses.
3. Manure is removed from the animal shed — 2 (two) — times daily.
4. Vermicompost is the excreta of — earthworms — rich in humus and nutrients.
5. Biogas burns with a non-luminous — blue — coloured flame.
6. A — ramp — is the sloping surface used to access from a lower to a higher level.
7. For very short distances, the most economical transport is — on foot (walking).
8. The recommended angle of the loading ramp is — 20° (or less).
9. Cattle are — social — animals used to living in herds.

SECTION C — TRUE OR FALSE:

1. Liquid waste is dumped in the manure pit — FALSE. Solid waste goes to the manure pit; liquid waste (slurry) is flushed by hose pipe.
2. PPE only protects the individual and does not prevent the accident — TRUE.
3. Slurry is obtained from FYM — FALSE. Slurry is liquid manure flushed from the shed with water; it is not derived from FYM.
4. Black colour and dryness indicate immature compost — FALSE. Black and dry = MATURE compost. Yellow and wet = immature compost.
5. Mulch is a layer of material applied to the soil surface — TRUE.
6. Transportation of aged animals is avoided — TRUE. Old animals are not suitable for transport.
7. During rail transport, the cattle wagon is attached at the end of the train — FALSE. The cattle wagon is placed in the middle of the train to reduce vibration and jerks.
8. Vaccination is done to prevent animals from diseases — TRUE.

SECTION D — MATCH THE FOLLOWING:

1. Natural process in which organic matter is decomposed by micro-organisms → (d) Composting
2. Use of earthworms for composting organic residues → (e) Vermicomposting
3. Solid waste from the livestock farm is dumped here → (a) Manure pit
4. A layer of material applied to the soil surface → (b) Mulch
5. Manure in liquid form → (c) Slurry

■ Glossary of Key Terms

PPE	Personal Protective Equipment — safety gear worn by farm workers to prevent injury and disease
Rumination	The process by which cattle bring swallowed food back to the mouth to chew it again (chewing the cud)
Vaccine	A fluid containing weakened or killed micro-organisms that builds immunity against a specific disease
FMD	Foot and Mouth Disease — a highly contagious viral disease affecting cattle and other cloven-hoofed animals
FYM	Farm Yard Manure — decomposed mixture of animal dung, urine, and leftover feed used as a natural fertiliser
Composting	A controlled process in which micro-organisms break down organic matter into a rich soil amendment
Vermicomposting	Using earthworms to convert organic waste into a highly nutritious humus-like fertiliser
Slurry	Liquid or semi-liquid animal waste flushed from the animal shed using water
Biogas	A flammable gas produced from the anaerobic decomposition of manure in a biogas plant
Mulch	A layer of organic material applied to the soil surface to conserve moisture and suppress weeds
Homoeothermic	An animal capable of maintaining a constant body temperature regardless of the environment
Manure Pit	A specially constructed pit located ~100 m from the animal house where solid waste is collected and decomposed
Loading Ramp	A sloping surface (max 20°) used to load and unload animals from vehicles or wagons safely
Earthworm Castings	The excreta of earthworms (vermicast) — extremely rich in nitrogen, potassium, and calcium
Zoonotic Disease	A disease that can be transmitted from animals to humans, e.g. brucellosis, ringworm

■ Quick Revision — Key Points to Remember

1. Always inspect animals every day — early detection of illness saves lives and money.
2. Vaccines must ONLY be given to healthy animals — never to sick or stressed ones.

3. PPE is mandatory for all farm workers at all times — it protects but does not prevent accidents.
4. Solid manure is removed twice daily; liquid manure (slurry) is flushed with a hose pipe.
5. The manure pit must be about 100 metres away from the animal house.
6. Mature compost = black colour + dry texture. Immature = yellow + wet (harmful to plants).
7. 1 kg of earthworms eats 1 kg of organic matter per day — vermicompost is nutrient-rich.
8. Biogas burns with a clean, non-luminous blue flame — no smoke.
9. Optimum temperature for dairy animals: 15°C–27°C; Relative humidity: 40–60%.
10. Cattle can walk a maximum of 30 km in a single day; calves: maximum 16 km.
11. Do NOT transport: pregnant (near delivery), recently delivered, very old, or sick animals.
12. Loading ramp angle must be 20° or less to prevent slipping and injury.
13. Biogas slurry is a better fertiliser than FYM because it is fully digested.
14. Cattle are social animals — isolation causes stress and aggression.
15. Vaccinate against: FMD, HS, BQ, Anthrax annually; Brucella only for female calves once.