



Department of Empowerment of Persons with Disabilities (Divyangjan)
Ministry of Social Justice & Empowerment



ASCI
Agriculture Skill Council of India



SCPwD
Skill Council for Persons with Disability

Participant Handbook

Sector
Agriculture

Sub-Sector
Dairying

Occupation
Dairy Farm Management



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NSQF Level 4

**Dairy Farmer Entrepreneur
(Divyangjan)**

For Locomotor Disability
For Speech and Hearing Impairment
For Lower Vision

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Unit No. 101, First Floor, Greenwoods Plaza

Block 'B' Greenwoods City, Sector 45

Gurugram - 122009 Haryana, India

Email: info@asci-india.com

website: www.asci-india.com

Phone: 0124-4670029, 4814673, 4814659

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Note: SCPwD

SCPwD has borrowed the qualification of Dairy Farmer (Divyangjan) from ESSCI SSC which is approved by NCVET in the 23rd meeting of NSQC on 29th Sep 2022 (Link of MOM <https://ncvet.gov.in/wp-content/uploads/2023/01/MoM-of-23rd-NSQC-held-on-29-Sept-2022-.pdf> And uploaded on NQR

WWW.nqr.gov.in The book caters to the job role aligned to the following disabilities as per the NQR codes mentioned below.

For LD- 2022/PWD/SCPWD/06416

For SHI- 2022/PWD/SCPWD/06417

For LV- 2022/PWD/SCPWD/06418





Shri Narendra Modi
Prime Minister of India

“ Skilling is building a better India.
If we have to move India towards
development then Skill Development
should be our mission. ”



Certificate

COMPLIANCE TO QUALIFICATION PACK – NATIONAL OCCUPATIONAL STANDARDS

is hereby issued by the

Skill Council for Persons with Disability

for

SKILLING CONTENT: PARTICIPANT HANDBOOK

Complying to National Occupational Standards of

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It is expected that this publication would meet the complete requirements of QP/NOS based training delivery. We welcome the suggestions from users, industry experts and other stakeholders for any improvement in future.

About this book

This skilling content is mapped to Model Curriculum of Qualification Pack, 'Dairy Farmer/ Entrepreneur' and is designed to help participants learn about proper care of dairy animals, their health and productivity, milking and marketing of the produced milk. This complete book is covering the undermentioned compulsory NOS:

1. AGR/N4101: Prepare and Maintain Livestock Accommodation
2. AGR/N4102: Establish Livestock within Accommodation
3. AGR/N4103: Prepare the feed and maintain feed and water supply
4. AGR/N4104: Maintain Health and Performance of Livestock
5. AGR/N4105: Perform Hand and Machine Milking
6. AGR/N4106: Ensure Proper Forage Conservation
7. AGR/N4114: Carry out breed improvement and reproduction management in livestock
8. AGR/N4107: Carry out basic entrepreneurial activities for small enterprise
9. AGR/N4121: Engage in collective Dairy farming/activity
10. AGR/N9903: Maintain health and safety at the workplace
11. DGT/VSQ/N0102: Employability Skills (60 Hours)

To enhance learning, URLs and QR codes of freely available learning materials are also provided at the end of related modules/units. The book also contains a few Exercises to facilitate formative assessments. Hence, the participant will be able to enhance his/her knowledge and required skills under the guidance of the trainer with the help of this handbook.

Symbols Used



Key Learning
Outcomes



Steps



Notes



Unit
Objectives



Exercise

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1. Introduction to the Role of a Dairy Farmer

Unit 1.1 - General Instructions

Unit 1.2 - Selection of Cattle



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the size and scope of the Dairy Industry and its market.
2. Discuss the role and responsibilities of a Dairy Farmer/Entrepreneur.
3. Identify various employment/ business opportunities for a Dairy Farmer/Entrepreneur.
4. Explain the process of milk procurement.
5. Discuss the concept of clean and antibiotic free milk.
6. Explain the opportunities and challenges in dairy business.
7. List types of synthetic milk and its effects on human health.
8. Explain emerging dimension for dairy business (viz. market technology and innovation).

UNIT 1.1: General Instructions

Unit Objectives

By the end of this unit, participants will be able to:

1. Discuss the role and responsibilities of a Dairy Farmer/Entrepreneur.
2. Explain the breeds of the cattle.

1.1.1 General Instructions to Participants

- Greet your instructors and the other participants when you enter the class
- Always be punctual for every class
- Be regular. Candidates who fall short of the required attendance will not be certified.
- Inform your instructor if, for any reason, you need to miss class.
- Pay attention to what your instructor is saying or showing.
- If you do not understand something, put up your hand and seek clarification.
- Make sure you do all the exercises at the end of each module in this book. It will help you understand the concepts better.
- Practice any new skills you have learnt as many times as possible. Seek the help of your Trainer or co-participant for practice.
- Take all necessary precautions, as instructed by your Trainer, while working with electricity, tools and animals.
- Make sure you are neatly attired and presentable at all times.
- Make sure you wear canvas shoes or rubber boots.
- Participate actively in all the activities, discussions and games during training.
- Always take bath, wear clean clothes and comb your hair before you come to class.
- The three most important words you must always remember and use in your daily conversation are 'Please, Thank You and Sorry'.

1.1.2 The Role of Dairy Farmer

Dairy farming is much more complex and needs to be managed scientifically. Dairy farmer managing a such dairy farm requires broad knowledgeable, wide variety of multi tasking skills and keen business acumen.

Duties and Responsibilities of Dairy Farmer (Manager)

Spend 50 percent of time in Management of the Dairy Herd and remaining time in supervising employees,

- Ration preparation and feeding
- Raising of replacements
- Milking
- Upkeep of facilities, grounds and equipment
- Pasture management
- Herd management

Spend 30 percent of time in Herd Health and Reproduction

- Treat and care for sick animals
- Help with difficult births
- Heat detection
- Breeding
- Fill in for sick and vacationing employees

Spend 20 percent of time in General Office Work and Procurement

- Record keeping (herd health, production, reproduction inventories)
- Monthly inventories
- Order supplies, repair parts, feed

Knowledge, Skills and Abilities Required:

- Trained in artificial insemination
- Knowledgeable of disease and injury treatment and calf pulling
- Knowledgeable in dairy nutrition
- Ability to motivate employees
- Ability to communicate
- Knowledge of milking procedures
- Knowledge of and use for Dairy Herd Improvement Records

Duties and responsibilities of Feeder

- Spend 70 percent to 80 percent work time to perform the duties of feeding and caring for all livestock.
- Keep the animal areas, lots and barns clean and free from manure and extraneous objects.
- Allow the production of a highquality product and promote animal well-being and comfort.

Feeding Responsibilities:

- Check all animals on a timely basis (three to four times per day) to be certain they are receiving adequate feed. Be certain clean water is available at all times.
- Feed cows and calves in a timely manner
- Be certain lots and barns are cleaned daily Routinely check freshening area and assist in birthing process.
- Check all lots at least five times per day (dry cow, heifer and calf areas) to be certain cattle are not under stress due to weather conditions.
- Maintain all equipment as prescribed by manufacturer's suggestions. Be certain all machinery is in working order. Notify manager immediately if any malfunctions occur.
- Take any necessary feed or forage samples for nutrient testing as required by manager.
- Be certain all pastures and fencing are maintained. Repair these items when needed.
- Maintain all equipment and tools in an orderly manner so they are readily available to use by any employee if needed.
- Treat sick animals and administer appropriate prescription drugs only when told by the manager.
- Perform routine vaccinations under supervision of the manager.
- Assist in any special projects or routine maintenance of farmstead in coordination with the manager

Duties and Responsibilities of Milker

Spend 70 percent to 80 percent work time to perform the duties of milking and related activities for lactating cows.

Milking Responsibilities and Procedures:

- Prepare milking equipment and bulk tank for milking.
- Bring in cows for milking or help other employees bring in cows if needed or requested.
- Wear gloves when milking to help prevent spread of mastitis-causing organisms.
- Follow recommended pre-milking preparation of cattle before milking.
- Milk all cows in an orderly, proper and consistent manner.
- Be certain to look at treatment records so that milk from treated cows is not put into the bulk tank.
- Note cows that may have mastitis or other problems and inform the manager for possible treatment. (No treatment will be done without permission of the manager.)
- Clean the milking parlor, holding area and bulk tank room.
- Operate all milking equipment as recommended by the manager and factory specifications.
- After milking, be sure all machinery and sanitation procedures are followed according to manufacturer's specification and Grade A Standards of the Public Milk Ordinance.

Milking Related Activities:

- Help to get cattle in barn if necessary.
- Maintain treatment records and identify treated cows with appropriate markers, such as leg bands, etc.
- Assist in ordering supplies by making a list and bringing to the manager's attention any items in short supply.
- If unable to be present at scheduled working hours, the manager must be given sufficient notice to arrange for a substitute milker. Clip udders, freeze brand and perform other procedures that promote accurate identification and animal well-being.

Other Responsibilities (approximately 20 percent to 30 percent of daily work schedule) as Assigned by the Manager.

These responsibilities may include, but are not limited to the following responsibilities:

- Care of springers and cows at calving
- Feeding and care of calves
- Feeding, cleaning and care of milking herd
- Maintenance of free-stalls
- Heat detection, A.I.
- Record keeping
- Cleaning and maintenance of office building
- Maintenance of grounds, pasture, fences
- Maintenance of vacuum pumps

1.1.2 Cattle Breeds

Farm manager or farmer should know cattle breeds with their features .

Cross bred cattle in India



Female



Male

1. Name: Jersey Crossbred
2. Crossbred
3. State: All India
4. Purpose: Food – Milk
5. Milk yield per lactation (kg:1749-2147)



Female



Male

1. **Name:** Holstein Friesian Crossbred
2. **Crossbred**
3. **State:** Hilly and Temperate regions (All India)
4. **Purpose:** Food – Milk
5. **Milk yield per lactation:** (kg 3000 - 3500)



Female



Male

1. **Name:** Thariparkar (White Sindhi, Grey Sindhi, Thari)
2. **Indigenusbred**
3. **State:** Gujarat, Rajasthan (Thariparkar Animals are Found along the Indo-Pakborder Overing Western Rajasthan and upto Rann of Kutch in Gujarat.
4. **Purpose:** Food -Milk
5. **Milk yield per lactation** (kg:1749-2147)



Female



Male

1. **Name :** Vechur (White Sindhi, Grey Sindhi, Than)
2. **Indigenusbred**
3. **State:** Kerla (Kuttanadu, a Unique Agriculture Tract Which covers Alappuzha, Kottayam and Pathanamthitta and Kasaragod districts of kerala.)
4. **Purpose:** Food -Milk: Dung - Manure
5. **Milk yield per lactation** (kg:561)



Female



Male

1. **Name :** Red Sindhi (Malir (Baluchistan), Red Karachi and Sindhi)
2. **Indigenusbred**
3. **State:** the ooriginal breeding tract is in Pakistan but some organised herds are availble in orissa tamil nadu,bihar, kerala and Assam states of india.
4. **Purpose:** Food -Milk:
5. **Milk yield per lactation** (kg:1840-2600)



Female



Male

1. **Name:** Sahiwal (Lambi Bar, Lola ,Montgomery, Multani and Teli)
2. **Indigenou**s**bred**
3. **State:** Punjab, Rajasthan
4. **Purpose:** Food -Milk: Dung - Manure
5. **Milk yield per lactation** (kg:2325-2750)



Female



Male

1. **Name :** Punganur
2. **Indigenou**s**bred**
3. **State:** AP (The breed tract is confined to the taluks of Punganur and adjacent taluks of Vayalpad, Madnapall and Palamanerin Chittoor district of Andhra Pradesh)
4. **Purpose:** Food -Milk; Work- Draught and Transportation
5. **Milk yield per lactation** (kg:546-1100)



Female



Male

1. **Name :** Rathi
2. **Indigenous bred**
3. **State:** Rajasthan (Rathi Animals are particularly Cincertarted in Loonkarnas artehsil of Bikaner district which is also known as Rathi tract).
4. **Purpose:** Food -Milk:
5. **Milk yield per lactation** (kg:1560-2810)



Female



Male

1. **Name :** Motu (Deshi)
2. **Indigenous bred**
3. **State:** odisha (south ern part of Malkangirl district and adjoining area of chhattisgarh and andhra Pradesh. Heavy Concentration is in motu, kalimela, podia and matu Malkangirl area of Malkangirl district in Orissa. Sandy and clay type soil is predominant. most of the area is covered with forest)
4. **Purpose:** Food -Milk- work- Draught & Manure.
5. **Milk yield per lactation** (kg:0-140)



Female



Male

1. **Name :** Ongole (Nellore)
2. **Indigenous bred**
3. **State:** Andhra Pradesh (The Breeding all along the Coast from Nellore to Vizianagram)
4. **Purpose:** Food -Milk- work- Draught & Manure.
5. **Milk yield per lactation (kg:798)**



Female



Male

1. **Name :** Khariar (Deshi)
2. **Indigenous bred**
3. **State:** Odisha (Nuapada district and adjoining area in kalahandi and Balangir district. Heavy Concetration is in khariar,komna.Sinapali and Boden block of Nuapada district)
4. **Purpose:** Food -Milk- work- Draught & Manure and fuel.
5. **Milk yield per lactation (kg:0-450)**



Female



Male

1. **Name :** Haryana (Hansi)
2. **Indigenous bred**
3. **State:** Haryana
4. **Purpose:** Food -Milk:- worker- Draught and Transport
5. **Milk yield per lactation (kg:997-1745)**



Female



Male

1. **Name :** Kankrej (Wadad or waged,Vagadia, Talabda, Nagar,Bonnai)
2. **Indigenous bred**
3. **State:** Gujarat, Rajasthan
4. **Purpose:** Food -Milk:- worker- Draught and Transport
5. **Milk yield per lactation (kg:1738-1800)**



Female



Male

1. **Name :** Gir
(Bhodali,Desan,Gujarati, Kathiawari,Sorthi and Surati)
2. **Indigenous bred**
3. **State:** Gujarat, (Saurashtra region of Gujarat specially area in and around Gir Forest)
4. **Purpose:** Food -Milk
5. **Milk yield per lactation**
(kg:2110-3300)



Female



Male

1. **Name:** Ghumusari (Deshi)
2. **Indigenous bred**
3. **State:** Odisha(Western part of Ganjam district and adjoining areas of Phulbani district. Heavy concentration is in Bhanjanagar, Sorada and Aska area of Ganjam district)
- 4.**Purpose:** Food - Milk Work – Draught , Manure , Fuel
- 5.**Milk yield per lactation**
(kg: 0 - 650)



Female



Male

1. **Name:** Gangatiri (Eastern Haryana or Shahabadi)
2. **Indigenous bred**
3. **State:** Bihar, UP (Ghazipur, Ballia, Varanasi, Mau, Mirzapur and adjoining districts of Uttar Pradesh and Bhabhua, Buxar and Bhojpur districts of Bihar.)
4. **Purpose:** Food - Milk Work – Draught , Manure
5. **Milk yield per lactation**
(kg: 1049.24 - 1200)



Female



Male

1. **Name:** Gaolao (Arvi, Gaulgani)
2. **Indigenous bred**
3. **State:** Madhya Pradesh, Maharashtra
4. **Purpose:** Food - Milk Work – Draught
5. **Milk yield per lactation**
(kg: 604 - 725)



Female



Male

1. Name: Deoni (Surti, Dongarpati, Dongri, Wannera, Waghyd, Balankya and Shevera.)

2. Indigenous bred

3. State: Karnataka, Maharashtra (The breeding tract lies in the Balaghat range of Sahyadri hills extending from Kannadtaluk of Aurangabad to Deglurtaluk of Marathwada region of Maharashtra state. The actual place of origin is Deoni, Udgir and Ahmadpurtaluks of Latur district..)

4. Purpose: Food - Milk Work – Draught, Transport

5. Milk yield per lactation
(kg: 868 - 1229)



Female



Male

1. Name: Belahi (Morni, Desi)

2. Indigenous bred


3. State: Haryana (Breeding tract lies in the foothills of Shivalik in Haryana.)

4. Purpose: Work – Milk, Draught and Manure

5. Milk yield per lactation
(kg: 1014 - 2092)

Fig 1.1.1 Breeds of cattle

1. 1.3 High Milk Yielding Varieties

Breed Image	Exotic Breeds
	<p>Ayrshires</p> <ul style="list-style-type: none"> • Strong and rugged cattle: adaptable to all terrain • Low somatic cell count • Male weighs – 600 kg while female weighs - 500 • Lactation yield – 5000 lit • Moderate Butterfat & Relatively high in Protein Content



Jersey

- Reddish fawn color
- Lactation yield – 5000 kg
- Accustomed to indian conditions



Brown Swiss

- Known for ruggedness and milk production
- Docile and easily manageable
- Crossbred from India – Karan Swiss



Red Dane

- Body color - is red, reddish brown or even dark brown.
- It is also a heavy breed; mature males weighing up to 950 kg and mature female weigh 600 kg.
- The lactation yield varies from 3000 to 4000 kg .
- fat content of 4 per cent and above.



Guernsey

- Golden coloured milk
- Rich in beta carotene
- Male weighs – 600 kg while female weighs - 500
- Lactation yield – 6000 lit
- Butterfat – 5 % & Protein Content – 3.7 %



Holstein - Friesian

- Rugged and large udder
- Large dairy breed - 700 kg
- Lactation yield - 7000 kg

Fig 1.1.2 High yielding breeds

UNIT 1.2: Selection of Cattle

Unit Objectives

By the end of this unit, participants will be able to:

1. Select the cattle for dairy farming.

1.2.1 Size and Scope of the Dairy Industry

Since 1998, India has become the world's top producer and consumer of dairy products due to a steady increase in the supply of milk and dairy products. The rural Indian economy is largely dependent on the dairy sector as a source of jobs and revenue. The largest population of cattle in the world is found in India. However, the milk production per animal is very low as compared to other major dairy producers. Additionally, almost all of India's dairy products are consumed locally, with much of it sold as liquid milk. Because of this, there is a lot of scope for growth and value addition in the Indian dairy business.

The dairy industry in India not only offers lucrative financial prospects, but also promotes socio-economic development. Keeping this in mind, the Government of India has launched several programs and initiatives aimed at increasing the dairy industry in the country. For example, the "National Dairy Program (Phase-I)" aims to increase milk production and boost animal productivity, while strengthening and expanding infrastructure for rural milk procurement and providing better market access to farmers. On the other hand, in the last few years, private investment in the Indian dairy industry has also increased. Due to the size and potential of the Indian market, both domestic and foreign companies are joining the dairy industry. In 2021, India's dairy market is expected to be valued at Rs 13,174 billion. It is estimated by IMARC Group to grow at a CAGR of 14.98% from 2022 to 2027 (IMARC Report).

1.2.2 Employment/Business Opportunities for Dairy Farmer/Entrepreneur

Animal rearing business can be started in dairy. Milk and milk products are consumed in almost all households. In dairy farming, you can earn money by rearing animals like buffalo, cow and milk obtained from them. Similarly, cheese, curd, ghee, butter, sweets, etc. can be made and sold from milk. All these food items require more time to prepare. And these can be sold at a higher price than the price of milk. Apart from this, animal dung can be used in cow dung gas, cow dung can be used as fertilizer in agricultural land. Beneficiaries can also earn money by selling the manure. Dairy farming is a round the year business

1.2.3 Milk Procurement Process

In India, milk is regularly collected and transported twice a day, morning and evening. Common methods of collecting and taking milk in a dairy plant are:

Milk Procurement Through Individual Producers: In this case, milk is brought to the dairy plant by individual producers in their own vessels of any type. This is possible for those producers who are located near the milk collection center.

- **Milk Collected Through Cooperatives:** In this case, one or more cooperatives form an organization that is responsible for uninterrupted supply of milk to the dairy plant. The system is beneficial to the producers because of the absence of middlemen.
- **Milk Procured Through Contractors:** In this method, the contractor supplying milk to the dairy plant collects the milk from the producers at a cheaper rate and transports the milk to the dairy. The presence of such contractors (middlemen) means lesser returns to the milk producers.
- **Getting Milk From Milk Collection/Cooling Centres:** This method is generally feasible and prevalent in organized sectors and dairy operations in India.

Milk is collected in 40 liter cans at various milk collection centers in nearby villages. It is weighed, tested for fat content and kept ready to be sent to the milk chilling centre. This milk is then picked up from these collection centers in an open truck and brought to a milk cooling center or dairy plant, where the milk cans are emptied, washed, and sent back to the milk collection centers.

1.2.4 Clean Milk

The objective of clean milk can be achieved by practical application of science based systems such as Hazard Analysis Critical Control Point (HACCP). Not only should it produce quantum milk, but it should also be free from debris, germs and should remain so till the time it is consumed. Raw milk tends to sour quickly when stored for long periods of time at the high ambient temperatures prevalent in tropical and subtropical countries. This is because lactic acid bacteria and contaminating microorganisms contained in milk utensils or from the environment break down the lactose in milk into lactic acid. When enough lactic acid accumulates, the milk turns sour and coagulates. Raw milk that contains a lot of lactic acid will curdle when heated, even if it doesn't curdle. This acidity is known as "developed acidity" and such milk is not acceptable for sale.

Strategies for clean milk production:

- The first step to clean milk production should be education and training of milk producers on cleanliness, housekeeping, hygiene, milking methods and good husbandry practices.
- Awareness and Training: Educational support and programs should be organized to make farmers aware of the importance of clean milk production. This should be in the form of charts/posters displayed at village, society and milk collection centres. Make them aware about proper handling of milk from udder to reception dock, maintenance of clean environment, clean utensils to milk cooling bulk tanks and availability of coolers.
- Feeding practices: Cattle feed and feed must not contain directly or indirectly microbiological or chemical contaminants in milk in quantities that are unacceptable to health. Forage fodder and silage should be obtained from a reliable source and stored properly.

- **Housing Management:** The shed should be comfortable and clean with proper arrangement for disposal of dung, urine, feed and fodder residues. There should be proper supply of clean drinking water and electricity. The shed should be washed before milking.
- Sanitation and disinfection of animal houses are complementary to cleaning and sanitation. Through hygiene, we adopt hygienic measures aimed at optimizing the health of the animals and ensuring the quality of the product.
- The measures include proper cleaning of the house, adequate drainage system, adequate lighting of the building and shed, proper ventilation and proper disinfection measures.
- It includes cleaning of bedding material like sawdust, paddy, straw etc. once daily
- Water and feeding material should be thoroughly cleaned.
- In case of earthen floor, top soil of 12-15 cm is removed and replaced with clean soil.
- Cleaning and washing of milk parlors.
- Slope drains that are 6-12 inches wide and 2 inches deep. It should maintain a proper gradient of 1 in 60 for smooth flow of drain water.

1.2.5 Disadvantages of Using Synthetic Milk

- According to the doctor, the use of synthetic milk causes very serious harm to the human body, causing inflammation in the eye and complications in the liver and kidney.
- Synthetic milk proves fatal for pregnant women, patients suffering from heart disease and high blood pressure conditions.
- Urea and caustic soda are very harmful for heart, liver and kidney.
- Its continuous use is highly toxic to small children and makes human body a farm house of diseases.

1.2.6 Emerging Dimensions for Dairy Business - Innovative Practices/Products/Technologies

Agricultural innovations are new practices/products/techniques which are suitable for a particular region, are economically viable alternatives to increase the physiological status of animals and the yield per day of animals. Low-cost and user-friendly dairy farming innovations (technologies) suitable for all types of farms created under rural conditions present in various tropical countries have proved useful in increasing animal productivity and socio-economic welfare of farmers from now on. The term technology describes the systematic application of a scientific or other organized body of knowledge, including new ideas, inventions, innovations, techniques, methods, and materials, for practical purposes.

This section discusses applied innovations to increase net profit, reduce costs and optimize production; To contribute to a more resilient and more sustainable future for all of us, the common dairy farmer as well as the consumer.

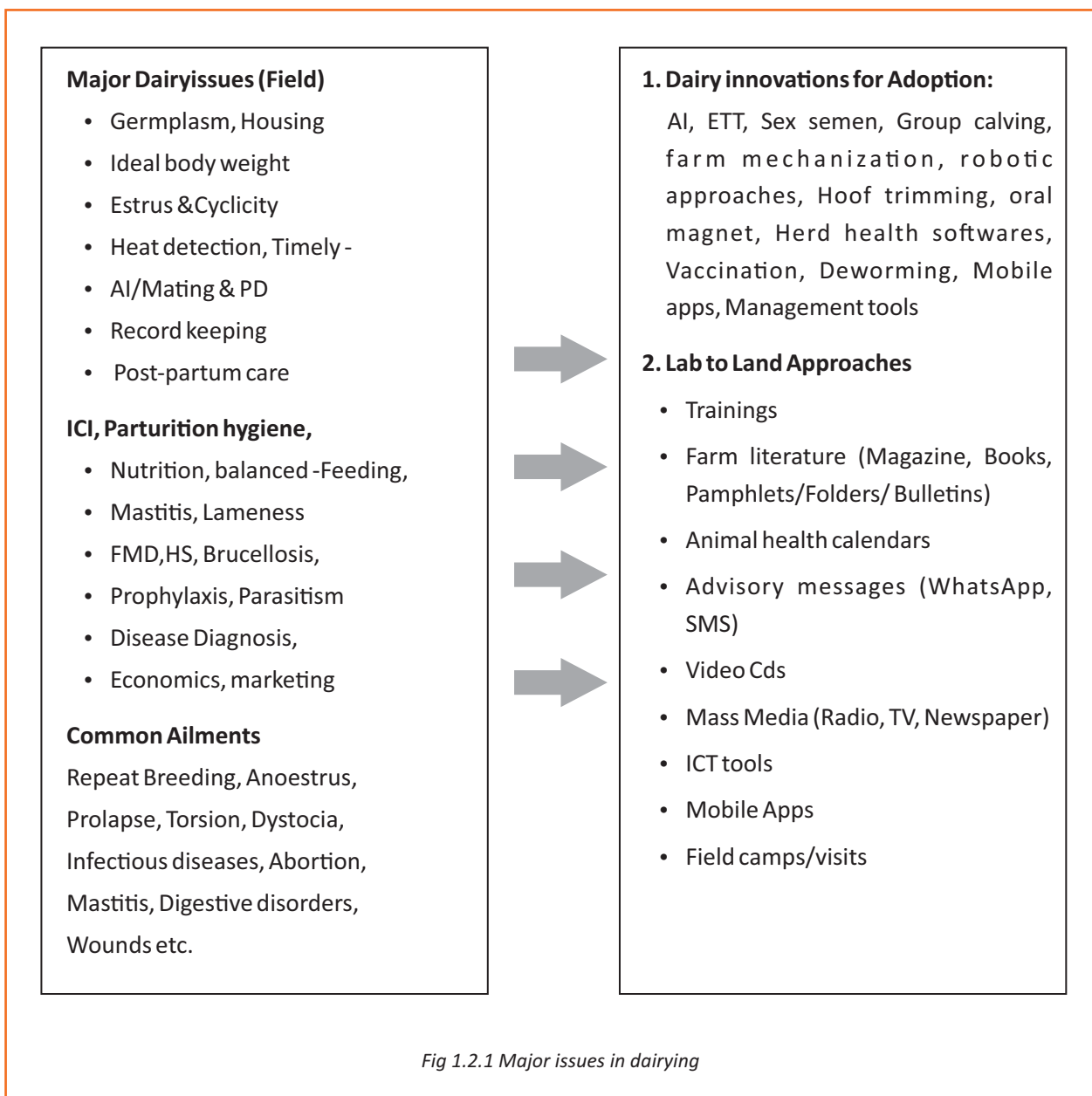


Fig 1.2.1 Major issues in dairying

1.2.6 Selection of Cattle

- For success in dairying, Proper selection of cows is the first and the most important step to be adopted.
- Records are the basis of selection and hence proper identification of animals and record keeping is essential.
- Maintain animals suitable to the local weather condition.
- Do not mix animals from different agro-climatic conditions as it causes problems due to non-adjustment in many cases.

Part of the True Type Dairy Cow

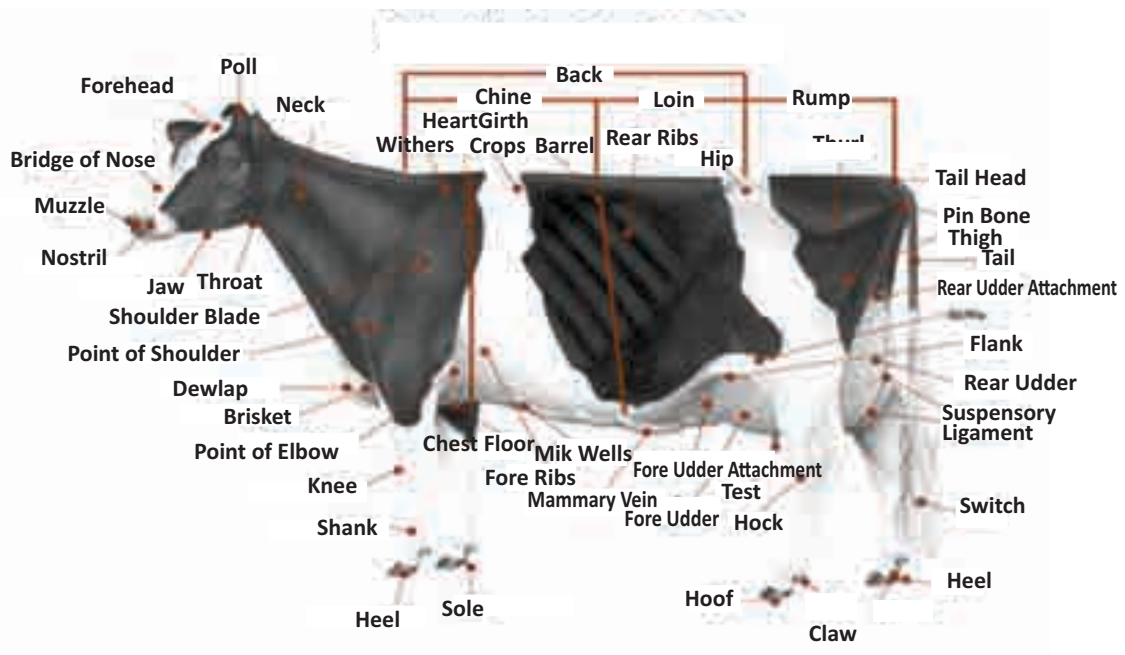


Fig 1.2.2 Part of the true type dairy cow

Selection of Dairy Cows

- A dairy farmer should build up his own herd by breeding his own herd.
- Select animals based on breed characters and milk producing ability.
- History sheet or pedigree sheet which are generally maintained in organized farms reveals the complete history of animal.
- Select cows in first or second lactation. Cows give maximum yield in 5th lactation.
- Select cows in second month of lactation. Maximum yield is noticed till 90 days after calving.
- Three successive complete milking has to be done and an average of it will give a fair idea regarding production by a particular animal.
- Select docile and approachable cow.
- Purchase the animals during the months of October and November.

Breed Characteristics of High Yielding Dairy Cows





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

Score Card in Selecting Cattle

Area to be Judged and Score	Description
Frame - 15	<ul style="list-style-type: none"> • Frame - skeletal parts excluding feet and legs. • Broad muzzle and strong jaws - Better feed consuming ability • Strong shoulder - Ability to move around and set up and down in stanchion and stalls. • Straight topline - General strength and conformation; (proper development of digestive, reproductive and mammary system is related to strong topline) • Width of pelvic region - ease of calving, width and length of rump affects support and placement of udder
Dairy Character - 20	<ul style="list-style-type: none"> • Excellent dairy character – converting feed with maximum efficiency. • Poor dairy character - Usually coarse and too fat (over condition) Skin should be thin, loose and pliable.
Feet and Legs - 15	<ul style="list-style-type: none"> • Proper placement of legs indicates ability to move with ease. • Width in front legs provides room for a wider chest, width in rear legs provide room for a larger udder. • Too much sickle hock weakens the legs as age advances. Too straight legs cause much stress on the hock.
Body Capacity - 10	<ul style="list-style-type: none"> • [Volumetric measurement of capacity of the cow (length x depth x width) evaluated with age] • Good body capacity helps in more feed and roughage consumption results in high milk yield.
Udder - 40	<ul style="list-style-type: none"> • It should be soft, pliable and elastic. If firm and large even after milking probably full of fibrous or scar tissue (meaty). • Teat should be 1.5 – 2.5 inches long, when the udder is full they should hang the structure down. • Size of mammary vein indicates the amount of blood circulating to the udder.

Table 1.2.1 Score card in selecting cattle

1.2.7 How to Differentiate Between Healthy Cow and Sick Cow?

S.No.	Parameter	Healthy Sheep	Sick Animal
1.	Look of cow	Active and alert	 <p>Dull and inactive</p>
2.	Head	Raised	Down ward
3.	Eyes	Wide open, bright and without any discharge.	 <p>Dull and purulent discharge in the corners.</p>
4.	Nose	No discharge	 <p>Mucopurulent discharge</p>
5.	Movement	Active	Sluggish
6.	Consistency of dung	Semisolid	 <p>Hard, loose or mixed with mucus or blood</p>


7.	Pulse / minute	70-90	More than 90
8.	Respiration/ minute	12-16	Above or below this range is seen in sick animals
9.	Grazing	Active	Dull or absent
10.	Rumination	Regular	Irregular
11.	Feed and water intake	Normal	Reduced
12.	Udder	Normal	 <p>Swelling or change in consistency</p>
13.	Appetite	Normal	Not interested in feed. Check for unconsumed feed in the feed trough.
14.	Ears	Positioned above the point of attachment to the head	Pointed below or droppy ears
15.	Vaginal Discharge	Normal upto 2 weeks after calving	Smelly and dark discharge due to uterine infection
16.	Posture	Normal	Arched back (lameness), Tailed away from the body (irritation in perineal region)

Table 1.2.2 How to differentiate between healthy cow and sick cow?

Reading the Cow Signs

A cow gives signals all the time about her welfare and health. She does this with behaviour, attitude, body language and body condition. You can use these cow signs to optimise your herd health, comfort and milk production results. Train yourself to observe, evaluate, and find solutions for the benefit of your cows and business

Ask yourself:

- What do I see?
- What is causing this?
- What does this mean?

How to judge cow signs

Judging an animal is not as easy as it may look. Please study the animal signs table closely and learn it by heart. Each time you walk among your cows, select one and check her in accordance with the key indicators for a healthy cow as outlined here. Once you have checked a few cows like this, you will start to gain an understanding of cow comfort and see possible issues that may need resolving. Please do not draw conclusions in this phase, as you still need to check the body condition score and the locomotion score.

- Learn to read the body language of cows. This will give us an indication of how they feel and how good the environment is
- Reading the signs better will help the farm manager in improving the productivity of the farm
- Cow OBSERVATION in its natural setting is first step towards reading the signs. Farmer need to stand back and observe the individual cow as well as the herd.
- Housing enables greater control of the cow's environment and feeding. However, when housed, it's crucial that cows are able to express their natural behaviour.
- Cows are able to express six things thorough their behavior, that include feed, water, light, space and quality air, along with the right environment to rest.
- Upon observation, the farmer needs to act on areas that the cow signals.
- Cows usually lie down 12 – 14 hrs a day and 90 percent of cows lie down in resting area at given time.
- A standing cow is the best indicator of what is wrong with her. If cows are standing, farmers should ask themselves: Is there enough feed space? Are cow cubicle beds comfortable and set up to the right dimensions for the size of the cows? Are there enough access points in the shed to enable less dominant cows to escape bully cows?
- Keep cows on deep bed straw yards in the run up to calving and then keeping cows in a "pamper pen".
- The newborn calf is then placed in front of the mother in a clean "cuddle box." Hay or silage is put on top of the calf to encourage the mother to lick the calf and eat food straight away.

"If you get the cow eating straight after calving, you get her off to the right start by maximising dry matter intakes at this critical time.

1.2.8 Basic Skills of Communication

Do's	Don'ts
Listening	
Keep an open mind. Maintain eye contact and show interest. Listen for the central themes. Consider the speaker's nonverbal behaviors and tone of voice. Ask for clarification. Paraphrase the meaning and feelings being expressed.	Be judgmental. Fake attention. Interrupt the speaker. Begin formulating a rebuttal. Distort the message based on your own beliefs or thoughts.
Non Verbal Communication	
Eye Contact: Look at people's eyes. Continually scan the group with your eyes. Look at the whole group.	Eye Contact: Avoid eye contact. Scan the group too rapidly or infrequently. Only look at one or two people or at only one side of the room.
Body Movement	Body Movement
Position your body so you face the majority of the people. Vary your position in the room. Stand with good posture. Walk toward people when they speak.	Body Movement: Talk to your notes, easel, or board. Turn your back to part of the group. Stand in fixed positions. Slouch. Distance yourself from people.
Gestures and Facial Expressions: Use natural and spontaneous gestures. Smile and be animated. Convey emotion affirmatively	Gestures and Facial Expressions: Engage in distracting behavior such as looking at your watch, or jingling change. Look disinterested. Use gestures or expressions that could be seen as negative or judgmental.
Use Your Voice	Use Your Voice
Speak loud enough to be heard. Vary the pace of your presentation. Slow down for important points. Use the pause.	Mumble. Use "fillers" such as "like" or "um." Speak with a monotone voice. Be afraid of pauses.
Engaging Your Audience	
Ask clear, concise questions. Ask open-ended questions. Focus each question on a single issue. Acknowledge responses in a positive manner. Allow time for the audience to answer. Let your conviction and passion for the subject matter show.	Ask questions that require two distinct answers. Answer your own question! Rephrase your question if you don't get an answer. Ignore comments or questions. Declare an answer is wrong. Be afraid to remain silent while waiting for responses

2. Prepare and Maintain Livestock Accommodation



Unit 2.1 - General Accommodation Needs of Livestock

Unit 2.2 - Tools and Equipments

Unit 2.3 - Waste Handling/ Management

Unit 2.4 - Routine Cleaning of Animal Shed



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the accommodation needs of livestock.
2. Explain the different types of accommodation- Head-to-Head, Tail to tail.
3. Describe the best balance between animal health and well-being and available resources.
4. Describe the cleaning routine.
5. Describe the process of waste segregation and waste management .

UNIT 2.1: General Accommodation Needs of Livestock

Unit Objectives

By the end of this unit, participants will be able to:

1. Establish housing for dairy animals.
2. Plan, Layout and design the shed.

2.1.1 General Accommodation Needs of Livestock

- Cow Comfort - Dairy animals need to be comfortable, healthy and achieve optimum protection through good housing design and animal welfare practices.
- Animals need to be protected from extreme heat and direct sunlight. India has wide geographic, climatic region with varying temperature. Hence it is impossible to provide a uniform housing design for dairy cows.
- The facility need to provide basic comfort to the dairy animals with regards to ventilation, drainage and manure removal.
- The flooring should have a slight gradient for effective drainage, non-slippery and all the flooring surfaces should be easily washable.
- The sheds and the facilities should be kept clean and free from metal objects, pieces of wire and plastic bags and all fittings and internal surfaces including entrances must be designed constructed and maintained to ensure there are no injury to the animals.
- Dairy animals must lie down and rest comfortably for sufficient periods in a day without any difficulty.

Housing of Animals

Animal housing is also very important in harnessing the maximum potential of the animal. Stressful conditions significantly reduce productivity and it is therefore important to protect the animal from inclement weather. Improper housing also predisposes the animal to hoof conditions and heat stress.

Some High Cost Cattle Shed Options



Fig 2.1.1 Housing of animals (1)

Some Low Cost Cattle Shed Options



Fig 2.1.2 Housing of animals (2)

It is important to provide clean and comfortable housing facilities to the dairy animals for their proper growth and optimum productivity. The milch animals should be provided proper sheds to protect them from extreme weather conditions of summer, winter, scorching direct sunrays and winds. During summer, the animals suffer from heat stress and they become restless. Sweating and panting, to some extent helps them cool their bodies. Reduced feed intake of the animals results into decreased milk production. Therefore, we must have a suitable housing for the animals.



Fig 2.1.3 Housing of animals (3)

Animal cooling systems are very important especially in high yielding crossbreds and exotic animals.

Animals Welfare Needs

- Provide proper and sufficient food and water
- Provide adequate shelter
- Provide opportunity to display normal patterns of behavior
- Unreasonable or unnecessary pain or distress shall be avoided while physical handling

Cow Comfort Factors

Cow Traffic - Cows need to move freely without any injury or hindrance from one area to other, turn around and back in and out of stalls.

Lying - Cows need to be able to lie in dry, clean and comfortable conditions.

Feed & Water - Cows need the correct feed and trough space at the right height.

Social Interaction - Herds or groups of cows have a social pecking order with higher and lower rankings. Cows will be most settled if there is minimal competition for space, feed and water.

Lighting - Cows need uniform distribution of light to make best use of lying areas and cow traffic. Good lighting also makes it easier for staff to observe heat detection or health problems.

Loafing Areas - Cows must be given the correct space and environment to be able to pass each other, socialize and groom.

Flooring - Cows need to walk confidently on non-slip reasonably clean flooring.

Air Quality - Cows need good quality air supplied through an effective ventilation system.

Bedding - Cows need dry and comfortable bedding that offers stability to get up and out of, and to spend long periods of time lying on.

Shade - Cows require shade to reduce the impact of heat stress.

Understanding Dairy Housing System

Ultimately design and management of a housing system is influenced by how long the cows will use it e.g. all winter or summer or for twelve hours a day. Irrespective of how the building is integrated within your farm system, it must provide a clean, dry and comfortable environment that does not compromise cow health, welfare, comfort or production.

The longer the building is expected to house cows, the greater the consideration for key factors like structural robustness, effluent management and cost. The level of design detail required when housing cows for long periods should not be underestimated.

Loose Housed:

Cows are kept loose in an open paddock throughout the day and night except at the time of milking and treatment. In this system, shelter is provided along one side of open paddock under which animals can retire when it is very hot or cold or during rains.

Common feed manger and water tank is provided and concentrates are fed at the milking time which is done in a separate milking barn or parlour in which cows are secured at milking time and are milked. The open paddock is enclosed by means of half walls or plain wire fences of convenient height.



Fig 2.1.4 Housing of animals (4)

- Feeding passage - Feed bags are kept in the feeding passage in the above picture.
- Feed Manger - Animal feed from the manger
- Standing space -



Fig 2.1.5 Housing of animals (Water trough)

- Water trough – Water trough is outside the shed.



Fig 2.1.6 Housing of animals (Tail to tail)

- Gutter or drainage channel
- Milking passage

Depending on the animal type and purpose following building units are needed



Fig 2.1.7 Milking unit/ barn

- Milking barn or parlour



Fig 2.1.8 Housing of animals (Cow calf pen)

Down Calver Shed / Calving Pen



Fig 2.1.9 Housing of animals (Calving pen)

- Calf pen/ Young stock or heifer shed
- Dry animal shed
- Isolation shed
- Quarantine shed

Accessory Buildings

- Store room
- Milk room
- Hay or straw shed

2.1.2 Layout and Design

The housing layout of dairy farm is the most important document in the design process. The objective of this layout is to make the design functional, flexible, expandable and cost-effective.

A conventional design with a central feed passage is likely to contain multiple rows of stalls on each side of the lane. Layout should be matched to herd size, building use and feed space per cow. Keeping cows clean and passageways free of effluent build up is critical to achieving best performance.

If the number of cows is less than 10, then they can be housed in a single row. If the number of cows is larger then they can be housed in double row.

In double row arrangement, the cows can be placed in head to head (face in) or tail to tail (face out) arrangement.

Head to Head Stall

Advantages

There should be no dead ends in the building with cow traffic and access to feed and water a design priority. Ultimately the feed space per cow drives the length of the building e.g. 70cm per cow with 100 stalls on each side will equate to a 70-metre barn in length (70cm per cow x 100 cows = 70m). The total width of the barn is driven by the number of rows of stalls and the width of the passageways.



Fig 2.1.10 Layout and design (Head to head)

Layout	Advantages	Disadvantages
<ul style="list-style-type: none"> • 4- row head - to-head 	<ul style="list-style-type: none"> • excellent cow comfort • Pleasing for the eyes of the visitor when heads are together • Cows get in to their stalls easily • Sun rays dry gutter easily • Feeding of cows is easier from the middle alley • It is better for narrow barns. • one stall width of feed space for every two stalls • more feed space than other free stall layout • no stalls against the outside wall • 11.1 m²/cow (120 ft²/cow) 	<ul style="list-style-type: none"> • cannot block animals away from free stalls • lose two stalls at the crossover

Table 2.1.1 Advantages of head to head

Tail to Tail Stall



Fig 2.1.11 Layout and design

Tail to Tail Stall

Advantages

Layout	Advantages	Disadvantages
<ul style="list-style-type: none"> • 4-row tail-to-tail 	<ul style="list-style-type: none"> • one stall width of feed space for every two stalls • can block animals away from free stalls after milking or for bedding • lose only one stall at crossover • outside row of stalls extend the length of pen • Cleaning and milking operations will be easy with the presence of middle alley • Spread of diseases among animals is less • Cows get outside fresh air in plenty • Supervisor can effectively look over milk men will milking from the center alley • Any ailments in the hindquarter can be detected easily • 10.2 m²/cow (110 ft²/cow) 	<ul style="list-style-type: none"> • stalls against the outside wall • rain and sun on the outside row of stalls • difficult to keep bedding on outside row of stalls • less feed space than head-to-head

Table 2.1.2 Advantages of Tail to Tail System

2.1.3 Cow Uniformity

The dilemma for any farmer moving from an open lying area i.e. loose housed system, to a freestall design, is the issue of herd size uniformity. Cows in a herd will not be uniform. Twenty percent of herd will be heifers in a herd. The practicalities of housing non-uniform cows

	Correct size cows	Small Cows (Heifers)	Large Cows
Correct Stall Design	Comfortable	- Lies diagonally - Lies forward (soil the bed area) - Lies backward (not feeding properly, standing in passage way)	- Fill the lunge space - Tails in the passageway - Rub their backs on divider - Difficulty in lying and getting up
Incorrect Stall Design	- Lie in wrong way - Sunlight in head space/ hind quarter	- Not comfortable	- Not comfortable

Table 2.1.3 Practicalities of housing non-uniform cows

Passageway Widths and Layouts

Passages and crossover passages provide escape routes for submissive cows, turning spaces, areas of social interaction and improve cow traffic flow:

- All passageways and crossovers should be scraped or washed regularly.
- Adequate turning room to reduce risk of falling or pushing.
- Head to head – 5 – 6 feet width, Tail to tail – 4 – 5 feet width
- Central alley should have slope toward the gutters forming a crown at center



Fig 2.1.12 Passageway widths and layouts

Consider placing slatted cross channels or grates in longer scraped passages. If manually scraping, a cross passage drain will speed up the process and limit the risk of overflow of effluent onto beds during scraping.

Central passage:

Feed lane passages facilitate machinery movement. The machinery used is likely to be a mixer feeder wagon.

Areas to consider for a central passage:

- Machinery must be able to enter the building easily.
- Machinery should be able to operate effectively inside.
- There must be adequate space outside at either end of the feed passage for a turning area.
- There must be enough height clearance to deal with downer cows and remove dead stock.
- Ensure floor strength matches machinery weights.
- Take into account the width of the feed table when deciding on the central passage width

Stall design factors

The dimensions of a freestall depend on the size of the cow. It is important to understand the space requirements of a cow when she lies down, rises and rests.

The Stages of Lying Down

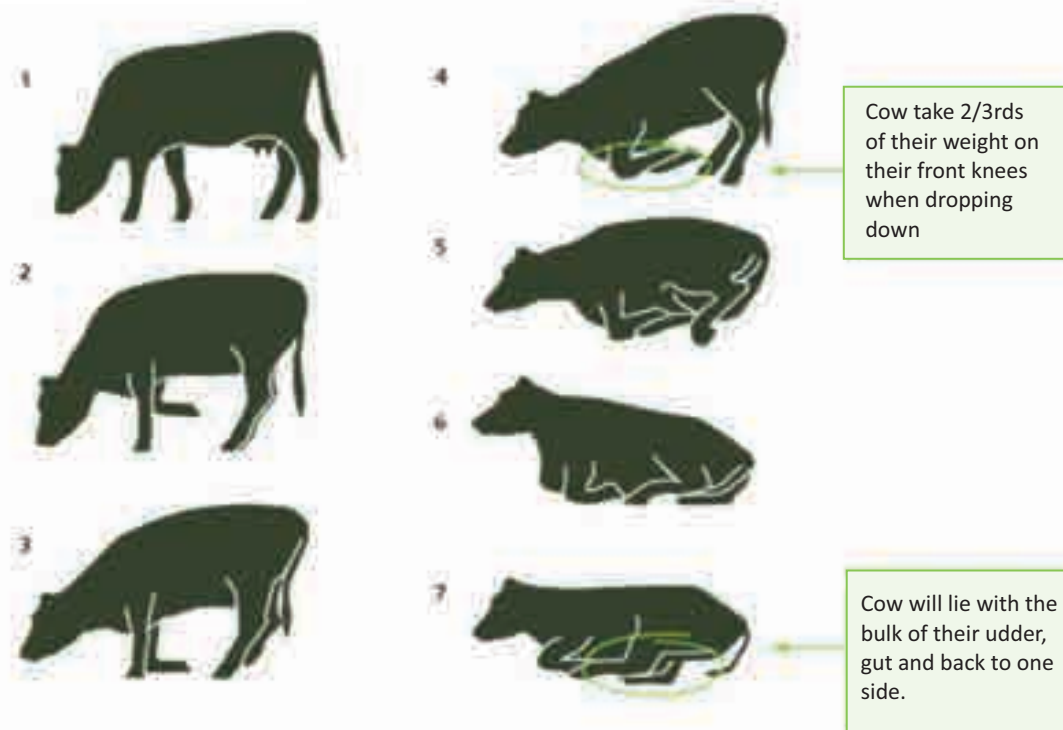


Fig 2.1.13 Stages of lying down

The Stage of Rising

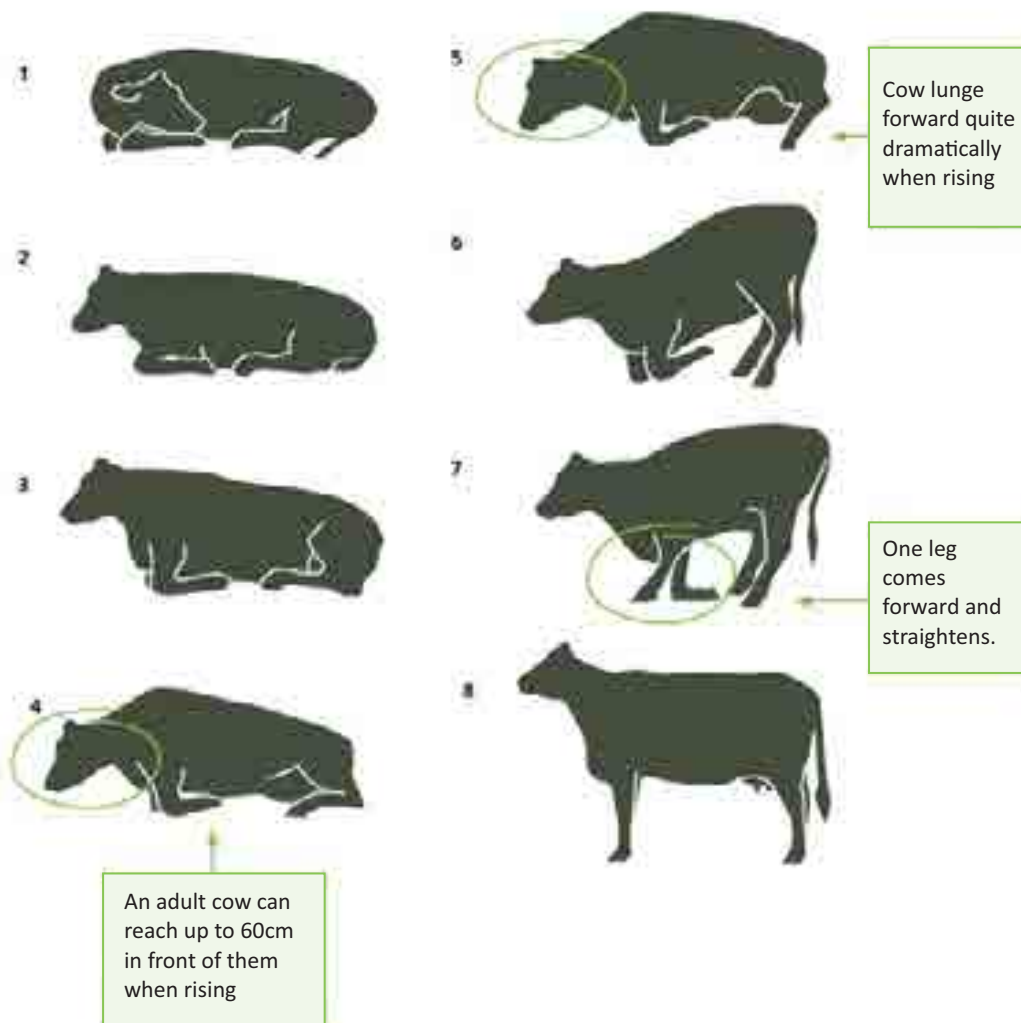


Fig 2.1.14 Stages of rising

Stall design factors have an effect on use and cow comfort.

- **Bed Length** – The area the cow has to place most of her body. This does not include the lunging space.
- **Lunge Space** – The space the cow has to lunge forward into **when getting up**. Stalls that are located too close to a wall have little or no lunging space, making it difficult for cows to stand up, compromising the lunging space, reducing stall use and lying time, and forcing cows to lie diagonally.
- **Head Space** – **The space at the front of the cow when she is lying down.** (Also referred to as the lunge space). Cows do not normally sit head to head. Cows need room before head when in rest. Cows do not intrude into each other's "threat" or personal space. Cows do not like a wall blocking. If blocked, cows will lie diagonally.

There should be 23–30cm from the back of the divider to the kerb. Longer than 30cm, cows may walk or lie along the back of the bed.

Freestall Width

- The stall should be wide enough to allow the cow to recline and rise easily without banging her hip bones on the dividers.
- Stall width is determined by the width of the gut of a fully fed cow lying down, with extra allowance for late pregnancy.
- It is possible to calculate the correct width of the stall by taking hip measurements. Hip Measurement $\times 1.8$ = hook bone to hook bone measurement.
- Divisions that allow horizontal adjustment help ensure appropriate stall widths

Freestall Division



Fig 2.1.16 Free Stall Division

- Cow should be correctly positioned in the stall and not cause any discomfort or injury.
- Dividers must not catch the legs while manoeuvring in and out of the stall.
- Cows extend hind legs away from the body, so rear of the divider should not be attached to the ground to avoid obstructing rear legs, tail or udder

Brisket Locator

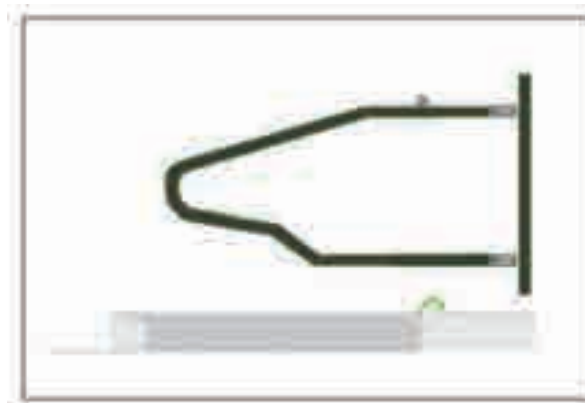


Fig 2.1.17 Brisket locator

- Brisket locator helps the cow to position itself when she lying down.
- Forward lying lead to bed soiling or interrupt with lunge space of opposite cows
- Brisket locator should be rounded, without sharp edges, 10 cms in height

Neck Rail

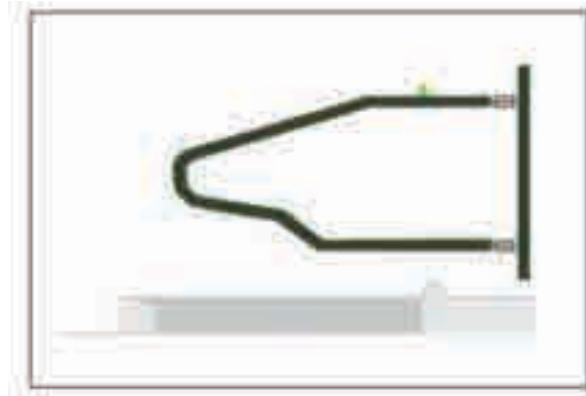


Fig 2.1.18 Neck rail

- Use - to position the cow when she enters the stall, before she lies down.
- The position of the neck rail needs to be correct both horizontally and vertically.
- Neck rails should be adjustable in herds with different sizes.



Fig 2.1.19 Kerb

- The kerb is the drop between the back of the bed and the cow passageway and keeps effluent off the stalls.
- Height will depend on the scraper type, floor type and length of passageway.
- It should not have sharp edges, be slippery or be too wide to prevent cows' hocks resting or rubbing on the kerb when lying down

Slope of Bed

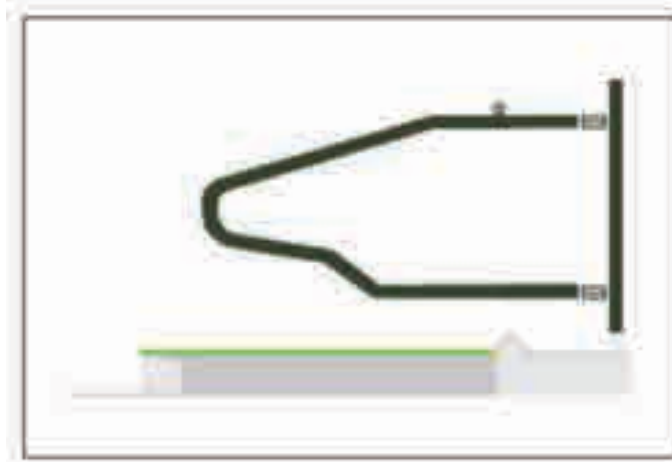


Fig 2.1.20 Slope of bed

- Stall beds should be installed with a slight fall of 1–2% from the front to the rear.
- The slope provides for drainage. Well-designed mattresses incorporate slope and grooving to draw fluid away from the cow.
- More sloppy bed (3%) will not retain the bedding material

Freestall Lying Surface

- It must be clean, dry, comfortable, safe, provide sufficient grip and be made from resilient and durable material.

There are Several Options

- Mattresses – foam or rubber mattresses,
- Waterbeds
- Sand – offers the highest comfort and cleanliness for cows. It requires daily grooming and replacing. Sand can also be separated, washed, dried and reused.

Managing Scraped Passages

- The target is to keep the building and the cows as clean and as possible.
- Passages ways usually get dirty and it need to be cleaned periodically. Dirty passageways increase the prevalence of lameness, weakening of the hoof or digital dermatitis.
- A higher stocking rate will require more frequent scraping or washing.

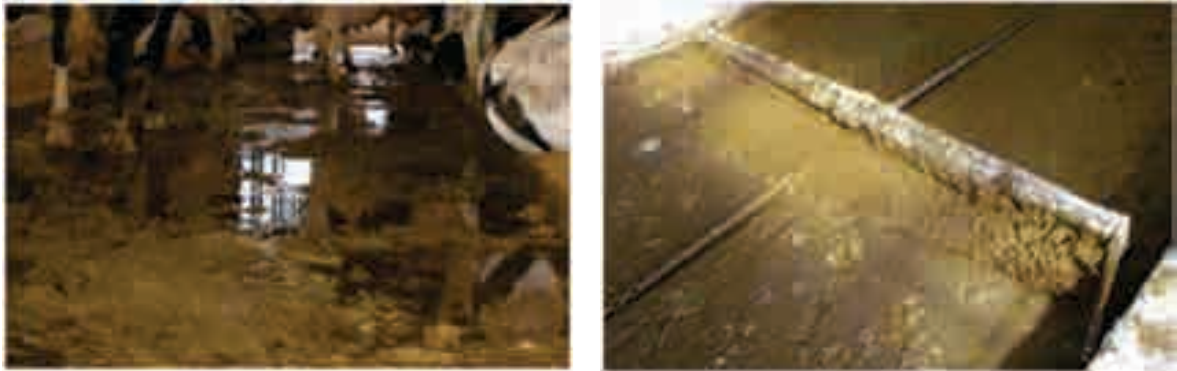


Fig 2.1.21 Managing Scraped passages

Ensure scrapers run regularly enough to stop effluent pooling.

Ensure the scraper runs frequently enough to keep the volume of scraped slurry from overflowing onto the beds.

Flood washing

- An alternative to scraping is flood washing. The floor should be laid with a 2–3% fall and 10mm wide groves cut in the floor in the direction of the water flow.
- Flood washes are not as common as scrapers and it is better if the barn is empty when the washing occurs. The volume of water required will depend on the slope of the floor and the width of the passage.



Fig 2.1.22 Flood washing

Flooring

Floors must:

- Anti-slippery
- Allow confident walking
- Allow standing on three legs and grooming with the fourth
- Allow expression of oestrus
- Prevent injury
- Be durable

Concrete Flooring

The durability, and particularly abrasion resistance, needs to be considered in the concrete specification for a feed passage floor. Cattle slats are typically spaced 40mm apart. The edges of the slats should be rounded to prevent hoof injuries.

- larger gaps create issues for cows when they walk,
- smaller gaps create issues with drainage.

Estimates of risk factor ratios for cows slipping on different concrete floor finishes and effluent conditions

Floor Surface	Risk Factor of Slipping
Dry un-grooved concrete	1.0
Un-grooved concrete and effluent	3.5
Grooved concrete and effluent	0.60*

Table 2.1.5 Risk factors

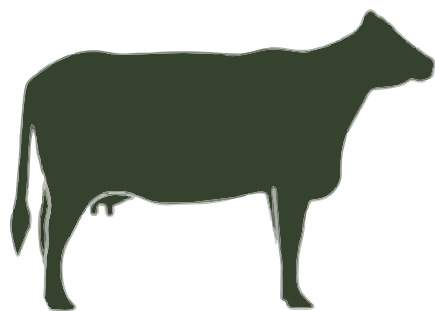
Rubber Matting

- Reduces pressure on cows' feet in passage ways.
- Expensive but very slippery when wet and bacteria grows in cracked worn rubber.

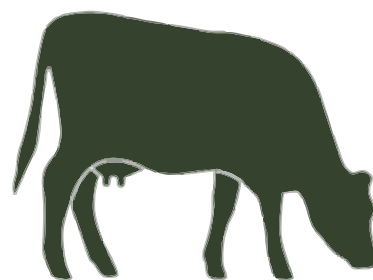
Feeding System Principles

- The principles applied to the feeding area are to:
- ensure easy and comfortable access to feed
- limit contamination from weather and pests
- limit feed wastage
- provide a non-injurious environment
- make feeding out easy for farm staff.

Standing and Grazing Stance:



When cows stand head up, there is a straight line from the front hooves to the point of the shoulder.



In grazing cows, the point of the shoulder tips forward of the front hooves to enable the cow's mouth to reach the ground.

Fig 2.1.23 Standing and Grazing

The natural stance (grazing stance) can be hindered when cows feed from behind a barrier. Correct design of the barrier will help reduce this impact.

Feed Barrier Dimensions



Fig 2.1.24 Feed barrier

How the feed table height affects feed utilization

Height of the feed table above cows feet	Reach of the cow	
0 cm	60 cm	Feed will be pushed away by cows trying to eat which increases the risk of wastage, and requires more regular "push up".
10 cm	90 cm	Good muscular action and salivary production will be achieved.
20 cm	1.2 cm	

Table 2.1.6 Feed table height

Feed Face Per Cow

These dimensions are a guide and you will need to measure your own herd to get the correct measurements.

Weight of Animal	Width of Feed Face Per Cow
450 - 500kg	70 cm
> 500kg	1 m

Table 2.1.7 Feed face per cow

The correct space per cow provides stress-free feeding, correct feed intakes and keeps cows on their feet for 30 minutes after milking.

Ventilation

Ventilation will maximise cow comfort and health by:

- Removing excess heat
- Removing excess water vapour (respiration and sweat) and reducing effects of humidity
- Removing microorganisms, dust and gases, especially ammonia
- Providing a uniform distribution of air
- Minimising draughts at stock height.

Correct building design is critical to ensure adequate ventilation that will maintain air quality and temperature all yearround regardless of outside weather conditions.

Passive or natural ventilation relies on external wind speeds and the design of inlets and outlets. Active or forcedventilation uses internal and external fans, sometime in conjunction with natural ventilation.

Buildings will naturally ventilate best when they are sited at right angles to the prevailing wind direction; have no wind disruption from other obstacles such as buildings or tree lines; and have adequate eave height and roof design.

The Chimney Effect Using a Central Ridge Outlet

The chimney, or stack effect, occurs in a livestock building when warm air from the cows rises and escapes through an outlet, and cool air from the sides is pulled in. For the chimney effect to work efficiently, there must be a suitable balance between air inlet and air outlet and adequate roof pitch.

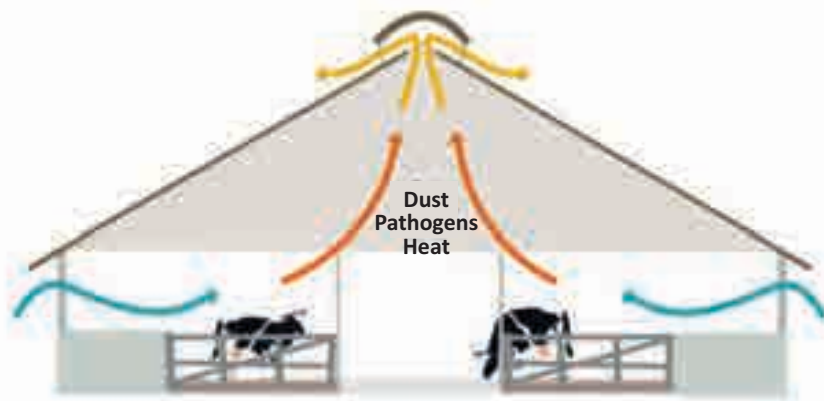


Fig 2.1.25 Ventilation

Basic Cross-Ventilation in an Open-Sided Building

Passive ventilation systems usually have open sides, with no or minimal side walls, and utilise wind break curtains. When cows have access to a building with a central ridge outlet for short periods of time for feeding, it is most likely that only cross ventilation will be achieved.

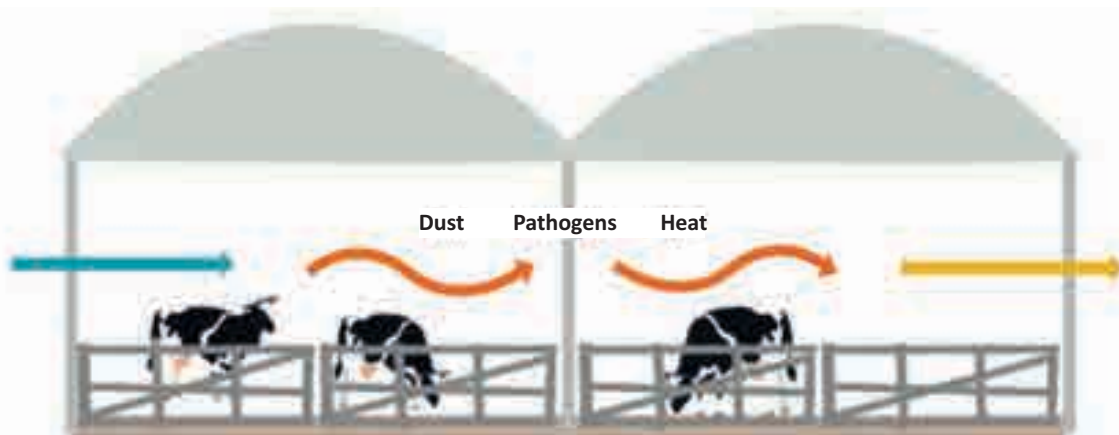


Fig 2.1.26 Ventilation

Condensation

Condensation forms when warm moist air rises and has no way of escaping, it collects under the cooler roof surface and forms droplets that fall down onto the bedding. If the droplets fall on lying areas it can increase the risk of pathogen growth and make some areas less appealing for cows to lie on. Good ventilation reduces the risk of condensation.



Fig 2.1.27 Condensation

Ensure Housing Environment is Clean at all Times

The housing area should:

- Be designed to provide good drainage and ventilation and to avoid animal injury
- Be of suitable size and designed to cater for the size of the animal and the herd; and
- Have adequate loose bedding which is maintained in a hygienic condition.
- All stalls and beds should be kept clean and dry (eg by replacing the bedding frequently). Regularly clean or scrape passageways to remove manure

Ensure Milking Area is Kept Clean

The milking area should:

- Be easy to clean;
- have a clean water supply;
- have waste handling facilities; and
- have sufficient temperature regulation, ventilation and light. Construct holding yards to enable a high standard of cleanliness to be maintained.

UNIT 2.2: Tools and Equipment

Unit Objectives

By the end of this unit, participants will be able to:







1. Understand and procure the needy tools for Dairy farming.
2. Use the tools/equipments in Dairy Farming.







2.2.1 Tools and Equipment

Use of Tools and Equipment Used for Preparation of Accommodation

Equipments	Name
	Stiff Brushes To groom the cow manually
	Roller Automatic brush To groom the cow
	Restraining ropes To restrain the cow

<p>1. Milk Strainer Kit</p> <p>2. Jar adaptor for 3441 strainer</p> <p>3. Storage Jar</p> 	<p>Milk Strainer, Jar adaptor and storage jar</p> <p>To collect the milk</p>
	<p>Mouth gag</p> <p>To open the mouth and to administer oral medication</p>
	<p>Milking pails</p> <p>To collect milk</p>
	<p>Milk strip cup</p> <p>To strip milk</p>
	<p>Weighing machine</p> <p>To weigh feed and medicine</p>

	<p>Weighing scale</p> <p>To weight solutions, medications etc</p>
	<p>Measuring tape</p> <p>To measure the barn</p>
	<p>Rubber mats</p> <p>To protect the hoof of cow</p>
	<p>Exhaust Fans</p> <p>To improve ventilation</p>
	<p>Feed Troughs</p> <p>To hold feed</p>
	<p>Portable Hay feeders</p> <p>To distribute hay</p>

	<p>Water bowl</p> <p>To hold/water calf and cows</p>
	<p>Clipper blades</p> <p>To groom the cow</p>
	<p>Clipper</p> <p>To trim the hair</p>
	<p>Dip cup</p> <p>To dip teat with medication</p>
	<p>Bedding material</p> <p>To absorb excess moisture</p>
	<p>Hoof Equipment</p> <ol style="list-style-type: none"> 1. Hoof clipper - hoof clipper for shortening tips of toes, light hooves and grown hoof walls. 2. Hoof clipper pliers - for shortening tips of toes.

	<ul style="list-style-type: none"> 3. Hoof club- made of special plastic. 4. Hoof knife - with curved blade. 5. Hoof blade - for paring the underside of the hoof. 6. Hoof rasp - for rounding hoof wall.
	<p>Foot bath</p> <p>To disinfect the hoof of the visitors and cows entering the farm</p>

Table 2.2.1 List of tools

Holding Chute

The holding chute is secured to the head gate and located immediately behind it. The holding chute should generally not be any wider than 26 inches but should be adjustable in order to compensate for different-size animals. The sides should be solid so that animals are not able to look out and be scared by their surroundings.

Working Chute

The working chute connects the holding chute with the holding pen. It should be long enough to hold five to six animals at a time.

Crowding Pen

The crowding pen is located at the back of the working chute. Size should be about 150 square feet. This area will hold five or six head of cattle.

Holding Pens

Holding pens should mesh conveniently with the rest of the facility. Each holding pen should provide approximately 20 square feet of space per animal.

Loading Chute



Fig 2.2.1 Loading chute

The loading chute may be optional if a trailer is used to transport animals. The loading chute should be located directly off the crowding pen.

Exercise

Q. 1. List the equipments required for dairy farming.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

UNIT 2.3: Understand the Different Methods of Waste Handling

Unit Objectives

By the end of this unit, participants will be able to:

1. Disposal of waste.
2. Explain waste management.

2.3.1 Understand the Different Methods of Waste Handling

Understand the different methods of waste handling/ management

Best waste management practices that help dairy operators are that

- Prevent direct discharge of manure or wastewater into surface waters or onto adjacent neighbors' property.
- Prevent any nuisance conditions that interfere with normal use and enjoyment of neighbors' property.
- Enhance the operational efficiency of the dairy unit.
- Collect and use dairy manure and wastewater for beneficial purposes such as fertilizer, compost, or bedding.

Efficient handling or managing of waste in dairy farm

- Reduces disease incidence (hoof problems, ectoparasites etc)
- Reduce medicine or health care costs
- Reduces milking time (cleaning time of udders)
- Reduces ammonia emissions
- Improves cleaning in the farm
- Improves hygiene and animal welfare in farm
- Improves milk quality and value
- Improves overall profitability of the farm

Environment

Manure can be used as a farm resource reducing the environmental impact of phosphate, ammonia and methane emissions.

Social Responsibility

Careful Manure handling at farm premises will reduce negative impact on human health in neighborhoods. This can be achieved through pro-active solutions that ensure minimum impact from farm operations.

Other Waste Management in Dairy Farm

Plastic

- Plastics must be recycled or disposed of in a landfill.
- Do not burn or bury plastic wastes in farm. Burning will release harmful chemicals in the atmosphere while burying will contaminate the soil and underground water of the farm. Waste Plastics include silage wraps, plastic disinfectant containers, drums, fertilizer bags, feed bags, baling twines.

Agrochemicals

- Pesticides, weedicides or veterinary medicine are used in a dairy farm. They can be toxic, and may contain carcinogens, heavy metals and other compounds which can be dangerous to humans, animals and the environment. They are often only used in small amounts, but can have a large environmental impact if used or disposed of incorrectly.

Dead Stock

- The primary purpose of safe disposal of carcass is to ensure the check and spread of disease either to other susceptible animals or humans.
- Carcasses of animals may be disposed of by sending them to knackeries or by burial or burning.

Run off Management

- Dairy liquid wastes (milking center), roof gutter and washing run off should be held in a pond.

Composting

- Composting is an effective way to dispose carcass while creating a useful product and minimising the potential for groundwater contamination.
- If managed well, composting can be low cost and relatively odour free. In Composting, micro-organisms break down carcasses to form humus that can be spread over non-productive areas such as domestic gardens and shelter belts.
- Bulking agents such as sawdust or straw are to be added for composting. The process may take up to six months depending on the size of the animal.

Solid/Liquid Separation for Dairy Waste

Solids and bedding waste should be collected separately in sedimentation pits so that it can be applied as fertilizers.

Land Application

It is the best end use of dairy manure and should match the fertilizer requirements of the target crop

Waste Storage Pond

- A specially constructed pond used to collect and store manure, flush water, and polluted runoff from a dairy facility for 3 to 6 months.
- At the end of storage period, the contents are used in land application
- Caution:
 - Impermeable liner to prevent leakage of stored water into ground water
 - Away and downside of neighborhood, highways and public access area

Dairy Waste Lagoon

- Earthen structures used for biological treatment and long term storage of dairy waste
- Biological treatment reduces nitrogen content upto 80 percent and can be used in sewer or irrigation lines

Scrape and Haul

- Remove solid manure from holding areas by scraping to a special manure holding area to await hauling for land application.
- This special manure holding area should have an impervious base such as compacted clay, but concrete is preferable. This impervious base should be sloped to drain liquid manure away into a waste storage pond that also handles milking center liquid wastes. Storage areas may also be covered to reduce rainfall runoff into the system. This method of dairy waste management is very basic and is generally most applicable for dairy herds with less than 100 cows.



Fig 2.3.1 Run off management



Fig 2.3.2 Land application



Fig 2.3.3 Waste storage pond



Fig 2.3.4 Dairy waste lagoon



Fig 2.3.5 Scrape and haul

UNIT 2.4: Plan and Follow the Routine Cleaning of Animal Shed

Unit Objectives

By the end of this unit, participants will be able to:

1. Plan /schedule the cleaning of shed.
2. Clean and sanitize the shed.

2.4.1 Plan and Follow the Routine Cleaning of Animal Shed

Assessment of Labour Requirement

TYPE OF WORK	Cows per labour
Hand Milking operation including cleaning of animal, heat detection	10
Machine Milking operation including cleaning of animal, heat detection	15
Shed cleaning and grazing	25
Calf management inclusive of feeding, cleaning	25
Other works like cleaning the premises, fodder chaffing etc	50

Table 2.4.1 Assessment of labour requirement

- Train the labour on farm hygiene and biosecurity measure periodically and properly
- Person involved in cleaning operation should be trained covering infectious and non infectious diseases, waste disposal, incineration and biosecurity measures, cleanliness, food and water safety, pest incidence etc.
- A person with patience, dedicated skill should be allotted to calf pen and calving pen.
- Modern facilities like close circuit cameras, intercom systems can be used to facilitate good monitoring.
- Safety of farm labour is very important. No compromise should be done in this regard, particularly equipment, electrical fittings and facilities should be monitored properly to avoid any untoward incidences.

TIME (Hours)	SI.NO	FARM OPERATION
03.00 - 03.30	1.	Cleaning/brushing of milch animals
03.30 - 05.00	1.	Feeding half of the daily concentrate ration just before milking
	2.	Milking cows
05.00 - 05.30	1.	Delivery of raw milk (in cans) to milk pick up van of dairy plants and receiving previous day's empty cans
	2.	Washing and disinfection of milking barns
05.30 - 08.00	1.	Cleaning of milk cow sheds
	2.	Feeding of dry/green fodder to milch stock
	3.	Cleaning of farm premises
	4.	Isolation of sick animals
	5.	Isolation of "in-heat" cows for artificial insemination
		<i>Note: use milk man at the rate of one for every 12-14 cows, for all the above operations. Milk man go off duty by 8 am and farm labour come on duty</i>
1.		Cleaning calf, maternity, dry stock, bullock and bull sheds
2.		Feeding half of the daily concentrate ration to calves, pregnant cows and bulls
3.		Exercising and grooming of bulls
4.		Treating sick animals.
5.		Breeding cows that are "in-heat"
6.		Harvesting, chaffing and feeding of green fodder to all the stock. Manger in all sheds should be filled with green fodder
		<i>Note: animals should be taken for grazing (if practiced) between 9 a.m and 2 p.m. in winter and between 6 a.m and 10 a.m. and again between 5 p.m. and 7 p.m. in summer</i>

1.	Lunch cum rest period for labourers	
1.	Miscellaneous jobs of dairy farm like stock identification, periodical vaccination, preparation of concentrate mixture, repair of farm fences, fitting and repair of equipments, rope and halter making, weekly scrubbing and white washing of drinking water tank, manure disposal/conservation, hay and silage making, periodical spraying of animal houses with suitable pesticides, periodical deworming of stock, clipping of hair from sides and hind quarters of cows; grooming, toe trimming, dehorning of calves, attending to sale and purchase of livestock and their transportation, fitting and training of cows for show	
	<i>Note: the dairy manager should plan the jobs well in advance in such a way that they are evenly distributed over the week. Some jobs may require longer time and the labour have to work extra time on such occasions.</i>	
		Milkers come duty by 14.30 hours and remain up to 1730 hours whereas general farm labour go off duty by 1700 hours .
14.30 - 15.00	1.	Washing/brushing of milch cows by milkers
15.00 - 16.30	1.	Feeding the other half of daily concentrate ration to milch cows just before milking
	2.	Milking
	3.	Cleaning calf, maternity, dry stock and bull sheds and feeding the other half of concentrate ration to calves, pregnant cows and bulls
16.30 - 17.00	1.	Delivery of milk (in cans) to milk pick-up vans of milk plants and collection of morning's empty cans
	2.	Washing and disinfection of milking barns
	3.	Feeding dry and green fodder to calves, dry stock and bulls
17.00 - 18.30	1.	Cleaning of milk cow shed
	2.	Feeding green / dry fodder to milch stock
	3.	Cleaning of farm premises
18.30 - 03.00		Night watchman on duty

Table 2.4.2 Routine daily dairy farm operation



3. Establish Livestock with in Accommodation



Unit 3.1 - Personal Protective Equipments

Unit 3.2 - Check the Suitable Environment Condition

Unit 3.3 - Handling to Minimize Stress

Unit 3.4 - Understand and Follow Thesafety Procedures

Unit 3.5 - Ensure Cleanliness and Follow Proper Method of
Waste Disposal



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the appropriate livestock accommodations required for each type of animal.
2. Enlist the materials (e.g. bedding) and environmental conditions which animals need within their accommodation to maintain their health and well-being.
3. Explain the different factors which should be taken into account when preparing accommodation in a safe, secure and clean state.
4. Explain the safety procedures to be followed.

UNIT 3.1: Personal Protective Equipment

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the requirement of PPE in Farm.
2. Use the Personal protective equipment.

3.1.1 Personal Protective Equipment

- This standard covers establishing, monitoring and maintaining livestock within indoor accommodation. The main emphasis will depend on the species of animal(s) you work with. Changes may occur in the behavior or physical condition of the livestock and you must be able to take the appropriate action when changes are identified.
- When working with livestock or machinery you need to be appropriately trained in line with current legislation, and hold a relevant award where appropriate.
- You must carry out your work in a way which will consider any impact on the natural environment.
- This standard is suitable for those involved in the establishment, monitoring and maintenance of livestock within indoor accommodation.

Ensure tools, equipment and machinery is fit for use and properly set up prior to undertaking the activity

- Fencing for cows is a little easier and cheaper option to choose to restrict the movement of cows. Barbed wire fencing is the most common type of fencing.
- Solar Electric fencing is best for farms that interference with animals from outside.
- More rugged fencing such as stand-alone iron panels, wood board or iron rail is best for corrals, handling facilities and working or holding pens, and highly recommended for cull-cow pens.

Outside Lots & Fencing

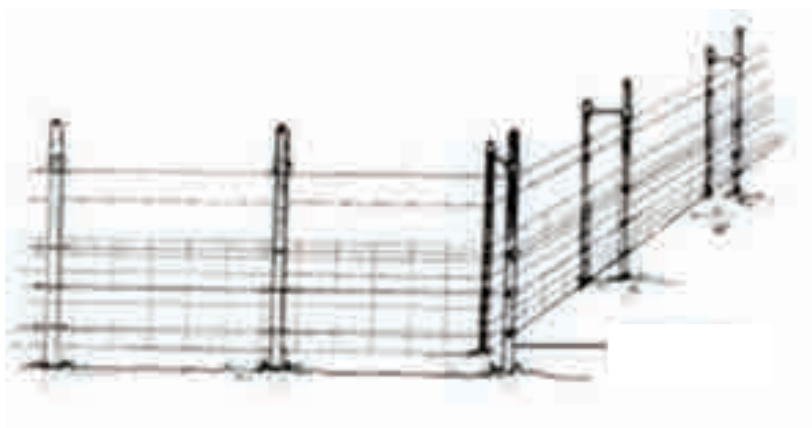


Fig 3.1.1 Fencing

Concrete Lot



Fig 3.1.2 Concrete Lot (1)



Fig 3.1.3 Concrete Lot (2)

Aprons, Boots, Goggles and Gloves



Fig 3.1.4 Personal protective equipments

The above protective gear helps the farm labour protect from injuries, slipping, dust from feeds materials, contamination from milk or manure.

The materials should be durable, water resistant, easy to clean, non staining and comfortable to the user

Automatic feeding systems

- Automatic feeding makes it easier for you to deliver TMR (Total Mixed Ration). Specific feed rations needs to be delivered regularly and frequently in order to run a successful dairy farm.
- Besides being highly time consuming; measurement and mixing of feed requires attention to detail and precision.
- With automation you will save time and eliminate the guesswork.



Fig 3.1.5 Automatic feeding system (1)



Fig 3.1.6 Automatic feeding system (1)

Bedding Chopper

- Bedding choppers used to spread bedding materials directly in the farm
- Bedding choppers finely chop large round or square bales.
- Advantage - Save you time, easy to clean and use less straw for bedding.
- Models - Skid loader mount and 4 wheel drive.

Calving Pens (Portable Handling Equipment)

Another critical criteria is the need for efficiency and reduced labor. The system was designed to get the most work done, with the least amount of labor. Cattle flow is improved when noise is reduced and this is accomplished with silicone sealant under the sheet metal and rubber bumpers between moving parts.

Cow Mats

- Mat has given good comfort to cow, buffalos and bulls. Enabling them to recover from lameness and also increases the productivity of that animal. Each Solid Rubber Mat provides a firm grip to the hooves of the animal when it goes to sit or when it rises.
- The grooved on the underside of mat to allow for drainage and increase the softness. These mats also come with a diamond pattern to minimize slippage. They are available in straight edge or interlocking.

Milking Machines

The portable milking machines are mainly constituted by:-,Milking system: pulsator, claw, stainless steel teat cups,milking liners and tubes, stainless steel milk bucket, etc.

Milk Unit Washers

- For washing a milking unit, the teat cups are inserted in respective flexible receivers which seal around the enlarged end portions of the teat cups and communicate with a distributor having an inlet connected to a vacuum line for washing liquid.
- During washing, a high vacuum in the milk pipe line raises a valve in the distributor, while closing a drain opening therefrom, and draws washing liquid through the distributor, the receivers, the teat cups therein, the milk claw connected to the teat cups, and then into the milk pipe line for washing the latter.

Milk Bulk Tank

- Milk Bulk Tank are made of Stainless steel cabinet with heavy duty polypropylene tank and is used to hold the milk in chilling temperature before it reaches milk processing plant.
- Floor standing, easy to install, requiring only a 13 amp supply.
- Built in water tank means they will work even in dairies with poor water pressure.
- Control has a variety of wash settings to suit individual situations.



Fig 3.1.7 Chopped feed



Fig 3.1.8 Bedding chopper



Fig 3.1.9 Portable handling equipment



Fig 3.1.10 Portable handling equipment



Fig 3.1.11 Cow mats (1)



Fig 3.1.12 Cow mats (2)



Fig 3.1.13 Milking machine



Fig 3.1.14 Milk unit washers



Fig 3.1.15 Milk bulk tank

UNIT 3.2: Check the Suitable Environment Condition

Unit Objectives

By the end of this unit, participants will be able to:

1. Confirm the suitability of indoor accommodation ready for the reception of the livestock.
2. Identify the location for dairy buildings.

3.2.1 Check the Suitable Environment Condition

Check the suitable environment condition of the accommodation before establishing livestock within it

Confirm the suitability of indoor accommodation ready for the reception of the livestock.

- Clean and disinfect the materials used for the construction of accommodation, and, in particular for the construction of pens, cages, stalls and equipment with which animals may come into contact,
- Ensure no harm or stress to animal while letting them in
- Ensure accommodation and fittings for securing animals do not have sharp edges or protrusions likely to cause injury.

An efficient management of cow will be incomplete without a well-planned and adequate housing, of cattle. Improper planning in the arrangement of animal housing may result in additional labour charges and that curtail the profit of the owner. During erection of a house for dairy cattle, care should be taken to provide comfortable' accommodation for an individual cattle. No less important is the

- Proper sanitation
- Durability,
- Arrangements for the production of clean milk under convenient and economic conditions, etc.

Location of Dairy Buildings

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

1. Soil Type

- Do not select fertile soil for dairy farm.
- Do not select dehydrated or dessicated soil as they will swell during rainy season and exhibit numerous cracks and fissures.

2. Exposure to the Sun and Protection From Wind

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

3. Accessibility

- Ensure the dairy farm is easily accessible from main road for transport of milk, feed and bedding materials.

4. Durability and Attractiveness

- Ensure durability of the structure in addition to attractiveness of the dairy farm.

5. Water Supply

- Ensure abundant supply of fresh, clean and soft water

6. Surroundings

- Avoid areas infested with wild animals and dacoits.
- Eliminate narrow gates, high manger curbs, loose hinges, protruding nails, smooth finished floor in the areas where the cows move and other such hazards.

7. Electricity

- Ensure continuous supply of Electricity, as it is the most important for several operations in modern dairy farm.

8. Facilities

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

Exercise 

Q. 1. List the criteria for deciding the location for dairy buildings.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

UNIT 3.3: Handling to Minimize Stress

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the behavior animals.
2. Explain how to minimize the stress in the animals and lead for good production.

3.3.1 Follow the Proper Handling to Minimize Stress

Cows need comfort and shelter, fresh water and a healthy balanced diet, freedom of movement, company of other animals, opportunities to exercise the most normal patterns of behavior, natural daylight, suitable flooring, veterinary care, avoidance of unnecessary mutilation and emergency arrangements.

Monitor and Assess Livestock Health and Welfare

- Conduct regular and periodic health and welfare checks in the farm
- Recognize and report symptoms of ill health and common diseases, disorders or parasite infestations
- Handle cows in calm and stress environment.

Implement Livestock Health and Welfare Procedures

- Occupational Health and Safety (OHS) hazards in the workplace are recognized and safety issues reported according to enterprise requirements.
- Quarantine and bio security procedures are maintained as instructed to minimize the risks of disease introduction.
- Thorough personal hygiene practices are maintained in all activities associated with handling livestock, including reducing risks from diseases transmissible to humans.
- Sick or dead livestock are safely treated and humanely destroyed, if necessary.
- Environmental implications associated with livestock husbandry practices are identified, assessed and relevant measures implemented.

Maintain the Indoor Accommodation in Accordance with Livestock Requirements.

Temperature:

- The overriding environmental factor affecting the physiological functions of domestic animals is temperature. For most farm animals, a mean daily temperature in the range 10–20 °C is referred to as the 'comfort zone'.
- In this range, the animal's heat exchange can be regulated solely by physical means, such as the constriction and dilation of blood vessels in the skin, ruffling up the fur or feathers and regulation of the evaporation from lungs and skin.
- At the upper and lower critical temperatures, physical regulation will not be sufficient to maintain a constant body temperature and the animal must, in addition, decrease or increase its metabolic heat production.

- A further decrease or increase in temperature will eventually bring the temperature to a point beyond which not even a change in heat production will be sufficient to maintain home other my.
- A very young animal, lacking fully developed temperature-regulating mechanisms, particularly the ability to increase heat production by increased metabolism, is much more sensitive to its thermal environment and requires higher temperatures.

Humidity

- Cows have varying abilities to sweat and, in descending order.
- In a hot, dry climate evaporation is rapid but, in a hot humid climate, the ability of the air to absorb additional moisture is limited and inadequate cooling may result in heat stress.
- Excessively low humidity in the air will cause irritation of the mucous membranes, while excessively
- high humidity may promote the growth of fungus infections. High humidity may also contribute to decay in structures.
- If possible, keep the relative humidity in the range of 40 percent to 80 percent.

Radiation

- The heat load on a grazing animal can be increased considerably by direct solar radiation and radiation reflected from clouds or the ground.
- A white hair coat will absorb less radiant energy than a dark one, but the heat penetrates deeper into a white, loose coat.
- Air movements will dispel the heat and reduce the differences. Solar radiation may also adversely affect the animal's skin, in particular breeds with unpigmented skin.
- Heat gain by radiation can be effectively reduced by the provision of a shaded area. It must, however, be
- sufficiently large to allow space between the animals to avoid reducing heat loss by other means. Grass-covered ground in the surroundings of the shade will reflect less radiation than bare soil.

Precipitation

- Avoid cows moving outdoor during monsoon. Heavy rain coupled with strong wind lead to excessive cooling and cause cold stress or lead to discomfort to cows.
- However, a naturally greasy hair coat will resist water penetration and with the provision of a shelter for the animals the problem may be avoided altogether.

3.3.2 Monitor Livestock in their Accommodation

Outdoor

- Prepare a plan for dealing with emergency situations such as adverse weather conditions or an outbreak of a serious disease.
- A good thing to have in your health and safety plan is an isolation system so that you can control a disease if there is an outbreak in your cattle.

Indoor

Ventilation

- The first and most important thing that you must consider when housing cattle indoors is ventilation.
- The main reason for this is because respiratory infection is undoubtedly the most common and the most financially damaging disease in housed calves and cattle.
- There are three different ways in which you can provide indoor livestock with ventilation; these are by wind effect, by outlet, or by inlet.
- You must remember that cows release a lot of heat and gas and therefore good ventilation also helps to control the air space/humidity and the gas concentrations.
- Good ventilation also allows cattle to have unlimited access to fresh air, so that it is as if they are outside.

Insulation

- This is done by providing them with bedding
- This provides the cows with all of the insulation they need as they do not need a lot because cows release their own heat.
- Insulation also links to temperature, it is important that cows are kept at a suitable temperature because otherwise it could cause illness.
- Cows release a lot of their own heat and therefore they do not need to be kept in very heated conditions.
- Flooring gives good insulation.
- This can link in with drainage because you must have to include this into your flooring plan. The most common flooring that is used is fully slatted flooring because cattle lie down regularly and bare slatted flooring would be uncomfortable

Lighting

- Ensure access to day light for cows. Do not place them in dark and damp corners.
- Keep Artificial lights that mimics natural light in the farm
- Avoid too bright or flashy lights in the farm.
- Lighting facilitates early identification of any abnormality in the farm.
- Good lighting stimulates feeding and result in high milk yield.
- Do not overcrowd cows in dairy farm as it leads to poor welfare and can increase the spread of disease. It can also cause the cattle to fight because they do not have enough space and it can also be caused by restricted access to food.
- With cattle it is especially important that you do not overstock when you have calves.

Overall, the main aim of the indoor accommodation is to provide shelter for the cattle; it should protect them from the extremes of rain and snow and protect them from the wind. This is really important because if cattle are not kept correctly and not kept in the correct conditions then it is not only seen as unfair to the animal but it can also cause the animals to become ill or die and therefore farmers end up losing lots of money because of it.



Fig 3.3.1 Outdoor livestock accommodation



Fig 3.3.2 Indoor accommodation

Exercise

Q. 1. How can the stress of animals be minimised?

Notes



A large rectangular area with a thin orange border, containing 30 horizontal lines for writing notes.

UNIT 3.4: Follow the Safety Procedures

Unit Objectives

By the end of this unit, participants will be able to:

1. Maintain Safety at the workplace.
2. Prepare the checklist.

3.4.1 Follow the Safety Procedures

Maintain Safety at the Workplace

Every year incidents involving livestock account for a large proportion of the injuries sustained by people working on farms. The effects can be severe. Many injuries caused by cattle result in the farmer being unable to work for months.

Before You Start

Before working with Cows take a moment to Stop and Think!

- Follow safety procedures while working with cows. Ensure that the cows are restrained properly. Ensure you wear necessary protective gears.
- Ensure that the cows are not aggressive. Agitated or stressed animals are more likely to be dangerous. Certain tasks, such as veterinary work, may also increase the risk.
- Take care while approaching a recently calved cow, sick or stressed cow. The risk is increased if the animals have not been handled frequently.
- If cows are not restrained, always check that there is somewhere safe you can get to easily
- Work out an escape route or refuge before working with cattle.
- Attempting to carry out stock tasks on unrestrained cattle or with makeshift equipment is particularly hazardous.

Preventing Disease

- Zoonoses are diseases passed from animals to humans. Reduce the risk of infection by vaccinating animals where appropriate and always wear suitable protective clothing when handling animals or potentially infected material such as the afterbirth or faeces.
- Ensure good personal hygiene at all times
- Wash and dry your hands before eating, drinking or smoking.

The Stop and think checklist The following helpful tips will help keep you safe on the farm.

Always

- Make sure handlers are competent and agile
- Work out an escape route or refuge before working with cattle
- Be careful around cows and heifers with new-born calves
- Remember that cows that are 'on heat' are unpredictable

- Try to keep cows calm when handling them
- Use a stick to assist in directing cow
- Debud calves early to prevent horn growth
- Watch for warning signs of animal aggression, especially in bulls and newly calved cows and heifers
- Cull aggressive and difficult cows as soon as possible
- Use well-designed facilities
- Regularly check and maintain facilities such as the crush, gates and fences
- Keep ground surfaces clean, as far as possible
- Protect yourself against disease with proper personal hygiene

Never

- Put an inexperienced handler or a child at risk with cows
- Turn your back on a cow following calving
- Stress or arouse cows unnecessarily
- Keep dangerous cows
- Beat or shout at cattle unnecessarily - they remember bad experiences

Principles of Handling Cows Safely

- Keep cows calm

The Following Factors Makes Handling Difficult

- Hunger, Thirstiness
- Loud noise – dog barking or motor traffic
- Being hit or beaten
- Being chased
- People in personal space
- Sickness

The Following Factors Calms Cow

- Working in quiet and confident way
- Familiarity
- Gentle and low sounds
- Rhythmic sounds and talking to cows
- Stroking

Recognising Danger Signs

- Bellow loudly
- Paw the ground with hooves
- Head down facing the ground likely to butt
- Lifted tail position

Use Gentle Handling

- Learn the 'flight zone'
- 5 mts or less Cows will move when you enter this zone. It is proportional to speed and how close you move towards the cow

Balance Lines

- Cattle have two balance lines.
- One runs across the shoulders and the other runs along the backbone.
- When you're working up close, whichever way you move through those lines, the animal will move the other way:
 - ✓ If you're alongside the animal and move forward, it will move backward.
 - ✓ If you go back, it will go forward.
 - ✓ If you're in front and move to the left, it will move to your right.

Use Your Voice

- Cows can not see the way we see
- Good handlers use voice to calm the cows
- Voice helps cows to assess your position or closeness

Use a Waddy

- Use a long stick with a cloth like a flag
- Helpful to handle difficult animals

Be Firm

- Assert your position as dominant person needing respect
- Do not threaten the cows frequently

Avoid Getting Kicked

- Stand away from cows
- If need to stand close, watch yourself for safety or ensure the cow is restrained properly

Wear the Right Gear

- Gumboots or Leather boots with steel toe-caps are best.
- A strong pair of trousers and leggings softens the severity of kick injuries.
- Remove watch, jewellery
- Roll your sleeves down

Render appropriate emergency procedures

- Inform the local authorities in case of disease outbreak.
- An animal disease outbreak may occur through natural pathways or could be introduced as an act of terrorism.
- Response measures for an animal disease emergency may involve the mutual aid support from sister counties and municipalities as well as local private industry support.
- Animal disease emergencies may lead to prolonged economic impacts requiring long term federal and state assistance programs for recovery.
- Owners losing livestock in an animal disease emergency or persons responding to the situation may require psychological counseling and support.

UNIT 3.5: Ensure Cleanliness and Follow Proper Method of Waste Disposal

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the importance of cleanliness of shed.
2. Explain the disinfectants to be used.

3.5.1 Ensure Cleanliness and Follow Proper Method of Waste Disposal

Washing of Cattle

- Wash cows to remove the dirt and maintain health
- It also helps in regulating body temperature in summer.
- Wash cows twice daily, preferably before milking.
- Wash the regions of flank, udder and tail with antiseptic lotions and dry with a clean towel.

Clean, Dry Floors to Prevent Slips and Falls:

- Maintain clean, dry floors in milking and bedding area
- Prevent slips and falls in the workplace. Different categories of floor cleaners serve different purposes.
- However, some products may contain chemicals that can be detrimental to flooring, so be sure to talk with a cleaning professional about what is best for your facility.
- In addition, keep your floors dry by using absorbent materials, such as floor mats.

Disinfectants Prevent the Spread of Germs and Illness, Including the Flu.

Germs can easily spread throughout a workplace, particularly during flu season—but disinfecting surfaces and objects with EPA-registered.

Disinfectants

- Disinfectants are germicide or antiseptic substances to kill organisms and their spores. Disinfection means destruction of pathogenic micro organisms from a place so that the place becomes free from infection.
- Disinfection can be brought about with the help of physical, chemical and gaseous agents. Most disinfectants are chemical agents.
- A good disinfectant neither stains nor damages materials and is free of undesirable odours.

Types of Disinfection

- Physical disinfectant
- Flame gun

- Ticks are eradicated using flame guns in dairy barn
- Radiation
- Artificial UV lamps can be used for disinfection
- Filtration – Control microbial population
- Air filters in ventilation
- Water filters in drinking water or drainage
- Dessication – Removes moisture from microorganism
- Chemical disinfectant
- Most widely used in veterinary practice, as their aqueous solutions are easy to prepare.
- Gaseous disinfectants – Fumigation is done. Primarily in empty sheds one or two days before the animals are placed.
 - ✓ Formalin gas
 - ✓ Ozone gas
 - ✓ Cresol gas

Proper Air Filtration

- Install air filters to prevent hazardous dusts and vapors from feed and manure
- Accumulated dusts and vapours are hazardous substances that can create an unsafe environment for employees.
- Maintain humidity around 30 to 50 percent through the use of a dehumidifier
- Eliminate air pollutants and promote clean air in the workplace.

Clean Light Fixtures Improve Lighting Efficiency.

- Bright workspaces ensure cleanliness and highlight dirt
- Dirty light fixtures can reduce essential light levels, making it difficult and unsafe for employees to complete their daily tasks.
- Clean light fixtures significantly improve lighting efficiency in the place.
- Well-lit stairways and aisles are also important in preventing accidents and maintaining a safe work environment.

Proper Disposal of Waste and Recyclable Materials Keeps Work Areas Clutter-Free.

- Do not allow trash to pile up and clutter the farm
- Use Disinfectants to eradicate pest in the farm. Untidy work environment allow pests to breed and pose a severe threat to health and well being of cows.
- Place “no-touch” wastebaskets in key locations and ensure materials are disposed of to reduce the spread of germs.
- Recycle materials and ensure a more sustainable environment.



Fig 3.5.1 Washing of cattle



Fig 3.5.2 Cleaning of accommodation



Fig 3.5.3 Cleanliness in accommodation (1)



Fig 3.5.4 Cleanliness in accommodation (1)

Exercise

Q. 1. Write a note on reducing stress in dairy cattle.

Notes



A large rectangular area with a thin orange border, containing 30 horizontal lines for writing notes.

4. Feed Preparation and Maintaining Feed and Water Supply



Unit 4.1 - Feed Composition and Quality

Unit 4.2 - Nutritional Requirement of Animals

Unit 4.3 - Inputs required for Feed Preparation, Identifying and Procuring

Unit 4.4 - Processing Various Feeds and Feed Supplements for Nutrition and Growth of Animals

Unit 4.5 - Adherence to Feeding Chart and Storage of Feed

Unit 4.6 - Formulation of Feed with Right Ingredients

Unit 4.7 - Providing Feed and Water to Animals

Unit 4.8 - Wastage Reduction



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the feed composition and quality.
2. Enlist the nutrients requirement for animals.
3. Explain the correct methods for supplying feed and maintaining adequate levels.
4. Describe the methods of cleaning and maintaining feeding and watering equipment in a fit condition.
5. Explain the importance of ensuring all livestock have access to feed and water
6. Explain the importance of following health, hygiene, safety and quality standards.
7. Describe the signs of possible pest infection and necessary actions to control.
8. Describe the Feeding Chart and process of feed storage.

UNIT 4.1: Feed Composition and Quality

Unit Objectives

By the end of this unit, participants will be able to:

1. Prepare balance ration.
2. Identify the feed components.
3. Procure the ingredients.
4. Prepare feed and feed supplements for dairy animals.

4.1.1 Animal Feed Composition and Types

Farmers keep livestock for obtaining milk. Food is the source for production for all such products as well for

producing offspring. We call as 'food' of what ourselves eat. The same is known as 'ration' in the case of animals.

Nutritionally balanced ration is a must for keeping the animals healthy and strong. Without proper food, i.e. ration, animals cannot grow well, cannot keep good health, nor can they produce products and young ones properly. That is why we have to feed animals with nutritionally balanced and adequate quantity of rations.

Hence the need to feed livestock scientifically according to their body needs.

The feedstuffs used for feeding livestock can be classified into three major classes depending on the contents of fibre, moisture and nutrients as:



Fig 4.1.1 Animal feed

(a) Green or Succulent forages or fodders:

Forages are Edible parts of plants, other than separated grain, provide feed for grazing animals, or that can be harvested for feeding. Includes browse, herbage, and mast.



Fig 4.1.2 Green or succulent forages or fodders

(b) Dry forages or fodders:

Hay has been the traditional forage provided for dairy cows during the barn feeding season. Cows fed excellent quality hay free-choice consume forage dry matter at a maximum rate.



Fig 4.1.3 Dry forages or fodders

(c) Concentrate Feeds.

Concentrates for dairy feeding come in a perplexing variety of different individual ingredients, descriptions and forms, each with their own advantages and limitations. Concentrates are good for: Providing highly concentrated sources of nutrients to supplement forages



Fig 4.1.4 Concentrate feeds

Their classification is given in the below:

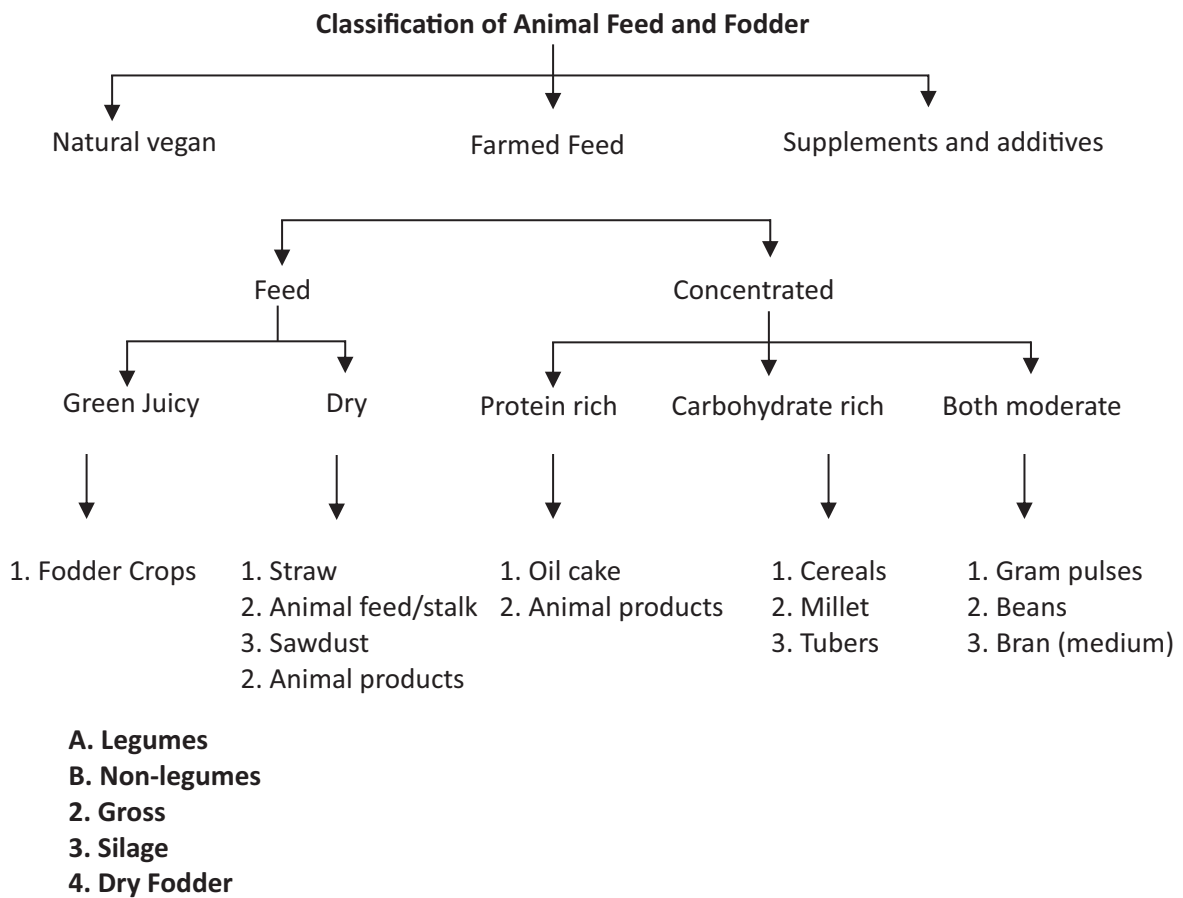


Fig 4.1.5 Feed and fodders

Trees and Shrubs

The forages – both green and dry are also known as bulk feeds or roughages, as they are voluminous due to high fibre content. They contain fewer nutrients per unit weight. By cultivated feeds and fodders we mean all those main and by products obtained via cultivation of crops by farmers, whatever may be their nutrient quality. The natural vegetation is that that occurs in nature even without human endeavour. On the other hand, there are some nutrients that are added to feeds or supplemented to the ration for providing some specific nutrient or group of nutrients. This is done to provide important high value nutrients in small quantities. Due to ever diminishing livestock feeds in the country, many unconventional feeds ranging from tree leaves to sea weeds were increasingly being recommended as animal feeds, especially during scarcity periods.

Feed Quality of Livestock

The nutritive value of a feed is determined by analyzing the quantity of various nutrients present in it, which will be available to the animal for maintenance, growth and/or production.

This has to be determined with respect to energy, protein, minerals and vitamins.



Fig 4.1.6 Animal feed

Feeding Standards or Requirements of Livestock:

Feeding standards are statements of the average daily nutrient requirements of different types of animals. Scientists have come to the help of farmers by providing certain guidelines in selecting properly balanced rations for meeting the nutrient requirements of various types and classes of livestock.

These recommendations have been collected, classified, tabulated and revised from time to time and have come to be known as feeding standards.

Thus, feeding standards are tables stating the amount of various nutrients that should be present in the daily ration of different classes of livestock for optimum results in growth, work and production.

Concentrate Feed of Livestock:

Concentrate feed means a mixture of milled grains, pulses, oil cakes etc. Given in Table below are set of formulae to make feed mixtures with ingredient available in different regions of the country. Farmers can use those ready-made formulae for preparing concentrate mixtures themselves.

Average dry matter content in feeds may be considered as follows:

All air-dry materials such as dry roughages, cakes and grain	90%
Succulent silage	30%
Green pasture, green maize, etc.	25%
Jowar young	30%
Jowar ripe	40%
Green legumes like berseem and lucerne	20%

Table 4.1.1 Average dry matter content in feeds

Important Grain Crops used as Fodder

Fodder Production:

The system of fodder production varies from region to region, place to place and farmer to farmer, depending upon the availability of water mainly and other inputs like fertilizers, insecticides, pesticides, etc. and the topography.

An ideal fodder system is that which gives the maximum out turn of digestible nutrients per hectare, or maximum livestock products from a unit area. It should also ensure the availability of succulent, palatable and nutritive fodder throughout the year.

One crop combinations sown in a season followed by the second crop combination after the preceding crop is harvested. Also one can choose from one of the 2 or 3 crop rotations recommended as it suits his/her farm conditions.

Fodder Crops of Livestock Feeding:

Leguminous Fodders	Leguminous Fodders	Non-Leguminous Roughages
Important true clovers useful as fodder crops are Berseem (<i>Trifolium alexandrinum</i>), Shaftal (<i>T. resupinatum</i>), White clover (<i>T. repens</i>), Red clover (<i>T. pratense</i>) Crimson clover (<i>T. incarnatum</i>) and Subterranean clover (<i>T. subterraneum</i>).	Among medics, Lucerne (<i>Medicago sativa</i>) is the most popular fodder crop. Black medic (<i>M. lupulina</i>) and Bur clover (<i>M. hispida</i>) are other members of utility as fodder. Crotalaria group includes a large number of species useful for foraging like Sunhemp (<i>Crotalaria juncea</i>), Cowpeas or Lobia (<i>Vigna sinensis</i>) and Kudzu vine (<i>Pueraria thunbergiana</i>). Certain other legumes like soya beans (<i>Glycine soya</i>) are also important in livestock feeding.	The non-leguminous fodder generally consists of a lower percentage of nitrogen. Therefore, when livestock get non-leguminous fodder, special care has to be taken to add sufficient protein rich concentrates to balance the ration. They include many cereal fodder crops, perennial cultivated grasses, some indigenous grasses and introduced grasses.

Table 4.1.2 Fodder crops of livestock feeding

Important Cereal Crops Used as Fodders	Important Perennial Cultivated Fodder Grasses Crops Used as Fodders
Maize (<i>Zea mays</i>), Sorghum (<i>Sorghum vulgare</i>), Bajra (<i>Pennisetum typhoides</i>), Oats (<i>Avena sativa</i>) and Teosinte (<i>Euchlaena mexicana</i>).	Para grass (<i>Brachianamutica</i>), Guinea grass (<i>Panicum maximum</i>), Napier grass (<i>Pennisetum purpureum</i>), Hybrid (Giant) Napier (an interspecies cross between Napier and Bajra), Rhodes grass (<i>Chloris gayana</i>), Blue panic grass (<i>Panicum antidotale</i>) and Sudan grass (<i>Sorghum vulgare var. Sudanense</i>).

Table 4.1.3 Important cereal crops used as fodders

Dry Fodders of Livestock Feeding:

Dry fodders contain more than 85% dry matter, i. e. less than 15% or moisture. They are highly fibrous, bulky, and less digestible and mostly help in filling the large digestive tracts of ruminants.

Grasslands, Trees & Shrubs Used for Livestock Feeding:

Grasslands are those covered with grasses and other edible plants of the locality that can be used for grazing livestock. Though the grasses grow naturally season wise, farmers can also carry out reseedling and develop the grasslands. We do not have specific pastures (cultivated grasslands) for livestock like in western countries.



Lucerne



Leucaena



S.Hamata



Guinea Grass



Fodder Maize



Fodder Cholam



Fodder Cumbu



Fodder Cowpea



Cumbu Napier

Fig 4.1.7 Fodders of livestock feeding

Exercise

1. Write a short note on fodder production in dairy farming.
2. Identify the Specimen.



3. What is balanced feed ?
4. What are the main components for the animal feed preparation?
5. Identify the fodder crop.



UNIT 4.2: Nutrition Requirements for Animals

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify the nutrition required for the dairy animal.
2. Identify the components of nutrient rich diet.

4.2.1 Nutrition Requirements for Animals Nutrition

Nutrition requirements for cows include proteins, energy and fibre in balanced portion. Dairy nutrition is the nutrient requirements of dairy cows at various stages of lactation and combining various feed ingredients to meeting the needs in the cost effective manner.

Animals need a daily supply of all nutrients required for maintenance and production: milk, meat, growth and pregnancy. Any type of nutrient can disturb the performance levels. Care has to be taken for high and average yielding cows, most likely to be in short supply are energy and protein.

Further, the nutrient rich diet should additionally be

- Cost effective
- Palatable
- Free of anti nutrients

The critical ones for practical rationing on farm are energy and protein, as these are the most costly nutrients to supply



Fig 4.2.1 Illustration of open farm with cows

Energy

A dairy cow's energy requirement (Metabolisable Energy (ME) is provided in the 'Feed into Milk' model that take account of several factors including live weight, live weight change, milk energy output, milk fat, efficiency of energy use, pregnancy and teen edgy density of the diet. ME is expressed as mega joules per kilogram dry matter (MJ/kg DM).

For basic feed planning, it is the overall ME requirement that is important, irrespective of how that requirement is met by grass, forages, or other feeds.

The cow's response to energy depends not only on the amount supplied, but also on the way the carbohydrates and fats are presented. Carbohydrates like simple sugars and starches and more complex hemicellulose and cellulose are fermented in the rumen and broken down to volatile fatty acids to provide the energy required.

Sugars and Starch

Presence of sugar and starch increase the fermentation rate in rumen. Excess sugar and starch will lead to acidosis. While less of sugar and starch in the diet, lead to less fermentable energy by rumen microbes for protein synthesis. It is advisable to include right amount of sugars and starch for optimum performance of dairy cow

Fibre

Expressed as Neutral Detergent Fibre (NDF) Cellulose, hemicellulose and lignin are dietary fibre that is digested in slower rates. Excess of fibre will reduce the rate of fermentation rate while less of fibre will cause acidosis.

Proteins

In ruminant diets protein is expressed as crude protein (CP), which is a simple measure of the nitrogen content of a feed. This is measured as the nitrogen content of the food multiplied by 6.25, as the nitrogen content of protein is 16%. It is expressed in feed analysis as grams per kilogram dry matter (g/kg DM) or as % DM.

The proteins in feeds are broken down in the rumen – known as Effective Rumen Degradable Protein (ERDP), to the building blocks of amino acids and ammonia. Rumen microbes act on ERDP and reform into the protein the animal requires to live, grow and produce milk and offspring.

Feeds are characterised by the extent to which they are degraded in the rumen to provide nitrogen for microbial protein synthesis. Microbially synthesised protein is supplied from both microbially synthesised and from by-pass protein which is digested in the intestine.

Digestible **crude protein (DCP)** is used to evaluate protein requirements, and it means the crude protein remains after losses in the rumen. For high-yielding cows, which have been shown, to benefit from protein that escape microbial degradation in the rumen and is absorbed as amino-acids in the small intestine.

Following this approach crude protein can be split into

1. **Rumen degradable Nitrogen (RDN)** and
2. **Undegraded** Dietary Nitrogen (UDN).

If sufficient RDP is not available, the rate of digestion of fibrous as well as concentrate rich diets will be reduced. This leads to a reduction in intake, lower energy supply and reduced milk production. Some protein nitrogen can resist microbial breakdown in the rumen and can pass directly to the cow's intestine is called by-pass protein. This is especially profitable for high-yielding cows, therefore important to have the optimum balance of UDP and RDP in the diet.

Fats

Fats are composed of different fatty acids and act as important sources and stores of energy. Dairy cows can produce fats from excess energy intake. But diet need to be supplied with some essential fatty acids that are not produced by the animal. Fats form important parts of cell walls and are involved in energy transfer.

Fats increase the energy density of the ration because they have a much higher ME content than carbohydrates. However, their inclusion should not exceed 5–6%, as at high levels they coat the rumen microbes which reduces their fermentation capacity and efficiency.

Minerals and Vitamins

The major mineral requirements for dairy cows are calcium and phosphorus. The calcium phosphorus ratio is important, and an imbalance can cause infertility. Seashells and fish meal are good mineral sources. All the required minerals can be incorporated in feed supplements.

Other major minerals that dairy cows require for production are Potassium, Magnesium, Sodium and Sulphur. Dairy cows need minor minerals such as Copper, Cobalt, Selenium, and Zinc for maintenance, growth and health.

Vitamin supplements are often added to balanced rations prepared as feed to be used in animals housed and reared in intensive systems. Vitamin A is one of the most important vitamins in animal nutrition. This vitamin is found in the carotenoid pigment of green plants; Vitamins D, E and K are also present in green plants.

Animals feeding on green pasture normally receive all vitamins that are needed.

Nutritional needs of cows depend on age, live weight and production levels. The requirements of ME and DCP for maintenance, milk production, pregnancy and live weight change are supplied.

Water

Water is essential for carrying nutrients around the body, rumen fermentation and digestion, control of body temperature and as a major component of milk.

A dairy cow yielding 45 litres of milk requires approximately 120 litres of water per day. It is essential that an adequate supply of good clean water is available to all stock.

How much nutrients the dairy animals need?

For Dairy Cows

Liveweight (kg)	ME allowance (MJ/day)
450	50
550	70
650	80

Table 4.2.1: Guidelines for the daily energy allowance for maintenance

Daily energy required for milk production is 5.3MJ ME/litre milk.

A 650kg cow producing 7,500 litres in a lactation will need $(80 \times 365) + (5.3 \times 7,500) = 68,950\text{MJ ME}$ over the course of a production year.

This same cow will need approximately 650kg of CP over the year plus or minus 120kg CP for every 1,000 litres variance from the 7,500.

Exercise

1. The nutrient rich diet should be.....
2. Excess of fibre will reduce the rate of fermentation rate while less of fibre will cause.....
3. What is DCP and its role?
4. What do you mean by RDN and UDN?

Notes



A large rectangular area with a thin orange border, containing 30 horizontal lines for writing notes.

UNIT 4.3: Inputs required for Feed Preparation, Identifying and Procuring

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify the inputs required for the feed preparation.
2. Procure the inputs for the feed preparation.

4.3.1 Identify and Procure the Inputs Required For the Feed Preparation

Feeds purchased can show wide variations in quality both between farms and also within the same farm. This can significantly affect animal performance potential.

The difference in ME between the poorest feed purchased and the average can equate to around 5 litres of milk.

It is important to assess forage stocks to ensure a balanced feeding programme through to turnout, without incurring large swings in ingredients, which may cause loss of performance, and dietary upsets.

There are many options for growing different feeds on-farm (see Table 1). It is worth considering not only the feeds currently fed, but also what could be produced at home to reduce costs and improve overall feeding efficiency.

Dairy farms need to buy feeds to meet all the nutrient requirements of production.

These tend to be higher in energy and/or protein content than forages (see Table 2).

Think about feed nutrients in the whole system. Nutrients, particularly N and P, that cycle in the biology of production systems go from feed to animal, to soil to grass and forage crops, and back to animals.

As grass and forage drives production and profitability, the more efficiently these recycled nutrients are used, the more efficient the feeding.

Nutrient and feed management plans are intrinsically linked.

The more the N, P, K and S from the soil and manures can be used, with any deficit in crop requirement met with inorganic fertiliser sources, the more the energy and protein from home grown grass and forage can contribute.

However this can only be done if the nutrients in the soils, grass, crops and feeds are measured and known. This then allows a targeted approach to buying-in only that which is truly needed for optimum grass/crop growth and feeding.

Feed	Dry Matter	ME	CP
	(%)	(MJ/kg DM)	(g/kg DM)
Grazed grass (good quality)	18	12.0	220
Grazed grass (average quality)	20	10.5	180
Grass silage	25	11.2	140
Forage maize	30	11.2	90
Crimped maize	70	14.0	100
Maize grain	86	14.0	100
Wheat	86	13.6	100
Crimped wheat	70	13.6	100
Cereal wholecrop	30	11.0	100
Barley	86	13.2	120
Peas	85	12.8	240
Beans	86	13.3	290
Potatoes	21	13.3	90
Hay	85	8.8	90
Wheat straw	85	5.0	40
Fodder beet	18	12.0	60
Kale	14	12.0	170
Stubble turnips	8	12.0	120
Swedes	11	13.0	90

Table 4.3.1 Typical nutrient content of some home-grown forages and feeds

Feed	Dry Matter	ME	CP
	(%)	(MJ/kg DM)	(g/kg DM)
Sugar beet pulp	89	12.5	100
Citrus pulp	88	12.6	70
Cane molasses	75	12.7	40
Maize distillers	89	14.0	310
Maize gluten	88	12.9	220
Wheat distillers	89	13.5	280
Biscuit meal	90	15.0	130
Rapeseed meal	90	12.0	400
Hipro soya	89	13.8	560
Brazilian soya	89	13.4	500
Trafford Gold	44	13.6	200
Brewers' grains	28	11.4	250

Table 4.3.2 Typical nutrient content of some bought-in forages and feeds

UNIT 4.4: Processing Various Feeds and Feed Supplements for Nutrition and Growth of Animals

Unit Objectives

By the end of this unit, participants will be able to:

1. Plan for inputs procurement.
2. Procure the quality inputs.
3. Check the quality of the feed delivered.

4.4.1 Arrange for Various Feed and Feed Supplements Essential for Animal Nutrition and Growth

Dairy farmer needs to be careful when buying animal feed, because quality of the feed should be good. Don't compromise on the quality for cost. Pay to the seller only when the quality of the feed materials is high.

Dairy farmer need to evaluate different market rates have clear idea on quality of produce and its cost. Getting feedback or opinion with other fellow farmers will give a fair indication on the price and indented quality.

Three steps of the buying process

1. Plan well
 - a. Regularly prepare feed budgets and
 - b. Decide on the maximum feed price to pay without making any loss.
2. Buy right a. Top priority is feed quality, feed supply as well as price risks.
3. Feed carefully
 - a. Avoid unnecessary losses
 - b. Wastage at i. delivery,
 - Storage and
 - Feed-out.

Feed Buying Methods

Farm-to-Farm Verses Trade Purchases

Buying directly from a grain or fodder producer may seem appealing, but it's always good to have a closer look. Farmer need to consider supply chain costs, market volatility and supplier risk. Direct purchase from the farmer will have quality or grading issues.

Buying from the market or trader has its own advantages. The feed will be graded and sorted. There will be reference price prevailing in the market for that grade. Disadvantage is it might be costly.

- Visually assess a feed's physical quality first.
- Look beyond the price tag – crunch the numbers using feed lab analysis results.
- Use reliable feed analysis results for value assessments.
- Use yardsticks to determine value per unit energy and protein.
- Factor your time to manage all the tasks associated with managing feed supply.
- Effective management doesn't happen by itself; merchant or trader can take these tasks off your hands.

Dairy farmer need to monitor feed prices on a daily/weekly basis to know what is happening in the market or he should access reliable information source to get these updates. Dairy farmer need to manage supplier risk.

He need to have contingency plans if the supplier doesn't have the feed or fails to deliver.

Buying on value, not price. Visually assess a feed's physical quality first. Look beyond the price tag – crunch the numbers using feed lab analysis results. Use yardsticks to determine value per unit energy and protein.

Also includes:

- Using your senses and experience first
- Things to look for (table)
- Look beyond price tag
- Incorporates series of examples on working out calculations
- Buying energy and protein

Feed Type	Things to Look for While Buying
Whole Grains or Grain Mixes	<ul style="list-style-type: none"> • Excessive small grains, which may result in poor feed digestibility and wastage if grain crusher isn't up to scratch. • Visual signs of weather damage or mould, which can increase the risk of fungal toxins (mycotoxins). • Excessive whole grains, which may result in poor feed digestibility and wastage. • Poor uniformity of mix, which may lead to uneven animal intakes and performance.
Pelleted Feeds	<ul style="list-style-type: none"> • Loads delivered still warm, which may lead to development of mould during silo storage. • Excess dust level, which may result in excessive feed wastage
Hay	<ul style="list-style-type: none"> • Visual signs and odours that may indicate hay was baled at too high a moisture level, or has been weather damaged, which can reduce nutritional value and increase the risk of fungal toxins (mycotoxins). • Leaf content, which will influence nutritional quality.

Silages	<ul style="list-style-type: none"> • Dry matter too high or too low for good fermentation. • Excessively long chop length, which may result in sorting by cows and excess wastage. • Off odour, which indicates an unstable fermentation. • Mould, which indicates poor sealing, or black strips of silage material (butyric acid silage).
Co Products	<ul style="list-style-type: none"> • An unusual appearance or inconsistency between deliveries or seasons. • Material too wet or too dry. • Any contaminants or foreign materials, which may reduce nutritional value or cause digestive problems. • Signs of mould, which can increase the risk of fungal toxins (Mycotoxins).

Table 4.4.1 Feed types and things to look for when buying it

- Weigh the feed in the farm during delivery. Deduct the amount if there are any transport losses from the supplier.
- Check the quality of the feed delivered.
- Send the feed sample to laboratory for analysis
 - ✓ Dry matter (DM)
 - ✓ Metab. Energy (ME)
 - ✓ Crude Protein (CP)

Calculate Value per unit Dry Matter

- Value per Unit DM (Paise/kg DM)= Cost of feed * 10 / % DM (Lab result)

Calculate Value per unit ME

- Value per unit ME (Paise/kg ME)= Value per Unit DM/ ME per KG (Lab result)

Calculate Value per unit CP

- Value per unit CP (Paise/kg CP)= Value per Unit DM/ % CP (Lab result)

Exercise

1. What are the main steps of procurement of feeds and inputs? Explain.
2. What are the things to be considered while buying the feed?

Notes



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UNIT 4.5: Adherence to Feeding Chart and Storage of Feed

Unit Objectives

By the end of this unit, participants will be able to:

1. Estimate the vitamins and minerals requirement.
2. Feed milch animals.

4.5.1 Follow Feeding Chart and Store Feed Appropriately

- While preparing the feeding chart for dairy cow, dairy farmer need to ascertain and to meet up the total requirement in terms of, Dry matter (DM), Digestible crude protein (DCP), Total digestible Energy (TDN), Minerals and Vitamins.
- Body weight of the animal and production status of the animals determines the quantity of dry matter
- Cattle will need daily 2.0 to 2.5 kg dry matter while crossbred cows need 2.4 to 3.0 kg dry matter for every 100 kg of live weight.
- All its requirements whether organic nutrients like carbohydrate, protein and fat or minerals or vitamins should come from the total dry matter that has to be allotted.

Dry Matter

The dry matter allowance should be divided as follows:

Digestible Crude Protein (DCP) Requirement

- The DCP requirement for maintenance is $2.84 \text{ g/kg } W^{0.75}$.
- The DCP requirement per kg of 4% fat corrected milk is 132 g of digestible nitrogen for 100 g of milk nitrogen.
- In high yielders about 8% of the total protein requirement should be in the form of 'bypass protein'.
- During the last trimester of gestation an additional amount of 90 to 130 g of DCP have to be provided to cattle of 350 kg to 500 kg body weight.

Total digestible Nutrient (TDN) Requirement

- The energy requirements for maintenance are calculated using 122 kcal of ME /kg $W^{0.75}$ (33.74g TDN) for cattle and buffaloes.
- The requirement for TDN per kg of 4% fat corrected milk is 1188 kcal of ME (328 g TDN).
- During the last trimester of gestation an additional amount of 1.0 to 1.1 kg TDN have to be provided to cattle of 350 kg to 500 kg body weight.

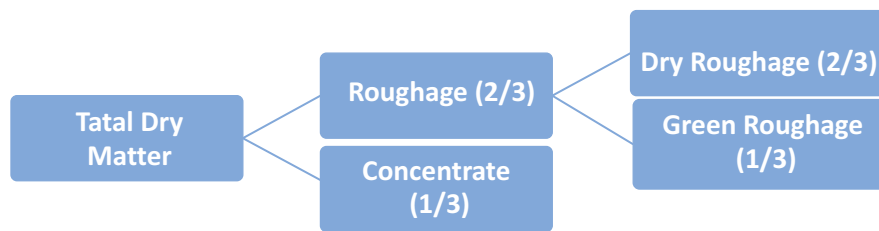


Fig 4.5.1 Daily nutrient requirements for maintenance, pregnancy and lactation for cattle and buffaloes

For Maintenance of Mature Cows/Bufaloes

Body Weight (kg)	Dry feed (kg)	DCP (g)	ME Mcal	TDN kg	Ca g	P g	Carotene mg	Vitamin A 1000 IU
200	3.5	150	6.0	1.7	8	7	21	9
250	4.0	170	7.2	2.0	10	9	26	11
300	4.5	200	8.4	2.4	12	10	32	13
350	5.0	230	9.4	2.7	14	11	37	15
400	5.5	250	10.8	3.0	17	13	42	17
450	6.0	280	12.4	3.4	18	14	48	19
500	6.5	300	13.2	3.7	20	15	53	21
550	7.0	330	14.4	4.0	21	16	58	23
600	7.5	350	15.5	4.2	22	17	64	26

Table 4.5.1 Feed chart for maintenance of mature cows/buffaloes.

For Maintenance and Pregnancy (Last 2 Months of Gestation)

Body Weight (kg)	Dry feed (kg)	DCP (g)	ME Mcal	TDN kg	Ca g	P g	Carotene mg	Vitamin A 1000 IU
250	4.9	270	10.8	3.0	14	12	51	21
300	5.6	290	12.4	3.4	16	14	56	25
350	6.4	320	13.2	3.7	21	16	67	27
400	7.2	350	14.1	4.0	23	18	76	30

450	7.9	400	15.9	4.4	26	20	86	34
500	8.6	430	17.3	4.8	29	22	95	38
550	9.3	465	18.8	5.2	31	24	105	42
600	10.0	500	20.2	5.6	34	26	114	46
650	10.6	530	21.6	6.0	36	28	124	50

Table 4.5.2 Feed chart for maintenance and pregnancy (last 2 months of gestation)

Feeding of Milch Animals

- The nutrient requirement of a lactating cow /buffalo can be conveniently divided into two parts, viz. requirement for maintenance and milk production. If the lactating animal is in first and second lactation, extra allowance, is needed to take care of growth and production.
- Similarly pregnant animals are to be offered extra nutrients during the last two months of gestation. The aim is that by the end of gestation period the cows should not only gain their initial body weight but also put on an extra 25 to 30 kg of body weight. This is necessary to enable the animal to withstand the stress of parturition and to maintain the persistency of milk production during the subsequent lactation period. The provision of extra nutrients should be given in the form of concentrate mixture and not as forage because roughages are not as efficient as concentrate in increasing the body weight. The rest of the ration must contain sufficient green feeds so that the colostrum secreted after parturition should be rich in vitamin A.
- During the last 3 days prior to calving, the amount of concentrate mixture should be reduced and a little warm bran is fed to keep the animal in laxative condition before calving.
- After parturition, the cow /buffalo should be given fresh warm water and a mash consisting of 1 kg wheat bran, 1-1.5 kg ground/cooked grains, 0.5 kg jaggery and 25 g each of common salt and mineral mixture. This mash may be continued for 3 to 4 days after calving; thereafter, the regular feed is gradually introduced to the cow.
- In feeding high-milk yielder, quality feed, i.e., nutrient dense feed need to be given. Ration should contain a minimum 25% DM from forages. Forage should be of superior quality and 30 to 50% of this should be from leguminous crops. Ration may be in the form of complete feed. Frequency of feeding is three to four times a day. To ensure proper nutrient intake, optimum roughage concentrate ratio need to be maintained.

Nutrient Requirement Per Kg of Milk Production

Fat%	DCP (2)	ME (Mcal)	TDN (kg)	Ca (g)	P (g)
3.0	40	0.97	0.270	2.5	1.8
4.0	45	1.13	0.315	2.7	2.0
5.0	51	1.28	0.370	2.9	2.2
6.0	57	1.36	0.410	3.1	2.4
7.0	63	1.54	0.460	3.3	2.6
8.0	69	1.80	0.510	3.5	2.8
9.0	75	2.06	0.500	3.7	3.0
10.0	81	2.16	0.600	3.9	3.2
11.0	85	2.34	0.650	4.1	3.4

Table 4.5.3 Nutrient requirement per kg of milk production

Permanent, basic, fodder feeding facility. Grounded surface and concrete or cement screed under electrical wires (Howdy).

Exercise 

1. Write notes on the following:

- a) Dry matter (DM)
- b) Digestible crude protein (DCP)
- c) Total digestible Energy (TDN)

Notes



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UNIT 4.6: Formulation of Feed with Right Ingredients

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify and use the proper machine for feed mix
2. Prepare Feed mix
3. Quality check of the feed mix
4. Store the prepared feed mix

4.6.1 Prepare Feed with the Mixture of Right Components or Procure Quality Compound Feed from Suppliers

Storing and Mixing Feed

- The process of storing and mixing feed needs careful attention. The basics of mixing and storing feed are the same as buying fodder and grain/ concentrates:
- Know what's in the feed before you buy it. Get a feed test.
- Store it in a way that you minimize spoilage and wastage.
- Make sure the ingredients fit your flexible feeding system
- Be aware of any potential hazards with certain types of feeds.

When Mixing and Delivering Feed to Your Herd, Check that:

- Follow the machine manufacturer's standard operating procedures for loading and mixing.
- Know what a well-mixed diet looks like and so does everyone in your farm team.
- The feed trough is higher than a foot off the ground.
- There is enough trough space for all the animals in the group.
- There is sufficient cow access to drinking water.
- The diet is palatable for cows, and not too wet, too dry or spoiling too quickly.
- Feed values can change between loads. Get a feed test on a representative sample. Wet feeds can 'shrink' by up to 25% after delivery. Get a feed test and use the figures to compare the costs based on dry matter, energy and protein
- Focus on securing your fodder requirements first, as fibre is essential in the diets of ruminants such as cattle. Then you can think about contracting energy-dense concentrates and protein sources to ensure a continuous supply.
- Use a blend of fibre sources
- Calculate concentrate feed requirement and plan to buy a proportion of your required tonnage on contract so there are no surprises o With little pasture, you will have little protein to work with. Make sure you have secured protein sources.
- Remember that co-products such as brewers grains are now commonly used by dairy farmers.

Storage of Feeds

Don't wait until the truck arrives before you work out where to store feed ingredients.

Cheap and inexpensive feed storage facilities can solve temporary storage issues in the short term but they usually involve higher feed spoilage and wastage costs. Other storage factors to consider are

- Dry feeds are subject to wind loss.
- In Wet protein sources, Flies might be a problem.
- Mycotoxins (Fungal Toxins) that can be found in some feed ingredients

Feed Mixing and Delivery Equipment

- Feed mixing and delivery equipment needs to: Be easy and safe to operate.
- Fit with existing farm infrastructure.
- Provide the same diet to all animals in the group.
- Deliver a diet that adds to farm profit
- Be easy to maintain (having local mechanical support is important).

Image	Feed Mixing and Delivery Units
	<ul style="list-style-type: none"> • Tractor and Bucket Front Loader • Can only mix dry processed feeds • Time consuming to mix and feed • Uneven mix, so can't include feed minerals, feed additives or urea • Long material separates and is wasted • No weighing (unless fit load cells) • Uneven results re. animal feed intakes and performance
	<p>Silage Cart</p> <ul style="list-style-type: none"> • Can't incorporate long and chopped materials • Uneven mix and feed-out, so can't include feed minerals, feed additives or urea • Long material separates and tends to be wasted. Cows can sort out less palatable ingredients • May be able to weigh if load cells fitted • If has a wide feed-out, this increases wastage • Uneven results re. animal feed intakes and performance

	<p>Paddle Mixer</p> <ul style="list-style-type: none"> • Cuts feed for processing hay, straw, silage • No dead spots and water tight • Slow moving • Hard to over-process • Lower horsepower needed and fuel usage • Good for delivering feed on feed-out facilities and in paddocks • Simple drive, no gear boxes • Volume will depend on feed bulk density • Relatively heavy • Higher loading height required
	<p>Vertical Mixer</p> <ul style="list-style-type: none"> • Single or twin cone • Mixes by throwing feed in air • Processes dry materials • Mix uniformity depends on brand. -Take care not to over-process • May not be water tight • Good for delivering feed on feed-out facilities. • Wheel arrangement less ideal for paddock feeding • Good capacity • High horsepower needed • Lower loading height required • Need to do mix to machine's size
	<p>Horizontal Mixer</p> <ul style="list-style-type: none"> • Single, twin or more augers • Works well with grain mixes • Will process dry hay, but some do not take whole bales • Some are not as good with a high proportion of hay in mix • Can compact feed • Some designs have dead spots • High horsepower needed and fuel usage • Some work well in the paddock, as well as on feed-out facilities • Lower loading height required

Table 4.6.1 Feed mixing and delivery equipment

UNIT 4.7: Providing Feed and Water to Animals

Unit Objectives

By the end of this unit, participants will be able to:

1. Estimate the monthly feed requirement.
2. Provide the feed and water to dairy animals.
3. Perform effective regular check.

4.7.1 Provide the Feed and Water to Cattle

Measuring, Mixing and Providing the Feed

- Poor ingredient measuring can increase acidosis risk, reduce production and be potentially dangerous to the cows.
- Poor mixing can result in feed settling/sorting. Some cows consume too little fibre and increase acidosis risk.
- Poor mixing where cows end up eating lumps of ingredients, such as urea, can have disastrous health consequences.
- Do not allow more than 4-5 hours in mud and slurry. It will increase risk of foot rot.
- Provide more time in the feed-out area (less feeds). It will decrease acidosis risk.
- High fecal contamination and poor teat end condition are two big risk factors for mastitis. Avoid Teat end contact with manure in the first 2 hours after every milking (especially the first 30 minutes)
- Prepare the feed-out area surface well so that it can be scraped/cleaned.
- A good scraping/cleaning program will reduce faecal contamination.
- Crowded cows push. Pressure on hooves can increase lameness risk.
- Work on 9-10 square meters per cow and 0.75 meters per cow of trough area.
- Disease spread is greater when cows spend time in a smaller area. For example, separate a cow with Salmonella quickly to avoid spread.

Planning for what lies ahead is one of the most important skills a successful dairy farmer can have.

Calculate Monthly Feed

- Accurate head count.
- Realistic ME requirements of different classes of stock.
- Estimate of pasture supply available on your farm.
- Do a feed budget to estimate feed requirements for all stock.

Calculate Your Total Feed Deficit for Each Month

This is the animals' DM requirement (from Step 1) less the amount of home-grown DM available (pasture, other standing crops, silage and hay on-hand).

If necessary, seek help from an adviser to estimate quantities of pasture and other home-grown feeds on.

Calculate your monthly feed demand	<ul style="list-style-type: none"> a) Count how many animals there are to feed, and milk production/growth targets. b) Calculate the daily Metabolisable Energy (ME) requirements of each class of stock milkers, dry cows, yearlings and calves. c) Calculate tonnes of Dry Matter (DM) required for all stock each month, based on animals' daily Metabolisable Energy (ME) requirements and stock numbers.
Calculate your total feed deficit for each month	<ul style="list-style-type: none"> a) Calculate tonnes of home-grown DM available each month (pasture, other standing crops, silage and hay on hand). b) Subtract tonnes of home-grown DM from tonnes of DM required for all stock each month.
Calculate quantities of each bought-in feed you require each month	<ul style="list-style-type: none"> a) Describe what feeds you intend to buy to fill the feed deficit for each month. b) Formulate diets for each class of stock – milkers, dry cows, yearlings and calves. c) Using these diets and the stock numbers from Step 1, calculate the total tonnes of each feed that need to be bought each month.
Daily ME requirements for different classes of stock.	
Milking Cows	70-90 MJ ME for maintenance (depending on liveweight) plus 5-5.5 MJ ME per litre milk*
Dry Cows (550 Kg – No change in wt)	90-100 MJ ME
Calves	40-80 MJ ME / day
Heifers	80-100 MJ ME
Bulls (700 kg No change in wt)	90-100 MJ ME

Table 4.7.1 Feed demand and deficit calculation

Calculate Bought in Feed

Calculate quantities of each bought-in feed you require each month

- (a) Describe what feeds you intend to buy to fill each month's feed deficit. What are the dry matter, meta bolisable energy (ME), crude protein (CP) and neutral detergent fibre (NDF) contents of the grains or concentrates, hay, silage and co-products you intend to buy?
- (b) Formulate diets for each class of stock – milkers, dry cows, yearlings and calves.
- (c) Using these diets and the stock numbers from Step 1) calculate the total tonnes of each feed that needs to be bought each month.

Closing Your Feed Gap - Key Considerations

- Home-grown pasture and crops.
- Feeding more grain/concentrates safely.
- Extending forage reserves with high fibre by-products.
- Drying off early.

Supplementary Forages and Forage Extenders Available - Key Considerations

- Feed market information.
- Cost / tonne and comparative \$ value per unit energy and protein.
- Limits to recommended daily feeding rates for specific feeds.
- Risks eg. mycotoxins, chemical residues.

Diet Formulation - Key Considerations

- Meeting cows' daily energy and protein requirements for target milk production level within their appetite limit.
- Ensuring adequate effective fibre for good rumen function.
- Feed additives.

Effective Feeding Checks**1. Concentrate Left in the Feed Trough**

- (a) Feed left behind in the dairy indicates a problem.
- (b) If half the bails have more than 10% of grain / concentrate left behind after milking, check the accuracy of the feeding system by weighing feed allocation in 10–20 individual feeders.
- (c) If the feeders are working correctly, consider reducing feed.
- (d) If more than one bail in 10 has more than 50% left, some cows may have substantially reduced appetites.
- (e) Check cud chewing and manure consistency to determine if this is caused by acidosis and seek help from an adviser.

2. Effective Fibre Value

- (a) Two feeds have similar N DF contents, but with Effective Fibre Values are very different.
- (b) The long fibre length helps to keep the rumen environment stable.
(Low risk diets - 75% of fibre sources are more than 1.5 cm long

3. Check for Vat

- (a) Is the fat test less than 3.6% for Holsteins or 5% for Jerseys?
- (b) Has the fat test dropped between 0.3 and 0.5 % in a week?
- (c) Has the protein test dropped more than 0.3% in a week?
- (d) Are your current fat and protein tests similar to this time last year?

Changes in milk composition are directly linked to the cow's diet. Both fibre content and energy intake contribute to the percentage of milk fat and milk protein.

A low fat test may be a sign of acidosis, especially if it falls below the protein test. A falling protein test is a sign that energy intake has dropped. Less commonly, acidosis can also cause the milk protein percentage to drop. Monitoring changes over a one week period and looking for changes from year to year can help to spot signs of acidosis.

Exercise

1. Write a note on - Measuring, mixing and providing the feed.
2. Write a note on - Estimate, calculate and plan for the feed requirement in the Dairy Farm.

Notes



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UNIT 4.8: Wastage Reduction

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify and estimate the wastage in the dairy farm.
2. Manage the feeding.
3. Minimize the waste.

4.8.1 Wastage Reduction

Losses in Dry Matter and Quality

The purpose of buying feed is to feed the cows. If feed is getting wasted in the process and cows does not receive the feed, then it is revenue loss to the farm.

The cost of feed wastage is calculated in two methods:

- Quantity Loss - Total dry matter feed to cows but not eaten
- Quality Loss - Reduced energy and protein value, contamination with moulds / fungal toxins, moisture damage and leaching.

The most obvious example of this is deterioration in silage quality during storage due to poor sealing.

Feed Losses Occur During:

- Delivery and storage
- Mixing of diets
- Feed-out to cows - Most significant

If significant quantities of hay, silage or mixed rations are fed out, investment in feeding infrastructure to reduce waste may be money well spent.

Allow for Feed Wastage in Feed Budget

When doing feed budgets, materialistic allowances for feed wastage during feed delivery and storage, feed mixing and feed-out.

Feed-Out Methods: The Trade-Offs

- Feed wastage rates vary between different feed-out methods.
- Low capital cost methods usually waste much more feed than high capital cost methods, and visa versa.

Farmers who decide to invest in higher capital cost feed out facilities are often driven by a desire to better control feed wastage. Many are surprised how short the payback period is on such an investment after they do a realistic estimate of the value of the feed being wasted in their current system. It may be worth crunching the numbers with help from an adviser.

% Feed likely to be Wasted in Feed-Out Method	Infrastructure Type	Capital Cost (Dollars)/Cow
< 30	Temporary, relocatable feed -out area. Forages or mixed rations are fed out on the bare ground in the paddock, in hay rings or old tyre tractors or under an electric fence line, etc.	< 50
15 - 20	Semi-permanent feed-out area. Compacted surface and low-cost troughing, such as conveyor belting and second-hand feed or water troughs.	50 -100
6 - 15	Permanent, basic, feed-out facility. Compacted surface and concrete feed troughs or cement strip under electric wires.	100 - 250
< 5	Permanent, fully developed, feed-out facility. Cement surfaces and feed alley. May be covered by a roof.	> 250

Table 4.8.1 Feed likely to be wasted in feed- out method

Feeding Management

- Offer cows the right amount of feed at the right time of the day – don't overfill troughs.
- Sequence feeds carefully during each 24-hour period.
- Clean feed-out surfaces regularly.
- If feeding out on pasture, avoid long pastures.
- Consider cows social order (aggressive versus less dominant cows).
- Adapt to the prevailing weather conditions (feed wastage may be much higher under wet conditions versus dry conditions).
- Within any given feed-out system, feed wastage rates can vary substantially. Some farmers achieve very low wastage with careful management and attention to feed quality and palatability.

How to Minimize the Wastage

More than 30% of feed can easily be wasted using these feed-out methods!

High feed wastage can also occur when using troughs that are not well designed.

Conveyor belting is used to best effect, with cables applying tension to keep the trough's shape

Periodically set to keep feed in feed-out facility where it belongs – in front of the cows

Even in a purpose-built feed-out facility, it is difficult to totally eliminate feed wastage, as cows tend to toss feed over their backs while eating. Head locks are one way to minimize this.

Ways to Minimize Waste During Feed-out

Feed Ingredients / Rations

- Pay close attention to chop length when cutting hay/ silage – if it is too long, the cows will sort through it and waste more.
- Offer cows fresh, palatable, high-quality feed at all times. Discard any spoiled/mouldy feed ingredients.
- If feeding a Partial Mixed Ration (PMR) using a mixer wagon, ensure the mix is not under or over processed. Follow the manufacturer's instructions. Use ration conditioners such as water, molasses or oil to reduce fines, sorting of feed and rejection or wastage of feed.

Feeding Infrastructure Design

- Use hay feeders that encourage cows to keep their heads in the feeder opening, reach for feed, and not easily back away and drop hay on the ground, e.g. a slatted bar design on a ring feeder that forces cows to rotate their heads when entering or leaving the feeder.
- If using troughs:
 - Ensure you provide adequate space for the number of cows (rec.: 75cm/cow).
 - Aim for a trough height that allows cows to eat with their head in their natural grazing position about 10-15cm above the ground. This position also helps cows produce more saliva to help buffer their rumen.
 - Ensure trough surfaces are smooth to avoid build-up of waste feed, moulds, odours and are easy to clean.
 - Consider concrete aprons around troughs to prevent mud and slush reducing feed palatability.

If You Use Naad

- Make sure you provide enough space for large number of cows (REC Rs 75 cm/cow).
- The height of a naad should be high enough to allow cows to graze with their heads in their natural grazing position.
- About 10-15 cm must be located above ground. This position also helps the cows buffer their first stomach and produce more saliva.
- Make sure that the surfaces of the trough are free of food waste, which can prevent the formation of molds, odors, etc., and which can be easily cleaned.
- A thick cloth is tied around the naad to prevent the entry of mud and mud.

Exercise

1. Write a note on waste minimization in dairy farm.

Notes



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5. Health and Performance of Livestock



Unit 5.1 - Explain the Parameters of a Healthy Animal

Unit 5.2 - Monitoring the Body Condition of Animals

Unit 5.3 - Examining Livestock for the Presence of External Parasites

Unit 5.4 - Health Maintenance Process of Livestock

Unit 5.5 - Cow Gestation

Unit 5.6 - Care during Gestation

Unit 5.7 - Calf Care

Unit 5.8 - Recording Animal Health Check up and Treatment



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the parameters of healthy animal and characteristics of different species.
2. Describe the preventive care for maintaining the health and well-being of animals.
3. Explain the significance of expiry dates on drugs and medications.
4. Describe the associated hazards and risks to animal and staff during animal related operations.
5. Explain the importance of personal hygiene and safety precautions
6. Explain relevant legislation, standards and policies.
7. Describe the correct method of waste segregation and waste disposal in eco- friendly way.

UNIT 5.1: Explain the Parameters of a Healthy Animal

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify and distinguish between healthy and sick animals.
2. Explain the symptoms of sick animals.
3. Explain the medication requirement for the sick animals.

5.1.1 Healthy Animal Parameters

A health cow gives signals all the time about her welfare and health. She does this by behaviour, attitude, body language and body condition.

You need to use these cow signs to optimize your results. Start by looking carefully, searching for causes, and translating the answers into positive action to benefit your cows and ultimately your dairy business. Train yourself to observe for the animal parameters in cows.

This will help you to evaluate, and find solutions.

1. Temperature
2. Mobility
3. Rumination
4. Alertness
5. Appetite
6. Loneliness
7. Neck
8. Hooves
9. Udder
10. Manure
11. Breathing
12. Heart rate
13. Body Condition Scoring

1. Temperature

A cow should have a temperature of 38 to 39°C. Cold ears might indicate milk fever or blood circulation problems. There are special conditions during which the temperature needs to be monitored regularly.

- Heat stress conditions.
- Recently calved cows (First 10 days).
- High Temperature indicate Illness, Metritis, Mastitis or Pneumonia.
- Low temperature indicate milk fever, ketosis etc.

How to take Temperature

If cows are mobile, Cows need to be restrained in crush, race or by halter. In the case of small calves the animals could be restrained manually.

Ensure that the thermometer has been shaken down. Lubricate the end of the thermometer to allow easy passage.

Rectal Measurement: Pass the thermometer through the anal sphincter and position so that at least 50mm of the thermometer lies within the rectum with the tip positioned against the rectal wall. Do not let go of the thermometer while it is in place. Remove after 30 seconds record the temperature.

Vaginal Measurement: In females, pass the thermometer through the lips of the vulva and position the tip of the thermometer along the dorsal wall of the vagina, approximately 50mm anterior to the lips of the vulva. Do not let go of the thermometer while it is in place. Remove after 30 seconds and record the temperature.

2. Mobility

Heel erosion or skinned heels are mainly caused by problems with bedding or bedding materials, incorrectly adjusted barn equipment and/or hoof infection. When it comes to health issues on a dairy farm, lameness is usually a main concern along with mastitis and reproductive issues. Lameness includes any abnormality which causes a cow to change the way she walks. It can be caused by a range of foot and leg conditions including foot rot, digital dermatitis, laminitis, and claw disease. Lameness can be influenced by nutrition, disease, genetic influences, management, and environmental factors. Not only does lameness cause pain and distress for dairy cattle, but it also has a large economic impact on the dairy operation. Lameness is commonly identified by locomotion scoring, but it can be difficult to detect until clinical signs are present.

Key benefits of scoring mobility

1. Every cow is regularly assessed for the early signs of poor mobility prompting foot trimming and action lists.
2. Mobility trends can be monitored to identify new problems at an early stage.
3. Provision of figures for benchmarking performance.
4. General foot health awareness is increased.
5. Motivates farm staff to improve herd mobility and therefore overall herd health.

How to Score Your Herd:

1. Check your herd ideally at least once a month.
2. Choose a time and a place which will allow you to observe cows, ideally on a hard (ie, concrete) non-slip surface. Monitor each cow individually allowing them to make between 6-10 uninterrupted strides. Watch the cow from the side and the rear, and if possible ensure the cow turns a corner as part of her test.
3. Record the identities of cows scoring 3 or 4 and schedule treatment with regular checks to ensure treatment is working.
4. Keep a tally of cows that are score 1 and 2. 5. If you are uncertain about the exact score of a cow, make repeat observations. If you are still unsure, examine her feet.

3. Rumination

A cow should ruminate for seven to ten hours per day, ruminating 40 to 70 times on a cud. Taking less time indicates inadequate rations.

Rumen

The rumen should be filled with feed. The left side of the stomach should protrude. If you press your fist into the rumen it should contract firmly about 10 to 12 times within five minutes.

4. Alertness

A healthy cow looks alert and powerful, with a glossy skin and a full stomach. Most animals will cut back on their activity levels when they are feeling sick. This may mean they spend more time in their shady shelter instead of lying out in the sunshine during the day, it may mean they spend most of the day near their feed and water sources instead of roaming the pasture, or it may mean they hang back when the rest of their herd wanders off to look for a new spot in the pasture to graze. Any change in activity can be a sign that something isn't right.

5. Appetite

Healthy cows should eat regularly. Make a habit of watching all the animals at feeding time, and you should start to notice some patterns. There is probably one (or two) "boss" animals who are always up to eat first, and tend to push some of the others out of their way. There will be the "middle of the pack" eaters, and then one or two "clean up" eaters who tend to sit back and wait for the initial pushing to stop before they come up to get their meal. Any changes in behavior around feeding time or food can indicate that one of your animals isn't feeling well. Cows that do not come to feed bunk may be due to illness.

6. Loneliness

Because farm animals are herd animals, they really enjoy spending time with their friends. Any farm animal who starts spending time alone (away from the rest of the herd) is probably already pretty sick. Staying with the herd is their best form of protection from predators, and this is the very last behavior that changes when they are sick.

7. Neck

A swollen neck is mainly caused by a feed fence being too low or incorrectly adjusted barn equipment.

8. Hooves

Healthy cows stand straight and still while eating. Tipping or walking with lame gait are signs of poor hoof health, from bad rations, poor floors or lack of hoof treatment.

9. Udder

To assess udder health, look carefully at the teats after milking. Good teats are flexible and naturally coloured. Poor udder health can be caused by hygiene problems, poor milking equipment installation or inadequate feed rations.

10. Manure

Should not be too thick or thin and should never have undigested particles in it.

11. Breathing

Normal breathing ranges from 10 to 30 breaths a minute for a cow. Faster breathing indicates heat stress or pain and fever.

12. Heart Rate

Cows normal heart rate – 60 -70 beats per minute

13. Body Condition Scoring

- Observe all the animals regularly to assess body condition
- Monitor early signs of weight loss

Body condition scoring is a method of evaluating fatness or thinness in cows according to a five-point scale and using the score to fine-tune dairy herd nutrition and health. Body condition influences productivity, reproduction, health, and longevity of dairy cattle. Thinness or fatness can be a clue to underlying nutritional deficiencies, health problems, or improper herd management. If done on a regular basis, body condition scoring can be used to troubleshoot problems and improve the health, longevity, and productivity of the dairy herd.

Body condition scoring in dairy cattle is a visual and tactile evaluation of body fat reserves using a 5-point scale with 0.25-point increments. Body condition scores (BCS) are an indirect estimate of energy balance. A score of 1 denotes a very thin cow, while 5 denotes an excessively fat cow, and 3 is an average body condition.

- **Body Condition Score 1:** Emaciated The ends of the short ribs are sharp to the touch and together give a prominent shelf-like appearance to the loin. The individual vertebrae of the backbone are prominent. The hook and pin bones are sharply defined. The anal area has receded and the vulva is prominent.

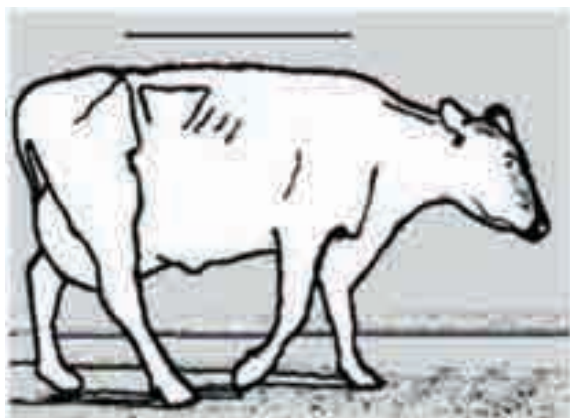
- **Body Condition Score 2: Thin** The ends of the short ribs can be felt but they and the individual vertebrae are less visibly prominent. The short ribs do not form as obvious of a shelf effect. The hook and pin bones are prominent but the depression of the thurl region is less severe. The area around the anus is less sunken and the vulva less prominent.
- **Body Condition Score 3: Average** The short ribs can be felt by applying slight pressure. The overhanging shelf-like appearance of these bones is gone. The backbone is a rounded ridge and hook and pin bones are round and smoothed over. The anal area is filled out but there is no evidence of fat deposit.
- **Body Condition Score 4: Heavy** The individual short ribs can be felt only when firm pressure is applied. Together they are rounded over with no shelf effect. The ridge of the backbone is flattening over the loin and rump areas. The hook bones are smoothed over and the span between the hook bones over the backbone is flat. The area around the pin bones is beginning to show patches of fat deposit.
- **Body Condition Score 5: Fat** The bone structure of the topline, hook and pin bones and the short ribs is not visible. Fat deposits around the tailbone and over the ribs are obvious. The thighs curve out, the brisket and flanks are heavy and the chine very round.



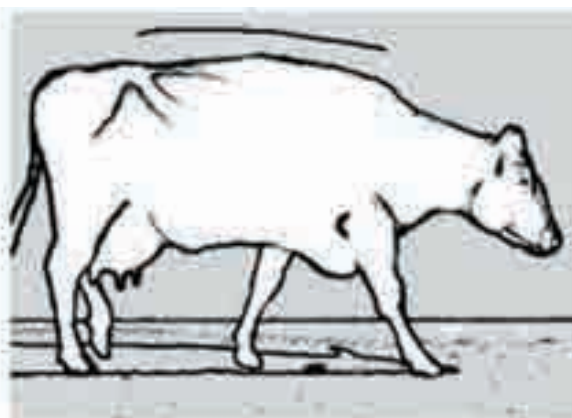
Fig 5.1.1 Rectal measurements



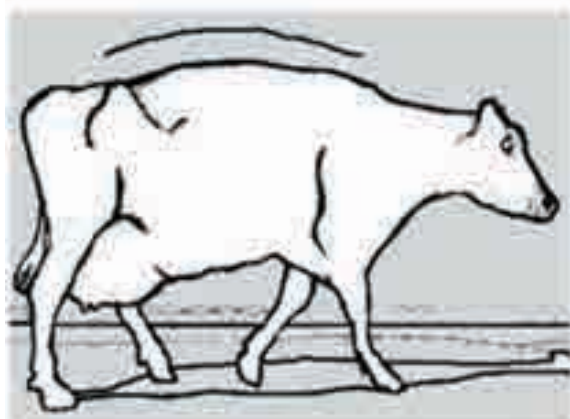
Fig 5.1.2 Vaginal measurement



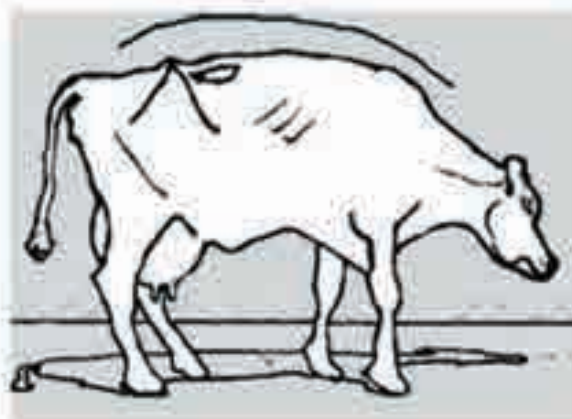
Locomotion Score 1



Locomotion Score 2



Locomotion Score 3



Locomotion Score 4

Fig 5.1.3 Locomotion score


Good Mobility	Score – 1
	
<p>Walks with even weight bearing and rhythm on all four feet, with a flat back. Long, fluid strides possible.</p>	<p>No action needed. Routine (preventative) foot trimming when/if required. Record mobility at next scoring session.</p>

Fig 5.1.4 Good mobility, Score – 1


Imperfect Mobility	Score - 2
	
<p>Steps uneven (rhythm or weight bearing) or strides shortened; affected limb or limbs not immediately identifiable.</p>	<ul style="list-style-type: none"> • Could benefit from routine (preventative) foot trimming when/if required. • Further observation recommended.

Fig 5.1.5 Imperfect mobility, Score - 2


Imperfect Mobility	Score - 3
	
<p>Uneven weight bearing on a limb that is immediately identifiable and/or obviously shortened strides (usually with an arch to the centre of the back).</p>	<ul style="list-style-type: none"> • Lamé and likely to benefit from treatment. • Foot should be lifted to establish the cause of lameness before treatment. • Should be attended to as soon as practically possible.

Fig 5.1.6 Imperfect mobility, Score - 3

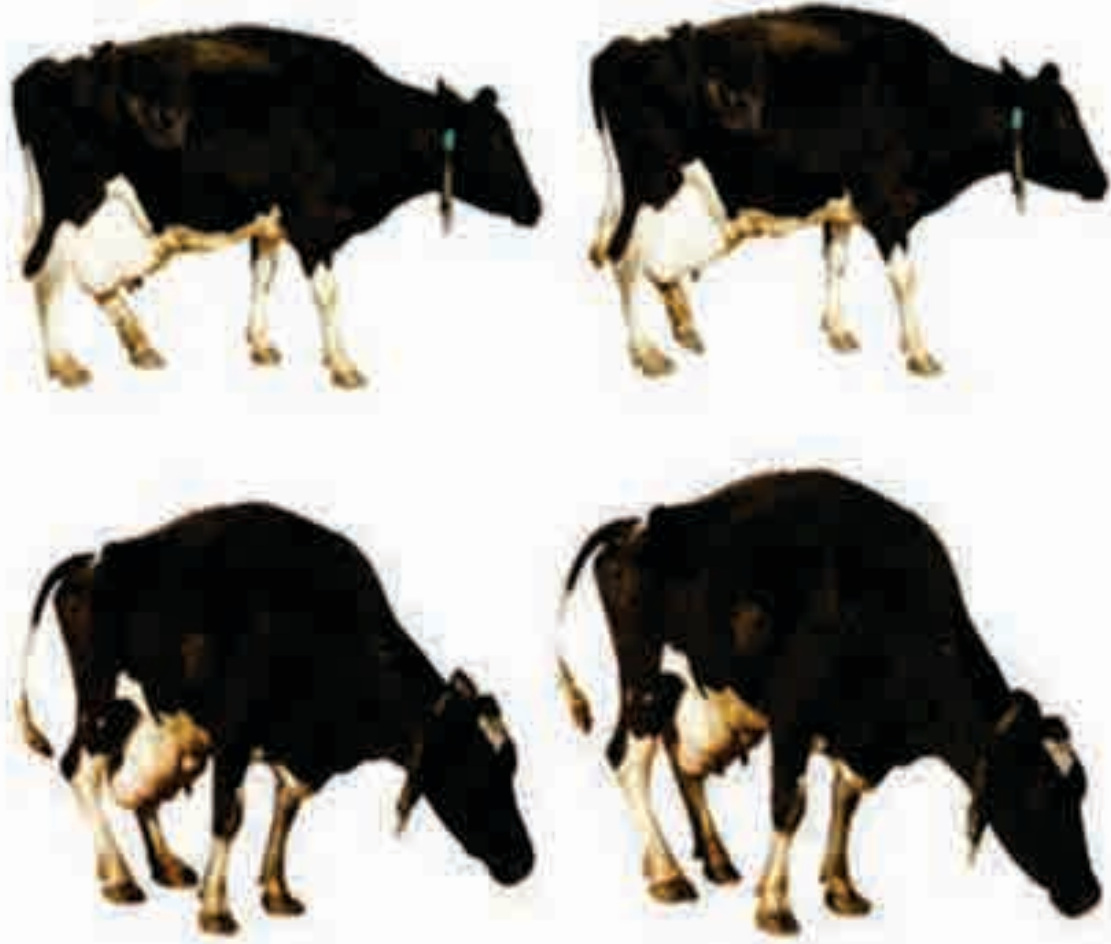
Severely Impaired Mobility	Score - 4
	
<p>Unable to walk as fast as a brisk human pace (cannot keep up with the healthy herd) and signs of score 2.</p>	<ul style="list-style-type: none"> • Very lame. • Cow will benefit from treatment. • Cow requires urgent attention, nursing and further professional advice. • Cow should not be made to walk far and kept on a straw yard or at grass. • In the most severe cases, culling may be the only possible solution

Fig 5.1.7 Move score

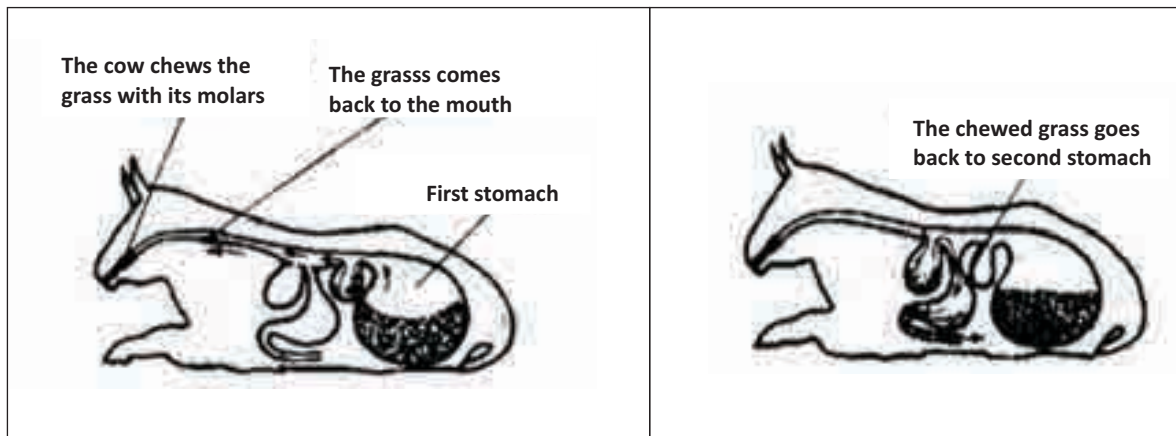


Fig 5.1.8 The process of grass chewing of cow

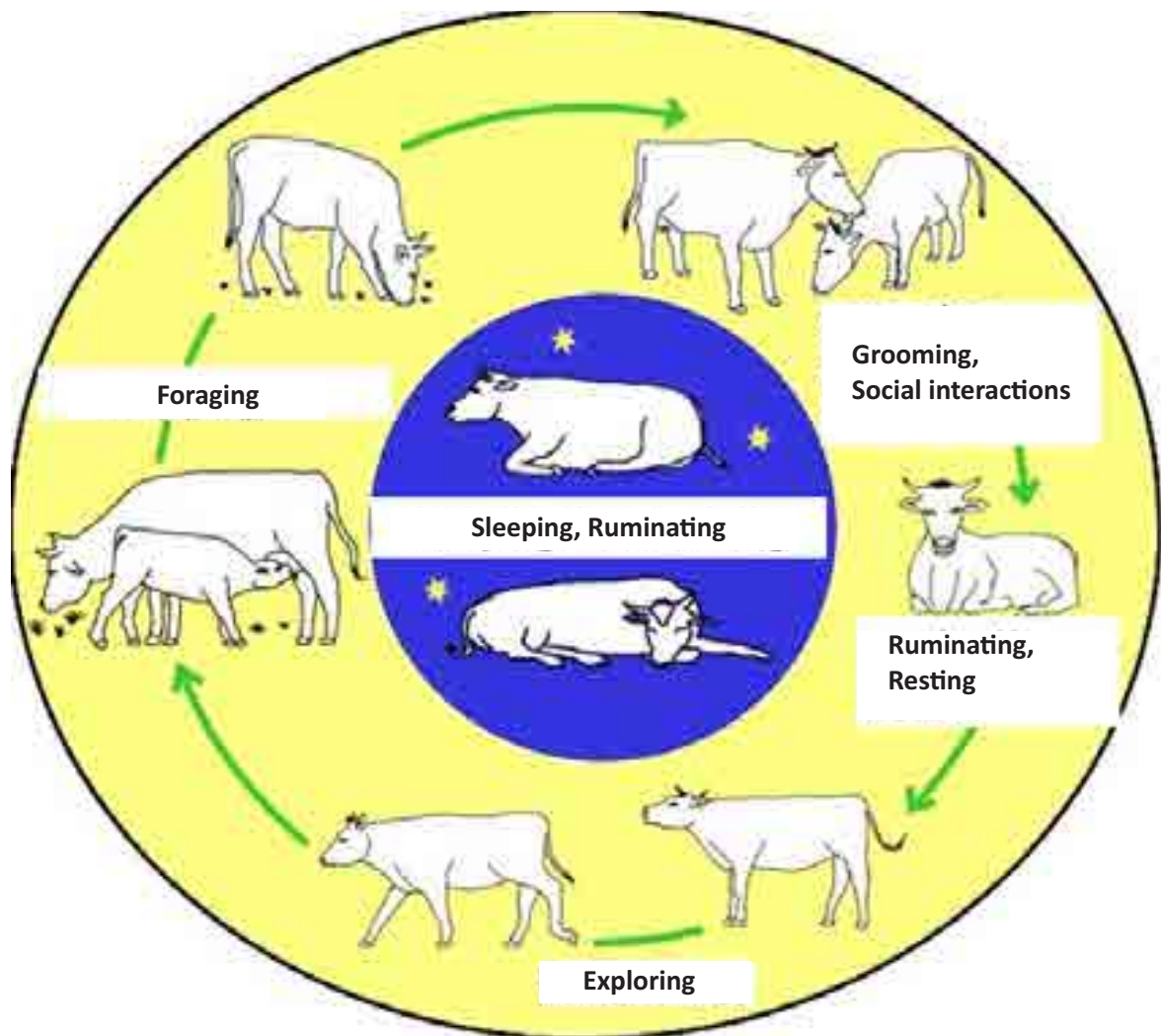


Fig 5.1.9 Ruminant

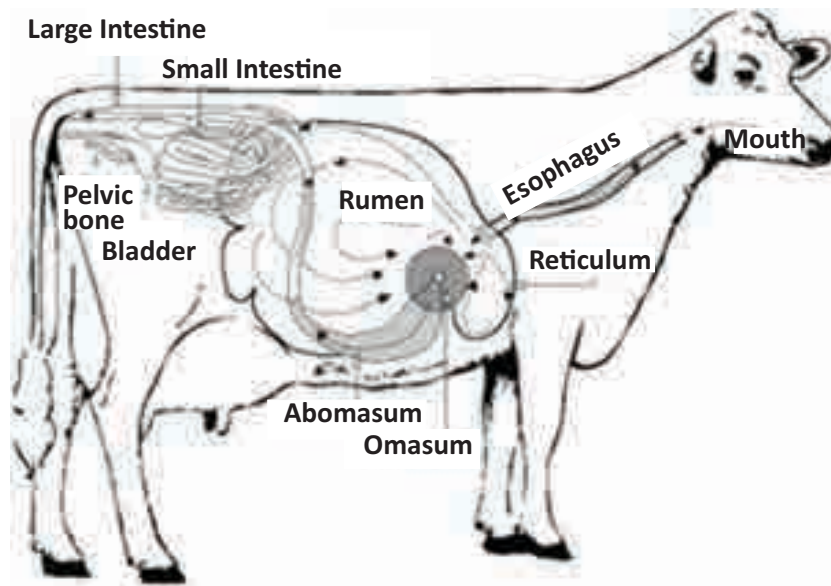


Fig 5.1.10 The process of digestion of grass in cow

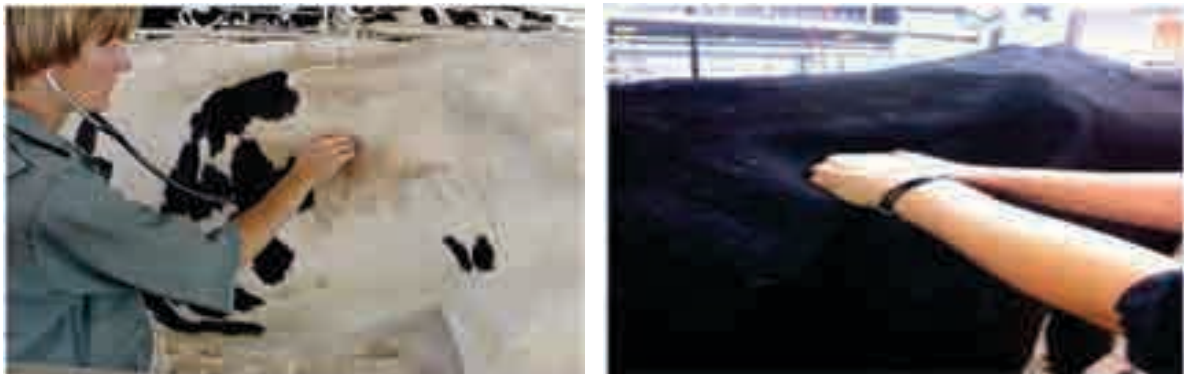
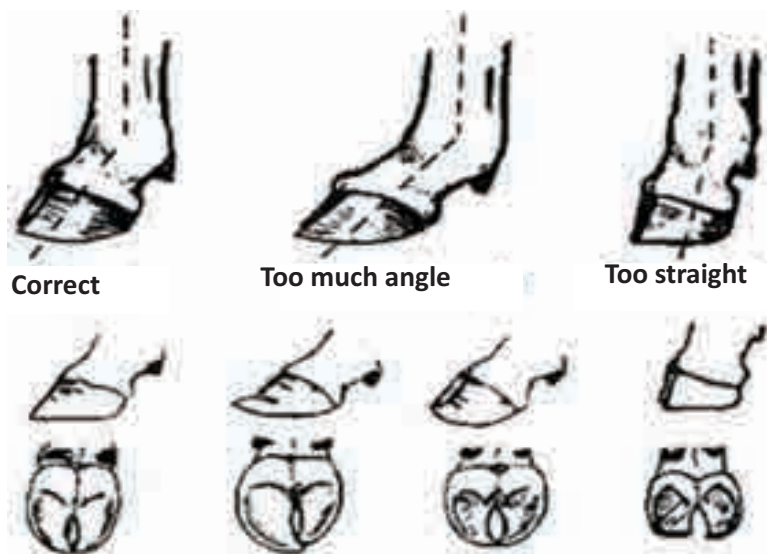


Fig 5.1.11 Rumen



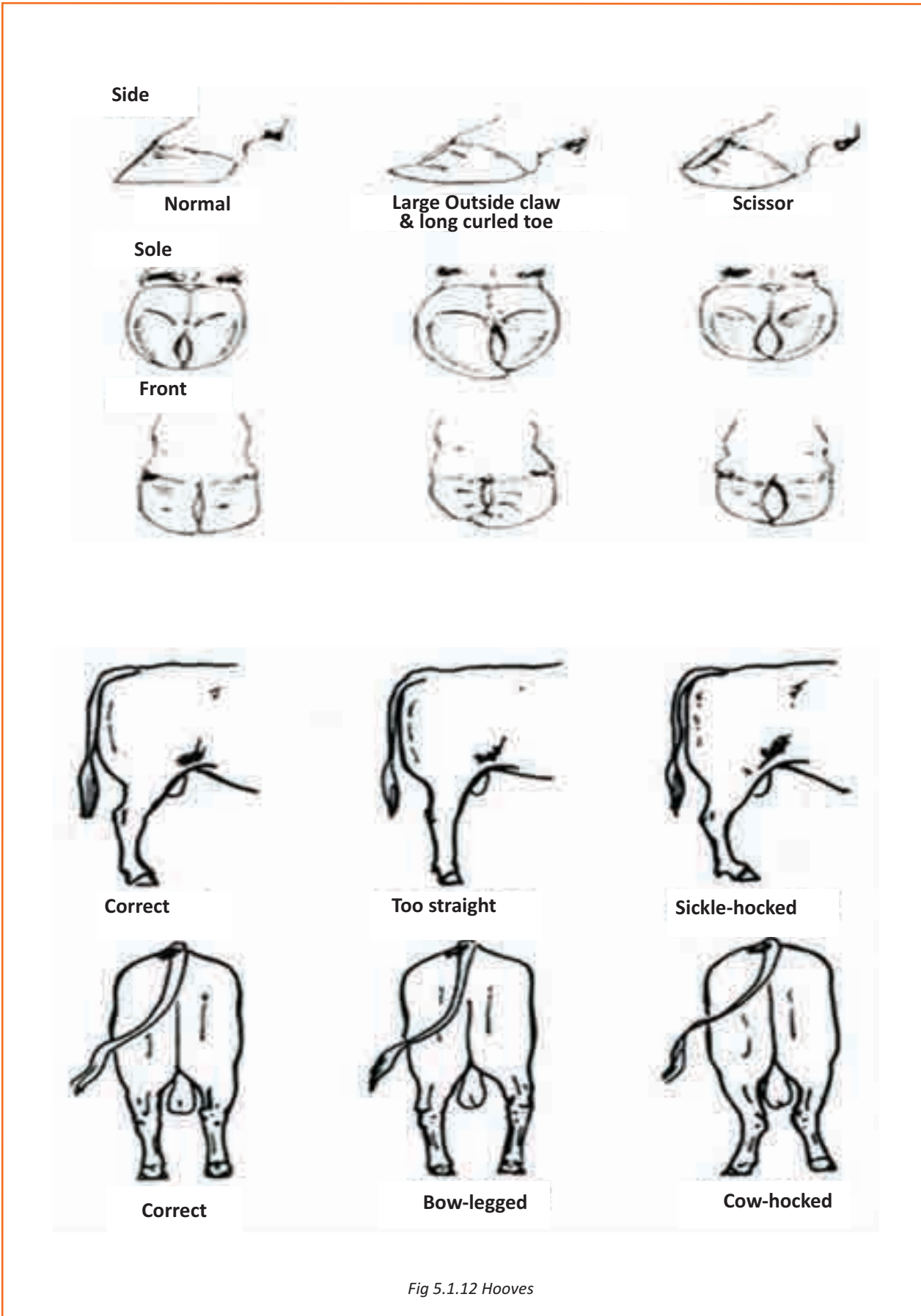
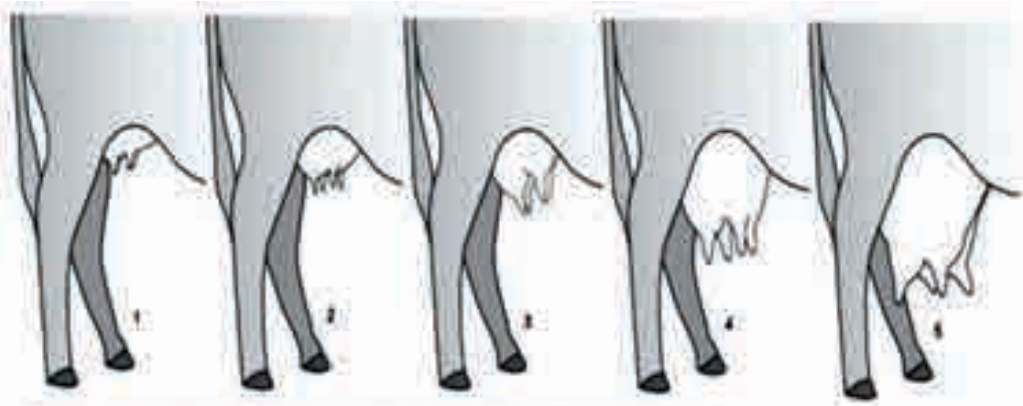


Fig 5.1.12 Hooves



Drawing 1: Udder suspension - Very Tight, very pronounced median suspensory ligament. Udder suspension score = 9.

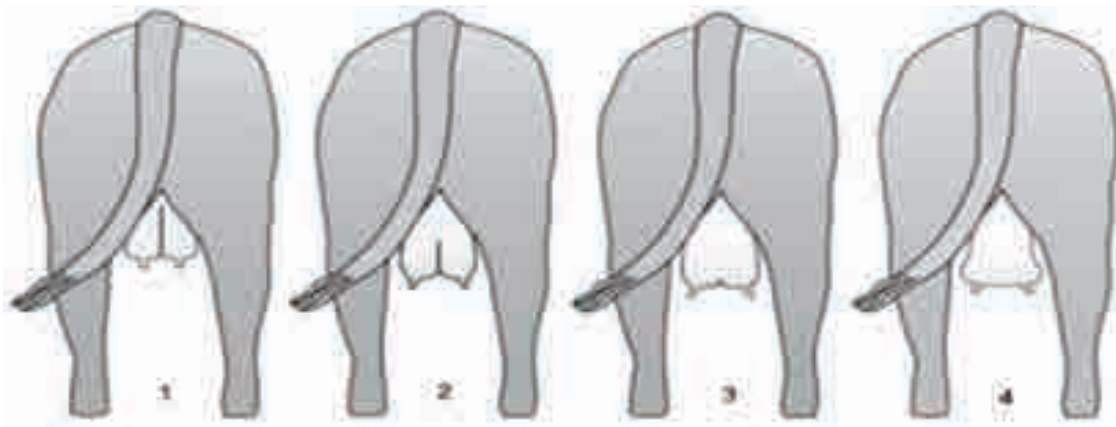
Drawing 2: Udder suspension - Tight attachment, pronounced median suspensory ligament. Udder suspension score = 7.

Drawing 3: Udder suspension - Intermediate attachment. Udder suspension score = 5.

Drawing 4: Udder suspension - Loose attachment, weak median suspensory ligament. Udder suspension score = 3.

Drawing 5: Udder suspension - Very loose and pendulous attachment, very weak median suspensory ligament. Udder suspension score = 1.

Fig 5.1.13 Udder



Drawing 1: Prominent median suspensory ligament which holds the udder tight to the body cavity. Teats suspend perpendicular to the ground.

Drawing 2: Intermediate prominent suspensory ligament. Udder suspended further from body cavity. Udders suspended about level with the hock and almost perpendicular to the ground.

Drawing 3: Very weak median suspensory ligament. Udder and teats suspended below the hock. When the udder and teats are engorged with milk, teats splay outward.

Drawing 4: Median suspensory ligament absent, udder and teats suspended below hocks. Udder balloons and teats splay outward.

Fig 5.1.14 Udder

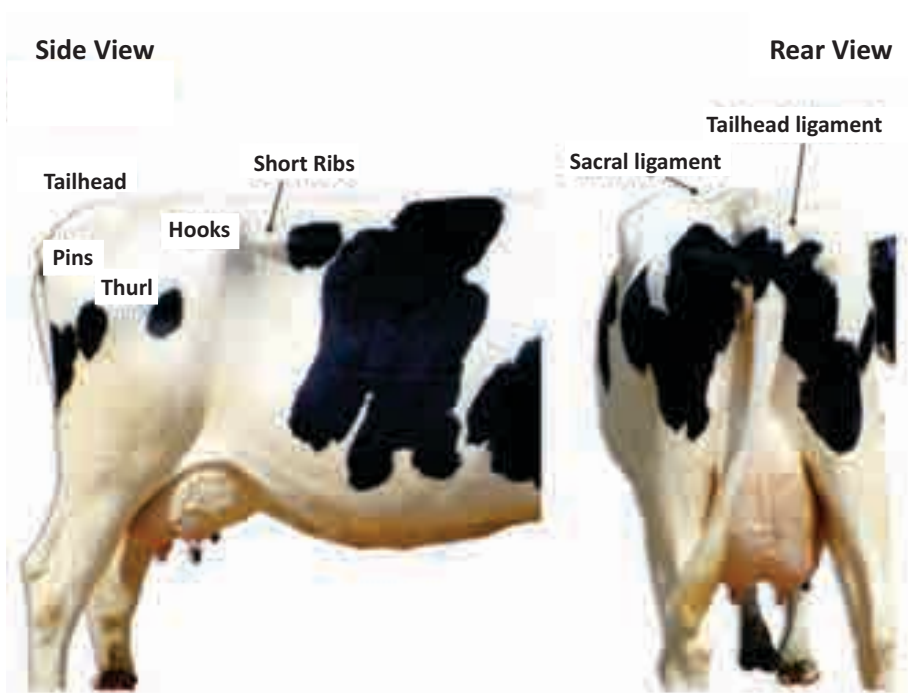


Fig 5.1.15 Body condition scoring

Suggested Body Condition Scores for Cows by Stage of Lactation (Days in Milk, DIM)

Stage of Lactation	Days in Milk	BCS Goal	Min	Max
Calving	0	3.50	3.25	3.75
Early Lactation	1 - 30	3.00	2.75	3.25
Peak Milk	31 - 100	2.75	2.50	3.00
Mid Lactation	101 – 200	3.00	2.75	3.25
Late Lactation	201- 300	3.25	3.00	3.50
Dry Off	> 300	3.50	3.25	3.75
Dry	-60 - -1	3.50	3.25	3.75

Table 5.1.1 Suggested body condition scores for cows by stage of lactation (days in milk, dim)

Suggested Body Condition Scores for Growing Heifers by Age in Months

Events	Age in months	BCS Goal	Min	Max
	0 – 4	2.25	2.00	2.50
	4 – 10	2.50	2.25	2.75
Pre Breeding	10 – 12	2.75	2.50	3.00
Breeding	12 – 15	3.00	2.50	3.25
Bred	15 - 20	3.25	3.00	3.50
Calving	> 20	3.50	3.50	3.75

Table 5.1.2 Suggested body condition scores for growing heifers by age in months

Exercise 

1. Differentiate between healthy and sick animals.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

UNIT 5.2: Monitoring the Body Condition of Animals

Unit Objectives

By the end of this unit, participants will be able to:

1. Monitor the activities of animals in the shed or outside.
2. Observe the physical condition of the animals.

5.2.1 Treat Animals as Per Animal Welfare Regulations

How to restrain the dairy animal with minimal stress?

Cattle restraining squeeze chute with angled rubber louvres on the side which prevent the cattle from seeing people. The side can be opened for easy access for injections and other veterinary procedures. The louvres block the animal's vision the same way that louvred shutters block vision through windows in a house.

- Solid sides or barriers around the cattle to prevent them from seeing people deep inside their flight zones. This is especially important for wild or excitable cattle.
- To prevent lunging at the headgate, the bovine's view of an escape pathway must be blocked until it is fully restrained.
- Provide non-slip flooring for all species of animals.

A good example of a non-slick surface for livestock.

- Slow steady motion of a restraint device is calming, while sudden jerky motion excite.
- Use the concept of optimal pressure. Sufficient pressure must be applied to provide the feeling of restraint, but excessive pressure that causes pain or discomfort must be avoided.
- The entrance of the restraint device must be well lighted, however, lamps must not glare into the eyes of approaching animals. All species must be able to see a place to go.
- Livestock will remain calmer if they can see other animals within touching distance.
- Engineer equipment to minimize noise. High pitched noise is more disturbing to livestock than a low pitched rumble.
- Restraint devices must be designed to avoid uncomfortable pressure points on the animal's body.
- Restrain livestock in an upright position.



Fig 5.2.1 Louvres design



Fig 5.2.2 Non-slick surface for livestock

Monitor the physical condition of the animals at suitable intervals, and recognize, record and report any abnormal signs.

Herd recording assists farmers with accurate information in making herd management decisions.

- Dry cows or choose dry cow therapy
- Sell cows
- Assess the production level of first-calf heifers to see how well replacements are being reared,
- Assess herd reproductive performance,
- Identify actions to improve cell count,
- Select the best cows to breed from,

Recording Herd Health

Accurate recording of all animal health events is important for timely identification of disease outbreaks, identification of cows for culling, effective management of sick cows, information for your vet and design of preventative programs.

Monitoring this information allows any increasing levels of disease in the herd to be identified early and managed, which is particularly important for larger herds where small and subtle changes can quickly lead to significant effects. Make sure there is a designated area in the dairy where this information can be recorded.

Types of records

- Daily stock register
- Birth/calving register
- Calf/young stock register
- Adult stock register
- Breeding register/AI register
- Weighment/growth register
- Milk yield and distribution register
- Sales/disposal register
- Mortality register
- Feed stock register

- Fodder stock register
- Receipt/Income register
- Herd health register

Herd Health Register Must Include

- The milking animal number.
- Condition/disease and veterinarian (if consulted).
- The type of treatment (including dose).
- The date of each treatment.
- The date of last treatment.
- The date that milk re-entered the bulk milk tank.

Displaying Records

Whatever system is used, written records are also required. This is particularly important for any cow that has received treatments or remedies

A clear list of all problem cows displayed on the wall within sight of the milker will save time and prevent mistakes. If you use a white board make sure you keep the information somewhere else permanently, i.e. take a photo of the board and transfer it into your records.

Early Detection of Disease

Disease detection can be difficult and cases are sometimes not detected until later in the course of the disease. Look for 'cow signals', for example, how to identify early signs of lameness, teat damage and mastitis.

- If more than 10% of your herd have lameness throughout the season or;
- More than 10% of your herd fails to get in calf or;
- More than 15% of your herd have a SCC above 150,000 at any herd test.
- Recording such cow signals in the herd will help to detect disease.

Signs of a Sick Cow

- Dull coat
- Dull/sunken eyes
- Arched back
- Sunken flanks or rapid weight loss
- Ears droopy
- Head lowered

Animals showing clinical signs of, or have been diagnosed with a disease or illness, must be removed from the main milking herd, marked and recorded, and their milk withheld from the bulk milk tank until the clinical signs have been resolved.

Prompt treatment of sick and lame cows is best for the cow's welfare and will also mean there is less of a drop in milk production. Recording the cause of lameness is an important part of prevention.

Steps to Safeguard Animal Health

- Protocols around teat disinfection as part of the milking routine.
- Milking hygiene to prevent cow to cow transfer.
- Milking machine maintenance.
- Drying off management.
- Recording and monitoring of infected animals.
- Treatment of cases.
- And monitoring of SCC.

To prevent the transfer of other infections between animals, protocols dealing with the segregation of infected animals and the quarantining of new stock are important.

Steps to Segregate Treated Cows:

If separating treated cows alone is not practical, then they need to be drafted out and milked last to prevent cross contamination. Do not milk them first.

If treated cows are run as a separate herd consider the following points:

- Ensure they are clearly marked.
- Ensure the animals are secure. Preferably the water trough should be away from main race. Try not to walk the main herd past prior to milking.

Wait until the main herd has left before the treated cows enter the platform. Consider holding them in a separate small yard while the main herd is being milked. This will also allow for checking that all are present and correct at each milking.

Steps to Carry Out for Problem Cows:

A problem cow is any cow that needs to be identified for special treatment. Problem cows might include.

- Cows treated with drugs,
- High SCC cows,
- Segregated for herd health procedures
- Artificial insemination
- Cows that impact on the milking routine - three titters, colostrum cows, kicking cows or slow milkers.

The Benefits of Identifying Problem Cows Include:

- Increased milking efficiency - by making sure problem cows e.g. those to be segregated or treated, are not missed at milking.
- Maintain milk quality - by ensuring the milk from cows that have been treated is withheld.

Steps to Mark the Problem Cows

It is critical for milking efficiency that these cows are easily identifiable by all milkers, particularly if their milk must be withheld from the bulk milk tank.

A good marking system will meet the following requirements:

- It must be clearly visible and alert the milker to the presence of a treated cow.
- Durable and visible in all weather conditions.
- All milkers must know and understand the system - display the markings in the dairy somewhere so people know what each marking means.
- The system must be able to be removed or cancelled once the cow is clear.
- Colostrum and treated cows must be marked differently.
- Uses two marking systems just in case one fails.

Prevention: Biosecurity, herd health programs, equipment and stall designs, as well as early identification of herd or facility-related problems will help to prevent many animal health problems.

Observation: Cattle should be observed several times a day, especially during milking or feeding. Early detection of illness and appropriate treatment are key elements in minimizing disease and discomfort.

Treatment: Treatment should be determined and administered as soon as possible to prevent conditions from deteriorating. Consult with a veterinarian to develop treatment strategies and protocols for common ailments.

Separation: Segregate compromised animals into designated 'hospital' pens or areas to permit close observation, treatment and easy access to feed and water.

Transport: If animals are fit for transport, decide where and when to ship them, ensuring all medicine withdrawal times have been observed.

Euthanize: All animals unfit for transport or unfit for human consumption must be euthanized on-farm.

Exercise 

1. How to control animals with minimal stress?

Notes



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UNIT 5.3: Examining Livestock for the Presence of External Parasites

Unit Objectives

By the end of this unit, participants will be able to:

1. Observe the body of the animal to check the parasites.
2. Remove the parasites from the animal body if any.
3. Consult the veterinary doctor in case of emergency.

5.3.3 Check Livestock for Presence of External Parasites

External parasites live on the skin of cattle or visit them to feed. The most important groups of external parasites are flies and ticks. Lice and mites are usually not very important, but do occur occasionally. Most of these parasites can be seen with naked eye while mites are microscopical.

Why are external parasites important?

- Cause a nuisance to the animals.
- Cause skin and eye irritation and damage, which can lead to bacterial infection and fly maggot attack.
- Create large wounds.
- Suck blood, causing the animals to become weak.
- Spread diseases between animals.
- Cause disease through poisonous bites (toxins).
- All of this can result in decreased production and even death.

Flies:

Flies are scavengers that feed on sweat, tears, saliva, manure. Some flies do bite and suck blood. Most flies lay eggs near moist environments.

Larval stage needs moisture to survive. Flies grow on Manure, rotting vegetation, mud while some species lay eggs in open flesh. Life cycle of flies include

Adult > Egg > Larvae (Maggot) > Pupa > Adult

House Flies (Muscadomestica) They lay eggs in feces, manure plies, garbage, or other decomposing organic material. They survive in Optimal temperature is 30-37° C. House flies complete life cycle in as short as 7-10 days and in a good summer 10 12 generations. Flies are only active in daylight hours. House flies tends to be an annoyance and can carry bacteria.

Horn Flies are about half the size of house flies and are dark gray with 2 stripes. They are blood-sucking flies that stay on the shoulders and backs of cattle almost continuously. During extremely hot weather or when it rains, they may move to the protected underside of the animal. When disturbed, horn flies will fly up in a swarm but they will return to the animals almost immediately. A horn fly leaves the back of a cow or calf only to lay eggs in fresh manure. They suck blood from the host 24 hours a day. Individual flies pierce the skin with their short, tube-like mouthparts 20 to 30 times per day to ingest blood. Their feeding activity is painful and annoys the animals, as well as causing some blood loss.

Face Flies (*Musca autumnalis*) closely resemble house flies. Face flies cluster on the faces of cattle and feed on secretions from the mucus membranes of the eyes, nose, and lips and cause pink eye infections. Face flies do not suck blood. They do irritate the surface of the eyeball and carry and spread bacteria and viruses that contribute to pinkeye problems. They lay eggs on manure paddle and are around fresh manure. They spend only a small portion of their life on cattle which makes them more difficult to control than horn flies. Face flies prefer to feed on broad daylight.

Stable Flies (*Stomoxys calcitrans*) are sometimes called biting house flies. They look very much like house flies and has 4 stripes. They feed primarily on legs and lower abdomen of cattle. The mouth parts penetrate the skin and allow them to engorge on blood two to three times a day depending on the weather. Once full they move to a resting place, usually in the shade, to digest the blood meal. The blood loss and pain associated with the bite of stable flies results in substantial economic loss. Stable flies attack legs, flanks and lower body. Stable flies lay eggs in manure, wet straw and old bedding.

Animal Health Concerns

- Production losses
- Annoyance factor
- Animal welfare concern and Stress factor for animals with docked tails –
- Reduce milk yield upto 25% Dry matter intake is reduced –
- Some animals could lose as much as 100 ml blood /day –
- House or stable fly carry bacteria onto skin around teat end
- Blood borne pathogens, Anaplasmosis – Re-emerging disease of concern. Most often ticks then needles but also biting flies
- Bovine Leukemia Virus
- New cases by transfer of infected white cells

Pinkeye

Reduce overall fly burden – Identify stable vs. pasture problems – Immunize in advance of challenge (midSpring) Very painful, prompt treatment – Vaccines: doses and multiple antigens – Some reports that Gram negative core antigen vaccines reduce severity (Coliform vaccines) – Ear tags can help - remove ear tags at end of season to reduce development of resistance by flies.

Control of Flies

Physical Control

- Practise good stable and kraal hygiene (Clean regularly).
- Drain damp areas to stop breeding of mosquitoes and biting midges.
- Immediately treat skin wounds so that strikes do not occur.
- Remove manure or stir bedding every 10 days or less.
- Compost, stack, or agitate manure
- On pasture - Remove weeds and brush around buildings and fencerows
- Use barrier teat dips
- Fly control in pasture and fans in barns
- Gram negative core bacteria vaccines

Biological Control

- Use of natural fly enemies
- Certain beetles and mites eat fly eggs and larvae
- Parasitic wasps attack fly pupa (available for sale)
- Add them early in Spring as fly population starts to increase
- Will hold population in check but will not kill every fly

Chemical Control

- Use Premise sprays – Space sprays-short term
- Usually premethrins and/or pyrethrins
- Usually short term with good knock down of flies
- Residual – longer term
- Usually synthesized pyrethrins with dicholovos or diazinon or chlorpyrifos
- Remove animals from buildings as directed
- Baits

Usually Methomyl

- Organophosphates (rarely chlorinated hydrocarbon)
- Some are effective for grubs – Avermectins for grubs/ticks/mites/lice
- Larvicides Usually in feed or by bolus - kill larval stage in manure
- Difubenzuron, Tetrachlorvinphos, or Methoprene

Ticks cause blood loss, discomfort, and spread diseases like anaplasmosis. Tick control is extremely difficult in areas with high tick populations. High concentrations of ticks usually occur in brushy pastures and woodlands so habitat management is an important part of tick control.

Control of Ticks

- Apply acaricides that kill ticks or prevent their attachment. They can be applied as handsprays or race-sprays, dips, pour-ons, spot treatment or injectable drugs
- Some breeds of cattle are more resistant to ticks and tick-borne diseases
- Seek advice from veterinarian or animal health technician on specific control methods for ticks in your area.

Lice cause skin irritation and itching. Both biting and sucking lice infest cattle. Infested cattle can experience reduced appetite and appear unthrifty. Lice reside entirely on the host cow. Lice are present year around but increase in numbers in winter. In spring most parasites are lost with the winter hair coat.

Control of Lice:

- Lice Control measure during fall and early winter when the lice populations increase.
- Treat with approved products. Repeat the treatment in three weeks to kill hatching lice since most insecticides do not successfully kill eggs.
- Sprays and pour-ons are common methods to treat cattle lice.

Mite infestation is called mange in cattle. A serious form of mange is called scabies. Scabies is caused by sarcoptic and psoroptic mites and must be reported to the disease control authorities. A less severe mange is caused by chorioptes, demodex, or psorergates mites. Mites are spread through close contact. Cattle infested with mites suffer hair loss and a thickening of the skin. Severe infestations can weaken cattle and make them vulnerable to diseases. Scabies can result in severely debilitated animal.

- Control of Mites
- Avermectins for Mites



Fig 5.3.1 Horn flies on cow

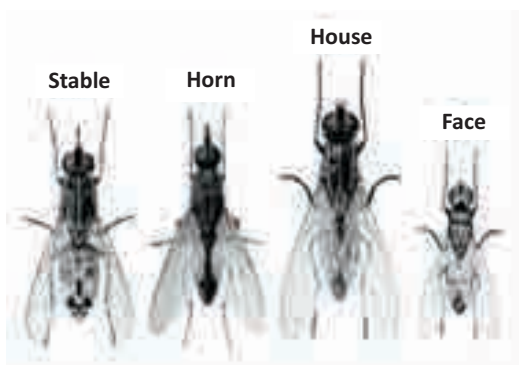


Fig 5.3.2 Flies



Fig 5.3.3 Ticks



Fig 5.3.4 Cattle lice

UNIT 5.4: Health Maintenance Process of Livestock

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain and practice the health maintenance procedure of Livestock.

5.3.4 Health Maintenance Process of Livestock

Interaction with Animals

Good stock handling skills are essential in dairy farms and are critical for successful animal management. Dairy cows have close daily contact with people. The nature and frequency of this contact affects the way cows behave and their productivity. If the interactions are positive, cows become easier to handle because they are less afraid of people. If the interactions are negative, fear responses increase, handling becomes more difficult, and animal production, health and reproduction suffer.

Understand Your Cow

Good dairy farmers are able to empathise with the cow and, therefore, understand why cows behave the way they do in certain situations. Understanding this relationship between cow behaviour and how people act is vital to working with cattle successfully.

Cow Vision

A cow's view of the world is different from a human's. Their eyes are positioned on the sides of their heads, rather than facing forward. This means that they can see all around them (panoramic vision), but have blind spots at the front and rear. As a result, they can be easily spooked when people approach from these points.

For a comparison, imagine how spooked you would be if someone you didn't trust approached you from behind (your blind spot).

The position of their eyes also means that they have poor depth perception and, therefore, will balk at shadows and lines on the ground.

Cow Hearing

Cows have good hearing and respond positively when talked to in a calm voice. They don't like loud high-pitched noises. This is why noises from pumps and motors should be minimised, especially at milking.

Cumulative Effects

The way a cow responds to a person will be a reflection of how that animal has been treated in the past; these effects are cumulative. There is evidence that cattle can discriminate between people. They do this using a mix of sight, smell and sound. For example, colour is a particularly strong cue and young calves will learn to discriminate people on the colour of their overalls.

Balance is Important

On dairy farms not all interactions with people will be positive. For example, human-cow interactions during painful veterinary procedures are negative. Although these interactions will be few for most cows, the number of positive interactions must outweigh the negative. It is important, therefore, to take every opportunity to interact positively with the animal. In addition, the impact of the negative procedures can be minimised through better planning, well lit areas, minimising noise, etc.

Cow Learning

- Cows have an impressive ability to learn.
- Cows' learning abilities are utilised in automatic milking systems, where cows physically operate a series of gates and laneways on their own to get milked.
- Good stock people like to spend time with young calves. As well as the enjoyment factor, this interaction has a long-term benefit for the relationship between those animals and people.
- The cumulative effects of interactions between cows and people are most obvious during milking as this is the time of most regular and close contact with cows.
- The best handlers are confident, calm and consistent and often use verbal encouragement and body position relative to the cow to move cows in and through the dairy. They are working with the learning abilities of cows to get the job done efficiently.

Downer condition can be prevented if the animals are maintained healthily

- Maintain your handling facilities to prevent the occurrence of downer-causing injuries.
- Handle cattle quietly and gently to prevent injury.
- Develop good health protocols and observe cows closely. This will allow for early detection of health problems and subsequent treatment during early stages of these problems when a successful outcome is more likely.
- Evaluate cows routinely for lameness.
- Reduce calving problems. Nerve damage during calving is one of the most common reasons cows become non-ambulatory. Select sires with appropriate genetics for calving ease and birth weight.
- Cull cows before they become extremely thin.
- Provide adequate nutrition to cows.
- Monitor body condition of cows. Cows with body condition scores of 2.5 or less (on a 1-9 scale) are more likely to go down during transport.

If a cow does go down and is unable to get back up without assistance the following are management suggestions for consideration:

- Consult with your veterinarian to determine whether the cow should be treated or humanely euthanized.
- Provide fresh feed and water to non-ambulatory cows twice daily.

Never Drag Cattle:

- If it is necessary to move the cow use caretakers to humanely roll her onto a sled or low-boy trailer, or into the bucket of a large loader. Be careful to control the animal's head to prevent trauma during this process.
- If the cow is unable to sit up unaided or refuses to drink or eat 36 hours after becoming non-ambulatory she should be euthanized.
- Do not send non-ambulatory cows to an auction market or harvesting facility.
- Dispose of the carcass in an approved manner - bury, compost or render.

Exercise 

1. What are the things to be kept in mind to maintain the health of animals? List them.

UNIT 5.5: Cow Gestation

Unit Objectives

By the end of this unit, participants will be able to:

1. Observe the pregnancy symptoms in animals.
2. Care the animals during the pregnancy.
3. Arrange the required facilities.

5.5.1 The Pregnancy Period of Cow

Pregnancy in Cows

- Gestation period in cows – 280 days (average)
- Embryonic phase – 0 – 42 days
- Foetal Phase – 42 to end of term

Pregnancy Diagnosis in Heifers and Cows

1. Non-return to oestrus

Non pregnant cows come to oestrus in 3 weeks after insemination. If oestrus signs are not observed around same time, the cow is assumed to be pregnant. There are several false positive cows that does not show oestrus and not pregnant. 7% of pregnant cows will show false negative signs ie. show some signs of oestrus during pregnancy. Insemination of these animals may result in embryonic or foetal death.

More reliable methods for detecting early pregnancy in cattle are:

- Rectal palpation
- Hormone measurements
- Early Pregnancy-associated Protein
- Ultrasound examination

Comparison of Early Pregnancy Diagnosis Techniques

Technique	Early Testing	+ve Diagnosis Accuracy	-ve Diagnosis Accuracy
Rectal Palpation	+	+++	++++
Transrectal Ultrasound	++	++++	++++
Milk Progesterone	+++	++	+++
Early Conception Factor	++++	+	+

Table 5.5.1 Pregnancy diagnosis techniques

1. Rectal Palpation



Fig 5.5.1 Rectal palpation

Advantage: Immediate result enabling early treatment of non-pregnant cattle.

Accuracy:

Depends on the experience of the practitioner and can reach 95%.

Rectal examination is usually carried done between 35 and 65 days post AI.

Early Pregnancy Diagnosis

(1-3 Months)

Based on a combination of the following:

- Asymmetry of the uterine horns
- Decrease in the tone of the pregnant horn
- Fluctuant contents in the pregnant horn (later both horns)
- A palpable corpus luteum on the ovary on the same side as the pregnant horn
- Membrane slip
- Appreciation of an amniotic vesicle.

Diagnosis in Later Pregnancy

(>3 Months)

- Cervix is located anterior to the pelvic rim and the uterus cannot be retracted
- Uterus is flaccid
- Placentomes, and sometimes the foetus, are palpable
- The median uterine artery increases in diameter and fremitus can be detected.

Common Reasons for Errors in Rectal Palpation

- Failure to retract the uterus
- Abnormal uterine contents (pyometra or mucometra)
- Incorrect service dates.

Safety

Rectal palpation is widely used and considered a safe method for pregnancy diagnosis in cattle. Nonetheless early or inappropriate palpation of the amniotic vesicle may damage the embryo and cause embryonic mortality.

2. Hormone Measurements

Progesterone Assay

The progesterone secreted by a functional corpus luteum between 18 and 24 days after service or insemination is an early indication of pregnancy. It can be assayed in milk or plasma. Optimal assay time is 24 days after service or AI, this eliminates the possibility of long oestrus intervals which might result in false positives.

Accuracy

Accuracy in detecting pregnancy of the cow-side milk progesterone (EIA) test was 93.1% in a study. However, specificity (i.e. accuracy in detecting non-pregnancy) was only 39.3%. A large number of non pregnant may thus be diagnosed as pregnant.

Common reasons for errors in hormone measurements

- Pyometra/persistent corpus luteum.
- Shortoestrus intervals.
- Cystic ovarian disease (luteal cysts).
- Incorrect handling of the samples and test kit.

3. Early Pregnancy-associated Protein

Recently available tests detect so called early conception factor (ECF) or pregnancy-associated glycoprotein in blood samples. They are reported to detect the pregnancy-associated glycoprotein within 48 hours of conception.

Because of the high incidence of embryonic mortality this test should be treated solely as an indication of conception. Pregnancy should be confirmed later by rectal or ultrasound examination.

4. Ultrasound Examination

Early identification of non-pregnant cows post breeding improves reproductive efficiency and pregnancy rate in cattle by decreasing the interval between AI services and increasing AI service rate.

Real time (B-mode) ultrasound is a reliable and relatively simple method of diagnosing pregnancy as early as day 26.

Accuracy

An accuracy of over 99% can be achieved, enabling fertility problems to be identified rapidly.

Two factors affect the speed at which ultrasound examinations can be conducted on a dairy farm:

- Operator proficiency and availability
- Restraint of animals

When both factors are optimised, the speed of ultrasonography can approach that of rectal palpation, while exceeding palpation in the amount of information gathered from each animal. The main advantage of scanning is that it can give an accurate diagnosis earlier than rectal palpation.

Early Pregnancy Diagnosis And Embryonic Loss

Pregnancy can be detected earlier with ultrasound compared with rectal palpation. The rate of detection of early embryonic loss is thus also higher.

10 to 16% of cows diagnosed pregnant at 28 days post AI, experience early embryonic loss by 56 days post AI. Cows diagnosed pregnant at 28 days post AI days post AI, when the rate of embryonic loss per day decreases dramatically.



Fig 5.5.2 Pregnancy examination using ultrasound

Step

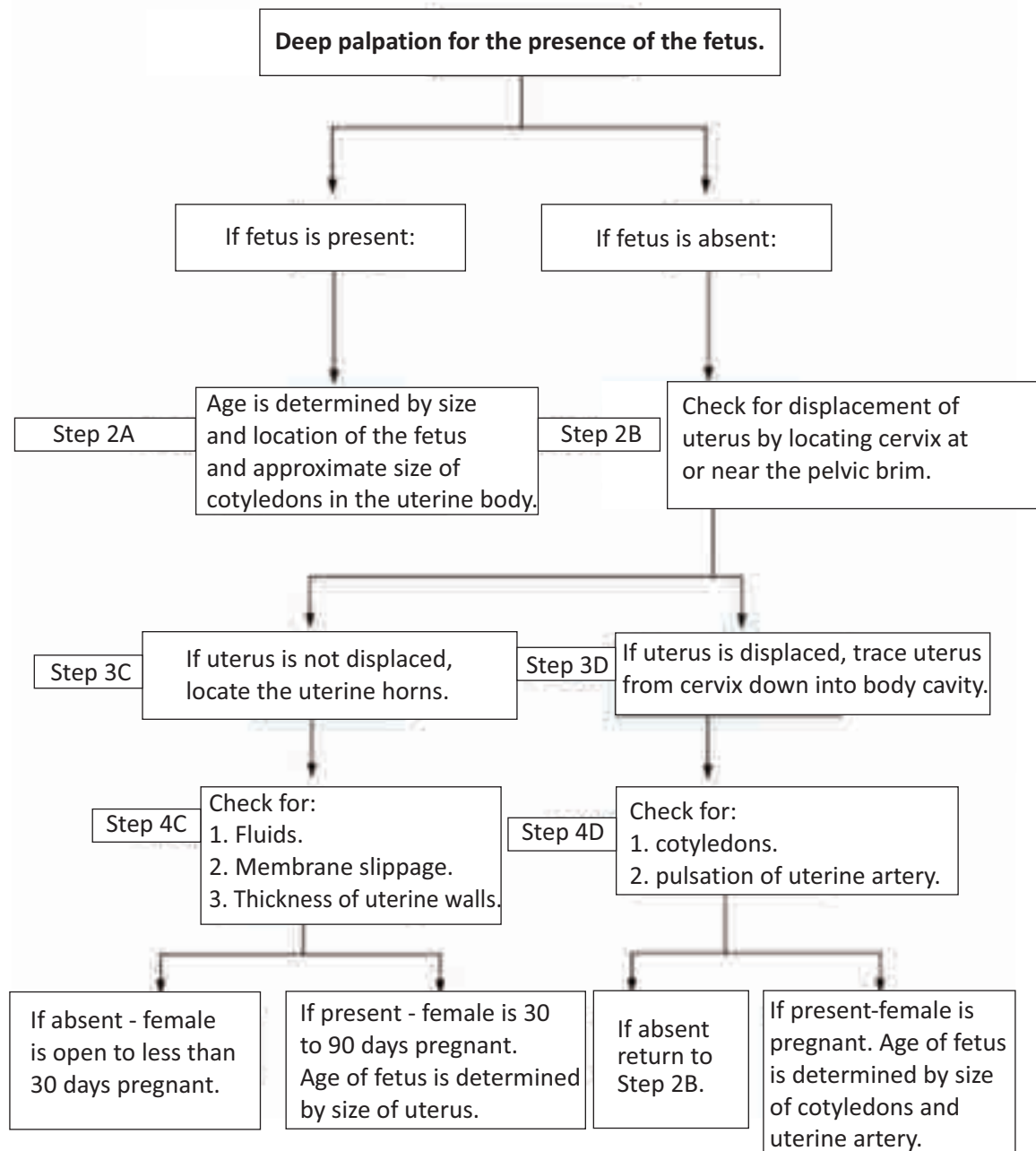


Fig 5.1.3 A systematic approach to pregnancy determination in the cow.

An outline of factors for determining pregnancy at different stages of gestation

Open cows

In females that are nonpregnant or open, the entire reproductive tract is usually located within the pelvic cavity; however, in older cows and large-frame cows the cervix and uterine horns may be distended over the pelvic brim into the body cavity.

Determining Factors:

1. No fluids in uterus.
2. No membranes present upon slippage.
3. Thick uterine wall with a meaty texture.
4. Uterine tone
 - a. Firm at or near estrus.
 - b. Flaccid between estrous periods.

Stage I Pregnancy

Females in this stage vary from 40 days to 3 months of pregnancy. Cervix and uterine horns in pelvic cavity or perhaps moving over the pelvic brim into the body cavity as Stage 1 advances.

Determining Factors:

1. Fluids in uterus and somewhat enlarged.
2. Presence of membranes upon slippage.
3. Thin uterine walls.
4. Buttons indistinct to the touch.

Stage II Pregnancy

Females in this stage vary from 3 to 5 1/2 months of pregnancy. Cervix normally located on pelvic brim with the uterine horns distended into the body cavity out of the normal reach.

Determining Factors:*

1. Displacement of uterus.
2. Presence of buttons.
3. Pulsation of middle uterine artery.

* Any two factors are considered sufficient evidence.

Stage III Pregnancy

Females in this stage vary from 5 1/2 months pregnant to term. Cervix at or near pelvic brim. Developing calf has achieved sufficient size to be reached. Palpation of the calf becomes progressively easier as Stage III advances.

Determining Factors:

1. Displacement of uterus.
2. Palpation of large fetus.
3. Presence of buttons.

UNIT 5.6: Care during Gestation

Unit Objectives

By the end of this unit, participants will be able to:

1. Care the animals during the pregnancy.

5.6.1 Care during Gestation

Adequate health care and nutrition can ensure rapid growth of female calf as well as attaining puberty at an early age. Timely insemination of such animals can help them to calve at 2 to 2 ½ years of age. As foetus develops rapidly during last 3 months of pregnancy, adequate care needs to be taken during this time. The good care and management practices given to pregnant animal will give good calf and also high milk yield during the successive lactation.

- Pregnant animals should be provided with extra ration to meet the requirement of fast growing foetus as well as store energy for future lactation.
- Provide extra concentrate mix of 1.25 to 1.75 kgs should be provided for pregnant animal as pregnancy allowance. Feed good quality of leguminous fodder.
- Feed one kg extra concentrate during last 8 weeks of gestation.
- Feed laxative about 3 - 5 days before and after calving (Wheat bran 3 kgs + 0.5 gs of Groundnut cake + 100 gms of mineral mixture of salt).
- Do not allow pregnant animal lose or gain weight to become too lean or too fat.
- Pregnant animals need suitable ration to reduce the possibility of diseases like milk fever and ketosis at the time of calving and also to ensure adequate milk production.

Daily Feed Requirement of a Pregnant Animal

- Green fodder 15-20 Kg
 - Oil cake 1 Kg
 - Dry fodder 4-5 Kg
 - Mineral Mixure 50gm
 - Compound cattle feed 3 Kg
 - Salt 30 gm
- Provide clean drinking water and protection from thermal stress. Water should be provided round the clock to pregnant animals with a minimum of 75-80 litres of fresh and clean drinking water daily.

- Do not allow them to mix with other animals that have aborted or that are suffering from or carriers of diseases like brucellosis. A heifer after 6-7 months of gestation should be tied with milking animals; and its body, back and udder should be massaged.
- Allow moderate exercise, which helps in calving normally. Do not tire them by making long distances especially on uneven surfaces.
- Avoid slippery conditions, which causes the animal to fall receiving fractures, dislocation etc.
- A lactating animal should be dried within a period of 15 days after the 7th month of gestation.
- If accurate breeding records are available, calculate the expected date of calving. Separate it one or 2 weeks before and shifted to individual parturition pens.
- Calving pens are thoroughly cleaned and fresh bedding may be provided.

Parturition

- One month prior to predicted calving, cows are checked a minimum of 3 times / day
- Cows are monitored for any physical changes leading to parturition
- Bedding materials like paddy straw should be spread on the ground for the animal.
- Pregnant animals should have enough space for standing and sitting comfortably .
- The Cow Check Folder accompanies staff on checks so that any changes in the cows can be notated and so that staff can check off each eartag number as it is observed.
- When a calf is born, the staff member/s present make sure it is breathing freely, stands and nurses and is healthy.
- After a calf is born, it is ear tagged as soon as possible.

Normal Stages of Calving

- Calving is the act of giving birth to calf of a Stages of Calving Duration in Hrs Symptoms First 2 - 6
Preparing the birth canal in positioning of calf for proper delivery
- Swelling of reproductive region
- Plumping of teats
- Restlessness
- Isolation from other cows
- Protrusion of water sac

Stages of Calving	Duration in Hrs	Symptoms
First	2 - 6	Preparing the birth canal in positioning of calf for proper delivery Swelling of reproductive region Plumping of teats Restlessness Isolation from other cows Protrusion of water sac
Second	1 – 2 (If this stage lasts more than 2 hrs, then it is due to abnormal presentation of calf in the birth canal.)	Physical delivery of cow through the birth canal Animal should be placed in individual, clean, dry and well bedded pens Frequent Abdominal contractions Thick mucus discharge from vulva Occasional kicking at abdomen with hind legs. Cow lies down and gets up frequently. Slight increase in pulse and respiration rate.
Third	1 - 8 (If this stage lasts more than 8 hrs, then it is called retained placenta)	Detachment of placenta from uterine connections

Table 6.6.1 Stages of calving

Normally, the cow calve on their own and occasionally they need assistance. If you try and intervene too early or too late, then you run into risk of

1. Damaging the birth canal
2. Contamination of the uterus
3. Injury to Calf

Presentation of Calf

Normal Presentation	Abnormal Presentation
Fore-limbs extended and calf head lies between the knees, straight body and hind limbs.	Any deviation from the normal presentation of calf if occurs, help of expert veterinarian should be taken (Distokia) Causes of Distokia <ul style="list-style-type: none"> - Calf is too large or misformed - Cow is too small, pelvic abnormalities or had previous history of distokia - Malpositioned calf - Head bent back - One or two legs flexed at body or mid joint - Transverse presentation - Twins

Table 5.6.2 Presentation of calf

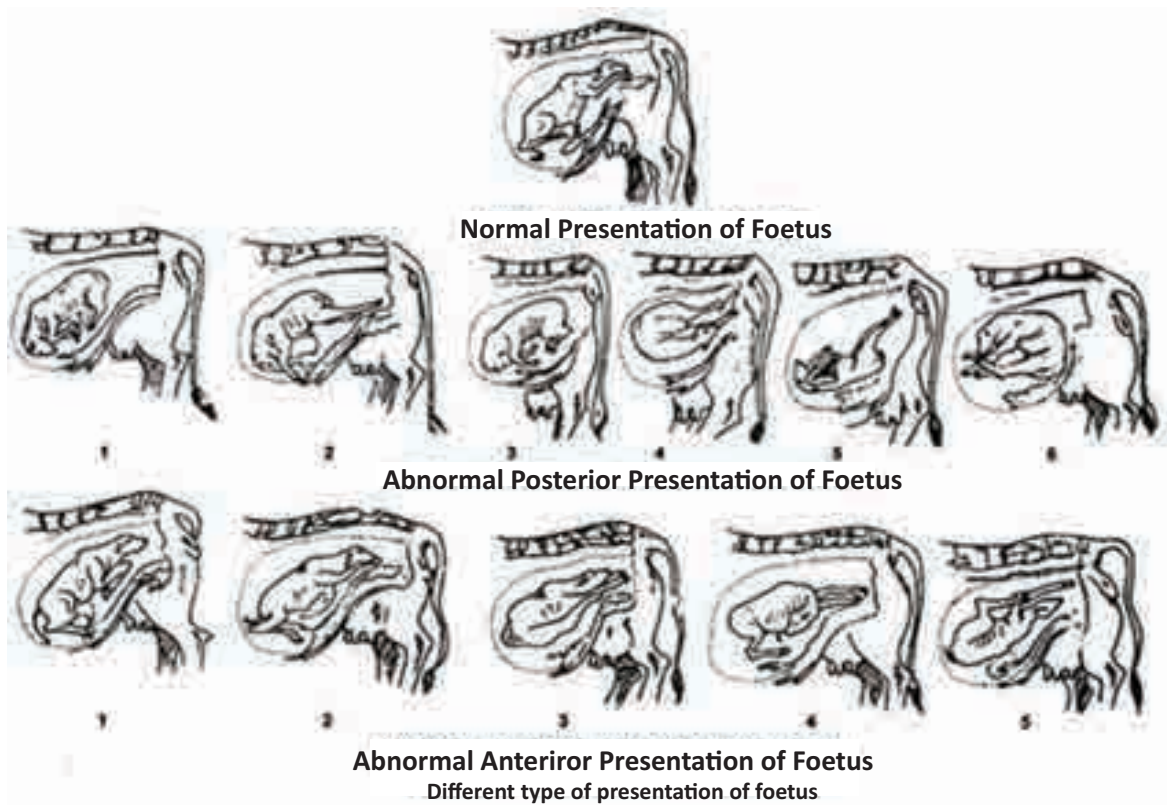


Fig 5.6.1 Abnormal posterior of foetus

- After parturition external genitalia, flank should be cleaned and protect the animal from chill and give warm water.
- Take care of the animal before calving from milk fever. Give calcium supplement.
- Some times the udder will be swollen just before calving. Remove the milk partially.
- Take care, of the animal, if at all any abortion.
- Provide always free access to drinking water.

Retained Placenta

(a) Causes of Retention of Placenta:

- Old age of cow.
- Low condition of health.
- Brucellosis.
- Other bacterial infection.
- Lack of tonicity of muscles of uterus.

(b) Signs of Retention of Placenta:

A portion of placenta may be seen hanging from vagina. If this portion of placenta contained weak blood solution and not forthcoming, then it is called retention of placenta.

(c) Results of Retained Placenta:

Retention of placenta longer than 24 hours signifies the following results:

- (i) Inflammation of uterus.
- (ii) Putrefaction within the uterus.
- (iii) Production of toxic substances.
- (iv) Loss of appetite,
- (v) Fever.
- (vi) Other evidences of severe trouble.

(d) Treatment:

- Symptoms of delivery may be observed i.e. swelling of external genitalia, swelling of udder, usually majority of animals will deliver without any help.
- If there is any difficulty, provide veterinary help.

UNIT 5.7: Calf Care

Unit Objectives

By the end of this unit, participants will be able to:

1. Undertake care and maintenance required for the calf.
2. Handle the calf.
3. Arrange the necessary facilities.

5.7.1 Handling of Calf

Calves are the future dairy herd. Replace 20-30% cows in the herd regularly with freshly calved heifer-cows to maintain production efficiency. Calves raised in one's own farm are highly reliable. Calf sale forms a major component of income in the dairy business.

Raising calves is the most difficult operation in a dairy farm which requires a great deal of management skill. Care of calf starts in the womb of the cow where it is a foetus. During dry stage the cow often neglected and fed with inferior quality fodder results in poor growth of calf

Calving Observation & Response

- Stay a good distance away so that the cow feels comfortable to lay down and get up in order to expel the calf.
- Notify the Livestock Technician (if on duty) of an impending birth.
- If, after the water breaks, the cow continues to struggle in labor for an hour, humane intervention most likely should occur.
- As the calf emerges, observe the orientation of the calf (front feet and nose first).
- Notify the veterinarian or Livestock Technician or Farm Manager as soon as possible, if dystocia is suspected.
- The cow should be moved into the separate Barn so that she can be helped.
- Do not put the cow in the cattle squeeze chute to pull a calf.
- Follow the directions of the Livestock Technician, Farm Manager or Livestock Veterinarian on how to proceed with the dystocia.

Care of Calf at Birth

Calving Pen

- It is a individual loose box or stall used for calving, which should be 3 m x 4 m size (12 m²) and well ventilated. Sufficient lighting is essential.
- It provided better protection to the cow and calf and avoid disturbances from other cows.
- Special attention can be provided for which attendant quarters may be nearer to calving pen.
- Attendant quarters may be established nearer to calving pen to monitor calving process during night time.
- The calving pen following items should be made available in all time.

- Antiseptic solution like tincture Iodine or Povidone iodine, thread, scissors, lubricants like liquid paraffin, vegetable oils, obstertical equipment like hook, snare, calf puller, wire saw; emergency drugs like local anesthetics, antibiotics, analgesic, calciumboroglugonate, other items like emergency light, towel, soap, buckets, aprons etc.
- In villages or farmers those who are maintaining only one or two animals must tie the animal in advanced stage of pregnancy separately under visibility.
- It must be protected from predators. The floor should be dry and clean and having clean grass cover is essential.
- The cow should not be tethered too close, it must be tied with sufficient rope so that animal can move freely and care the new born easily during night time when calving is unnoticed.
- If any abortion, calves should be examined thoroughly to ascertain the possible cause for abortion (age of the foetus, condition, necrotic foci if any etc).
- In such case the calving pen should be thoroughly sterilized with 4 per cent caustic soda.

Management Immediately After Calving

- Udder and hind quarter should be washed with lukewarm water containing an antiseptic solution and dried with clean cloth.
- Cows may be milked to relieve the pressure from the udder.
- If day old weaning is not practiced the calf can be allowed to remain with the mother in the calving pen for 7 to 10 days.
- Otherwise the calves can be removed immediately to calf pen.
- The maternal instinct is more, cow's eyes can be blindfolded before the calf is removed.
- The placenta should be expelled within 12 hours after parturition, if not it should be removed manually. (Refer Retained Placenta)



Fig 5.7.1 New born calf

- Normally cow will lick and dry the calf immediately after parturition which may stimulate circulation and respiration.
- If the cow fails to do, it can be stimulated to lick by sprinkling handful of bran or salt over the body of the calf.
- Sometime primiparous cows may be nervous and inexperienced or cow may exhaust after a prolonged labour.
- Under such circumstances the mucus (phlegm) from the nostrils of the newborn calf should be wiped and cleaned with a dry towel.
- The calf should be massaged vigorously for some times with a handful of straw rolled into a ball.
- Some times respiratory passage may be block with mucus and interfere with calf's respiration.
- Under such condition the calf should be lifted by holding the hock in such a way that the head is down, so that the phlegm may flow off.
- Care should be taken while lifting the calf, it may slip off. A hand full of straw can be used to have a grip while lifting.
- The calf can also made to sneeze by tickling a twig of hay or grass inside the nostrils.
- If the above methods are failing, little time is left to lose. The attending person should apply his mouth to the nostrils of the animal and suck out the mucus.
- After that he should blow in his expired air through the calf's nostrils closing its mouth.
- Carbon dioxide in the expired air which has been blown-in the lungs of the calf will act as respiratory stimulant to initiate respiration.
- This should be followed with intermittent pressing and releasing of pressure on the chest wall of the calf to give artificial respiration.
- *Attending naval:* naval or umbilical chord should be ligatured with a sterile thread one inch from the body (under field condition the thread can be soaked with tincture iodine) severed 1 to 2 cm distal to the ligature and tincture iodine or povidone iodine should be painted liberally.
- This is very important because infection can gain easily through naval and cause serious illness like naval ill, naval abscess and joint ill.
- A single oral dose of 10 g piperazineadepate is recommended for the calves.

Colostrum Feeding

- Colostrum is the first milk secreted after parturition.
- It contains large amount of gama globulins which are nothing but anti-bodies produced by the cow against antigens encounter during her life including those against may disease producing organisms.
- Absorption of these antibodies provide the calf with an umbrella of passive immunity.
- Newborn calf should void meconium in 4 to 6 hours of first colostrum feeding and first faeces is tarry in colour and consistency.

Lactation

- Cow/Calf pairs are checked 3 times per day until told otherwise.
- Cows should be observed for good body condition.
- Cows should be observed for good udder condition.
- Calves should be observed for good body condition, alertness and activity level.
- Calves should be observed nursing, grazing, eating hay and drinking water.
- If problems associated with lactation are observed or suspected, the affected animal/s should be brought into the separate unit and penned for observation .
- Veterinarian or Livestock Technician or Farm Manager should be notified of any Lactating issues.

Weaning

- Making the calf independent of its mother or separating the calf from its mother is known as weaning.
- Under early weaning system, the cow is not allowed to suckle its calf. Instead, the cow is completely milked out and required quantity of whole milk or skim milk are fed to the calf.
- During weaning, cows are checked a minimum of 3 times per day.
- Animals are observed for good health and well being.
- Animals are counted daily to ensure none have gone through fences or left the property.
- Once weaning is completed, cows are checked 2 times per day until the Livestock Technician determines it is no longer necessary.

Disadvantages

- Weaning is a problematic in Bos indicus and buffaloes due to strong maternal instinct.
- 0 day weaning can cause reduced milk yield in such animals, and also cause early drying and temperamental problems.

Milk Feeding

- In day old weaning method, following points should be adhered strictly.
- Each calf should be treated individually, it should be weighed weekly and feed according to the body weight and growth response.
- Group feeding should be avoided to minimize over feeding or under feeding.
- Calves should be fed twice or more times in a day. One time feeding may cause indigestion and diarrhea results in dehydration.
- Milk container, milk pails/buckets and other appliances should be kept clean and hygienic.
- Milk should be boiled and cooled to body temperature (39°C) before feeding.
- Milk allowance should be correct to the body weight of the calf and over feeding should be avoided in the first month of age.
- If the calves not consume milk, the next allowance should be withheld and it can be drenched with 30-50 ml of castor oil.

- Milk feeding should be 3 or 4 times in a day during the first week and can be reduced to 2 times in a day up to 90 days of age.
- Milk allowance should be correct to the body weight of the calf and over feeding should be avoided in the first month of age.
- If the calves not consume milk, the next allowance should be withheld and it can be drenched with 30-50 ml of castor oil.
- If the milk or milk replacer contains large amount of foam, it should be removed by drawing a paddle on the surface or by filtering through a clean cloth.
- Foam causes the calves to take in entrapped air which may lead to bloating.
- Clean drinking water should be made available all times and the pen floor should be sloped adequately and the pen should kept dry always.
- Calves should be dewormed in the first week itself for ascariasis.
- Antibiotics and feed additives should be mixed in the milk or concentrate to improve the growth rate.

Pail Feeding

- Weaned calves should be trained to drink milk from pails so that feeding management is easier.
- Generally crossbred calves learn quickly to drink milk from pail or nipple. But it is little difficult to train buffalo calves.
- Buffalo calves are lazy and slow in learning to drink milk or milk replacer from the pail or bucket.
- The scheduled quantity of boiled and cooled milk poured in the milk pail and should be moved to the calf.
- Care should be taken to avoid frightening.
- The calves should not be forced to drink milk by immersing the head in to the bail.
- Frightened calves may refuse to come close to the pail.
- The attendant should first dip his two fingers (index and middle fingers) in to the milk after cleaning and kept close to the mouth of calf.
- After testing the milk calf will start suckle the fingers.
- Gradually the fingers should be lower to the bail and should be dipped in to the milk.
- When the calf takes one or two mouthfuls of milk remove the fingers.
- This process may be repeated whenever the calf stops drinking and lifts its head.

Feeding Management of Calves

- Reticulo-rumen is non functional in calves and hence feeding of calves should be treated as non-ruminant and they are not equipped to utilize roughages
- To encourage the early development of rumen and reticulum the calves should be fed with good quality leguminous hay and other roughages.
- Because of non availability of good quality protein due to lack of ruminal microbial digestion.
- The calves have little capacity to utilize non-protein nitrogenous compounds and therefore substance like urea should not be included in their ration.

- Due to the same reason, B-complex vitamins also are dietary essential for calves in addition to vitamin A and D.
- For digestion of milk and enzymatic digestion in the abomasums and small intestine is more important for calves. To avoid this oesophageal groove exist in the reticulum connecting the oesophagus with the omasum. During nursing and milk feeding, the sides of the groove are raised by reflex action to form a tunnel through which milk passes from oesophagus to omasum by-passing the rumen and reticulum. This continues to function even after considerable development of the rumen if milk feeding is continued.

Other Management Practices

- Identify the calf by tattooing in the ear at birth, and branding after one year.
- Dehorn the calf within 7-10 days after birth with red hot Iron or caustic potash stick or electrical method.
- Deworm the calf regularly to remove worms using deworming drugs. Deworm at 30 days interval.
- Fresh water should be given from second week onwards.
- House the calves in individual calf pens for 3 months afterwards in groups.
- After six months males and females calves should be housed separately.
- Weigh the calves at weekly interval up to 6 months and at monthly interval afterward know the growth rate.
- Mortality in calves is more in first month due to pneumonia, diarrhoea and worms.
- Extra teats beyond 4 should be removed at 1-2 months of age.
- 8-9 weeks of age, males should be castrated.
- Keep the body clean and dry to avoid fungal infection.
- Mineral-blocks should be provided, so that the calves lick and no changes for mineral deficiency.

Exercise

1. What are the things to be kept in mind while taking care of a cow calf?

UNIT 5.8: Recording Animal Health Check up and Treatment

Unit Objectives

By the end of this unit, participants will be able to:

1. Arrange the regular health check-up of the animals.
2. Record the details.

3.8.1 Record the Health Check up of the Animal and Treatment

Importance of Recording

- The performance of the farming enterprise can be seen through the records.
- The value of the farm enterprise will be available only from the records.
- From the health register, it is possible to collect the details of incidence of diseases in the past and the precautions to be taken in the future.

Recording of Information

- The recording must be simple and involve little paper work for farmers.
- The recording must be carried out in an appropriate time
- The frequency of recording should be as low as possible. At the same time information should not be missed
- The recording must be appealing to the average farmer; they should feel that it benefits them in managing the animals better.
- The direct cost to the farmer should be small.
- The records kept should enable the farmers to identify the best and the poorest producer and should make it possible for progeny testing of bulls.
- The information from the records should be made available to the farmer quickly and in simple form and should be utilized for extension and research purpose.
- The records containing expenditure and income details should be checked daily.

Prevent Residues:

Simple management practises will prevent contamination of milk. To prevent residues:

- Record all treatments given;
- Visibly mark all treated cows;
- Inform all people involved in milking of treated cows;
- Milk treated cows last or use separate "bypass" equipment to insure that no contaminated milk enters the milk supply;
- Discard milk from all quarters of treated cows;
- Discard milk from all cows calving within 30 or 42 days of dry treatment according to label directions;

- Discard milk from fresh cows for the required period if dry treatment was used;
- Use antibiotic test kits as needed; and follow label directions for all medications used. These include feed additives, medicated feeds such as calf starter, topical preparations, as well as injectable and infusion products.

Drug Inventory

The drug inventory on the farm can be managed using the following procedures:

- Purchase drugs in quantities which will be used in a reasonable amount of time;
- Check product expiry dates before purchase;
- Clean and reorganize the drug cabinet regularly;
- Use products with older dates first; and
- Discard all expired products.

Preventive Health Management Practises

- Enrolled in a veterinarian supervised health management program
- Environmental management includes provision of:
 - Adequate space per animal
 - Clean, dry bedding
 - Good ventilation
 - Clean, readily available water
- A ration formulated to meet animal requirements
- Proper milking practices are used to prevent mastitis:
 - Post-milking teat dipping
 - Treatment of all cows at the time of dry-off
 - Treatment of lactating cows as recommended by a veterinarian.

Treatment Records

Many antibiotic residue violations result from failure to: identify treated cows, maintain treatment records, and use proper milk withholding times. The record system must make all staff involved in milking aware of treated cows and the period for withholding milk from sale. Identify treated cows in a manner clearly visible to the person milking. Some methods used are:

- Leg bands,
- Coloured tape or fluorescent hockey tape around the legs or tail, or
- Paint markings on the cow's flank, rump or legs.

In larger herds identification may be colour coded to show the last day to withhold milk. In tie-stall barns where cows always occupy the same stall, coloured tape or tags attached to the milk inlet of the pipeline can identify a treated animal (Figure 2).

Re-enforce cow identification systems with a prominent chalk board or bulletin board in the milking parlour or barn entrance.

The identity of all treated cows and the date and time of the last milking withheld should be clearly visible (Figure 3). Train all staff involved in milking to refer to this board immediately before each milking.

Keep a permanent, detailed treatment record for reference and management purposes. Write this in the herd health book or in the individual cow record files. This record should identify the animal, the product and dosage administered, the date of treatment and the milk withholding period (Table 1). Before shipping any animal for slaughter, check this record to insure pre-slaughter treatment withholding requirements are met.



Fig 5.8.1 Clearly visible identification of treated animals such as leg bands (left) or tags on the pipeline (right).



Fig 5.8.2 Example of box top file

Cow Identity							
Date	Diagnosis	Treatment	Dosage	Duration of Treatment	Label Withdrawal (No. of milkings)	Date Tested	Milking Returned to Tank

Table 5.8.1 Treatment record example

In addition, store product inserts and packaging from all livestock medicines in a file folder. This "box top file" (Figure 4) will provide additional information if questions about previous treatments arise.

On Farm Antibiotic Testing

The persistence of antibiotic residue in milk of treated cows may vary in amount and duration of time present. This may depend on the cow, her metabolism, the medicine type, the use of a combination of medications, the dosage of medication and the method of administration. Test milk suspected of contamination using antibiotic test kits. Examples of these situations where milk contamination may occur include:

- The addition of purchased milking cows to the herd for which the treatment history is unknown,
- Fresh cows purchased during their dry period who have unknown dry off dates or dry treatment histories, cows treated in an extra-label manner, cows treated with more than one product, cows which are severely ill at the time of treatment.

- Cows which calve before the end of the milk withholding time following dry treatment,
- Establishing the identity of a treated cow when an error in identification may have occurred, and
- The testing of milk in the bulk tank when contamination with milk containing medication may have occurred.

A variety of kits are commercially available. When selecting a test kit the user should recognize that kits vary in the type of antibiotics and amount of antibiotic they detect. No single kit can detect all commonly used antibiotics. Confirm that the kit you use "matches" the antibiotic you need to detect. Antibiotic testing services may also be available from veterinarians, milk processing plants, and others.

Disposing of Milk From Treated Cows

All unmarketable milk must be disposed of in a manner which protects the environment and keeps drug residues out of all food products. Do not feed milk from treated cows to calves. Milk from treated cows cannot be used in a sour colostrum program since antibiotics prevent normal fermentation. Do not feed milk from treated cows to calves or other livestock which may be sold or slaughtered before they are residue free.

Milk from treated cows can be added to a liquid manure storage, or along with straw to absorb it, to a solid manure storage. Do not add milk containing antibiotic to milk house wash water entering a septic tank or treatment trench system. Milk solids will plug the trench tile.

Exercise

1. Write a note on livestock and health maintenance.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

6. Hand and Machine Milking



- Unit 6.1 - Pre and Post Milking Activities
- Unit 6.2 - Mastitis and its Precautions
- Unit 6.3 - Use and Identification of Milking Machinery and Equipment
- Unit 6.4 - Adjustment of Milking Machinery and Equipment
- Unit 6.5 - Correct Milking Techniques
- Unit 6.6 - Process of Clean Milk Production



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the hygiene and proper environment requirements for stress-free milking.
2. Explain the factors which increases livestock stress and measures to be taken to minimize stress.
3. Describe how to identify mastitis and measures to be taken thereafter.
4. Discuss the methodology of operating milking machine and its maintenance.
5. Brief the relevant codes of practice with regard to milking operation.
6. List the causes of poor milk quality.
7. Describe the hygiene requirements of milker, premises, animal and utensils.
8. Describe the proper milk storage techniques to avoid milk spoilage.
9. Explain the basic types & control of udder health problems of dairy cattle.

UNIT 6.1: Pre and Post Milking Activities

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the pre milking and activities, its importance.
2. Explain about organization of community meetings and record keeping .

6.1.1 Pre Milking and Post Milking Activities

Preparing Conducive Milking Environment

- Milking is an art requiring experience and skill. Milking should be done gently, quietly, quickly, cleanly and completely.
- Comfortable cows yield more milk than a roughly handled and excited cow.
- The milking process should be completed within 5 to 7 minutes.
- Complete milking has to be done. If any residual milk is left it may act as nidus for mastitis causing organism and the overall yield also getting affected.
- Provide cows a clean and stress free environment for milking
- Provide cows a calm place for milking. Cows should be away from loud noise and other frightening causes
- Provide cows a well lit area for milking. Dark and narrow spaces should be avoided for milking.
- Provide cows a warm and cool place. And avoid contact of extreme hot and cold air or surroundings to the cows during milking.
- A milking environment that chronically stresses cows may predispose cows to a greater rate of mastitis. Proper udder stimulation enhances oxytocin release and milk letdown
- f a number of cows are refusing to enter the parlor or are defecating frequently in the milking parlor, operator and parlor performance should be examined.

Restrain the Cow for Milking

- Apply the figure “8” just above the hock to prevent kicking while milking.
- Hock twitch is the milkers delight. It prevents a cow from raising the rear legs and thus prevents kicking. It is simple and effective.
- Get a rope made of heavy cotton between 18-22 inches around the hind legs just above the hock joint in figure of “8” pattern crossing between the two legs.
- A strong stick or piece about a foot long is put through the eye by turning the stick, the rope is twisted until it binds the legs tightly and presses the tendon down. Thus it prevents the animal raising its legs and make milking possible.

Milking Hobbles Technique



Metal hobble

The animal are tied using a rope or metal hobbles so that animal didn't kick



Rope Hobble

This is done in female animal when milking or when going to give birth

Fig 6.1.1 Milking hobbles technique

12 Golden Rules For Conventional Milking

Before Milking

1. Monitor udder health regularly



2. Follow the right milking order



3. Always foremilk



During Milking**5. Check milking vacuum****6. Attach milking cluster in time****7. Avoid overmilking****After milking****8. Disinfect teats immediately****9. Clean/disinfect milking equipment****10. Ensure proper milk cooling**

Fig 6.1.2 Golden rules for conventional milking

Before Milking

1. Monitor Udder Health Regularly

- Examine the udder for swelling, heat, or pain, and, using a strip cup or plate, examine the foremilk from each quarter prior to every milking.
- Removing hair from udders reduces the amount of dirt and manure that may adhere to the udder and contaminate milk. Udders with long hair are difficult to clean and dry.
- Clean the teats with soapy water or iodine. (Warm water may help coax or "bring down" the milk.) Dry the teats, but don't rub or irritate them.
- Always use disposable gloves and always ensure they are clean
- Check udder health regularly; first check fresh first-calf heifers and cows 1–2 weeks after calving (use California Mastitis Test CMT, Cell Counter DCC, Herd Navigator HN, etc)
- Regularly review the dairy processor info on milk quality
- Keep record of udder health results for each cow
- Always keep milk of identified sick cows separate

2. Follow the Right Milking Order

- First start with milking healthy cows and healthy first calvers
- Follow by fresh milking cows and first calvers—until they are checked for udder health status
- Always milk older and sick cows last or milk in a separate group
- Always follow a standardized milking routine. Any variable milking routine will cause drop in milk production.
- Sit or squat in a position that will allow you to move away quickly if the cow becomes uncooperative. Sitting cross-legged on the ground, for example, is not safe. (See Warnings below.) An ordinary milk stool can be fabricated with two 2x4's cut and nailed to form a "T" - cut to fit your behind and make sure it is low enough to afford comfortable access to the cow's teats.

3. Always Foremilk

- Always use disposable gloves and always ensure they are clean.
- Never strip milk onto the floor or in the hand of the milkman.
- Strip 2–3 milk jets from each teat into a foremilk or strip cup. After each milking strip cups should be cleaned and sanitized.
- Examine the milk for flocculation, colour changes or other inconsistencies.
- Always keep abnormal milk separate.
- Foremilking also stimulates the milk letdown.

4. Clean and/or Disinfect Teats Before Milking

- Use your hands to remove debris from teats. Only the teats should be cleaned, as washing and wetting the whole udder makes it difficult to adequately dry the udder before milking machines are attached.
- Always use disposable gloves and always ensure they are clean.

- When pre-milking teat disinfection is allowed: use approved pre-milking teat disinfectant and wait 30 sec before removing.
- In all case use disposable paper or udder towels to clean off and carefully dry each teat properly
- Never use paper or towels for more than one cow.
- Milking wet udders and teats may lead to increased mastitis and bacteria counts in bulk milk.

During Milking

5. Check Milking Vacuum

- Always check the milking vacuum at the start of each milking.
- Vacuum level, pulsation rate and pulsator ratio should be in accordance with Equipment supplier recommendations.

6. Attach Milking Cluster in Time

- Always use disposable gloves and always ensure they are clean.
- Always make sure to clean or, when necessary, disinfect clusters in between cows.
- Attach milking cluster within 60 sec after teat preparation.
- Avoid air entry during cluster attachment.
- Check cluster positioning.
- Make sure that long milk tubes are aligned with pulse tube, avoiding twisting of tubes.
- Adjust units for proper alignment.
- If teat cups are seated excessively high on teats, irritation to the lining of the teat may result.
- Improperly aligned units may block milk flow and increase the amount of milk remaining in the udder at the end of milking. Of greatest concern is slipping or squawking teat cups. Only about one-third of slips produce audible squawks. Such occurrences can result in an increase in infected quarters.

7. Avoid Over-Milking

- Watch the milking process during milking; don't do anything else
- Over milking could damage teat ends.
- Identify the end of milking; by direct observation of milk flow; or via flow sensors in case of automatic cluster removal.

8. Remove Clusters Correctly

- Always use disposable gloves and always ensure they are clean.
- Shut off vacuum to the cluster when milking completed (manually or automatically).
- Allow claw vacuum to decline fully before removing cluster.
- Do not squeeze the udder. Do not do machine stripping.
- Take off cluster after vacuum shut-off. Avoid pulling off the cluster as it will result in liner slips.
- Avoid liner slips during the end of milking to prevent future infections.

After Milking

9. Disinfect Teats Immediately

- Always use disposable gloves and always ensure they are clean.
- Dip or spray teats as soon as the milking cluster has been removed.
- Use an approved post milking teat disinfectant as this is the most effective way to prevent the spread of mastitis.
- Keep the cows standing up for 30 minutes after milking.
- Care should be taken to ensure that all four teats are covered.

10. Clean/Disinfect Milking Equipment

- Clean outside milking units and all surfaces in the parlour.
- After each milking rinse and clean internal milking system, either manually or automatically.
- Use approved detergents, following dosing, routine and temperature instructions on the label.
- When required disinfect the milking system using approved sanitizers, following label instructions.
- Remove clusters from cluster cleaners and allow milking system and milking units to dry.

11. Ensure Proper Milk Cooling

- Always check temperatures to ensure correct cooling is reached during and after milking.
- Make sure always to follow dairy specific recommendations for cooling temperatures.
- Milk cooling and milk storage tanks need to be cleaned immediately after emptying, using approved detergents.

12. Regularly Monitor Milking Results

- Review dairy processor info on milk quality and milk composition regularly.
- If available, cross check with data from CMT, DCC, HN, etc on a regular basis.
- Regular preventative maintenance including replacement of liners, tubes and other parts, according to recommendations, is the best way to ensure a well functioning milking system.



Fig 6.1.3 Disinfecting teats

UNIT 6.2: Mastitis and its Precautions

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the udder diseases occur in dairy animals.
2. Take precautions for mastitis disease.

6.2.1 Mastitis and Precautions to be Taken

Mastitis

- Inflammation of mammary gland is Mastitis. It is caused by physical, chemical and biological agents such as bacteria, fungi, virus, yeast etc.
- Mastitis is characterized by physical and chemical change in milk, and pathological changes in glandular tissues.

Changes in Udder Include

- Hardness
 - Reddening
 - Swelling
 - Hot to touch
 - Pain to the animal on touching/palpation
 - Changes in milk include
 - Presence of flakes, clots or serous milk
 - Coloration – Yellow or Pink or red or watery
 - Increased electrical conductivity
 - Observation of first stream of milk (foremilk) permits the detection of abnormal milk that should be withheld and discarded promptly.
 - The most important bacterias responsible are *Streptococcus agalactiae*, *Staphylococcus aureus*, *Corynebacterium pyogenes*, *Corynebacterium bovis*, *Mycobacterium species* and *E.coli*.
- Classification of mastitis

	Acute Mastitis	Chronic Mastitis
Onset of symptoms	Quick	Recurrent
Severity	Reddening, swelling, high temperature, painful to touch, discoloured secretion	Little change in milk. Slow in onset of symptoms
Classification	Fever and loss of appetite in per acute cases	Clinical symptoms not visible. Diagnosed by lab tests.

Table 6.2.1 Classification of mastitis

Detection of Mastitis in Herd

- It is difficult to detect mastitis in a herd because few animals have the disease with or without clinical symptoms (subclinical form).
- Routine Milk sample for lab tests will reveal presence of mastitis in the herd. It is tool to monitor mastitis prevalence in the herd over time.
- Subclinical Mastitis does not show visible changes. It is difficult to diagnose subclinical mastitis and hence it is more problematic.
- Often there is a decrease in milk production in a herd with mastitis.

Somatic Cell Count	Sub Clinical Mastitis
< 1 lakh	Absence
< 2 lakhs	Presence
> 5 lakhs	Presence (1/3 of mammary gland affected)

Table 6.2.2 Detection of mastitis

Disadvantage:

The somatic cell count of a composite sample does not reveal the type of infection nor identify the infected cows.

Best Milking Practices Checklist:

This checklist will help you to pinpoint areas in your milking routine that need improvement. Producing quality milk to help to increase your farms income.

1. Observation of Cow Cleanliness. Is there manure on the udder and teats?
2. Observation of milking Parlor and Equipment Cleanliness.
3. Are milking person/employees using gloves?
4. Proper use and coverage of Pre-dip. Test proper coverage with "Paper Towel Test"
5. Length of time dip is on teat before drying. (Follow Label most 15-30 seconds)
6. Is the employee stripping each teat vigorously and getting good milk flow?
7. Is a strip cup being used? This can help to detect early cases of mastitis and decrease change of pathogen spread.
8. Is CMT test being performed on animals that are suspected to have an infection?
9. Is water being used to clean udder? No Water should be used. Aids in bacteria growth.
10. What is the milking preparation procedure? Dip-Strip-Dry-Apply (Dry must be the last step before application of unit)
11. Are teats being thoroughly dried (including teat ends) before unit attachment? (Clean Dry Towels) Test teat end cleanliness with "Alcohol Swab Test".
12. Are teats farthest away from milking being dried first? (reduce risk of recontamination).

13. What is the time from first contact with the teat until the unit is fully attached? This is referred to as Lag Time. Should be between 60-90 seconds.
14. Are units properly adjusted to squarely hang under the udder?
15. Are employees properly using the automatic take offs? (Should not be switching to manual).
16. What is the length of time from until attachment to unit removal? This is referred to as "Unit On Time." This should be 3.5 to 5 minutes in length with proper milking stimulation.
17. Observe teat ends of damage or tops of teats for purple ring.
18. Are employees getting proper post dip teat coverage? Use the "Paper Towel Test".
19. Are all employees following the same procedure. Consistency is very important.
20. Observe milk filter post milking for dirt or mastitis.

Steps

Steps to Control Mastitis:

1. Identify the Problem Organism

- (a) Culture Bulk Tank
- (b) Two main categories of organism:
 - i) **Contagious Bacteria** – Streptococcus agalactia and Staphylococcus aureus. These types of bacteria infect the udder of the cow and are transmitted from cow to cow usually through milking.
 - ii) **Environmental Bacteria** – Coliforms, Streptococcus (nonagalactia), Staphylococcus (non-aureus). These bacteria come from the cow's environment.

2. Control Contagious Bacteria

(a) Isolate Infected Cows -

It is important to remove them from the milking herd and treat them so that the infection does not spread. They should be milked last or completely separate from the herd, so long as their milk does not enter the bulk tank. Often, newly purchased cows coming into the herd bring mastitis infections with them.

(b) Milk Infected Cows Often -

Bacteria use the milk as a growth medium, so removing their nutrient source often, increases the rate of recovery for a cow being treated for mastitis.

(c) Whole Teat Dipping

- i) Instead of spraying, dip whole teat with a teat cup
- ii) Teat dips should contain an iodine solution.
- iii) Make sure teats are clean

(d) Antibiotic Treatment

- i) After milking, treat each infected quarter.
- ii) A withdraw period occurs after treatment with antibiotics. During this period no milk from the treated cow can be put in the bulk tank.
- iii) Treatments are typically given as intra mammary infusions.

(e) Dry-Cow Therapy

- i) Measures to control and prevent mastitis infections during a cow's non-lactating period.

3. Control Environmental Bacteria

- (a) Clean and dry teats thoroughly before milking. This reduces the likelihood of milk becoming infected during the milking process.
- (b) Pre-dip teats to help sanitize them and prevent spread of infection. Many environmental bacteria may be resistant to several germicides, so it is necessary to make sure other control measures are taken as well.
- (c) Keep milking parlor clean. A clean parlor discourages the growth of bacteria.
- (d) Maintain sanitary housing conditions for cows. Manure on bedding, floors, aisles, etc. can breed bacteria and become caked onto cow udders. Identify potential problem spots such as muddy areas, manure pits, stagnant ponds, and soiled bedding. Take steps to eliminate or reduce their potential to breed pathogens

How to Prevent Mastitis

- Maintain good hygiene during milking.
- Disinfect all teats after every milking.
- Keep equipment clean and functional.
- Carry out annual inspection and servicing of milking equipment.
- Environment should be clean and dry as possible.
- Exchange bedding material every 48 hrs.
- Don't over stock the barn.
- Provide nutritious and healthy diet.
- Treat new and clinical cases of mastitis and record data.
- Choose appropriate cases for treatment.
- Major infections occur during dry period during first 21 days at the end of lactation or around calving.
- Separate healthy cows with infected cows.
- Eventually cull infected cows when you have a replacement.

Handling of Teat Disinfectants

- Store teat disinfectants in cool, dry areas.
- Do not allow disinfectants to freeze!
- Keep containers closed to prevent contamination, and do not use after the expiration date.
- Do not assume that teat disinfectants will kill all pathogens. Some pathogens can survive in disinfectant under some conditions.
- Follow label instructions for use.
- Use teat disinfectants at the recommended concentration.
- Do not dilute unless indicated on the label. o If dilution is necessary, be sure that water quality standards (bacteria, pH, hardness, etc.) are met.
- Use a clean container for diluting, and thoroughly mix the final product.
- Disinfectant cups should be emptied and cleaned as part of the routine wash-up after each milking or if they become contaminated during milking.
- Never pour used disinfectant back into the original container.






Score	Description	Illustration
(Adapted from Mein, et. al., 2001, A Scoring System for Teat-End Conditon) (1)		
1.	No Ring The teat-end is smooth with a small, even orifice. This is a typical status for many teats soon after the start of lactation.	
2.	Smooth or Slightly Rough Ring A raised ring encircles the orifice. The surface of the ring is smooth or it may feel slightly rough but no fronds of old keratin are evident.	
3.	Rough Ring A raised, roughened ring with isolated fronds or mounds of old keratin extending 1 to 3 mm from the orifice.	
4.	Very Rough Ring A raised ring with rough fronds or mounds of old keratin extending 4 mm or more from the orifice. The rim of the ring is rough and cracked, often giving the teat-end a "flowered" appearance.	
5.	Open Lesions or Scabs Teat end is severely damaged and ulcerative with scabs or open lesions.	

Table 6.2.3 Teat end condition scorecard

Hygiene Scoring Card













Score	Legs	Udders	Flank & Upper Log
1			
2			
3			
4			

Fig 6.2.1 Hygiene scoring card

Exercise

1. Describe the disease found in dairy animals and its treatment.

Notes



A large rectangular area enclosed by an orange border, containing numerous horizontal lines for writing notes.

UNIT 6.3: Use and Identification of Milking Machinery and Equipment

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify the convenient milking machine as per the requirement.
2. Use the milking machine properly.

6.3.1 Identify and Use Milking Machine and Equipment

Milking machine

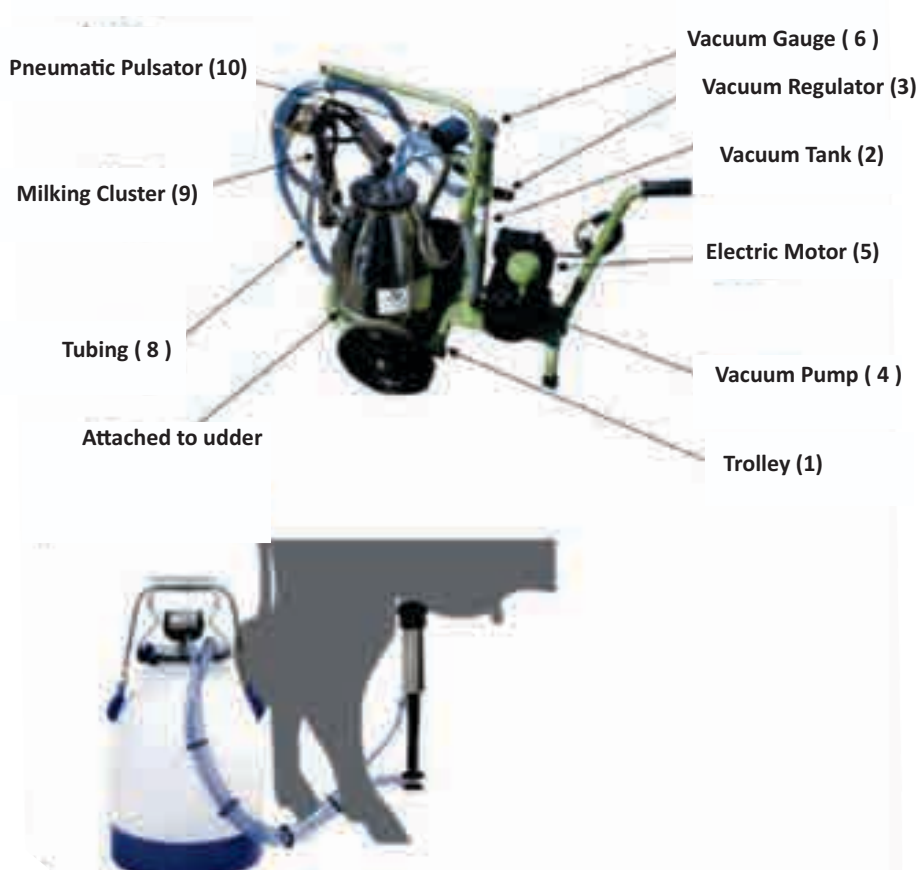


Fig 6.3.1 Milking machine

Milking machine use alternating negative and atmospheric pressure with the help of double chambered teat cup assembly, the continuous partial vacuum inside the inflatable rubber tube that is teat cup liner into which teat is inserted.

- A partial vacuum and normal atmospheric pressure is alternated in the space between rubber liner and metal shelf of the teat cup by means of pulsator.
- When negative pressure is applied between the liner and shelf, milk flows from the teat.

- When atmospheric pressure enters the chamber, the rubber liner inflation collapses with the result the teat is compressed and massaged.
- The continuous vacuum would cause congestion and irritation of teats.

Factors Influencing Efficiency of Milking Machine

Vacuum Level

- The degree of vacuum in a milking system during operation, expressed as inches of mercury/Kilo Pascal (mmHg/kpa) differential measured from atmospheric pressure and indicated by the vacuum gauge.
- Ideal vacuum level – 45 -48 Kpa

Pulsation Rate

- The number of cycles of alternating vacuum and atmospheric air which occur per minute.
- It may vary between 40 to 60 cycles per minute on most machines.

Milking or Pulsation Ratio

- The proportion of time spent under vacuum and atmospheric air and is usually approximately 60:40.

Exercise

1. What are the factors affecting the use of milking machine? Mention them.

Notes



A large rectangular area enclosed by an orange border, containing numerous horizontal lines for writing notes.

UNIT 6.4: Adjustment of Milking Machinery and Equipment

Unit Objectives

By the end of this unit, participants will be able to:

1. Make adjustments of milking machine and equipment.

6.4.1 Adjustments of Milking Machine and Equipment

Liner Replacement



Fig 6.4.1 Liner replacement

Only Teatcup liners have contact with teat and udder from the milking machine.

- Teatcup liners should hold teat firmly and gently and do not cause injury to the teat.
- Due to regular usage, these liners undergo regular wear and tear. Their lifespan depends on the material.
 - o Rubber based liners – 2500 milkings
 - o Silicone based liners – 10000 milkings
- If not properly maintained, teat cup liners undergo excess wear and tear and cause mastitis
- Disinfectants make the inner surface rough, splitting and damage teatcup liners.
- Lifespan of teatcup liner is calculated in number of cows in herd × **number of times milked per day** × **liner life in days**

UNIT 6.5: Correct Milking Techniques

Unit Objectives

By the end of this unit, participants will be able to:

1. Use the proper milking technique.
2. Identify the problems due to improper milking.

6.5.1 Right Milking Technique

Getting Clean Milk while Hand Milking

- The persons milking the cows should be clean, healthy and free of infectious diseases.
- Keep the cows free of dirt. Prevent their hindquarters from becoming matted with manure and mud.
- Groom the cows regularly to remove loose hair and dirt because these can fall into the pail during milking.
- Detect and treat all cows showing signs of udder infection
- Tie the cow's hind legs so that the tail does not swish around.
- Do not use a dirty/ wet cloth to clean the udder and teats because it is unhygienic and can cause problems such as mastitis.
- Wash your hands before milking. Your hands should be moist but not dripping wet.
- Do not dip your hands into the milk because this can spread diseases.
- Pour the milk into a container through a fine metal gauze strainer or muslin. Tie the muslin so that dirt cannot bypass it.
- Keep the milk refrigerated or in a cool place after milking.

Hand Milking Steps

- Milking should be done at regular times, if possible by the same person and at intervals of 12 hours.
- Avoid noise in the dairy because it will have a negative influence on the release of milk.
- Get proper training in the correct procedures and have patience with the cows.
- Milk cows with dry hands and never use milk to lubricate the cow's teats. Use a milking salve if needed.
- Always test the first milk to come out for mastitis (ask your agricultural extension officer how to do this).
- Wash dirty udders and teats by hand under running water. If they are clean, massage the udders for about 1 minute.
- Complete milking in 5 to 7 minutes because the cow will stop giving milk after that.
- After milking, if the cow's calf does not suckle, use a teat dip to prevent mastitis.
- Supervise the milking process and maintain the same routine in every milking. This will get the cows used to the process and will also reduce stress, which will result in a successful dairy operation.

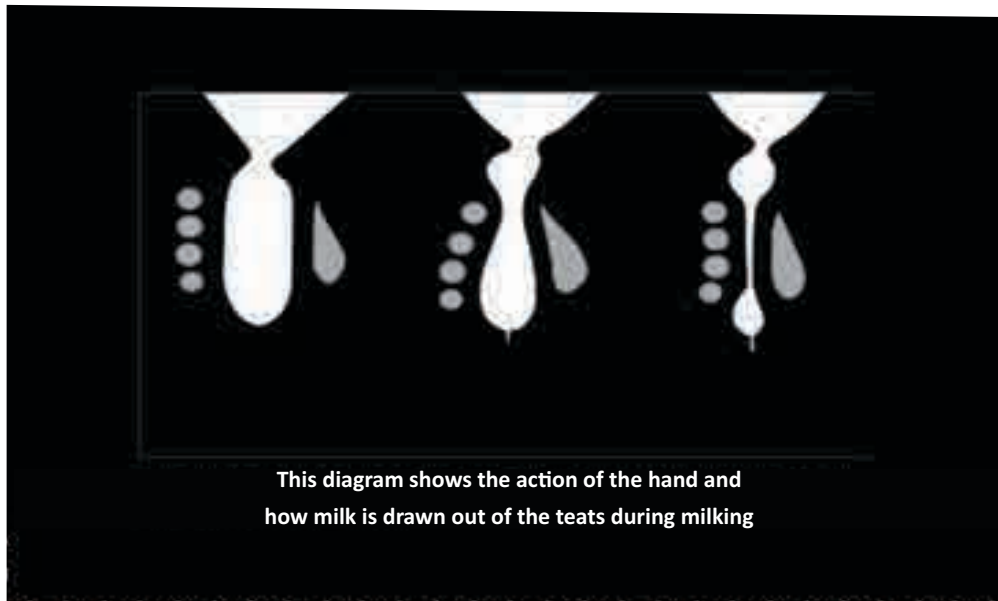


Fig 6.5.1 Hand milking

Hand Milking

Two Methods are followed

- Wet hand milking - Use of oil or water in the hand. This will lead to cracks and sores in teats. Painful to cows.
- Dry hand milking – No lubrication. Best method.

Premilking routines are important. Always use a smooth and comfortable technique for milking.

Make sure the cow has a halter and is tied to a sturdy post or held in a stanchion.



Fig 4.5.2 Halter use to milking cow

Clean each teat and teat end, preferably using an approved pre-milking teat cleaner.



Fig 6.5.3 Teat cleaning with approved cleaner

Place a Bucket Underneath the Udder

Better yet, hold it between your legs. It takes practice, but this can be done easily and comfortably. This position reduces the chance of the cow kicking over the pail of milk.



Fig 6.5.4 Bucket placement

Sit or squat in a position that will allow you to move away quickly if the cow becomes uncooperative.

Sitting cross-legged on the ground, for example, is not safe. (See Warnings below.) An ordinary milk stool can be fabricated with two 2x4's cut and nailed to form a "T" -cut to fit your behind and make sure it is low enough to afford comfortable access to the cow's teats.



Fig 6.5.5 Appropriate sitting posture

Apply a lubricant such as Vaseline to your hands to minimize friction.



Fig 6.5.6 Use of lubricant to minimise friction

Wrap your warm hands around two of the four teats. Choose diagonal teats (front left and rear right, for example). Or, try the front teats first, then the back pair.



Fig 6.5.7 Settling hand position

Squeeze the base of the teat and start teat massaging, after gently clamping each teat between your extended thumb and first finger, so that the teat fills your palm as you squeeze down. The recommended method is "full hand milking followed by stripping".



Fig 6.5.8 Appropriate hand milking action-I

Use Full hand milking action: Squeeze down to push out the milk, maintaining your grip on the base of the teat so that the milk doesn't flow back up into the udder. Do not jerk or yank the teats. This motion is performed by sequentially squeezing your fingers from the middle to the pinky to force the milk out. Be gentle yet firm. Keep your eyes peeled for mastitis (see Tips).



Fig 6.5.9 Appropriate full hand milking action-II

Repeat with your other hand. Most people prefer to alternate (right hand, left hand, right hand, etc.) The downward squeezing motions takes less effort doing it in alternate steps than all at the same time.



Fig 6.5.10 Appropriate hand milking action-III

Continue until the quarter that you're milking looks deflated. Use stripping action in the final stages of milking to let down remaining milk in each quarter. Stripping action is done with fingers only. Experienced farmers can feel the udder to know exactly when all the milk has come down. Often even looking at the quarter just milked can tell you if it's been emptied enough or not.



Fig 6.5.11 Deflated milking

Move on to milk the other two teats: If you use the diagonal method, switching sides is not necessary.

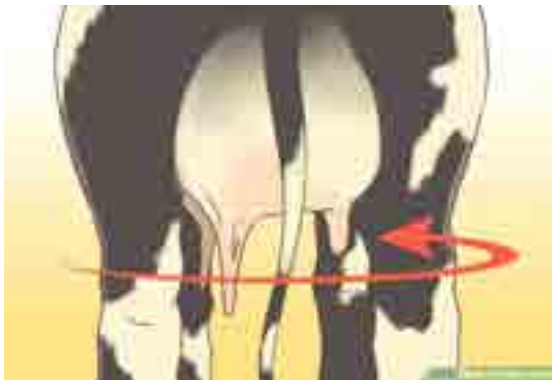


Fig 6.5.12 Switching movement

By Milking Machine

Advantages

- Peak yield is achieved quicker and remains longer than hand milking.
- Total yield is more than hand milking.

Secure the cow in position as outlined above.

Clean the teats as outlined above.

Turn on the milking machine and allow it to build pressure.



Fig 6.5.13 Milking machine

Hand-milk each teat a few times to let down the milk and check for mastitis (See Tips).



Fig 6.5.14 Hand milking before putting suction device

Release the pressure so that suction begins.



Fig 6.5.15 Suction device placement

Place each suction device on each teat: This must be done quickly before the machine loses its pressure.



Fig 6.5.16 Milk collected in milk container

Remove the suction devices from the teats.

Many modern milking machines do not require the milker to manually remove the suction cups. Once one quarter has been milked dry, they automatically fall off, one by one.



Fig 6.5.17 Suction device removal

Empty the milk into a pail or similar container.



Fig 6.5.18 Milk transfer to another container

Clean the machine. This prevents milk that dries from building up in the machine.



Fig 6.5.19 Machine cleaning

Post-milking teat disinfection

Aim is to remove contagious pathogens on the teat surface immediately after milking. It will also protect opened teat canal when the liner and clawpiece is removed. It is important to dip or spray immediately after cluster unit removal, before the teat canal sphincter begins to close and before any bacteria have the opportunity to colonise and multiply.

Dip chemicals also kill bacteria present on any sores on the teats, promoting quicker healing. Chemicals with emollients and humectants are added to prevent irritation and dry-out of teat skin. They also soften and improve teat skin condition after milking.

Post milking teat treatment products are available

- in ready-to-use form or
- may require dilution

Chemicals	Require emollients	Advantage	Disadvantage
Iodophors	Yes	Common, Effective on bacteria	
Chlorhexidine	Yes	Effective on Bacteria	Ineffective against Organic matter
Hypochlorite	Yes	Cheap, effective on Bacteria	Ineffective against Organic matter
Quarternary Ammonium Compounds	Yes	Less irritating	
Dodecyl Benzene Sulphonic Acid	No	Effective on most bacteria and organic matter	Not on spores

Table 6.5.1 Post milking teat treatment products

Barrier dips are also used for post-milking only; they are a gel-like substance that dries to create a plasticised barrier that covers the teat and requires removal immediately before the next milking. This barrier stops bacteria from colonising on the teat surface or invading the teat orifice.



Fig 6.5.20 Barrier dips

Dipping	Spraying
To achieve better coverage and uses less chemical	Quicker and more care, costly to install spraying equipments
To be Cleaned between milking	Less coverage, inconsistent and use more chemical

Table 6.5.2 Barrier dips

Exercise

1. Explain the process of hand milking.

Notes



A large rectangular area with a thin orange border, containing 30 horizontal black lines for writing notes.

UNIT 6.6: Process of Clean Milk Production

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain and practice the clean milk production.

6.6.1 Follow Procedure for Clean Milk Production

Follow procedure for clean milk production

- Always milk animals in calm and quite atmosphere preferably play light music (if possible)
- Milk animals in the following order
- Recently calved
- Heavy milking cows
- Poor milking cows
- Cows in the last phase of lactation.
- Milk sick or mastitis affected animals separately at the end.
- Fix Milking schedule. Do not change the process frequently. Make changes in the schedule gradually.
- Clean Milking parlor at least half an hour before milking.
- Clean and dry Milking vessels or cans
- Use round shaped vessels for milking without any joints.
- Heat milking vessel before milking (dry heat application) to improve the keeping quality of milk.
- Add few crystals of potassium permanganate in lukewarm water and wash the udder (Amount sufficient to change the colour)
- Massage(light) the udder while washing.
- Check for personal hygiene of milking person: clean hand and trimmed nails are must.
- Dry the udder with clean cloth from the tip of the teat upward.
- Always ensure full handmethod milking while milking (Not with folded thumb),
- Complete milking quickly, fully and comfortably (Animal should feel comfortable).
- Do not drag or give jerks to teats.
- Complete the process from washing to milking within 8 minutes.
- Dip the teats in disinfectant solutions e.g. weak iodine solution, after milking
- Milk twice a day if cows give upto 10 liters. Milk thrice a day, if it gives upto 25 litres
- Do not mix milk from medicated teat
- Strain the milk through muslin cloth (four layers) or through thin nylon mesh.
- Cool the milk (by putting ice around the milk can) and transport it to the retailcenter or collection center of the cooperative society as early as possible.
- Use clean water for washing utensils.

Milking Routine

- An appropriate milking routine is important for hygienic reasons as well as for creating a comfortable and smooth environment for animals and milkers.
- It is easier to maintain a good hygiene if a consistent milking routine is applied.
- In dairy cows, strict milking routine results in increased milk production.
- The routine mentioned below can be followed by both hand and machine milkers.
- Routine check of the milking machine should be done before each milking session according to the manufacturers recommendations.

Exercise

1. Write a note on livestock and milk maintenance.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

7. Proper Forage Conservation



- Unit 7.1 - Leveraging the Knowledge of Different Fodder Crops
- Unit 7.2 - Right Time to Harvest Crops
- Unit 7.3 - Tools and Equipment for Forage Preparation
- Unit 7.4 - Fodder Conservation Activities
- Unit 7.5 - Methods to Minimise Loss



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the method of hay making, silage preparation and treatment of straw.
2. Describe the different methods of storing the forage.
3. Describe the various types and functions of equipment and machinery used in silage and haymaking.
4. Describe about common weeds, pests and diseases associated with crops and pastures.
5. Describe about the environmental and climate risks and impact on forage conservation.
6. Describe the measures to minimize risk of spoilage and combustion during storage.
7. Describe the correct method of waste segregation and waste disposal in eco-friendly way.

UNIT 7.1: Leveraging the Knowledge of Different Fodder Crops

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify the different fodder crops suitable for dairy farming.
2. Explain the different varieties of crop.

7.1.1 Gain Knowledge on Different Fodder Crops

Fodder crops are cultivated plant species used as livestock feed. Usually harvested and stall feed to animals.

Forages are vegetative matter fresh or preserved utilized as feed for livestock.

Eg. grasses, legumes, crucifers and other crops cultivated and used in the form of hay, pasture, fodder and silage.

Classification of Forages

Forages are classified on different ways.

On the Basis of Season of Cultivation

Season	Forages
Kharif(June - September)	Cowpea, Cluster bean, Field bean, Bajra, Sorghum, Maize
Rabi(October -Dec/Jan)	Berseem, Lucerne, Oats, Barley

ON THE BASIS OF NUTRIENT DENSITY IN THE DRY MATTER

Nutrient Density	Crops
Non - maintenance	Eg. Wheat straw, Rice straw, Ragi straw, Maize and Sorghum stover, Jungle hay, cereal forages harvested at advanced maturity
Maintenance	Eg. Sorghum, Maize, Bajra, Hybrid napier, Para grass and all grasses
Production	Low protein- Maize, Oats, Barley, Sorghum Root crops etc. High protein- Berseem, Lucerne Cowpea, Subabool and all Legumes

Table 7.1.1 On the basis of plant types

Type	Crops
Cultivated	Cereals - Sorghum, Oats, Maize, Bajra, Legumes - Lucerne ,Berseem, Cowpea and Root crops - Turnips, Carrots
Grasslands/Pasture	Managed - Legume, Grass, Shrubs, Fodder trees, etc., Unmanaged - Grasses, Bushes etc.
Forests edibles	Grasses, Shrubs and tree leaves etc.
Plantation	Grass and Tree leaves Fruits and fruit tree wastes
Aquatic	Fresh Water hyacinth lotus etc Marine Algae

On the Basis of Duration of the Crop

Cereal - Annual	Grass		Legume		Tree
	Annual	Perennial	Annual	Perennial	
Maize, Sorghum	Deenanath grass	Hybrid Napier, Guinea grass	Cowpea, Berseem	Lucerne , Stylosanthes	Soobabul, Sesbania

On The Basis of Plant Family and Duration of the Crop

Legumes	Non-legumes
Eg. Berseem, Cowpea, Stylosanthes etc.	Eg. Hybrid Napier, Guinea grass, Fodder sorghum, etc.
Annual :Berseem, Cowpea	Annual : Fodder Maize, Sorghum
Perennial :Stylo, Desmanthes	Perennial : Hybrid Napier grass, Para grass

Table 7.1.2 Classification of forages

Proper Stage of Harvest of Grass Fodders:

Grass Fodders	Harvest stage
Hybrid Napier:	6-7 weeks (40 to 45 days advocated to have less oxalate toxicity)
Guinea Grass:	At 6 weeks intervals
Para grass:	4-6 weeks intervals
Blue panic grass:	Every two months
Cenchrus:	At 50% flowering
Deenanath:	At mid flowering
Rhodes grass:	At flowering

Table 7.1.3 Stage of harvest of grass fodders

Characteristics of Fodders Crops

- Quick regrowth and short duration.
- Profuse foliage and heavy yield of fodders.
- Should have high palatability and nutritive value.
- Should be adaptable to various agro-climatic conditions and different soils.
- Capacity to ratoon and give continuous supply of green fodder.
- Resistance to diseases and pests and safe to feed at all stages of its growth without any deleterious effect on animal health and growth.

Plant sources of animal feed - Various parts of plants are used as animal feeds

Straw	Silage
	
Husk and hulls	Haulms
	
Grasses	Hay
	

Stovers**Bhusa**

Fig 7.1.1 Plant sources of animal feed

Exercise

1. Explain different fodder crops suitable for dairy farming.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

UNIT 7.2: Right Time to Harvest Crops

Unit Objectives

By the end of this unit, participants will be able to:

1. Prepare for the harvesting of crop at right time.
2. Harvest the crop when it reaches the maturity.

7.2.1 Right Time of Harvesting of Crops

Factors Affecting Fodder Quality

- The major challenge in fodder production is preserving the feed quality during monsoons and summer season. Factors that affect the feed quality of fodder include:
 - **The Stage of Harvesting:** As the fodder matures in the field, it becomes fibrous and loses almost all its feeding value.
 - **The Method of Harvesting:** Poor harvesting methods can lead to loss of biomass that has the highest nutritive value.
 - **Handling and Storage:** Poor handling and storage can lead to spoilage of fodder, especially when it is exposed to adverse weather conditions such as rain and/or too much sunshine.
 - **Harvesting is done at 50% flowering:** For most of the cereal crops 50% flowering will occur between 60-75 days. At this stage animals will get maximum nutrients from the plants. For other minor/small millets 50% flowering may occur 10-15 days earlier i.e., 50-65 days. Harvest at the above period produces forage of good quality with higher nutrients to animals and also highly palatable stage with higher forage production.

Proper Time for Harvest

Crops	Harvesting day	Time of harvest	Yield (tons)
Sorghum/Jowar	First cut on 60 days after sowing and once in 35 – 40 days	immediately after flowering and upto 50% flowering.	35 – 40
Maize	60 -70 days	Cob formation to milk stage	35 – 40
Bajra	First cut at boot leaf stage and once in 35 – 40 days	Boot leaf stage to early flowering.	30 -35
Ragi			15 – 20
Other minor millets			10 – 20

Table 7.2.1 Crop Harvesting time

Comparative yield of small millets:

S. No.	Crop	Duration (days)	Green fodder (t/ha)	Crude protein (%)
1.	Arisipillu (<u>Brachiaria ramosa</u>)	54	18.70	13.53
2.	Kudiraivali (<u>Echinochloa colona</u>)	53	18.20	11.93
3.	Tenai (<u>Setaria italica</u>)	53	14.57	9.95
4.	Varagu (<u>Paspalam scrobiculatum</u>)	64	13.92	9.95
5.	Ragi (<u>Eleusine coracana</u>)	66	13.00	9.95

Table 7.2.2 Yield details

Proper stage of Harvest of Grass fodders:

Grass fodder types	Harvesting time
Hybrid Napier:	6-7 weeks (40 to 45 days advocated to have less oxalate toxicity)
Para grass:	4 to 6 weeks intervals
Blue panic grass:	Every two months
Cenchrus:	At 50% flowering
Guinea Grass	At 6 weeks intervals
Deenanath:	At Mid flowering
Rhodes grass:	At flowering

Table 7.2.3 Proper stage of harvest of grass fodders

Exercise

1. Tell the time of harvesting of different types of crops.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

UNIT 7.3: Tools and Equipment for Forage Preparation

Unit Objectives

By the end of this unit, participants will be able to:

1. Use the tools and equipment for preparation of forage.
2. Identify the suitable tools and equipment for the preparation of forage.

7.3.1 Use of Tool and Equipment for Preparation of Forage

The farm machines have reduced the burden and human dependency of farm work to a great extent.

Tillage: it is the preparation of soil for sowing seeds and the process of providing adaptable conditions in the soil by improving the soil tilth for good crop growth.

Objectives of Tillages

- To increase soil aeration.
- To improve the moisture retaining capacity of the soil.
- To destroy soil insects and their breeding places.
- To add humus and fertility to the soil by covering the crop residues.
- To destroy the competitive weeds.

Tools and Equipment: Tillage

Image



Description

Country plough

- Most common practice in India. The shape and size of the country plough varies from place to place depending on the type of soil and tillage requirements.
- The main parts of the plough are body, shoe, share, beam and handle.
- All the parts except share are made of wood. Share is made of mild steel. The share makes an angle of 10° to 30° with ground level.



MOULD BOARD PLOUGH

The mould board plough does the following functions:

- Cutting
- Lifting
- Turning and
- Pulverisation



CULTIVATOR

- It breaks the clods.
- It does weeding and intercultural operations in between standing rows of crops.
- It aerates the soil.
- It conserves soil moisture by preparing soil mulch.



HARROWS

- Harrows are used to break the clods, to stir the soil and to destroy weeds after ploughing.



LEVELLER

Levelling of agricultural land is necessary for

- Effective application of irrigation water.
- Reducing water logging and
- Controlling soil erosion.

**RIDGER**

- The ridger is useful in forming ridges and to facilitate sowing of seeds

**BUND FORMER**

- It makes bunds by gathering the top soil Bunds are formed in the field to prevent water run – off and to reduce soil erosion.
- In dry land, bunds are formed across the slope to conserve soil moisture

**BASIN LISTER**

- It is a soil conservation equipment especially useful in dry farming areas receiving meagre rainfall.
- Using this equipment furrows are formed in the field intermittently.
- The precipitated water is retained in the furrows, thus reducing the top soil erosion and conserving moisture.

Tools and Equipment: Sowing**SOWING EQUIPMENT**

- Placing seeds into the soil at optimum row to row and plant to plant spacing.
- To get high yield, the right amount of seed should be placed at the right time at a predetermined depth and spacing in the soil.

The operational requirement is as follows:

- Provision to change the seed rate, depth
- Seeds should not be exposed to injury by the seeding devices.
- Operating efficiency of the seed drill should not be dependent on field undulation
- Travel speed should be 6-15 km/h.

Tools and Equipment: Weeding**WEEDER**

- It is used for removing weeds in between line sown crops in rainfed and garden lands.
- The weeder is operated by one person. For best results, the operator has to give push – pull movements to the handle and walk behind in the field.

**MINI POWER TILLER FOR WEEDING AND INTERCULTURE**

An engine operated mini power-tiller has been developed for weeding and interculture in between rows of crops such as maize, tapioca, cotton, pulses, sugarcane and grape.

**COMPRESSION SPRAYER**

- The air pump builds up pressure in the space above the liquid.
- When the nozzle is opened, spray liquid is forced out through the nozzle opening by the compressed air.

**LEVER OPERATED BACKPACK SPRAYER OR KNAPSACK SPRAYER**

- It is useful for spraying small trees, shrubs and row crops.
- A uniform pressure can be maintained by keeping the pump in operation. One man can spray 0.4 ha in a day.

Tools and Equipment: Harvesting**MOWER CONDITIONER****SCYTHE**

To cut large amounts of fodder in a short period of time. This tool is especially suitable for women as it eliminates bending (as in the case of the traditional sickle)

**PITCH FORK**

For lifting hay

**METAL RAKE**

For gathering hay. This tool is stronger and more durable than a wooden rake.



WOODEN RAKE

For gathering hay. If a farmer can't afford a metal rake, the farmer can make a wooden rake.



TEDDER RAKE

Tools and Equipment: Baling



ROUND HAY BALER



SQUARE HAY BALER



HAY RACK

A fodder storage rack to keep hay dry

Tools and Equipment: Storage

	HAY STORAGE AREA
	COLLECTION & TRANSPORTATION

Table 7.3.1 Tools and equipment

Exercise 

1. List the various tools and equipments used for the preparation of feed for animals.

Notes



A large rectangular area with a thin orange border, containing numerous horizontal lines for writing notes.

UNIT 7.4: Fodder Conservation Activities

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the method of forage conservation.
2. Explain the structures to be used for forage conservation.

7.4.1 Fodder Conservation Activities

Dairy farms need continuous and year round supply of high quality feed and fodder for dairy animals. However, seasonal climatic variation causes feed and fodder shortage during summer and excess during winter / rainy season. Dairy farmer need to adopt conservation techniques to store the forage during abundance and utilize it during lean period. Additionally, fodder conservation will help feeding during floods or droughts or transfer to distant areas.

Conserved fodder crops do NOT match the nutritive value of fresh forage, as some storage losses (due to fermentation, spoilage) are expected. Thorough conservation techniques, forage losses are minimized.

Major Forage Conservation Options

Silage

- Silage is forage conservation through a natural 'pickling' process. Silage is a fermented feed resulting from the storage of high moisture crops, usually green forages, under anaerobic conditions in a structure known as a silo.
- Silage is usually made from a grain crop that has been cut and chopped and put in bulk silos, ie... bunks, bags, or upright silos
- Silos are air tight structures designed for storage of high moisture feeds
- Forage conserved this way is known as 'ensiled forage' or 'silage' and will keep for up to five years without deteriorating.
- Forage conserved in lactic acid that are produced through fermentation of its water soluble carbohydrate (WSC) by anaerobic lactic acid bacteria (LAB) when it is stored in the absence of air
- Silage has 60–70% moisture and is very palatable to livestock and can be fed at any time.

Advantages

- More economical with high moisture content.
- Preserves 85% of feed value of the crop (Grass silage).
- Can be stored for longer duration – 5 years.
- Economical way of storing and preserving corn and sorghum.
- Low wastage – Entire plant is ensiled.
- Minimal nutrient loss – 10 percent.
- Can be produced in cold and cloudy weather.
- Reduces harmful plant substances through fermentation.

- Less storage space – one – tenth of space required for hay
- Not easily inflammable
- Good weed control
- Uniform quality

Disadvantages

- Difficult to transport to long distance
- Low Vitamin D content
- Difficult to determine the quality
- Requires a permanent structure
- Risk of wastage, if not done properly
- Additional farm expenditure

Risks

- Air contact will spoil the silage
- Rain or weather conditions (humidity, duration of sunlight) will spoil the silage
- Plastic wraps will get accidentally consumed
- Injury due to specialized equipment
- Damage due to Rats and Rodents

Mitigation

- Use plastic wraps or bags
- Dispose unwrapped plastic wraps or bags properly
- Use weather forecast to plan and manage your spoilage preparation
- Proper storage of spoilage and usage of rodenticides

Characteristics of Silo Pits

- Animal number, type, feeding period length, forage availability determine the size of the silos
- Silo should be air tight completely
- Side walls of silos should be smooth and straight to prevent air pocket formation
- Reinforcement of side walls is needed as pressure builds up inside the silos during fermentation. or make the side walls strong and rigid.
- Silo pits should be deep less exposure and better packing
- Provide a drain for escape of juices from the silage.
- Should be weather proof and accessible thorough out.

Types of Silos

Image	Silo Type
	<p>Tower Silo Upright and Circular Series of doors for removal of silage Recent ones have bottom unloading facility Gas tight silo is specialized tower silo Complete anaerobic condition Store high moisture grain (50 – 75%)</p>
	<p>Inverted tower silo Made in Low water table areas Not damaged by storm and Require less reinforcing. Danger of CO2 suffocation Difficult to remove silo from the pit</p>
	<p>Bunker Silo Above ground silo Labour saving</p>



Trench Silo
Below ground silo
Low cost
Easy to construct
Require larger space to seal






Temporary silos
Modified trench stack silo



Plastic silo bag

Fig 7.4.1 Types of silos

Crops Suitable for Silage Making

Image	Crop
	Corn Best for silo
	Sorghum Best for silo
	Napier

	Bajra
	Lucerne
	Berseem
	Cow pea

Fig 7.4.2 Crops suitable for silage making

Additives and preservatives

To Add

nutrients. Provide fermentable carbohydrates. Furnish additional acids. Inhibit undesirable types of bacteria and moulds. Reduce the amount of oxygen present, directly or indirectly. Reduce the moisture content of the silage. Absorb some acids which might otherwise be lost in seepage. Increase nitrogen content.



Molasses

Add 3.5 – 4 %

To increase palatability, nutritive value and lactic acid production (formation)



Urea

Add 0.5 %

To enrich silo with nitrogen



Limestone

Add 0.5 – 1 %

To increase acid production



Sodium Metabisulphite

Good antibacterial preservative

Improves carotene content

Organic acids – Propionic and formic acid

Improves preservation

Add 1%

Silage Making**Automatic mechanical harvesting cum chopping for maize****Simple mechanical chopping**

Cut to proper length

The length of the cut sections affects the packing by eliminating air pockets.

Chopping forage crops into 1 to 2 cm length is ideal.

Finely chop Grass silages than maize or sorghum.

Finely chop Wilted and dry forages and forage with hollow stems than forage of high moisture content

**Chopped Forage**



Unloading in the pit

If moisture content is high, How to reduce?
Conditioning - wilting: For 3 – 4 hrs sundrying reduces 10 - 15 % moisture in grass silage
Adding dry hay or straw – 5 – 20 %
Combining high and low moisture crops:
Adding dry preservative: ground grains, maize or cob meal



Silage filling

Fill silo in two days or less.
 Compress the forages during filling
 Do not fill a silo when it is raining.
 Distribute forage uniformly in the Silo:
 Avoid the presence of air pockets and spoilage, chopped forage should uniformly be distributed in the silo and packed well.



Sealing of Silo:

For maintaining the silo anaerobic it is a must to stop the entrance of atmospheric air in the silo.
 This may be done as follows :
 Level the top and tramp the last few feet, especially near the walls.
 Cover the top by using any type of insulator like mud, plastic or loose earth.
 For bunker or trench silo apply sufficient load on top to facilitate compactness

Fig 7.4.3 Silage making

Quality of silage





Quality	Description
	<p>Very good silage</p> <ul style="list-style-type: none"> • It is clean, the taste is acidic, and has no butyric acid, no moulds, no sliminess nor proteolyses. • pH - 3.5 and 4.2. • Ammonical nitrogen <10 % of total N2 • Uniform in moisture and green or brownish in colour. Taste is pleasing, not bitter or sharp.
	<p>Good silage</p> <ul style="list-style-type: none"> • The taste is acidic. There may be traces of butyric acid. • pH - 4.2 and 4.5. • Ammonical nitrogen 10% - 15% of total N2 • Other qualities are same as that of very good silage
	<p>Fair silage</p> <ul style="list-style-type: none"> • The silage is mixed with a little amount of butyric acid. There may be slight proteolysis along with some mould. pH - 4.5 and 4.8. • Ammonical nitrogen 15% - 20% of total N2 • Colour of silage varies between tobacco brown to dark brown.
	<p>Poor silage</p> <ul style="list-style-type: none"> • It has a bad smell due to high butyric acid and high proteolysis. The silage may be infested with moulds. • Less acidity, • pH > 4.8. • Ammonical nitrogen >20% of total N2 • Colour tends to be blackish and should not be fed.

Fig 5.4.4 Quality of silage

When to Open the Silo?

- In 2-3 weeks, forages are converted in to silage. However, in 6 – 8 weeks the fermentation will be complete.
- Type of forage, silo pit, packing, anaerobic condition, duration determines the fermentation process or silage making process
- Where to open
- Tower and Trench silo – Top
- Bunker silo – Front
- 2 to 4 inch layer is removed daily
-

Haylage

- Haylage is an anaerobic method of conserving forage when the energy is at its highest. Moisture content in haylage is between 40 – 60 percent.
- In Haylage, Grass is usually baled and plastic film wrapped at a higher moisture
- Baleage is usually referring a grain crop that has been cut and baled at the higher moisture as stated above

Advantages

- Brings Cost and labor saving
- More palatable than hay
- Can be made with hay making equipment

Disadvantages

- Need to have air tight condition for fermentation
- Difficult to make than hay making

Risks

- Air contact will spoil the haylage
- Rain or weather conditions (humidity, duration of sunlight) will spoil the haylage
- Plastic wraps will get accidentally consumed
- Injury due to specialized
- Damage due to Rats and Rodents

Mitigation

- Use plastic wraps or bags
- Dispose unwrapped plastic wraps or bags properly
- Use weather forecast to plan and manage your haylage preparation
- Proper storage of haylage and usage of rodenticides

Crops suitable for haylage making





Image	Crop
	<p>Alfalfa</p> <p>Best for haylage</p>
	<p>Rye grass</p>
	<p>Switch grass</p>
	<p>Bermuda grass</p>

Fig 7.4.5 Crops suitable for haylage making

Hay

- Hay is defined as forage conserved under aerobic dry or limited moisture conditions. Moisture content is less than 12- 14 percent.

Advantages

- Very long period of storage
- Easy to handle
- Easy to transport and distribute
- Provide good dry matter content

Disadvantages

- More nutrient loss – 30 percent
- Rainfall affects the quality. Not suitable for wet regions
- Machinery and equipment are expensive.
- Requires large storage area

Risks

- Rain or weather conditions (humidity, duration of sunlight) will spoil the hay
- Fire will destroy hay if not stored properly

Mitigation

- Use weather forecast to plan and manage your haylage preparation
- Proper storage of hay in closed environment
- Take fire safety steps in hay storage place

Wastelage

- A material obtained after ensiling of waste material (animal organ waste) in a suitable combination with forages and additives, under anaerobic condition through fermentation by lactic acid producing bacteria.
- Except for this, the other steps in the preparation of wastelage is similar to that silage.

Favorable Conditions for Forage Conservation

Particulars	Silage	Haylage	Hay
Crops Used	Corn, Sorghum and Crop by products	Alfalfa, Rye grass, Bermuda grass, switch grass	
Moisture	60 -70 %	40-60%	12 – 20%
Dry Matter	35 -50%	50 – 70%	80 – 85 %
Anaerobic	Yes	Yes	No
Weather	Rainy		Summer
Ph	4.5	5.5	6.0
Mould Incidence	Moderate	Less	High

Table 7.4.1 Favorable conditions for forage conservation

How to assess the dry matter content of forage using a microwave oven?

Tips to ensure accurate measurements

- Use the full power setting.
- Limit the sample size to less than 50 grams.
- Use short heating intervals when drying to prevent the sample from burning. 4. Keep the sample spread out thinly to promote uniform heating.
- Samples do not have to cool before weighing.
- Puncture grain kernels in corn silage and high moisture grains to ensure more complete drying.
- Do not place a glass of water in the microwave with the sample; it will add moisture to the sample as it boils.
- Use a scale that reads to one-tenth of a gram (0.1).

The procedure

- Weigh a paper plate; tare the scale with its weight.
- Collect a small sample of forage and place it on the plate.
- Weigh the sample on the plate.
- Record this weight as the “Initial Weight.”
- Dry the sample using the guidelines in the table to the right. Feel the sample after each drying period; it should get more brittle after each drying.
- After the fourth drying, weigh the sample and record this amount.
- Place the sample in the microwave for another 10 to 20 seconds.
- Weigh the sample again.
- Repeat steps 7 and 8 until the sample weight does not change.
- Record this weight as the “Final Weight.”
- Calculate dry matter by dividing the initial weight into the final weight and multiplying this result by 100. % Dry matter = (Final Weight ÷ Initial Weight) x 100

Suggested Guidelines for Drying Time

	Corn silage	Hay-crop silage	
	< 40% DM	< 40% DM	> 40% DM
Initial drying	1.30 min	1.00 min	0.50 sec
2nd drying	0:45 sec	0:35 sec	0:40 sec
3rd drying	0:35 sec	0:25 sec	0:25 sec
4th drying	0:30 sec	0:15 sec	0:15 sec

Table 5.4.2 Suggested guidelines for drying time

After the fourth time, weigh sample, then dry at 10 to 20 second intervals. Weigh after each drying until the sample weight stops changing.

UNIT 7.5: Methods to Minimise Loss

Unit Objectives

By the end of this unit, participants will be able to:

1. Minimize the spoilage of forage.
2. Adopt the proper method to avoid spoilage.

7.5.1 Method of Minimization of Spoilage

Storage losses can be quantitative, qualitative, economical, nutritive or germinative.

- Storage losses can be prevented or reduced by better management at pre-harvesting stage, during harvesting, threshing and shelling, drying and by applying sound storage practices.
- Grains and fodder stored under favourable conditions for many years undergo relatively minor changes in composition and can be used as a source of nutritious and palatable food or animal feed, but under unfavourable conditions result in complete spoilage of grain for food or feed purpose within a few days.

Factors Affecting Feed Value and Deterioration

Basically there are some physical, biological and chemical agents that cause the damage and ultimate loss to the stored feed and feed ingredients.

It may include

- Temperature
- Moisture
- Insects
- Fungus
- Rodents etc.

Physical Factors

- Regulate Moisture and temperature to ensure safe storage and to prevent spoilage
- Optimum moisture content for storage < 10%
- Optimum temperature for storage below 15° C. High temperature (21-43° C) speeds up the life process of all microorganisms

Control

- Dry the grain before storage to reduce the moisture content to 10% and keep the storage area temperature below 15 C.

Biological Factors

Principle biological agents that cause deterioration during storage are

- Insects
- Fungi
- Rodents

Insect control measures

- Good hygiene.
- Cleaning and checking of storage containers as well as the stored food as far as possible.
- New dry grain should be kept separate from old grain.
- Stores should be remote from the field to reduce the risk of infestation.
- Traditional pest control system such as use of local herbs, mixing ash with grain and smoking are effective and should be encouraged

Fungal Control Measures

- Apply drying and storage technology.

Rodent Control Measures

- Rodent exclusion efforts in store construction.
- Improved sanitation.
- Fumigation with phosphine and other gasses.
- Trapping and hunting.
- Use of cats and dogs.
- Rodent repellants.
- Poison baiting with chlorofacinone, warfarrin, coumarin, zinc phosphate, barium carbonate etc.

Chemical and Engineering Factors**Chemical Factors**

- Pesticides are used in the storage area to prevent grain spoilage. However, there is risk of residues in the grain that deteriorate the value and quality.
- Hence, care should be taken for correct dose of spraying pesticides and also avoiding spray at the late stages of maturity.

Engineering Factors

- Engineering factors refer such as storage structures (bag or bulk storage), mechanical (conveying of produce, threshing and shelling).
- During these process grains are broken and may result in rapid spoilage during the storage.

Storage Area Requirement

- Building for the storage of feeds and feed ingredients must be water proof and airtight with sealable doors and windows.
- The roof walls, doors, windows and floor must be leakproof.
- The floor must not transmit water vapour from the soil.
- The facility should have good rodent and bird control program.
- Gaps between roof and walls should be sealed with local mud, sheet metal or close netting
- Pipes, shafts, ducts etc. should be fitted with wide metal guards outside and netting inside.

Essential Criteria for Safe Storage of Products

- Entirely weather proof.
- Gas tight to enable fumigation of entire contents.
- Fitted with controllable ventilation.
- Proof against entry of rodents and birds.
- Free from light transmitting areas in the roof in order to avoid high temperature areas on top of stored produce.
- Designed to permit incorporation of few fans in the walls and ducting on the floor for special storage requirement.

Steps to Prevent Silage Spoilage

In hot tropical climate, Secondary fermentation occurs when

- Air temperature is high,
- Packing density is low,
- Moisture content of raw materials is low
- The take-out amount per day is small.

Follow the Steps to Prevent Silage Spoilage

- Increase the packing density to about 700 kg per 1 m³.
- Adjust the moisture content of raw materials to about 65-75%.
- Adjust the size (width) of a silo so that the thickness of silage taken out per day is 20 cm or thicker.

Prevention of Accidents in Silo Works

- It may happen occasionally that poison gas is produced in underground silos, causing oxygen deficiency. When a worker enters into a silo to restart packing more silage materials after silage making works were temporarily discontinued and it passed more than half a day, and when the work for silage take-out is carried out in the lower part of a silo, a burning candle (fixed on a stick) should be brought near the lower part of a silo to check whether fire is extinguished. If fire is extinguished immediately, there is a possibility that oxygen may be deficient. Since this is a very dangerous situation, air in the lower part of the silo should be ventilated before starting work by exhausting with a vacuum cleaner or sending air with a blower, etc.
- A ladder should be used to go up and down to prevent people from falling. When an underground silo becomes empty, a fence should be built around the silo.

8. Breed improvement of Livestock



Unit 8.1 - System of Breeding



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Explain relevant legislation, standards, policies and procedures in the workplace.
2. Describe breed improvement methods and their suitability for different animals.
3. Describe the various factors which influence the breeding efficiency.
4. Explain various factors affecting the reproductive performance of animals.
5. Describe various materials and equipment required in the process.
6. Describe potential hazards related to the reproduction and well-being of animals caused by humans or other animals.
7. Explain the measures to ensure hygiene and sanitation standards.

UNIT 8.1: System of Breeding

Unit Objectives

By the end of this unit, participants will be able to:

1. Interpret relevant legislation, standards, policies and procedures in the workplace.
2. Describe the methods of breed improvement and their suitability for different animals.
3. Describe the various factors affecting fertility.
4. Explain the various factors affecting the reproductive performance of animals.
5. Describe the various materials and equipment required in the process.
6. Describe potential threats to the breeding and welfare of the animals caused by humans or other animals.
7. Explain the measures to ensure sanitary standards.

8.1.1 System of Breeding

Basically, there are two methods of breeding which are as follows:

- 1. Inbreeding:** Breeding of the related animals as sire (male) and dam (female) are known as inbreeding.
- 2. Outbreeding:** Out breeding of unrelated animals as male and female is known as out breeding.

1. Inbreeding:

- Inbreeding i.e. mating of related individuals often results in a change in the mean of a trait.
- Performance of inbred animals lowers down the reproductive efficiency and may have several disorders. Hence, this method of breeding is not practiced for livestock improvement.
- However, inbreeding is intentionally practiced to create genetic uniformity of laboratory stocks and to produce stocks for crossing (animal and plant breeding).
- But inbreeding is unintentionally generated by keeping small populations for breeding and during selection.

There are again two types of inbreeding which are:

(a) Close breeding : This is most intensive breeding where animals are very closely related and can be traced back to more than one common ancestor. Examples: Sire to daughter Son to dam Brother to sister.

(b) Line breeding : Mating animals that are more distantly related which can be traced back to one common ancestor. Examples: Cousins Grandparents to grand offspring, Half-brother to half-sister. Line breeding increases genetic purity amongst the animals of progeny generations.

2. Out breeding:

Out breeding system i.e. breeding of unrelated animals is generally of two types:

(a) Crossbreeding:

- Crossbreeding is the mating of two animals of different breeds. Superior traits that results in the crossbred progeny from crossbreeding are called hybrid vigor or heterosis.

(b) Grading up:

- Grading up is the breeding of animals of two different breeds where the animals of an indigenous breed/genetic group is mated by an improved pure breed for several generations towards attaining the superior traits of the improved breed.
- Grading up is continuous use of purebred sires of the same breed in a grade herd. By fifth generation, the graded animals may reach almost purebred levels.

By following out breeding system i.e., crossbreeding, selective breeding and grading up according to the need, results in improvement in production performance of the crossbred/graded along with improvement in growth rate, reproduction and production.

General Considerations Regarding Crossbreeding Systems

- Good record keeping of the animals is required for selection good quality of male and females for breeding. Records on milk production and age at first calving are two important characters besides others.
- Calving difficulties may increase when crossing large breed sires with small breed dams and hence selection of animals/breeds should be done carefully.
- Fewer calving problems if large breed dams are used. However, large breed dams have higher maintenance costs.
- Artificial insemination allows access to better bulls which may be practiced.

Selection of Breeding Animals

- Selection of good quality improved animals for breeding is done by allowing some animals to have offspring while preventing the animals with inferior quality from reproducing.
- The process allows producing genetically superior animals. Emphasis has to be given on several traits when selecting breeding stock.

8.1.2 Factors Affecting Breeding Efficiency of Cattle

The breeding efficiency of the cow/ cattle can be affected by:

- Time of ovulation,
- Failure to ovulate,
- Failure to manifest estrual activity,
- Viability of the gametes,
- Embryo survival, and
- Fetal development.

Under stress of high ambient temperatures one or a number of these conditions could be important.

8.1.3 Factors Affecting Reproductive Performance

Factors affecting reproductive performance are linked to either management factors or cow factors and indirectly in many cases to the level of education and social status of farm owners of livestock in terms of context.

- 1. Management Factors:** methods of husbandry, feeding, estrus detection, semen handling and transition cow management)
- 2. Cow/ Cattle Factors:** Age, body condition score (BCS), post-parturient problem, disease events, milk yield, and genetics.
- 3. Social Factors:** Social status of farm owners and attendants: (such as education level among farmer-owners and attendants, experience i.e. years involved in farming and AI breeding, is a potential factor for reproductive performance of effectiveness of AI programs.

8.1.4 Materials and Equipment for Animal Breeding Process

1. Vaccination:

Reproductive and respiratory disease vaccinations are essential to administer before the breeding season starts. If you haven't given livestock vaccines yet, allow at least 6 weeks before the breeding season starts to ensure you have enough time for the first and second round of vaccine shots.

Two livestock vaccines we recommend to give to your bulls and entire herd are basic five vaccines, Bovi-Shield Gold 5 and Cattle Master Gold FP 5. Both aid in the prevention of Bovine Rhinotracheitis (IBR), Bovine Viral Diarrhea (BVD type 1 and type 2), Parainfluenza (PI3) and Bovine Respiratory Syncytial Virus (BRSV).

It is important to give respiratory vaccines prior to breeding (or regularly) to an adult female because it protects against respiratory complications. They also protect against abortions that can occur from exposure to the pathogens that cause those respiratory illnesses.

Other things to consider vaccinating for before breeding season are reproductive specific pathogens such as Lepto and Vibrio

An additional vaccine to consider for your bulls and whole herd health care is a Trichomonas vaccine. It helps protect against infertility caused by Trichomonas in both cows and bulls.

In addition to needed pre-season vaccines, make sure you have the proper needles and syringes, as well as a cooler to ship your vaccines.

Coolers help keep the vaccines at the right temperature to protect from freezing as well as from overheating. Freezing a vaccine can ultimately cause more damage than the vaccine getting too warm.

2. CIDRs

Most often used in estrus synchronization protocols, CIDRs release progesterone at a controlled rate into the bloodstream. This acts to synchronize the estrus cycles of all females receiving a CIDR insert. This way groups of livestock can come into heat together and can all be bred in a narrow time window. CIDRs are most often used in AI (artificial insemination) "time" breeding protocols but can also be used for pasture breeding if a producer has enough males to cover all females who will be cycling together. Plan ahead when using CIDRs as many breeding protocols involve hormone injections prior to inserting CIDRs as well as when CIDRs are pulled. A proper timeline should be worked out with your veterinarian or breeding specialist.

3. Paint Sticks

Paint sticks are handy during breeding season when using the AI breeding method. Use them to mark who you have CIDRed as well as who you have bred. This makes it easier to watch for signs of heat as well as looking for CIDRs if you haven't CIDRed the whole group.

Another useful factor of marking with a paint stick is if an animal loses a CIDR. You would know if it was lost and not that one was not put in.

4. Scrotal Tape Measures

Scrotal tape measures are also essential for a breeding season. You want to measure your bulls, rams & bucks to ensure that they have ample scrotal circumference. Scrotal circumference is proven to be directly linked to fertility. It is better to measure before breeding season and feel confident that the males have adequate scrotal circumference than to assume and be disappointed when it is time to check for pregnancy. Scrotal measurements do not take the place of a pre-breeding season exam performed by a veterinarian. However, when selecting young males for breeding, small scrotal circumference should be a definite red flag as well as culling criteria.

5. Disinfecting Solutions

Disinfecting solutions, like a good chlorhexidine solution, aid in farm biosecurity.

6. Mounting Detectors

Mounting detectors are another breeding aid that producers can use to make accurate heat detection easier.

7. OB Sleeves

OB sleeves protect the farmer and rancher as well as the livestock. As with disinfecting solutions, keeping everything clean and sanitary is vital during the breeding season. They are typically shoulder-length, and some have a neck loop to prevent the glove from slipping off.

8. OB Lube

OB Lubes are typically needed for rectal lubrication during AI breeding. Choose from a variety of brands and sizes.

9. Early Pregnancy Detection Kits

To check if pregnancy has been successful during a breeding season, Livestock Early Pregnancy Detection Kits are available for cattle, sheep, and goats.

In addition to these top livestock breeding supplies, Jeffers Livestock also recommends getting a gestation calendar or table like this goat gestation wheel. These tables help you decide when you need to start your breeding season based on when you plan to market.

Jeffers Livestock also recommends making a breeding sheet. This breeding sheet could have six columns to cover a 90 day breeding season. These columns include a column for the animal ID number, date bred column (three times to allow for three different breedings), a result column, and a breeding season year column. Keep this breeding chart sheet on a clipboard in the barn, so it is easy to access. Use it to mark if you see animals breeding and be able to check if an animal is not showing heat. Watch our Livestock Breeding Supplies Video for more information on making your own breeding sheets.

Pls. note that the information mentioned is for educational purpose only. And is not in any case, intended to replace, the diagnosis, treatment or advice of a licensed veterinarian.

8.1.5 Potential Hazards Related to the Reproduction and Well-being of Animals Caused by Humans or Other Animals

Hazards Due to Chemicals:

Persistent organic pollutants (POPs) can have carcinogenic, teratogenic, and mutagenic effects, and can have a strong harmful effect on humans and animals' reproduction, genetics, immunity, and nerves endocrine and other systems. Presently, there are thousands of POPs substances in the world. POPs are generally divided into three categories: pesticides, industrial chemicals and by-products from industrial processes, and solid waste combustion.

Animal Welfare

John Webster defines animal welfare by advocating three positive conditions: Living a natural life, being fit and healthy, and being happy.

The ultimate goal of Animal Welfare is the effort to ensure the following 'five freedoms' for all animals.

- Freedom from thirst, hunger and malnutrition – by ready access to fresh water and food to maintain full health and vigor.
- Freedom from discomfort – by providing a suitable environment including shelter and a comfortable resting areas.
- Freedom from pain, injury and disease – by prevention and treatment.
- Freedom to express normal behavior – by providing sufficient space, proper facilities and company of the animal's own kind.
- Freedom from fear and distress -by enduring conditions which avoid mental suffering.

Instances of Cruelty Commonly Inflicted On Animals

Animal cruelty means inflicting suffering, distress, pain to animal.

Following are some of instances of common cruelty:

- Starved unproductive animals on streets left to fend for themselves.
- Diseased or weak animal overloaded and over worked to pull vehicles. Lashing, whipping and torture of such animals.
- Pigs and poultry being transported from one place to another in a manner which subjects them to pain and suffering.
- Exhibition of blood sports, using animals such as bulls, rams and cocks.
- Animals made to perform in circuses.

The cruelty inflicted on animals is an offence punishable under the Prevention of Cruelty to Animals Act 1960 and they are summarized as follows:

- Beating, kicking, overriding or over loading of animals. Torturing and treating animals so as to subject it to unnecessary pain and sufferings.
- Employing for work an animal which is unfit or suffering from any disease, infirmity, wound or sore.
- Administration of injurious drugs and other substances to animals.
- Carrying any animal or bird in such a manner so as to inflict unnecessary pain.
- Keeping an animal or a bird in a cage which is not big enough to permit the animal / bird reasonable movement.
- Keeping an animal tied with an unreasonably short or unreasonably heavy chain or cord.
- Abandoning an animal knowing that it will be exposed to starvation.
- Needlessly mutilating any animal.
- Owning an animal and not providing it with sufficient food, water and shelter.
- Organizing fights between animals or birds. As per the act, the following are not considered as cruelty if conducted as per appropriate procedure / method:
 - Dehorning of cattle, castration, branding or nose roping of any animal.
 - Destruction of any animal under the authority of any law
 - Experimentation on animals
 - Slaughter of animals for food for human.

8.1.6. Measures to Ensure Hygiene and Sanitation Standards

Proper cleaning and sanitation removes most of germs and parasites along with dirt, thereby remaining germs are few in number and possibly in weakened condition so as to be harmless under ordinary conditions. Various problems in practical implementation for prevention of diseases are due to the fact that the majority of livestock is managed by illiterate and ignorant persons who ignore the basic principles of hygiene and sanitation. Majority of causes for spread of diseases could be ascribed to improper sanitation which gives shelter to carriers of germs.

Losses among livestock from infectious diseases and parasites often can be prevented if the following essential features of adequate sanitation are adopted in the living quarters:

- Proper ventilation without drafts and without accumulation of moisture on walls and ceiling.
- Proper disposal of manure, feed wastes and other excreta twice daily and keeping manure pit covered with straw to prevent breeding place of flies.
- Proper construction of smooth and wide enough gutter for holding accumulated dropping and with proper slope to facilitate drainage of liquid excreta.
- Watering and feeding utensils so constructed that may be easily cleaned and thoroughly disinfected.
- Good lighting programme through doors, windows, ventilation and artificial lights to facilitate proper cleaning and keeping floor dry.
- Smooth inside walls with corners rounded to facilitate cleaning and disinfection.
- Use of proper and clean bedding material (e.g. saw-dust, wheat bhusa, paddy straw etc.) and removed at least once daily.
- Avoiding use of permanent pastures where internal parasites or their intermediate hosts are found.
- Judicious use of such insecticides that have no adverse physiological effects on the animal body, e.g. maratho dust.
- Adequate cleaning prior to effective disinfection.
- Sweeping and scrubbing all feed racks, troughs and passages and disinfecting with lye solution.
- Burning of all sweeping and scrapings.
- Application of heavy coating of white-wash containing a reliable disinfectant to the floors, walls and partitions, mangers etc. (1/2 kg of lime in one gallon of water + disinfectant).
- In case of mud floor, a top of 12 to 15 cm soil is removed and replaced with clean soil.
- Providing plenty of shade in hot weather.
- Routine programme of de-worming specially on pasture.
- Judicious spraying for lice control.
- Segregating the sick animals.
- Protecting feed and water from being contaminated with sewage disposals.
- Proper disposal of infected litter and carcass.
- Proper cleaning and disinfection of calving pens.
- Abundant supply of clean water with good pressure for easy and effective cleaning of milking parlors, etc.
- Barns and stalls must be constructed with concrete metal stanchion which are easier to clean than wood.
- Cleaning should be followed by the use of a disinfectant over all surfaces.

A clear understanding of the definition and function of different cleaning products is important to design an effective cleaning protocol. Three types of product are generally used for environmental cleaning:

- ✓ **Soap/Detergent:** Cleaning agent which works by suspending dirt and grease. Does not kill harmful microorganisms.
- ✓ **Disinfectant:** Chemical agent which kills harmful microorganisms. Does not necessarily remove dirt or grease.
- ✓ **Degreaser:** More powerful soap/detergent specially formulated to penetrate layers of dried on body oils and other greasy debris

Common Disinfectants Used in Animals Houses/ Shelters:

1. Quaternary ammonium compound
2. Bleach (Sodium hypochlorite)
3. Potassium peroxydisulfate
4. Alcohol (Usually in hand sanitizer)
5. Chlorhexidine
6. Phenolic disinfectants

Exercise

1. Explain different systems of animal breeding.
2. Enlist factors affecting cattle breeding efficiency.
3. Mention few hygiene and sanitation standards protocols to be adhered in the animal shed.
4. Can you name any three disinfectants that can be used to sanitize the animals shelters/ sheds?

Notes



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9. Process of Planning, Budgeting and Marketing



Unit 9.1 - Dairy Farming Economics and Finances

Unit 9.2 - Collect information on Financing Institutions for Dairy farming

Unit 9.3 - Estimate the budget for dairy farming

Unit 9.4 - Understand and update Market Information

unit 9.5 - Manage the records of the business

Unit 9.6 - Understand method of marketing

Unit 9.7 - Develop contact with market players



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Explain how to analyse the demand and supply of the relevant dairy produce in the market
2. Describe the process of identifying the target customers and assess their needs and expectations with respect to the quality and price of the produce.
3. Explain how to identify various types of dairy entrepreneurship/ business opportunities.
4. Explain how to prepare a basic business plan for dairy entrepreneurship/business activities.
5. State the appropriate sources of funding for the dairy entrepreneurship/ businesses
6. State the relevant government schemes and programs
7. Explain the importance of ensuring compliance with the government structural reforms and framework, along with the applicable rules and regulations.
8. List various resources required for dairy production
9. Describe the process of planning dairy production and the use of relevant technologies to enhance production
10. Explain the importance of ensuring no cause adverse impact on the environment and produce during production
11. State the recommended practices to be followed for efficient input resource management.
12. Describe the process of optimising the production processes and output through the amalgamation of existing practices with smart technologies.
13. Explain the recommended sustainability practices to be followed during dairy production to prevent and deal with deforestation, loss of biodiversity, soil degradation, etc.
14. Explain how to collect information related to the wholesale and retail price of dairy produce.
15. Explain how to calculate the economics of the produce viz.
16. Production cost, price of the produce, B:C Ratio etc.
17. Explain the relevant government schemes with the provision of subsidies/funds for the promotion of dairy produce.
18. Describe the process of selecting appropriate marketing channels for marketing dairy produce, and the applicable requirements and constraints.
19. List the relevant buyers of different types of dairy produce.
20. Explain how to identify and manage various risks to production and postproduction processes.
21. Explain how to undertake outreach programs to promote dairy products and services, and expand agribusiness.
22. Explain the 4Ps i.e., product, price, promotion, and place and 4As i.e., acceptability, affordability, accessibility, and awareness considered while preparing and executing a marketing plan.

UNIT 9.1: Dairy Farming Economics and Finance

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify basic requirements for entrepreneurial initiatives in dairy.
2. Plan for the Dairy Farm establishment.
3. Identify the resources required and procure.

9.1.1 Dairy Farming Economics and Finances

Performance Criteria

To be competent, the individual on the job must be able to: PC1. farm Planning and Budgeting with reference to various components of Dairy Farm PC2. Keep books of accounts and various transactions of the farm PC3. Arrange for financial assistance from various quarters in the light of various schemes available for dairy development

Basic Requirements for Entrepreneurial Initiatives in Dairy

A number of critical factors are important for new-venture assessment. One way to identify and evaluate them is with a checklist. In most cases, however, such a questionnaire approach is too general. The assessment must be tailor-made for each activity.

A New Venture Goes Through Three Specific Phase:

Pre Start-up:

The pre start-up phase begins with an idea for the venture and ends when the doors are opened for business.

Start-up:

The start-up phase commences with the initiation of sales activity and the delivery of products and services and ends when the business is firmly established and beyond short-term threats to survival.

Post Start-up:

The post start-up phase lasts until the venture is terminated or the surviving organizational entity is no longer controlled by the entrepreneur. The pre start-up and start-up phases, are the critical segments for entrepreneurs. During these two phases, five factors are critical:

1. The relative uniqueness of the venture,
2. The relative investment size at start-up,
3. The expected growth of sales and/or profits as the venture moves through its start-up phase,
4. The availability of products during the pre-start-up and start-up phases, and
5. The availability of customers during the pre-start-up and start-up phases.

Specific Activities of Feasibility Analysis

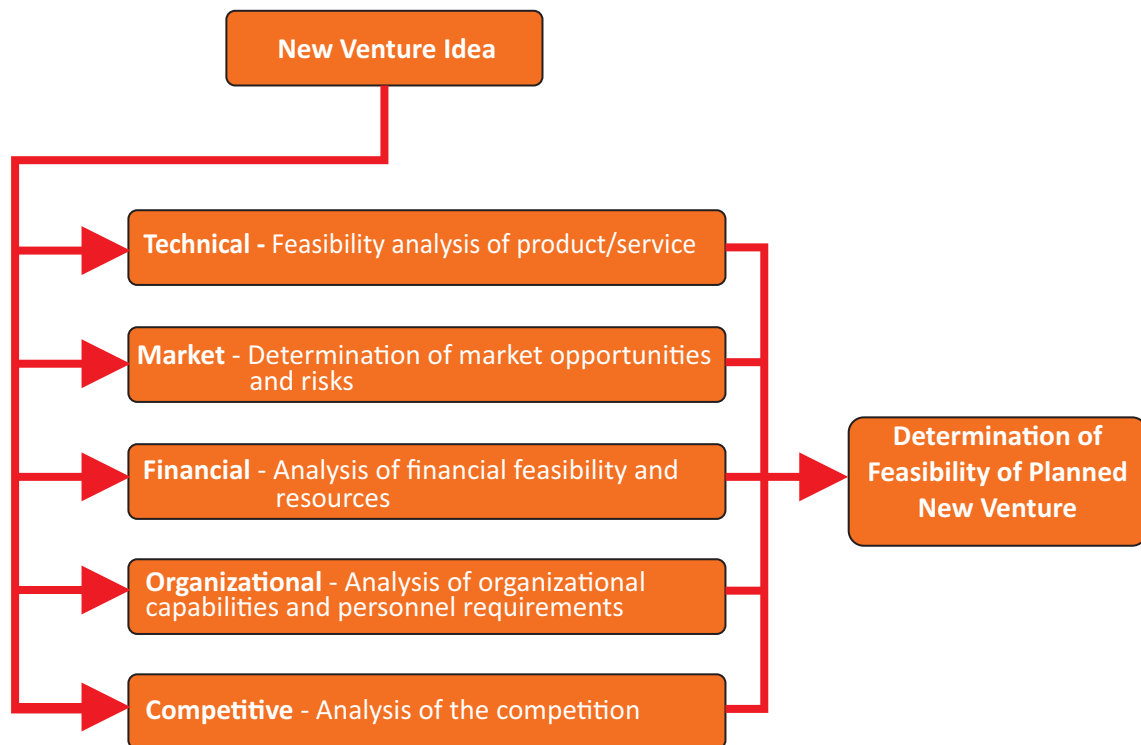


Fig 9.1.1 Dairy Farming economics and finance

Technical Feasibility Analysis	Market Feasibility Analysis	Financial Feasibility Analysis	Analysis of Organizational Capabilities	Competitive Analysis
<ul style="list-style-type: none"> • Standard quality specifications • Technical requirements • Product development • Product testing • Plant location 	<ul style="list-style-type: none"> • Market potential • Market planning issues 	<ul style="list-style-type: none"> • Required financial resources • Available financial resources 	<ul style="list-style-type: none"> • Personnel requirements • Required skill levels of potential employees • Managerial requirements • Determination of individual responsibilities 	<ul style="list-style-type: none"> • Existing competitors • Size, financial resources, market entrenchment • Potential reaction of competitors to newcomer • Potential new competitors • Scope for future expansion

Project Evaluation

- Project is a specific plan or design presented for consideration.
- It is a location specific activity with specific objectives, time and cost limitations and of non-repetitive nature.
- In banking, projects refer to an activity in which financial resources are expended to create capital assets that produce benefits over an extended period of time and which logically lends itself to planning, financing and implementing as a unit whereas, UNIDO defines a project as a proposal for an investment to create and or develop certain facilities in order to increase the production of goods/services in a community over a certain period of time.

- Projects are common term used by many to denote specific action plans.
- Project can be long term or short term, limited or comprehensive, single sector concentrated or multi sector concentrated.
- Project evaluation is a step-by-step process of collecting, recording and organizing information about project results, including short-term outputs (immediate results of activities, or project deliverables), and immediate and longer-term project outcomes (changes in behavior, practice or policy resulting from the project).
- Common rationales for conducting an evaluation are:
 - Response to demands for accountability;
 - Demonstration of effective, efficient and equitable use of financial and other resources;
 - Recognition of actual changes and progress made;
 - Identification of success factors, need for improvement;
 - Validation for project staff and partners that desired outcomes are being achieved.

Importance

Evaluating project results is helpful in finding answers to key questions like

1. What progress has been made?
2. Whether the desired outcomes were achieved, if not why?
3. Are there ways that project activities can be refined to achieve better outcomes?
4. Do the project results justify the project inputs?

Project: can be defined thus as

- A scientifically evolved work plan
- Devised to achieve specific objectives
- Within specified time limit
- Consuming planned resources

Dairy Project Planning

- Project planning can be defined as a scientific and systematic process, in which logical linkages are clearly
- established among various element of projects. Successful implementation of the project lies on effective
- project plan.
- Based on the anticipated goals and objectives the project planning shall be made.
- The project plan is the blue print of the project.
- Effective planning gives proper direction in the implementation of the project and it further helps inadequate monitoring and evaluation.
- For the implementation of plan, an activity chart has to be prepared.
- The activity chart consists of all the proposed activities in the implementation process, including the start date, calendar for the entire project, dates of monitoring and evaluation periods, finishing stages, series of out puts, slack time and responsible person who is going to coordinate the activities etc.

UNIT 9.2: Collect Information on Financing Institutions for Dairy Farming

Unit Objectives

By the end of this unit, participants will be able to:

1. Identify the Financial institution.
2. Identify and update with the schemes related to dairy farming.
3. Update with the documents required for the loan proposal from the financial institutions.

9.2.1 Collect information on Financing Institutions for Dairy Farming

Scheme

- The needy livestock farmer should visit bank in the local area and enquire with the bank manager about the livestock projects and after having discussion with him, he should visit the technical expert.
- A scheme can be prepared by a beneficiary after consulting local technical persons of State animal husbandry department, DRDA, SLPP, etc. livestock co-operative society/union /federation /commercial livestock farmers.
- If possible, the beneficiaries should also visit progressive livestock farmers and government/military/agricultural university livestock farm in the vicinity and discuss the profitability of livestock farming.
- A good practical training and experience in livestock farming will be highly desirable.
- The livestock co-operative societies established in the villages as a result of efforts by the Livestock Development Department of State Government and National Livestock Development Board would provide all supporting facilities particularly marketing of fluid milk.
- Nearness of livestock farm to such a society, veterinary aid center, artificial insemination center should be ensured.
- The scheme should include information on land, livestock markets, availability of water, feeds, fodders, veterinary aid, breeding facilities, marketing aspects, training facilities, experience of the farmer and the type of assistance available from State Government, livestock society/union/federation.
- The scheme should also include information on the number of and types of animals to be purchased, their breeds, production performance, cost and other relevant input and output costs with their description.
- Based on this, the total cost of the project, margin money to be provided by the beneficiary, requirement of bank loan, estimated annual expenditure, income, profit and loss statement, repayment period, etc. can be worked out and shown in the Project report.

Major Schemes:**1. Dairy Entrepreneurship Development Scheme (DEDS) by National Bank for Agriculture and Rural Development (NABARD)**

(a) Objective to bring structural changes in the unorganized sector of dairy farming. It also aims to setting up of modern dairy farms and providing employment opportunities for individuals.

(b) Who can apply?

- Farmers, individuals, self-help groups, companies etc. can apply for this scheme
- An individual entrepreneur is eligible for one time assistance on all the components.
- More than one family member can be assisted under this scheme provided that they set up different dairy unit parted by at least 500 m distance.

S.No.	Component	Unit Cost	Pattern of Assistance
1	Establishment of small dairy units with crossbred cows/ indigenous descript mulch cows like Sahiwar, Red Sindhi, Gir, Rathietc /graded buffaloes upto 10 animals. (for SHGs, Cooperatives societies , Producer Companies unit size will be 2-10 animals per member)	Rs 6.00 lakh for 10 animal unit — minimum unit size is 2 animals with an upper limit of 10 animals.	25% of the project cost (33.33% for SC / ST farmers), as back ended capital subsidy. Subsidy shall be restricted on prorata basis to a maximum of 10 animals subject to a ceiling of Rs.15,000 per animal, (Rs 20,000 for SC/ST farmers) or actual whichever is lower. Beneficiaries may purchase animals of higher costs, however, the subsidy will be restricted to the above ceilings.
2	Rearing of heifer calves — cross bred, indigenous descript milch breeds of cattle and of graded buffaloes — upto 20 calves	Rs 5.30 lakh for 20 calf unit — with an upper limit of 20 calves	25% of the project cost (33.33 % for SC / ST farmers) as back ended capital subsidy Subsidy shall be restricted on prorata basis to a maximum of 20 calf unit subject to a ceiling of Rs.6,600/- per calf (Rs.8,800 for SC/ST farmers) or actual whichever is lower
3	Vermi compost with milch animal unit (to be considered with milch animals/small dairy farm and not separately	Rs 22,000/-	25% of the project cost (33.33 % for SC / ST farmers) as back ended capital subsidy subject to a ceiling of Rs 5,500 (Rs 7300/- for SC/ST farmers) or actual whichever is lower.

4	Purchase of milking machines /milkotesters/bulk milk cooling units (upto 5000 lit capacity)	Rs 20 lakh	25% of the project cost (33.33 % for SC / ST farmers) as back ended capital subsidy subject to a ceiling of Rs 5.0 lakh (Rs 6.67 lakh for SC / ST farmers) or actual whichever is lower
5	Purchase of dairy processing equipment-for manufacture of indigenous milk products	Rs 13.20 lakh	25% of the project cost (36.33 %for SC/ST farmers) as back ended capital subsidy subject to a ceiling of Rs 3 30 lakh (Rs 4.40 lakh for SC/ST farmers) or actual whichever is lower
6	Establishment of dairy product transportation facilities and cold chain	Rs 26.50 lakh	25% of the project cost (33.33 % for SC / ST farmers) as back ended capita! Subsidy subject to a ceiling of Rs 6.625 lakh (Rs 8.830 lakh for SC/ST -farmers) or actual whichever is lower
7	Cold storage facilities for milk and milk products	Rs 33 lakh	25% of the project cost (33.33 % for SC / ST farmers) as back ended capital subsidy subject to a ceiling of Rs 8.25 lakh (Rs 11.0 lakh for SC/ST farmers) or actual whichever is lower
9	Dairy marketing outlet / Dairy parlour	Rs 1.0 lakh/-	25% of the project cost (33.33% for SC / ST farmers) as back ended capital subsidy subject to a ceiling of Rs 25,000/- (Rs 33,300/- for SC/ST farmers) or actual whichever is lower

2. Dairy Plus scheme for financing dairy unit by State Bank of India

(a) For construction of shed, purchase of milch animals, milking machine, chaff cutter or any other equipment required for the purpose.

(b) Who can apply?

- Individual farmers who are members of the milk procuring societies or located on milk route.
- They should be less than 65 years of age.
- Individual dairy unit having less than 10 animal - should own minimum 0.25 acre of land for every 5 animals for growing fodder and be in a position to procure the balance requirements locally.
- Individual dairy unit having 10 animals and above - should own or lease a minimum of one acre of land for cultivation of fodder for every 5 animals.

3. Agriculture Finance Dairy Farming - IDBI Bank Dairy Loans

Credit for Individuals and group of farmers for Purchase of high yielding milch animals (Cattle: Indigenous breed like Gir, Tharparker, etc. and exotic breeds like Jersey, Holstein friesian, etc. and in case of Buffalows: Mehsana, Jafarbad, etc.), Construction of cattle shed, Purchase of dairy equipments, chaff cutters, etc and expenditure incurred for transportation of animals where the animals are not purchased locally.

Who can apply? Individuals and group of farmers experienced in Dairy farming and are actively engaged in such activity. Loan Amount - Min. Rs. 20,000 and Max. Rs. 10 lakh

4. Dairy Development - Bank of India

Purpose

- To establish small dairy unit with 2 to 4 milch cattle.
- To establish new medium /large unit.
- Collection, processing ,distribution of milk & manufacturing of milk products.
- Purchase of improved/crossbreed milch cattle.
- Construction of cattle shed.

Who can apply? Farmer, Agriculture labours, Registered partnership firm, limited companies, dairy co-operative societies, SHGs. (For Commercial Dairy, submission of project report is necessary)

Quantum of finance - As per unit cost approved by NABARD / Project Cost

- Security
 - Loan up to Rs. 100,000/- Hypothecation of live stocks etc.
 - Loans above Rs . 100,000 /-
- ✓ Hypothecation of live stocks
 - ✓ Mortgage of land OR declaration as per april. credit act OR collateral security of adequate worth.
 - ✓ Third party guarantee if stipulated.

Exercise

1. Write a note on Major schemes which finance and support dairy farming business.

Notes



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UNIT 9.3: Estimate the Budget for Dairy Farming

Unit Objectives

By the end of this unit, participants will be able to:

1. Estimate the budget for the business
2. List out the inputs required for the business
3. Formulate the business proposal

9.3.1 Estimate the Budget for Dairy Farming

- The project budgeting phase is in the project formulation phase.
- Two types of budgets are to be made.
- One is the cost category budget (materials, administration, capital; expenditures etc) and
- The second is the activity budget.
- This project budget is to calculate the cost of each project inputs.
- The estimation of the project cost should be made on fairly realistic sense of financial values.
- In the multi year projects the inflation rate also has to be anticipated in advance.

Economics of Dairy Farming

A model project with 10 buffaloes is given below. This is indicative and the applicable input and output costs as also the parameters observed at the field level may be incorporated

A. Fixed Cost

Capital expenditures are defined as investments to acquire fixed or long lived assets from which a stream of benefits is expected. Such expenditures represent an organization's commitment to produce and sell future products and engage in other activities. The estimate of the costs and benefits of a capital project should show the difference that results from making the investment. The important information is the change in cash flows as a result of undertaking the project, i.e. the differential principle.

Cost of animals	Rs. 500000
Transportation cost	Rs. 10000
Construction of animal shed	Rs. 60000
Construction of calf shed	Rs. 24000
Total	Rs. 654000

B. Techno Economic Parameters

Type of Animal	Graded Murrah Buffalo
No. of Animals	10
No. of animals/batch	5
Cost of Animal (Rs./animal)	50000
Cost of culled animal	5000
Transportation Cost/Animal	1000
Average Milk Yield (litre/day)	10
Floor space (sqft) per adult animal	50
Floor space (sqft) per calf	20
Cost of construction per sqft (Rs.)	120
Cost of chaff cutter (power operated) (Rs.)	50000
Cost of equipment per animal (Rs.)	1000
Insurance premium (% per annum)	5
Veterinary aid/animal/ year (Rs.)	1000
Quantity of Concentrate feed in one bag(kgs.)	50
Cost of concentrate feed (Rs./kg)	12
Cost of dry fodder (Rs./kg)	2
Cost of green fodder (Rs./kg)	1
No. of laborers	1
Salary of laborer per month (Rs.)	4500
Cost of electricity and water/animal/year (Rs.)	150
Margin (%)	25
Rate of interest (%)	12
Repayment period (years)	5
Selling price of milk/litre (Rs./litre)	26
Sale price of gunny bags (Rs.per bag)	10
Lactation days	270
Dry days	150

C. Feeding Schedule

Type of feed	Lactation			Dry	
	Price (Rs.)	Qty. (kg)	Cost Per Day (Rs.)	Qty. (kg)	Cost Per Day (Rs.)
Concentrate Feed	12	5	60	2	24
Green Fodder	1	25	25	20	20
Dry Fodder	2	4	8	5	10
			93		54

D. Total Concentrate Feed Consumed (Kgs.)

Year	BATCH 1		BATCH 2	
	Lactation Days	Dry Days	Lactation Days	Dry Days
I	240	30	90	0
II	240	120	210	150
III	210	150	240	120
IV	210	150	270	90
V	210	150	270	90

E. Economics

Particulars	YEARS				
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Sale of Milk	429000	585000	585000	585000	624000
Sale of Gunny bags	1710	2790	2790	2880	2880
Total	430710	587790	587790	587880	626880
Cost of feeding during lactation	153450	209250	209250	223200	223200
Cost of feeding during dry period	8100	72900	72900	64800	64800
Veterinary aid and breeding charges	10000	10000	10000	10000	10000
Labor charges	54000	54000	54000	54000	54000
Electricity and misc. charges	1500	1500	1500	1500	1500
Insurance charges	25000	25000	25000	25000	25000
Total	252050	372650	372650	378500	378500
Surplus	178660	215140	215140	209380	248380

F. BCR, NPW & IRR

BCR is worked out by dividing the present value of cash inflows by the present value of cash outflows.

- If the BCR is more than one, that project is accepted and if BCR is less than one the project is rejected.
- Among the different projects, the project with highest BCR is to be selected.

$$BCR = \sum_{t=1}^n B_t / (1+r)^t - \sum_{t=1}^n C_t / (1+r)^t$$

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Capital Cost	654000				
Recurring Cost	252050	372650	372650	378500	378500
Total Costs	906050	372650	372650	378500	378500
Benefit	430710	587790	587790	587880	626880
Net Benefit	-475340	215140	215140	209380	248380

The Net Present Worth which is also called as Net Present Value (NPV) is nothing but the present value/worth of the cash flow stream in the project.

- The cash flow in the project is the difference between cash inflow and cash outflow.
- The investments made in the projects are generally called costs or cash outflows.
- The receipts that accrued during different time periods are called as cash inflows or gross returns.
- The cash flows discounted with an appropriate discount rate will give the net present worth of the project.

$$NPW = \sum_{t=1}^n B_t / (1+r)^t - \sum_{t=1}^n C_t / (1+r)^t$$

life span of the project

The choice criterion using NPW is that the project with positive NPW is accepted for implementation and the project with negative NPW is rejected.

- If he is to choose among different projects, the project with highest NPW has to be chosen.
- IRR is the rate of return per rupee invested in an agricultural project over its life span.
- For example if the IRR is 30 per cent in a livestock project, it means that this project gets an average annual return of Rs. 30/ per Rs. 100/ invested in the project over its life span.
- It is the rate of return at which the present value of total cash flows in a project is equal to zero. In other words, it is the discount rate at which the NPW of the project is zero, i.e.

$$IRR = NPW = 0 \text{ or } IRR = \sum_{t=1}^n \frac{P_t}{(1+r)^t} \quad (\text{Ignore the signs})$$

$$IRR = \frac{\text{Lower discount rate} + \text{Difference in discount rate} \times \frac{\text{Present worth of cash flow at lower discount rates}}{\text{Total of present worth of cash flow of both discount rate}}}{1}$$

$$\text{Present worth} = \frac{\text{Future value}}{(1+r)^t}$$

- For a project to be viable it should have a BCR of one or greater than one at the opportunity cost of capital and a NPW of zero or greater than zero at the opportunity cost of capital and the discount rate for IRR should be greater than the opportunity cost.

PW Costs @ 15%	1719259.92
PW Benefits @ 15%	1853258.04
NPW	133998.11
B.C. Ratio	1.08
I.R.R. (%)	30

A . Loan Repayment Schedule

Payback period refers to the period of time required for the return on an investment to 'repay' the sum of the original investment. For example, a Rs.1000 investment which returned Rs.500 per year would have a two year payback period. Shorter payback periods are obviously preferable to longer payback periods, other things being equal.

Payback period as a tool of analysis is often used because it is easy to apply and easy to understand for most individuals. The payback period is considered a method of analysis with serious limitations and qualifications for its use, because it does not properly account for the time value of money , risk , financing or other important considerations such as the opportunity cost. It is generally agreed that this tool for investment decisions should not be used in isolation.

Alternative measures of 'return' preferred by economists are net present value and internal rate of return. An implicit assumption in the use of payback period is that returns to the investment continue after the payback period.

Pay back period is a simple technique of ranking projects based on the actual period of time in which one can get back total investment.

$$P = I/E$$

where, P is the payback period, I is the total investment made in the project and E is the net cash revenues / net revenues per annum.

Year	Loan Outstanding	Gross Surplus	Interest	Principal	Total Repayment	Surplus
1	490500	178660	58860	98100	156960	21700
2	392400	215140	47088	98100	145188	69952
3	294300	215140	35316	98100	133416	81724
4	196200	209380	23544	98100	121644	209380
5	98100	248380	11772	98100	109872	138508

Exercise

- Q.1. Define fixed cost.
- Q.2. Write a note on techno economic parameters to be considered in the Dairy farming B plan?
- Q.3. Define payback period.

Notes



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UNIT 9.4 : Market Information Management

Unit Objectives

By the end of this unit, participants will be able to:

1. Ascertain the prices of various inputs and milk and milk products from the market.
2. Assess the influence of various quality parameters of the milk on the milk pricing.

9.4.1 Market Information Management

I-DIS

- Internet-based Dairy Information System (I-DIS)
- National Dairy Development Board Developed
- To provide a platform through which all the unions and federations can share their data
- To compare its performance with other contemporary unions on varied performance parameters.
- Key information shared include o number of village dairy cooperatives societies
- Member details
- Quantum of milk procured & sold,
- Milk products made & sold and
- Technical inputs supplied among others.

Information Network for Animal Productivity and Health (INAPH)

- NDDDB has developed an Information Network for Animal Productivity & Health (INAPH),
- Desktop/ Netbook / Android Tablet based field IT application
- Capture real time reliable data and data type, breeding.
- Nutrition and Health Services delivered at farmer's doorstep.
- Beneficiaries - farmers, field functionaries, Union, Federation.

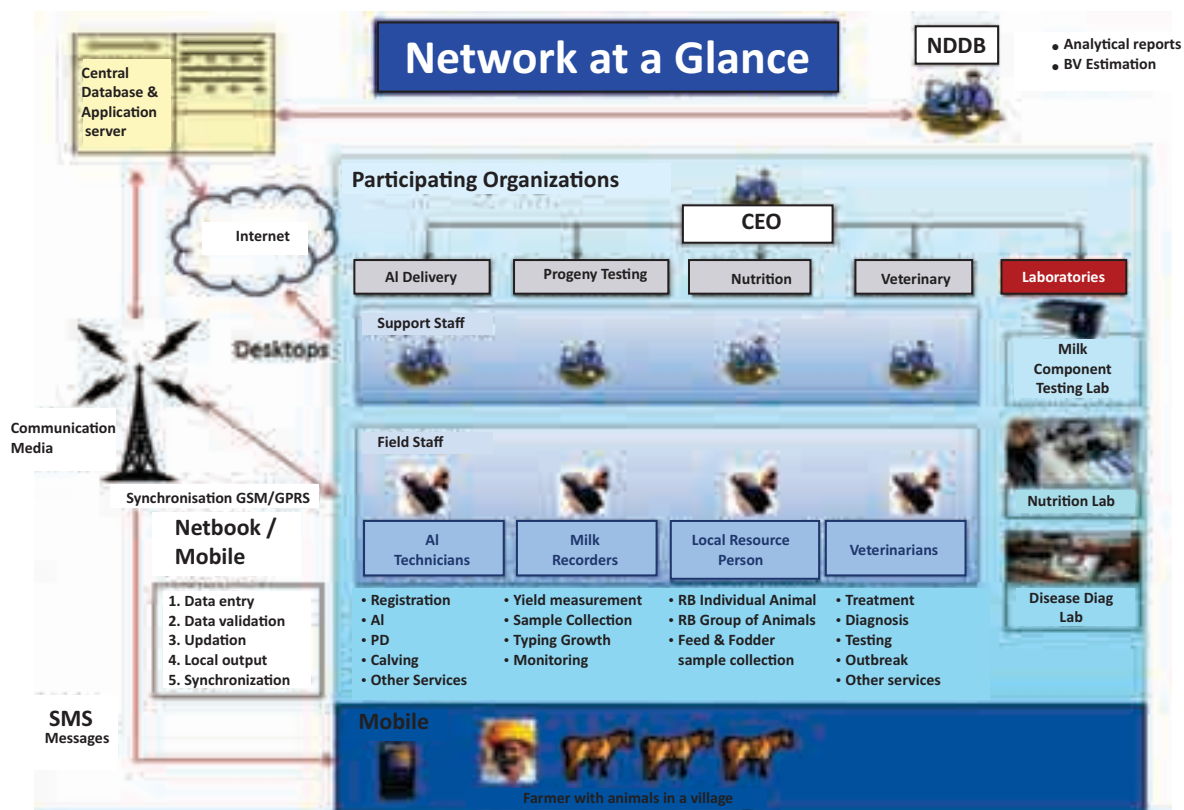


Fig 9.4.1 Market Information Management

Market Information

Agmarket

- Agmarket is the portal developed by government of India which provides the following information useful for Dairy Farmers.
- Commodities market arrival and price information eg. Maize
- Dairy Cow/Buffalo Price Information

A Farmer Decision Support System

- Kisan gates a leading agro - informatics organization based out of Hyderabad developed an Android based mobile APP to provide decision support to Dairy farmers based market and agro-climatic dynamics.
- Kisan Gates(KG) has also developed an APP called PANDO which provided Field force management and dairy performance monitoring services to Dairy Entrepreneurs.

The Solvent Extractors' Association of India

Solvent Extractors association of India(<http://www.seaofindia.com/>) provides the periodic price updates of major protein based feed ingredients i.e, Soy Bean Meal, Ground nut oil cake and Rice/Wheat Bran

Milk Quality

Physical Quality of Milk

- Milk should be Clean
- Free from sediments, dirt, odor or foreign bodies
- Free from antibiotic residues
- Free from added water

Microbial Quality of Milk

- Aerobic Plate count – 30x10³/ml (Min) - 50x 10³/ml (Max)
- Cominform Count - Absent/0.1ml (Min)
- Staphylococcus aureus - Methylene blue reduction test (MBRT) applicable at Manufacturing unit shall not decolorized in 5 hrs. w
- Yeast and Mold count - Methylene blue reduction test (MBRT) applicable at Manufacturing unit shall not decolorized in 5 hrs. w

Food Safety Standards Of Milk 2006			
Class of Milk	Designation	Fat %	Solid Not Fat(SNF) %
Cow	Raw boiled pasteurized flavoured and sterilized	3.5	8.5
Buffalo	Raw, pasteurized, boiled, flavoured, sterilized	5	9

Exercise

- Q.1. Write a note on market information management.
Q.2. Write a note on milk quality and marketing.

Notes



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UNIT 9.5 : Manage the Records of the Business

Unit Objectives

By the end of this unit, participants will be able to:

1. Proper maintenance of farm budget.
2. Record the live stock and feed purchase.
3. Keep all the record of expenditure.
4. Record the Income statement and revenue etc.

9.5.1 Manage the Records of the Business

Proper management is the key to success in any enterprise, and the dairy business is no exception. Each successful dairy farmer must have records which are accurate and reliable to make sound management decisions.

Records of identification and pedigree, production, feed, reproduction, health and costs help producers

- Cull the least profitable cows,
- Feed for most efficient production,
- Make precise management decisions for greatest returns and
- Select animals with the greatest genetic producing ability for herd replacements and for breeding a better herd for the future.

Records are Important and Answers the Following Queries

- Are the cows produce same amount of milk from the feed as compared to last year?
- Is the farmer meeting the breeding goals on this feed?
- Is the dairy farm profitable?
- Why records are important
 - ✓ Scheduling and organizing day to day activities
 - ✓ Monitoring for early appearance of problem
 - ✓ Diagnosing problems efficiently

Records can be Used

- To provide early warning system
- Tools to diagnose problems
- Performance indicators in dairy farm
 - ✓ Production - milk/ cow/day
 - ✓ Herd lactation status - Days in milk
 - ✓ Reproduction - Pregnancy rate
 - ✓ Udder Health - Somatic cell count
 - ✓ Culling and replacement rate - Cull rate

- Record keeping options for the farmer o Manual calculations, working on individual sheets
 - ✓ Custom excel sheet for the farm
 - ✓ Commercial dairy record analysis program
- As herds increase in size, less individual attention can be paid to one particular cow. As a result, larger herds now require more effective tools for making decisions concerning the management of the dairy. These decisions are based on information summarized, which allows the dairy producer to have management reports available for an individual cow, a group of cows or the herd.
- These reports then allow the quality and effectiveness of management to be improved by using information in a condensed form
- These management reports should cover all areas of herd management, including production, nutrition, reproduction, inventory, replacements, financial and health. Everyone manages differently, so these reports should have the ability to meet the specific needs of any dairy. Printing the reports should be easy where a single command gives the producer a complete, up-to-date report. The reports should be easily understood and could serve as a temporary or a permanent record.
- Milk production records, including liters of milk, fat percentage, protein percentage and somatic cell count, are integral parts of any dairy management record system for groups of cows and are best for individual cows.
- Also, feed records should be kept for each cow or group of cows and should include feed inventory records.
- Reproductive records should include calving, breeding and fertility data as well as date of birth, date of all estruses or heats, breeding dates including the sire used and results of veterinary checks including pregnancy checks.
- Health records should include all vaccinations, all diseases the animal has had and the somatic cell count data from the analysis of the monthly milk records. Reasons for culling animals and problems on a specific day should also be included in the records.
- Financial records should total costs of production including costs of equipment, land and facilities. Records should include the price of the milk per hundredweight and allow manipulation of the data to calculate costs per hundredweight of milk.
- Financial records are now allow dairy producers to project what an individual cow may produce in the remainder of her lactation, and a financial analysis can indicate the financial results of culling her. In turn, this may indicate whether it is more profitable for the manager to cull her, keep her or cull another cow. In other cases, these records may project his cash flow for the next month, year or other period of time using reasonably valid assumptions of future prices and yields.

Herd Summaries and Comparisons

The dairy producer should choose a software program that best suits his/her needs. The program should provide analyses of milk production, feed, reproduction, health and financial data and allow for comparisons among individual cows within the herd, groups of cows within the herd and a comparison to other herds in the region and across the country. The data should allow dairy producers to determine how they compare to other dairy producers so they can determine the strong and weak points of their operation. This comparison allows dairy producers to determine the areas they can most improve in their herd management.

The collection of raw data should also allow dairy producers to compute management reports which will provide herd summaries. These allow dairy producers to manage their herds more efficiently so they can spend less time with their records and manage only animals needing attention on a particular day.

Individual Animal Records

By storing lifetime health information on each animal in the herd, immediate access to health history is available. For example, all health activities and treatments of an individual animal should be available on a management report if needed. Also, it is important to be able to retrieve a management report listing all animals which have had a particular disease (i.e., acute mastitis) or a management practice (i.e., dehorning) so producers can see if a particular disease or condition exists in their herds.

Farm Budget and Income Statement

- Simply stated, income statement is excess of revenue over expenses. If the expenses exceed the revenue the result is a loss to the farm.
- Income statement is generally prepared for one agricultural year, i.e. at the end of the year. However it may also be prepared over a period of time, so that one can know the trend in receipts and expenses which indicates the success or failure of a farm business.
- It shows whether the farm is running under loss or profit. Hence it is also called as Profit and Loss Statement.
- It is different from balance sheet in that the balance sheet indicates about the assets and liabilities but not about the operational efficiency of the farm business in terms of receipts, expenses, profit and losses.
- The objective of preparing Income Statement is to summaries the income and expenses incurred in the farm throughout the year and present them in a schematic picture. This statement lists all the farm expenses on one hand and all the receipts on the other.

Revenue

- In the revenue realized through the sale of following items are included.

Opening Receipts

- Crops and feed
- Livestock and Poultry sold
- Livestock and Poultry Products sold
- Custom work- cash
- Government payments and patronage dividends, gifts etc.

Capital Receipts

- Breeding stock
- Machinery and equipment
- Appreciation in the value of assets

Non Farm Income

- Interest and dividends

Opening Expenses

- Labour charges
- Repairs
- Rents and Leases
- Seed and Fertilizer
- Chemicals
- Livestock expense(Breeding Vet., etc)
- Gas Fuels, Oil
- Insurance
- Utilities(Electricity, Gas, Telephone)
- Marketing and transport expense
- Interest on working capital

Live stock and Feed Purchase

- Capital Expenditure/Fixed expenses

Machinery and Equipment

- Building and Improvement
- Depreciation
- Interest on fixed Capital
- Rental value of owned land

Exercise 

Q.1. Write a note on Manage the records of the business.

Notes



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UNIT 9.6 : Understand Method of Marketing

Unit Objectives

By the end of this unit, participants will be able to:

1. Plan for the marketing of dairy farm produce.
2. Update with the market trend.
3. Plan for the marketing strategy.

9.6.1 Understand Method of Marketing

For a dairy farmer, Milk marketing can be a difficult and confusing proposition. There are so many things to think about. The farmer needs to understand answers to these questions to develop and act on a marketing plan. A solid plan is an effective weapon in managing the emotions involved in milk marketing.

Milk price has become more variable over the past decade. A milk marketing plan tries to reduce the amount of price variability. The purpose of milk marketing is to get a good average price more consistently. Trying to outguess the market can lead to more variable milk prices, rather than less.

A marketing plan is a proactive strategy to price your milk that considers your financial goals, cash flow needs, price objectives, anticipated production, and appetite for risk. The old saying 'knowledge is power' is true when it comes to developing and implementing a milk marketing plan. Knowing the milk price that will cover your needs gives you the power to act.

There are two pieces of information farmer must have to calculate for milk price: milk production and total cash needed. Milk production is the easy one to figure out. Total cash needed takes a little more time to determine but is worth the effort once you have the numbers. Having a good record system to track both direct and overhead expenses is important not only to help make business decisions throughout the year but also in order to put together a good milk marketing plan.

1. Organize a Cooperative Group

Small Dairy farmers have only a few animals giving milk at any one time and will have only a small surplus to sell. Dairies and retailers, on the other hand, require a reliable daily supply of milk, in a sufficient quantity and of a reliable quality.

- Organize a group of producers to produce and sell your milk. Together, you can produce enough milk to make it worthwhile for a trader to pick up, process and sell it. You will have a stronger bargaining position with the buyer, and you can share tasks, exchange information and get services such as credit and training.
- Make sure that women are part of the group: they often do the milking, make butter and cheese, and sell dairy products on local markets. They need milk for cooking and to feed to children.

Advantages	Disadvantages
Cheaper farm inputs	Conflict of interest
Better prices	Interpersonal conflict
Expert marketing	Sharing responsibility
Improved market knowledge	Lack of startup funds
More economic power	Lack of expertise of farmers as board members
Better quality products	

2. Set Up a Milk-collection Point

It is costly and time-consuming for a dairy to pick up small amounts of milk from scattered locations. Setting up a collection centre will encourage traders or dairies to buy your milk and get you higher prices.

- Set up a collection centre with your milk-producers' group at a convenient location.
- Arrange for all members of your group to deliver their milk to the collection centre each morning, and for the milk to be picked up quickly by a refrigerated truck.
- Make sure the milk that members bring to the collection centre is fresh and uncontaminated.

3. Start a Small Processing Plant

A small processing plant nearby can buy your milk and create jobs for the community. It can serve local consumers or supply a larger dairy in town. It can be run only in the wet season when there is enough milk available for processing. It can pasteurize and package milk and turn it into yoghurt, ghee and other products.

- Before investing any money, develop a business plan: you will need to research the potential market and products.
- Set up a small-scale processing plant in a convenient place.
- To keep milk fresh, you need to boil or pasteurize it, then cool it Down. You can pasteurize milk by heating it to 63 degrees C for 30 minutes. Allow it to cool, then put it in a refrigerator.

4. Direct Marketing

Direct marketing is selling directly to consumers – individuals, families, restaurants, tour groups, big companies and others.

A typical direct marketing farmer tends to be:

- Small scale
- Diverse in their product range (fruit, vegetables, flowers)
- **Flexible** – Timing their production schedule with their distribution strategy
- **Socially Adept** – Fostering social links with other farmers who direct market and with consumers.
- **Value Adding** – Farmers who are able to value add their product, benefit from direct marketing
- **Using Sustainable Practices** – Small-scale production and social collaboration tend to promote social and environmental sustainability

Advantages	Disadvantages
Capture higher share of value	Time consuming
Better product quality	Needs marketing skills
Remove/reduce middle men in the chain	Sales attitude
Low promotion cost	Area of operation is small/limited
Competitive prices	Resource constrained (to promote in radio, TV etc)
Less overhead on marketing	

Decisions that can be made using market information.

Business Type	Information
Input supply industry	Forecasting sales
Food processors	Timing input purchases Devising market strategies
Farmers	Planting, purchasing, marketing Developing business plans for credit Identifying potential markets
News Media	Timing purchases Planning production Projecting costs and returns
Food service industry	Resource constrained (to promote in radio, TV etc)
Farm Advisory Services	Creating farm budgets Decisions about profitability Timing of operations
Exporters	Timing purchases Devising market strategies
Governments	Operation of commodity programs Formulation of farm legislation Anticipating and reacting to developments

Exercise

- Q.1. Write a note on planning and marketing strategy.
- Q.2. Create the new innovative marketing strategy for the dairy products (for village and urban area customers).

Notes



A large rectangular area with a thin orange border, containing 30 horizontal lines for writing notes.

UNIT 9.7: Develop Contact with Market Players

Unit Objectives

By the end of this unit, participants will be able to:

1. Plan for the marketing of dairy farm produce.
2. Update with the market trend.
3. Plan for the marketing strategy.

9.7.1 Develop Contact with Market Players

Establish cordial relations with various clients for the benefit of dairy farm development

Assess the needs and requirement of the clients and assess one's own unique selling proposition

Extract critical market information that is otherwise not in the public domain

Client Relationship Management is the Strategy used to learn more about customers' needs and behaviors in order to develop stronger relationships with them. Research has shown that companies that create satisfied, loyal customers have more repeat business, lower customer-acquisition costs, and stronger brand value—all of which translates into better financial performance

Importance of CRM

- Increase customer service levels
- Improve efficiency of dairy units
- Cross-sell products more effectively
- Help sales staff close deals quickly
- Simplify marketing processes
- Increase ROI

Relationship Management Focuses on

- Establishing
- Developing
- Maintaining

Successful Exchanges with Customers

Retention of customers gives greater benefit over acquisition of new customers

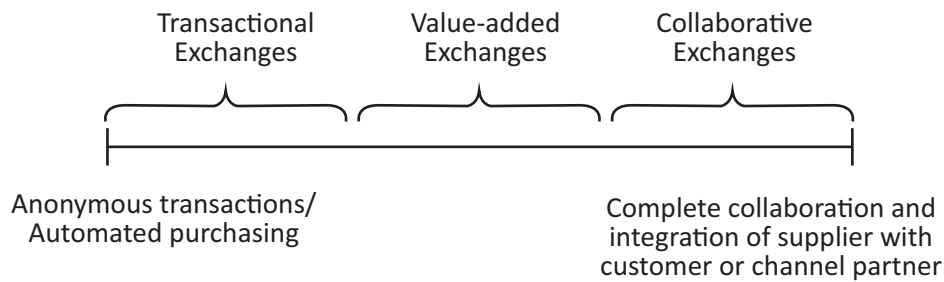
- Builds trust and loyalty
- Up-sell and cross sell opportunities

Move customers through the life cycle

- Acquisition, Growth and Retention
- Movement will maximize their value and increase profits

Studies indicate that increasing the number of customers a company retains each year by just 5% can increase contribution to shareholder value by 40% to 95%

Types of Relationships



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Fig 9.7.1 Types of relationships

To develop 'key supplier' status, sellers need to:

- Target the right customer.
- Match with their purchasing situation.
- Develop strategies that are appropriate for each type of buyer. Collaborative buyers seek long, strong and lasting relationships.
- Buyers perceive significant risks with suppliers, so competence and commitment are vital when starting the relationship.

Customer Relationship Management (CRM) is a cross-functional process for achieving:

- Continuing dialog with customers across all contact and access points
- Personalized service to the most valuable customers
- Increased customer retention
- Continued marketing effectiveness

A CRM program cannot help unless a company employs the proper strategy to secure and retain profitable customers. - Special attention must be given to five areas.

- Acquire the right customer.
- Craft the right value proposition.
- Institute the best processes.
- Motivate employees.
- Learn to retain customers.

10. Engagement in Collective Farming/Activities



Unit 10.1 - Collectivization and Aggregation to form
Group Organizations



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Describe the process of forming PG/FIG/SHG, their management, and operation.
2. Describe the various laws and regulation regarding PG/FIG/SHG.
3. Describe the importance of organizing the meetings and training of PG/FIG/SHG.
4. Describe the process of group's credit facility and the concept of group owned bank.
5. Enlist core collective farming activities.
6. Explain the concept and benefits of forward and backward linkages.
7. Explain the benefits of value addition.

UNIT 10.1: Collectivization and Aggregation to form Group Organizations

Unit Objectives

By the end of this unit, participants will be able to:

1. Explain the concept of organising the meetings to form group organisations.
2. Explain the benefits of various capacity building exercises such as skill development and training programmes.
3. Explain the importance of planning optimal production to meet the market and household food security needs.
4. Describe the process of preparing for the Producer Groups (PGs)/Farmers Interest Groups (FIGs)/ Self-Help Groups (SHGs) etc.
5. Explain the importance of setting the group objectives and deciding the group income-generating enterprises/ activities, methods of operation, benefits, etc.
6. Explain the importance and process of conducting field trials to identify and resolve problems encountered by farmers in the field operations.
7. Explain the concept of the group- owned bank to provide quality seeds, fertilizers, pesticides, tools and equipment to the member farmers.
8. Describe the process of using the group's credit facility.
9. Explain various core collective farming activities such as procuring inputs in bulk, large-scale farming,
10. Explain the concept and benefits of forming forward and backward linkages.
11. State the relevant value addition practices such as processing, packing, upgrading the quality, etc.
12. Explain the benefits of connecting with similar groups to address common problems on a large scale
13. Explain the importance of setting the group objectives and deciding the group income-generating enterprises/ activities, methods of operation, benefits, etc.

10.1.1 Concept of Collectivization and Aggregation

Small farmers with holdings less than a hectare, in particular, and others, in general, are prone to all kinds of problems spanning time period of round the year as well as seasonal farm problems, viz., drought, cold, flooding, etc., sourcing & management of resources, storage, marketing and even processing before selling the produce at a plus price.

One of the ways the small farmers can overcome these common handicaps is by getting together and aggregating and sharing their resources, sharing best production practices, aggregating their produce and getting together at the time of marketing to enlarge their commodity base with a view to have bargain power, reasonable and recognizable presence in the market and at the same time, possibly add value to the raw produce and achieve higher engagement level of participant members and consequently, a higher income.

Govt. of India, recognizing the potential and advantage of this approach, set up an organization called Small Farmers' Agribusiness Consortium (SFAC). This organization's major goal and objectives is to help farmers achieve higher productivity at a relatively smaller cost with an effective & vigorous support in aggregating and marketing their farm produce. The government stepped into this kind of endeavor as it felt, by doing so, not only the farmers' incomes will go up but also it will impact the overall agri-economy in the state as well as the prevalent or emerging marketing / processing / value chain systems.

Govt. of India has targeted, by the year 2023-24, ten thousand units of these Farmer Producer Organizations (FPOs). An FPO may be single or multiple commodity based and also, it may be for marketing raw products or processed products from the produce available to them. This is anticipated to help development of vibrant, self- sustainable, income enhancing farming opportunities by leveraging economies of scale in production and marketing of agricultural and allied sector.

This idea has been generally well received and progressed. But the movement has come to face several challenges viz.,

- finding financial resources to manage collective enterprise
- lack of perspective
- managerial skills and training of manpower
- marketing problems.

Accordingly, some degree of flexibility was built into the proposed scheme of things to enhance possibilities of their success.

Aims and Objectives of the Scheme

- Providing a broad based, holistic and enabling environment to establish new 10,000 FPOs to in the country.
- Encourage enhancement of productivity, cost-effectiveness and profitable use of resource base, better liquidity and dynamic market access and linkages as a result of collective functional approach.
- Hand holding and providing whatever support is needed to new FPOs going up to five years from their formation, including company management, inputs & inventory management, best production practices, value addition and possibly processing (and use of technology etc.) to enable better market linkages, flow of funds, credit linkages, etc.
- To maximize capacity building of these FPOs towards agri-produce, agri-business skills to achieve viable and self-sustainable functional abilities further to the period of govt support.

Implementing Agencies- Access to Govt. Development Programs

The government has a desire to make the functioning of FPOs uniform and effective so as to able to better target the formation of FPOs and make them economically sustainable.

There are three Implementing Agencies responsible to assist in the formation and promotion of FPOs.

- **SFAC** for FPOs to be incorporated under Part IXA of the Companies Act.
- **NCDC** for FPOs to be registered under any Co-operative Societies Act of the States.
- **NABARD** for FPOs registered under either of the above two acts

In addition, if any State/ Union Territory has its own implementing agency, State/ UT approved by DAC & FW (center) then that agency will also constitute an authorized implementing agency

Before entering into an organized endeavor, Cluster-Based Business organizations (CBBO) are advised to undertake a "Feasibility Study" in assigned clusters on the following lines:

10.1.2 Formation and Promotion of Farmer Producer Organization

FPO is name which includes farmer-producers' organization incorporated/ registered either under Part IX the A of Companies Act or under the Co-operative Societies Act of the concerned States. However, FPOs registered under all kinds of Co-operative Societies Act of the State are required to be insulated from interference in everyday management, the election process, etc., for which, FPOs are mandated to make suitable provisions in their Memorandum of Association and Bye-laws, even as they have to be consistent with the Cooperative Societies Act of respective States.

Commodity Coverage

Formation and promotion of FPO are primarily based on "Produce Cluster Area", which means a geographical area with similar or of almost similar nature of crops/produce. An FPO, therefore can be formed for leveraging economies of scale in production and marketing. Natural Farming and Organic Produce are also covered in this exercise. Hence cluster approach will lead to various collective activities such as large scale common produce based activities, input procurement, credit and sales etc.

Eligibility to be an FPO

An FPO with a minimum membership of 300 is eligible for recognition in the plains region while in North-Eastern and Hilly areas* (including such other areas of Uts), a membership of 100 farmers will suffice. To achieve this, the following line of action is first taken up.

Members of the farming community having cohesively the same interest in close proximity of livelihood are encouraged to form a group of 15- 20 participants as a Farmer Interest Group (FIG) or Self Help Group (SHG), Farmers Club (FC), Joint Liability Group (JLG), Rythu Mitra Group. When 20 or more such groups have been formed, then, based on certain commonalities they can be put together to form an FPO.

Stakeholders - Who can be the Members / Part of FPO

In order that the FPO has an "inclusive" and also, perhaps an effective character, it is advisable to include small, marginal and women farmers/women SHGs, SC/ST farmers and other economically weaker categories. There are limitations of having too many members but an ideal FPO is expected to boast of a membership of 500-1,000 participants only. Also, the FPOs can federate at the district level and state level based on their need of processing, branding and marketing of produce/trading of commodities, which are essential for scaling up for survivability, competitiveness and growth.

How will it Operate

The FPOs will be equipped with the technical team with five categories of specialisation in Agriculture / Horticulture, Marketing and Processing, Incubation Service Provider, IT/MIS and Law & Accounting to provide overall guidance at all India level.

The supporting and funding agencies will be expected to provide handholding support and mentoring support to FPOs and they need to have extensive experience in performing strategic roles, preferably in the agricultural domain at the national and state level.

10.1.3 New Roles for Farm Extension in Capacity Building & Backward & Forward Linkages

Farm extension has largely addressed technology transfer, from research stations to farmers by using individual, group, and mass media methods. Recently, the scope of farm extension has been enlarged to include a "technology development role" by linking research with local community group activities by facilitating the development of Farmer Organizations /commodity organizations/cooperatives. The groups work towards sourcing owning and sharing various input, marketing, and educational services to the farmers. India has already introduced renowned dairy cooperatives with great success.

Formation of groups or Farmer Producer Organizations basically introduces new directions and roles to the farmers towards improving their lot on a social scale rather than just an individual level. The strength that is drawn from these organizations includes empowerment for growth, development, commitment and action by triggering imagination, innovation and concerted unceasing efforts. It brings out the best in local leadership towards a Community-Organizing and Human Resource Development Role. As a consequence, it supports applying skills in conflict resolution, negotiation, and persuasive communication, which in turn becomes a built-in Education Role.

There are many primary-level agricultural start-ups, formal companies and cooperatives in the developing world. This group of organizations can generate income from various measures including value addition at farm gate, sale of inputs and outputs, credit mobilization, education, etc. The income can then be put back into the organization by spending it on extension, data generation, business planning, and administration. It has to be conceded that FPOs have to operate and perform in a competitive environment.

The rate of success of these organizations is determined by their capacity to arrange for major investments and a continuous flow of raw materials appropriately backed by competent management of operations, enterprise, and member satisfaction. The profits generated are used to provide supplementary and supportive services at a reduced cost to encourage members to use them.

Participation in FPOs

The following aspects are known to influence the magnitude of fellow farmer participation in FPOs:

- Appreciation of the output activities of FPO and accruing advantage to participants
- A high-level belief and certainty in the availability of FPO outputs
- A high level of belief and faith in collective action and collective leadership
- Nature and extent of rewards accruing within a reasonable time frame and being commensurate with costs of participation in the collective activity.
- Perception of participating members on how sustainable the FPO activities are going to be over time, viz., how sustainable is FPO going to be.

Extension Component of FPOs – Updates & Demonstrations

The FPOs will continue to have close contact and cooperation with local, nearby farm extension personnel and organizations to keep a speedy update on new agricultural recommendations and sourcing of inputs necessary to adopt as well as speedily disseminate the same across members.

Greater importance and collective farmer participation must be shown towards demonstrating these technologies across the geography and demography of the FPO., need to provide specific information in addition to the general information available from research centers.

A number of new, effective and good-performance inputs are nowadays being made available by the private agri-input industries. These industries are keen to demonstrate their products to farmers at no cost and even make available the products on a short-term loan basis. FPOs can avail such free demonstration facilities together for better sustainable agriculture practices and improved productivity thereby leading to enhanced income in collective manner.

FPOs can employ this knowledge and facility to have active business contacts with the industry for the overall betterment of FPO outputs. This will have short-term and long-term benefits also in financially self-supporting the FPO.

10.1.4 Steps in Establishing Farmer Organizations

Some of the principles and steps for social action models, community organizations, and management are used in designing the simplified step-wise approach to establish FPOs (Chamala, 1990). Care needs to be taken in selecting a person or a group of people who will take the lead in establishing community-based or commodity-based farmer organizations.

This person - from another FPO or government or other organization, such as a village extension worker (VEW) - needs to be acquainted with and convinced of how the FO can be used to increase the income of small producers. In the following steps, the term VEW will be used to refer to the person or group of people selected to establish the FO.

Step 1: Understanding the Village Community

It involves using “Key informant”, tea stall gossip, direct participation or arranging community meeting, “walk the talk” techniques to collect qualitative and quantitative information on income, productivity, cost of cultivation, post-harvest losses, product disposal / utilization and potential for making significant improvement for the village and village folk.

Step 2: Identifying Potential Leaders in the Community

It is wise to search for and contact middle-aged leaders of the area who are not too young or too old. Preferably, they should come from better-off families, have social status and respect, and be from farming households. Case studies of leaders who have established farmer organizations show that these leaders initially made considerable sacrifices, experienced financial losses, and had to be supported by their families.

Step 3: Identification of Cluster Area

As discussed earlier in this chapter, it is perhaps an easier approach to initiate the process of FPO formation on a ‘cluster-based approach’ for produce or produce-mix, by focusing on “One FPO One Product” pattern so as to be able to develop product specialization. This in turn can encourage and catalyze the promotion of processing, branding, marketing and export of the product for better value realization. There may be more than one cluster for one product in the vicinity, taluka or even in a district. Yet, an economically sustainable, relatively risk-free and diversified FPO might act towards enhanced returns. A product-mix FPO will also boast of additional products and service mix and will provide for reducing underemployment at rural level with enough activities and engagements of the members throughout the year. Furthermore, uni- or multi-product FPOs can federate at the local or taluka or district level, as per their growth and needs of processing, branding and marketing.

Concerted efforts and priority are needed to be made to prioritize formation of FPOs in aspirational districts through intense awareness programmes, adequate support, handholding, training & skill development by implementing and supporting agencies but more so on voluntary basis by the community of farmers themselves because that is the mantra for long term survival of the group activity and sustainability.

A highly desirable, prospective and potential area for FPO formation relates to the forest and minor forest produce by the tribal communities. The benefits of quality input, technology, credit and value addition and processing as well as better market access should reach the tribal community and North-East Region through the Scheme in co-operation with Tribal Affairs Ministry, DONER and North Eastern Council (NEC). The FPOs which are already registered but have not been provided funds under any other schemes and have not yet started operation are also going to be covered under the Scheme.

10.1.5 Broad Services and Activities to be Undertaken by FPOs

Most common needs of member farmers as follows, must be taken care of by the FPO management

- Quality production inputs like seed, fertilizer, pesticides etc., at reasonably lower wholesale rates.
- Need based production and post-production machinery and equipment like cultivator, tiller, sprinkler set, combine harvester and necessary equipment on custom hiring basis for cost minimization .
- Value addition facilities like cleaning, assaying, sorting, grading, packing, storage and transportation at competitively less cost.
- Income generating activities and bringing down under-employment level by seed production and supplementary vocations like bee keeping, mushroom cultivation, etc.
- Aggregation of smaller lots of farmer-members' produce, safe storage and adding value at farm gate to catch more remunerative market.
- Collate and share market information to enable judicious decision in production and marketing.
- Facilitate logistics like storage, transportation, loading/unloading etc. on shared cost basis.
- Market the aggregated produce with better negotiation strength in the marketing channels.

Diagnostic Study Including Baseline Survey to Find Out:

- Nature and extent of total agri-produce.
- Current situation of farming, small, marginal and landless farmers for aggregation.
- Socio-cultural similarity.
- Identify minimum geographical area for potential interventions.
- Potential activities.
- Existing gap.
- Nature and extent of Interventions necessary viz., infrastructure, services, etc.
- Existing / prospective scope for value addition locally or centrally organized facility.
- Value chain of agricultural and horticultural produce including post-harvest management and marketing.
- Any other, based on local needs or possibility/potentiality.

10.1.6 Prospective Business Plan

A vital baseline requirement of a business enterprise like FPO would be to prepare and execute a Business Plans for short term spurt and long-term sustainability using processes and methodology for qualitative and quantitative application & to ensure best possible realization of stated objectives.

Business plan preparation (for different incubation services), acquiring land, mobilizing equity capital and implementation of Business must include a constructive action plan for input management, adoption & application of best agricultural practices, knowledge sharing, effective and timely aggregation, supply chain development and marketing along with establishing key market linkages with buyers/processors/exporters, trading, export, etc., as far as possible.

Other activities that are expected to find appropriate emphasis in action plan include:

- Establishing necessary common poolc for knowledge and information sourcing, production, storage, processing facility and marketing.
- Regular interface with stakeholders (Govt. Departments, Financial Institutions, Training, R&D Institutions).
- Availing Equity Grant and Credit Guarantee Facility as per need and growth from assigned authority.
- Incubation/hand holding services for sustainability, capacity building of BODs & sustainability.
- Create effective review and interface platform for monitoring the timely and effective implementation of desired outcomes.
- Assist in communication and dissemination of relevant information on all aspects of FPO functions.
- Ensuring that the programme/project targets are met effectively and timely.

10.1.7 Training and Capacity Building for Promotion of FPOs

Capacity building, training and skill development of management body (Viz., CEOs, BOD etc.) and other stakeholders is essential for working on a self-sustainable basis.

The capacity building includes aspects of:

- money management
- transfer of technology and innovation
- agricultural value chain with emphasis on value addition, processing, and marketing.

The subject matter of training covers accounting, auditing, compliance requirements, incubation, communication and management information systems. Success case studies are included as part of the training.

The Bankers Institute of Rural Development (BIRD), Lucknow is designated as Nodal Training Institution at the central level for FPOs promoted by NABARD and SFAC and other allowed/designated Implementing Agencies. The BIRD prepares a custom-made training module and training schedule for the concerned FPO. Training expenses, in case of BIRD being nodal agency are shared by Govt agencies and selected FPOs get the training without cost.

Laxmanrao Imandar National Academy for Co-operative Research & Development (LINAC), Gurugram promoted by NCDC is also designated as Nodal Training Institution for FPOs registered under Cooperative Societies Act and promoted by NCDC. It serves cooperative societies like BIRD serves FPOs. These Nodal Training Institutes ensure that training programme are held preferably in same State/UT wherein FPO . Coop trainees are located.

Nodal Training Institutes will ensure that BoDs, CEOs/Managers and other stakeholders etc. are trained twice in a year. Nodal Training Institutions will also evolve methodology to monitor and track the performance of trainees and their FPO organization to ensure effectiveness of training being provided.

10.1.8 Fund Raising – Credit Facilities

Central Sector Scheme of Financing facility under 'Agriculture Infrastructure Fund' takes care of the infrastructure development which is crucial for agriculture development and for taking the production dynamics to a profitable and sustainable level. It also takes care of vagaries of nature, the regional disparities, human resource development and realizing to the full, the real potential of land resources, even if limiting. Funding Agriculture Infrastructure Projects at farm-gate & aggregation points (Agri-Coops, FPOs, Start-ups, Agri - entrepreneurs) is a recent major input from Govt. of India towards impetus for the development of farm-gate & aggregation point, affordable and financially viable post-harvest management and infrastructure.

Non-banking organizations and Farmer Producer Federations like "Samonnati" (headed by a former chief of SFAC) also extend credit facilities on attractive terms to established and experienced FPOs after due diligence (evaluation and value of the work by FPO).

Also as stated elsewhere, agri-business and agri-input companies give loan in kind by placing their products at the disposal of the FPO which can pay the price after harvest of the crop

Banking Ecosystem

- With Credit Guarantee, incentive and interest subvention lending institutions will be able to lend with a lower risk. This scheme will help to enlarge their customer base and diversification of portfolio.
- Refinance facility will enable larger role for cooperative banks and RRBs.

Provisions Under the Scheme

1. Interest Subvention Cost

All loans under this financing facility will have interest subvention of 3% per annum up to a limit of Rs. 2 crore. This subvention will be available for a maximum period of 7 years. In case of loans beyond Rs.2 crore, then interest subvention will be limited up to 2 crore. The extent and percentage of funding to private entrepreneurs out of the total financing.

2. Credit Guarantee Cost

Credit guarantee coverage will be available for eligible borrowers from this financing facility under Credit Guarantee Fund Trust for Micro and Small Enterprises (CGTMSE) scheme for a loan up to Rs. 2 crore. The fee for this coverage will be paid by the Government. In case of FPOs, the credit guarantee may be availed from the facility created under FPO promotion scheme of Department of Agriculture and Family Welfare (DA&FW).

3. Administration Cost of Project Management Unit (PMU)

Farmers Welfare Programme Implementation Society under DA&FW will provide PMU support to the scheme at the central level and state PMUs of PM KISAN at state level. Services of knowledge partners will be engaged to identify clusters including export clusters and gaps in supply chains to target projects and prepare viable project reports to support the beneficiaries.

Eligible Projects

The scheme will facilitate setting up and modernization of key elements of the value chain including 'Post Harvest Management Projects' like:

- Supply chain services including e-marketing platforms
- Warehouses
- Silos
- Pack houses
- Assaying units
- Sorting & grading units
- Cold chains
- Logistics facilities
- Primary processing centers
- Ripening Chambers

Cap on Lending Rate

Lending rate of participating lending entities will be decided after due consultation with lending entities and same will be circulated to all stake holders. Lending institutions will sign MOU with DAC&FW/ NABARD for implementation of the Scheme. MOUs to be signed by DAC&FW/NABARD with banks/financial institutions with a view that NABARD will negotiate cap on lending rates in a fair manner.

10.1.9 Measures Taken by the Government to Promote the SHGs

GOI has included Self-help Groups (SHG) as a priority sector to mandate and enhance banks focus on them. Under this programme, banks were allowed to open savings accounts for Self-Help Groups (SHGs). Banks provide loans to the SHGs against group guarantee and the quantum of loan could be several times the deposits placed by such SHGs with the banks. It is being implemented by commercial banks, regional rural banks (RRBs), and cooperative banks. Banks should consider entire credit requirements of SHG members, such as:

- income generation activities,
- social needs like housing, education, marriage, etc. and
- debt swapping" (SHGs are eligible for priority sector advance under respective categories viz., Agriculture, Micro, Small and Medium Enterprises, Social Infrastructure, etc.

Self Help Groups -What are SHGs ?

Self-help Groups (SHGs) are formally organized groups of people coming together to alleviate limitations in the way of their efforts to improve their livelihood and living conditions. Mostly these groups pr SHGs are self-governed, largely democratically, and are often peer-controlled. Persons of mostly similar socio-economic background get together sometimes prompted by an NGO or govt agency.

Stages in evolution of Self Help Groups in India

- Formation of group
- Funding or Formation of Capital
- Development of required skills to boost income generation for the group

Agencies coming forward to help establish SHGs

- Non-governmental agencies engaged in social welfare
- Government
- Rural, industry and social welfare agencies / programs
- Banking and non-banking financial organizations assistance of Self- help
- FMCG companies, Ayurveda products companies, etc
- Entrepreneurs, start ups

Functions of Self Help Groups

- Build up a financial base by way of collective membership and Govt. Non-Govt supporting agencies to invest in group activities.
- Capacity building of the less endowed or neglected sections of society in terms of employment and income-generating activities.
- Extend loans towards essential needs (professional, household) of the group members.
- Managing / obviating collateral against loans to the poorer section of society.
- Attempting to resolve conflicts by way of discussions and creative and imposing leadership.
- Inculcate & encourage thrift and permanent habit of savings.
- Work on mutual trust by monitoring participants towards self and secure functioning.
- It is being increasingly recognized that SHGs are impressively and successfully addressing the most important elements of credit linkage in rural areas with sound community networks in Indian villages. SHGs are known to be giving credit access to the lowly placed poor and thus contributing to poverty alleviation.

Advantages of Self Help Groups

- Financial Inclusion (incentivize banks, address needy poorly endowed sections of society, assured returns).
- SHGs have given a presence and voice to the otherwise under-represented sections of society.
- Social Integrity (eradicate social ills like alcoholism, dowry, early marriage)
- Gender Equality (empowering women).
- Enabling the effective implementation of govt schemes (and also reducing the element of corruption).
- They also help ease the dependency on a sole occupation like agriculture.
- Impact on healthcare and housing (better family planning, reduced child mortality, better maternal health).
- Enhanced Banking literacy.
- SHG, have been allowed to run grain banks for the purpose of food security in food & scarcity regions.
- Priyadarshini scheme, with NABARD as the nodal agency, has aimed at women empowerment and livelihood enhancement through SHGs.

Deendayal Antodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM) seeks to alleviate rural poverty through building sustainable community institutions of the poor. One of the components of this yojana is the Mahila Kisan Shashaktikaran Pariyojana meant to promote agro-ecological practices, increase generation and reducing input costs and risks.

10.1.10 FPO Establishment Status

- More than 10,000 Farmer Producer Companies (FPCs) have been promoted in last one decade by various agencies including Ministry of Agriculture (MoA&FW), NABARD, Corporates and other institutions. Nearly, 80% of these FPOs came into existence in last Five Years. Interestingly, 60% FPOs are in the states of Maharashtra, UttarPradesh, TamilNadu, MadhyaPradesh, Rajasthan and Karnataka.
- FPOs have now been considered as “Value Led Enterprises” by Policy Think Tank to help achieve the target of DFIs. Govt is geared to create 10,000 more FPOs by 2026. Out of these 10,000, nearly 2500 FPOs were into making in 2021-22.
- Broad idea is to cover 14 million hectares by 2029-30 which should help in addressing structural weaknesses associated with fragmented land holding patterns (DFI Committee).
- Going forward, Government intends to integrate its various schemes with FPOs. So, there is paradigm shift happening from a production/productivity-oriented extension approach to nurturing a farmers’ enterprise to address livelihood issues of small and marginal farmers. However, a hybrid approach (clubbing the two) could yield better, which has not been well thought out.
- These FPOs created so far are widely diversified and need to be segregated properly with some typology based on Crops/commodities, Geographical regions, purpose, organizational forms, turnover etc. There is a strong need of creating a common database of FPOs.

A Successful FPO Establishment Case of an NGO

One of the NGOs working in agriculture and development sector known as Indian Society of Agribusiness Professionals (ISAP) has established more than 200 FPOs in 12 States/UTs of India and nearly 100 FPOs are in the making. 14 FPOs have Turnover of more than INR 1Crore. Another 12 FPOs have turnover between Rs 50 lakh to Rs 1Crore and 11 FPOs have turnover of Rs 20 - 50lakhs. All these 37 FPOs are from Haryana, Punjab and Karnataka.

A National Level Federation of Indian FPOs & Aggregators (FIFA) with 500 FPOs with 500 FPOs, promoted by ISAP has now been acquired with NAFED, Govt of India.

Challenges

There is serious need of integrating various welfare schemes with the FPO program, which is still a challenge. Agriculture is a State subject and FPO promotion is largely a central government push.

The policies need to be made conducive to FPO operations and include policies related to procurement; policies related to pricing (lack of consistency in public procurement and prices that affect operations and member loyalty) and difficulty in accessing subsidies (they are meant often for small farmers but many FPOs forgo due to high transaction costs). In short, it is boiling down to be able to raise funds through equity from member farmers, grants, loans and business activities.

Seasonality and lack of homogeneity in the agricultural output is big differentiator, when we compare it with Dairy sector. Unlike a startup, FPO cannot raise funds by selling its equity to potential investor/incubation agency.

Exercise

A. Short Questions

- Q.1. What do you understand by the terms SHGs and FPO?
- Q.2. Mention three most important services that a FPO can offer to farmer members.
- Q.3. Mention the names of central Nodal organizations designated to impart training to members of Board of Directors of FPOs and of Cooperative Societies.
- Q.4. What kind of agencies are involved in prompting or motivating farmers to develop SHGs and FPOs?
- Q.5. What do you understand by the term Business plan with reference to an FPO?

B. Fill in the Blanks

1. Small farmers should overcome problems like sourcing of resources, storage, marketing, processing before selling etc., by forming_____or_____to aggregate and share their resources.
2. A major central govt scheme under which FPOs can avail fund generation facility is _____.
3. Banks provide loans to SHGs against group guarantee and loan amount can be_____the number of deposits placed by such SHGs in the bank.
4. GOI has included SHG as a priority sector to mandate and enhance banks_____on them.
5. Formation of FPOs can be enhanced in_____districts through intense awareness programs by implementing and supporting agencies.

C. State True or False

1. A major function of the SHG is to extend loans to members to the underprivileged members towards meeting their professional or household needs.
2. There is no difference in nature of rules and by laws for groups registered as FPOs and Cooperatives.
3. The central Govt has set up a target of creating 10,000 FPOs in the country by the year 2024.
4. SHGs also help ease the dependency on a sole occupation like agriculture.
5. Financial inclusion and gender equality are two of the most important goals of SHGs.

11. Maintaining Health and Safety at the Work Place



Unit 11.1 - Cleanliness Around the Workplace



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Explain the risks to health and safety and the measures to be taken to control those risks in your area of work.
2. Enlist the workplace procedures and requirements for the treatment of workplace injuries/illnesses.
3. Describe basic emergency first aid procedure.

UNIT 11.1: Cleanliness Around the Workplace

Unit Objectives

By the end of this unit, participants will be able to:

1. Describe the importance of workplace safety.
2. Explain the know abouts of PPE equipment/kit.
3. Explain cleaning, disinfection and pest control measures.
4. Describe the importance of drainage and waste disposal around workplace.
5. Describe the importance of labeling and risk assessment practices in workplace.

11.1.1 Importance of Workplace Safety Checklists

Cleanliness around the workplace is important not only for making good impression but also for maintaining overall productivity in the organization. This is highly important phase for any organization to ensure customer satisfaction as well as keeping office environment safe, reducing the chances of potential hazards and accidents.



Fig. 11.1.1 Various characteristics of maintaining workplace checklists

11.1.2 Workplace Safety Inspection Checklists

Here are a few examples of items included on the self-inspection for general industry checklist:

- Employer posting of safety guidelines in a public and visible place
- Record-keeping of safety permits, occupational injuries and employee training records
- Safety and health program existence, consistency and participation
- Medical services and first aid availability, proximity and response
- Fire protection guidelines for alarms, hydrants, facilities and entryways
- PPE and clothing, such as gloves, aprons, safety glasses, goggles and hard hats
- General work environment sanitation, debris mitigation, hazard removal and waste management
- Walkway clearance, surface management, elevation measurement and bridge compliance
- Floor and wall openings
- Stairs and stairways
- Exit clearance
- Portable ladders
- Hand tools and equipment
- Power-operated tools and equipment
- Compressors and receivers
- Hazardous chemical exposures and handling practices
- Noise management
- Electrical

11.1.3 Personal Protective Equipment (PPE) Inspection

The PPE safety inspection checklist contains items that relate to workplace compliance in providing, maintaining, using and updating equipment that can protect employees from occupational hazards. Professionals across many industries can use the PPE checklist to identify hazards and find protective equipment solutions to support employee safety.

Here are a few examples of the items covered by the PPE inspection checklist:

- Hazard analysis performance and updating
- Eye protection standards
- Ventilation
- Hazardous waste management
- Noise level monitoring and hearing conservation
- Documentation guidelines for noise exposure
- Hearing protective equipment availability
- Respiratory risk identification
- Respirator availability, use and storage
- Medical qualifications for employee PPE
- Fall protection equipment
- Foot protection equipment



Fig.10.2.2 PPE kit¹

11.1.4 Cleaning and Disinfection

Cleaning is the removal of foreign material (e.g., soil, and organic material) from objects and is normally accomplished using water with detergents or enzymatic products. Thorough cleaning is required before high-level disinfection and sterilization.

Cleaning is done manually in use areas without mechanical units (e.g., ultrasonic cleaners or washer-disinfectors) or for fragile or difficult-to-clean instruments. With manual cleaning, the two essential components are friction and fluidics.

The most common types of mechanical or automatic cleaners are ultrasonic cleaners, washer-decontaminators, washer-disinfectors, and washer-sterilizers.

Methods of Disinfection

Chemical Disinfectants

- Alcohol
- Chlorine and chlorine compounds
- Formaldehyde
- Glutaraldehyde
- Hydrogen peroxide

¹Source:<https://www.freepik.com/PPE kit>

- Lodophors
- Ortho-phthalaldehyde (OPA)
- Peracetic acid
- Peracetic acid and hydrogen peroxide
- Phenolics
- Quaternary ammonium compounds

Master sanitation schedule shall be maintained for overall facility through checklists which includes:

- Areas, items of equipment and utensils to be cleaned;
- Responsibility for particular tasks;
- Cleaning method and frequency of cleaning; and
- Monitoring arrangements for checking effectiveness of cleaning.
- Person responsible for cleaning.
- Persons responsible for monitoring & verification of effectiveness of cleaning.
- In case of any deviation what correction & corrective actions being taken.
- Where ever chances of microbial risk with product air count & swab test being recommended.

Cleaning procedure should generally involve:

- Removing gross visible debris from surfaces.
- Applying a detergent solution to loosen soil and bacterial film (cleaning)
- Rinsing with water (hot water where possible) to remove loosened soil and residues of detergent.
- Dry cleaning or other appropriate methods for removing and collecting residues and debris
- Where necessary, cleaning should be followed by disinfection with subsequent rinsing.

11.1.5 Pest Control System

General Requirements

- The organization shall have a nominated pest control technician to manage pest control activities and/or deal with external pest management agency.
- Pest control program shall identify target pests and address plans, methods, schedules and control procedures.
- Program shall include a list of chemicals which are approved for use in specified areas.
- Effective sanitation and Hygiene, inspection of incoming materials and monitoring can minimize pest infestation and thereby limit the need for pesticides.



Fig. 11.1.3 General depiction of pest control measures²

11.1.6 Preventing Access

- Buildings shall be kept in good condition to minimize pest activity and to eliminate potential breeding sites. Holes, drains and other places where pests are likely to gain access shall be sealed.
- Windows, doors and ventilation openings shall be designed to minimize pest entry.

Harbourage and Infestation

- Storage practices shall be designed to minimize the availability of food and water to pests.
- Ingredients and materials shall be stored above the ground and away from walls.
- Where outside space is used for storage, stored items shall be protected from weather or pest damage (e.g., bird droppings).
- Any Potential pest harbourage such as burrows, undergrowth, old & unused equipment shall be removed.

²Source:<https://www.efacility.in/pest-control-system/>

11.1.7 Examine Workplace and Report Issues

Workplace Inspections are conducted to ensure all work areas are kept free from potential hazards that may lead to injury, illness, property damage or adverse effect on the environment.

In consultation with the local Health and Safety Representative, managers are required to perform inspections at all organisational places occupied by their staff or contractors.

An inspection is an examination of the workplace to check for hazards and operational safety standards are being maintained. An inspection may include an informal or formal, unplanned walk around the worksite and planned inspection.

An inspection:

- Evaluates the safety of existing operations or equipment.
- Checks for opportunities to improve health and safety.
- Identifies immediate or potential hazards.
- Gives positive feedback on good safety practices.
- Creates an opportunity to understand the concerns of staff and team leaders.
- Gives an effective way to monitor improvements and hazard control measures.
- Enables the closure of the corrective measures outstanding.
- Proves that management takes the safety of all workers seriously.
- Demonstrates compliance with Occupational safety and health (OSH) legislation.

An inspection can be carried out on the complete workplace, a specific region of operations or a single piece of equipment.

Regular scheduled inspections must be carried out by a team including line management (e.g. a supervisor or local manager) and the HSR (where elected). They should use checklists that have been tailored to the particular area and its operations.

11.1.8 Prevention of Accidents and Damages

A single workplace accident can leave a big impact on your business. There are elevated expenses between the medical charges, loss of productivity, all the compensation for employees' documentation and the lower moral.

The best way to avoid these expenses is by preventing an injury. Follow these 10 tips to safeguard your workers against injury.

- I have a plan for safety and wellness. An efficient accident prevention and wellness program is the basis for the secure work environment. The program should include all levels of employee safety and health and also encourage employees' to report hazardous practices or behavior.
- Conduct pre-placement physical examination. Inability and the inexperience to physically perform the job role are the reasons for some accidents. Screening candidates helps in placement of people with the positions matching their physical capabilities.
- Cultivate a safety standard among employees and management staff frequently. Train workers on the significance of safety measures as often as possible. Additional body mechanics training can decrease strain injuries and maintain workers safe while lifting and moving.
- Research safety vulnerabilities. Every business is unique and does not necessarily have the same safety concerns. Pay special attention to prevalent accidents and create strategies to prevent such setbacks.

- Provide protection equipment. Personal protection equipment is essential and should be enforced at hiring, meetings, and with spontaneous monitoring. Teach employees how to use goggles, facial protection, gloves, hard hats, safety shoes and earplugs or ear muffs correctly.
- Have adequate staffing levels. More often than not, overtime hours are implemented because of low staffing levels. Overworked employees suffer from exhaustion and can cut down corners in order to achieve or exceed output. The recruitment of part-time or seasonal personnel could assist avoid accidents owing to fatigue.
- Do not take shortcuts. Accidents occur when employees skip steps to finish a task ahead of schedule. Clear and organised all instructions for the prevention of undue occupational malfunctions.
- Inspect all company vehicles and maintain them. The Occupational Safety and Health Law reveals that an avg of 60 billion dollars annually is paid by employers in accidents at the work environment. Maintenance should include monthly inspections and repairing vehicles as soon as possible.
- Monitor safety measures. Strengthen security measures at every opportunity, i.e. meetings, supervision and education. Reward employees who comply with standards or who remain free of injury for a quantity of time is specified.
- Keep an orderly workplace. Poor housekeeping can lead to serious safety and health hazards. The layout of the workplace must have foot path markings, stations for cleaning up spills and be free of debris.
- Unfortunately, no matter how much you prepare, an accident can still occur, and an employee can still get injured. When that happens, make sure you're prepared to get them the care they need, quickly.
- Direct employees to attend fire drills and other safety related workshops organized at the workplace.

11.1.9 Personal Protective Equipment

Every work situation presents its own set of hazards such as traffic dangers, falling objects, chemical spills and excess noise which affects hearing, eye sight and can cause personal injury.

PPE is an equipment which is worn by employees to help minimise the effects of hazards. PPE includes items such as hard hats, goggles, respirators, ear muffs, a reflective vest, high visibility clothing, boots and gloves.

Head Protection: Helmet/hard hat/sun hat shall be provided where a risk of head injury exists, such as a person may get hit on the head by a falling object, A person may hit their head against the object, head contact with electric hazards may occur inadvertently.



Fig 11.1.4 Safety Helmet

Eye Protection: (Goggles, safety glasses) When there is a risk of eye injury, goggles / safety glasses should be provided. Typical hazards include flying particulate matter, dust, splashing substances, hazardous gases, vapours, aerosol and high-intensity radiation from welding operations.



Fig 11.1.5 Safety Goggles

Hearing Protection: (Ear plugs, ear muffs) Shall be provided where a risk of noise-induced hearing loss exists. Noise monitoring or surveys can evaluate the need for hearing protection.



Fig 11.1.6 Ear Plugs

Respiratory Protection: (Respirators face masks, cartridge filters) Shall be provided where there is a risk of airborne contaminants. This reduces the risk of atmospheric exposure that is harmful to health or can damage the health.



Fig 11.1.7 Respiratory Masks

Hand Protection: (Gloves, gauntlets) Shall be provided where there is an identified hazard associated with a potential for a hand injury. For every workplace a list of hazards is compiled and the appropriate hand protection is used to minimise risk.



Fig 11.1.8 Protective Gloves

Protective Footwear: (Safety boots, gumboots, enclosed shoes) shall be provided where the nature of the work exposes the employee to a medium to high risk of injury to feet, e.g. occupations such as workshop/maintenance and gardening staff.



Fig 11.1.9 Safety Boots

Body Protection: Body Protection (High - Thermal wear, visibility garments, safety harnesses, aprons) shall be provided to minimise the risk of injury happening to the body. Examples may include those who are required to operate continuously and for constant phases in a day are subjected to the rays of the sun. Hats, long sleeves/trousers and sun screen will reduce direct exposure of the skin to UV radiation.



Fig 11.1.10 Safety Jackets



Fig 11.1.11 Components of PPE

11.1.10 Hazards, Accidents, Fires and Emergencies

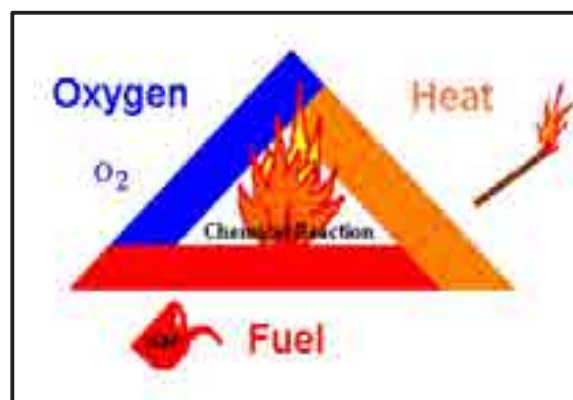


Fig 11.1.12 Fire Triangle

Extinguishing a fire occurs through the removal of one or more of the elements of the fire triangle.

Fire Extinguisher Categories:

Fire extinguishers are loaded with different dousing agents to fight specific classes of fires. Some types of extinguishers will be ineffective against certain classes of fires, while others could make the fire worse. Before trying to put out a fire, ensure the fire fuel is known and only proceed if the right type of fire extinguisher is available.

Class A: Suitable for cloth, wood, rubber, paper, various plastics and regular combustible fires. The extinguishing agent is water or foam.

Class B: Suitable for gasoline, grease and oil fires. The extinguishing agent is a dry chemical or carbon dioxide. Extinguishers smaller than 6 pounds (2.72 kg) are not recommended.

Class C: Suitable for energized electrical fires. The extinguishing agent is a dry chemical or carbon dioxide.

Class D: Suitable for combustible metals. The extinguishing agent is a dry powdered chemical.

Class K: Suitable for kitchen fires, including oil, grease and fat. The extinguishing agent is a wet or dry chemical.

Class ABC: This is an all-purpose fire extinguisher that works on class A, B and C fires. The extinguishing agent is a dry chemical.

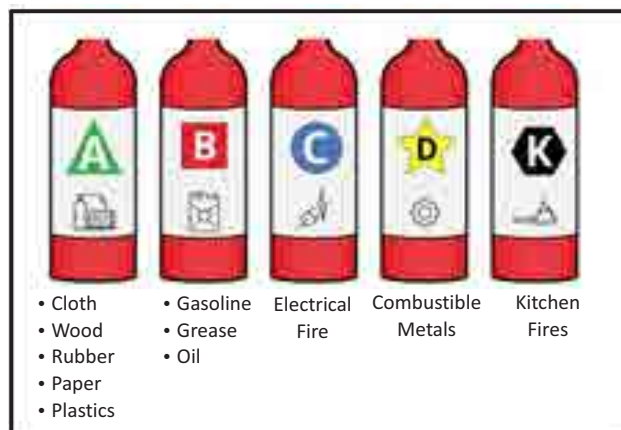


Fig 11.1.13 Fire Extinguishers Categories

How to Use Fire Extinguishers?

Remember the "PASS" word. To use a fire extinguisher, one must understand how to operate them properly. Before taking action to extinguish a fire, be sure that the fire is small enough to be extinguished. Know what material is burning and be sure that the proper type of extinguisher is selected. Stand at a safe distance (approximately 6 feet) away from the fire and follow the four-step PASS procedure. If the attempt to extinguish does not come under immediate control or the escape route is threatened, leave the area immediately.





	<p>PULL the pin out: This unlocks the operating lever and allows you to discharge the extinguisher. Some extinguishers have other devices that prevent inadvertent operation.</p>
	<p>AIM low: Point the extinguisher nozzle (or hose) at the base of the fire.</p>
	<p>SQUEEZE the lever below the handle: This discharges the extinguishing agent. Releasing the lever will stop the discharge. Some extinguisher have a button that you press.</p>
	<p>SWEEP from side to side: Moving carefully toward the fire, keep the extinguisher aimed at the base of the fire and sweep back and forth until the flames appear to be out. Watch the fire area. If the fire re-ignites, repeat the process.</p>

Fig 11.1.14 Fire Extinguisher Operation

Failure of Power:

This emergency situation involves failure of power for movement area lighting. Carry out the following activities in response to the situation:

- Notify staff and repair personnel of power outage.
- Start the generator.

11.1.11 Emergency Evacuation Pathways and Exit Signage

Emergency evacuation is the urgent or immediate removal of people away from an area that contains an imminent threat, an ongoing threat or a hazard to lives or properties.

Emergency evacuation is the urgent or immediate removal of people away from an area that contains an imminent threat, an ongoing threat or a hazard to lives or properties.

The key to a successful evacuation is situational awareness. In an procurement environment, personnel work in many different settings other than their primary work area. It is essential for the safety of employees, tenants and customers that each person becomes familiar with the standard indicators of evacuation routes and emergency exits.

- Emergency exits will be clearly marked and lit with an “EXIT” sign which is typically green and white.
- Exit signs are directional and mark the evacuation route. No arrow on the sign indicates go straight ahead; an arrow on the sign indicates a turn is needed to continue on the exit path.
- Pathways must be wide enough to accommodate a large number of evacuating personnel.
- Pathways must remain clear of debris or obstructions at all times.
- Routing must not expose evacuating personnel to additional hazards.



Fig 11.1.15 Evacuation Signs

Evacuation Do's and Don'ts:

If an exit leads to a stairwell, continue down the stairs to the ground level and exit the building at that time – do not stop on any floor unless instructed.

- Stairwells are typically rated for smoke and heat protection – if rescue assistance is needed, remain in a stairwell and wait for rescue personnel.
- Do not use the elevators.
- It is not advised to go to the roof, using helicopters for roof rescue is a dangerous procedure for the occupants, the pilots and firefighters.
- Follow directions of emergency responders and other response personnel.
- Make every attempt to account for all of your personnel.
- Report any missing people to evacuation monitors or emergency response personnel.
- Do not return to the building until emergency response personnel have permitted to do so.

Evacuation on Fire/Smoke

- Notify people to evacuate the area.
- Close the door to the room or area to confine the spread of the fire.
- Activate the fire alarm.
- Call fire station and inform about the condition and location.
- Walk. Do not run. Evacuate the building out from the nearest exit.
- Listen and follow directions of fire department and other response personnel.
- Notify fire department of any personnel remaining in the building and their location.

Evacuation During Earthquake

- Take immediate cover under tables or desks, or crouch against an interior wall.
- Do not stand in a doorway. Keep away from windows to avoid flying glass. Do not stand under light fixtures, or near objects that could fall.
- Evacuate the building only after the shaking has completely stopped.
- Keep calm. Do not run outwards, watch for falling debris or electrical wires when leaving the building.
- Proceed to the designated gathering area if it is safe to do so.
- If disabled or injured, remain in place and wait for assistance.
- If fire occurs, activate the nearest fire alarm pull station.
- If qualified, render first-aid. If not qualified, assist those rendering or requiring first aid.
- Report any missing persons to the fire department or other response personnel.

11.1.12 First Aid

Definition:

First aid implies instant therapy before medical assistance is acquired for the survivor of a new disease or incident.

An Injury is any wound or damage to the body resulting from an event. Damage or harm that is often localised. Injuries can be caused by activities, such as accidents, or physical trauma.



Fig 11.1.16 First Aid Symbol

Aims of First Aid:

First aid is based on scientific medicine and surgery. It is a skilled assistance. But the first aider is not a doctor. After the doctor takes charge, the first aider's responsibility ends. He can then stand by to help the doctor.

1. Preserve life

- Ensure the air passages are open and remain so.
- Check for and control bleeding immediately.

2. Prevent complications

- Cover wounds.
- Immobilise fractures and large wounds.

3. Promote recovery

- Reassure the casualty.
- Handle casualty gently and make him/her comfortable.
- Arrange to transport the casualty to hospital or obtain medical aid.

General rules to be followed as a first aider:

- Ensure that there is no further danger to the casualty
- Do first things first, quickly and without fuss or panic.
- Give CPR if breathing has stopped, every second count.
- Stop any bleeding.
- Guard against or treat for shock by keeping the casualty warm, by moving him as little as possible and handle him gently.
- Reassure the casualty and those around, to help to reduce anxiety or embarrassment.
- Do not allow people to crowd around, as fresh air is essential.
- Do not remove clothes unnecessarily, as they help to keep the casualty warm and to protect against shocks.
- Arrange for removal of the casualty to the care of a doctor or hospital as soon as possible.

Basic First Aid Kit:**A basic first aid kit should contain:**

- Small, medium and large sterile gauze dressings
- Plasters in a variety of different sizes and shapes
- Triangular bandages
- At least two sterile eye dressings
- Tweezers
- Safety pins
- Disposable sterile gloves
- Scissors
- Crepe rolled bandages
- Alcohol-free cleansing wipes
- Thermometer (preferably digital)
- Antiseptic cream
- Skin rash cream, such as hydrocortisone or calendula
- Cream or spray to relieve insect bites and stings
- Sticky tape
- Cough medicine
- Painkillers such as paracetamol (or infant paracetamol for children), aspirin (not to be given to children under 16), or ibuprofen
- Eye wash and eye bath
- Antihistamine tablets
- Distilled water for cleaning wounds



Fig 11.1.18 Basic First Aid Kit

Chemical Burns in the Eye

- Immediately rinse the eye or eyes under water tap in a gentle shower, or with a clean container of water. Set the face of the person so that the damaged face is downward and sideways. Do not scrap the eye or eyes with high-pressure water.
- Flush with lukewarm water for 15 to 30 minutes. The person should keep the eye open as wide as possible. Wash the person's hands thoroughly to make sure no chemical is still on them.
- Do not rub the eye or place a bandage over the eye.
- Make the person wear sunglasses in order to reduce light sensitivity, while waiting for medical attention.

Foreign Particle in the Eye

- Tell them not to rub their eye – this could cause scratches on the eye's surface.
- Ask them to sit down and gently separate their eyelids with your thumb and finger.
- Ask them to look right, left, up and down and examine the eye for foreign objects as you do.
- If you can see something in the white of the eye, wash it out by pouring clean water or a sterile eye wash from the inner corner of the eye towards the outer corner.
- If this is unsuccessful, try to lift the particle with a the damp corner of a clean handkerchief or moist swab. If you can't remove it, seek medical assistance.



Fig 11.1.19 Washing the Eyes in Running Water

Severe Bleeding

For severe bleeding, take these actions immediately:

- If there is an object embedded in the wound, control bleeding by pressing firmly on either side of the object, do not remove or press the object, otherwise apply direct pressure to the wound.
- Apply a dressing firmly to control bleeding. Be careful it is not so tight it restricts circulation.
- Prevent/treat shock by lying the casualty down with their feet raised (if possible).
- In case of head injury, lay them down and slightly raise their upper body parts.
- If blood comes through the dressing apply another bandage on top.
- If blood seeps again through dressing, take off both bandages and cover with a new aseptic dressing by putting gentle pressure to the wound.
- Support the injured area in a raised position.
- Seek medical attention if you are unable to stop the bleeding or the casualty goes into shock.
- Keep the casualty warm by lying them on a blanket or some other item.



Fig 11.1.20 Controlling the Bleeding



Fig 11.1.21 Controlling the Bleeding

Fracture

If someone has broken bone, provide first-aid treatment and help them get professional care.

- Stop any bleeding: If the injured person is bleeding, elevate and apply pressure to the wound using a sterile bandage, a clean cloth, or a clean piece of clothing.
- Immobilise the injured area: If the injured person is bleeding, has broken a bone in his/her neck or back, help him/her stay as still as possible. If the injured person has broken a bone in one of his/her limbs, immobilise the area using a strap or suspend.
- Apply cold to the area: With an ice cube or cover it in a napkin and gently apply it to the swelling area.
- Treat the injured for shock: Help the injured to get into a comfortable position, encourage him/her to rest and reassure. Cover him/her with a blanket or clothing to keep himself.

**R-Rest**

After the injury, stop the injured person from taking part in any painful activity. Moving the injured part can increase bleeding and swelling and slow down the healing process.

**I-Ice**

Use an ice pack to reduce the pain and swelling in the affected area. Apply ice for 15 minutes every two hours for 24 hours, then for 15 minutes every four hours for 24 hours.

**C-Compression**

Bandage the area firmly (but not too tightly), starting just below the injured area and moving up. Overlap each layer by half. Finish bandaging about one hand's width above the injured area.

Fig 11.1.22 Rest Ice Compression Method

Electric Shock

To assist the person who has experienced an electric shock follow these steps:

- Look first. Do not touch. The individual may still be in touch with the origin of electricity. You may move through the present by touching the individual.
- if feasible turning off the source of electricity. If not, attempt to transfer the electricity supply away from the individual concerned by using a non-conductive item made of wood or plastic.
- Check for signs of circulation (breathing, coughing or movement). If absent, begin resuscitation (CPR) immediately.
- Lay the individual down and place the body mildly higher than the head, with raised ankles, if necessary.
- Figure 5.4.38 shows a man moving the power source away from the affected person using a wooden stick.



Fig 11.1.23 Electric Shock

Shock Due to Injury

- Lay them down with their head low and legs raised and supported, to increase the flow of blood to their head. Do not raise an injured leg.
- Loose any stiff clothes around the neck and body to ensure that the victim's blood flow is not restricted.
- Fear and pain can worsen shock by raising the body's requirement for oxygen, so it is essential to maintain them relaxed, hot and calm while waiting for assistance to arrive. Do this by wrapping and comforting them with a jacket or blanket.
- Continue to check your breathing, pulse, and reaction rate.
- If the victim does not respond at any point, check their breathing. If absent, start resuscitation (CPR) immediately.

11.1.13 India Emergency Helpline Number

Prepare a list of hot line/emergency numbers and keep it in an easily accessible place at work as well as in your mobile phone or small pocket diary. Some numbers are listed below. You can discuss with your management for such information for your local area and update the list accordingly:

National Emergency Number	112
Police	100
Fire	101
Ambulance	102
Disaster Management Services	108
Women Helpline	1091
Women Helpline (Domestic Abuse)	181
Air Ambulance	9540161344
Aids Helpline	1097
Anti Poison (New Delhi)	1066 or 011-1066
Disaster Management (N.D.M.A):	1078, 01126701728
Earthquake/Flood/Disaster (NDRF Headquarters)	011-24363260, 9711077372, 1094
NDRF Helpline Number:	139
Deputy Commissioner of Police - Missing Children and Women	14567
Railway Inquiry	108
Senior Citizen Helpline	1072
Medical Helpline in Andhra Pradesh, Gujarat, Uttarakhand, Goa, Tamil Nadu, Rajasthan, Karnataka, Assam, Meghalaya,	1073
MP and U.P	1033
Railway Accident Emergency Service	1060
Road Accident Emergency Service	18001801551
Road Accident Emergency Service	1070

National Highways for Private Operators	1098
ORBO Centre, AIIMS (for Organ Donation) Delhi	1800116117, 011-26593677, 26589391
Kisan Call Center	18004251213
Natural Disaster Relief Commissioner	1363 or 1800111363
Children in Difficult Situation	1906
National Poison Information Center AIIMS New Delhi (24*7)	18005990019
Poison Information Center (CMC, Vellore)	155620

Table 11.1.1 India Emergency Helpline Numbers

Exercise

1. Short Question

- Q.1. List the general hygiene steps in the workplace.
- Q.2. What are the course of action to be taken if you suspect a case of COVID-19 at workplace?
- Q.3. What do you understand by the term first aid?
- Q.4. List the fire extinguisher categories.
- Q.5. State the measures of first aid in case of fracture.

2. Fill in the Blanks

1. _____ is the prompt or immediate removal of people from an area in which there is an imminent danger, ongoing danger or danger to life or properties.
2. _____ is conducted to ensure that all work areas are kept free from potential hazards.
3. Fire Extinguishing Class 'A' is suitable for _____.
4. _____ is the national emergency number.
5. For emergency fire service contact number is _____.
6. Kisan Call Center Helpline Number is _____.

12. On the Job Training



Unit 12.1 - On the Job Training



Key Learning Outcomes

By the end of this module, participants will be able to:

1. Show how to Communicate effectively at the workplace with internal and external stakeholders.
2. Show how to prepare and maintain livestock accommodation.
3. Show how to prepare the feed and maintain feed and water supply.
4. Demonstrate how to perform Hand and Machine Milking.
5. Carry out commercial activities such as buying and selling dairy related products using the appropriate e-commerce platforms or from authorized vendor.
6. Demonstrate various methods of Forage Conservation.
7. Explain formation and operation of collective dairy farming/activity.
8. Process payments using the relevant e-payment method.
9. Prepare training schedule for an apprentice.
10. Explain the requirements of personal health, hygiene and fitness at work.
11. Discuss the industry recommended practices for the safe utilization of dairy products.
12. Implement the practices related to gender and PwD sensitization.

UNIT 12.1: On the Job Training

Unit Objectives

By the end of this unit, participants will be able to:

1. To describe the various aspects of dairy farmer.

12.1.1 On the Job Training

This is an on-the-job training, therefore all aspects regarding training of dairy farmer have been covered in the above units and the trainer is advised to refer them for further understanding and practical application.

Notes



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7. Employability Skills (60 Hours)



It is recommended that all trainings include the appropriate Employability skills Module. Content for the same is available here:
<https://www.skillindiadigital.gov.in/content/list>










14. Annexure






Annexure I - QR Codes –Video Links



Annexure of QR Codes for Dairy Farmer

Chapter No.	Unit No.	Topic	Page	URL Links	QR Code (s)
Chapter - 4 Feed Preparation and Maintaining Feed and Water Supply	Unit 4.1- Feed Composition and Quality	Dairy Management in Rainy Season	96	https://www.youtube.com/watch?v=8z1GRguSQf0	 Dairy Management in Rainy Season
		Best practices of catle feeding for increased milk production.		https://www.youtube.com/watch?v=KhuZ2ka7qb8	 Catle feeding
Chapter - 5 Health and Performance of Livestock	Unit 5.3 - Examining Livestock for the Presence of External Parasites	Ethnoveterinary Formulation for FMD Foot Lesions	157	https://www.youtube.com/watch?v=rnN7bvWaGkI	 Ethnoveterinary Formulation for FMD Foot Lesions
	Unit 5.4 - Health Maintenance Process of Livestock	Ethnoveterinary Treatment for FMD Oral Lesions	161	https://www.youtube.com/watch?v=62yCAgzYf08	 Treatment for FMD Oral Lesions
		Combating Mastitis		https://www.youtube.com/watch?v=9f1cYdS5LzQ&t=154s	 Combating Mastitis
	Unit 5.5 - Cow Gestation	Pregnancy related Problems in cow	168	https://www.youtube.com/watch?v=Npx6if3VGt4	 Pregnancy related Problems in cow
	Unit 5.7 - Calf Care	Calf feeding Management NDRI	181	https://www.youtube.com/watch?v=-vE3-BQTyEw	 Calf feeding Management NDRI

Chapter No.	Unit No.	Topic	Page	URL Links	QR Code (s)
Chapter - 9 Process of Planning, Budgeting and Marketing	Unit 9.1 - Finance and Economics of Dairy Farming	Dairy Farming Business Plan	278	https://www.youtube.com/watch?v=PZWJ6-w9YT4	 Dairy Farming Business Plan
Chapter - 10 Collective Farming and Creating Farmer Groups	Unit 10.1 - Collectivization and Aggregation to form Group Organizations	Dairy Farmers Producer Organization (FPO)	321	https://www.youtube.com/watch?v=uPXINKmQAT A	 Dairy Farmers Producer Organization (FPO)
Chapter - 11 Maintaining Health and Safety at the Workplace	Unit 11.1 - Cleanliness Around the Workplace	Handling and First Aid	344	https://www.youtube.com/watch?v=J2002sall0w	 Handling and First Aid



Department of Empowerment of Persons with Disabilities (Divyangjan)
Ministry of Social Justice & Empowerment



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
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Skill Council for Persons with Disability

Skill Council for Persons with Disability

Sector Skill Council Contact Details:

Address: 501, City Centre, Plot No. 5 Sector 12 Dwarka New Delhi - 110075

Website: www.scpwd.in

Phone: 01120892791