



Skill India
कौशल भारत - कुशल भारत



सत्यमेव जयते
GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT
& ENTREPRENEURSHIP



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Transforming the skill landscape



ASCI
Agriculture Skill Council of India

Facilitator Guide



Sector
Agriculture and Allied

Sub-Sector
Dairying

Occupation
Dairy Farm Management

Reference ID: **AGR/Q4101**, Version **1.0**
NSQF Level: **4**

Dairy Farmer / Entrepreneur



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. ”

Acknowledgements

We are thankful to all organizations and individuals who have helped us in preparation of this Participant manual. We also wish to extend our gratitude to all those who reviewed the content and provided valuable inputs for improving quality, coherence and content presentation of chapters. This handbook will lead to successful roll out the skill development initiatives, helping greatly our stakeholders particularly trainees, trainers and assessors etc. We are thankful to our Subject Matter Expert **Dr. Suresh Damodarajan** who has given the content and helped us in preparation of Participant Handbook.

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 Guide

Dear Trainer,

This Trainers Manual is intended to empower preparing for the Dairy Farmer Qualification Pack (QP). Every National Occupational (NOS) is spread over Unit/s. Key Learning Objectives for the NOS check the start of the Unit/s for that NOS. The images utilized as a part of this book are portrayed beneath. Dairy Farmer is in charge of Installation, Testing, Commissioning of Dairy Farmer at agriculturist's field for better water administration and increment in yield of product. The National Occupational Standards indicate the measures of execution an individual must accomplish when doing a capacity in the work environment, together with the information and comprehension they have to meet that standard reliably. These word related guidelines are appropriate both in the Indian and worldwide settings. According to these measures the Dairy Farmer ought not work freely, ought to be relentless and must be able to settle on operational choices relating to his range of work. The student ought to pick up clarity of work and ought to be result situated; The Trainee ought to likewise have the capacity to exhibit abilities to utilize different devices in the Dairy Farmer. The mentor should guide and prepare the students' in the accompanying abilities:

- **Knowledge and Understanding:** Satisfactory operational learning and comprehension to play out the required chore
- **Performance Criteria:** Pick up the required aptitudes through hands on preparing and play out the required operations inside the predetermined measures
- **Professional Skills:** Capacity to settle on operational choices relating to the zone of work

The course incorporates Trainer Guide including student handbook for the learners and coach's aide; appraisal guide; session arrangement; and syllabus for you. The course material likewise incorporates a couple of blurbs as showing helps in the classroom. The appraisal guide subtle elements the assessment system. As a mentor you will assess the learners' execution and grade them in light of the assessment parameters given in the aide. The system additionally incorporates field visit for the students where they will watch the method/operations and administrations of the Dairy Farmer. Chapter are prepared to build up the expert abilities like – choices making, systematic and basic considering. We hope you will be able to impart your knowledge with our help to make this program a success and up-skill the workers to the recommended standards.

We trust you will have the capacity to confer your insight with our help to make this program a win and up-skill the workers to the suggested norms.

All the best!

Role of the Trainer

As a trainer, keep in mind the following guidelines:

Know your job thoroughly

The Trainer ought to first know his/her learners (the students) keeping in mind the end goal to guarantee their productive contribution in the learning procedure. Fundamentally the majority of these contemplations are guided by the reasoning of participatory preparing, which advocates that preparation, not at all like instructing, is more worried with the general improvement of the human identity.

- As a Trainer, remember the accompanying rules:
- Training is not learning
- The trainer needs to learn for himself/herself, through his/her own particular activity and movement
- The trainer can just guide the understudy movement in a way that prompts a decent learning background
- The trainer can create reasonable situations fancied to deliver a powerful learning (curricular, co-curricular and additional curricular) experience
- Trainees' response with the earth is relied upon to achieve an adjustment in conduct
- The trainer is the key component, as on him/her depends the arranging of the learning circumstance for accomplishing the sought result

Practice these common courtesies

- Greet the students
- Be warm and neighborly
- Introduce yourself
- Ask their names
- Explain the reason and objectives of preparing project
- Ask their desires
- Always make inquiries
- Listen to then quietly and answer their inquiries
- In case you can't react to an inquiry say that you will hit them up
- Respect the students
- Do not hang over them, their work, or get in their work-space
- Do not take their work or move it without requesting their consent
- Be a decent onlooker
- Offer rededication for weaker students Correct the flawed practices of learners at work before they transform into propensities
- Do not condemn
- Show gratefulness where it is expected
- Always say 'please', 'thank you', and "too bad"
- Be a tutor

Responsibilities

- The trainer has a unique position and assumes a few parts. He/she is a go between the student and administration.
- The trainer has moral and lawful duties and guarantees the expert advancement as well as the prosperity of the young. You need to counteract:
 - Discrimination as a result of sexual orientation, race or nationality or some other kind
 - Bullying and/or lewd behavior
 - Abuse of liquor, prescription or whatever other substance
 - Physical threats through mischance, air contamination, commotion or risky chemicals
 - Overstepping the student's physical limit
- You likewise need to secure that time directions or other lawful controls are not infringing– neither by you nor by the disciple.

Symbols Used



Steps



Time



Tips



Notes



Objectives



Do



Ask



Explain



Elaborate



Field Visit



Practical



Lab



Demonstrate



Exercise



Team Activity



Facilitation Notes



Learning Outcomes



Say



Resources



Activity



Summary



Role Play



Example

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1. Introduction

Unit 1.1 - Skills In Dairy Farming

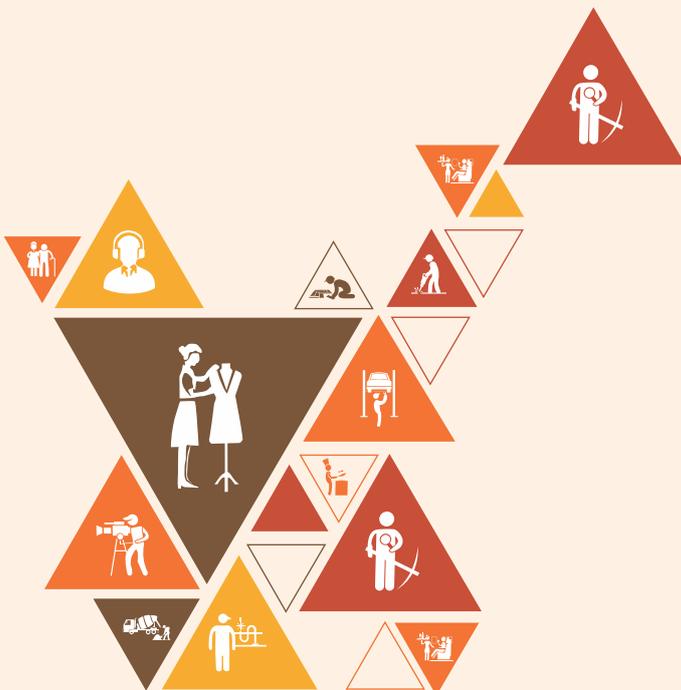
Unit 1.2 - Cattle Breeds

Unit 1.3 - Judging The Dairy Cattle

Unit 1.4 - Dairy Industry In India

Unit 1.5 - Future Scope of Dairy Farmer

Unit 1.6 - Constraints of Present Dairy Farming



Key Learning Outcomes

After completing this session the trainees will be able to:

- Understanding various skill activities of dairy farm
- Practicing skill activities of feeder
- Knowing the skill activities of milker
- Other activities of the dairy farming

UNIT 1.1: SKILLS IN DARIY FARMING

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Required skills to know management of dairy farm

Say

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

Introduction

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

Skill Activities 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's
- 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 vacating 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 and Skills Required:

- Trained in artificial insemination
- Knowledge 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 Dairy Herd Improvement Records

Skill Activities 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 high quality 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
- 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

Skill Activities 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 equipments 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 equipments 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 managers 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

UNIT 1.2: CATTLE BREEDS

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Skill and knowledge on different dairy breeds and breed characteristic of each of them

Say

- This chapter explain breed character and production potential of different dairy breeds in India

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)



Male



Female

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 available 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. **Indigenusbred**
3. **State:** Punjab, Rajasthan
4. **Purpose:** Food -Milk: Dung - Manure
5. **Milk yield per lactation (kg):**2325-2750



Female



Male

1. **Name :** Punganur
2. **Indigenusbred**
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 arthezil 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 : Harijana (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)

Summary of cattle breed and its population in India

S. No	Breed	Breeding Tract	Productivity	Population as per 2007 Livestock Census	Population as per 2012 Livestock Census
Breeds of Cattle					
Dairy Breeds					
1	Gir	Gujarat (Junagarh, Bhavnagar, District)	Milk Yield: 2100 kg (800-4000) Milk Fat 4.6%	21,03,307	5113013
2	Rathi	Rajasthan (Bikaner, Jaiselmer & Ganganagar District)	Milk Yield: 1560 kg (1062-2810) Milk Fat 3.7%	9,24,087	1237509
3	Red Sindhi	Pakistan (Karachi and Hyderabad District); Uttarakhand, Tamil Nadu, Odisha; Bihar	Milk Yield: 1840 kg (1,100 - 2600) Milk Fat 4.5%	5,49,432	557402
4	Sahiwal	Pakistan (Sahiwal District), Ferozpur and Amritsar District of Punjab	Milk Yield: 2326 kg (1600-3500) Milk Fat 4.8-5.1%	4,57,405	4882294
Dual Purpose Breeds					
5	Deoni	Maharashtra (Latur, Parbani, Nanded and Osmanabad District), Karnataka (Bidar)	Milk Yield: 1135-3000 kg Milk Fat 4.3% SNF 9.69%	1,66,025	351600
6	Gaolao	Maharashtra (Wardha District), MP (Balaghat, Chindwara District) Chhattisgarh (Durg, Rajnandgoan)	Milk Yield: 600-1500 kg Milk Fat 4.3-5.5%	2,22,663	322683
7	Hariana	Haryana (Rohtak, Hissar)	Milk Yield:	26,00,122	6279966

		, Jind District), Rajasthan (Alwar, Bharatpur)	1567 kg (1067-2500) Milk Fat 4.5% SNF 9.10		
8	Kankrej	Gujarat (Kutch, Mehsana, Ahmedabad, Kaira, Sabarkantha District), Rajasthan (Barmer & Jodhpur)	Milk Yield: 1746 kg (1097-3194) Milk Fat 4.8%	38,87,152	3028249
9	Krishna Valley	Karnataka (Belgam, Raichur, Bijapur District) Maharashtra (Satara, Sangli, Solapur)	Milk Yield: 1135-3000 kg Milk Fat 4.3%	2,314	14399
10	Mewati	Rajasthan (Alwar, Bharatpur), Uttar Pradesh (Kosi, Mathura District)	Milk Yield: 900-1500 kg Milk Fat 4.7-5%	75,427	32940
11	Ongole	Andhra Pradesh (Chittoor, Kurnool)	Milk Yield: 688 kg (475-1000) Fat 4.2%	2,58,240	634526
12	Tharparkar	Rajasthan (Jodhpur, Barmer, Jaisalmer)	Milk Yield: 1749 kg (913-2147) Milk Fat 4.88% SNF 9.2%	5,57,679	732479
Draught Breeds					
13	Amrit Mahal	Karnataka (Hassan, Chikmagalur, Chitradurga)	Milk Yield: 572-650 kg Milk Fat 4.3-5%	98,169	230142
14	Bargur	Tamil Nadu (Erode District)	Milk Yield: 250-1300 Milk fat: 4.5 to 5.5%	21,312	16307
15	Bachaur	Bihar (Sitamari, Madhubani, Darbhanga District)	Milk Yield: 495-605 kg Milk Fat 4.5%-5%	4,51,659	1546488
16	Binjarpuri	Orissa (Jajpur subdivision, Cuttack District)	Milk Yield: 400-450 Kg Fat 4.94% SNF 7.8%	43,680	110553
17	Dangi	Maharashtra (Nasik, Ahmednagar District.)	530 Milk Fat	3,04,238	193780

18	Ghumsuri	Orissa (Cuttack District)	4.3% Milk Yield: 450-650 kg Milk Fat 4.8 to 4.9%	82,815	83988
19	Hallikar	Karnataka	Milk Yield: 540 kg (227-1134) Milk Fat 5.7%	21,96,698	1807932
20	Kangayam	Tamil Nadu (Erode District)	Milk Yield: 540 kg (600-800) Milk Fat 3.88% SNF 6.96	3,16,114	193445
21	Kenkatha	Uttar Pradesh (Lalitpur, Hamirpur, Banda District), Madhya Pradesh (Tikamgarh District)	Milk Yield: 500-800 kg Milk Fat 4.7 to 6.7%	1,85,886	670402
22	Kherigarh	Uttar Pradesh (Lakhimpur Kheri District)	Milk Yield: 300-500 kg Fat 4-6%	1,71,414	199251
23	Kheriar	Orissa			383824
24	Khillari	Maharashtra (Solapur, Sangli Satara District)	Milk Yield: 384 kg (240-515) Milk Fat 4.5 to 5.5%	14,23,742	2014352
25	Malvi	Madhya Pradeash (Dewas, Ujjain, Sajapur District), Rajasthan (Jhalawar District)	Milk Yield: 1047 kg (627-1227) Milk fat 4.28%	15,18,452	1710465
26	Nagori	Rajasthan (Nagaur District)	Milk Yield: 603 kg (479-905) Milk Fat Av 5.8%	8,37,344	508703
27	Nimari	Madhya Pradesh (Khandwa, Khargoon and Barwani District)	Milk Yield: 360 kg (310-495) Milk Fat 4.9%	3,09,859	453633
28	Motu	Orissa (Koraput District)	Milk Yield: 100-140 kg Milk Fat: Av 4.86%- 5.3%	7,02,347	536758
29	Ponwar	Uttar Pradesh	Milk Yield:	24,072	27967

		(Pilibhit District)	500-1000 kg kg Milk Fat: 4-5%		
30	Red Kandhari	Maharashtra (Nanded District)	Milk Yield: 598 kg Milk Fat 4.6% SNF 8.62	1,78,758	458040
31	Siri	West Bengal (Darjeeling) and Sikkim	Milk Yield: 2-6 Kg/day Milk Fat 2.8-5.5% SNF 7.56-9.37	61,764	17749
32	Umblachyery	Tamil Nadu (Thanjavur, Nagapattinam District)	Milk Yield: 500 kg Milk Fat 4.5 to 5.5%	2,18,315	72510
33	Vechur	Kerala (Vaikam, Kottayam District)	Milk Yield 550 kg Milk Fat 4.7-5.8%	3,170	2499
34	Punganur	Andhra Pradesh (Chittoor District)	Milk Yield 546 kg (194-1099) Fat 5% SNF 9.5%	771	2828
New Breeds					
35	Malnad Gidda	Karnataka (Chikmagalur, Dakshina Kannada, Uttara Kannada, Kodagu, Shimoga, Udupi)	Milk Yield 200 kg Milk Fat 4.5 to 5.5%	1281000	1049543
36	Kosali	Chhattisgarh (Raipur Durg Bilaspur Janjgir)	Milk Yield 200-250 kg Milk Fat 3.5%	1500000	2432236
37	Pulikulam	Tamil Nadu (Madurai)	Milk Yield 500 kg Milk Fat: 4.5 to 5.5%	45000	10085
38	Gangatiri	Uttar Pradesh (Varanasi, Gorakhpur, Ghazipur, Ballia, Mau, Mirzapur)	Milk Yield 900-1200 kg Milk Fat Av 4.9% (4.1 to 5.2%)		364806
39	Belahi	Foot hills of Shivaliks in Haryana	Milk Yield 182-2092 kg		30,000 (NBAGR)
			Milk Fat Av 5.25 (2.37-7.89)		

UNIT 1.3: JUDGING THE DAIRY CATTLE

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Practicing the skill and gaining knowledge in judging of dairy cattle

Say

- This chapter says structural and functional activities of dairy cattle, udder conformation and additional conformation need to be evaluated

Judging the dairy cattle

- Judging dairy cattle is a comparative evaluation of cattle in which animals are ranked based on their closeness to “ideal” dairy conformation
- Desirable dairy conformation involves functional traits associated with high milk production over a long, trouble free productive life
- In addition to learn how to judge cattle, many life skills are gained through the dairy judging experience.
- These include observation, decision making, and public speaking skills

Frame - 15%

- The skeletal parts of the cow, with the exception of feet and legs, are evaluated
- **Rump** - long and wide throughout with pin bones slightly lower than hip bones. Thurls need to be wide apart and centrally placed between hip bones and pin bones. The tail head is set slightly above and neatly between pin bones, and the tail is free from coarseness. The vulva is nearly vertical
- **Stature** - height, including length in the leg bones. A long bone pattern throughout the body structure is desirable. Height at the withers and hips should be relatively proportionate
- **Front End** - adequate constitution with front legs straight, wide apart and squarely placed. Shoulder blades and elbows need to be firmly set against the chest wall. The crops should have adequate fullness
- **Back** - Straight and strong; the loin broad, strong, and nearly level. Breed Characteristics- overall style and balance. Head should be feminine, clean-cut, slightly dished with broad muzzle, large open nostrils, and a strong jaw is desirable
- Rump, Stature, and Front End receive primary consideration when evaluating Frame

Dairy Character - 20%

- The physical evidence of milking ability is evaluated. Major consideration is given to general openness and angularity while maintaining strength, flatness of bone and freedom from coarseness. Consideration is given to stage of lactation

Dairy Character - 20%

- The physical evidence of milking ability is evaluated. Major consideration is given to general openness and angularity while maintaining strength, flatness of bone and freedom from coarseness. Consideration is given to stage of lactation
- **Ribs** - wide apart. Rib bones are wide, flat, deep, and slanted toward the rear
- **Thighs** - lean, incurving to flat, and wide apart from the rear
- **Withers** - Sharp with the chine prominent
- **Neck** - long, lean, and blending smoothly into shoulders. A clean-cut throat, dewlap, and brisket are desirable
- **Skin** - thin, loose, and pliable

Body Capacity - 10%

- The volumetric measurement of the capacity of the cow is evaluated with age taken into consideration
- **Barrel** - long, deep, and wide. Depth and spring of rib increase toward the rear with a deep flank
- **Chest** - deep and wide floor with well-sprung fore ribs blending into the shoulders
- The barrel receives primary consideration when evaluating Body capacity

Feet and Legs - 15%

- Feet and rear legs are evaluated. Evidence of mobility is given major consideration.
- **Feet** - steep angle and deep heel with short, well-rounded closed toes.
- **Rear Legs: Rear View** - straight, wide apart with feet squarely placed.
- **Side View** - a moderate set (angle) to the hock. Hocks- cleanly molded, free from coarseness and puffiness with adequate flexibility
- **Pasterns** - short and strong with some flexibility
- Slightly more emphasis placed on Feet than on Rear Legs when evaluating this breakdown.

Udder - 40%

- The udder traits are the most heavily weighted. Major consideration is given to the traits that contribute to high milk yield and a long productive life.
- **Udder Depth** - moderate depth relative to the hock with adequate capacity and clearance. Consideration is given to lactation number and age.
- **Teat Placement** - squarely placed under each quarter, plumb and properly spaced from side and rear views
- **Rear Udder** - wide and high, firmly attached with uniform width from top to bottom and slightly rounded to udder floor
- **Udder Cleft** - evidence of a strong suspensory ligament indicated by adequately defined halving
- **Fore Udder** - firmly attached with moderate length and ample capacity
- **Teats** - cylindrical shape and uniform size with medium length and diameter
- **Udder Balance and Texture** - should exhibit an udder floor that is level as viewed from the side.
- **Quarters** should be evenly balanced; soft, pliable and well collapsed after milking.

Additional Factors to Evaluate

Horns

- No discrimination

Eyes

1. Blindness in one eye: slight discrimination
2. Cross or bulging eyes: slight discrimination
3. Evidence of blindness: slight-serious discrimination
4. Total blindness: disqualification

Wry Face

- Slight-serious discrimination

Parrot Jaw

- Slight-serious discrimination

Shoulders

- Winged: slight-serious discrimination

Tail Setting

- Wry tail or other abnormal tail settings: slight-serious discrimination

Capped Hip

- No discrimination unless effects mobility

Judging Procedures

- The first impression of an animal is often quite valuable. Stick with it unless further inspection gives good reason to change
- Observe walking animals for ease of movement, and set to the rear legs and strength of pasterns. Also, check for strength of loin and firmness of udder attachments
- A front view of the animal shows width of chest. A rear view aids in evaluating sharpness of withers, spring of rib, width of rump, width of rear udder and amount of udder cleft
- The udder is 40% of the scorecard and often becomes the deciding factor
- Milking cows at the peak of lactation are given an advantage over dry cows or stale cows of equal merit
- Develop a good system to evaluate classes for ranking each cow in a class for each major category on the score card

UNIT 1.4: DAIRY INDUSTRY IN INDIA

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Practicing the skill and gaining knowledge in judging of dairy cattle

Say

- This chapter enlightens the growth pattern of dairy industry in India

Dairy industry

- Dairy industry occupies an important place in animal husbandry. It embraces the production of milk, its preparation for sale as well as the manufacture of dairy products.

Dairy industry growth

- The dairy industry of India has grown from an almost completely unorganized but vastly complex industry of a large magnitude to an organized industry during the last 55 years with an annual milk production of about 29 million metric tons in the year 1979-80.
- India's milk production in 2001 is forecasted at 81 million tones. In India it took nearly 30 years to achieve self- sufficiency in milk production. The country had produced 123 million tones of milk in 2010-11, 127.9 million tons in 2011-12.
- The annual growth rate for production of milk is increased about 5% in 2011-12 as compared to 2010-11. India continued to rank third amongst the countries of the world.
- The composition of the milk production in India has been dominated by buffalo milk with 76 per cent of the total milk production as compared to 94 percent of cow milk in the total production of milk in the ward.
- The importance of cow continues as a supplier of cheap milk as also bullocks. Livestock keeping in general and dairying in particular has been the integral part of Indian agriculture. In additional, dairying provides a source of nutrition and additional income to our farmers.
- Inefficient and poor maintenance of large number of cattle in the context of available resources could be responsible for the fact that although there are 12 percent more dairy animals in India than four leading countries put together, India produces less than 12 percent of the milk produced by these leading countries of the world.

Dairy Industry: Over the time

Traditional Dairying

- Traditionally, all the milk in the past had been produced in the villages in India. Even today the bulk of the country's milk supply comes from the cattle owners in the rural areas. In the old days, the farmers produced milk usually for their own consumption.
- Most of the milk was converted by them into butter, ghee and butter milk, which constituted important food items for the family. As marketing facilities for milk did not exist in those days, the surplus milk was generally turned into ghee for sale in the villages or in the near-by town markets.
- Later on, this pattern changed and most of the surplus milk was either sold by the cattle-owners to the consumers, in the nearby areas or collected by the middlemen for sale in the urban markets.

Modernization of Dairy Industry

- Modernization of the dairy industry in India gained momentum with the commencement of India's first five Year plan in 1951.
- With the aim of catering to the requirement of clean milk for the growing population in urban areas, the initial government action in this regard consisted of organizing milk schemes for the large cities.
- The basic objectives of these schemes was to facilitate arrangement for the efficient flow of milk produced in the rural areas to the dairy plants located in cities and distribution of the processed milk to the urban consumers.
- The working of the milk schemes was quite helpful for the development of the dairy industry on modern lines in India.

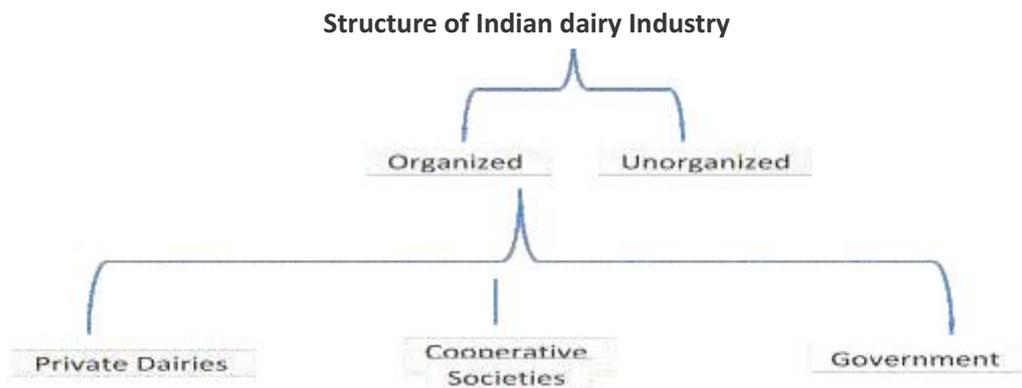
Co-operativization

- The establishment of milk co-operatives is another feature of the modern dairy industry in India. For successful functioning of economic enterprises in our villages, it is necessary that they are given a corporate identity. In most developed countries, co-operative have emerged as the most cohesive organization of farmers.
- They provide the middle course between the acquisitive and individualistic trends of economy on one hand and too much centralization and regimentation on the other. They have the merit of combining freedom and opportunity for the small man with benefits of large scale management and organization as also good- will and support from the community.

- In India, though the co-operative movement was initiated by the co-operative credit societies Act, 1904, dairy co-operative could not be promoted till the passing of the co-operative societies Act, 1912.
- Though, with the establishment of the first cooperative dairy society at Allahabad (U.P.) in 1913, the movement of dairy cooperative got initiation and spread subsequently in different parts of our country. Its real large sale and systematic break through could be noticed since 1946 when Kaira District Co-operative Milk producers' Union Limited (KDCMPUL) popularly known as 'Amul Dairy' which was set up at Anand in the Gujarat state.

ANAND PATTERN – THREE TIER MODEL

- A big success story in India's dairy development is of dairy cooperatives. In the forefront is Gujarat Cooperative Milk Marketing Federation (CCMMF), the apex body of farmers' milk cooperatives. It markets the milk products produced by its member cooperatives under the brand name Amul and Sagar. Milk is sourced from 15,301 village dairy cooperatives where more than three million farmers collect their milk produce.



Top 10 milk producers in India

S.No.	Dairy Industry	Production ('000 liters per day)
1	AMUL	2500
2	OMFED, Odisha	1950
3	AP Dairy Development Cooperative Federation Ltd	1500
4	Haryana Dairy Development Cooperative Federation Ltd	1450
5	Dynamix Dairy Industries Ltd., Maharashtra	1000
6	Mother Dairy, Delhi	1000
7	Vasundhara Dairy, Nagpur	1000
8	Dudhsagar Dairy, Gujarat	950
9	Hatsun Agro, Chennai	800
10	Sterling Agra, New Delhi	800

UNIT 1.5: FUTURE SCOPE OF DAIRY FARMER

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- gain detailed outline on future scope of the dairy farming

Say

- This chapter says factors deciding the growth pattern of the dairy industry, consumption pattern and milk production outlets, challenges ahead in the dairy industry and milk production marketing scope

Dairy market

- India is a land of opportunity for investors looking for new and expanding markets. Dairy food processing holds immense potential for high returns.
- The dairy market in the India has witnessed a growth in recent years on account of rising demand for milk and its products fueled by expansion in milk production

Rising consumption

- India is not only the largest producer of milk but also the largest consumer of milk. The policy approach should be to create growth path for the dairy industry. Currently, milk constitutes 15 per cent of the average households' expenditure on food.
- However, with increasing urbanization and growing GDP, income rises are leading to fall in share of food as percentage of total expenditure.

Sustained Growth

- Undoubtedly, dairying has provided gainful employment to millions, primarily women, in the villages. Investments under 'Operation Flood' have resulted in sustained growth and self-sufficiency in dairy:
- Amul Model has demonstrated the capacity of a single commodity to have multi dimensional effect on producers, consumers as well as the economy of the country. This model has also delineated the importance of commercial approach to development and nil interference of government in commercial enterprise.
- By the year 2020, India's GDP is targeted to cross that of UK and will be ready for a steep rise till 2050. But it can be realized only by active government support to vital sectors like dairying and implementation of well formulated ideas provided by dairy scientists and experts.

Cooperatives

- Amul apart from being Asia`s largest milk brand is a vehicle for economic and social development through which farmers manage their own resources.
- Amul has long been dedicated to providing best prices to its member producers for their milk and at the same time providing value for money to its consumers.
- Amul is also developing wide range of products to meet future demand, including calcium fortified milk, flavored yoghurt, frozen yoghurt, sugar free ice-cream and pro-biotic products.
- In order to keep pace with the growing market and production base, GCMMF has planned a total investment of \$600 million for milk processing and village level infrastructure enhancement in the next five years.

Milk Production Outlook

- India's White Revolution has attracted world-wide attention and Indian performance is expected to continue to play a major role in the future of the dairy industry in the world in coming years.
- It is expected that the world milk production will rise to 867 MMT by 26 per cent from current 714 MMT. However, as per the current CAGR of 4 per cent and optimistic projection of 4.5 per cent, India`s milk production is estimated to touch 180 million MT by 2020.
- This will lead to increase of India`s share in the world milk production from the current 16 per cent to 21 per cent in 2020. The core of the dairy industry lies with the milk producing farmer, who gets affected by many factors ranging from fuel and agricultural input prices to government`s foreign policy.
- Hence, the state of milk producing farmer is crucial for the dairy industry. To sustain the milk production there has to be a right mix of social, environmental and economic factors influencing the farmer.

National Policy

- Against this backdrop, the national policy on dairy is critical for the growth of dairy industry. Milk production in US has been growing at a very good pace as a result of policies of the US government which nurture and protect cooperative marketing by dairy farmers.
- Experts feel India should also continue its emphasis on dairy development through cooperatives and private investments to ensure long term growth and sustainability of the industry.

Challenges

- However, there are challenges to dairy in India, mostly in the form of rapid urbanization, low interest of younger generation in dairy farming and increasing real estate price that leads to loss of farm lands. Due to these factors, some dairy regions may come under pressure.
- The preventive measures would be to implement changes in the dairy production to make farming system more competitive.

UNIT 1.6: CONSTRAINTS OF PRESENT DAIRY FARMING

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Important constraints in present dairy farming industry – need to understand

Say

- This chapter explain the problems in scientific dairy farm management, cold chain to maintain milk quality and factors fixing the milk price

Smallholder dairy farming

- Smallholder dairying has inherent weaknesses and is confronted with various threats. However, the sector can build on its strengths and use opportunities to satisfy the increasing demand. At the national level, the following issues will need a concerted response from both the Government and the private sector to enable the participation of smallholder dairy farmers in dairy markets and to help them competitively supply expanding consumer markets.

Constraints and its solutions

Lack of proper livestock management practices and inaccessibility to support services leads to low animal productivity

To enhance productivity, the following measures are recommended:

- strengthen extension services to reach and educate the maximum number of farmers;
- launch mass-scale awareness campaigns on management and production issues;
- improve farmers' access to financial services;
- initiate sustainable long-term breed improvement programmes.

In the absence of an integrated cold chain, adulteration is rampant and access to markets is hampered.

To improve the provision of quality milk as well as enhanced market access for small holders, the following measures are recommended:

- provide equipment and facilities related to a cold chain at subsidized rates;
- provide credit to improve access to infrastructure, such as cold chains;

- Adjust utility fees to dairy farmers to equal with what other farmers are charged; currently, most peri-urban and commercial farms are charged the industrial or residential rate for electricity and water consumption. This is in bare contrast to the main agricultural sector in which farm use of electricity and water is determined on the basis of subsidized agricultural rates. This can be a discouraging factor for many farmers to upgrade their farms, and policies governing the supply of public utilities to the dairy sector must be revised;
- promote local manufacturing of storage and processing equipment;
- Encourage the establishment of integrated cold chains instead of piecemeal approaches in which the focus is only on cooling tanks.

Smallholder dairy farmers need to coordinate their marketing activities.

To further organize smallholder farmers into groups that can reap maximum market benefits, the following measures are recommended:

- create a policy environment conducive to the formation of milk co-operatives societies; laws governing co-operative societies should be drafted with an approach that encourages their formation. This includes tax incentives for collective marketing and a subsidized provision of inputs, such as veterinary services, feed and electricity.
- link various groups to organizations like the Small and Medium Enterprise Development Authority to provide guidance in designing an co-operative society
- provide management training in various areas, including production, marketing, value addition, and financial and business management techniques;
- encourage middlemen to integrate their operations with co-operative society; there can be many modalities for this.

The local government is allowed to fix the price of milk on the pretext that it is an essential commodity. However, the prices of inputs are not synchronized in the same manner and keep increasing with the growing inflation.

To ensure parity between input and output prices towards profitable dairying, the following measures are recommended:

- review of laws governing price control and their implementation in regards to milk;
- explore alternative measures, such as setting a control price and incentives for increased production to meet demand;
- provide a level playing field by applying similar pricing regulations to both packaged and non-packaged milk.



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2. Prepare and Maintain Livestock Accommodation

Unit 2.1 - Selection of Site For Dairy Farming

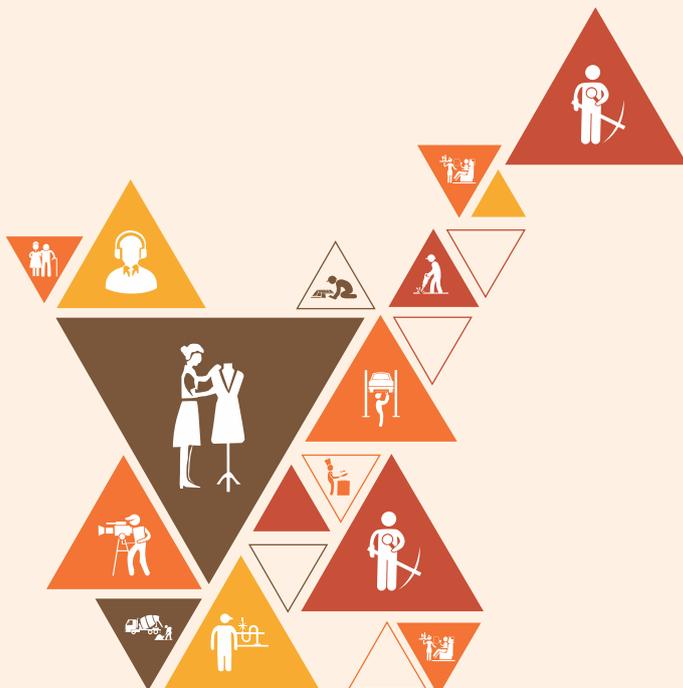
Unit 2.2 - Principles of Housing

Unit 2.3 - Housing of New Born Calves

Unit 2.4 - Housing of Heifer or Bull Calves

Unit 2.5 - Housing For Lactating Animals

Unit 2.6 - Housing Of Bull



AGR/N4101

Key Learning Outcomes

After completing this session the trainees will be able to:

- Understanding various points in selection of site
- Knowing various criteria for selection of site
- Gaining information of site location
- Analysis of the environmental factors

UNIT 2.1: SELECTION OF SITE FOR DAIRY FARMING

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Know scientific approach for site selection for construct the dairy farm

Say

- This chapter details various criteria for dairy farm site selection

Introduction

- Farmers considering greatly for selection of sites to build the farms with new structures. Nowadays, farmers should have aware of dairy farm related to location of the farms such as nearby neighbors and public areas, environmental issues like water quality, odors and files, litter management, electrical supply, etc. and laws and regulations that affect farming operations.

Criteria for dairy farming site selection

- Soil Type
- Elevation
- Topography
- Sunlight
- Protection from wind
- Marketing
- Durability
- Labour
- Accessibility
- Surrounding

<i>Factors</i>	<i>Desired Characteristics</i>	<i>Reasons for</i>
1. Soil		
(a) Kind	Sandy Loam	1. Keep surrounding clean and dry by proper drainage. 2. Avoid cracks near foundation.
(b) Type	Fertile	1. Good yield of fodder crops. 2. Spare unfertile land for buildings.
(c) Condition	Neither too dry Nor too moist	1. Hygiene. 2. Longer life to building.
2. Elevation	Higher than surroundings	1. Effective drainage. 2. Clean surroundings. 3. Avoid foul odour.
3. Topography	Somewhat Levelled	Less cost of fitting soil.
4. Sunlight	Exposure of Floor to sunlight	1. Removes Dampness. 2. Checks germs growth. 3. Keeps floor dry. 4. Facilitates work. 5. Benefits animals also.
5. Protection from wind	No direct draft of hot and cold wind currents	1. To prevent sudden fluctuation in temperature. 2. Avoids bad effect on body of animals. 3. Avoids contamination at milking time.
6. Market	Near	1. Ready, easy and cheap, availability of raw material. 2. Easy disposal of products 3. To stabilize prices. 4. Reduction in storage and refrigeration cost of products.
7. Durability	Longer life and Scenic view	1. Better look. 2. Clean 3. Low maintenance 4. Long life.
8. Labour	Skilled, reliable, Cheaper, regular, plenty, honest and laborious	1. Economic. 2. Better care of animal. 3. Better quality work. 4. Better efficiency 5. Higher return. 6. Longer life of machines.
9. Accessibility	Near to main road	1. Minimize cost of transport. 2. Quick procurement. 3. Quick disposal.
10. Surrounding	Safe, Clean	1. Prevent thefts. 2. Safety from wild animals. 3. Prevent economic losses.

UNIT 2.2: PRINCIPLES OF HOUSING

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Important principles for dairy house design and construction of house

Say

- This session deals with dairy farm layout and blue print, house design, principles of housing and specification of house

Introduction

- The need for livestock housing is important from the point of animal health, welfare and comfort, hygiene, efficient and economical use of labour. A suitable house is essential to make best use of the, efficient environment.

Goal of ideal housing

- Proper housing contributes animal comfort, good sanitation and efficient farm work
- Animals are protected from cold winds, sun scorches and rain

Principles of housing

Foundation

- Footing – Broad base of the foundation wall designed to carry the load without settlement
- Foundation wall – it required for farm buildings depends on the soil condition of the site; generally the height for light farm building will vary from 18” to 30” and thickness ranges from 9” to 12”

Dimension	Heavy	Light
Width	24”	12”
Depth	12”	8”

Floor

- Comfortable floor is constructed by making the earth surface hard
- The floor is constructed of bricks laid in cement mortar to secure cleanliness and permanency of suitable slope of one in 60 is provided towards gutter for removal of manure and for effective drainage
- Floor should be non-slippery, durable, impervious to water and urine and easily cleaned
- Gutter has to be 30 cm wide and 10 cm deep that may facilitating proper drainage
- It is recommended minimum slope of two percent

Roofing materials

- Selection of roofing material is essential to prevent the solar radiation. It is preferable to have material with low conductivity of heat.

Commonly used roof materials

1. Tiles

- Pan tile or Mangalore tiles – Rectangular tiles with grooves on outer surface and two nibs on the inner surface. They are laid one at the side of the other to cover the roof
- Country tiles – semi-circular tiles of different shape and dimensions. They are used by keeping one over other in layers forming numerous air pockets, they conduct less heat

2. Asbestos sheet

- It is prepared by mixing cement mixture with varying quantities of vegetable fibers
- Sheets are easily fixed to roof trusses and more durable than tiles. But the houses under this roof will be hotter during summer.

3. Aluminum sheets

- The bright and polished surface of aluminum sheets provides a reflective insulation and keeps the animal houses cool during summer
- They are expensive but have a greater resale value. They are rust proof and therefore they are more durable

4. Galvanized iron sheets

- They are iron sheets, which are galvanized on the surface and provided with corrugation. They are available in standard dimension of 6 feet x 3 feet
- Suitable for hot climate
- Sheet should be painted white on outer side to avoid absorption of heat

Other parts of cattle housing

- A **feeding trough** of 60 cm, width is provided the back of the trough has to be 125 cm above the floor so that animals may not throw the fodder outside
- Common **water trough** of 120 cm length and 60 cm wide has been suggested for cows
- The **wall** is 30 cm wide and 125 cm high and is constructed by using bricks laid in cement mortar
- A structure of this type is quite strong and at the same time economical and essentially will protect the animals from cold wind

UNIT 2.3: HOUSING OF NEW BORN CALVES

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Design and specification for housing of new born calves

Say

- This chapter says calf pen layout planning and preparation

Calf pen

- This is meant for housing young calves separately.
- It can be located either at the end or on the side of the milking barn.
- This facilitates taking calves to their dams quickly.
- If there are large numbers of calves, the separate unit of calf shed should be arranged and located nearer to the milking barn.
- Calf pens should be well ventilated, well lighted, clean, dry, adequately bedded using soft material
- It is better to rear calves in individual calf pens. If room for individual pens is not available calves must be tied properly for 15 to 20 minutes after feeding

Floor space requirement per animal

	Covered area (m ²)	Open area (m ²)
Young stock up to 3 month	1	1.5
Young stock up to 3-6 month	1	2.5
Young stock >6	2	4

Precautions to be taken:

- The calves are kept in the calf pen for minimum of 5 days after their birth. The calf paddock should be kept neat & clean without any debris, sharp objects & stones. The paddock should be located in an elevated area without any water logging, well aerated and with good shade.
- The calf pen and calf shed are to be cleaned with good quality disinfectant in correct dilution. The calf pen and calf shed are to be dried well before the calves are housed inside them.
- The calf pen, calf shed and water troughs are to be white washed with lime at regular intervals.
- The calf pens, calf shed are sprayed with ectoparasiticide/ organophosphorus reagents to avoid tick/lie infestation in calves.
- Immediately after the birth, clean the nostril and mouth from the mucus.
- Clean the whole body of the calf massages/ press the chest for the onset of respiration.

UNIT 2.4: HOUSING OF HEIFER OR BULL CALVES

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Design and construction of heifer and bull calves house

Say

- This session says scientific planning and essential elements for heifer or bull calves house construction

Heifer housing

- A good heifer housing facility can help provide well-grown replacement animals ready to enter the milking herd at 24 months of age.

To achieve this goal, the facility must:

1. Produce replacement heifers that are ready to breed at 13 to 15 months of age;
2. Provide a comfortable, healthy environment for calves and heifers;
3. Provide a convenient working environment for the operator. A complete calf and heifer raising facility must meet a number of other requirements from an animal's birth to freshening.

Housing options for heifers

1. Pasture housing
2. Open yard housing
3. Conventional barns

Pasture housing

- Access to pasture is typically considered positive for cattle welfare. In general, pasture provides cattle with more space, fewer agonistic interactions, better air quality, and access to pasture allows the animals to perform a greater repertoire of normal behaviors such as walking and grazing
- Keeping cows on pasture is also thought to increase the frequency of self-grooming behavior as well as exploratory behaviors

Open yard housing

- Under this housing system, animals are kept loose in an open paddock throughout the day and night
- Shelter is provided along one side of open paddock under which animals can retire when it is very hot or cold or during rain
- Common feed manger and water tank is provided
- The open paddock is enclosed by means of half walls or plain wire fences of convenient height

Conventional barns

- In this system of housing, the animals are confined together on a platform and secured at neck by stanchions or neck chain
- These barns are completely covered with roofs and the sidewalls are closed with windows or ventilator located at suitable places to get more ventilation and lighting
- The similar type of housing can be utilized for tropical region with slight modification

Criteria for housing bull calves

- Bull calves are maintained at least for 6 months after birth with the female stock to bring early sexual maturity in bulls
- The young bulls of six month age are kept in separate stalls in a group of two or three for their better care and management up to one and half year age
- Then they are shifted to individual pens. The young bulls usually keep together in an enclosure daily for at least one to two hour for exercise

Bull calves

- Bull calves should be housed in individual pens
- Pens should be provided with feeding troughs and water bowls which has to be cleaned daily
- Calf pens should be provided with adequate bedding which should be changed regularly
- The pens should be cleaned and disinfected regularly
- Male and female calves should be separated before nine months of age

UNIT 2.5: HOUSING FOR LACTATING ANIMALS

Unit Objectives

After Completing This Session The Trainees Will Be Able To:

- Design and construction of lactating animal house

Say

- This chapter says different systems and specification of lactating animal house

Milking Barn / milk parlour

- This is a barn where milch animals are milked and is fully covered.
- It should be located at the centre of the farm with all other farm buildings arranged around it.
- There shall be an individual standing in the milking barns and the number of standings required should be 25% of total number of milch animals in the herd.
- The milking operation should be carried out in batches

Dimensions of milking barn

- Length of standing space: 1.5 – 1.7 m
- Width of standing space: 1.05 – 1.2 m (80% of length of standing space)
- Width of central passage: 1.5 – 1.8 m
- Width of feed alley: 0.75 m
- Width of gutter: 0.30 m
- Overhang: 0.75 m

Calving box/pen

- Pregnant animals are transferred to a calving pen 2 to 3 weeks before the expected date of calving.
- Calving pen of 3m x 4m (12 m²) is essential to keep the animals in advanced stage of pregnancy.
- It should be located nearer to the farmer's quarters for better supervision.
- The number of calving pens required is 10% of the number of total breedable female stock in the farm.

Floor space requirement per animal

Animal	Covered area (m ²)	Open area (m ²)
Cow	3.5	7
Buffalo	4	8
Pregnant Cow	4	8

Types of Housing System

1. Single row – Less than 15 animals
2. Double row – More than 15 animals
 - a. Tail to tail system
 - b. Head to head system

Single row system

- In single row system, 12-16 numbers of animals can be kept.

Double row system

- If it is greater than 16, then double row system is preferable.
- In double row system up to 50 animals can be maintained in a single shed.
- The distance between two sheds should be greater than 30 feet or it should be twice the height of the building

Tail to tail system**Advantages**

- Cleaning and milking of animals easy
- Supervision of milking also easy
- Less chance for transmission of diseases from animal to animal
- Animals can get more fresh air from outside
- This system is more labour friendly system

Head to head system**Advantages**

- Getting animals into the shed is easy.
- Feeding of animals also easy.

UNIT 2.6: HOUSING OF BULL

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Norms and specifications for bull housing system

Say

- This chapter says planning for design and construction of bull house

Bull housing

- Bulls should be kept in concrete floor individual pens with corrugated asbestos roofed shed with the orientation of east-west direction through its long axis
- Bulls are kept in individual pens (30'x10') with adequate loafing area separated by solid partitions that restricted both direct physical and visual contact of bulls in adjacent pens, with a sufficient long rope to ensure its almost free movements within the shed
- Hygienic measures should be taken to maintain cleanliness within and surrounding the bull farm.

Bull house building units

- The adult bulls can be housed in individual loose houses or a number of bulls can be housed together in confinement (single/double row stanchion barns)
- The individual loose houses should have a covered area (12 sq m) and an open area (120sq m). In group housing each animal should be provided a standing space of 2.5 x 1.5 meters. The covered area should be half walled for free movement of air into the shed
- The loafing area should be enclosed by railing and should have shady trees
- The sheds should be provided with feeding mangers, water troughs and dung and urine channels corners of mangers, troughs, drains and walls should be rounded to avoid injuries and to facilitate easy cleaning.

Bull house maintenance

- In summer, exotic bulls and buffalo bulls need cooling mechanism in the pen to maintain Homoeothermic. During summer, sprinkling along with fan gives them some amount of relief from heat stress.
- Regular disinfection of the pens should be carried out with insecticides to keep away the flies, fleas, ticks etc
- Foot bath should be provided at the entry point
- Slurry tanks should be constructed adjoining the sheds for the collection of dung, urine and wash water which then can be applied to the pastures and leys

Key Learning Outcomes

After completing this session the trainees will be able to:

- Importance of micro environmental factors
- Different components of the micro environment
- Optimum temperature and relative humidity for comfort zone
- Understanding role of ventilation, insulation and lighting

UNIT 3.1: MICRO ENVIRONMENTAL FACTORS IN DAIRY FARMING

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Influence of different environmental factors to keep animal in comfort zone

Say

- This chapter says feed different components of micro environmental factors in animal house

Micro environment

- The micro environment of an animal is the physical environment immediately surrounding it - the primary enclosure with its own temperature, humidity, and gaseous and particulate composition of the air
- The micro-environment is affected to a considerable extent by the meteorological factors of the external environment, the type of construction of animal house, the management practices and the animals housed in time

Tips for better micro-environment

Animal shelter

- Providing proper shade is one of the cheapest ways to modify an animal's micro environment during the hot or cold weather
- The aim of the animal shelter is to provide a congenial micro environment for better growth, reproduction and production performance of animals
- Shelter should be accessible to all animals, have sufficient ventilation, and be designed to prevent buildup of waste materials and excessive moisture
- Houses, dens, boxes, shelves, perches and other furnishings should be constructed in an manner and made of materials that allow cleaning or replacement in accord with generally accepted husbandry practices when the furnishings are excessively soiled or worn

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 homeothermy
- 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.

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
- 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.

Conclusion

- Overall, the main aim of the micro environment 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.

Do



- Allow the trainee's to assess micro environmental conditions (temperature, relative humidity, lighting and ventilation) in dairy farm at field level

Notes for Facilitation



- Explain the components of micro environmental factors in dairy house
- Field visit and hands on training is necessary

UNIT 3.2: SUMMER MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific planning to manage the cows during summer months

Say

- This chapter says reasons for heat stress and how to manage to alleviate heat stress.

Introduction

- Productivity and efficiency of dairy animals goes down drastically during summer season and heat stress is an inevitable part of life during the summer for dairy farmers in India. Hence it is need to be managed during summer season for increasing production efficiency.

Outcome of high ambient temperature

Heat stress

- Heat stress occurs in animals when there is imbalance between heat production (thermogenesis) within the body (gain) and heat dissipation (thermolysis) from the body i.e. impaired thermoregulation. Increased ambient temperature may lead to enhanced heat gain as compared to heat loss from the body and cause heat stress in animals.
- When feed is converted by the animal's metabolism for the production of milk, eggs, meat, offspring etc., heat is produced as a by-product. An increased production level and thus feed requirement will therefore result in increased internal heat production.
- High yielding animals are consequently more likely to suffer from heat stress in a hot climate than are low yielders. Hence utmost considerations must be taken to protect the high yielders from heat stress.

Signs of heat stress

- During heat stress the animals usually show the following signs. Restlessness
- Lethargy
- Reduced appetite (decreased dry matter intake) to minimize metabolic heat production
- Increased thirst and more crowding around the water tanks
- Decreased activity
- Crowding under shade
- Usually more animals remain standing rather than lying down
- Increased respiration
- Increased sweating and panting to lose more heat (help thermolysis)

- Increased salivation
- Rise of rectal temperature
- Reduction in heart rate
- Maintenance requirement may increase by 20-30% in animals under heat stress.

Tips for summer management

Orientation

- Animal shelter should be constructed in east west orientation so as to avoid maximum solar radiation during summer.

Nutrition

- Increasing the amount of feed available during the cooler period of the day, early morning or late evening.
- Feeding 60 to 70 percent of the ration between 8 pm and 8 am has successfully increased milk production during hot weather.
- Feeding bypass protein (fish meal) and bypass fats.
- Reduce the amount of fiber in the diet to minimize the metabolic heat production
- Soaking of concentrate in equal amount water for 20-30 minutes helps in better **utilization** of nutrients and reduces dustiness in concentrates.
- Supplementation buffer sodium bicarbonate and magnesium oxide help to maintain rumen PH in summer.
- Feeding of antioxidants (vitamin A, & E Zinc etc) reduce heat stress and prevent mastitis

Water

- Provided unrestricted access to cool, fresh and clean water to cows especially during winter season.

Heat stress alleviation:

- Shades, fans, fog misters and sprinklers are used to alleviate heat stress of high producing cows
- High velocity blast fans mounted on side walls can also help in reducing heat stress during July to September

Fogger system

- Sprinkling water with air draft or wind from fan on heat stress vulnerable animals helps to decrease their body temperature and respiratory activity

Other Managemental strategies:

- Avoid transporting livestock in hot weather

- Reduce biting fly populations (with improved sanitation, repellents and traps) which tend to cause cattle to bunch together
- Reduce parlor walking distance.
- Reduce time in holding area.
- Improve ventilation.
- In areas of extreme heat, it is even more important for cows to give birth in good body condition because after parturition their dry matter intake will be lowered by heat stress, as well as the usual low intake immediately after calving.
- Fly control.
- Under these conditions dairy farmers must go for artificial insemination rather than using natural service of heat stressed bulls.
- Teat dipping with germicidal dips is recommended.
- Handling cattle can elevate their body temperature by as much as 3.5°F. Therefore avoid handling during intense heat.

Do



- Assessment of environment factors in a commercial dairy farm
- Practice summer management procedures

Notes for Facilitation



- Explain the heat stress
- Discuss the factor responsible for heat stress
- Hints for alleviation of heat stress

Notes



UNIT 3.3: WINTER MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Skill and knowledge on micro environmental manipulation, nutritional correction and disease control procedures during winter stress

Say

- This chapter attributes problems due to lowering of micro environmental temperatures in farm house, water hygiene maintenance and disease control management procedures during winter season

Introduction

- Production performance of the animal will also be affected when it is too cool because increased proportion of energy will be used for maintenance of body temperature and productivity depends on the ability of the animal to keep normal and stable body temperature.

Protective measures to prevent the effect of cold stress:

- Increase barn temperature- Supply of heating in the winter keep the calf healthy, less chances of calf pneumonia, diarrhea and mortality.
- Reduce humidity to ensure better ventilation, preventing excessive moisture in sheds, roof dripping and ground freezing phenomenon.
- Ventilation should be carried in afternoon.
- Less water should be used in winter barn to wash the ground and dry cleaning should be followed.
- In the afternoon sunlight cattle should be kept out of the barn.
- Bedding should be provided to protect them from cold floor.
- Waterers or water tanks should not be frozen. Lukewarm water should be provided for drinking purpose
- Cold weather increases feed needs of cows. Hay provides more heat during digestion than concentrate feeds.
- Prevention of cold draught. Cows need dry, draught-free resting area.
- During winters, provision of dry, clean bedding keeps the animal dry and insulates the udder against cold temperatures and pathogens. Having dry teats when the cow leaves the parlor is important. One way to lessen the risk is to dip the teats, allow the dip of about 30 seconds and then blot dry using a paper towel.
- Protect the animal from frostbite.

Effect of cold stress on calves:

- Calves born in winter and early spring as well as wet and cold calves are more prone to cold stress or hypothermia. Precipitation adds to the negative effect on calf survival when temperature drops, so it is important to combat cold stress (hypothermia) in newborn calves.

Signs of cold stress:

- Rectal temperature is the most accurate method of determining if a calf is experiencing hypothermia.
- Mild hypothermia- Body temperature drops below 100°F; Severe hypothermia- Body temperature drops below 94°F.
- Vital organs are cold and impaired brain function results.
- Calf shivers to increase heat production and shunt blood from body extremities to the body core.

Protective measures:

- Protective measures include warm water bath, warm air or heat lamps and warm blankets. Blankets are most useful for calves less than 3 weeks of age that are not yet eating grain. Warm blankets should not be so hot that they cause skin burns or sweating during the day.
- Thick, dry straw or sawdust at resting area should be provided for better insulation
- Wind drafts must be avoided because they encourage heat loss.
- Young dairy calves have very little stored fat they can use for warmth. To cope with cold stress by feed with extra energy should be provided.
- Additional amount of feed (starter, milk replacer, or milk) that a calf would need to eat to compensate for extra energy used to keep warm during cold weather. Repeated changes in the calf's diet should not be done.
- Calves less than 3 weeks of age increases the amount of milk or milk replacer to provide extra energy.
- Calves that are eating starter, especially those over 3 weeks of age and can more easily cover their increased energy needs by voluntarily eating more grain is beneficial in terms of generating heat.
- In cold weather, provision of warm water three times per day for a minimum of 30 minutes each time in order to ensure calves have ample opportunity to drink.
- Closing air inlets restricts the ventilating rate and causes moisture to accumulate in the shed. As moisture accumulates, it will begin to condense on cold surfaces, and if the surfaces are below freezing, frost will form.
- In severe cold weather and during blizzard conditions, air inlets can be partially closed to reduce airflow blowing into the barn. The minimum inlet opening during severe cold weather is one-half inch for each 10 feet of building width. (There should be an inlet on each long side of the building.)
- When normal winter weather conditions return, eave inlets should be reopened to the standard one inch per 10 feet of building width on both sides of the building. Of course, eave inlet adjustments are much easier if the inlets have been designed to be adjusted. Boards on hinges are the most common type of adjustable eave inlet.

UNIT 3.4: DAIRY ROUTINE MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Routine management practices followed in dairy farm

Say

- This chapter attributes various plan for dairy routine management

Introduction

- In a dairy farm the primary objective is to produce quality milk and sell the same with profit. Therefore, routinely some activities or operations are carried out to meet this primary object.

Weaning

- Weaning is defined as the separation of young calves from their mother after birth
- In bovine, weaning may be followed either just after birth called as weaning at birth or zero day weaning, or after colostrum period i.e. 3-4 days after birth
- Weaner calves are fed milk @8-10% of their body weight

Milking practices

- Milking is the most important daily routine activity in dairy farm
- Milking is done commonly twice in most dairy farm morning and evening; however, if milk productivity of animal and labour availability is more then go for three times milking per day i.e. early morning, at noon and evening keeping the duration of milking interval equal
- Milking should be conducted gently, quietly, quickly, cleanly, completely and at regular intervals

Feeding

- Feeding activity is most important daily routine operation and proper understanding of nutrient requirement and feeding management will reduce the expense
- Dairy animals are generally allowed for free access to roughages but measured amount of concentrate is given based on body weight for maintenance, milk yield, milk fat percent, pregnancy and growth.
- The roughage and concentrate are generally give separately; during milking only concentrate is given.
- The daily requirement of dairy cattle and buffaloes are calculated based on daily dry matter intake. Cattle generally eat @2-2.5 kg dry matter per 100 kg body weight. As a thumb rule up to 4-5 liter milk yield no concentrate is needed if sufficient green fodder is available.
- If a cow giving 10 lit milk with approximately 400 kg body weight then give 20-25 kg greens, 3-4 kg dry fodder and 5 kg concentrate

Exercise in dairy animals

- In conventional housing management where animals are tied throughout the day and night, exercise is compulsory
- Exercise should be recommended daily at least once during morning just after milking for ½ to 1 hour

Washing

- Washing in dairy animals is generally followed to remove the dirt and loose hairs before milking for clean milk production
- Washing of flank, udder and tail are washed with clean water followed by drying with a clean towel/cloth

Weighing

- Young growing calves are commonly weighed at weekly interval as their growth is much faster than the adults
- However, in adult animal weighing is followed at fortnight intervals or monthly interval depending on the labour availability. Regular weighing of dairy animals is essential for the optimal dairy farm management

Marking/Identification

- Marking of animals soon after birth for easy identification is important managerial practice in dairy farm
- Tattooing is a common method used in animal with lighter body coat and preferably done at the ventral aspect of ear
- In cattle and buffaloes ear tagging is done using either self piercing or non-piercing plastic or non-rusting tags.
- Under branding hot iron branding using hot branding iron or cold branding using branding iron dipped in liquid nitrogen is vogue
- Now-a-days for easy and automatic identification, electronic identification of animal is done using either electronic ear tag or neck collar

Disbudding and Dehorning

- Disbudding is the process of removing horn bud in young calves before its attachment to skull within 3-5 days after birth. On the other hand dehorning is the removal of horn after it has attached to the skull in older calves. However, in most dairy farm disbudding is practiced instead of dehorning as former is less painful

Disbudding and dehorning

- Dehorning may be practiced by chemical cauterization using caustic soda, caustic potash or Silver nitrate sticks.
- Disbudding may be done mechanically using red hot iron or electrical dehorner pressing on the horn bud

Electrical dehorning

- Electrical dehorning is best as it requires only 10 minutes and less hazardous compared to chemical or hot iron method

Grooming

- Grooming or brushing of body hair coat is an important daily farm operation to make and keep the animals' body clean and fit
- For grooming blunted type brush is used, if not available then use coarse rope made from paddy straw, coconut coir or dried grass
- In India, grooming generally practiced before milking along with washing to improve the clean milk production

Castration

- Castration is the unsexing of both male and female, and during castration there is removal of testis and ovaries, respectively. However, surgical removal of testes produces pain to the animals
- Moreover, castration with burdizzo castrator is most commonly used bloodless castration, where the testicles are not removed rather the spermatic cord is crushed and separated from each testicles

Burdizzo castration method

- Castration is generally preferred at young age preferably within 1 year
- Castration should be performed during cold season and strictly avoided in rainy season

Hoof trimming

- Hoof trimming is a routine procedure in dairy farm which corrects the hoof problems or lameness and extent the productive life of cows.
- The foot trimming in animals practiced at 6 month interval and cut only the extra grown hoof otherwise if excess than causes pain and bleeding.

Record keeping

- Record keeping is an important daily farm activity, helpful for the evaluation of individual performance of cow and economic assessment of dairy farm as a whole.
- Daily farm record data entry is a challenge with rewards. The different types of record maintained in a dairy farm are birth register, body weight register, herd register, production register (milk yield register) death and disposal register, feed and fodder register, breeding register, treatment register, health care register, expenditure and income register, labour records etc.



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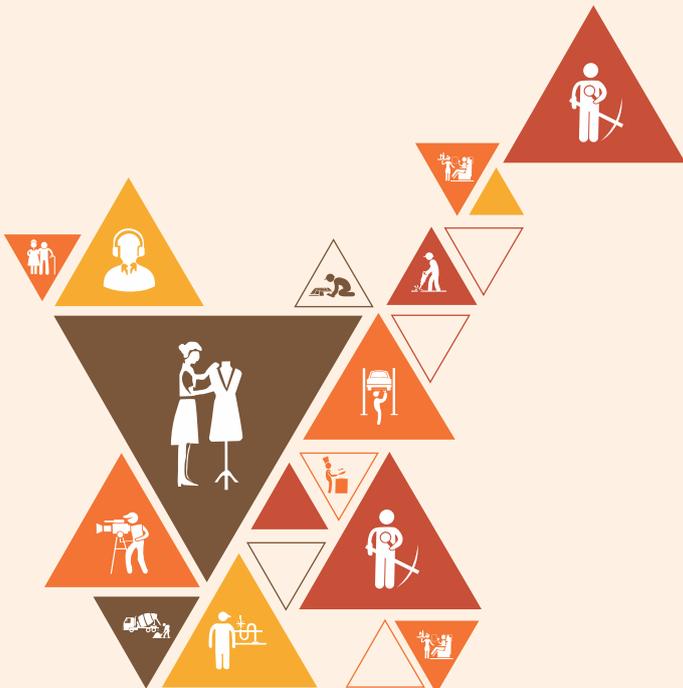
4. Provide Feed and Water For Livestock

Unit 4.1 - Basic Principles of Feed

Unit 4.2 - Important Feed Ingredients

Unit 4.3 - Feed Mixing

Unit 4.4 - Feeding Management



AGR/N4103

Key Learning Outcomes

After completing this session the trainees will be able to:

- Different components of principles of dairy nutrition
- Rumen digestion process – understanding
- Different types of feed energy
- Various parts of feed protein

UNIT 4.1: BASIC PRINCIPLES OF FEED

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Importance of feed and its role in health and productivity of animals

Say

- This chapter says different components of principles of dairy nutrition and explain rumen digestion process

Introduction

- Feed contain the various nutrients for animal survival and production. Hence understanding the principle behind the selection of feed for ration formulation is necessary.

The nutrients needed by livestock are classed below:

- Carbohydrate (for needed energy in body activities)
- Fats and fatty acids (for energy and normal body functioning)
- Protein and amino acid (for bodybuilding, growth, maintenance and reproduction)
- Minerals (for growth, maintenance, and reproduction)
- Vitamins (for normal body and cell functioning)

Nutrient supplied by feed

Water

- The body of a dairy cow is composed of 70–75% water. Milk is about 87% water. Water is not a feed as such because it does not provide specific nutrients. However, it is essential in body processes and to regulate body temperature.
- Water is involved in digestion, nutrient transfer, metabolism and waste removal. Water has structural and functional roles in all cells and all body fluids.
- An abundant, continuous, and clean source of drinking water is vital for dairy cows

Energy

- Dairy cows use energy to function (to walk, graze, breathe, grow and put on body condition, lactate and maintain a pregnancy)
- Energy is the key requirement of dairy cows for milk production. It determines milk yield and milk composition

Protein

- Protein is the material that builds and repairs the body's enzymes and hormones, and is a constituent of all tissues (muscle, skin, organs and foetus)
- Protein is needed for the body's basic metabolic processes, growth and pregnancy. Protein is also vital for milk production. Proteins are made up of various nitrogen-containing amino acid molecules.
- Amino acids are the building blocks for the production of protein for milk, tissue growth and the development of the foetus during pregnancy

Fibre

- For efficient digestion, the rumen contents must be coarse with an open structure and this is best met by the fibre in the diet
- Fibre contains most of the indigestible parts of the diet. It ensures that the cow chews its cud (ruminates) enough and therefore salivates. Saliva buffers the rumen against sudden changes in acidity

Vitamins

- These are organic compounds that all animals require in very small amounts
- At least 15 vitamins are essential for animals. Vitamins are needed for many metabolic processes in the body, such as the production of enzymes, bone formation, milk production, reproduction and disease resistance

Minerals

- These inorganic elements are needed for teeth and bone formation, enzyme, nerve, cartilage and muscle function or formation, milk production, blood coagulation and efficient utilisation of energy and protein

Describing feed energy**1. Digestibility**

- Measured as a percentage, digestibility relates to the portion of food that is not excreted in the faeces and so is available for use by the cow. Digestibility is not a direct measure of energy, but it does indicate overall feed quality.

2. Metabolisable energy (ME)

- This describes the energy in a feed that cows can actually use for their metabolic activities; that is, maintenance, activity, pregnancy, milk production and gain in body condition. The ME content of a feed can be calculated directly from its digestibility
- The ME content of a feed (also called its energy density) is measured as megajoules of metabolisable energy per kg of dry matter (MJ ME/kg DM). Intake of ME is expressed in MJ/day.
- The higher the energy content of a feed, the more energy is available to the animal.

3. Total digestible nutrients (TDN)

- This is an alternative method to describe feed energy.
- TDN content is expressed as a percentage, with TDN intake expressed in kg/day.
- TDN and ME are interchangeable.
- References to the energy density of feeds are given in either of these two measures, as ME (as MJ/kg DM) and TDN (as %).

4. Undegradable dietary protein (UDP)

- This is any protein in the diet that is not digested in the rumen. It is digested 'as eaten', further along the gut. That's why UDP is sometimes called 'bypass protein'. The proportion of the protein that is digested in the rumen is called its degradability.

Selection of feed

- In dairy ration formulation, selection of feed is mainly based on TDN and DCP value of feed

Feed ingredient	DM	DCP	TDN
Roughages			
Rice	90	--	40
Wheat	90	--	40
Jowar	90	--	40
Bajra	90	--	40
Sugarcane bagasse	90	--	40
Hay	90	--	50
Greens			
Maize	25	5	65
Lucerne	20	12	60
Berseem	20	12	60
Hybrid napier	20	5	55
Jowar	30	4	55
Bajra	25	5	55
Sugarcane whole	25	3	60
Concentrates			
Cotton seed cake	90	20	75
Groundnut cake (expeller)	90	45	75
Groundnut cake (deoiled)	90	45	75
Sunflower cake	90	28	75
Linseed cake	90	30	75
Rice bran	90	09	65
Rice bran (deoiled)	90	10	55
Wheat bran	90	08	60

UNIT 4.2: IMPORTANT FEED INGREDIENTS

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Skill and knowledge of different feed ingredients for preparation of rations

Say

- This chapter says feed ingredient classification and feed ingredients role in dairy ration

Classification of feed stuffs

Concentrates

- Feed mixture which supplies primary nutrients (protein, carbohydrate and fat) at higher level but contains less than 18% crude fibre with low moisture.
- In general, concentrates are feeds that are high in nitrogen free extract and total digestible nutrients and low in crude fibre

Two types of concentrates

1. Energy rich – less than 18% CP
2. Protein rich – more than 18% CP

Grains and seeds

- Cereal grains are essentially carbohydrates, the main component of the dry matter being starch which is concentrated on the endosperm
- Many of the grains are milled or processed in some manner thereby creating additional by-products which can be fed to livestock with varying degrees of nutritive values
- Crude protein content of grains and seeds ranges between 8 to 12% which again is deficient in lysine and methionine.
- All cereals are deficient in vitamin D and calcium, but are moderately rich in phosphorus and vitamin E
- Lipid content of grain ranges from 1 to 6%; Maize and oat contain 4-6% oil, sorghum contain 3-4%, wheat, barley and rice contain 1-3% oil

Molasses

- It is highly palatable and an excellent source of energy. In addition to its use as energy feed is also used in following ways: as appetizer, to reduce dustiness of a ration, as a binder for pelleting, to stimulate rumen microbial activity and to supply unidentified factors.

Roots and tubers

- The most common root crops used in the feeding of farm animals are fodder beet, sugar beet and turnip
- It contain 75-90% moisture and low crude fibre content
- The organic matter of roots consists mainly of sugars (50-75%) and is of high digestibility
- Poor source of vitamin and crude protein

Grains and seeds	Nutritive value
Maize grain	Maize is a high energy grain because it contains about 70% starch, 85-90% TDN, 4% oil and 8-12% protein
Sorghum	It contains 65% starch, 80-85% TDN, 2-3% oil and 8-12% protein This grain should be grounded before feeding, otherwise they will escape digestion Less palatable than maize
Wheat	Though wheat is a good source of energy containing 75 -80% TDN, it is rarely used for cattle feeding in India due its higher cost and demand for human consumption
Rice	Unprocessed rough rice contains about 8-10% crude protein, 9% crude fibre, 1.9% ether extract and 6.5% ash. The TDN content ranges from 78-82%. The unprocessed rice contains about 25% of its weight as hulls which are not recommended for cattle feeding Rice should be ground or cracked before feeding to animals Its by-products like rice polish and rice bran are extensively used for cattle feeding in India
Milling by-products	Nutritive value
Wheat bran	Crude protein ranges from 13-16% and TDN from 65-70% The bran has amino acid balance superior to that of wheat
De-oiled rice bran	Raw rice bran contains 13-19% oil which is removed by solvent extract process leading to production de-oiled rice bran It is good source of protein, vitamin and minerals

Protein sources

Protein sources	Nutritive value
Soya bean meal	Soya bean is an annual legume that grows in wide range of condition It contains from 16-21% of oil and are normally solvent extracted The residual meal has an oil content of about 1%
Groundnut meal	It is an important source of protein for livestock feeding in India Three types of oil cakes are available in India, namely ghani pressed (10-12% oil), expeller pressed (6-8% oil) and solvent extracted (0.5-0.7%)

Two type of roughages

1. Dry roughage (10-15% moisture)
2. Green or succulent roughage (60-90% moisture)

Dry roughage	Green roughages
<p>Hay (Conserving the green crops)</p> <p>To reduce the moisture content of green crops up to 15-20%, to inhibit the action of plant and microbial enzymes</p>	<p>Cowpea</p> <p>Early fresh leaves contains 18% crude protein</p> <p>Important varieties – EC-4216, UPC-287, UPC-5286, GFC-1, GFC-2 and GFC-4</p>
<p>Straw</p> <p>Inadequate production of green fodder in the country compelled the farmers to utilize dry roughages as cattle feed</p> <p>Digestible energy varies between 40 and 50%</p>	<p>Sorghum</p> <p>It contains 5-8% of crude protein</p> <p>Important varieties – Rio, Vidisha 68-1 and IGFRI-5</p>
<p>Stover</p> <p>Stovers are the mature cured stalks from grain crops, typically maize or sorghum, with the grain or corn removed</p> <p>Poor in nutritive value</p>	<p>Maize fodder</p> <p>It contains 8-10% protein and 60% digestible energy</p> <p>Important varieties – African tall, JS-1006 and Vijaya composite</p>

Grasses

Grasses	Nutritive value
Napier grass	<p>8-12% crude protein</p> <p>26-28% crude fiber</p> <p>55-58% TDN</p>
Anjan grass	11% crude protein
Para grass	<p>Highly palatable and nutritious</p> <p>10.2% crude protein</p> <p>23.6% crude fiber</p>

Alternate Feed resources for animals

- Straws and stovers are the basic feeds of the ruminants. However straws and stovers are deficient in fermentable nitrogen, energy and minerals. To overcome these problem following products are available in the market, which can be used daily:
 1. Urea molasses mineral block (UMMB)
 2. Urea treatment of straws
 3. Bypass protein feed
 4. Bypass fat

Urea molasses mineral block

- Helps in increasing the number of micro-flora in the rumen there by digestibility
- The urea molasses mineral block should be kept before the animal in a special dispenser to facilitate it to lick as and when desired
- Provision of adequate straw or fodder and water should be made
- The concentrate feeding can be reduced when UMMB lick is provided

Composition of mineral block

Ingredient	Inclusion level
Molasses	30-50 %
Urea	5-10 %
Rice/Wheat/Maize Bran	15-25%
Salt	5-7 %
Lime or cement	5-7%
DCP	2-4%
Minerals	1-2%

- Molasses give a sweet taste to block; It provides energy and other minerals i.e. sulphur; Don't exceed 40-50% otherwise block will break too easily and take too long to dry
- Urea – limited to 10% to avoid poisoning; Improves digestibility and provides protein
- Cereal brans – Provides protein and holds the block together
- Salt – Control the rate of consumption and accelerates hardening of block

Urea treatment of straw

- Treatment of straw by urea can greatly increase in nutritional value, digestibility palatability and intake
- Urea at the rate of four percent of straw is sprinkled in solution form layer by layer and then well pressed by manual tampling
- Mineral mixture at appropriate level is also sprinkled layer by layer. Treated straw heap is left undisturbed for two to three weeks before it is used as feed
- Initially aerate the treated straw for half an hour before feeding. Once the animal is accustomed to the treated straw, feed it without aeration
- If animal does not accept the treated straw initially, sprinkle some concentrate powdered flour over it to induce eating
- Eg to treat 1000 Kgs straw, 40 Kg urea is dissolved in 400 Liters of water. Cover the treated straw with plastic sheet

By pass protein feed

- In bypass protein feed the dietary protein escapes ruminal degradation but degraded in fourth stomach (abdomen)
- Ideally, compounded by pass protein feed should have a minimum of 28% crude protein.
- The concentrate is reduced by 40%
- The efficiency of protein utilization is far superior in BPF formulation as it is based on the principle of dietary protein degradability

By pass fat

- By pass fat is also protected from the rumen degradation, it by passes the rumen and gets totally digested in lower gut
- The energy is used with maximum efficiency without any wastage
- By pass fat increases the milk yield and also balance the protein energy ratio to increase the fertility. In the concentrate feed it is incorporated at 2-4% level, where the feed is given as per the milk production and for maintenance so as to get the requisite amount energy

UNIT 4.3: FEED MIXING

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge on preparation of compound balanced feed using specific machineries in feed mixing unit

Say

- This chapter says mechanized feed mixing unit and its parts and explain grinding, mixing, packing and storage of compound feed

Introduction

- Feed mixing is to assure that an animal receives all of its formulated nutrient allowances every day.
- Uniformity of particle size and number of particles per unit weight are important considerations for assessing mixing of the various micro ingredients.

Guidelines for feed mixing

1) Premix

- Premix micro ingredients such as drugs, vitamins, and trace minerals with a suitable diluent prior to their inclusion in a supplement
- Diluents serve to dilute the micro ingredient and thereby facilitate the rate of mixing
- Examples of suitable diluents include the macro minerals typically incorporated in a feed mix (ie. salt, limestone, dicalcium phosphate, magnesium oxide)
- Diluents should be dry in order to permit a more uniform dispersion of individual micro ingredient particles
- Moisture must be avoided as it may cause entrainment and clumping (hygroscopic compounds such as urea are not suitable diluents)
- The premix (micro ingredients plus diluent) should represent 3%, by weight, of the supplement. Premixing may be done by hand in a large container.
- However, it can be performed more easily and efficiently by means of a small portable cylinder mixer (cement mixer). Protective clothing, gloves and dust mask should be worn when handling micro ingredients

2) Supplement

- Prepare a supplement. This supplement will contain the premix, a suitable carrier, and the remaining minor dry ingredients in the diet including minerals, urea, and supplemental protein sources
- Carriers are feed ingredients which combine with the micro ingredients in the premix to alter their physical characteristics.
- By adsorbing to the carrier, the very fine particles of the micro ingredients are allowed to move more rapidly and uniformly through the mix.
- This rapid movement of micro ingredients through the mix is important to assure adequate distribution prior to addition of molasses.
- Carriers should have physical properties comparable to ground grain or oilseed meals. Indeed, both of these may be used as carriers.
- However, the adsorptive properties of ground grain and oilseed meals are low. This limitation may be overcome by first combining 2% fat to the ground grain or oilseed meal before blending with the premix.
- The thin film of fat covering the carrier will facilitate adsorption of the micro ingredients in the premix.
- Outstanding carriers for micro ingredients include rice hulls, wheat bran, vermiculite, alfalfa meal, ground corn cobs, and beet pulp.
- The amount of carrier to include in the supplement will depend on the “space” available in the diet formulation.
- The supplement should comprise a minimum of 3% by weight of the finished feed.
- In preparing the supplement, first add the carrier, and then add other major ingredients until they reach the central shaft line, then add the premix and other minor ingredients, and finally add the remaining major ingredients.
- Mixing volume and mixing time will depend on the specifications of the particular mixer being used.
- Although some mixers will mix feed very efficiently at low volumes, most do not.
- Review the literature regarding your mixer and then see that the volume of feed being mixed and mixing times are optimal for the mixer. Be careful not to underfill or overfill the mixer.

3) Finished feed

- Finished feed may be prepared as follows:
 - 1) add the grain portion of the diet to the mixer;
 - 2) add the dry supplement (remember that the supplement should comprise a minimum of 3% of the finished feed) to then center of the mixer (if possible, add supplement on the opposite end of the mixer to where the feed is discharged);

- 3) allow feed to mix for a minimum of 1 minute;
- 4) add forage component of the diet;
- 5) Add fat component of the diet;
- 6) add molasses or liquid component of the diet;
- 7) Allow to mix for the time specified for the mixer (usually not less than 8 minutes).

Steps to avoid feed mixer troubles

- Ribbon and auger mixers operate most efficiently if they are filled to 70 to 90% of capacity.
- With paddle mixers, satisfactory mixing may be obtained at much lower levels of loading (25% of capacity). However the application of fat and/or molasses to mixers that are not adequately loaded may cause coating of the sides of the mixer and mixer bars, resulting in decreased mixer efficiency and contamination.
- The mixer should not be overloaded. Overloading the mixer will cause some of the feed to float above the mix and not blend properly.
- With paddle and ribbon mixers the mixer bars should rise at least 12 cm above the level of the mix.
- Improper mixing can also occur if the tolerances between the mixer bars and the sides of the mixer are not set properly. Mixers are factory-set with an agitator clearance of .3 to .9 cm.
- If that clearance increases to 1.3 cm, mixer efficiency will be impaired. Mixers should be visually inspected periodically.
- Establish a set schedule for inspecting the mixer. Worn paddles and ribbons should be replaced.
- Do not deviate from proper mixing times. If possible have mixing time controlled by a timer.
- Mixing time increases with the level of liquid feed added to the mix. This is because the mix becomes more viscous, slowing down the flow of ingredients through the mix.
- This problem accentuates when the level of molasses added to the mix exceeds the absorptive capacity of the mix. Thus, the level of molasses employed in a diet formulation should be considered not only with respect to relative cost of the molasses, but also with respect to practical mixing time and the acceptable limiting micro ingredient in the mix.

Sampling

- It is best if the sample can be obtained directly as the feed is being delivered from the mixer.
- Scoops or containers used for collecting samples should be of the size and volume to uniformly collect only the amount desired.
- The sample should be stored in air-tight sealed containers.
- Keep in mind that if feed is to be sampled from sacks, bins or feed bunks the sampling variation is increased (that is, it will be more difficult to obtain a representative sample).
- Accordingly, the sample of finished feed should be approximately 10 kg, for representing 1-kg samples taken at random as the feed is delivered from the mixer.

Sample size

- Because the principal objective in feed mixing is to assure that an animal receive all of its formulated nutrient allowances every day, the sample size should reflect the expected average daily intake of the animals consuming the finished feed.

Mixing efficiency

- Due to costs involved, assays for mixing efficiency should be based on nutrients or drugs whose concentration in the diet, from either a legal or animal performance standpoint, are critical.
- Drugs make particularly good markers of mixing efficiency because there is usually only one ingredient source of the drug in the mix, and accurate analytical assays are available for most drugs.
- Because of their high density and low concentration in the diet, trace elements might also serve as markers of mixing efficiency. However, they have the disadvantage that there are usually many ingredient sources of trace elements in the mix.

Compound feed ingredients

- **Grains:** Maize, sorghum, wheat, rice, oats, barley, ragi, millets, etc.
- **Brans:** De-oiled rice bran, rice polish, wheat bran, maize bran, etc.
- **Protein meals/cakes:** soyabean meal, groundnut cake, rapeseed meal, linseed cake, etc.
- **Chunnies:** Gaur, tur, urd, moon, gram and chunnies of other locally available pulses
- **Agro-industrial by-products:** Molasses, mango kernel extraction, tapioca waste, etc.
- **Minerals and vitamins:** Mineral mixture, calcite powder, common salt, di-calcium phosphate, vitamins A, D₃ & E

Compound feed manufacturing

- Different feed ingredients are taken in batch mixer from the raw material storage godown, in accordance with the computerized least cost feed formulation
- After mixing, all raw materials are ground to uniform particle size of 3mm. ground material is further mixed
- Materials used in feed formulation in smaller quantities, such as vitamins, minerals, urea, calcite powder, common salt etc., are mixed in a ribbon mixer using proper diluents and stored in one of the storage bins
- Ground material and molasses are mixed simultaneously in twin –screw type mixer
- Molassed feed is mixed with the dry steam (75-80°C) before pelleting.
- Steam acts as conditioner to the feed and it helps killing some pathogens
- Steamed feed is converted to pellets by passing it through cylindrical die and press roller
- Usually, 8 mm die is used for production of pelleted feed. Pelleted feed, thus produced is passed through pellet cooler, before packing in HDPE or gunny bags

Quality control aspects

- Each raw material is tested in the laboratory, before it is finally accepted for production of cattle feed
- All adulterated and infested raw materials are out rightly rejected, to ensure proper quality of finished product
- Even, finished product is tested for quality, before dispatch
- Finished product of improper quality is reprocessed

UNIT 4.4: FEEDING MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge on feeding management of different stages of cow

Say

- This chapter says feeding management of calves, milch animals and bull

Feeding management of calves

- Reticulo-rumen is nonfunctional in calves and hence feeding of calves should be treated as non-ruminant and they are not equipped to utilize cellulose. The calves cannot utilize roughages containing higher amount of cellulose
- To encourage the early development of rumen and reticulum the calves should be fed with good quality leguminous hay and other roughages
- Urea should not be included in calves ration because of calves have little capacity to utilize non-protein nitrogenous compounds
- B complex vitamins also are dietary essential for calves in addition to vitamin A and D

Feed Formulae for Calves

Composition of Good Milk Replacer (Biologically similar to natural milk)

Ingredient	Proportion (Kg)
Dried skin milk	70
Dried whey	18
Lecithin	2
Animal fat	10
Dicalcium phosphate	1.7
Copper sulphates, ferrous sulphates, manganese sulphates and antibiotic	Traces

Composition of Partial Milk Replacer

Ingredient	Proportion (Kg)
Wheat	10.0
Fish meal	12.0
Linseed meal	40.0
Milk	13.0
Coconut oil	7.0
Linseed oil	3.0
Molasses/ Jaggery	10.0
Mineral mixture	3.0
Butyric acid	0.3
Antibiotic mixture	0.3
Rovimix A, B2, D3	0.015
Total	100.115

Note: Crude protein around 10%

Crude fibre less than 5%

Feed Formulae for Calf Starter

Ingredient	Proportion (Kg)			
	Model 1	Model 2	Model 3	Model 4
Maize chuni	35	40	21	46
Dal chuni	30	27	20	30
Soyabean meal	10	10	-	11
Groundnut cake	12	10	11	10
Linseed meal	-	-	10	-
Dried whey	-	-	10	-
Dehydrated lucerne meal	-	-	5	-
Molasses/Jaggery	10	10	5	-
Calcium and Phosphorus	2	2	2	2
Trace minerals	1	1	1	1
Total	100	100	100	100

- For these mixtures add 5 lakhs I.U. of vitamin A and 60 thousand I.U. of Vitamin D and 0.15 gram of Aurofac or TM-5
- **Note:-**Minimum protein content 16%; total digestible nutrient 75 %
- In addition to milk, calf starter may be fed at the rate of 125 grams per day from 5th to 8th week, 250 grams from 9th to 12th week, 650 grams from 13th to 16th week (quantity of milk feeding is reduced from 2.5 lts to 0.5 lts) and 1000 gram from 17th to 24 weeks (at this period, milk is totally withdrawn)

Feeding management of milch cattle

- In general the dry matter from roughage should not exceed 2 per cent of cow's live weight nor should it be less than 1 per cent
- Challenge feeding
- It means the cows with high milk production potential are to be fed increase quantity of concentrate to 'challenge' them to produce to the maximum

Challenge feeding schedule

Period	Concentrate allowance
Last 2 weeks before calving	Starting from 500g, increase 300-400 g daily until the cow is eating 500-1000 g per 100 kg of body weight
First 2 weeks of lactation	Increase 500 g per day to free choice level
Second week to peak yield (test day)	Free choice
From test day onwards	According to production as per thumb rules. Example: 1 kg for every 2½ kg milk produced
Remaining lactation	Concentrated adjusted to monthly test of milk production
All periods	Green fodder and dry fodder given adequately

Feeding management of bull

- A good rule to feed mature bull is to feed daily about 1 kg hat and ½kg concentrate per 100 kg body weight
- Excess calcium in bull ration can cause problem particularly in older bulls. When legume roughage is fed the concentrate mixture should not contain a calcium supplement

Allowance of feed at different stages of cattle

- Additional allowance for milch cow – 1.0 kg of concentrate for every 2.5 kg of milk average 4% fat percentage
- Additional allowance for pregnant animal after 6 months of pregnancy – 1.5 kg of concentrate mixture over and above the ration schedule of adult animal

Cattle age	Feed allowance
Calves – 3 to 6 months	Concentrate mixture – 1 to 1.25 kg Green fodder - 5 to 10 kg OR Concentrate mixture - 1.25 to 1.5 kg Green fodder - 3 to 5 kg Dry fodder, <i>ad libidum</i> (Usually 1.5 to 2 kg)
Young stock – 6 to 12 months	Concentrate mixture - 1.5 to 1.75 kg Green fodder - 10 to 15 kg OR Concentrate mixture - 2.0 to 2.5 kg Green fodder - 3.0 to 5 kg Dry fodder, <i>ad libidum</i> (usually 2.5 to 3.5 kg)
Adults	Concentrate mixture - 1.5 to 2 kg Green fodder - 20 to 30 kg Dry fodder - 2 to 3 kg

Feed Formulae for Dairy and Working animals

Ingredient	Proportion (Kg)		
	Model 1	Model 2	Model 3
Maize/Jowar	25	27	27
Groundnut cake	20	20	15
Rice polish/wheat bran (1 st quality)	30	10	20
Soyabean meal	10	10	-
Deoiled rice polish	20	30	15
Maize gluten	-	10	10
Dried whey	-	-	10
Husks/groundnut shell/powder	2	-	20
Mineral mixture	2	2	2
Salt	1	1	1
Antibiotics	+	-	-
Vitamins	+	+	+
Total	100	100	100



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5. Maintain Healthy Performance of Livestock

Unit 5.1 - Maintaining Healthy Farm-Causes of Infertility and Reproductive Management

Unit 5.2 - Clean Milk Production

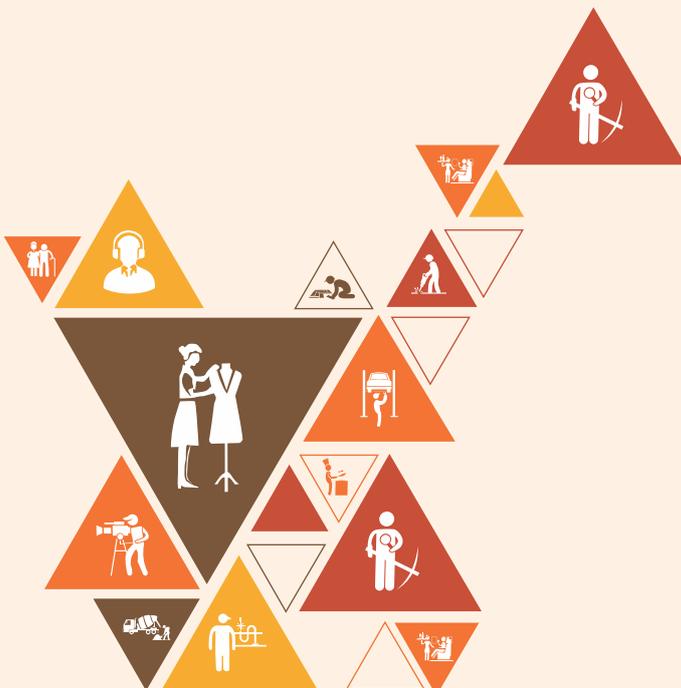
Unit 5.3 - Dairy Waste Management

Unit 5.4 - Cleaning of Utensil

Unit 5.5 - Important Vaccination of Dairy Animals

Unit 5.6 - Care of The New-Born Calf

Unit 5.7 - Prevention and Control of Mastitis



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Key Learning Outcomes

After completing this session the trainees will be able to:

- Best practices for reproductive management
- Observation of standing heat
- Reproductive problem and its management
- Points to identify different infertile animals

UNIT 5.1: MAINTAINING HEALTHY FARM - CAUSES OF INFERTILITY AND REPRODUCTIVE MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific information and background of fertility management of dairy cattle

Say

- This chapter says best practices for reproductive management of dairy cows

Introduction

- A sound reproductive program is essential to the financial health of the organic dairy. A fundamental goal should be to breed cows back in a timely manner so that daily milk production remains high and a steady supply of new heifers is available for replacements or sale.

Reproductive management in dairy farm

- It is not advisable to use artificial hormones for breeding or to treat the animals with reproductive problems
- Good dairy farm should follow the measures that pertaining to heat cycle detection and natural alternative treatments that will help to increase the fertility of the farm

Best practices for improvement of dairy farm

- Observation of standing heat is the best way to judge the time to inseminate or breed a cow
- Some farms may use some heat detection devices or other physical methods but nothing beats watching the cows for heats twice daily

Observation of standing heat

- Cow standing to be mounted
- Vulval discharge
- Vulval lips thickening
- Cows ovulate about 12 to 16 hours after a standing heat so most of the farmers have a habit of "Morning-Evening" rule for breeding.
- If a farmer observes a cow in standing heat in the morning, he/she will breed her that evening; if a cow is observed in standing heat in the evening, she/he will be bred in the morning

Insemination

- Even though frozen semen contains small amounts of antibiotics, dairy farmer follow to use artificial insemination for safety reasons and to improve genetics by breeding for selected traits.
- Some farms still use natural service (breeding by a bull) if good heat detection is difficult, for "clean-up" (breeding cows that have not been successfully bred by AI), or on virgin heifers.
- Additionally, some farmers feel that available semen does not possess the genetic traits they desire.

Points to be considered for bull handling

- All bulls are potentially dangerous animals and should manage them with caution and respect and some basic considerations
- Raise bull calves in a group or on a nurse cow for proper socialization
- Know aggressive behavior in bulls
- Never run from bulls
- Remove bulls from herd at the first sign of aggressive behavior

Reproductive challenges and its solution

Challenge	Definition	Factors Involved	Management Considerations
Anestrus-True	Failure to come into heat; ovaries are not cycling.	<ul style="list-style-type: none"> • Lack of energy in diet. • Low hormone levels because of feeding excessive stored feeds • Cystic ovaries • Uterine infections • Anemia 	<ul style="list-style-type: none"> • Evaluate ration for energy balance • Feed adequate amounts of trace minerals (selenium, iron, copper, phosphorous) and vitamins • Feed fresh forage or stored forages that contain estrogens (red clover). • Have veterinarian perform physical to detect anemia, cystic ovaries, or infections
Anestrus	Failure to detect heats.	<ul style="list-style-type: none"> • Poor animal identification • Poor record-keeping • Cows in an environment where they cannot express estrus (crowded) • Not enough time to watch cows 	<ul style="list-style-type: none"> • Keep good estrous cycle records • Increase time spent watching cows • Provide good footing • Consider tail paint

Cystic Ovaries	Large cysts on ovaries that last more than 10 days; cows may be constantly in heat or not cycling	<ul style="list-style-type: none"> High estrogens in feeds (legumes or molds) Genetics Calcium: Phosphorus ratio greater than 2:1 Older cows 	<ul style="list-style-type: none"> Forage analysis (calcium, phosphorus, mycotoxins) Avoid cows and bulls that produce cystic daughters
Persistent CLs (corpus luteum)	CLs that are present on the ovary beyond 20 days in a non-pregnant cow	<ul style="list-style-type: none"> High milk production Uterine infection 	<ul style="list-style-type: none"> Evaluate diet for energy imbalance (too little energy)
Retained Placenta (RP)	Failure to drop placenta within 24 hours of calving	<ul style="list-style-type: none"> Twin births or difficult calvings. Selenium/vitamin E/vitamin A deficiencies Fat dry cows Infection (bacterial or viral) Low-grade milk fever 	<ul style="list-style-type: none"> Review selenium and vitamin A and E levels in dry cow diet Avoid weight gain in dry period Select bulls for easy calving Calcium supplements
Metritis	Infected discharge that last more than 2 weeks post-calving	<ul style="list-style-type: none"> Secondary to retained placenta Difficult calving Poor hygiene during an assisted calving 	<ul style="list-style-type: none"> Calve in clean areas and use sanitized equipment when assisting calving Address factors that result in RPs. Feed maximum amounts of vitamin E/selenium
Pyometra	Severe infection of uterus with yellow, foul-smelling discharge	<ul style="list-style-type: none"> See metritis (above) Poor infusion technique when treating metritis 	<ul style="list-style-type: none"> See metritis (above). Uterine infusion by veterinarian (iodine, chlorhexidine-check with certifier). Antibiotics, prostaglandins, and removal from herd in severe cases.
Repeat Breeders	Cows requiring 3 or more inseminations	<ul style="list-style-type: none"> Poor insemination technique Improper handling of semen Early death of embryo (rough rectals, bacterial, or viral infection) Bull infertility Sexually spread diseases 	<ul style="list-style-type: none"> Culture/testing for infectious diseases Good quality forage Careful timing of breeding New bull tested for high fertility Review AI technique and semen handling Veterinary examination

UNIT 5.2: CLEAN MILK PRODUCTION

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Knowledge on clean milk production procedures

Say

- This chapter says plan and steps of clean milk production

Introduction

- Clean milk production following Good hygienic practices is an essential pre requisite for obtaining whole some and superior milk quality.

Clean milk definition

- Defined as “Milk drawn from the udder of healthy animals, which is collected in clean dry milking pails and free from extraneous matters like dust, dirt, flies, hay, manure etc. Clean milk has a normal composition, possesses a natural milk flavor with low bacterial count and is safe for human consumption”.

Steps for clean milk production

1. Animal shed and environment

- The floor of the milk shed should be swept with clean water, and disinfected with one-percent bleaching powder solution to arrest cross contamination and spreading of undesirable odors.

2. Animal

- The animal itself is one of the most significant sources of contamination, care and management of the animal and its health is therefore the starting point for clean milk production
- Milk from diseased animals should be kept separate and disposed of safely. Animals suffering from any contagious disease, including mastitis, should be segregated from the healthy ones.

3. Milking method

- In hand milking, the danger of contamination coming from the milker is higher as compared with machine milking.
- The milker should therefore be free from contagious diseases
- Nails should be well trimmed; she/he should wear clean clothes and should wash her/his hands with soap and water before milking, then dry with a clean towe
-
- In modern Dairy farms, the milking is done with the help of milking machine in very hygienic way without hand touch.
- The operation of milking is very fast and the quality of milk also superior.

4. Utensil cleaning

- Utensil must be thoroughly cleaned with Water followed by Hot water rinsing.
- Dirty milking equipment is one of the main sources of infection of milk.
- About 15 minutes before milking, milking equipment should be rinsed with a sanitizing solution

5. Personnel hygiene

- The Milk Handlers need to wash their hands thoroughly with cleaned water followed by hot water rinsing or sanitization with sanitizing agent to avoid physical and biological contamination.

6. Milk handling and testing

- Milk needs to be handled hygienically without spillages while transferring
- Milk needs to be filtered in order to be free of dust and foreign particles
- All the Filled milk cans to be kept in organized way in very clean and hygienic way in a shade without direct exposure to Sunlight. The milk is susceptible to get deteriorated and develop oxidized flavors if kept exposed to direct sunlight
- The milk samples to be drawn using an appropriate and cleaned sample device as per the Quality Control guidelines.

7. Transportation of milk

- The Milk cans to be transported in a Covered/protected hygienic milk vans.

Clean milk production – merits

- Prevention of milk spoilage in short period
- Increase the quality and shelf life of the milk and its products
- It controls the spread of infectious disease through milk

Do



- Provide exercise to enumerate steps for clean milk production

Notes for Facilitation



- Detailed discussion of clean milk production
- Visual demonstration and hands on training is necessary

UNIT 5.3: DAIRY WASTE MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Systematic and scientific utilization of dairy farm waste for recycling with cost effectiveness

Say

- This chapter enlightens the various components of dairy farm waste and explains different techniques used to manage the waste

Introduction

- Animal manure is rich in nitrogen, phosphorus and potassium manure has several beneficial effects on soil properties, in addition to providing supplemental nutrients for crop growth
- Composting is a sustainable waste farm management practice that converts a large volume of accumulated organic waste into a usable product.
- When organic wastes are broken down by microorganisms in a heat-generating process, waste volume is reduced by almost 50%, many harmful organisms including pathogens and weed seeds are destroyed, and a useful, potentially marketable product is produced.

Component of dairy farm waste

1. Cattle manure
2. Spoiled hay and feed
3. Animal bedding

Types of waste

(i) Solid waste (dung)

(ii) Slurry

Various techniques used are:

1. Composting
2. Biogas production (anaerobic fermentation)
3. Aerobic oxidation in ditches/Lagoons/lakes
4. Direct application in field
5. Use as fish feed in fish ponds
6. For growing algae (diluted slurry)
7. Other techniques (less popular) recycling as filler in animal feed (i.e. poultry waste in cattle feed, etc.)

Composting:

- In composting pile of solid waste is collected in pit 1.5 m deep and 3×4 meter dimension or large as per requirement (3 cubic meter/adult animal units) as per (Allnut design described by R.G. Linton)
- This design has two pits with walls on all three sides covered on top with temporary roof to prevent desiccation, and alternative filling and emptying has been suggested.
- The front side should have a gutter which should be filled with cresol and water to control fly breeding and the front side should have a vertical sliding shutter to prevent debris falling into the gutter.
- The manure should be dumped and well packed in each compartment separately. While one is filled and packed, fermentation and decomposition occurs in the other which was filled earlier.
- The manure should be turned periodically to ensure uniform decomposition; this also enhances the destruction of larvae of parasites that are normally present in the dung.
- During composting frequent mixing of waste is required. The manure from other livestock farms like sheep, goat, pig and poultry can be decomposed in the similar manner. After piling within 24 hours temperature rises to 50°C and within 3-8 days it reaches to 70°C. Thereafter it falls to 50°C. C: N ratio and moisture are important in this process.

Biogas Production (Anaerobic fermentation)

- In this process organic matter is converted into volatile fatty acids which is in turn by the action of anaerobic bacteria (methanogenic bacteria) is converted to CH₄ and CO₂.
- The slurry is valuable product for using in fields.

Aerobic Oxidation

- Slurry can be disposed by keeping it in shallow ditches, lagoon, and lakes. BOD (Biological oxygen demand) per acre is generally 20 for proper oxidation.
- Large areas are required and periodically solid sludge has to be removed. Upper water is used for irrigation after mixing with fresh water or directly also

Liquid Form by Means of Lagoon:

- Lagoon is a body of water like a small pond where in liquid manure is discharged and digested by bacterial action. In this method fertility value of manure is wasted but helps in saving of equipment and labor which may compensate the loss.
- Pens are scraped and washed daily with water under pressure 75 lbs./sq" inch and 500 gallons water per hour. This is run into lagoon which should hold at least one week accumulation of manure @ 20 kg/cow/day.

UNIT 5.4: CLEANING OF UTENSIL

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Basic scientific principles of cleaning of milking utensils

Say

- This chapter explains procedure for cleaning of milking utensils, different method of cleaning and assessment of cleaning

Selection of Utensils for Milking/Storage

- The pails/ containers/cans made up of mild steel and HDPE/plastic material shall not be used for storage and transportation of milk
- The utensils/pails and the storage vessels should have smooth surface with minimal joints and free from dents, cracks and crevices
- A suitable size lid should always be used to cover the utensils and the vessel
- Ensure that the milking utensils are uniform having small mouth so that dirt and flies do not gain easy access
- They should be exclusively used for milking and storage
- Use separate vessel for washing of udder and teats & for milking

Procedure for cleaning the milking utensils

- Pre-rinsing with cold or lukewarm water should always be carried out immediately upon emptying the vessels.
- After rinsing scrub utensils/pails thoroughly with a suitable brush, using hot water and efficient dairy cleaner
- Follow the washing up on scrubbing with hot water. The temperature water should be more than 50°C.
- Wash the utensil again with enough cold water (tepid water in cold season) to remove traces of detergent.
- Sanitise the cleaned utensils with acceptable sanitizing agent (iodophors /chlorine solutions (50-200ppm of active compound)) to kill/disinfect the utensils.
- Properly cleaned vessels should be placed in inverted position for the complete drainage of water, so as to avoid contamination from air, insects, rodents, reptiles etc.
- Dry cleaned utensils should be stored in dust, dirt and other contamination protected area.
- Hot water sterilization- the temperature should be as near the boiling point as possible and never below 85°C. The utensils should be immersed for 20 min, but where it is not possible, boiling water should be poured over the milk-contact surfaces till they are too hot to touch.

Cleaning and Sanitation of Milking Machines

Manual Cleaning

- After milking, the outside of the milking unit is cleaned by wiping and rinsing. Each unit should be rinsed by connecting the vacuum tube to a vacuum tap and drawing clean water through the teat cups. If the clusters are not cleaned immediately, they should be left immersed in water.
- The warm detergent-disinfectant wash, is the most important of the three. Unless the solution reaches all milk-contact surfaces, milk residues may remain which will protect bacteria from the disinfectant. Care must be taken to avoid air-locks in the clusters.
- Clusters should be washed first by full immersion for two minutes; teat cups, milk tubes and claws are scrubbed, and the cluster is reassembled and transferred to the rinsing trough.
- The final clean water rinse, the addition of 50 ppm of hypochlorite significantly improves results. The clusters should be rinsed and hung up to drain.

II. In place cleaning

- This method used in the milking equipment is connected with the pipelines and cooling tank. This has circulation and acidified boiling water cleaning methods, latter method is less commonly used in cleaning.
- After milking, rinse the machine thoroughly with warm water, and brush the clusters to remove external dirt. Attach the letters to the cluster. Check the water temperature (85°C).
- Drain the milk from the receiver and milk pump. Remove the filter sock (interior) and clean the filter as recommended by the manufacturer.
- Connect the air pipeline directly to the water heater and set the three way valve to the washing position so that the hot rinse water is drawn into the machine.
- Set the releaser milk pump to run continuously and adjust the spreader on the receiver lid to the washing position.
- Allow hot water to pass through the machine and discharge to waste until the temperature of the water leaving the machine exceeds 50°C.
- Add approved detergent-disinfectant solution to the measured volume of hot water, in accordance with the specifications of the manufacturer.
- Set the three-way valve to draw solution from the wash through the installation and continue circulation for 5-10 min. No advantage is gained by prolonging circulation, as the temperature of the solution progressively falls.
- Discharge the detergent-disinfectant solution by deflecting the delivery pipeline.
- Run clean cold water into the machine. Sodium hypochlorite may be added at a concentration of 50 ppm to avoid risk of contamination from supply lines.
- Switch off the releaser and vacuum pumps; drain and prepare the machine for milking.

Cleaning assessment methods

1. A Visual inspection

- Cleaning failures usually result in a visual build up or residual film on some part of the milk harvesting or storage equipment.

2. Rinse/Swab method

- Rinse method for cans/pails and Swab method shall be used for testing Cleaning efficiency of milking equipment and its accessories.

3. Bioluminescence method

- ATP bioluminescence is a rapid detection method suited for on-site sampling and takes less than five minutes to perform.
- ATP bioluminescence can detect both bacterial contamination and non microbial contamination such as milk soil.

Do



- Practice them to assess the cleaning efficiency of utensils

Notes for Facilitation



- Notes on utensil cleaning in dairy farm
- Demonstration of cleaning procedures

Notes



UNIT 5.5: IMPORTANT VACCINATION OF DAIRY ANIMALS

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Common vaccine and vaccination schedule for dairy cattle

Say

- This chapter says need, storage and handling for vaccine and explain common vaccination schedule for dairy cattle

Vaccine and vaccination – Good management practices

1. Vaccine purchase

- Consult veterinarian before purchasing vaccine to determine which vaccine is necessary at that point of the time
- Check expiration dates when purchase or receive vaccine
- Check the shipping cooler as soon as it arrives and refrigerate the vaccine immediately
- Purchase vaccine in small-dose vials to minimize waste

2. Storage of vaccination

- Read and follow label instructions
- Discard any vaccine that freezes
- Discard expired vaccine
- Store vaccine that will expire first near the front of the refrigerator and use it first
- Do not overstock vaccine
- Train employees, family members and others on proper vaccine handling

3. Handling of vaccine at field level

- Pre-cool the cooler for at least 1 hour prior to placing the vaccine inside
- Use enough ice or cold packs to maintain a steady temperature, 35-45°F
- Take enough vaccine for the morning or for afternoon, not for both
- Keep the cooler out of sunlight
- Identify any leftover unopened bottles of vaccine and use them first the next time
- Do not use the same vaccine gun for different vaccines
- Do not mix modified live vaccines if won't be able to use them within 1-2 hours reconstituting them
- Discard bottle of killed vaccines that have been opened for more than 2 days because vaccine can be contaminated by repeated introduction of air and needles

4. Injection of vaccine

- Give injections in front of the shoulder in the middle neck region
- Avoid giving injections in the nuchal ligament of the neck region
- Remove air from syringes or guns prior to injecting vaccine
- Use the correct gauge and length of needle as specified by the label
- Change needles every time you fill a syringe or vaccine gun
- Change needles that become burred, bent, or broken
- Never straighten and reuse a broken needle
- Space multiple injections 4 inches apart on the animal to avoid mixing different products
- Use a new needle each time syringes are filled

5. Disposal of vaccine

- Follow if any disposable instructions provided on the label
- Do not place the unused vaccines on water sources
- Unused or empty vaccine container should be banned either through burn barrels or incinerators

Vaccine schedule for dairy animals

S. No	Disease	Vaccine	Dose (ml)	Schedule
1	Foot and mouth disease	Raksha FMD	3	Twice in a year September and March
2	Haemorrhagic septicaemia	Alum ppt H.S	5	Annually before monsoon (twice a year in endemic areas)
3	Black quarter	Alum ppt B.Q.	5	Annually before monsoon
4	Brucellosis	Brucella cotton – 19 strain	5	Only once (4-9 months of age in cow in prevalent herds)
5	Theileriosis	Rakshavac T	3	Annually

Deworming schedule for dairy animals

Type of worm	Deworming schedule
Round worms	First dose at 10 days of age and thereafter at monthly interval up to 6 months Thrice a year in animals above 6 months of age
Liver Flukes	Twice a year in prevalent area (before and after monsoon)
Tape worms	Twice a year (January and June in prevalent herds)

UNIT 5.6: CARE OF THE NEW-BORN CALF

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific principle and management of new born calf

Say

- This chapter explains calf management up to six month of age and weaning procedures for new born calves.

Calf rearing system

Calf rearing system varies with the facilities available to farmers. They may be reared indoors or outdoors or partly indoors and partly outdoors. The important factors to be considered are:

1. Availability of quality fodder.
2. The humid tropical environment is ideal for the proliferation of internal parasites and it is very difficult to keep the calves free from massive infection if they are grazing.
3. Outside grazing may not provide sufficient nutrients from optimum growth.
4. Climatic stress affects growth and utilization of feed nutrients.

In humid tropics, it may be desirable to keep the calves indoor in day time and outdoor at night. This will reduce parasitic infection also. Thus, it is advantageous to keep new born calf in individual pen for the first 3-4 weeks of age. Calves that are running in batches often suckle or lick each other after feeding and it is a good practice to keep them in their ties for some time after milk feeding. Hair swallowed by the calves after suckling each other often forms a hard ball in the abomasum and this is a constant cause of digestive disturbances. Cleaning the mouth of the calves after each milk feeding is a sanitary practice. The calf pens should provide comfort and easy cleaning.

Management practice up to six months age of calves

- Clean nostrils and mouth which helps the calf breathe better and help prevent future breathing problems.
- Allow the mother to lick the calf clean which promotes circulation within the calf's body and prepares the calf to stand up and walk.
- Tie the naval cord with a thread at a distance of around
- 2 inches from the base and cut the remaining cord with a clean instrument.
- Dip the navel (a simple smearing will not serve the purpose) in 7% or higher tincture of iodine solution and repeat after 12 hours. (Do not use teat dip or weaker iodine solutions). A poorly maintained navel is the gateway to serious infections.

- A new born calf should be given 2 litres of colostrum within the first 2 hours of birth and 1-2 litres (based on size) within 12 hours of birth.
- Many calves do not nurse adequate amounts of colostrum from their dams within the first few hours of life, and thus they may not receive adequate immunity.
- Feeding colostrum after 24 hours of birth may not help the calf to ward off infections.
- A calf must receive adequate colostrum to protect it from diseases for the first three months of its life. Colostrum is the calf's "passport to life".
- Hand-feeding new-born calves are therefore recommended so that the farmer is sure about the amount of colostrum an individual calf receives.
- Provide fresh, clean water all times, particularly when milk feeding is induced discontinued

If **muconium (first faecal matter)** is not voided out, mild enema by dissolving soap in a liter of warm water should be given.

Weaning:

- If weaning at birth is followed care should be taken to see that adequate colostrum is fed for the first 3-4 days. If weaning is practised 4 days after calving, then further ration has to be fed as per the schedule described.

Health management

- De-worming should be done within 10-14 days of age subsequently on a monthly basis up to the 6th month
- When the animal is 3 months old, contact the veterinarian for vaccination.

Calf nutrition

- Provide calf starter from 2-8 weeks for better growth and early maturity.

Example of a simple calf starter (approx. percentages)

Feed ingredients	Percentage
Maize	52 %
Oats	20 %
Soya bean meal	20 %
Molasses	5 %
Salt	0.5 %
Minerals (Macro & Micro)	1.5%
Vitamins	1%

Calf pen

- Calf pen should be close to cow shed.
- Pen should provide sunlight; good ventilation floor should not be slippery.
- After 6-8 weeks, calves may be grouped according to age, sex.
- The feed boxes & watering equipment should be provided in the pen.

Identification mark

- Giving of identification mark which is necessary for keeping proper records, proper, feeding, better care and management.

1. Branding

1. Freeze Branding
2. Hot Iron Branding

- Uses a metal instrument to burn or freeze a mark on the animal's hide

2. Ear Tagging

- Use special pliers to attach pieces with numbers on them
- Easy to read from the front view

3. Tattooing

- Uses a special tool to put inked numbers in an animal's skin
- Permanent, Simple and relatively painless
- Hard to read from a distance

Dehorning the calves

- Dehorning or disbudding: Disbudding is carried out either by the use of hot iron, caustic sticks and electrical dehorning cone. Both the buds are destroyed at the early age (within 3 to 10 days).

Castration

- Castration of bull calf: At age of 2-3 months, bull calves should be castrated suitably.
- Non-invasive method of castration
- Bloodless method of castration
- Burdizzo
- Elastrator
- Calicrate bander
- Short-scrotumed
- Chemical castration

Burdizzo method of castration

- Restrain the animal
- Do one at a time
- Push teste down into scrotum and over to the side
- Place the lips of the instrument over the cord 1/2 the distance between the teats and abdomen
- Push handles together until the cord is crushed

Elastrator method of castration

- Restrain the animal
- Place the rubber band over the prongs
- Spread the rubber band and push both testes down through it
- Release the band above the testes
- Check later for the scrotum to fall off and disinfect

Invasive method of castration

- Restrain the animal
- Examine the calf to see if testes have descended in to the scrotum
- Disinfect equipment, hands, and scrotum
- Grab the end of the scrotum with one hand and pull down. Cut off the lower 1/3 of the scrotum
- Pull testicles down one at a time / scrape if necessary
- Trim excess fat and membrane carefully
- Disinfect the area again
- Incision method is performed much the same way, but make an incision on each side of the scrotum first, then pull down each testicle through the incision

Record keeping

- Add record keeping of newborn care, when calf was moved from calving area, navel dipped, fed colostrum, which provided care.

Do

- Practice them to do calf starter formulation

Notes for Facilitation

- Outline the new born calf management protocol
- Skill demonstration or hands on training of different castration methods, branding and ear tagging

UNIT 5.7: PREVENTION AND CONTROL OF MASTITIS

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Systematic scientific rationale for prevention and control of mastitis

Say

- This chapter outline the causes of mastitis and scientific planning for prevention and control of mastitis

Mastitis

- Mastitis, or inflammation of the mammary gland, is the most common and the most expensive disease of dairy cattle throughout most of the world.

Clinical mastitis

- Infected quarter becomes swollen, sometimes painful to touch, and the milk is visibly altered by the presence of clots, flakes, or discolored serum and sometimes blood
- In severe cases (acute mastitis), the cow shows signs of generalized reaction: fever, rapid pulse, loss of appetite and sharp decline in milk production

Subclinical mastitis

- The cow appears healthy, the udder does not show any signs of inflammation and the milk seems normal. However, microorganisms and white blood cells (somatic cells) that fight infections are found in elevated numbers in the milk.

Development of mastitis

Stage 1	Invasion of the teat (After milking, the teat canal remains dilated for one to two hours; however, the canal of a damaged teat may remain partially open permanently. Organisms from the environment (manure, bedding, etc.) or those found on injured skin at the tip of the teat may easily invade an open or partially open canal)
Stage 2	Migration of bacteria and colonization of milk secretion cells
Stage 3	Production of toxic substances from organism affects milk secretion cells

Common bacteria causing mastitis

Bacterial type	Percentage of infections	Primary source	Source of spread
<i>Streptococcus agalactiae</i>	>40%	Infected udder	Quarter to quarter; cow to cow during milking
<i>Staphylococcus aureus</i>	30-40%	Infected udder and teat tenderness	Quarter to quarter; cow to cow during milking
Environmental streptococci (<i>Streptococcus uberis</i> and <i>Streptococcus dysgalactiae</i>)	5-10%	Bedding and manure	Environment to cow
Coliforms (<i>Escherichia coli</i> , <i>Enterobacter aerogenes</i> and <i>Klebsillia pneumonia</i>)	<1%	Manure	Environment to cow

Prevention of mastitis

- Create a clean, stress-free environment for cows. Starting with a clean stall and parlor will decrease the presence of mastitis-causing bacteria
- Remove all solids and clean teats. Do not use chapped, cracked or bleeding teats or teat ends for milking
- Use paper towels or reusable cloth towels to clean and dry teats
- Fore-strip milk from each quarter. This practice should be done before attaching the milking unit to check for clinical infection
- Use milking equipment properly. All personnel who use the milking equipment should be trained on how to properly attach, adjust and remove (if required) the milking unit
- Using milking machines properly is an important part of a milking parlor or milking barn routine, plus an important component of a mastitis management program

Steps to mastitis control

S. No	Steps	Control measures
1	Milking hygiene	Prepare the udder to be milked. The appropriate use of pre-dipping is very important; Single use of towels; Use of gloves; Dry teats before inserting the milking machine
2	Good milking system	Milking equipment should be adequate in size, functioning properly, and regularly cleaned and maintained
3	Good use of machinery	Apply and remove machine carefully. Remove machine when cow is milked out, shut off vacuum at claw before removal
4	Pre-dipping	Effective teat disinfection post milking reduces SCC
5	Monitor mastitis trough SCC and milk weight	Monitor your mastitis score (DHI-SCC, CMT) regularly
6	Treat clinical mastitis	Treat clinical cows, follow label recommendations, and treat aseptically. Withhold treated cows' milk from milk supply
7	Eliminate chronic cows from the herd or milk them last	Segregate chronic mastitis cows, milk them last, cull when necessary. Cows with chronic mastitis serve as reservoirs of organisms and could infect susceptible cows
8	Dry cow therapy	Dry treat each quarter using partial insertion techniques with an approved dry cow treatment at drying off. Cure rate is twice high as that during lactation. Lowers the risk of clinical and subclinical mastitis during subsequent lactation
9	Keep environment clean as much as possible	Keep cows' clean, udders free from soil and manure. Fence off wet, swampy areas. Keep free stalls and stanchions bedded properly. Keep calving areas clean, properly bedded (straw preferred)
10	Good nutrition	Properly feed and care for cows. It has been shown by different studies that there is an association between mastitis and supplementation with vitamins and minerals



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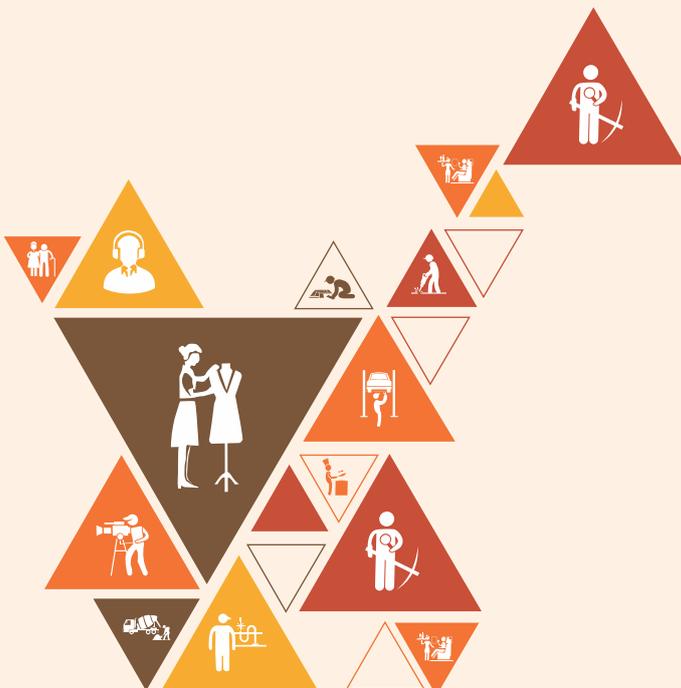


6. Performing Hand and Machine Milking

Unit 6.1 - Steps of Hand Milking

Unit 6.2 - Milking Machine

Unit 6.3 - Operational Steps in Machine Milking



AGR/N4105

Key Learning Outcomes

After completing this session the trainees will be able to:

- Right approach for hand milking
- Points to be noted for clean milk production
- Outline of milking machine
- Parts of milking operation
- Advantage of milking machine
- Limitation of milking machine

UNIT 6.1: STEPS OF HAND MILKING

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Technique and skill of hand milking

Say

- This chapter guide right approach for hand milking and points to be noted for clean milk production

Procedure for milking by hand

- 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 corrected 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
- 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

Tips

Tips for clean milk production through hand milking

- Person involved in milking process should be clean, healthy and free of infectious diseases
- Maintain the cows free of dirt and prevent their hindquarters from becoming matted with manure and mud
- Groom the cows regularly to remove loose hair and dirt 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 cloth to clean the udder and teats because it is unhygienic and can cause problems such as mastitis
- Wash the hands before milking and hands should be moist but not dripping wet
- Do not dip the hands into the milk
- Pour the milk into a container through a fine metal gauze strainer or muslin. Tie it so that dirt cannot bypass it
- Keep the milk refrigerated or in a cool place after milking

UNIT 6.2: MILKING MACHINE

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Systematic and operation skill of milking machine

Say

- This chapter explain parts of milking machine and its own merits and demerits

Introduction

- Dairy cattle are milked by machine. **Milking machine** design and function is critical for rapid and efficient removal of milk without damage to the teat or gland and with minimal risk for transmitting pathogenic microorganisms that might cause mastitis.

Modern milking machine

- Modern milking machines are capable of milking cows quickly and efficiently, without injuring the udder, if they are properly installed, maintained in excellent operating conditions, and used properly. The milking machine performs two basic functions.
 1. It opens the streak canal through the use of a partial vacuum, allowing the milk to flow out of the teat cistern through a line to a receiving container.
 2. It massages the teat, which prevents congestion of blood and lymph in the teat.

Milking machine parts

1. A calf and the machine- similar fashion
 2. Tongue, Dental pallet and jaw movement of the calf by the inflation tube, pulsator and vacuum pump.
 3. 352mm Hg- Cattle
 4. 400mm Hg in Buffaloes
- The machine includes **teat cups** that contact the cow's teats and remove the milk, a **claw** where milk pools as it is removed from the four teats, **vacuum tubes** that provide vacuum to the teat cups and a **milk tube** that removes milk away from the claw, a source of vacuum for the machine, and a pulsator that regulates the on-off cycle of the vacuum
 - Many milking machines today have an automatic take-off (ATO or detacher) device that removes the machine from the cow when milking is completed.

- In addition, many milking machine systems are linked to a computer system that both regulates the machine and generates data about the cow and its milk as milking is occurring. The description below is an overview of the milking machine components.
- The milking system is divided into the milking side and the pulsator side. When the system is turned on, vacuum is created everywhere by a vacuum pump that removes air from the system.
- When the cows are not attached to the milking system, the vacuum created will be the same on both the milking side and the pulsator side of the system.
- When the cows are attached to the milking system by the milking claws, milk and vacuum are present on the milking side.
- This will cause the vacuum on the milking side of the system to be somewhat lower than the vacuum on the pulsator side. The pulsator side will never have milk, only vacuum or air.
- The easiest way to understand the milking system is to look at the action taking place at the teat cup level.
- There are 4 teat cups with liners attached to the milking claw. The area between the liner and the claw is part of the pulsator side of the system.
- The area between the teat and the liner is on the milking side of the system. The pulsators are devices that sit on top of the pulsator lines on the pulsator side of the system.
- They alternately expose the area between the liner and the shell to air and vacuum.
- When exposed to vacuum, the liner is pulled open around the teat and milk flows. Milk flows because the teat is exposed to vacuum.
- When exposed to air, the liner collapses around the teat, and the teat is not exposed to the vacuum on the milking side of the system, so milk ceases to flow and the teat rests. This is how the cow is milked. This pulsator action generally takes place around 60 times a minute.

Advantages

- Saving of labour expenses
- Reduction of dependency on skilled farm workers
- Enables rearing of larger herd strength
- 3-4 times faster than hand milking
- Increase in the milk yield
- Increase in the quality of milk
- Reduces stress throughout the lactation by creating good milking routines

Limitations

- Some of the older cows which are accustomed to hand milking may not adjust to machine milking
- Standby power supply is essential
- High initial investment and training of staff
- Negligence in following the strict cleaning procedures would lead to severe contamination and higher incidence of mastitis
- Greater water requirement for cleaning of equipment
- Prompt service and availability of spares is essential

UNIT 6.3: OPERATIONAL STEPS IN MACHINE MILKING

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Step wise procedure for skill operation of milking machine

Say

- This chapter explain arrangements for machine milking and operation of the milking machine

Check foremilk and udder for mastitis.

- Examine the udder for swelling, heat, or pain, and, using a strip cup or plate, examines the foremilk from each quarter prior to every milking.

Wash teats with an udder wash sanitizing solution.

- Washing each teat aids milk letdown and removes mud, dirt, manure, and other foreign objects on the skin.

Application of the machine:

- The milking machine should be applied within one minute of the initial wiping of the teats to take maximum advantage of the milk letdown response
- The milker holds the claw in hand, the vacuum is turned on and four teat cups are applied as efficiently as possible, with minimal sucking of air when teat cups are turn up to place on the teat ends. Milk should start flowing immediately
- Adjust the machine so that it hangs straight down from the cow. Teat cups that ride-up excessively high on a teat should be adjusted. This situation can potentially cause irritation to the teat lining

Machine-on time:

- Maximal intramammary pressure caused by milk letdown occurs at about one minute after udder preparation begins and continues for about 5 minutes
- Shortly after that the milk flow will drop to a point where the automatic take-offs will detach the milking machine. Most cows will milk out in 5 to 7 minutes.
- Some cows are slow to milk out. This may occur because they produce more milk than can be removed in 5 minutes, even with maximal removal efficiency. Or, cows may have structural problems with the teat end or inside the udder that makes them milk out slowly. In the latter case, because the machine is on the cow repeatedly for long periods, the cows may be expose to more chances of contacting mastitis-causing pathogens.

Detaching the machine at the end of milking:

- The vacuum must be turned off before the machine is removed. Otherwise, pulling on the teat cups while the vacuum is still on may cause trauma to the teat ends, weakening the sphincter muscles that keep the streak canal closed.
- Normally it takes about one hour after milking for the streak canal to re-close. Any teat end trauma may compromise the ability the sphincter muscles to close the canal and prolong the exposure of the teat end to mastitis-causing pathogens post-milking.
- Most people milking cows tend to over-milk the udder. In an effort to remove all of the milk, they will physically push down on the claw or pull down on one or more teat cups. This is called machine stripping, and while it does result in removal of more milk from the quarters, it also results in over milking and more stress on the gland. The purpose of the automatic take-off (ATO) is to prevent this over milking.
- The milking system detects flow rate of milk coming from the gland. When that flow rate drops to a specified level, the vacuum is turned off and a mechanical arm or chain retracts and pulls the machine from the cow's udder. Many modern milking machines do not require the person milking the cow to manually remove the suction cups.
- Once one quarter has been milked dry, they automatically fall off, one by one. Teat dip the cows within one minute after take off. This will safeguard disinfection and protection of the teat canal while it still is open.
- It is important to keep the dairy cow standing for a while after milking. This will give some time for the wax like seal of the teat orifice to seal back up. A good solution is to have a rack of fresh hay and fresh water available right after they exit the milking parlour.

Do

- Provide training them to operate machine milking in a correct manner

Notes for Facilitation

- Notes on dairy farm waste utilization
- Field visit (recycling unit) is necessary
- Demonstration of recycling methods of waste (like composting)

Notes





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7. Forage Conservation

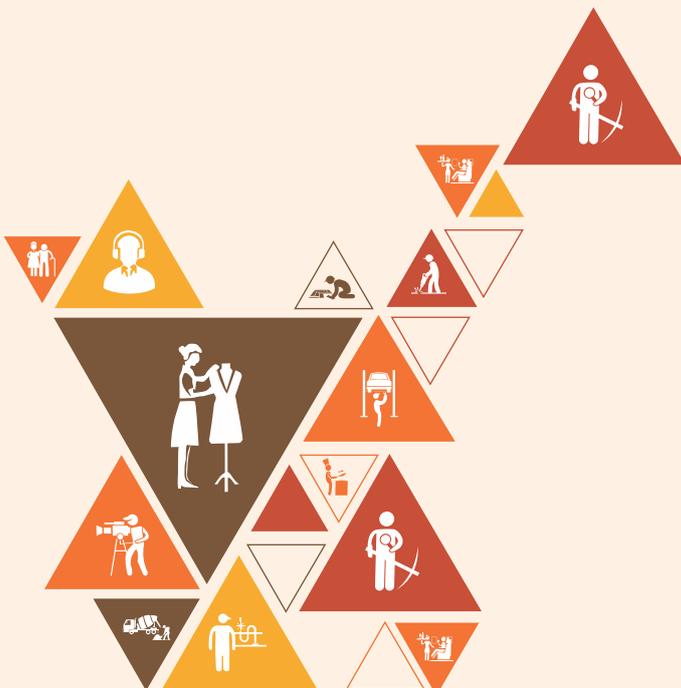
Unit 7.1 - Importance of Fodder

Unit 7.2 - Cultivation of Fodder

Unit 7.3 - Silage Making

Unit 7.4 - Nutrition In Different Fodder

Unit 7.5 - Fodder Feeding Management



AGR/N4106

Key Learning Outcomes

After completing this session the trainees will be able to:

- Importance of fodder nutrition
- Classification of green fodder
- Use of tree fodder
- Planning and scheduling of crop rotation
- Use of crop residues
- Cultivation of model fodder unit

UNIT 7.1: Importance of Fodder

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge on importance of fodder in dairy farming

Say

- This chapter covers green fodder classification and value of green fodder nutrition

Introduction

- Production of fodder plays a major role in feed of milch animals, thereby providing required nutrients for milk production and health of the dairy animals. Green fodder production provides the better option of feed buying alternative for farmers who are planning to go for dairy farming

Merits of green fodder production

- It provides best way of nutrients for animals and has a effects on their growth and health
- It reduces the feed cost
- Green fodder can be utilized for silage making
- These fodder varieties are mostly perennial so can get more fodder cultivation for each year
- Cultivation and maintenance cost is low compared to other feed ingredients

Classification of fodder on the basis of season of cultivation

- Kharif fodder (June – September) : Eg. Cowpea, Field bean, Bajra, Sorghum, Maize
- Rabi fodder (October – Dec/Jan) : Eg. Berseem, Lucerne, Oats, Barley etc.,
- Summer fodders (April – June) : Eg. cowpea, Maize, Field bean, Sorghum, Bajra etc.

Classification based on Plant family and duration of the crop

- Legumes (Annual and Perennial) : Eg. Berseem, Cowpea, Stylo, Hedge Lucerne
- Non – legumes (Annual and Perennial) : Eg. Hybrid Napier, Guinea grass, Fodder maize, Fodder sorghum etc.
- Tree fodder: Eg. Leucaena leucocephala, Erythrina indica, Acacia nilotica, etc.

Legume fodder

- Dairy animal in the smallholder sector depend on natural pastures and crop residues for the greater part of the year.
- During the dry season, the natural pastures and crop residues available for animals after crop harvest are usually fibrous and devoid of most essential nutrients including proteins, energy, minerals and vitamins which are required for increased rumen microbial fermentation and improved performance of the animal.
- One potential way for increasing the quality and availability of feeds for smallholder ruminant animals in the dry season may be through the use of shrub legumes

- Legumes are the most important component of animal fodder in view of their high content of crude protein (20–25%) compared to fodder cereals (8–12%) and fodder grasses (5–10%)
- Non leguminous fodders (Cereal and grass) provided much of the required energy (carbohydrates) for livestock while legumes improve the quality of fodders when mixed with non-leguminous fodders
- Green fodders of non-legumes are fed in bulk quantities (about 10% of body weight of the animal) whereas those of legumes are fed in small quantities (1-2% of body weight).
- If legumes are fed in bulk, it may create problems like bloat in animals.

Non-legumes fodder

- Non legumes refer to all grasses belonging to the family of plants, gramineae comprising 450 genera and more than 6000 species distributed throughout the world.
- Grasses considerably vary in their habits, size and habitat. Some grasses are annuals, while others are perennials.
- Another group of non-legumes is the Cereal fodders. They play an important role in the feeding of dairy animals.
- Farmers in general are not growing cereals exclusively for fodder purpose. Rather they grow them mainly (straw / stover) is used as cattle feed. But such straw/stover are very poor in their nutritive value compared to their value as green fodder.
- However there are varieties available in the cereal group exclusively meant for fodder purpose and in such a case the crop should not be allowed for grain setting.

Value of tree fodder

- Trees, which can be grown either in combination with agricultural crops or on separate land usually not fit for agriculture, offer opportunity of producing green nutritious fodder for the livestock.

Desirable features of a tree species:

1. Be reasonably easily and reliably established
2. Having good competitive ability against weeds
3. Remain grandly productive under repeated ability or grazing and browsing
4. It will be well adopted to different climatic condition
5. As compared to other fodder, it requires less fertilizer
6. Mostly having resistant against local pests and diseases
7. Have good nutritive value
8. Palatability and acceptability to animal is comparatively high

UNIT 7.2: CULTIVATION OF FODDER

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge to establish the model fodder plot

Say

- This chapter covers planning and scheduling of crop rotation, crop residues usage and model fodder unit cultivation

Introduction

- Awareness and adoption of improved fodder production and conservation technologies among farmers will increase the production & availability of green fodder in term of quality and quantity significantly.

List of various fodders

1. Annual	Legumes	: Berseem, Lucerne, Cowpea, Guar, Rice bean, Velvet bean
	Cereals	: Sorghum, Oats, Maize, Millets, Barley
	Miscellaneous	: Mustard (Chinese cabbage), Turnip, Fodder beet, Soya bean, Sunflower
2. Perennial	Grasses	: Hybrid napier bajra, Guinea grass, Para grass, Congo signal grass
	Range Grasses	: Nandi grass, Anjan grass, Blue panic grass, Marvel grass, Rhodes grass
	Pasture legumes	: Butterfly pea, <i>Stylo</i> , <i>Siratro</i>
	Shrubs & trees	: Hedge lucerne, Subabool, Siris, Khejari, Shevari, <i>Gliricidia</i>

Crop rotation

- Suitable crop rotation can enhance productivity of the land and availability of the green fodder throughout the year

Crop rotation schedule

Sr. No.	Crop rotations	Green fodder production potential (tonnes/hectare/year)
1.	Hybrid napier bajra + Cowpea – Berseem + Mustard	285
2.	Maize + Cowpea – Maize – Cowpea – Oats – Maize + Cowpea	165
3.	Maize + Cowpea – Rice bean – Berseem + Mustard	110
4.	Hybrid napier bajra + Guar – Lucerne	250
5.	Sorghum + Cowpea – Maize + Cowpea – Maize + Cowpea	110
6.	M.P chari – Cowpea – Berseem + Mustard – Sorghum + Cowpea	168

Tips for fodder production

- Select the seeds of high yielding varieties or hybrids of fodder crops
- Choose suitable crop rotation
- short duration fodder crops during the swap over season
- Legume as an inter-crop or as mixed crop with a non-legume crop to enhance the nutritional value of fodder and improve soil fertility
- Plant perennial grasses like hybrid napier bajra/guinea grass in about 15 to 20 per cent of the cultivated area to get green fodder round the year
- Plant tree fodders on farm boundaries to get green fodder during the lean period
- Harvesting the fodder at correct stage
- Adopt modern practices like hay or silage making to overcome the problems raised in scarcity period
- Use chaff-cutter to minimize the fodder wastage

Effect of Crop Residues

- Due to regional and seasonal imbalances, there is considerable wastage of crop residues in areas of surplus, while there is a perennial shortage of dry fodder in some areas. Not only productivity of livestock is affected due to regional imbalances and shortages, but also huge expenditure is incurred on transportation of crop residues due to low bulk density of biomass
- The straw recovery, enrichment and densification machines not only provide additional roughage for cattle but also help in increasing farm productivity and providing cleaner environment

Do



- Allow them to do model cultivation unit by using 1 acre land

Notes for Facilitation



- Explanation of crop rotation and usage of crop residues
- Field visit to fodder cultivation land is necessary

UNIT 7.3: SILAGE MAKING

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge to establish the model fodder plot

Say

- This chapter covers fodder selection and stepwise procedure for silage making

Introduction

- Forage which has been grown while still green and nutritious can be conserved through a natural 'pickling' process. Lactic acid is produced when the sugars in the forage plants are fermented by bacteria in a sealed container ('silo') with no air
- Forage conserved this way is known as 'silage' and will keep for up to three years without deteriorating

Suitable fodder for silage making

- Fodder maize, Fodder sorghum, Bajra, Hybrid Napier, Sugar cane tops, etc are suitable for silage making
- Preference for cereal green fodder is due to it has more sugar content than protein, as sugar is utilised in fermentation process to make lactic acid by microorganisms.
- These cereal fodder crops have hard stem, which takes more time for drying in making hay of these crops, so it is better to use these kinds of crops for making silage than hay.

Methods of silage making

- Pit method
- Tank method
- Depending upon local situation like ground water level, number of animals & duration of feeding silage to animals, decide shape & size of constructing pit/tank for silage making.
- For pit method, select location for making pit at higher level on ground so that rain water may not percolate in to pit.
- In rectangular pit, corner edges should be making round so that while filling & pressing chaffed fodder, air will not remain inside in the corners of pit or tank. Wall of pit/tank should be air proof to avoid air too come inside in pit/tank through cracks or crevices
- To avoid this situation, plaster wall of silo pit or tank with cement or moistened soil. If ground water level is nearer, then go for building tank for silage making than pit method. If plastering cement to the wall of pit/tank is uneconomical, then you may use HDPE plastic paper (200 micron) to cover pit/tank inside out position.

Treatment for Silage

- For making best quality & balanced silage, needs proper treatment of additives like-
- Per ton of chaffed green fodder requires 1 kg urea, 2 kg jaggary, 1 kg common salt, 1 kg mineral mixture & 1 litre of whey.
- Prepare separate solution in 15 to 20 litres of water for urea, jaggary, mineral mixture & common salt in separate pots/buckets & then spread it on layer of pressed chaffed green fodder while filling silo pit/tank.

Stepwise procedure of silage making

- Prior to filling silo pit / tank, clean & dry it.
- Cover with plastic film inside pit/tank in such way that it will cover all sides of pit/tank.
- For making silage, chaffing of fodder is essential component. With the help of chaff cutter machine, make pieces of 1.5cm. to 2 cm. length of green maize, sorghum, sugarcane tops, fodder bajra etc for filling silo pit
- Prepare separate solution in 15 to 20 litres of water for urea, jaggary, mineral mixture & common salt in separate pots/buckets & then spread it on layer of pressed chaffed green fodder while filling silo pit/tank
- Start to fill chaffed green fodder in pit or tank
- After making 4" thick layer of chaffed green fodder, press it with wooden plank (Like Mortar) in such a way that air will not entangled in chaffed fodder. Then sprinkle it with prepared solution of jaggary, mineral mixture, urea, common salt & whey
- Follow the same procedure until filling of pit/tank 1 to 1.5 feet above the ground level (In pit). Then cover it from plastic film from all side carefully
- Cover it with Trash, Wheat straw, Soil & dry hay to protect it from entering rain water in to it. If possible to temporary arrangement of shed above the silo pit/tank
- It will require 45 to 60 days to make good quality of silage

Quality of Silage

- Mould: If silage while filling pit/tank, not well pressed; there will be growth of mould
- Odour: Good quality silage has sweet & sour taste
- Colour: Good quality silage has faint green or brownish colour. Rotten silage has black colour
- pH: Good quality silage has pH of 3.5 to 4.2

Advantages of silage

- It is stable for longer period of time
- Reduce the nutrient loss compared with hay production
- Economical use of plants with high yield of green fodder
- Better use of land with 2-3 crops per annum
- Silage making is suitable for both cold and cloudy weather
- Plants can be harvested at optimal phase of development and are efficiently used by animal

UNIT 7.4: NUTRITION IN DIFFERENT FODDER

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Nutrients availability in green and tree fodders

Say

- This chapter says nutritive value of green and tree fodder

Nutritive value of fodder crops

- These are highly digestible (55 – 65%) mostly when harvested at a proper time. The crude protein may range from as little as 3% in very mature forages to over 30% in young heavily fertilized grass (on DM basis)
- The soluble carbohydrate of grasses ranges in the dry matter from 4-30%. The cellulose and hemicellulose are generally within the range of 20-30% and 10-30% of the dry matter respectively
- Grass proteins are particularly rich in arginine, glutamic acid and lysine. Green forages are excellent source of carotene 250mg/kg), the precursor of vitamin A
- Generally leguminous fodder contain 8-12% DCP and 45-60% TDN
- The phosphorus content of leguminous fodder are poor. It is advisable to supplement a ration containing a large amount of leguminous fodder with a limited quantity of wheat or rice bran, which is rich in phosphorus
- The non-leguminous fodder are having 2.5% DCP and 45-60% TDN on dry matter basis
- Green fodder is the primary source of vitamin A. Vit.A is present in the form of precursor
- Green fodder contains 100 mg carotenes /Kg when compared with about 20 mg /Kg in silage
- Carotene Content of some fodder: Agathi 18.3 mg / 100 dry matter; Lucerne 15.6 mg / 100 dry matter; Guinea grass-14.2 mg / 100 dry matter and Desmodium 7.09 mg / 100 dry matter

Nutritive value of tree fodders

- Shrubs and leguminous trees are good source of digestible crude protein (DCP) for supplementary feeding to farm animals. Tree leaves are useful as protein supplements to straws and low protein fodder. Tree leaves are good sources of calcium but low in phosphorus.

Conclusion

- Ideal fodder production is depends on maximum yield of digestible nutrient per hectare or maximum livestock products from unit area. Hence nutritive values of each fodder is helpful for ideal dairy management

UNIT 7.5: FODDER FEEDING MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific basis for green fodder feeding management

Say

- This chapter says fodder feeding management to dairy animals

Introduction

- Feed alone constitute 60 per cent of the production cost of milk. The farm manager should carefully plan a cropping programme to ensure year round supply of mixture of leguminous and non leguminous forages. However, feeding of cereal and legume green fodder alone meets the nutrient requirements for cows that producing up to 10 kg of milk. Feeding of fodder mainly based on DCP and TDN content of the fodder

Nutrient requirement of cow

Particular	Requirement for maintenance of 450 kg body weight cow	Additional requirement per kg milk with 4% fat
DCP	275g/day	45 g
TDN	3.33kg/day	315 g

Nutrient composition of fodder crops

- Highly digestible (55 – 65%) mostly when harvested at a proper time
- Crude protein may range from as little as 3% in very mature forages to over 30% in young heavily fertilized grass (on DM basis)
- Soluble carbohydrate of grasses ranges in the dry matter from 4-30%
- Cellulose and hemicellulose are generally within the range of 20-30% and 10-30% of the dry matter respectively
- Grass proteins are particularly rich in arginine, glutamic acid and lysine
- Leguminous fodder contains 8-12% DCP and 45-60% TDN

- Phosphorus content of leguminous fodder are poor. It is advisable to supplement a ration containing a large amount of leguminous fodder with a limited quantity of wheat or rice bran, which is rich in phosphorus
- Non-leguminous fodders are having 2.5% DCP and 45-60% TDN on dry matter basis
- Green fodder is the primary source of vitamin A. Vit.A is present in the form of precursor. Green fodder contains 100 mg carotenes /Kg when compared with about 20 mg /Kg in silage

Nutrient composition of tree fodder

- The nutritive value of shrubs and tree species vary widely due to varying inherent nutritive value between species and within species because of climatic and edaphic conditions, cutting and grazing strategies and the soil in which the plant is growing.

Quantity of green fodder for feeding dairy cow at different stages of lactation

Animal type	Quantity of green grass to be give (kg) for animal weighing		
	250 kg	300 kg	350 kg
Dry cow	25	30	35
Milch cow	25	30	35

Nutritive value corresponding with intake of fodder

Particulars	Volume intake % of body weight	Nutritive value (%)		Remarks
		DCP	TDN	
Green cereal + legume forages	2.5	10-15	55-65	Maintenance with 5 -6 kg of milk production
Green cereal forages	2.0	3-6	50-55	Maintenance with 2 -5 kg of milk production
Cereal hay	1.5	13	40-50	Sub maintenance
Straw	>1.5	0.5-1.0	>40	Sub maintenance

NUTRITIVE VALUE OF TREE LEAVES (%DMB)

S.No	Tree species	CP	EE	CF	NFE	TA	DCP	TDN
Nitrogen fixing trees								
1	Gliricidia sepium	17.21	4.25	15.50	51.65	11.40	14.90	62.20
2.	Inga dulci	15.21	4.37	13.81	55.71	10.91	-	-
3.	Albizia lebbek	16.85	3.16	15.21	51.98	10.82	14.70	57.30
4.	Sesbania grandiflora	29.88	3.02	8.61	46.08	12.52	-	-
5.	Leucaena leucocephala	16.74	4.90	12.94	53.32	12.10	16.70	65.00
6.	Erythrina indica	17.52	4.29	13.76	50.51	13.92	-	-
7.	Acacia nilotica	14.00	4.30	12.50	64.70	4.50	10.20	66.50
Non-nitrogen fixing trees								
1.	Artocarpus heterophyllus	14.01	5.63	18.74	50.53	11.07	8.04	68.19
2.	Ficus bengalensis	11.40	5.17	15.46	53.59	11.93	6.22	46.63
3.	Ficus religiosa	9.84	3.97	23.20	49.17	13.82	6.24	40.00
4.	Millingtonia hortensis	8.444	4.81	22.49	50.08	14.18	8.29	54.85
5.	Lannea Coromandelica	12.06	5.23	20.61	53.72	7.48	5.93	55.15

Tips for fodder feeding management

- Physical treatments like sprinkling of molasses, water, salt solution or wilting in shade for 8 hours for Gliricidia or neem leaves, shade wetting resulted in the significant improvement in palatability rather than feeding fresh leaves
- Roughage should be fed at the rate of 65% of dry matter requirement in ruminant animals
- The feeding of sugarcane tops increased to growth rate of calves by 29.2%.
- Subabul can make up the protein requirement for maintenance of cattle weighing 400 kg, if given at 25-30 per cent of the paddy straws. Feeding larger quantities to lactating cows gives taint in the milk. It is believed to cause sterility in cows and sows. Feeding up to 25 per cent in daily ration has not shown any adverse effect
- Good quality roughage can save the concentrate supplement. Approximately 20 kg of grass (guinea, napier, etc) or 6-8 kg of legume fodder (leucerne, hedge leucerne, etc) can replace 1 kg of concentrate mixture
- Half the roughage ration can be fed in the forenoon after watering and cleaning the animals. Remaining half is fed in the evening, after milking and watering
- High yielding animals may be fed three times a day and the optimum concentrate roughage ratio on dry matter basis should be 60:40
- Highly moist and tender grasses should be mixed with straw before feeding to prevent the occurrence of bloat and indigestion



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8. Entrepreneurship

Unit 8.1 - Preparation of Project Report

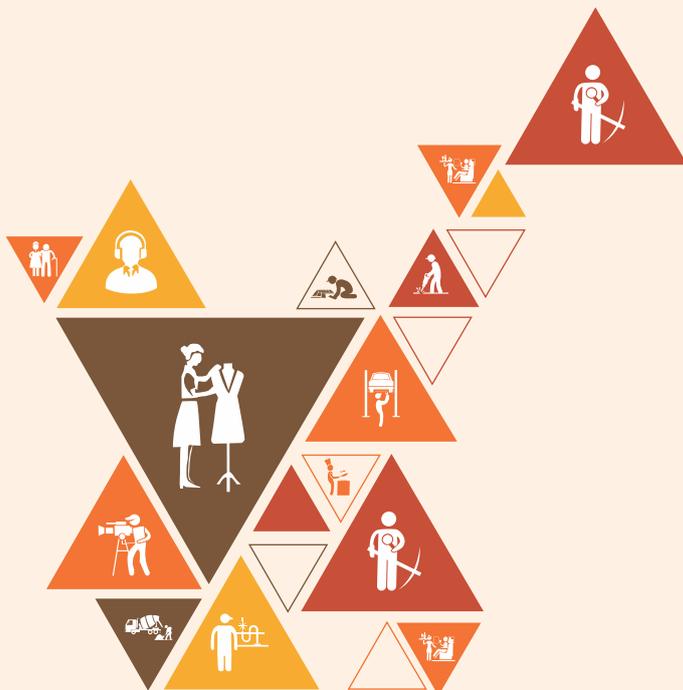
Unit 8.2 - Availability of Bank Loan

Unit 8.3 - Insurance Facilities

Unit 8.4 - Marketing Management

Unit 8.5 - Retail Milk Market

Unit 8.6 - Value Added Milk Product



AGR/N4107

Key Learning Outcomes

After completing this session the trainees will be able to:

- Segmentation of project report
- Scheme formulation to avail bank loan
- Scrutiny of scheme by bank
- Lending terms

UNIT 8.1: PREPARATION OF PROJECT REPORT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Project report preparation for financial investment arrangements in order to safe guarding the farm

Say

- This chapter enlightens segmentation of project reports for new farm construction and maintenance

1. Production Capacity And Price Per Annum

S.No	Description	Amount Rs.
1	Production of milk per year @ rate of X litres per cow	
2	Selling price of the milk	

2. project cost/capital investment

S.No	Description	Amount Rs.
1	Preliminary & Preoperative Expns (land cleaning)	
2	Land leasing cost and registration	
3	Planting cost of CO4, hedge lucerne, sorghum, agathi, maize, etc.	
4	Labour	
5	Animal	
6	Insurance	
7	construction of shed	
8	Equipment (grass cutter and chaff cutter)	
	Total project cost	

3. means of finance

S.No	Description	Investors	Amount Rs.
1	Promoter Contribution		
2	Contribution of per investor		
3	Subsidy /Soft Loan		
4	Term Loan		

4. Financial aspects

A. Fixed capital

(1) Land and Buildings			
(2) Machinery and equipment			
Cow cost			
Shed cost			
Milk testing machine cost			
Equipment cost			
Insurance rate			

B. WORKING CAPITAL

1. Salaries & Wages (per month)

S.No	Description	Amount Rs.
1	Supervisor/Entrepreneur	
2	Unskilled	

2. Raw Material (per month)

S.No	Description	Amount Rs.
1	Feed	

3. Utilities (per month)

S.No	Description	Amount Rs.
1	Power	
2	Water	

4. Other Expenses (per month)

S.No	Description	Amount Rs.
1	Stationery Expenses	
2	Transportation Expenses	
3	Miscellaneous Expenses	

Total working capital (per month) = Salaries & Wages + Raw material + Utilities + Other expenses

5. COST OF PRODUCTION (PER ANNUM)

S.No	Description	Amount Rs.
1	Total working capital	
2	Depreciation	
3	Interest	

6. TURN OVER (PER YEAR)

S.No	Description	Amount Rs.
1	Total working capital	
2	Depreciation	
3	Interest	

7. PROFIT ANALYSIS & RATIOS

S.No	Description	Amount Rs.
1	Net profit	
2	Profit per month	
3	Return on Investment for investors share per Month	

Summary

DESCRIPTION	1 year	2 year	3 year	4 year	5 year
Capital cost					
Recurring cost					
Total cost					
Profit from milk					
Profit from sale of new born cow (Ready to sale at 3 year end)					
Total benefit					
Net profit					
Profit per month					
Investors profit per Month					

UNIT 8.2: AVAILABILITY OF BANK LOAN

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Financial investment arrangements and safe guarding the farm through banks

Say

- This chapter enlightens important points for applying bank loan for new farm construction and maintenance

Financial Assistance Available from Banks/NABARD for Dairy Farming

Loan from banks with refinance facility from NABARD is available for starting dairy farming

- For obtaining bank loan, the farmers should apply to the nearest branch of a commercial bank, regional rural bank or co-operative bank in their area in the prescribed application form which is available in the branches of financing banks.

For dairy schemes with very large outlays, detailed project reports will have to be prepared

- The items of finance would include capital asset items such as purchase of milch animals, construction of sheds, purchase of equipments etc.
- The feeding cost during the initial period of one/two months is capitalized and given as term loan. Cost towards land development, fencing, digging of well, commissioning of diesel engine/pumpset, electricity connections, essential servants' quarters, godown, transport vehicle, milk processing facilities etc. can be considered for loan.
- Cost of land is not considered for loan.

Scheme Formulation for bank loan

- A Scheme can be prepared by a beneficiary after consulting local technical persons of State Animal Husbandry Department, DRDA, Dairy Co-operative Society / Union / Federation / commercial dairy farmers.
- If possible, the beneficiaries should also visit progressive dairy farms and government / military / agricultural university dairy farms in the vicinity and discuss the profitability of dairy farming. A good practical training and experience in dairy farming will be highly desirable.
- The dairy co-operative societies, if existing in the villages would provide all supporting facilities particularly for marketing of fluid milk. Nearness of dairy farm to such a society, veterinary aid centre, artificial insemination centre should be ensured. There is a good demand for milk, if the dairy farm is located near urban centre.

- The scheme should include information on land, livestock markets, availability of water, feeds, fodder, veterinary aid, breeding facilities, marketing aspects, training facilities, experience of the farmer and the type of assistance available from State Government, dairy society/union/federation.
- The scheme should also include information on the number and types of animals to be purchased, their breed, 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.

Scrutiny of Schemes by banks

- The scheme so formulated should be submitted to the nearest branch of the bank. The bank's officer can assist in preparation of the scheme or filling in the prescribed application form.
- The bank will then examine the scheme for its technical feasibility and economic viability.

(A) Technical Feasibility - this would briefly include

- Nearness of the selected area to veterinary, breeding and milk collection centre and the financing bank's branch
- Availability of good quality animals in nearby livestock market
- Availability of training facilities
- Availability of good grazing ground/lands, green/dry fodder, concentrate feed, medicines etc.
- Availability of veterinary aid / breeding centres and milk marketing facilities near the scheme area

(B) Economic Viability - this would briefly include -

- Unit Cost
- Input cost for feed and fodder, veterinary aid, breeding of animals, insurance, labour and other overheads.
- Output costs i.e. sale price of milk, manure, gunny bags, male/female calves, other miscellaneous items etc
- Income-expenditure statement and annual gross surplus.
- Cash flow analysis.
- Repayment schedule (i.e. repayment of principal loan amount and interest).
- Other documents such as loan application form, security aspects, margin money requirements etc. are also examined.
- A field visit to the scheme area is undertaken for conducting a techno economic feasibility study for appraisal of the scheme.

Sanction of Bank Loan and its Disbursement

- After ensuring technical feasibility and economic viability, the scheme is sanctioned by the bank.
- The loan is disbursed in kind in 2 to 3 stages against creation of specific assets such as construction of sheds, purchase of equipments and machinery, purchase of animals and recurring cost on purchase of feeds/fodders for the initial period of one/two months

Lending terms – General

Outlay

- Outlay of the project depends on the local conditions, unit size and the components included in the project. Prevailing market prices may be considered to arrive at the outlay.

Margin Money

- Margin depends on the category of the borrowers and range from 5 to 25%.

Interest Rate for ultimate borrower

- Banks are free to decide the rates of interest within the overall guidelines. However, for working out the financial viability and bankability of the model projects we have assumed the rate of interest as 12 % p.a.

Security

- Security will be as per NABARD/RBI guidelines issued from time to time.

Repayment period of loan

- Repayment period depends upon the gross surplus in the scheme. The loan will be repaid in suitable monthly/quarterly installments usually within a period of five to seven years.

Insurance

- The animals and capital assets may be insured annually or on long term master policy, where ever it is applicable

Format for Project report preparation - Dairy Farm

General

- Nature and objectives of the proposed scheme
- Details of proposed investments
- Specification of the project area
- Name of the financing bank branch
- Status of beneficiary:(individual/Partnership/Company/Corporation/Co-operative Society/Others)
- Details of borrowers profile – Capability, Experience, Financial Soundness, Technical/Other special Qualifications, Technical/Managerial Staff and adequacy

Technical aspects

Location, Land and Land Development - Location details of the project, Total Area of land and its cost, Site map and Particulars of land development, fencing, gates, etc.

Financial Aspects

- Project Cost included total capital cost and recurring cost
- Down payment/margin/subsidy (Indicate source & extent of subsidy)

Financial viability particulars include Internal Rate of Return (IRR), Benefit Cost Ratio (BCR) and Net Present Worth (NPW)

UNIT 8.3: INSURANCE FACILITIES

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge on safe guarding the farm through different dairy cattle insurance schemes

Say

- This chapter enlightens important points for applying dairy cattle insurance

Cattle Insurance

Applicability:

- Applicable to indigenous, cross breed and exotic cattle owned by/ belonging to private owners various financial institution i.e. Bank-financed, Military dairy farms, Co-operative/Corporate dairies etc

Cattle means and Include - Milch cows and Buffaloes, Calves/Heifers, Stud Bulls, Bullocks/He buffaloes and Mithuns

Age Group

a) Milch cows 2 years or age at first calving to 10 years b) Milch Buffaloes 3 years or age at first calving to 12 years c) Stud bulls 3 years or earlier age at sexual maturity to 8 years d) Bullocks/He buffaloes 3 years to 12 years e) Calves/Heifers 4 months upto date of 1st calving
(No relaxation in upper age-limits is allowed)

Valuation

- Valuation based on market value as on date and place and to be decided on the basis of recommendations of the local veterinary surgeon.

Sum Insured: Not exceeding market value.

Scope of Cover

- The policy shall give indemnity only for death of cattle due to:
 - 1) Due to accident (inclusive of fire lighting, flood/inundation, cyclones, tornado, tempest, storm, hurricane, famine) or any other fortuitous circumstances (Fortuitous means accidental in origin).
 - 2) Diseases (Inclusive of Rinderpest, Black Quarter Haemorrhagic Septicemia, Foot and mouth disease subject to vaccination against these diseases.
 - 3) Surgical operations.
 - 4) Strike, Riot and Civil Commotion risk & Terrorism
 - 5) Earthquake

Exclusion

- Theft or clandestine sale, missing of insured animal.
- Malicious or willful injury or neglect/intentional slaughter.
- Transport by air or sea or beyond 80 km by rail or road.
- Partial disablement of any type, whether permanent or temporary.
- Accident happened/Diseases contracted prior to commencement of risk.
- War & allied perils.

Premium Rates

- 1) 4% gross p.a. & 1% gross p.a. for PTD cover.
- 2) 2.25% net p.a. for IRDP (Integrated Rural Development Programme) (Any government sponsored scheme) animals. Addl. 0.85% net p.a. for PTD cover.
- 3) 2% gross p.a. for exotic animals.

Additional Benefits Available

- Long term policies of 3 & 5 are years available

No of years	Discount rate
3	15% on basic rate
4	25% on basic rate

Special Features

- PTD arising out of accident animal and or unable to conceive or yield milk or unable to be used for breeding can be covered by payment of additional premium.

Points to be noted:**1) 15 days waiting period**

- The company is not liable to pay the claim in the event of death of insured animal due to diseases occurring within 15 days from the commencement or risk

2) No tag no Claim

- In the event of death of animals covered under the policy, claims shall not be entertained unless the ear tags are surrendered to the company. In the event of loss of ear tags, it is the responsibility of the insured to give immediate notice to the company and get the animal retagged

3) Service tax

- Exempted for IRDP Scheme policies

UNIT 8.4: MARKETING MANAGEMENT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Scientific knowledge on detailed analysis of marketing trend in dairy industry

Say

- This chapter says marketing channels for milk producers and analysis of problems faced in marketing of milk

Marketing

- All the activities that are involved in moving products from producers to consumers. This includes product-exchange activities, physical activities and auxiliary activities. The functions of marketing can be further divided into buying and selling as exchange activities; storage, transport, processing and standardizing as physical activities; and financing, risk-bearing and market intelligence as auxiliary activities.

Marketing chain

- The flow of commodities from producers to consumers that brings in economic agents who perform complementary functions with the aim of satisfying both producers and consumers

Marketing node

- Any point in the marketing chain where an exchange and/or transformation of a dairy product takes place. A marketing chain may link both formal and informal market agents.

Marketing agents

- Individuals, groups of individuals or organizations that facilitate the flow of dairy products from producers to consumers through various activities, such as production, purchasing, processing and selling. Examples of market agents include farmers selling dairy products, retailers, wholesalers, dairy cooperatives, importers and exporters.

Milk producers

- Rural subsistence farmers, rural market-oriented farmers, commercial dairy farmers and urban and peri-urban milk producers.

Milk collectors

- Contractors, village milk collection centres and dairy cooperatives (MPOs).

Dairy processors

- Large-scale private dairy processing corporations.

Emerging Dairy markets

- Food service institutional market – It is growing at double the rate of consumer market
- Defense market – An important growing market for quality products at reasonable prices
- Ingredients market – A boom is forecast in the market of dairy products used as raw material in pharmaceutical and allied industries
- Parlour market – The increasing away-from-home consumption trend opens new vistas for ready-to-serve dairy products which would ride take credit on the fast food revolution sweeping the urban India

Challenges for marketing of milk

- Majority of the market is still un-organized
- Acceptability of the consumer base
- Less penetration to the rural market
- Lack of transparent milking pricing system

Solution to overcome the challenges for dairy marketing

Dairy cooperatives

- One of the most successful producer organization is the Indian dairy cooperative which in 2005 had a net work of more than 100,000 village level dairy cooperatives with 12.3 million members
- National Dairy Development Board covers 1,40, 227 village level societies and 14 million farm families of which 4 million are women. It has a daily procurement of 22 million liters of milk.
- Amul Pattern of dairy cooperatives have contributed immensely to the fact that India has progressed from a milk-deficit country to emerge as the largest milk-producing nation in the world. In the process, they have generated millions of days of employment for the rural poor and improved their socio-economic condition

Contract farming

- Contract farming has a potential to help the small and marginal farmers overcome constraints in accessing inputs, credit, extension and marketing
- The problem of the higher cost of contracting with small producers is overcome by contracting with a single person in the village often an agent who acts as an intermediary between the processor and producers
- The country's dairy sector is dominated by small holders, and contracting with a large number of them involves transaction costs for the processors. The processors do not have much choice but to take milk from smallholder producers.

Self Help groups and group approach

- The women's self help group (SHG) movement particularly SHG-bank linkage programme has spread all over the country.
- These programme's interventions and processes have resulted in a sustained process of empowerment of its women members.
- The real power of the SHG-bank linkage model (SBL model) lies in the economies of scale created by Self Help Group (SHG) Federations (comprising 150–200 SHGs each). This is evident, for example, in bulk purchase of inputs (seeds, fertilisers etc.) and marketing of outputs (crops, vegetables, milk, NTFPs etc).
- Government of India has now started National Rural Livelihoods Mission (NRLM) in 2011. There is a clear understanding that the SBL programme can only be successful if it is tied up with livelihood programmes such as improved agriculture, dairying, marketing etc.

UNIT 8.5: RETAIL MILK MARKET

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Understand the retail marketing system of milk

Say

- This chapter covers reorganization of structure of retail market on various types of retail outlet

Introduction

- Retailing of milk in India is thoroughly unorganized. There is no supply chain management perspective. An overwhelming proportion of the Rs. 4,00,000 crore retail market is unorganized. In fact, only a Rs. 20,000 crore segment of the market is organized

Retailers

- Milk shops, peri-urban farmers, rural subsistence and market-oriented farmers and retail shops.

Unorganized milk retail chain

- Milk producers directly supply milk to the consumer or through a marketing channel
- Milk producers supply milk to the consumers through the intermediaries like middle men

Organized milk retail chain

- Milk producers supply their milk to primary cooperative society, which further supplies to secondary cooperative. The milk after processing, reaches consumers via marketing channel either directly or through apex cooperative

Industry based milk retailing opportunities

Milk	Butter/Cheese/Ghee
<ul style="list-style-type: none"> • Ice cream manufactures 	<ul style="list-style-type: none"> • Bakery/Confectionaries
<ul style="list-style-type: none"> • Restaurants or food chains 	<ul style="list-style-type: none"> • Pizza retailers
<ul style="list-style-type: none"> • Coffee shop chains 	<ul style="list-style-type: none"> • Snacks retailers

Conclusion

- Hence farmer choose organized milk retail or industry based retailing chain for improving their status as well as Indian economy

UNIT 8.6: VALUE ADDED MILK PRODUCT

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- know the Existence of value added milk products

Say

- This chapter covers scope for value added milk products and classification of Indian traditional dairy products

Value added dairy products

- Dairy farmers can add value to their milk by processing and marketing their own products, such as cheeses, yogurt, butter, ice cream, and flavored milk. Many consumers are willing to pay a premium for locally produced, high-quality and farmstead dairy products
- India's demand for milk and milk products is increasing twice as fast as the production of milk. The market is also witnessing a consumer shift towards healthier products such as UHT milk, probiotic drinks, Processed Cheese, Curd, Butter, Milk & Ghee etc.

Classification of Indian traditional dairy products

1. Heat and acid coagulated milk products

Paneer is an unaged, acid-set, non-melting farmer cheese made by curdling heated milk with lemon juice or other non-rennet food acid, and then removing the whey and pressing the result into a dry unit

Chhena is like paneer, except some whey is left and the mixture is beaten thoroughly until it becomes soft, of smooth consistency and soft but firm

Sandesh is a confection made from chhena mixed with sugar then grilled lightly to caramelize, but removed from heat and molded into a ball or some other shape

Rasagolla is confection made from mixture of chhena and semolina rolled into a ball and boiled in syrup

2. Fat rich dairy product

Ghee - Ghee is prepared by simmering butter, which is churned from cream (traditionally made by churning yogurt), skimming any impurities from the surface, and then pouring and retaining the clear, still liquid fat, while discarding the solid residue that settled on the bottom

Malai - It is made by heating non-homogenized [whole milk](#) to about 80 °C (180 °F) for about one hour and then allowing to cool. A thick yellowish layer of [fat](#) and coagulated [proteins](#) forms on the surface, which is skimmed off. The process is usually repeated to remove most of the fat.

Cultured dairy products

Yogurt and Dahi are dairy foods that are used and consumed widely. A notable difference between these two is that Yogurt is prepared by pasteurizing milk, whereas Dahi is prepared by boiling milk, then cooling it to room temperature, and finally adding the previous day's mild acidic curd to it.

Mishti doi is dahi (Indian Yogurt) mixed with sugar

Shirkhanda is Strained Yogurt mixed with sugar, and often flavorings such as cardamom, saffron, or fruit.

3. Heat desiccated products

Kulfi is made from slowly freezing sweetened condensed milk. In comparison to ice Cream, kulfi is not whipped or otherwise aerated.

Khoa or Mawa is made by reducing milk in an open pan over heat.

Rabri is a sweet, condensed-milk-based dish, made by boiling the milk on low heat for a long time until it becomes dense and changes its color to pinkish. Sugar, spices and nuts are added to it to give it flavor. It is chilled and served as dessert.

Basundi is a sweetened condensed milk made by boiling milk on low heat until the milk is reduced by half

Do



- Provide exercise to do any one of the value added milk products

Notes for Facilitation



- Explanation of different value added milk products
- Hands on training is necessary

Notes





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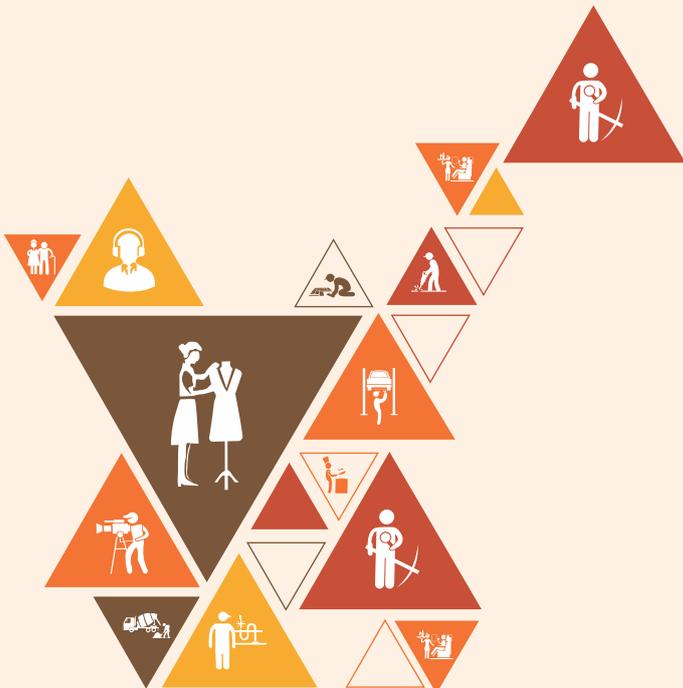
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9. Maintain Healthy and Safety at the Work

Unit 9.1 - Water Sanitation

Unit 9.2 - Labour Hygiene

Unit 9.3 - First Aid



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Key Learning Outcomes

After completing this session the trainees will be able to:

- Role of water in dairy farm
- Physical qualities of water
- Method of water sanitation
- Method of chlorination

UNIT 9.1: WATER SANITATION

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Water quality, water analysis and water sanitation in dairy farm

Say

- This chapter covers importance of water hygiene in dairy farm

Objective

Define Water

- Water is a critical nutrient for all living organisms. Water is essential for health of the birds and hygienic surroundings of the farm

Water in dairy farm

- Drinking or free water intake satisfies 80 to 90 percent of the dairy cows' total water needs.
- The amount of water a cow will drink depends on her size and milk yield, quantity of dry matter consumed, temperature and relative humidity of the environment, temperature of the water, quality and availability of the water, and amount of moisture in her feed.
- Water is an especially important nutrient during periods of heat stress. The physical properties of water are important for the transfer of heat from the body to the environment.
- During periods of cold stress, the high heat capacity of body water acts as insulation – conserving body heat.

Drinking Behavior

- Providing the opportunity for livestock to consume a relatively large amount of clean, fresh water is essential.
- Water is consumed several times per day and is generally associated with feeding or milking.
- Cows may consume 30 to 50 percent of their daily water intake within 1 hour after milking.
- On the basis of farm studies, the length of water troughs should be 2 inches per cow with an optimal height of 24 to 32 inches.
- Water depth should be a minimum of 3 inches to allow the animal to submerge its muzzle 1 to 2 inches
- Provide at least one watering device for every 15 to 20 cows, or a minimum of two foot of tank space per 20 cows

Water Quality

- Water quality is an important issue in the production and health of dairy cattle
- The five properties most often considered in assessing water quality for both human and livestock use are organoleptic properties (odor and taste), physiochemical properties (pH, total dissolved solids, total dissolved oxygen and hardness), presence of toxic compounds (heavy metals, toxic minerals, organophosphates and hydrocarbons), presence of excess minerals or compounds (nitrates, sodium sulfates and iron), and presence of bacteria.

Explain method of water analysis

- New dairy farms must get the analysed water samples before starting the farm
- Analytical report should contain mineral status and microbial load of the water samples
- Interpret the water sample analysis report with veterinary surgeon

Water hygiene

- Cleanliness of the water should be maintained from water yielding point to water usage point
- Water collection should be hygienic
- Five feet surrounding the well should be cement plastered to avoid possible subsoil water contamination
- Unused water from waterers should be discharged properly
- Waterer cleaning place should be an elevated place with proper drainage to avoid any stagnation
- There should not be any leakage in water lines
- Water storage places should be properly covered

Microbial quality of water

Contaminant	Maximum acceptable level
Total heterotrophic bacteria	100 cfu/ ml
Coliform bacteria	50 cfu/ml

- If the number of microorganisms found in a water sample is too high, it indicates that the water supply is contaminated
- Coliform bacteria are organisms normally found in the digestive tracts of livestock, and human Their presence in water is used as a sign of fecal contamination
- Desirable bacterial count in water is 0/ml

Discuss Physical quality of water

1. pH: (6.0 to 6.8)
2. Hardness: (No hard water)
3. Color: (Colorless)
4. Turbidity: (Free from turbidity)
5. Total solids: (Represent the total amount of solid material in a suspension or solution)
6. Dissolved oxygen: (Normal level – 7 to 14 ppm)

Routine monitoring of the watering system

- Check of water pressure on individual lines
- Replacement of clogged filters
- Residual chlorine levels
- Random sampling of drinkers in every line
- Inspection of pumping, water treatment, and storage sites

Observation of watering schedule

- Water should be turned on and available for one hour prior to feeding and turned off or removed one hour after all feed is consumed

Water sanitation

1. Filtration
2. Sedimentation
3. Ozonisation
4. Ultraviolet treatment
5. Chemical treatment – Chlorination is best and cheapest method of water sanitation in poultry farm

Method demonstration of Chlorination

5 grams of stabilized bleaching powder (available chlorine level 35%)



Add 1000 litres of drinking water



Minimum contact time 60 minutes



Residual chlorine level at collection point is 0.2 ppm

Other chemicals

- Hydrogen peroxide (50%) solution, at 1ml/50 liters of water
- Iodophor compounds (1.6% available iodine)
- Quaternary ammonium compounds (1ml/10 liters of water).

UNIT 9.2: LABOUR HYGIENE

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- Understand the labour hygiene in the dairy farm

Say

- This chapter enlightens the guidelines for labour hygiene

Guidelines for labour hygiene in dairy farm

- Persons suffering from an illness or being a carrier of a disease which could contaminate the milk, e.g. food poisoning, must not carry out milking or handle milk.
- All personnel should have clean hands; wear clean clothing and carryout clean practices.
- Adequate hand washing facilities and a hygienic method of hand drying should be available close to the milking area.
- Smoking is not permitted in any areas used for milking, milk storage or washing up.
- During milking and milk handling, the operator must wear clean clothing.
- Operator's hands and forearms must be thoroughly washed before milking.
- These parts, as well as gloves if worn, must be kept clean during milking and milk handling. Damaged gloves must be replaced as soon as is practicable.
- Milking person should be free from infectious diseases. Cut his nails regularly, wash his/her hands and legs before milking and wear cap or head gear.
- He/she shall not wet his hands with water or milk or saliva etc during milking.

Do

- Provide tips for labour or personnel hygiene

Notes for Facilitation

- Explain labour hygiene in the dairy farm

UNIT 9.3: FIRST AID

Unit Objectives

After completing this session the trainees will be able to get scientific knowledge on:

- know comprehensive view on use and applications of first aid in the dairy farm

Say

- This chapter outline the first aid purpose and its application

First aid

- First aid includes any emergency care given to an injured or ill person before medical assistance arrives. Due to the often hazardous nature of farming and isolation, all people working on the farm should be trained in basic first aid.

Basic supplies

- Basic supplies to include: adhesive medical tape, antibiotic ointment, antiseptic solution, gauze in assorted sizes, bandages including elastic wraps, cotton balls, instant cold packs, duct tape, plastic bags for disposal of contaminated items, sterile eye wash, thermometer, scissors (for cutting bandages or clothing), tweezers, soap or instant hand sanitizer, latex gloves and a first-aid manual.

Emergency contacts

- A card inside an emergency kit should include numbers for an ambulance, hospital or fire department and have written directions on how to get back to the farmstead, field or work area. Numbers for poison control and emergency road service should also be included.

Additional safety measures

- Check the farm safety kits every three months to make sure supplies are not expired and that they fit the current season.
- Safety kits are important tools to have on the farm, but additional training could also be beneficial in responding to emergencies. Consider getting training in first aid or other important topics to assist when first responders can't be on the scene immediately.

Individual needs

- Make sure the kit includes personal medications and medical information for those who require special attention.
- Drugs to treat allergic reactions and any other personal medications that don't require refrigeration should be included. The name and a phone number of the family doctor should also be included.

Fire

- Everyone on the farm should be familiar with the location of fire extinguishers, fire hoses and exit points from buildings.
- Everyone should be aware of which fire extinguisher to use and how to use it.

If a fire is detected, immediately raise the alarm. Use the fire extinguisher if it is safe to do so. Never fight a fire alone. To reduce the risk of injury from a fire:

- Have a fire plan
- Extinguish the fire (only if safe to do so)
- Alert all persons nearby and request assistance
- Call 000
- Assemble at the evacuation assembly point and ensure that everyone has been located
- Assist any person in immediate danger (only if safe to do so)
- Close the door on the fire to contain the spread
- If threat to life exists, evacuate immediately closing all doors
- Maintain control of people at the evacuation assembly area
- If you are exposed to smoke or fumes seek medical attention

Hazardous material spills and leaks

- Working with chemicals and hazardous and dangerous substances on farm means there is a possibility of spills or leaks and people on the farm should be trained in how to handle these situations.
- Storage facilities should be constructed to contain spills and leaks; this includes chemicals in use in the dairy, chemical store and mixing area, and fuel storage.
- For small leaks or spills from a container, move the container or empty the contents into another container that is safe; isolate the area and keep people away.
- Clean up small spills immediately. Avoid contact with skin or breathing vapours or dust.
- A designated spill control kit should have adequate material to clean up a small spill. Dispose of products in a safe and approved manner. Refer to the material safety data sheets for any requirements for protective clothing and equipment for the cleaning up process.



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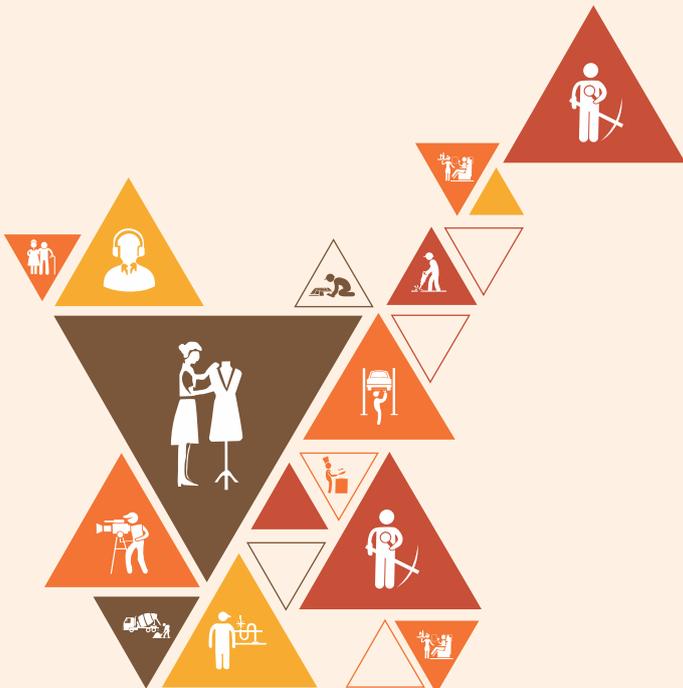
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10. Annexures

Annexure I : Training Delivery Plan

Annexure II : Assessment Criteria



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Annexure I

Training Delivery Plan

Training Delivery Plan			
Program Name:	Certificate Course in Dairy Farmer / Entrepreneur		
Qualification Pack Name & Ref. ID	Dairy Farmer / Entrepreneur AGR/ N4101 , AGR/ N4102, AGR/ N4108, AGR/ N4103,AGR/ N4104, AGR/N4105, AGR /N4106, AGR/N9903		
Version No.	1.0	Version Update Date	21-01-2016
Pre-requisites to Training (if any)	No entry level barrier; 5th Standard Passed preferable One year prior experience in field (crop) operations		
Training Outcomes	<p>By the end of this program, the participants would have achieved the following competencies:</p> <ol style="list-style-type: none"> 1. Increased understanding of Dairy Farmer / Entrepreneur 2. Increased knowledge about various aspects of Dairy Farmer / Entrepreneur system 3. Enhanced knowledge of Dairy Farmer / Entrepreneur components 4. Increased motivation to take up Dairy Farmer / Entrepreneur as livelihood options 5. Increased awareness about schemes like - NHM, NHB, NABARD, Central & State Schemes 6. Development of a strategy for adaptation of Dairy Farmer technology 		

S. No	Module	Session	Objectives	Methodology	Tools	Duration
1	Pre-training assessment	Internal assessment	Assess the current knowledge on dairy farm management	Theory test	Assessment Guide Trainer's Guide	1 hour
2	Ice Breaker	Ice Breaker	Introduce each other and build rapport with fellow trainees and the trainer	Group participation activity	Trainer's Guide	1 hour
3	Interesting facts about dairy farm	Introduction to dairy farming	State the interesting facts about dairy cattle	Trainer led Discussion	Trainer's Guide	1 hour
4	Skills in dairy farming	Skill activities of dairy farm manager	State the detailed farm manager duties like management of dairy herd, health, reproduction and general office work	Trainer led Discussion	Trainer's Guide	30 minutes

5	Skills in dairy farming	Skill activities of Feeder	Explain the duties of feeder (person involved in feeding and carrying of cattle)	Trainer led Discussion	Trainer's Guide	30 minutes
6	Skills in dairy farming	Skill activities of milker	Outline the responsibilities of the person involved in milking process	Trainer led Discussion	Trainer's Guide	30 minutes
7	Cattle breeds	Breed characters	Information on different breed characters and its production performance	Trainer led Discussion	Trainer's Guide Visual aid	1 hour
8	Cattle breeds	Cattle population in India	Summary of cattle breed and its population in India	Trainer led Discussion	Trainer's Guide	30 minutes
9	Judging the dairy cattle	Cattle body score card	Discuss on score or grade the cattle based on its conformation	Trainer led Discussion Hands on training	Trainer's Guide Visual aid Skill practical	1 hour
10	Judging the dairy cattle	Judging procedures	Enumerate stepwise procedure involved in cattle judging	Trainer led Discussion Practical	Trainer's Guide Visual aid Skill practical	1 hour
11	Dairy industry in India	Dairy industry growth	State the dairy industry growth in terms of traditional dairying, modernized dairying and Co-operativization	Trainer led Discussion	Trainer's Guide	30 minutes
12	Dairy industry in India	Structure of dairy industry	Information on dairy industry structure in India	Trainer led Discussion	Trainer's Guide	30 minutes
13	Dairy industry in India	Leading milk producers in India	State the top 10 milk producers in India	Trainer led Discussion	Trainer's Guide	30 minutes
14	Future scope of dairy farmer	Dairy market	Detailed outline on future scope of the dairy farming	Trainer led Discussion	Trainer's Guide	30 minutes
15	Future scope of dairy farmer	Dairy food products	Information of dairy food products marketing in future India	Trainer led Discussion	Trainer's Guide	30 minutes

16	Constraints of present dairy farming	Constraints of present dairy farming	Discuss important constraints and its solutions in present dairy farming industry	Trainer led Discussion	Trainer's Guide Questionnaires	30 minutes
17	Recap	Recap	Revise the learning of the "Introduction to dairy industry in India"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
18	Prepare and maintain livestock accommodation	Selection of site for dairy farming	Information on scientific approach for site selection for dairy farming	Trainer led Discussion	Trainer's Guide Field visit	1 hour
19	Prepare and maintain livestock accommodation	Layout of dairy farm	Schematic explanation of ideal layout of dairy farm	Trainer led Discussion	Trainer's Guide Blue print	30 minutes
20	Prepare and maintain livestock accommodation	Principles of dairy housing	State the principles of dairy housing	Trainer led Discussion	Trainer's Guide	30 minutes
21	Prepare and maintain livestock accommodation	Roof materials	Describe different roof materials for dairy farm construction	Trainer led Discussion	Trainer's Guide Visual aids or exhibition	30 minutes
22	Prepare and maintain livestock accommodation	Housing of new born calves	Describe design and structure of new born calves housing	Trainer led Discussion	Trainer's Guide Field visit	30 minutes
23	Prepare and maintain livestock accommodation	Housing of heifer or bull calves	Outlook on design and management of heifer and bull housing	Trainer led Discussion	Trainer's Guide Field visit	30 minutes
24	Prepare and maintain livestock accommodation	Housing for lactating animals	State scientific planning for design and construction of housing of lactating animal	Trainer led Discussion	Trainer's Guide Field visit	30 minutes
25	Prepare and maintain livestock accommodation	Dairy cattle housing system	Information on different types of cattle housing system	Trainer led Discussion	Trainer's Guide Field visit	30 minutes

26	Prepare and maintain livestock accommodation	Housing of bull	Explain planning for design and construction of bull house	Trainer led Discussion	Trainer's Guide Field visit	1 hour
27	Recap	Recap	Revise the learning of the "Prepare and maintain livestock accommodation"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
28	Establish livestock within accommodation	Micro environmental factors in dairy farming	State the role of different environment factors to keep animal in comfort zone	Trainer led Discussion Practical	Trainer's Guide Skill practical Field visit	1 hour
29	Establish livestock within accommodation	Heat stress in dairy cattle	Explain the heat stress mechanism in dairy cattle	Trainer led Discussion	Trainer's Guide	30 minutes
30	Establish livestock within accommodation	Tips for summer management	Enumerate the tips for summer management in dairy farming	Trainer led Discussion Practical	Trainer's Guide	30 minutes
31	Establish livestock within accommodation	Cold stress	State the cold stress mechanism and signs in dairy cattle	Trainer led Discussion	Trainer's Guide	30 minutes
32	Establish livestock within accommodation	Tips for summer management	Outline the preventive measures during winter season in dairy farming	Trainer led Discussion Practical	Trainer's Guide	30 minutes
33	Establish livestock within accommodation	Daily management practices	Stepwise daily works followed in dairy farming	Trainer led Discussion Practical	Trainer's Guide Field visit	1 hour
34	Establish livestock within accommodation	Identification of dairy cattle	State different identification procedures (branding, tattooing and tagging) in cattle	Trainer led Discussion Hands on training	Trainer's Guide Visual demonstration	1 hour
35	Establish livestock within accommodation	Disbudding, dehorning, grooming and hoof trimming	Explain the detailed procedures of disbudding, dehorning, grooming and hoof trimming	Trainer led Discussion Hands on training	Trainer's Guide Visual demonstration	1 hour

36	Establish livestock within accommodation	Castration	Demonstrate different procedures for bull castration	Trainer led Discussion Hands on training	Trainer's Guide Visual demonstration	1 hour
37	Recap	Recap	Revise the learning of the "Establish livestock within accommodation"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
38	Provide feed and water for livestock	Principles of dairy nutrition	Explain five basic principles of dairy nutrition	Trainer led Discussion	Trainer's Guide	30 minutes
39	Provide feed and water for livestock	Rumen digestion process	Schematic explanation of rumen microbial digestion and protein digestion process in cattle	Trainer led Discussion	Trainer's Guide	30 minutes
40	Provide feed and water for livestock	Energy and protein digestibility	Discuss digestibility of energy and protein in cattle	Trainer led Discussion	Trainer's Guide	30 minutes
41	Provide feed and water for livestock	TDN and DCP values of different feed ingredients	List the TDN and DCP values of different feed ingredients	Trainer led Discussion	Trainer's Guide	30 minutes
42	Provide feed and water for livestock	Classification of feed stuffs	Classify the feed stuffs based on its nature	Trainer led Discussion	Trainer's Guide	30 minutes
43	Provide feed and water for livestock	Concentrates	Explain the role of concentrates in dairy feed	Trainer led Discussion	Trainer's Guide Exhibition	1 hour
44	Provide feed and water for livestock	Roughages	Explain the role of roughages in dairy feed	Trainer led Discussion	Trainer's Guide Exhibition	1 hour
45	Provide feed and water for livestock	Alternate Feed resources for animals	Discuss alternate feed resources for dairy cattle available in market	Trainer led Discussion Hands on training	Trainer's Guide Skill practical	1 hour

46	Provide feed and water for livestock	Feed mixing	Practical estimation of feed mixing quality	Trainer led Discussion Practical	Trainer's Guide Skill practical	1 hour
47	Provide feed and water for livestock	Trouble shoots in feed mixer	Enumerate the steps to avoid feed mixer troubles	Trainer led Discussion Practical	Trainer's Guide Skill practical	1 hour
48	Provide feed and water for livestock	Sampling of feed	Importance of sampling in each batch of feed prepared	Trainer led Discussion Practical	Trainer's Guide Visual demonstration	1 hour
49	Provide feed and water for livestock	Compound feed preparation	Explain compound feed ingredients and preparation	Trainer led Discussion	Trainer's Guide Skill practical	1 hour
50	Provide feed and water for livestock	Feeding management of cattle	Discuss the feeding management for each category of cattle	Trainer led Discussion	Trainer's Guide	1 hour
51	Provide feed and water for livestock	Feed formulation	Practices to formulate the ration for dairy cattle	Trainer led Discussion Practical	Trainer's Guide Skill practical	1 hour
52	Recap	Recap	Revise the learning of the "Provide feed and water for livestock"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
53	Maintain healthy performance of livestock	Reproductive management	State reproductive management in dairy farm	Trainer led Discussion	Trainer's Guide Visual demonstration	1 hour
54	Maintain healthy performance of livestock	Reproductive challenges and its solution	Explain common reproductive challenges in dairy cattle and its solution	Trainer led Discussion	Trainer's Guide Visual demonstration	1 hour
55	Maintain healthy performance of livestock	Clean milk production	Describe steps involved in clean milk production in dairy farming	Trainer led Discussion	Trainer's Guide Skill practical	30 minutes

56	Maintain healthy performance of livestock	Dairy waste	Explain dairy waste and its importance for recycling	Trainer led Discussion	Trainer's Guide	30 minutes
57	Maintain healthy performance of livestock	Dairy waste recycling	Explain various techniques involved in dairy waste recycling	Trainer led Discussion Hands on training	Trainer's Guide Visual demonstration	1 hour
58	Maintain healthy performance of livestock	Utensil selection	Outline the importance of utensil selection in dairy farming	Trainer led Discussion	Trainer's Guide	30 minutes
59	Maintain healthy performance of livestock	Utensil cleaning	Enumerate the steps involved in utensil cleaning	Trainer led Discussion	Trainer's Guide	30 minutes
60	Maintain healthy performance of livestock	Assessing utensil cleaning quality	Practices to assess the quality of utensil cleaning	Trainer led Discussion Hands on training	Trainer's Guide Visual demonstration	1 hour
61	Maintain healthy performance of livestock	Vaccination	Discuss vaccine storage, handling and route of administration	Visual demonstration	Trainer's Guide Visual aids	1 hour
62	Maintain healthy performance of livestock	Vaccination schedule in dairy cattle	Outlines vaccination schedule followed in dairy farming	Trainer led Discussion	Trainer's Guide Visual aids	1 hour
63	Maintain healthy performance of livestock	Deworming cattle in dairy cattle	Outlines deworming schedule followed in dairy farming	Trainer led Discussion	Trainer's Guide Skill practical	30 minutes
64	Maintain healthy performance of livestock	Care of new born calves	Detailed discussion on care of new born calves and its health management	Trainer led Discussion Practical	Trainer's Guide Visual demonstration	1 hour
65	Maintain healthy performance of livestock	Detection of mastitis	State the detection of mastitis and bacterial causes for mastitis	Trainer led Discussion	Trainer's Guide	30 minutes

66	Maintain healthy performance of livestock	Mastitis control	Explain steps involved in mastitis control	Trainer led Discussion	Trainer's Guide Visual aids	30 minutes
67	Recap	Recap	Revise the learning of the "Maintain healthy performance of livestock"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
68	Performing hand and machine milking	Steps of hand milking	Discuss steps of hand milking	Trainer led Discussion	Trainer's Guide Skill practical	1 hour
69	Performing hand and machine milking	Milking machine	Explain the parts of milking machine	Trainer led Discussion	Trainer's Guide Skill practical	1 hour
70	Performing hand and machine milking	Application of machine milking	Guidelines for milking machine application in dairy cattle	Trainer led Discussion	Trainer's Guide Data sheet	1 hour
71	Performing hand and machine milking	Operational steps in machine milking	Explain step wise procedures involved in machine milking	Trainer led Discussion	Trainer's Guide	1 hour
72	Performing hand and machine milking	Packages of hygienic practices at farm level	Discuss on packages of hygienic practices at farm level	Trainer led Discussion	Trainer's Guide	1 hour
73	Recap	Recap	Revise the learning of the "Performing hand and machine milking"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
74	Forage and concentrate	Leguminous fodder	Explain different leguminous fodder for cattle feeding	Trainer led Discussion	Trainer's Guide Skill practical Exhibition	1 hour
75	Forage and concentrate	Non leguminous fodder	Importance of non leguminous fodder for cattle feeding	Trainer led Discussion	Trainer's Guide Skill practical Exhibition	1 hour

76	Forage and concentrate	Tree fodder	State tree fodder importance in cattle feeding	Trainer led Discussion	Trainer's Guide Exhibition	1 hour
77	Forage and concentrate	Crop rotation	Explain how the crop rotation increasing the land productivity	Trainer led Discussion	Trainer's Guide Visual aids Field Visit	30 minutes
78	Forage and concentrate	Model fodder cultivation unit	Practice to do model fodder cultivation unit	Trainer led Discussion Practical	Trainer's Guide	1 hour
79	Forage and concentrate	Crop residue	Explain effects on crop residue in dairy farming	Trainer led Discussion	Trainer's Guide	30 minutes
80	Forage and concentrate	Fodder for silage making	State suitable fodder for silage making	Trainer led Discussion	Trainer's Guide Skill practical Exhibition	1 hour
81	Forage and concentrate	Silage making methods	Discuss silage making procedures at field level	Trainer led Discussion Practical	Trainer's Guide Hands on training	1 hour
82	Forage and concentrate	Nutritive value of green fodder	Enumerate nutritive value of green fodder	Trainer led Discussion	Trainer's Guide	30 minutes
83	Forage and concentrate	Green fodder feeding management	Explain scientific basis For green fodder feeding management	Trainer led Discussion	Trainer's Guide	1 hour
84	Recap	Recap	Revise the learning of the "Forage and concentrate"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
85	Entrepreneur -ship	Preparation of project report	Preparation of project report for dairy farming	Trainer led Discussion	Trainer's Guide Data sheet	1 hour

86	Entrepreneur -ship	Format for project report preparation	Discuss the format for project report preparation	Trainer led Discussion	Trainer's Guide	1 hour
87	Entrepreneur -ship	Availability of bank loan	Explain bank loan availability for dairy farm startup	Trainer led Discussion	Trainer's Guide	1 hour
88	Entrepreneur -ship	Insurance facilities	State insurance facilities and its coverage for dairy farming	Trainer led Discussion	Trainer's Guide	1 hour
89	Entrepreneur -ship	Marketing channels for milk producers	List the marketing channels for milk producers	Trainer led Discussion	Trainer's Guide	30 minutes
90	Entrepreneur -ship	Emerging dairy markets	Discuss the emerging dairy markets	Trainer led Discussion	Trainer led Discussion	30 minutes
91	Entrepreneur -ship	Challenges in milk marketing	List the challenges and its solutions in milk marketing	Trainer led Discussion	Trainer led Discussion	30 minutes
92	Entrepreneur -ship	Retail milk market	Outline the retail milk marketing	Trainer led Discussion	Trainer led Discussion	30 minutes
93	Entrepreneur -ship	Value added milk products	Enumerate the value added milk products	Trainer led Discussion Practical	Trainer led Discussion	1 hour
94	Recap	Recap	Revise the learning of the "Entrepreneurship"	Group participation Quiz	Trainer's Guide Questionnaires	1 hour
95	Maintain healthy and safety at the work	Water sanitation	Explain water sanitation methods in dairy farming	Trainer led Discussion	Trainer led Discussion Visual aids	1 hour
96	Maintain healthy and safety at the work	Water quality assessment	Discuss on water quality assessment in dairy farming	Trainer led Discussion Practical	Trainer led Discussion Hands on training	1 hour
97	Maintain healthy and safety at the work	Labour hygiene	State labour hygiene maintenance in the farm	Trainer led Discussion	Trainer led Discussion	1 hour

Annexure II

Assessment Criteria

CRITERIA FOR ASSESSMENT OF TRAINEES

Assessment Criteria for ASCI- Greenhouse Operator	
Job Role	Dairy Farmer / Entrepreneur
Qualification Pack	AGR/Q4101
Sector Skill Council	Agriculture

S.No.	Guidelines for Assessment
1.	Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2.	The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3.	Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training center (as per assessment criteria below).
4.	Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training center based on this criteria.
5.	To pass the Qualification Pack, every trainee should score a minimum of 50% in aggregate.
6.	In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack.
7.	The marks are allocated PC wise, however, every NOS will carry a weight age in the total marks allocated to the specific QP.

Assessment Outcome	Assessment Criteria	Total Marks (450)	Marks Allocation		
			Out of	Theory	Skills Practical
1.AGR/ N4101 Prepare and Maintain Livestock Accommodation	PC1. Prepare animal accommodation which achieves the best balance between animal health and well-being and available resources, consistent with relevant legislation	75	8	4	4
	PC2. Prepare and maintain equipment, tools and materials required for livestock accommodation		6	3	3
	PC3. Follow cleaning routine in accordance with supervisor's instructions		8	4	4
	PC4. Dispose of waste according to established workplace procedures		7	5	2
	PC5. Report any hazards identified, to the supervisor immediately		6	4	2
	PC6. Maintain accommodation in a safe and clean condition for livestock		8	6	2
	PC7. Replenish materials and supplies as required by livestock		6	3	3
	PC8. Clean tools and equipment and maintain according to established workplace procedures		8	3	5

	PC9. Store equipment safely and securely in the assigned location		6	2	4
	PC10. Use working methods and systems which promote health and safety and which are consistent with relevant Legislation and codes of practice.		6	2	4
	PC11. Take the appropriate action when monitoring reveals problems or issues with the accommodation		6	2	4
			75	38	37
2.AGR/ N4102 Establish Livestock within Accommodation	PC1. Wear suitable personal protective equipment when establishing livestock in their accommodation		2	1	1
	PC2. Check that the equipment, materials and accommodation are suitable for reception of the livestock, prior to their arrival		2	1	1
	PC3. Establish suitable environmental conditions for the animals		2	1	1
	PC4. Handle and move the livestock correctly and safely, according to supervisor's instructions		2	1	1
	PC5. Introduce livestock into the accommodation in a way that minimizes stress and maintains their health and welfare		2	1	1
	PC6. Deal with any difficulties arising according to established workplace procedures		2	1	1
	PC7. Carry out your work according to relevant legislation And codes of practice.	25	2	2	0
	PC8. Monitor the livestock carefully, to ensure their on-going health and welfare is maintained		2	1	1
	PC9. Monitor environmental conditions carefully to ensure that they promote the health and well-being of livestock		2	1	1
	PC10. Adjust and replenish materials as required by the livestock		2	1	1
	PC11. Arrange for regular cleaning of animal housing areas, floors and mats of animals (if any) according to the Animal accommodation and specification.		2	0	2
	PC12. Carry out cleaning routines of animals as per Prescribed procedures.		1	0	1
	PC13. Arrange for regular disposal of animal waste and Other wastes as per prescribed procedures.		1	1	0
	PC14. Report problems that cannot be dealt with to the supervisor immediately		1	1	0
			25	13	12

3. AGR/ N4103 Provide Feed and Water for Livestock	PC1.check that the correct quantities and types of animal feed have been delivered and that they are in an acceptable condition	100	10	5	5
	PC2.report any shortfalls or faults in delivered animal feed to the appropriate person		5	2	3
	PC3. Handle animal feed safely, and in a way that protects it from damage and contamination and minimizes wastage		6	3	3
	PC4.store animal feed safely according to the manufacturer's recommendations, in the order in which it is to be used		6	4	2
	PC5.check stored animal feed regularly for any signs of pest infestation and report this to the appropriate person straight away		8	4	4
	PC6.Check stock levels regularly and tell the appropriate person if Stocks are low.		5	2	3
	PC7.Wash hands effectively before and after handling animal feed		4	0	4
	PC8.Obtain the equipment and materials needed to prepare and serve animal feed		8	3	5
	PC9.Clean work surfaces, utensils and equipment effectively before and after use		6	2	4
	PC10.Arrange for various feed and feed supplements essential for Animal nutrition and growth.		8	4	4
	PC11.Mix the appropriate proportions of feed and feed Supplements depending on the age and stage of growth of animal.		8	3	5
	PC12.Prepare the correct amount of animal feed as directed in the Feeding Plan in a way that minimizes wastage		6	3	3
	PC13.Operation and maintenance of equipment used in feed Preparation e.g. chaff cutter.		2	1	1
	PC14. Use working methods and practices throughout the process that promote health and safety		2	2	0
	PC15. Dispose of any stale and unusable animal feed in a safe place And put equipment and utensils away safely.		2	2	0
	PC16.Wear suitable personal protective equipment when providing feed and water to livestock		2	2	0
	PC17. Supply feed to livestock according to established workplace procedures		2	0	2
	PC18. Supply clean, fresh water to the animals according to their needs		2	2	0
	PC19. Report concerns, related to the feeding and drinking habits of animals, to the supervisor immediately		2	2	0
	PC20. Monitor the condition of feed and water and take the appropriate action when problems occur		2	2	0
	PC21. Clean and maintain feed and water equipment according to established workplace procedures		2	0	2
	PC22. Dispose of waste from the feeding and watering systems safely and correctly, according to established workplace procedures		2	2	0
			100	50	50

4. AGR/ N4104 Maintain Healthy Performance of Livestock	PC1.Treat animals in a manner which complies with relevant legislation, minimizes any likelihood of stress and injury, and maintains their health and well-being	100	6	3	3
	PC2.Provide animals with sufficient and effective opportunities to move, and maintain physical functioning		8	4	4
	PC3.Monitor the physical condition of the animals at suitable intervals, and recognize, record and report any abnormal signs		8	2	6
	PC4. Check livestock for presence of external parasites		8	3	5
	PC5. Carry out specific measures to promote and maintain animals' health and welfare correctly and safely		6	3	3
	PC6.Ensure records are accurate, legible and complete and comply with organizational and legal requirements for future reference		4	3	1
	PC7.Immediately summon assistance for any animals health emergency, and initiate action appropriate to the situation		6	2	4
	PC8. Manage waste safely and correctly in accordance with Legislative requirements.		8	2	6
	PC9.use and store drugs, medication and equipment in accordance with veterinary instructions and organizational policy		8	6	2
	PC10.use current and uncontaminated prescribed medication only for the intended animal		8	5	3
	PC11. use the correct technique to give the specified treatment at the correct time		8	4	4
	PC12. Report any difficulties, in administering treatments, immediately to the supervisor		6	3	3
	PC13.Complete records of the treatment accurately, according to established workplace procedures		8	6	2
	PC14.Observe livestock after treatments and report concerns immediately to the supervisor		8	4	4
			100	50	50
5. AGR/N4105 Performing Hand and Machine Milking	PC1. Maintain conducive milking environment	25	2	2	0
	PC2.Restrict the cow in preparing her for milking		2	1	1
	PC3.Prepare Udder before milking		2	0	2
	PC4. Check for mastitis		2	0	2
	PC5.Check and Adjust milking equipment, as required, to ensure correct operating order		2	2	0
	PC6.Carry out livestock health treatments during drying off, as directed, with minimal stress and weight loss		2	2	0
	PC7. Perform Milking using the right technique		2	0	2
	PC8. Establish a calm regular milking routine		1	0	1
	PC 9. Implement milking procedures with minimum stress to livestock and maximum yield within reasonable timeframes		1	1	0
	PC10. Rectify Minor malfunctions of equipment or milking systems are rectified to manufacturer's specifications, and more complex repairs are reported for specialist attention		1	1	0
	PC11. Implement prescribed handling practices so as to prevent cross-infection during milking operations		2	1	1
	PC12. Perform Teat dipping to prevent mastitis		2	1	1
	PC13. Weigh and store the milk into milk can		2	1	1
	PC14. Clean the milking pail and keep them in the designated place		2	0	2
			25	12	13

6. AGR/N4106 Forage Conservation	PC1.Explore various forage conservation options based on the year Round requirement of feed and fodder.	75	4	2	2
	PC2. Identify risk factors for spoilage in forage conservation such as Fire, vermin and air in silage.		4	3	1
	PC3. Ensure favorable conditions sui table for forage conservation.		5	2	3
	PC4. Prepare forage conservation machinery and equipment in accordance with manufacturer's specifications, Occupational Health And Safety (OHS) requirements.		4	2	2
	PC5. Ensure clear access to paddocks for harvesting and transport Machinery.		2	1	1
	PC6. Prepare storage facility for selected forage conservation Method.		4	1	3
	PC7. Identify safety hazards and implement OHS procedures for Forage conservation.		4	1	3
	Monitor weather conditions to determine optimum time for Harvest and to ensure quality.		2	1	1
	PC8. Identify dry matter target and assess dry matter content of Forage material for the forage operation.		4	2	2
	PC9.Mow, condition, tender and/or rake swaths depending on Weather conditions and forage drying targets.		5	2	3
	PC10.Conduct harvesting activities in a safe, controlled and efficient Manner.		5	2	3
	PC11. Check equipment during harvesting operations regularly for Wear and damage.		4	2	2
	PC12. Bale, wrap, compact, seal or store forage in accordance with Storage plan.		6	4	2
	PC13. Load, transport, and store/compact (if required) forage in Accordance with OHS and quality requirements.		4	4	0
	PC14. Store forage so as to minimize risk of spoilage and combustion		6	4	2
	PC15. Dispose of all waste and debris to minimize environmental Impacts.		4	2	2
	PC16.Clean and service machinery and ancillary equipment in accordance with manufacturer's specifications, OHS requirements And industry practice.		3	1	2
	PC17.Test or sample stored forage for quality.		3	0	3
PC18.Mitigate environmental impacts of forage conservation Activities such as effluent run off, if any.	2	2	0		
		75	38	37	

7. AGR/N4107 Entrepreneur ship	PC1.Farm Planning and Budgeting with reference to various components of Dairy Farm	75	8	4	4
	PC2.Keep books of accounts and various transactions of the farm		8	4	4
	PC3.Arrange for financial assistance from various quarters in the light of various schemes available for dairy development		6	3	3
	PC5.Ascertain the prices of various inputs and milk and milk products from the market		6	2	4
	PC6. Assess the influence of various quality parameters of the milk on the milk pricing		6	2	4
	PC7.Establish cordial relations with various clients for the benefit of dairy farm development		8	4	4
	PC8.Assess the needs and requirement of the clients and assess one's own unique selling proposition	75	8	3	5
	PC9.Extract critical market information that is otherwise not in the public domain		6	2	4
	PC10. Choose appropriate buyer in a given situation of market parameters		7	3	4
	PC11. Identify best ways of attracting market price for one's produce		6	3	3
	PC12. Ensure quality before and during the sale activity to ensure Good returns.		6	4	2
			75	34	41
8. AGR/N9903 Maintain Health & Safety at the workplace	PC1. undertake basic safety checks before operation of all machinery and vehicles and hazards are reported to the appropriate supervisor	25	3	1	2
	PC2. work for which protective clothing or equipment is required is identified and the appropriate protective clothing or equipment is used in performing these duties in accordance with workplace Policy.		3	1	2
	PC3. read and understand the hazards of use and contamination mentioned on the labels of pesticides/fumigants etc.		3	1	2
	PC4. assess risks prior to performing manual handling jobs, and Work according to currently recommended safe practice.		1	1	0
	PC5. use equipment and materials safely and correctly and return the same to designated storage when not in use		3	1	2
	PC6. dispose of waste safely and correctly in a designated area		1	1	0
	PC7. recognize risks to bystanders and take action to reduce risk associated with jobs in the workplace		1	1	0
	PC8. perform your work in a manner which minimizes environmental damage all procedures and work instructions for Controlling risk are followed closely.		1	1	0
	PC9. Report any accidents, incidents or problems without delay to an appropriate person and take necessary immediate action to Reduce further danger.		1	1	0
	PC10. follow procedures for dealing with accidents, fires and emergencies, including communicating location and directions to Emergency.		1	1	0
	PC11. follow emergency procedures to company standard / workplace requirements		1	1	0
	PC12. use emergency equipment in accordance with manufacturers' specifications and workplace requirements		3	1	2
	PC13. provide treatment appropriate to the patient's injuries in accordance with recognized first aid techniques		1	1	0
	PC14. recover (if practical), clean, inspect/test, refurbish, replace and store the first aid equipment as appropriate		1	1	0
	PC15. Report details of first aid administered in accordance with Workplace procedures.		1	1	0
			25	15	10
	Total	500	500	250	250



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