Animal Health Worker

(Job Role)

Qualification Pack: Ref. Id. AGR/Q4804

Sector: Agriculture

Textbook for Class X

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विद्यया ऽमृतमश्नुते

एन सी ई आर टी
NCERT

राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
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Foreword

The National Curriculum Framework–2005 (NCF–2005) recommends bringing work and education into the domain of the curricular, infusing it in all areas of learning while giving it an identity of its own at relevant stages. It explains that work transforms knowledge into experience and generates important personal and social values such as self-reliance, creativity and cooperation. Through work one learns to find one's place in the society. It is an educational activity with an inherent potential for inclusion. Therefore, an experience of involvement in productive work in an educational setting will make one appreciate the worth of social life and what is valued and appreciated in society. Work involves interaction with material or other people (mostly both), thus creating a deeper comprehension and increased practical knowledge of natural substances and social relationships.

Through work and education, school knowledge can be easily linked to learners' life outside the school. This also makes a departure from the legacy of bookish learning and bridges the gap between the school, home, community and the workplace. The NCF–2005 also emphasises on Vocational Education and Training (VET) for all those children who wish to acquire additional skills and/or seek livelihood through vocational education after either discontinuing or completing their school education. VET is expected to provide a 'preferred and dignified' choice rather than a terminal or 'last-resort' option.

As a follow-up of this, NCERT has attempted to infuse work across the subject areas and also contributed in the development of the National Skill Qualification Framework (NSQF) for the country, which was notified on 27 December 2013. It is a quality assurance framework that organises all qualifications according to levels of knowledge, skills, and attitude. These levels, graded from one to ten, are defined in terms of learning outcomes, which the learner must possess regardless of whether they are obtained through formal, non-formal or informal learning. The NSQF sets

common principles and guidelines for a nationally recognised qualification system covering Schools, Vocational Education and Training Institutions, Technical Education Institutions, Colleges and Universities.

It is under this backdrop that Pandit Sunderlal Sharma Central Institute of Vocational Education (PSSCIVE), Bhopal, a constituent of NCERT has developed learning outcomes based modular curricula for the vocational subjects from Classes IX to XII. This has been developed under the Centrally Sponsored Scheme of Vocationalisation of Secondary and Higher Secondary Education of the Ministry of Human Resource Development.

This textbook has been developed as per the learning outcomes based curriculum, keeping in view the National Occupational Standards (NOS) for the job role and to promote experiential learning related to the vocation. This will enable the students to acquire necessary skills, knowledge and attitude.

I acknowledge the contribution of the development team, reviewers and all the institutions and organisations, which have supported in the development of this textbook.

NCERT would welcome suggestions from students, teachers and parents, which would help us to further improve the quality of the material in subsequent editions.

HRUSHIKESH SENAPATY
Director
National Council of Educational
Research and Training

New Delhi
June 2018

About the Textbook

Under the legal provisions of Veterinary Council of India Act, the Animal Health Worker delivers services that are defined under Minor Veterinary Practices notifications of respective state governments. It is mandatory for all state governments to identify minor veterinary services like Animal Health Workers and to notify the same in the respective government gazettes. The need for partnership between practising veterinarians and animal health workers to ensure delivery of service to a large number of farmers in remote areas needs no emphasis.

The Animal Health Worker can offer services only under the supervision of veterinarians. For career progression under the National Skill Qualification Framework (NSQF), the Animal Health Worker can study further to become a Dairy Farmer/Entrepreneur (covered in Classes XI and XII). They can work anywhere in India or even seek employment outside the country. Students of this course, have bright chances of seeking admission in Bachelor of Veterinary Science (B.V.Sc.) if they choose to go for higher education. In the B.V.Sc. degree course of Tamil Nadu Veterinary and Animal Sciences University, five per cent of the seats are reserved for the candidates of vocational stream (Source: www.tanuvas.tn.nic.in).

To achieve these objectives, the textbook has been developed with the contribution of many experts. It is hoped that the textbook will be useful for students aspiring for a career in the veterinary field. Adequate care has been taken to align the contents of the textbook with the National Occupational Standards (NOS) for the job role of Animal Health Worker. This will enable the students to acquire necessary knowledge and skills as per the performance criteria mentioned in the Qualification Pack by the Agriculture Skill Council of India.

The textbook has been reviewed by experts from the Indian Veterinary Research Institute so as to ensure that the content is not only aligned with the National Occupational Standards (NOS),

but is also of high quality. The NOS for the job role of Animal Health Worker covered through this textbook are as follows:

1. AGR/N4808 assists in veterinary extension services.
2. AGR/N4810 develops programme implementation and marketing in livestock sector.
3. AGR/N4813 assists in animal welfare, breed conservation and disaster management.
4. AGR/N4821 implements animal breeding services in farm animals.

The textbook has been divided into four units. Unit 1 explains how the Animal Health Worker is expected to assist in veterinary extension services. Unit 2 discusses the various developmental programmes for animal health and their implementation and marketing in livestock sector. Unit 3 covers how the animal health worker can assist in animal welfare, breed, conservation and disaster management. Animal breeding services and their implementation is a central area of importance in dairying and is covered in Unit 4.

It is hoped that this textbook will prove to be useful for students and teachers who opt for this job role. Any further suggestions for improving this textbook are welcome.

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The Council also extends its gratitude to all contributors for sharing their expertise and time by responding to the requests for the development of this textbook. The Council acknowledges the contribution of the Review Committee members—Gyanendra Kumar Gaur, Sanjod Kumar Mendiratta and Geeta Chauhan, all faculty members at ICAR—Indian Veterinary Research Institute, Izatnagar for reviewing the textbook and providing valuable inputs and photographs.

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Contents

Unit 1

Assisting in Veterinary Extension Services


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Introduction

This unit is based on how animal health workers can promote approved technologies and practices among farmers and entrepreneurs for productivity enhancement and profitability of farming operations. It describes the guidelines for purchasing various farm inputs like feed, fodder, fodder seed, medicine, implements and machinery, etc. and how to minimise the cost of production of various farm outputs. The unit also focusses on Information and Communication Technologies (ICT), especially mobiles, which help to disseminate information to farmers.

Session 1: Promotion of Technologies and Good Practices in Livestock Farming

In India, livestock are reared mostly under traditional farming system. Livestock farming in the world has greatly benefitted by advancements in science and technology. These advances have been made in feeds and feeding of animals, prevention of diseases in animals, adoption of better farming systems, other farm practices and technologies for optimum utilisation of animal and

farm wastes. Fig. 1.1 describes some of the scientific advances and technologies, which have been adopted as standards in livestock productivity enhancement and profitability of farming.

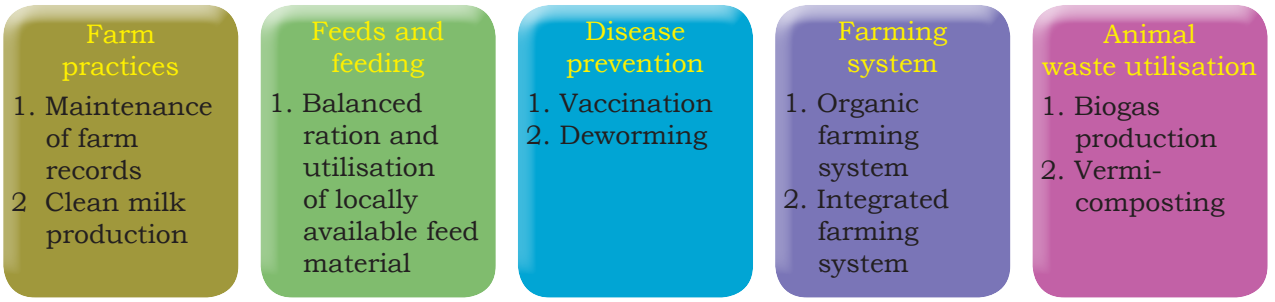


Fig. 1.1: Technologies and practices for productivity enhancement and profitability of livestock farming

The job role of animal health workers demands that they should have some understanding of science, belongingness to the community, and compassion for animals. Therefore, they should be inquisitive and always be on the lookout for new and approved technologies and practices that are profitable in livestock production and management. The technologies shown in Fig. 1.1 are not exclusive in any way.

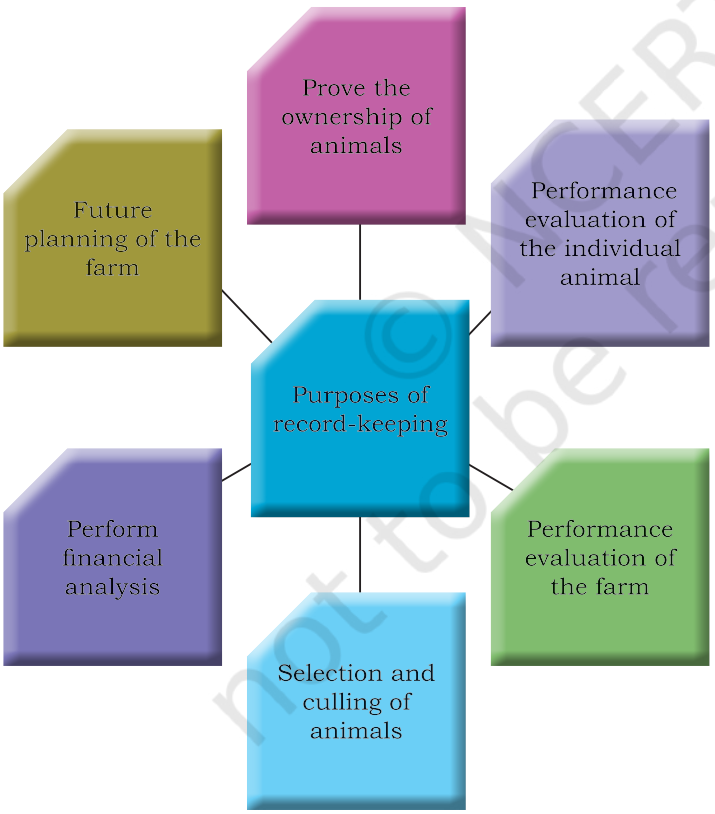


Fig. 1.2: Purposes of maintaining farm records

Farm practices

Maintenance of farm records

In India, a majority of the farmers do not maintain any farm records due to lack of awareness and illiteracy. Therefore, record-keeping is an essential part of livestock management. The success of livestock farming depends more on proper management than only on hard work. Farmers must guide their workers, livestock, etc., and use machines and available resources in best possible ways. Farmers generally remember important events and data but often,

but often, the other relevant information is easily forgotten. Information about animals, inputs and prices is useful for making farm management decisions. Recording can be done easily if animals have some form of identification. Thus, animal identification and maintaining the records are inter-related. The main purpose of record-keeping are shown in Fig. 1.2.

Farm records

A useful farm record should have the characteristics as shown in Fig. 1.3.

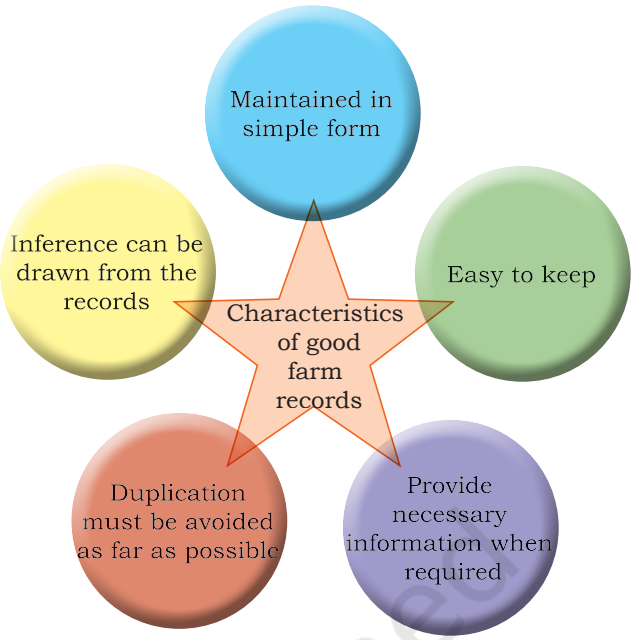


Fig. 1.3: Characteristics of useful farm records

Types of farm record

There are different types of record which are maintained in a livestock farm. The farmers should maintain the records relevant to their livestock farm. Records of a livestock farm can be broadly classified into three categories as shown in Fig. 1.4.

1. Technical records	2. Farm section records	3. Financial records
• Daily report register • Artificial insemination register or service • Calving register • Daily milk yield register • Feed stock register • Feeding records • Health records	• Fodder cultivation register • Field register • Labour register • Muster roll • Tractor logbook • Machinery and equipment book	• Store stock book • Attendance and pay record • Feed cost record • Veterinary expenses • Cost of fodder seeds • Equipment purchases

Fig. 1.4: Different types of record

Types of record-keeping

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

(a) **Manual record-keeping:** In this system, the data are maintained in various types of registers and tables.

(b) **Electronic record-keeping:** In this system, farm data are maintained in a computer. Data compilation and retrieval is quite easy in electronically maintained records.

Table 1.1: Different kinds of records maintained at animal farms

(a) Breeding record

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

(b) Calving record

S. No.	Cow tag number	Date of calving	Bull tag number	Calf tag number	Sex of calf (M/F)	Weight at birth (kg)	Remarks, if any
1							
2							
3							
4							
5							

(c) Growth record of young animals

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

(d) Lactation record

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

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

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

(f) Herd strength record maintained on a daily basis

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

(g) Record of daily milk yield for the month of ----------

S. No.	Cow tag number	Date of calving	Date																		Monthly total milk yield	Total lactation yield
			1		2		3		4		...		27		28		29		30		31			
			M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E		
1																								
2																								
3																								
4																								
5																								

(h) Vaccination record

S. No.	Date	Name of vaccine	Route of vaccination	Number of animals vaccinated	Tag numbers of animals vaccinated	Next due date of vaccination	Remarks, if any
1							
2							
3							
4							
5							

(i) Health check-up record

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

(j) Herd health record

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

Some specimen of different kinds of records maintained at the animal farms are given in Table 1.1. These specimen records are not exhaustive and the former may develop other records as per necessity.

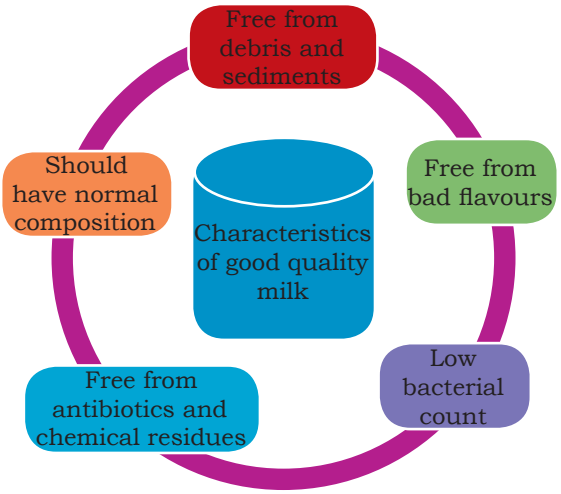


Fig. 1.5: Characteristics of good quality milk

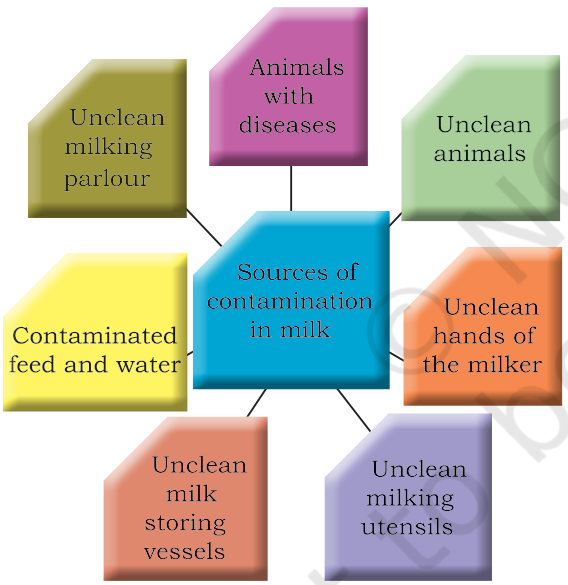


Fig. 1.6: Sources of contamination in milk

Techniques of clean milk production

Clean milk is defined as milk drawn from the udder of healthy dairy animals, collected in clean milking pails, and free from unwanted objects like dust, dirt, flies, manure, etc. Clean milk has a normal composition, possesses a natural flavour and is safe for human consumption.

Characteristics of good quality milk

Good quality milk consists of the characteristics as shown in Fig. 1.5.

Sources of contamination in milk

Milk is usually contaminated through various sources, as depicted in Fig. 1.6.

Need for clean milk production

Clean milk production is important for dairy farmers, milk product manufacturers and consumers. The reasons are given in Fig. 1.7.

- Required for production of good quality dairy products
- Safe for human consumption
- Transportation of raw milk over long distance
- Higher market value of milk

Fig. 1.7: Reasons for clean milk production

Balanced ration and utilisation of locally available feed material

A ration is the amount of feed an animal receives for consumption in a 24-hour period. A ration is balanced when it contains all the essential nutrients needed by an animal in the right proportions. A balanced ration provides protein, energy, and minerals in appropriate quantities. It also provides vitamins that come from dry, green fodder, concentrates, mineral supplements, etc., so that the animal can perform optimally and remain healthy.

Feeding alone accounts for more than 70 per cent of the total cost of animal production. To maximise profitability in animal production, the farmer needs to ensure that the animals receive the required quantity of nutrients, preferably from locally available feed resources, which are usually cheaper and easily available.

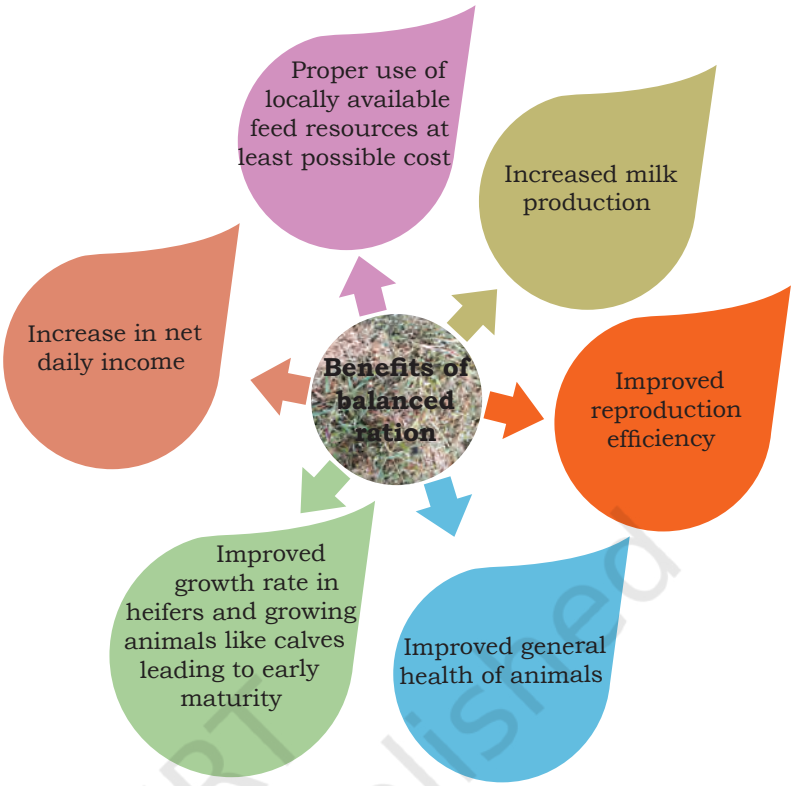


Fig. 1.8: Benefits of a balanced ration

Benefits of balanced ration

The animal's ration should be balanced in all nutrients to deliver the various benefits to the diary farmer as described in Fig. 1.8.

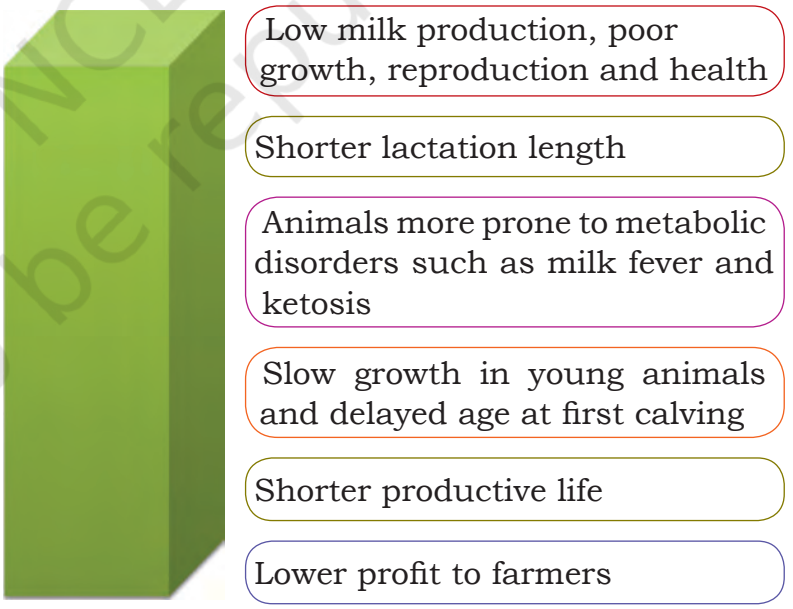


Fig. 1.9: Various unwanted outcomes of imbalanced animal ration

Imbalanced animal ration leads to various unwanted outcomes as shown in Fig. 1.9.

Disease prevention

Vaccination

A common proverb states that "prevention is better than cure". It means that instead of spending a lot of money on the treatment, it is always better to protect animals from diseases. Such an approach to animal health would cost much less. Vaccines are administered to prevent the occurrence of particular diseases. It is the only available method to prevent some bacterial and viral diseases. Routine vaccination of animals is often more affordable than paying for the treatment of sick animals.

Vaccines consist of killed or weakened microbes that stimulate an animal's immune system. When injected into the animal, these microbes do not produce that particular disease. Instead, their presence in the animal's body naturally starts boosting the animal's immune system. If a disease-producing microbe attacks the animal, its vaccination provides a strong defense to fight against that disease. Vaccines are environment-friendly and increase animal welfare by preventing their suffering.

Table 1.1: Vaccination schedule for cattle and buffaloes

Vaccine	Primary vaccination	Booster	Re-vaccination
Foot and Mouth Disease (FMD)	4 months of age and above	6 months after first dose	Biannual
Haemorrhagic Septicaemia (HS)	6 months of age and above	---	Annual
Black Quarter (BQ)	6 months of age and above	---	Annual
Anthrax	6 months of age and above	---	Annual
Brucella (once in a lifetime)	4-8 months of age (only in female calves)	---	

Parasite control

Parasites are organisms that live within or on the body of different animal species and may cause them harm. Parasites are broadly classified into two categories. They are ectoparasite and endoparasite. Ectoparasites,

for example, ticks, mites, etc., live on the outside or in the skin of the animals. Endoparasites are found within the animal's body and may be in the blood, tissue or gastrointestinal tract. Nematodes, Trematodes, Cestodes, and Protozoa are examples of Endoparasites.

Problems caused by parasites

Fig. 1.10(a) shows animals suffering from parasites. These parasites create a number of problems in livestock, which are described in Fig. 1.10(b).

Fig. 1.10(a): Parasites in animals

Control of parasites

The major aim of the parasite control programme is to minimise economic losses. The nutritional status of the animals has immense influence in reducing the effects of parasitism. Animals in good body condition, who receive a balanced ration, are often able to reduce the effect of endoparasites. Animals deficient in feed are unable to cope with parasitism and, in extreme cases, may die.

Parasite control programme mainly focusses on two areas: a) control of ectoparasites (external parasites), and b) control of endoparasites (internal parasites). The details of the parasite control programme have been discussed in Session 3 of Unit 2 of the *Animal Health Worker* textbook, Class IX.

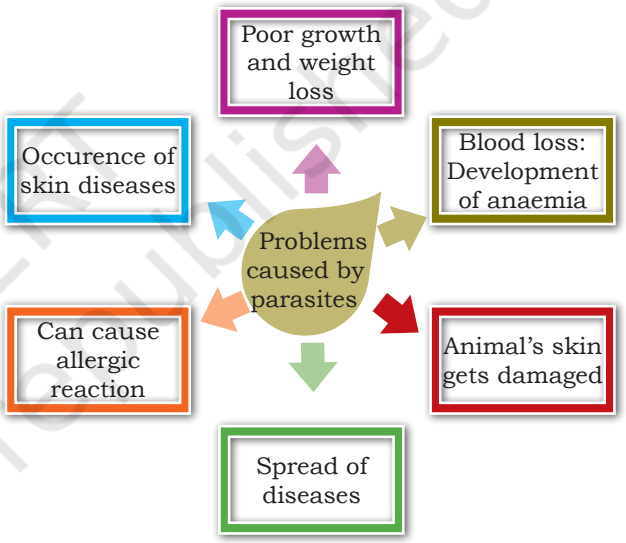


Fig. 1.10(b): Problems caused by parasites

Farming systems

Organic livestock farming

It is a system of livestock production that promotes the use of organic and biodegradable inputs from the ecosystem in all areas of animal production, including animal housing, nutrition, breeding and animal health. The aim of this kind of farming system is to use natural breeding methods, minimise stress, prevent diseases, avoid use of chemicals and allopathic veterinary

drugs (including antibiotics), avoid feeding products of animal origin (for example, meat meal) and ensure the maintenance of the health and welfare of the animal. Organic farming is practiced all over the world and more than 37.2 million hectares of agricultural land is managed organically. In India, organic livestock farming is also gaining popularity and in the year 2017-18, around 3.56 million hectares of land was registered under National Programme for Organic Production.

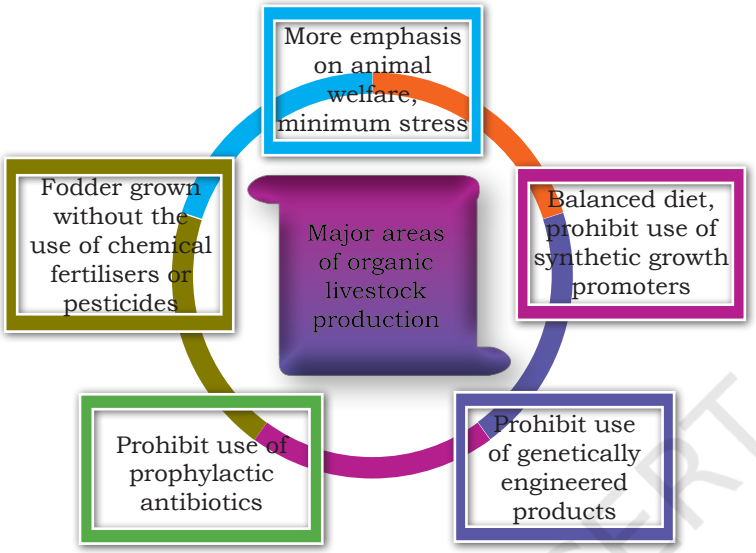


Fig. 1.11: Important areas of organic animal production

The primary characteristics of organic livestock farming include well-defined standards and practices, which can be verifiable. In organic livestock farming, more attention is being given to the areas shown in Fig.1.11.

Organic farming system begins with the maintenance of health of the soil and ends with the availability of organic

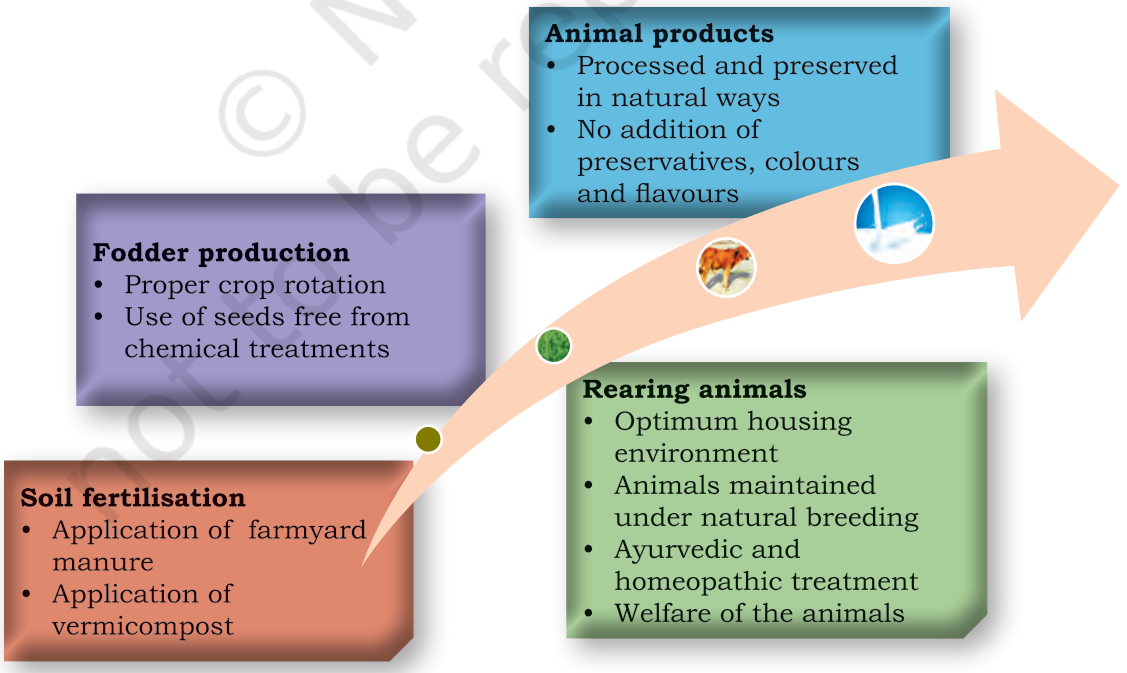


Fig. 1.12: Different stages in organic livestock production

livestock products to the consumer. Fig. 1.12 depicts the basic concepts of organic livestock production by showing different steps of the total production cycle.

Record-keeping in organic farming

Maintenance of detailed records of various farm activities is the most important criteria of organic farming. Farm records not only help in better management of the farm but are also important to verify the organic status of production, harvesting, and handling practices associated with animals. An organic farm must maintain information related to every possible record like date of birth, sex, colour and other individual identification marks of the animal, productive and reproductive performance, details of cropping scheme and fodder production, and details of veterinary interventions, etc.

Standards of organic livestock production

A farm may be considered as organic if it meets the criteria mentioned in a set of guidelines known as 'organic standards'. The quality of production under organic management is ensured through certification procedures using internationally accepted standards. Organic certification guarantees both, quality of the

Permitted farm practices	Farm practices not permitted
• All animals should be born and raised in organic farms. • Breeds, adaptable to local conditions, should be chosen. • Natural breeding is preferred but artificial insemination is allowed. • Livestock should be fed 100 per cent organically grown feed of good quality. • All ruminants should have daily access to roughage. • There should be emphasis on natural medicines and methods, including homeopathy, ayurvedic, unani and acupuncture. • Vaccination of animals on the recommendation of a veterinarian and as per legal requirements.	• Embryo transfer techniques are not allowed. • Mutilations (castrations, tail docking of lambs, dehorning) are not allowed. • Hormonal treatment and induced birth are not allowed unless needed by individual animals for medical reasons and under veterinary advice. The following feeds and feed supplements are not permitted: a) Synthetic growth promoters or stimulants, b) Artificial colouring agents, c) Urea, d) Farm animal by-products (for example, abattoir waste) for feeding, e) Pure amino acids, f) Genetically engineered organisms or their products.

Fig. 1.13: Farming practices permitted and not permitted in organic livestock farming

production process as well as that of the products. Organic milk, meat and eggs are produced, harvested, preserved and processed according to verifiable organic standards. In India, Agricultural and Processed Foods Export Development Authority (APEDA) under the Ministry of Commerce, Government of India is the controlling authority for organic certification.

Farm practices included in organic livestock production

A comparative description of permitted and prohibited practices in organic livestock farming system, are given in Fig. 1.13.

Integrated livestock farming

Integrated farming systems involve simultaneous farming of crops, animals and fish together in a synergistic way, which results in greater total output than the sum of their individual output. In this system of farming, by-products of one sub system are used as inputs by another sub system. Thus the system eliminates the problem of waste disposal and also maintains ecological sustainability.

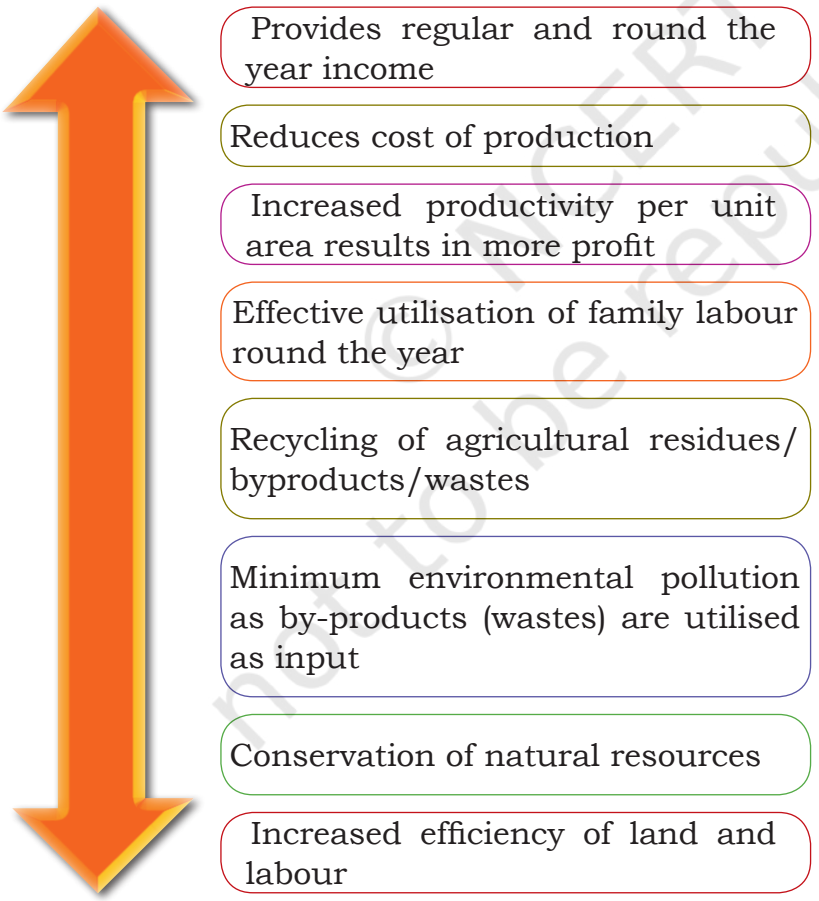


Fig. 1.14: Benefits of integrated livestock farming

Benefits of integrated livestock farming

Fig. 1.14 depicts how integrated livestock farming is beneficial for the farmers in various ways.

Examples of important livestock-based integrated farming system commonly practiced in India

Duck-cum-fish farming—This type of integrated farming is managed in such a way that the by-products of

duck farming (droppings) are utilised for direct or indirect consumption by fish. During the day the ducks are left at a nearby water source like a pond and are kept in pens at night. Duck droppings fall directly into the water and act as feed for the fish. On the other hand, ducks consume mosquitoes and other insects, like, larvae, tadpoles, snails (growing in water), etc., which also serve as vectors (disease transmitting organism) both for humans and animals. This type of farming is popular in West Bengal, Bihar, Odisha, Andhra Pradesh, Kerala, Assam and other North Eastern states. On an average, 250 ducks per hectare are recommended for duck-cum-fish farming.

Cattle/buffalo-cum-fish farming—In this type of farming, manure from farm animals is used as feed for fish. An adult cow weighing about 400 kg excretes about 8 tonnes of dung and about 5,000 liters of urine annually. This system not only provides fish to the farmer but also provides milk on a daily basis. This increases the farmer's revenue and reduces the working capital. Cattle sheds are built in the vicinity of the fish ponds for easy supply of manure. Manure is channelised directly into the ponds, which serve as excellent food for fish. The manure also indirectly works as a source for growth of plankton in the pond. A unit of 5–6 cows can provide sufficient input for a one-hectare fish pond. However, excess manure supply to the pond is restricted, otherwise, it can create water pollution.

Pig-cum-fish farming— Pig manure is a suitable supplementary feed for some fishes. Pig manure is rich in nitrogen and phosphorus and helps in fast growth of fish. The undigested solid feeds present in pig dung serve as a direct food source. A pig house (sty) is constructed near a pond, thus, channelising manure directly into the pond. In some cases, pig manure is fermented for some days and then channelised into the pond. About 30 to 40 pigs are recommended for a one-hectare pond.

Animal waste utilisation

Environmental degradation is a major threat to the world. Usually, a large volume of organic matter, generated

from livestock farms is dumped locally, which emits a foul smell and pollutes the soil and water. Therefore, emphasis is placed on proper utilisation of waste. The following are some of the methods, which can be employed for proper utilisation of farm waste.

Biogas production

Biogas is a mixture of various gases produced by the breakdown of organic matter in anaerobic conditions (absence of oxygen). A major component of these gases is methane that constitutes 50 to 65 per cent of the gaseous mixture.

Manure generated at the livestock farm can be used as raw material for biogas production. Biogas is an odourless and colourless gas. Biogas is about 20 per cent lighter than air and has an ignition temperature in the range of 650° to 750°C. Therefore, it produces a clear blue flame, similar to that of LPG during combustion.

A biogas plant (Fig. 1.15) produces biogas and slurry, which is one of the major products from a biogas plant. Biogas slurry is a good quality organic fertiliser.

Fig. 1.15: A biogas production unit

Uses of biogas

Biogas produced from a biogas plant can be used for the following purposes.

Cooking can be done through biogas. A 2 cubic metre capacity biogas plant can meet the energy needs of a family of four persons.

Lighting can be done with specialised (silk mantle) lamps using biogas. The requirement of gas for a 60 W lamp is 0.13 cubic metre per hour.

Power generation with a dual fuel biogas engine can help replace up to 80 per cent of diesel. Nowadays, diesel engines have been modified to run on 100 per cent biogas. Petrol and CNG engines have also been modified to run on biogas.

Vermicomposting

It entails the use of earthworms for composting organic waste. In vermicomposting, earthworms are used to convert organic material (usually waste) into humus-like material. The aim is to process farm waste as quickly and efficiently as possible.

Fig. 1.16: Earthworms used to prepare vermicompost

Earthworms can consume practically all organic matter. Their daily consumption of waste is almost equal to their body weight. Thus, one kilogram of earthworms can consume one kilogram of waste every day. Vermicompost is nothing but the excreta of earthworms, which is rich in humus and nutrients. The excreta (castings) are rich in various soil nutrients like nitrogen, potassium, phosphorus, calcium and magnesium. Castings contain, 5 times the available nitrogen, 7 times the available potassium, and 1½ times more calcium than is available on good topsoil. *Eisenia foetida* and *Lumbricus rubellus* (red worm) species of earthworms are commonly used for vermicomposting. Earthworms not only convert garbage into valuable manure but also keep the environment healthy. Fig. 1.16 shows earthworms preparing vermicompost.

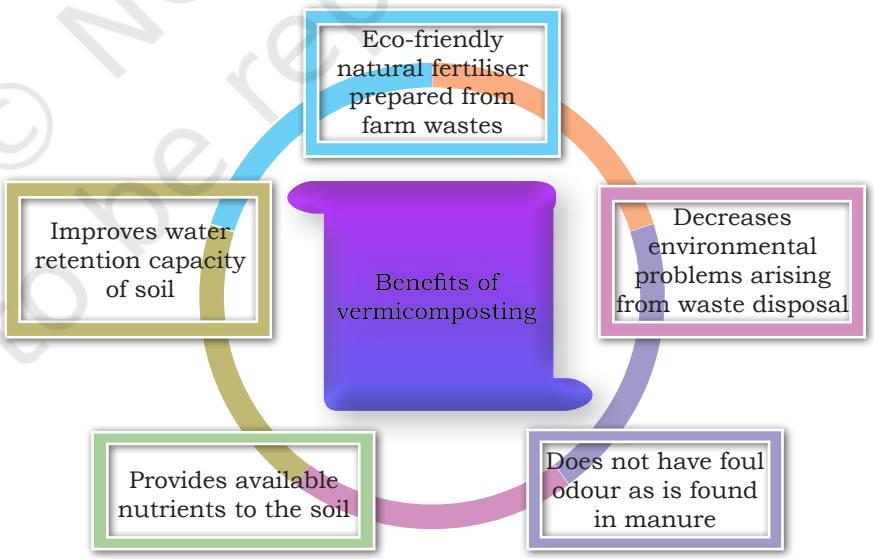


Fig. 1.17: Benefits of vermicomposting

Benefits of vermicomposting

Fig. 1.17 shows the various advantages of vermicomposting.

Practical Exercise

1. Visit any biogas plant. Note down important parts of the biogas unit.
2. Visit a vermicompost unit. Note down different steps of vermicompost production.
3. Visit any established livestock farm. Check the various records maintained and their entries.

Check Your Progress

A. Multiple Choice Questions

1. Records are maintained in organic livestock farms for _____
   (a) productive performance
   (b) reproductive performance
   (c) both a and b
   (d) none of the above
2. Milk is considered as clean milk when it is procured _____
   (a) from a clean animal (b) in a clean environment
   (c) in clean utensils (d) all of the above
3. Feeding alone accounts for about _____ per cent of the total cost of animal production.
   (a) 20 (b) 40 (c) 50 (d) 70
4. In India, the controlling authority for organic certification is _____
   (a) Agricultural and Processed Food Products Export Development Authority (APEDA)
   (b) ICAR (c) FSSAI (d) MoAFW
5. Which of the following is allowed in organic livestock farming?
   (a) Artificial Insemination
   (b) Hormonal treatment
   (c) Synthetic growth promoters
   (d) Embryo transfer

B. Fill in the Blanks

1. Recording can be done most easily if animals have proper _____.
2. A ration is the amount of feed an animal receives in a _____ hour period.
3. Organic livestock farming is a system of livestock production that promotes the use of _____ inputs.
4. In integrated farming, by-product of one enterprise is used as _____ by another enterprise.
5. Vermicomposting is the process by which _____ are used to convert organic material (usually waste) into humus-like material.

C. Mark True or false

1. In India, a majority of the farmers maintain farm records.
2. Calving register is considered as a financial record.
3. Clean milk is free from unwanted objects.
4. Vaccines are administered to prevent the occurrence of particular diseases.
5. Embryo transfer techniques are not allowed in organic livestock farming.

Session 2: Assisting Farmers in Quality Farm Input Selection and Procurement

Relevant knowledge

Like any other shop or factory, a farm is a business where inputs are required for livestock production. Farmers too, like other businessmen, want to make a profit, which is made when the selling price of output is more than the money spent on the input.

The resources used in livestock farming such as animals, equipment (tools and implements), chemicals, feeds, fodder and fodder seeds are collectively called farm inputs. In a farm, a large quantity of these inputs is used. These have to be stored on the farm before being used. Expensive equipment is required to be maintained when not in use to increase its life. Fig. 1.18 describes various inputs required for a livestock farm and the output generated from it.

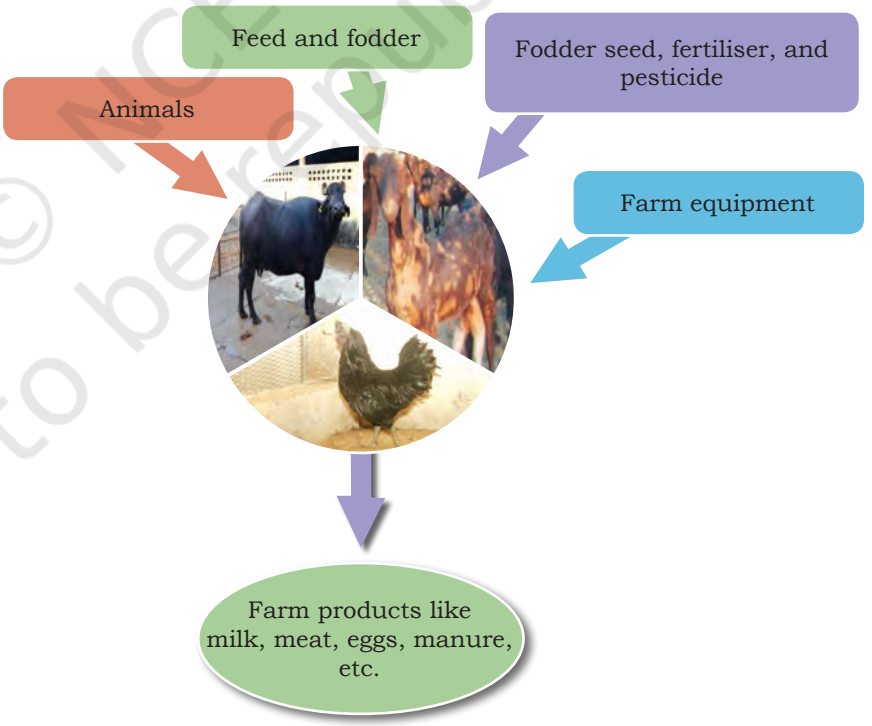


Fig. 1.18: Inputs and outputs of a livestock production system

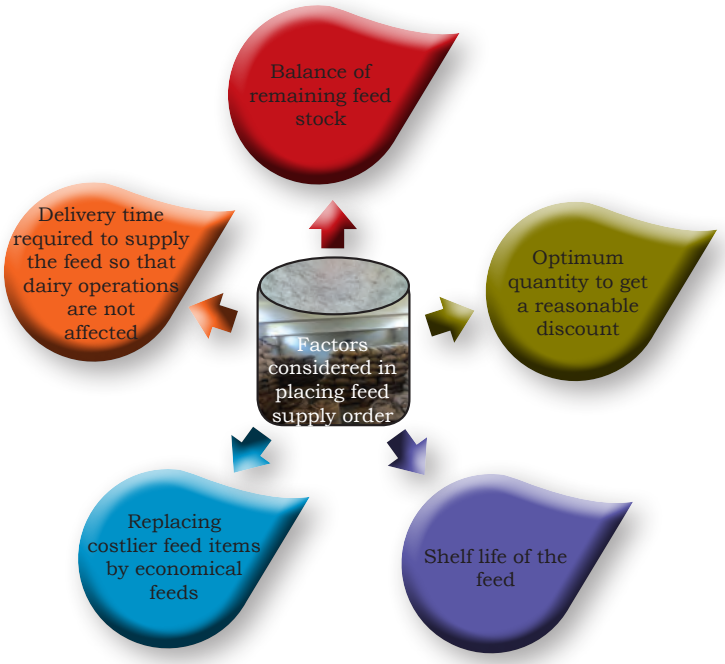


Fig. 1.19: Factors to be considered before placing a fresh order for feed supply

Selection and procurement of feed and fodder

Feed requirement of the animals and procurement of feed stuff depends upon the following factors:

(a) nutritive value of the feedstuff
(b) protein quality of the feedstuff
(c) feed requirement of different categories of animals
(d) feed supplements
(e) major ingredients in feed

Based on the understanding of these factors, the requirement of animal feed is calculated on a daily or monthly basis. Attention is also paid to the factors described in Fig. 1.19 while placing supply orders for feed items.

Broadly, three categories of feed and fodder are required for a dairy farm—green fodder, dry fodder (hay, straw) and concentrate (Fig. 1.20). If sufficient land is available, a dairy entrepreneur can grow green fodder in their own farm. Dry fodder like hay can be prepared in one's own farm from the cultivated green fodder and stored for future use. Straw is an agricultural byproduct,

Concentrate mixture in a gunny bag

Green fodder (jowar)

A heap of wheat straw

Green fodder (berseem)

Fig. 1.20: Broad categories of feed and fodder

which is available only at the time of harvesting of crops. Therefore, it would be economical for the farmer to store sufficient quantities of straw on the farm for future use. concentrates are prepared by mixing a number of feed ingredients to maintain the nutritional balance of the ration. All feed ingredients required for preparation of the concentrates may not always be available locally and, therefore, need to be purchased through suppliers. Special care is taken to ensure that the feed items are in good condition. It is ensured that no mouldy or sub-standard feed items are used in the feed preparation.

The various activities included in procurement, checking and receiving of animal feed in a dairy farm are explained with the help of Fig. 1.21.

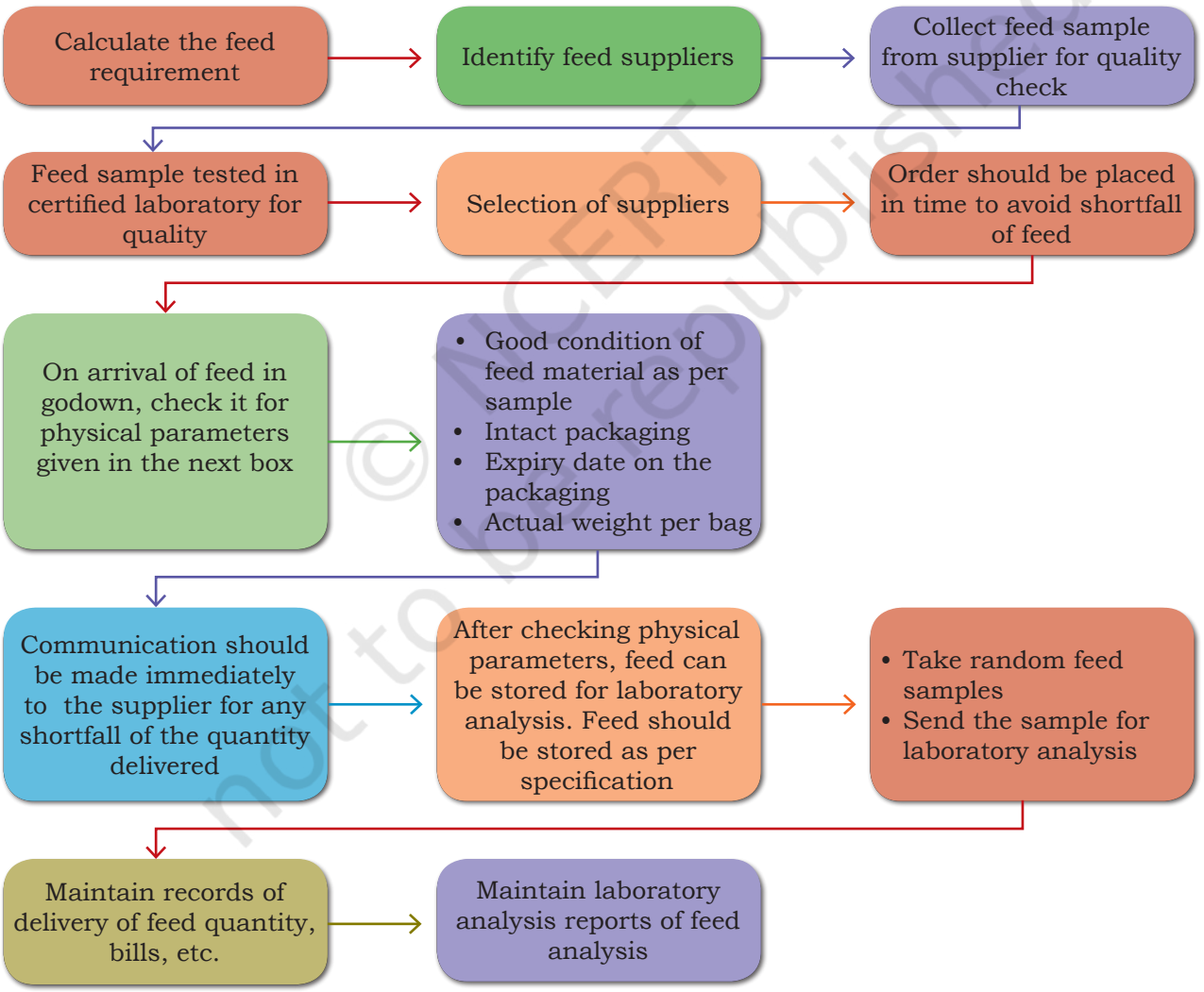


Fig. 1.21: Flow chart describing procurement, checking and receiving of animal feed in a dairy farm

Procurement of fodder seeds, fertilisers, and pesticides

All fodder seeds, fertilisers, and pesticides have an expiry date. For example, if the pesticide has passed the expiry date, it may not contain the correct concentration of active ingredients. Lack of proper concentration of active ingredients will lead to a loss in pesticide efficacy. The solvents in the compound may also evaporate during storage, causing the formulation to become over-concentrated. This will lead to too much active ingredients being applied on a fodder crop, which in turn can harm animals.

Like any other seeds, fodder seeds have a shelf life. Depending on the storage conditions, the viability of seeds can vary. For purchasing of fodder seeds the following points are considered:

Berseem seed

Oat seed

Sorghum seed

Maize seed

Fig. 1.22: Seeds of common fodder crops

(a) Seeds should be purchased well before the fodder growing season.
(b) Always use a recommended variety of fodder seeds as per local climate and adopt recommended seed rate and other package of standard practices to be followed.
(c) Always procure certified seeds from authorised agencies and store the seeds in a cool, dry and clean place.
(d) Always use treated seeds for sowing and test for quality parameters like purity, germination, etc., before sowing.

Figure 1.22 presents the seeds of some common fodder crops and Fig. 1.23 shows common fertilisers used in fodder crop production.

(a) Urea

(b) DAP (diammonium phosphate)

(c) Farmyard manure

(d) Vermicompost

Fig. 1.23: Common fertilisers (a & b) and organic manures (c & d) used in fodder crop production

Procurement of farm equipment

Every farm requires machinery and equipment for day-to-day operations. However, the requirements depend upon the level of mechanisation and the scale of operations. Some common machinery and equipment like chaff cutter, milking pails, milk cans and minor implements are essentially required for every livestock farm.

In hot climatic conditions, it is essential to install fans and cooling devices in the dairy animal sheds to protect them from the heat stress. As the size of the farm increases, milk coolers, electricity generator sets, etc., are very essential for the farm. A vehicle is also essential for the purchase of inputs and selling of farm produce to the market. Besides this, tractors along with implements are required for the cultivation of fodder crops and their harvesting, transportation, chaffing, etc.

It should be ensured that appropriate machinery and equipment is purchased as per the farm size. Machinery and equipment can also be used by custom hiring or sharing by groups of farmers in the nearby areas. Government grants help farmers who seek assistance in procuring machinery. Some grants also provide funding for purchase of farm equipment. Following incentives are offered by the government for the purchase of machinery and implements.

Incentives for purchase of agricultural machinery and implements

To make available various agricultural implements and machines at cheaper rates, assistance in the form of subsidy at the rate of 25 per cent to 50 per cent of the cost of equipment is available to all categories of farmers. These are available under various schemes of the Department of Agriculture and Cooperation such as Macro Management of Agriculture, National Food Security Mission, *Rashtriya Krishi Vikas Yojana* (RKVY) and National Horticulture Mission, etc.

Incentives for setting up custom hiring centres of agricultural machines

Incentives in the form of subsidy are supported through the RKVY and macro management schemes so that

the established farm machinery companies can make available costly equipment to the farmers. Such an approach, supplements the efforts of the government in extending appropriate mechanisation in the country, makes available different input supply and services to needy farmers and provides profitable employment to rural unemployed youth. This results in timeliness of farm operations, ultimately leading to increase in production and profit.

Procurement of animals

Purchase of new animals is a common practice for livestock farms. Animals can carry diseases without showing any visible signs. Hence, there is a need to examine new animals carefully before introducing them to the existing herd to avoid an outbreak of a new infection to the existing farm animals. As mentioned earlier in the book, 'prevention is better than cure' which reveals that prevention methods are much better to keep away any problem than finding solutions for them later. Treating new animals is cheaper and easier than managing a new disease in all animals of the farm.

Before inclusion of new animals to the existing farm, the following points should be considered.

(a) It is always better to purchase livestock from reputed farms and thoroughly inspect them before signing the deal.
(b) During transportation of animals, proper cleaning and hygienic measures should be ensured.
(c) New animals should be isolated for 30 days (quarantine period) before mixing them up with the existing farm animals.

Practical Exercise

Visit any livestock farm. Note down the important body parts of different livestock species.

Talk to the animal workers about day-to-day handling of animals and note down their practical feedback.

Check Your Progress

A. Multiple Choice Questions

1. Procurement of feedstuff depends upon _____
   (a) nutritive value (b) protein quality
   (c) moisture content (d) all of the above
2. Which of the following resources is used in livestock farming?
   (a) Machinery (b) Feed
   (c) Labour (d) All of the above
3. During purchase of fodder seed, which of the following is required?
   (a) Seed should be purchased well before the fodder growing season
   (b) Use recommended variety of fodder seeds as per local climate
   (c) Seeds should be tested for quality parameters like purity, germination, free from weed seed, etc.
   (d) All of the above
4. In a hot climatic condition, which of the following is required to maintain better milk production?
   (a) More feed to the animals (b) Cooling system
   (c) Cleaning of animals (d) None of the above
5. Which of the following is considered dry fodder?
   (a) Hay (b) Silage
   (c) Freshly chopped greens (d) None of the above

B. Fill in the Blanks

1. Isolate new animals for _____ days (quarantine period) before mixing them up with the existing farm animals.
2. Lack of proper concentration of active ingredients will lead to a loss in pesticide _____.
3. RKVY stands for _____.
4. _____ is used for chaffing of green fodder.
5. Like shops and factories, a farm is a _____.

C. Mark True or false

1. Profits are made when the selling price of output is more than what is spent on the input.
2. Pesticides, fertilisers and fodder seed have no expiry date.
3. Animals can carry diseases without showing any visible signs.
4. In a livestock farm, a required quantity of concentrate mixture can be stored for a period of one year.
5. Concentrates are prepared by mixing a number of feed ingredients to maintain the nutritional balance of the ration.

Session 3: Information and Communication Technology (ICT) in Animal Husbandry Extension Services

Relevant knowledge

Animal husbandry extension activities include transferring knowledge and skills to farmers, advising and educating them in decision making and encouraging animal husbandry development. Livestock extension activities are not well-developed in India to effectively meet the requirements of livestock farmers. This happens mainly due to poor infrastructure and high costs of delivering information and skills.

Farmers need to be updated on modern technologies and management practices of livestock production on a regular basis to remain competitive. Fig. 1.24 depicts the information that is required on a regular basis by the farmers for profitable animal husbandry.

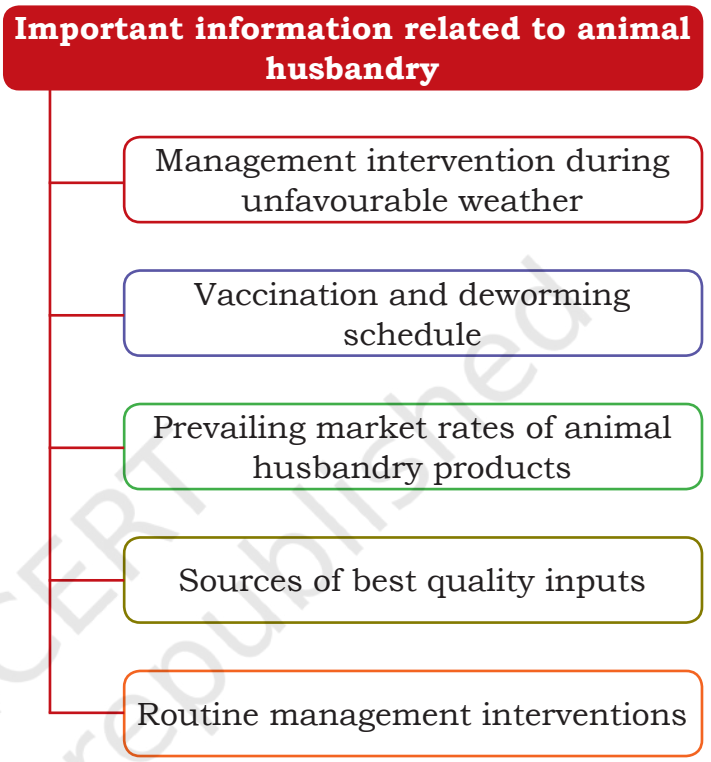


Fig. 1.24: Important information related to animal husbandry

Agencies providing livestock extension services in India

The following agencies are instrumental in providing information and skills related to livestock production and management (See Fig. 1.25).

Information and Communication Technology (ICT) is an important tool for providing animal husbandry-related information and services. The information required for the farmers includes farm inputs supply, disease control, marketing of products, availability of latest technology, etc. ICT includes the use of computer, the Internet, geographical information service, mobile phone messages, etc.

Fig. 1.25: Agencies responsible for livestock extension services in India

Use of mobile phones in extension services in animal husbandry

A very large number of small and marginal livestock farmers are, increasingly, being empowered through the convenience and affordability of mobile technology. For many farmers, mobile phones have become essential tools that have strengthened business ties and opened up new opportunities.

Mobile technologies have reduced transaction costs and increased the reach of banks and microfinance institutions, allowing them to effectively serve smallholder farmers across remote areas. This includes using mobile phones to provide farmers with information about livestock operations like vaccination, deworming in their locations, helping farmers to share price and market information via SMS and learn livestock management practices by speaking with an animal husbandry expert at a call centre.

The rapid rise and proliferation of mobile technologies has also resulted in new analytical business tools and calculators to equip farmers and self-help groups with production and sales data to help them in making business decisions.

The use of mobile phones is growing rapidly even in the remote rural areas. The exceptional speed of adoption of mobile phones has great potential to disseminate innovative farm practices as well as farmers' knowledge and awareness. Mobile phones with the help of SMS, audio and video, manages help to spread information and skills related to animal husbandry.

Initiatives by the central government

The central government has taken the following initiatives towards animal husbandry extension services.

(a) The farmers can contact the nearest Kisan Call Centre (KCC) on toll free number 1800-180-1551 for answers to their specific queries through the KCC agents or through senior experts from 6 am to 10 pm on all days of the year.
(b) Enable participation in exposure visits and trainings for progressive farmers.
(c) Provide selected information and services from the web through interactive SMS on farmers' mobiles.
(d) Enable access to a farmer's portal to get location specific information (including a package of practices (having a detailed list of the steps followed), list of dealers, crop advisories, etc.), directly or through an Internet kiosk.
(e) Provide advisories and services from SMS portals for farmers after getting registered through KCC or Common Service Centre or Pull SMS by registration at 51969 or 9212357123.
(f) Help farmers get price information for their produce available on the Agmarknet website (www.agmarknet.nic.in) or through KCCs or SMS.
(g) Buyer-seller portal is available at www.farmer.gov.in/buysell.htm.

Practical Exercise

1. Note down how mobile services help numbers in dissemination of information.
2. Surf the Internet and find out the recent initiatives of the government.

Check Your Progress

A. Multiple Choice Questions

1. Mobile phone helps in the extension services, because _____.
   (a) it provides direct connectivity
   (b) it is affordable
   (c) it is accessible in remote areas
   (d) all of the above
2. The contact number of Kisan Call Centre is _____.
   (a) 1800-170-1551
   (b) 1800-180-1331
   (c) 1300-180-1551
   (d) 1800-180-1551

3. The information required by the farmers includes _____.
   (a) farm inputs supply
   (b) disease control
   (c) marketing of products
   (d) all of the above
4. Which of the following disseminate the information and skill in mobile phones?
   (a) Audio
   (b) Video
   (c) All of the above
5. Information and Communication Technology (ICT) includes _____.
   (a) computer
   (b) SMS
   (c) audio and video massages
   (d) all of the above

B. Fill in the Blanks

1. For prevention of diseases _____ is done in animals.
2. _____ enabled SMS, audio and video, help to disseminate information and skills related to animal husbandry.
3. _____ activities include transferring knowledge and skills to farmers, advising and educating farmers in decision making and promoting animal husbandry development.
4. Under the central government initiative, a farmer can get the price information of their produce on _____ website.
5. KCC stands for _____

C. Mark True or false

1. Farmers need to be updated on modern technologies and management practices of livestock production on a regular basis to remain competitive.
2. Livestock extension activities are not well developed in India.
3. ICT includes the use of computer, the Internet, geographical information service, mobile phone messages, etc.
4. ICAR involves trading of animals.
5. KVK stands for Krishak Vigyan Kendra.

Unit 2

Development Programme Implementation and Marketing in Livestock Sector

Introduction

This unit is about how an animal health worker can assist various organisations in implementing programmes and projects in the livestock sector. Issues such as empowerment of livestock farmers, creation of awareness, engagement with stakeholders and promotion of economic activities are discussed in this unit. Special focus has been given on marketing of livestock products.

This unit will enable an animal health worker in helping in selection of targeted beneficiaries and also work with them in implementing developmental activities. They will also be able to ensure convergence of developmental projects. This will motivate the farmers to form self-help groups and guide them in business options and basic economics of various livestock activities. An animal health worker will also be able to encourage farmers to produce for the market and promote collective marketing of livestock products. They will also be able to provide information to livestock farmers on prices of farm inputs as well as output.

Session 1: Awareness Programmes for Farmers

Relevant knowledge

Awareness programmes entail extending benefits of technology and skills to the rural population. It is an effort to extend research-based knowledge to the rural areas to improve the lives of farmers. This process offers advice and information to help the farmers solve their problems with the help of authentic information and skills provided to them. This encourages the farmers to take proper and beneficial decisions in their operations. Awareness helps to increase the efficiency of the farm, increase production and thus improve the standard of living of the farmers.

Need for awareness programmes for livestock farmers

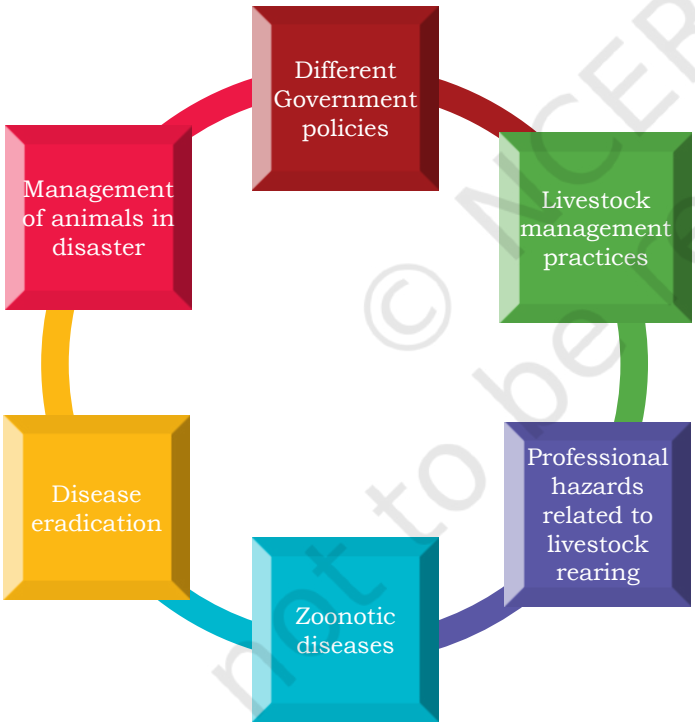


Fig. 2.1: Awareness programmes for farmers

Awareness programmes are the activities conducted to disseminate right and timely information and give exposure to the farming community on different types of farming. These programmes cover various animal husbandry/ agricultural marketing reforms, modern marketing methods, policies on livestock farming system, general management practices, latest technology and its transfer, availing bank loan and finances, etc., and to upgrade their skills.

In the animal husbandry sector, various awareness programmes are organised for farmers. These programmes are shown in Fig. 2.1.

National programmes for animal husbandry and livestock

To promote animal husbandry based entrepreneurship and to enhance livestock productivity and production,

the Department of Animal Husbandry and Dairying, Ministry of Agriculture, Government of India is implementing the following major programmes at the national level.

1. National Programme for Bovine Breeding and Dairy Development
2. Intensive Dairy Development Programme
3. Strengthening Infrastructure for Quality and Clean Milk Production
4. Dairy Entrepreneurship Development Scheme
5. National Dairy Plan-I
6. Dairy Processing and Infrastructure Development Fund
7. Rastriya Gokul Mission
8. Gokul Gram
9. National Mission on Bovine Productivity
10. National Livestock Mission
11. Entrepreneurship Development and Employment Generation
12. Rural Backyard Poultry Development

A combination of the three broad tools of communication namely, written, spoken, and visual, is utilised for successful awareness programmes (Fig. 2.2).

Fig. 2.2: Major tools of communication

Types of awareness programmes

Awareness programmes can be broadly classified into three types according to their target groups, that is, an individual, a group or general masses. The methodology

adopted for different types of awareness programmes is shown in Fig. 2.3.

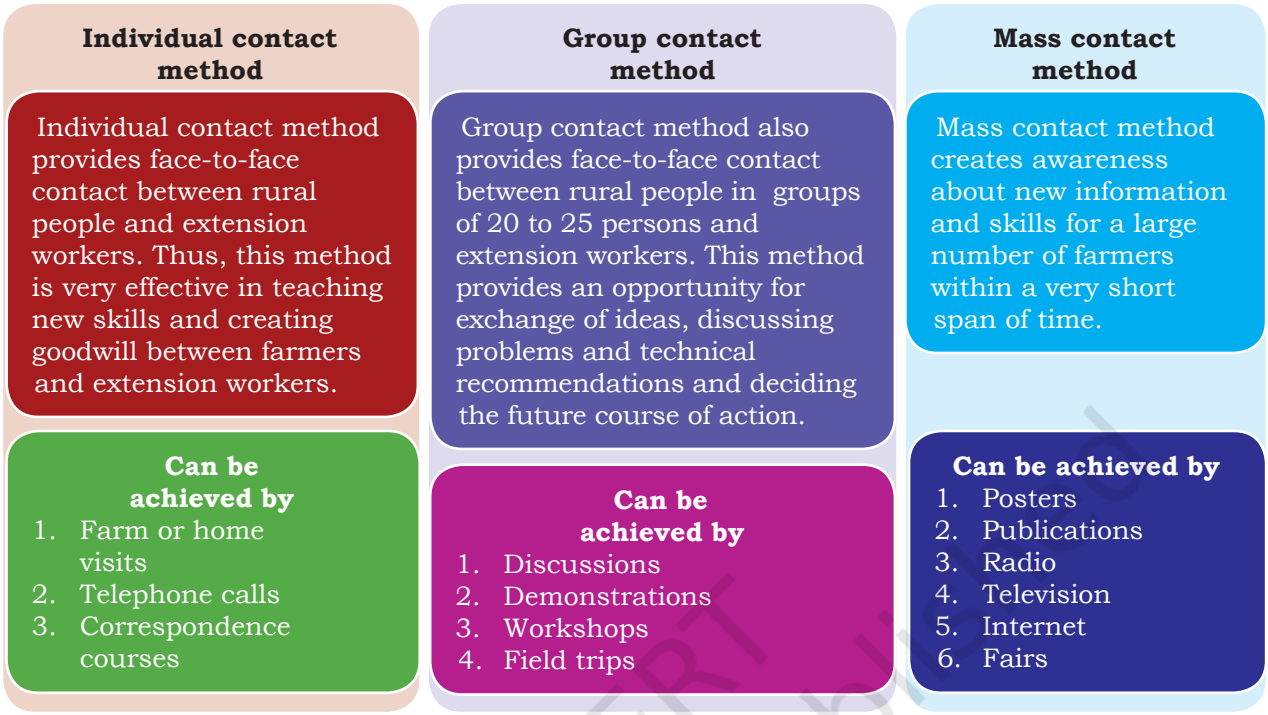


Fig. 2.3: Major types of awareness programmes for livestock farmers

Steps for organising awareness programmes

An awareness programme usually has the following steps in the sequential manner as shown in Fig. 2.4.

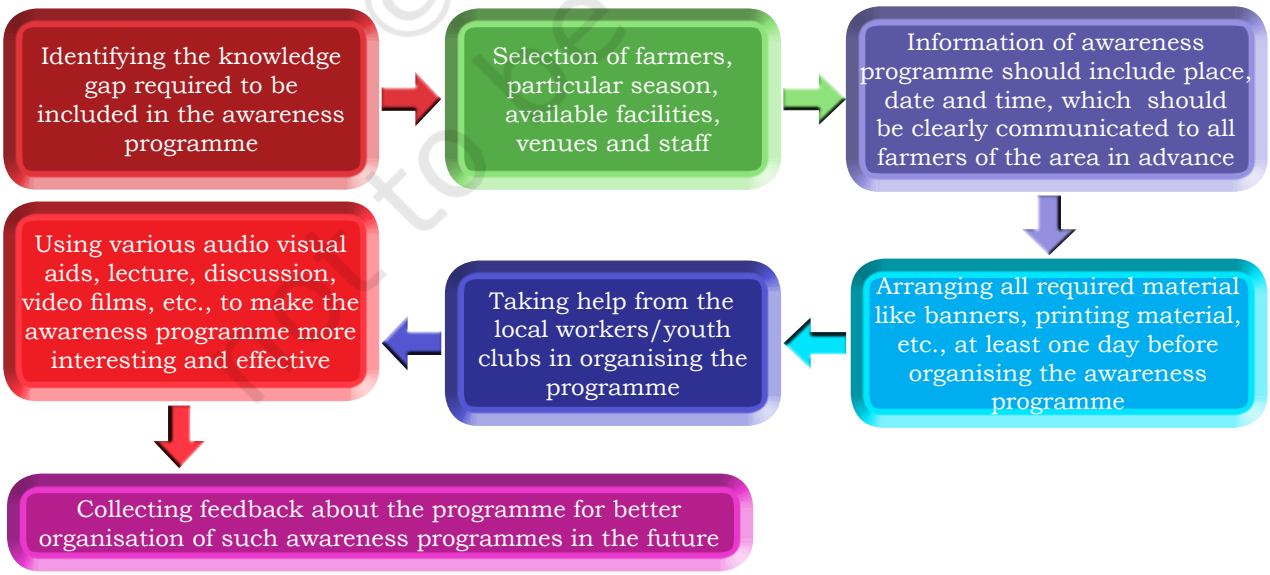


Fig. 2.4: Steps for organising an awareness programme

Practical Exercises

1. Note down the various awareness programmes organised in livestock sector.
2. How does the extension worker and farmer communicate through individual contact method?

Check Your Progress

A. Multiple Choice Questions

1. Extension awareness programmes aim to
   (a) increase the efficiency of the farm
   (b) increase production
   (c) improve the standard of living of the farmers
   (d) all of the above
2. To organise an awareness programme, which of the following is essential?
   (a) Selection of farmers (b) Available facilities
   (c) Venues (d) All of the above
3. Mass contact method includes
   (a) Radio (b) Discussion
   (c) Demonstration (d) Workshop
4. Individual contact method includes
   (a) Posters (b) Publications
   (c) Telephone call (d) Radio
5. Group contact method includes
   (a) Posters (b) Discussion
   (c) Telephone call (d) Radio

B. Fill in the Blanks

1. Awareness programmes mean extending the benefits of technology to the _____ population.
2. Main aim of awareness activities is to convey meaningful information to the_____.
3. _____ method creates awareness about new information for a large number of farmers within a very short span of time.
4. Group contact method also provides face-to-face contact between rural people in a group of _____ persons and extension workers.
5. _____ is an effort to extend research-based knowledge to the rural areas to improve the lives of farmers.

C. Mark True or False

1. Various audio-visual aids, video films, etc., are used to make the awareness programme more interesting and effective.
2. An awareness programme offers advice and information to help urban population solve their problems.
3. Arrangement should be made for all required material like banners, printing material, etc., at least one month before organising the awareness programme.
4. Farm visit is considered as written communication method.
5. Collection of feedback about the present awareness programme is needed for better organisation of awareness programme in future.

SESSION 2: GUIDING FARMERS ON BUSINESS OPTIONS AND BASIC ECONOMICS OF LIVESTOCK PRODUCTION

The principles of economics for market-oriented dairy farming are discussed in this session. Various costs of production are applicable to a dairy enterprise. The options for financing the enterprise are also discussed in this session.

Basic economics of livestock-based activities

The economics of any livestock enterprise is studied by computing and analysing cost of production and the returns obtained from it. To get the profit and loss figures, that is, net returns, we subtract total cost from the gross return, that is, difference between the gross returns and the total costs. Therefore,

Net returns= Gross returns - Total costs

Positive net returns indicate profit for the enterprise and negative net returns indicate loss.

The computation of the economics is done for a particular period of time, depending on the nature of the enterprise. Usually, it is calculated for one production cycle for a livestock enterprise. One production cycle consists of the lactation period of a cow or buffalo.

Types of costs in livestock-based enterprise

1. Fixed cost includes wages of permanent labour, interest on fixed capital assets, depreciation of the value of assets, etc.
2. Depreciation cost is the decline in the value of an asset due to wear and tear. Depreciation covers the cost of equipment and livestock before their usefulness is exhausted. It adds an annual charge to the fixed cost, which is enough to recover the original cost within that period. The junk value of the asset is calculated before calculating the depreciation cost. Junk value is the value of the asset obtained at the end of its economic life. So,

$$\text{Depreciation rate} = \frac{\text{Original asset value} - \text{Junk value}}{\text{Estimated life of that asset}} \times 100$$

3. Variable cost is the cost incurred on variable factors. These factors respond to changes in rate of output. They include wages of hired labour, expenditure on feed and fodder, fuel and electricity, transportation, veterinary care, etc.

Returns from livestock-based enterprise

Two types of returns are obtained from livestock activities that is, main product and by-product. Main products are milk, meat, eggs, etc., and by-products include manure, etc. The quantity of both these products is multiplied by their respective prices. The sum obtained forms the gross returns. These returns are required to compute the profitability of a livestock enterprise.

Table 2.1: Calculation of simple economics of a dairy enterprise

Parameters	S. No.	Particulars
Fixed capital	1	Cost of building
	2	Cost of animals
	3	Cost of equipment and appliances
	4	Total fixed capital (S. no. 1+2+3)

Fixed costs	5	Interest on fixed capital (S. no. 4 x rate of interest)
	6	Depreciation cost on building (S. no. 1 x depreciation rate)
	7	Depreciation cost on animals (S. no. 2 x depreciation rate)
	8	Depreciation cost on equipment (S. no. 3 x depreciation rate)
	9	Total fixed costs (S. no. 5+6+7+8)
Variable costs (recurring costs)	10	Cost of feed and fodder Cost of concentrate mixture Cost of green fodder Cost of dry fodder
	11	Cost of treatment and vaccination
	12	Cost of labour
	13	Miscellaneous expenditure
	14	Total variable cost (S. no. 10+11+12+13)
Gross costs	15	Sl. no. 9+14 (total fixed cost+ total variable cost)
Returns	16	Sale of milk
	17	Sale of cow dung
	18	Sale of gunny bags
	19	Gross return (S. no. 16+17+18)
Gross profit	20	S. no. 19—S. no. 15
Net return		S. no. 20—bank loan repayment, if any

Financial aspects and risk management

The following aspects of finance and risk management need to be considered for a livestock farm to flourish.

Business plan and finance

Livestock farming is a risky and challenging business. Livestock farmers have to deal with unpredictable situations, such as disease outbreaks, animal losses, and market fluctuations. Many livestock farming businesses fail because the owner does not plan properly.

Business plans help in thinking strategically, managing effectively, and staying on track towards the goals. To enable lenders and investors to invest in your enterprise, it is important to develop an organised, well thought-out plan for them to evaluate and approve.

Options for financing

Explore different options when deciding how to finance a livestock farm.

- If family and friends want to invest, be sure that the terms are clearly defined and all parties understand the conditions of the investment or financing agreement. Any potential problems can be addressed when communication and written documentation is clear.
- Many banks and lending institutions specialise in livestock loans. Their loan officials have the knowledge and experience to help you succeed. It is important to establish good relations with these people so you can discuss your needs and concerns openly. Being honest and open to options is a good way to address potential problems.

Financial statements

Two primary financial statements are the balance sheet and the income statement. A balance sheet reflects the financial position of livestock business at a specific point in time. An income statement, also known as a profit and loss statement, shows all income and expenses over a period of time and indicates whether a business is profitable or not.

The various items to be included in a balance sheet are shown in Table 2.2.

Table 2.2: Assets and liabilities

Assets (list here what you own)	Liabilities (list here the money you owe)
1. Cash 2. Certificates of deposit 3. Life insurance (cash value) 4. Securities (stocks, bonds) 5. Real estate (market value) 6. Vehicles (market value) 7. Individual retirement plan(s) 8. Other assets (specify), etc.	1. Current bills 2. Mortgages on real estate 3. Loans 4. Taxes 5. Other liabilities (specify), etc.
Total assets	Total liabilities
Net worth = Total assets – total liabilities	

Other considerations to be kept in mind at the time of financing

1. To minimise investment, start on a small scale.
2. Plan for the entire year before you start spending your income.
3. Prepare a budget and stick to it.
4. Keep current and accurate records. Pay attention to details of income and expenditure.
5. Avoid unnecessary borrowing. Making wise decisions and investments will pay off in the long term.
6. Set financial goals and review them often to be sure you are headed in the right direction.
7. Plan for reasonable living allowances for yourself and your family.
8. If you apply for a loan, be timely, plan ahead, and be prepared.
9. Establish a good credit history. Don't be late in repaying your loans.
10. Seek out a mentor in the livestock business and learn from him. This will result in a more positive experience than learning from your mistakes.

Managing risk

Livestock farming is an inherently risky and labour–intensive business. Markets can fluctuate and current prices may not always support the cost of production. Dealing with risks proactively is what risk management is all about. Anticipate what might happen, and act to reduce the chances of it happening.

Risk of livestock business can be minimised by the following tools.

(i) Insurance is a tool to protect personal and business assets. What type of liabilities do you face as a livestock farmer? Have you explored insurance options to cover accidents and injuries on the livestock farm?

(ii) Diversified production simply means not putting 'all your eggs in one basket'. A good strategy for diversification in livestock farms is to keep small animals like goat and sheep with cattle or buffaloes.

(iii) Marketing means to understand how and what drives the livestock business. What type of value-added products would benefit the livestock business? Which markets are most profitable? Which markets are most consistent?

Steps for starting livestock-based enterprise

Starting a sustainable and profitable livestock farming business involves proper planning, management, controlling, and organising all factors of production at the right time. Therefore a step-wise process is followed to start the enterprise.

(i) Selecting the right species of animals (cattle, buffalo, etc.) according to the area, weather, soil condition, and market facilities.

(ii) Selecting the right breed as per the demand of consumers.

(iii) Preparing a detailed project report with proper financial planning and cost and benefit analysis.

(iv) Properly enlisting the available and required resources including financial resources.

(v) Applying for government subsidy and grants.

(vi) Participating in relevant trainings, demonstration, skill upgradation programmes of the relevant fields for improving knowledge and expertise.

(vii) Using locally available, cost-effective and proper equipment with the latest technology.

(viii) Conducting market research that is, proper marketing planning for output products.

(ix) Proper maintenance of essential and required records.

(x) Forecasting the uncertainty and risk related with an enterprise and remedial action for the same with proper management ability.

Practical Exercises

1. Note down the capital investments required to start a dairy farm enterprise.
2. How do you handle risk, uncertainties and fluctuations in the market price of farm output?
3. What are the various types of cost included in the variable cost?

Check Your Progress

A. Multiple Choice Questions

1. Fixed cost includes the _____.
   (a) cost of animals (b) cost of medicine
   (c) cost of electricity (d) All of the above
2. Variable cost does not include _____.
   (a) cost of feed and fodder (b) cost of building
   (c) cost of equipment (d) Both (b) and (c)
3. Depreciation cost is calculated on _____.
   (a) cost of animals (b) cost of building
   (c) cost of equipment (d) All of the above
4. Return from the livestock farm can be obtained from _____.
   (a) sale of milk (b) sale of gunny bags
   (c) sale of manure (d) All of the above
5. Risk in the livestock farm can be minimised by _____.
   (a) insurance
   (b) proper marketing of animal products
   (c) diversified production
   (d) All of the above

B. Fill in the Blanks

1. The difference between gross returns and the total cost is known as _____.
2. Many livestock farming businesses fail because the owner(s) do not _____ properly.
3. A good strategy for _____ in livestock farms will be to keep small animals like goat and sheep with cattle or buffaloes.
4. _____ is the value of the asset obtained at the end of its economic life.
5. Positive net returns indicate _____ for the enterprise.

C. Mark True or False

1. To minimise investment, start on a small scale.
2. To make livestock enterprises profitable, it is required to maintain essential records properly.
3. The government does not provide subsidy in livestock enterprises.
4. A profit and loss statement is also called an income statement.
5. Liability is a tool to protect personal and business assets.

SESSION 3: MARKETING OF LIVESTOCK PRODUCTS

Business activities which direct the flow of goods and services from producers to consumers are called marketing. In case of livestock, it comprises two components, that is, live animal marketing and livestock product marketing.

Apart from these, waste material like gunny bags and waste products like manure and urine also form a part of the livestock production system. However, these are relatively unimportant.

Live animal marketing

In India, animals are primarily kept as a supplementary source of income. Approximately 75–80 per cent of the dairy animals are kept in an average animal holding size of 2–8 animals. Thus, livestock farming in India is mostly a small farmer phenomenon. So, the marketing of live animals is mainly informal and lacks regulation and government supervision. Organised markets are far and few in number. Livestock that are marketed includes draught animals, dairy cows and small ruminants. These livestock are bought and sold at fairs, daily and weekly markets. In fairs and mandis (open wholesale market), farmers themselves are the sellers. Hence, these are the primary markets. Livestock markets are mostly under the influence of private individuals and local bodies. Except for a few states, there are no market committees or regulated markets.

Methods of buying and selling of live animals

Buying and selling are essential requisites for the establishment of a new farm and running an established livestock farm. Various groups involved in the buying and selling of animals are discussed below.

Breeders are professionals, whose principle occupation is breeding and rearing cattle. People who breed animals as a side occupation are also included in this group. These animals are mainly sold in cattle fairs and negotiations are done through brokers.

Nomadic traders buy and sell animals in the course of their movement from one place to another. These itinerant traders play an important role in the distribution of cattle all over the country.

Cattle dealers are a type of traders who live in villages and towns and make their purchase in one area and sell them in another. Some of these traders act as agents of wholesale dealers working in cities and towns and make purchases on their behalf.

Wholesale merchants are small in numbers and mostly transport cattle between states and also export them to foreign countries. Export merchants handle all types and classes of animals according to foreign demand. They are well aware of international rules involved in animal export.

The unit of sale in livestock may be on the basis of per head, per pair or per group. The most common is sale per head. The sale is usually accomplished after careful general physical inspection of the animal and examination of performance, like milking, in the case of dairy animals.

Price determination

Price determination of live animals is done through one of the following methods.

- Private treaty is when all negotiations are done through brokers. The buyers and sellers do not come in contact.
- Negotiation under cover where the buyers touch the fingers of the brokers under a covered cloth to keep secrecy from other buyers when there is more than one.

- Auctions are when an animal is given to the highest bidder who has examined the animal earlier. This method is easy and helps in quick sale of animals when the number of buyers is more. After the settlement, advance amount is paid. The sale registration is done by a deed writer. In case of any dispute, there are arbitrators who take the decision.

Webportal or e-pashuhaat

At present, there are many shortcomings in animals' trade market, such as,

(i) there is no authentic organised market.

(ii) it is very difficult to get quality disease-free animal of high genetic merit.

(iii) there is misleading valuation due to lack of knowledge of the past history of the animals.

(iv) other malpractices include removal of horns and filling of teeth to give a misleading impression of the real age of the animals.

A web portal 'e-pashuhaat' has been developed by the Government of India under the National Mission on Bovine Productivity. E-pashuhaat is a unique web portal, which has been developed for connecting breeders and farmers regarding availability of high genetic merit animals. This portal will assist farmer/breeders to sell and purchase breeding stock. They can find and utilise information on all forms of germplasm including semen, embryos and live animals are the agencies and different stakeholders in India. Through e-pashuhaat, farmers will be informed about the availability of quality disease-free bovine germplasm with different agencies in the country. The main aims and objectives of this portal are:

(i) promotion of e-trading

(ii) to act as a market portal for livestock germplasm and additional related services

(iii) to connect farmers with breeders, central, state cooperative, milk federations, and private agencies

(iv) to provide real time authentic certified information on availability of germplasm

Livestock products marketing

In India, almost all livestock products are marketed through the unorganised sector. Only in the case of milk and eggs, there are partially organised markets. Unlike crops or horticultural produce, most of the livestock products are highly perishable and have very low shelf life. This forms a primary challenge in marketing of livestock products. From the marketing perspective, livestock products can be classified as high value food produce (milk, meat and eggs, etc.) and commercial produce (wool, hair, skin and hide, etc.).

Marketing of high value food produce

Milk and milk products marketing

The milk market is largely informal. Only 15 per cent of the milk is marketed through formal channels. Nearly 45 per cent of the milk produced in the country is retained by rural producers and the rest is marketed as fresh milk.

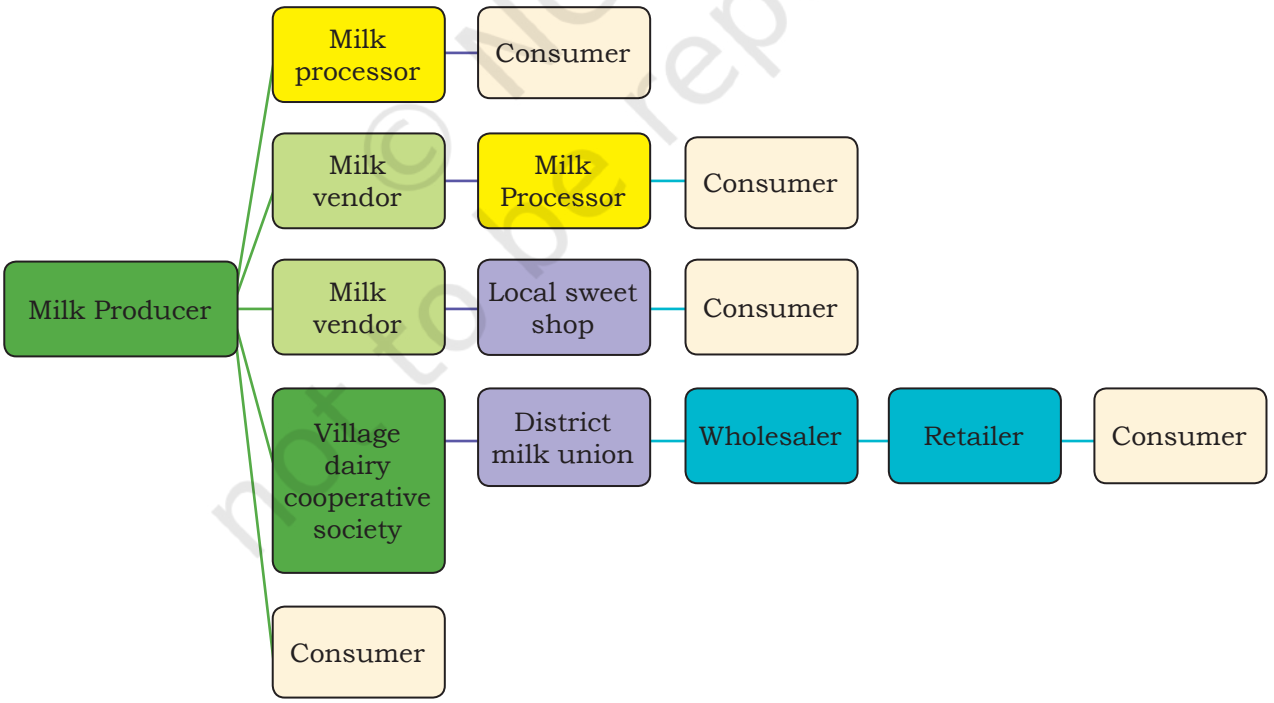


Fig. 2.5: Channels of milk marketing in India

Cooperatives and private players play an important role in the formal sector. Milk processing is mainly carried out through this sector (that is, production of ghee, butter, ice-cream, etc). Fluid milk is sold in packs of 0.5 litres and 1 litre. The leading cooperatives in India are Amul, Mother Dairy, etc.

Some private players also have an important role in the dairy market. The dairy cooperatives play an important role in linking farmers to markets. Their role in poverty alleviation is praiseworthy. Despite their importance and role in milk marketing, their contribution in the quantity of milk handled, installed processing facilities and marketing infrastructure are highly skewed. Only in states like Gujarat, Maharashtra, Tamil Nadu and Karnataka, cooperatives handle more than 2/3rd of the total milk procurement. In the remaining states, the accessibility of milk cooperatives by producers is not up to the desired level. The common channels of milk marketing in India are shown in Fig. 2.5.

Processing of milk in the informal sector is restricted to tea shops, restaurants, and sweetshops. A few households and self-help groups (SHGs) also process milk and market the products. From a farmer's perspective informal markets are unstable and often exploitative, particularly during surplus seasons. Here, prices are determined arbitrarily and under-pricing is common in peak production season of milk.

Meat marketing

Marketing of meat is totally operated by the unorganised private sector. The role of the government or any regulatory agency in the marketing of meat is negligible. Marketing of meat, starting from procurement of animals in the villages, to the sale of meat to consumers at retail shops, is entirely in the hands of middlemen. Mainly goat, pig, sheep and poultry are reared for meat production in India. There are official slaughterhouses owned by local bodies but they lack modern facilities and even hygienic conditions. Usually, proper scientific slaughter procedures and meat inspection facilities are not followed.

The local village traders and wholesale butchers operate in almost all urban consumption centres. They buy animals from rural producers in bulk and redistribute them to urban consumption centres. Slaughtering and disposal of smaller quantity of meat is done at the retailers premises itself.

Broiler marketing

In Indian broiler industry, there are several large-scale private players. They enter into contract farming with the producers. With their entry, the poultry production and marketing activities have become integrated, leading to processing and developing value-added poultry products. Their entry has also improved the cold storage and transportation facilities in these sectors. However, since such players are restricted to a specific region only, there is a need to scale up both backward and forward integration. There is a need for fixing prices based on the actual cost of production rather than only on demand and supply. In villages, poultry traders and commission agents still play an important role and fix prices on a day-to-day basis. These prices are mainly non-remunerative for the producers. Further, very little value addition happens at the village level.

Egg marketing

The National Egg Coordination Committee (NECC) declares the prices of eggs after monitoring the supply and demand situation. It is not a government organisation and is a producers' association. Egg prices are generally fixed twice a week by the various regional centres. Here the primary problem is that the prices are not determined on the basis of cost of production but on demand-supply scenario, which can cause losses to layer poultry farmers. The layer poultry farmers mainly raise the egg laying poultry birds which will be subsequently used for commercial egg production. Further, NECC is not always able to administer declared prices due to scarcity of funds. Therefore, there is an immense need for backward and forward integration to avoid middlemen and intermediaries. This would help in quality control and standardisation in this sector and also help in delivery of fresh eggs to consumers.

Commercial livestock products marketing

These products are generally considered as by-products of livestock production. They also constitute income for livestock owners.

Marketing of wool

In India, wool procurement is generally made through private traders and government agencies. Also the wool produced, being coarse, is used in the carpet and khadi industry. In India, as currently sheep is primarily reared for meat, the wool market has not developed over time. Only 10 per cent of the wool is graded and the remaining 90 per cent is sold as ungraded.

Marketing of hides and skins

The sale of hides and skins in villages occurs through various levels of middlemen. They operate at the village and block levels to the terminal markets, from where they reach the tanneries. In the urban areas, slaughterhouses act as a source of hides and skins.

Constraints in livestock marketing

The following are some of the constraints faced in marketing in the livestock sector.

1. Most of the livestock products are of highly perishable nature.
2. Poor market information systems.
3. Livestock farms are scattered, unorganised and unregulated. Most often, pricing of livestock products is at the mercy of middlemen and intermediaries.
4. Livestock products are mainly produced in rural areas have a major market in the urban areas.
5. There is seasonality in demand of livestock products, for example, demand of eggs is higher in the winter season.
6. The absence of grading and standardisation in livestock products.
7. The lack of awareness about hygienic production of animal products and the processing environment.

National Agriculture Market (e-NAM)

The Ministry of Agriculture and Farmers' Welfare, Government of India, has created this online electronic trading portal, which networks the existing APMC (Agricultural Produce Market Committee) mandis to create a unified national market for agricultural commodities all over the country. This portal gives an opportunity to 'plug-in' to various markets (whether regulated or private), existing in a state. The NAM software is available to those mandis that agree to join the national network. It is free of cost with necessary customisation to conform to the regulations of each State Mandi Act. A mandi refers to a wholesale marketplace of agricultural and animal products. Currently only agricultural produce like pulses, cereals, vegetables, and fruits are being traded on the NAM platform. In future, animal products such as milk and processed products, eggs and meat are likely to be included for trading on the NAM platform.

It provides all the information related to all APMC-related information and services on a single portal. This information includes commodity arrivals and their prices, offers on buying and selling produce, provision to respond to trade offers, etc. Although the agricultural produce moves through mandis, this online market reduces transaction costs and information asymmetry.

Practical Exercises

1. Note down the milk marketing channels existing in your area.
2. Visit a livestock market. Note down how the animals are sold in the market.

Check Your Progress

A. Multiple Choice Questions

1. NECC stands for
   (a) National Energy Circulation Committee
   (b) National Egg Coordination Committee

(c) National Egg Cooperative Committee
(d) None of the above

2. Which of the products is not considered as a processed milk product?
   (a) Whole milk (b) Cream
   (c) Ghee (d) Butter
3. Which of the following is a cooperative?
   (a) Amul (b) Sanchi
   (c) Mother Dairy (d) All of the above
4. Determination of the price of live animals can be done through
   (a)private treaty (b) negotiation under cover
   (c)auctions (d) all of the above
5. The main objective of e-pashuhaat portal is
   (a) promotion of e-trading
   (b) to act as market portal for livestock germplasm and additional related services
   (c) to connect farmers with breeders
   (d) all of the above

B. Fill in the Blanks

1. _____ is the performance of business activities that directs the flow of goods and services from producers to consumers.
2. In India, most of the livestock products marketing are made by _____ sector.
3. Wool produced in India is mainly of _____ type used in carpet and Khadi industries.
4. SHGs stands for _____.
5. Livestock markets are mostly under the influence of _____ sector.

C. Mark True or False

1. Cooperatives and private players play an important role in the informal sector.
2. Most of the livestock products are not of perishable nature.
3. There is an absence of grading and standardisation in livestock sector.
4. Consumption of livestock products is mainly an urban phenomenon in India.
5. In India, livestock are reared by small farmers.

Unit 3

Animal Welfare, Breed Conservation and Disaster Management

Introduction

In this unit, the animal health worker will learn about various forms of cruelty to animals and poultry birds. This will help them to identify and report the same to the appropriate authority. This unit also discusses the importance of rearing pure-bred indigenous animals and government projects related to their promotion. Animals are worst sufferers during a disaster. Therefore, the topic of preparedness for saving animals during a disaster is also discussed.

Session 1: Prevention of Cruelty to Animals

Cruelty to animals means willfully causing them unnecessary pain or suffering.

The following are the major forms of cruelty to animals (Fig. 3.1)—

1. Beating, kicking, over-driving, over-loading, torturing the animal, etc.
2. Employing any animal for a work that the animal is unfit to perform.

3. Unreasonable administration of any injurious substance to artificially boost the performance of an animal.
4. Transporting animals in a manner that causes them pain or suffering.
5. Keeping animals in close confinement and overcrowded conditions.
6. Starving or keeping the animal thirsty.
7. Using animals for public entertainment.

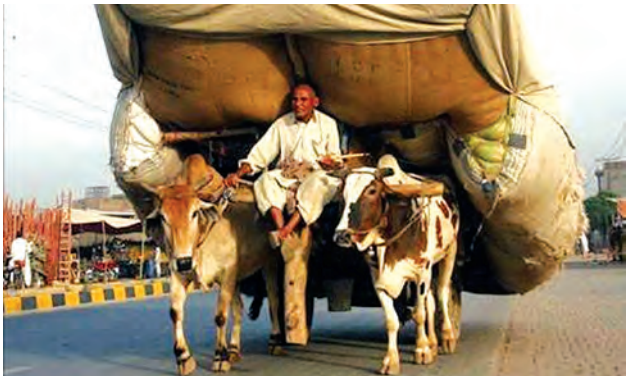
Transportation of cattle in an overcrowded vehicle

Loading of animals in an inhuman manner

Carrying cattle in an inhuman manner

Beating of animals

Carrying poultry in unethical, stressful and painful conditions



An overloaded bullock cart

Fig. 3.1: Various forms of cruelty to animals

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

The 1960 Act is comprehensive. Various rules under the Prevention of Cruelty to Animals Act, 1960 have been framed from time-to-time on various aspects, such as—

(a) Birth control in dogs (Fig. 3.2)
(b) Control and supervision of experiments on animals
(c) Prevention of cruelty to animals in slaughterhouses
(d) Welfare of draught and pack animals
(e) Prevention of cruelty during transportation of animals

Fig. 3.2: Notched ear indicating that the dog has been emasculated under the birth control programme

Practical Exercise

1. Note down instances of cruelty being inflicted on animals in your area.
2. Note down instances of cruelty in a nearby slaughterhouse.

Check Your Progress

A. Multiple Choice Questions

1. Which of the following conditions is considered cruelty to animals?
   (a) Beating the animals
   (b) Using animals for public entertainment
   (c) Overloading of the animals
   (d) All of the above
2. Prevention of Cruelty to Animals Act was enacted in the year _____.
   (a) 1960 (b) 1966
   (c) 1972 (d) 1985
3. Prevention of Cruelty to Animals Act includes _____.
   (a) birth control in dogs
   (b) control and supervision of experiments on animals
   (c) prevention of cruelty during transportation of animals
   (d) All of the above

4. Prevention of cruelty to animals in a slaughterhouse comes under the
   (a) Prevention of Cruelty to Animals Act
   (b) Population Control Act
   (c) Human Rights Act
   (d) All of the above
5. Animal Welfare Board of India was formed primarily for the
   (a) treatment of animals (b) animal welfare
   (c) formulation of the act (d) all of the above

B. Fill in the Blanks

1. Willfully causing unnecessary pain or suffering to the animal is called _____.
2. Unreasonable administration of any injurious substance to artificially boost the _____ of an animal is called cruelty.
3. Birth control in dogs comes under the _____ Act.
4. Notched ear indicates that the dog is emasculated under _____.
5. The headquarters of the Animal Welfare Board of India is in _____.

C. Mark True or False

1. Starving or keeping the animal thirsty does not come under cruelty.
2. Before the enactment of Prevention of Cruelty to Animals Act, 1960, the Animal Welfare Board of India was formed.
3. Supervision of experimental animals comes under the Prevention of Cruelty to Animals Act, 1960.
4. Using animals for public entertainment is not considered as cruelty to animals.
5. An unfit animal can be employed for work.

SESSION 2: FARMING INDIGENOUS BREEDS OF LIVESTOCK

Livestock in a particular area have evolved over hundreds of years through selection and have carried with them various traits of economic and environmental importance of that area. These animals have adapted to the peculiar

climatic conditions and natural habitat of that region and are, therefore, termed as indigenous (native) animals.

Currently, there is a huge demand for animal products. To meet the needs of the growing human population, exotic breeds of cattle such as Jersey and Holstein Freisian have been extensively used in cross-breeding programmes to increase milk productivity in a very short span of time. In cross breeding of cattle, we produce an animal by mating two different breeds of cattle. As an example, if we use indigenous cattle breed cows and exotic bull such as Jersey, we carry out a cross breeding of cattle. Exotic breeds are high-producing but they are basically adapted to completely different climatic conditions.

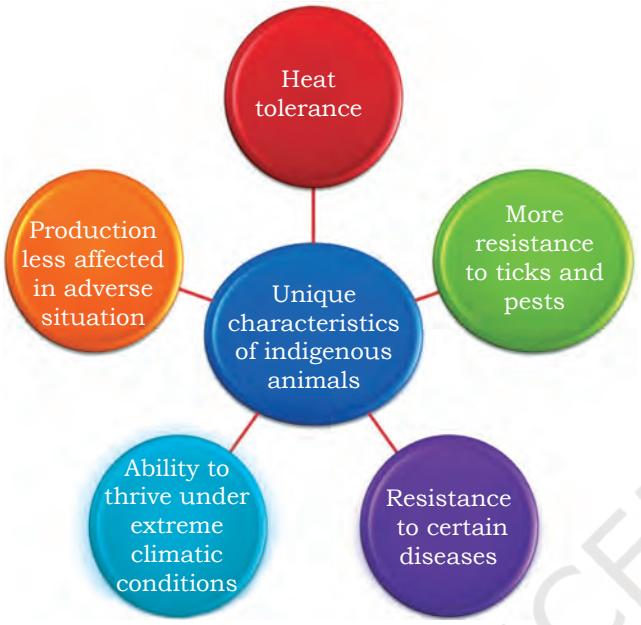


Fig. 3.3: Important traits of indigenous animals

Climate change and temperature rise are of great concern in the animal husbandry sector. Thus, cross-bred animals may become vulnerable to environmental changes, adverse nutritional conditions, diseases and parasites. On the other hand, indigenous livestock species have unique characteristics that enable them to survive and perform in unfavourable conditions as compared to the exotic breeds. Fig. 3.3 describes some important traits of indigenous animals while Fig. 3.4 describes some important indigenous breeds of livestock and poultry.

In India, the population size of some indigenous breeds is declining rapidly due to preference towards cross-bred animals and mixing of indigenous breeds.

The farmers also believe that indigenous animals with a slow growth rate, are low milk producers, etc., and are therefore not economically viable. The Government of India, state governments, and other organisations are taking initiatives to strengthen and promote the rearing of indigenous breeds.

Sahiwal cow (Punjab)

Gir cow (Gujarat)

Murrah buffalo (Haryana)

Sirohi goat (Rajasthan)

Kadaknath poultry bird (Madhya Pradesh)

Ghungroo pig (West Bengal)

Fig. 3.4: Some important indigenous breeds of livestock and poultry

Some of the important central government projects in this area are listed below:

- Central Herd Registration Scheme (CHRS)
- Rashtriya Gokul Mission (RGM)
- National Project for Cattle and Buffalo Breeding (NPCBB)
- National Kamdhenu Breeding Centre (NKBC)
- National Programme for Bovine Breeding and Dairy Development (NPBBDD)

Practical Exercise

1. Note down indigenous cattle breeds found in India along with their place of origin.

Check Your Progress

A. Multiple Choice Questions

1. The great concern in the animal husbandry sector is
   (a) climate change and temperature.
   (b) adverse nutritional conditions.
   (c) disease and parasites.
   (d) All of the above.
2. RGM stands for
   (a) Rashtriya Gokul Mission.
   (b) Regional Gokul Mission.
   (c) Religious Gokul Mission.
   (d) All of the above.
3. Characteristics of indigenous animals are
   (a) ability to thrive under extreme climatic conditions.
   (b) can produce even with irregular feed and water supply.
   (c) heat tolerance.
   (d) All of the above.
4. CHRS stands for
   (a) Central Herd Registration Scheme.
   (b) Cattle Herd Resistant Stock.
   (c) Cattle HerdResearch Scheme.
   (d) All of the above.
5. NKBC stands for
   (a) National Kamdhenu Breeding Centre.
   (b) National Kangayam Breed Centre.
   (c) National Kaveri Breed Conservation.
   (d) All of the above.

B. Fill in the Blanks

1. Cross-bred is developed from the cross between indigenous breed and _____ breed.
2. Gir cattle breed is found in _____ state.
3. Ghungroo pig breed is found in _____ state.
4. Sirohi goat breed is found in _____ state.
5. Kadaknath poultry breed is found in _____ state.

C. Mark True or False

1. Indigenous animals are tick and pest resistant.
2. In India, the population size of most of the indigenous breeds is declining rapidly.
3. Indigenous breed animals are low milk producers in comparison to exotic breeds.
4. Presently, the Government of India is emphasising on strengthening and promoting exotic breeds.
5. Indian cattle have not been used in cross-breeding programmes to increase milk production.

Session 3: Disaster Preparedness for Safety of Animals

A disaster can be either natural or man-made. Fig. 3.5 describes various types of disasters.

Disasters affect the environment and lead to financial, environmental, animal and human losses. Since emergencies appear suddenly some management strategies should be formulated to mitigate, prepare, respond and recover from the after effects. Animals are the worst affected by a disaster due to the following reasons—

- Spoilage of feed and the water supply.
- Transmission of diseases from animals to humans and vice versa (zoonoses).
- Bites of Snakes, insects, etc.
- Significant impact on public mental health due to the emotional attachment of the owners with the animals.

Natural disasters

- Flood
- Tornado
- Volcano eruption
- Earthquake or landslide

Man-made disasters

- Riots
- Accidents (train, air, ship)
- Industrial accidents
- Fires (forest fires)
- Bomb explosions
- Nuclear attack

Fig. 3.5: Types of disasters

- Reduced animal productivity due to the scarcity of feed and water.
- High mortality of livestock.
- Damage to both domestic and wild animal species due to lack of feed and water and the diseases that spread during and after a disaster.

Preparedness is a kind of arrangement that ensures all the resources and services needed to cope with the effects of a disaster can be rapidly mobilised and deployed at the time of the disaster.

Preparedness means a clear and complete plan of action for an emergency which indicates what to do before it happens. Depending upon the severity and vulnerability of the disaster, suitable preparatory measures can be taken. In some cases, such as a flood or hurricane, an early warning gives several hours to act for its preparedness. However, usually no prior warning of an emergency, such as earthquakes, tornadoes, explosions or major fires is possible. Any emergency requires a detailed and comprehensive plan for preparedness.

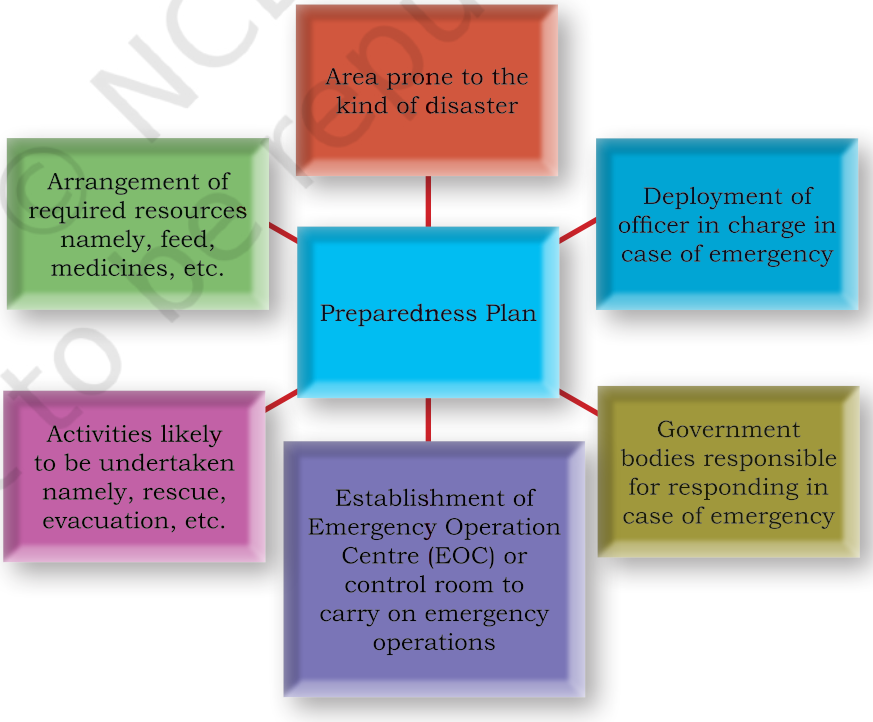


Fig. 3.6: Preparedness plan for an emergency

Preparedness plan provides a systematic way of responding to an emergency situation. The following aspects (Fig. 3.6) should get due consideration in the preparedness plan for an emergency.

Besides considering the above aspects, the following important points should be kept in mind during disaster preparedness.

Keep an emergency kit ready

The emergency kit should have

1. Handling equipment (for example, halters, nose leads, etc.)
2. Rope – 50 feet or more
3. Water, feed and buckets
4. Tools and supplies needed for sanitation
5. Flashlights
6. Basic first-aid kit
7. Animal identification kit
8. Safety and emergency items for the handlers
9. Emergency telephone number list, including workers, employees, veterinarian, local animal shelter, agency for extension service, etc.

Storage of feed and fodder for livestock

A sizeable quantity of feed and fodder is stored well in advance in suitable places. A fodder bank can be established in disaster-prone areas to supply fodder during scarcity. The fodder bank is a store of conserved fodder (hay or silage), which is purposefully stored for use in unpredictable events.

Arrangement of an emergency animal shelter

An emergency animal shelter should be arranged in advance especially in disaster-prone areas.

Practical Exercise

1. Visit any district head office of the Animal Husbandry Department and note down the detailed disaster preparedness programme.

Check Your Progress

A. Multiple Choice Questions

1. Disaster affects the environment and leads to
   (a) financial loss (b) environmental loss
   (c) animal and human loss (d) all of the above
2. An example of a natural disaster
   (a) flood and tornado (b) volcano eruption
   (c) earthquake and landslide (d) all of the above
3. An example of a man-made disaster is
   (a) riots and accidents (train, air, ship)
   (b) industrial accidents and fires
   (c) bomb explosions and nuclear attack
   (d) all of these
4. Preparedness plan for an emergency includes
   (a) arrangement of required resources namely, feed, medicines, etc.
   (b) activities likely to be undertaken namely, rescue, evacuation, etc.
   (c) government bodies responsible for responding in case of an emergency
   (d) all of the above
5. EOC stands for
   (a) Emergency Operation Centre
   (b) Environment Operation Centre
   (c) Ecological Operation Centre
   (d) All of the above

B. Fill in the Blanks

1. In a fodder bank _____ is stored.
2. The disaster affects the _____.
3. A disaster can be either _____.
4. _____ means a clear and complete plan of action for an emergency, which indicates what to do before the event.
5. In some cases, such as a _____ an early warning gives several hours to act for its preparedness.

C. Mark True or False

1. Disaster does not affect the environment.
2. Preparedness means a complete plan of action for an emergency well in advance.
3. First aid kit is a part of an emergency kit.
4. Forest fire is considered as a natural disaster.
5. Arrangement of an emergency animal shelter is a part of disaster preparedness plan.

Unit 4

Implementation of Animal Breeding Services in Dairy Animals

Introduction

In this unit we will learn about selection of animals for breeding, various breeding methods and artificial insemination. Students will also learn the methods of detection of oestrus and the best time for artificial insemination. Reproductive health is vital for animal productivity. Therefore, basic aspects of reproductive health and diseases affecting the same have also been discussed in this unit.

Session 1: Selection of Animals

Selection of good animals for milk production is very important for starting a dairy farm. The selection of dairy animals can be done in the following ways—

(i) based on available farm records

(ii) based on body conformation of animals

In the absence of authentic records it is very difficult to ascertain the actual production potential of an animal. The following points need to be considered while selecting the best animals for milk production.

Selection of animals for milk production

(i) Parity: Ideally, farmers select animals in their first or second parity. If selected in the first or second parity, a cow will have milk for 4–5 lactations after purchase. Generally, maximum milk yield is obtained in the third to fifth lactation in cattle.

Parity is defined as the number of times a female has had an offspring. If a cow has calved twice, then the parity will be two.

(ii) Age of the animal: Ideally, cows of 3–4 years of age are selected for purchase. At this stage, the animal should be in its first or second parity. If the heifers are purchased at the time of puberty, it should be ensured that they have attained two-third of their adult body weight.

(iii) Body conformation: Animals that are healthy and have a shining coat should be selected by the farmers. While selecting dairy cows, it should be kept in mind that the animal is not carrying too much fat on its body. The selected animals should conform to its ideal breed characteristics.

(iv) Head: Efforts should be made to select the animals with sufficiently broad jaws, which help in chewing and rumination. The muzzle of the cow should always be moist, which indicates good health. Eyes should be shining.

(v) Neck: The animal should have a long and slender neck. There should not be too much fat on it.

(vi) Thorax: The thorax of the animal should be of a large capacity. A large thorax region provides more space for vital organs like the heart and lungs, which are essential for respiration and blood circulation. In dairy cows, three ribs of the animal should be visible from the outside. This indicates lack of excessive fat (Fig. 4.1).

Fig. 4.1: Thorax is the middle part of the body between the neck and the abdomen. The three ribs are also visible.

(vii) Back: The cow's back should be straight. The abdomen should be capacious (Fig. 4.2). The base of the tail should be slightly raised.

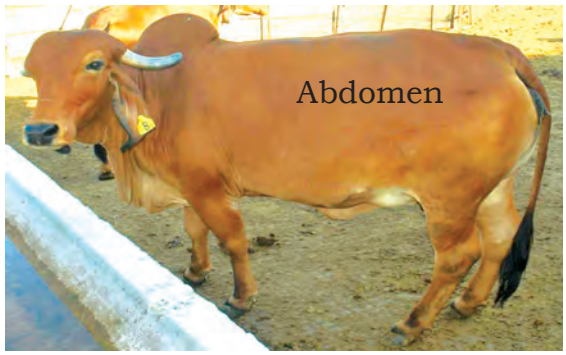


Fig. 4.2: Photograph showing abdomen of the cow

(viii) Legs: The forelegs should be straight. There should be sufficient space between the two forelegs and two hind legs. Sufficient space between the two hind legs allows for proper development of the udder. The hooves of the animal should be flat and broad so that the animal is able to stand properly on its legs. Dark black hooves are ideal as they are comparatively harder than the light coloured ones.

(ix) Udder: The udder of the dairy cattle should be large and capacious. It should be tightly attached to the abdomen. All the teats of the udder should be symmetrical and of equal size. The consistency of the udder should be soft. The skin of the udder should also be soft and pliable. The udder should appear shrunken after complete milking.

(x) Rear part: The examination of the rear part of the animal should be done from behind. The two pin bones should be distinctly visible. The rear part of the animal should preferably look angular.

(xi) Other points to be considered: Pregnancy status of the animal should be enquired while purchasing it. If the cow is not pregnant, the date of last calving should be enquired. The milk yield of the animal should be ascertained by milking at least three successive times. While milking, the following points should be considered:

(a) ease of milking,
(b) health and disease condition of the udder,
(c) blockage of teats and
(d) whether the cow is adjusted to a particular milker.

These points should be considered while selecting animals for purchase. A thorough knowledge of breed characteristics and body configuration of the animals is essential for their selection. If required, the help of a veterinarian should be taken for this purpose.

Practical Exercise

1. Visit a dairy farm. Examine and recommend animals for selection of purchase.
2. Interact with dairy farmers for desirable traits that they would look for in the animals to be purchased.

Check Your Progress

A. Multiple Choice Questions

1. Maximum milk yield is obtained in animals during their _____.
   (a) first lactation (b) fifth lactation
   (c) third lactation (d) seventh lactation
2. The muzzle of a healthy animal should be _____.
   (a) dry (b) moist
   (c) dull coloured (d) None of the above
3. The skin of the udder of ideal animals should be _____ after complete milking.
   (a) shrunken (b) tense
   (c) distended (d) None of the above
4. The eyes of a healthy animal should be _____.
   (a) dry (b) swollen
   (c) bulged (d) shining
5. The animals should be selected for purchase on the basis of _____.
   (a) body conformation (b) farm records
   (c) both (a) and (b) (d) None of the above

B. Fill in the Blanks

1. Ideally, animals in their _____ parity should be selected.
2. Good heifers should have attained _____ of their adult body weight at puberty.
3. In dairy cows _____ ribs should be visible, which indicates lack of excessive fat.
4. Cows should have _____ coloured hooves.

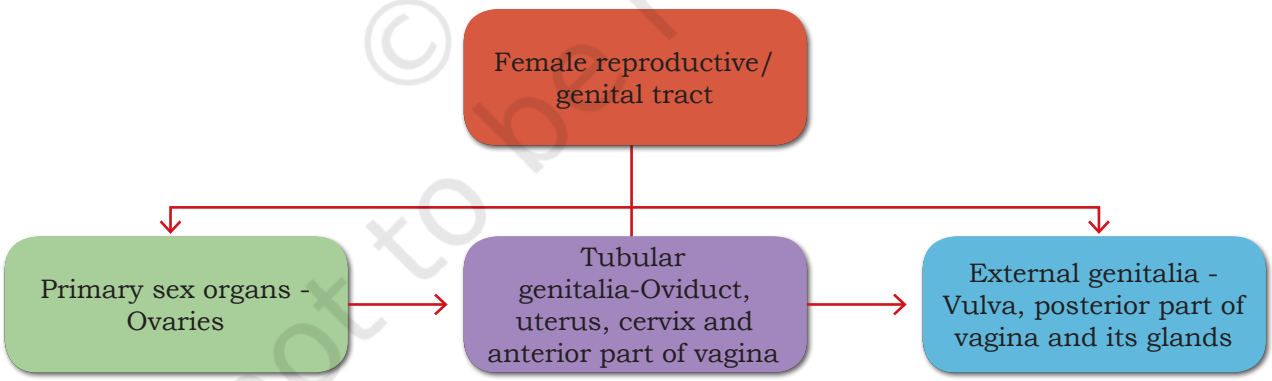
5. On examination from the rear, the points of _____ bone should be distinct in dairy animals.

C. Mark True or False

1. An ideal dairy animal should have abundant fat on the neck and other body parts.
2. The parity of animal should not be considered while selecting dairy animals.
3. There should be minimum space between the two forelegs in dairy animals.
4. Ideally, the abdomen and thorax region of the dairy animals should be capacious.
5. Dark coloured hooves in dairy cows are more hard and firm as compared to light coloured hooves.

Session 2: Basic Reproductive Anatomy

The objective of this session is to understand the dairy animals' physiology and reproductive anatomy system. This knowledge is a requirement for good dairy management, because all products from dairy farms such as calves, heifers and milk depend on the reproductive efficiency of the dairy animals. Maximum reproductive efficiency is a precondition for economical milk production.



The Reproductive Anatomy of Cattle and Buffalo

The animal health workers should be well-versed with the anatomy and physiology of female reproductive

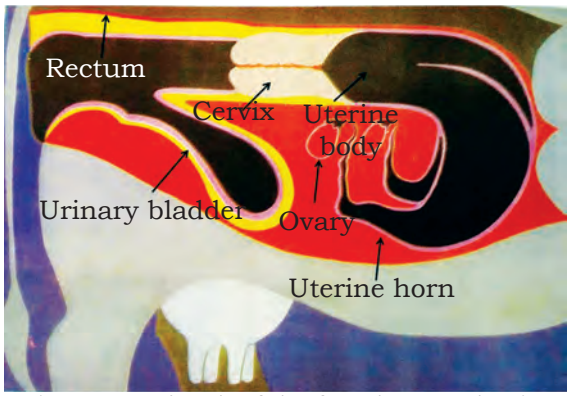


Fig. 4.3: A sketch of the female reproductive tract in cattle

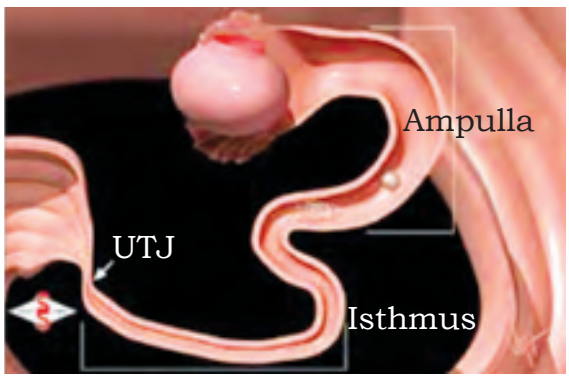


Fig. 4.4: The ovary with oviduct and its attachment with uterus at utero-tubal junction

organs. The reproductive tract of farm animals can be discussed under the following heads (Fig. 4.3).

Primary sex organs (ovaries)

Ovaries are the primary sex organs in a female. They are paired organs and contain follicles, produce ova and secrete hormones like estrogen, progesterone, etc. The ovum is fertilised by spermatozoa forming embryo, which subsequently develops into an offspring.

Tubular Genitalia

Oviduct/Fallopian tube consists of three parts namely, infundibulum (funnel shaped), ampulla and isthmus (Fig. 4.4). The oviduct performs the unique function of simultaneously conveying eggs and spermatozoa in opposite directions. The junction of ampulla and isthmus of the oviduct also acts as a site of fertilisation in farm animals.

Uterus

It is a hollow muscular organ consisting of body and two horns (Fig. 4.5). The uterus can enlarge and extend

Fig. 4.5: The uterus of a cow

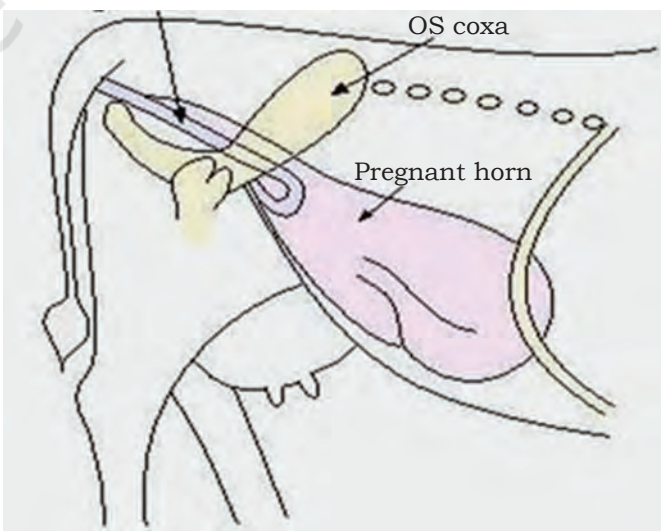


Fig. 4.6: A sketch showing the comparative growth of a uterus in non-pregnant and pregnant animals

itself to accommodate the foetus during pregnancy and again reduce following parturition to its original size and form (Fig. 4.6).

Cervix

It is a cylindrical part of the female reproductive tract (Fig. 4.7 and 4.8). The cervix performs the following functions.

(i) Acts as a barrier to prevent the entry of infection in uterus.

(ii) Acts as a reservoir for sperms.

(iii) Forms a pregnancy seal by secreting thick mucus during pregnancy i.e., 'cervical plug'.

(vi) Is responsible for expulsion of foetus during parturition.

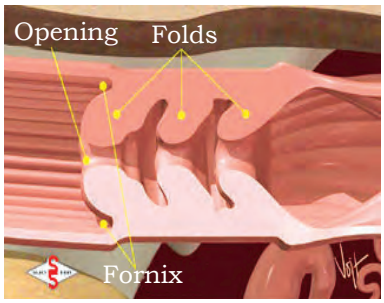


Fig. 4.7: Diagram showing cervical folds


Fig. 4.8: Photograph showing external os of cervix marked with a green straw

Vagina

It is a hollow tubular structure. It is the organ of copulation in female animals.

External genitalia

Vulva is the external part of the female genital tract. It has closed vulvar lips. The vulva lies just below the anus. When the vulvar lips are separated, a round rudimentary structure, known as clitoris lies on the floor. Clitoris is homologous to the penis in male animals. The vulva of a cow has tuft of hair on its lower aspect (Fig. 4.9 and 4.10).

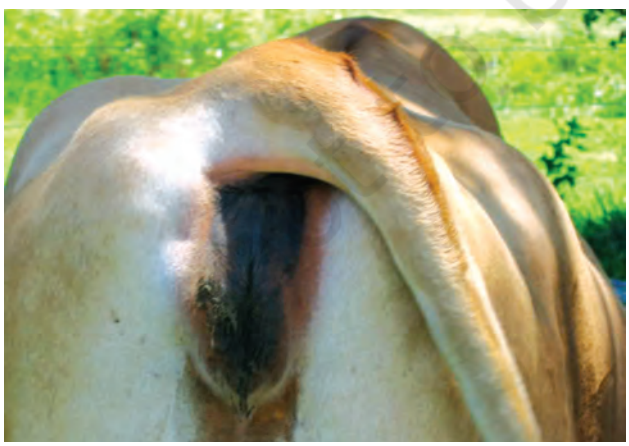


Fig. 4.9: Tufts of hair on the vulva of cow


Fig. 4.10: Tufts of hair absent on buffalo's vulva

Practical Exercise

1. Identify different parts of the female reproductive system.

Check Your Progress

A. Multiple Choice Questions

1. A pair of primary sex organs in a female is called
   (a) testis (b) ovaries
   (c) seminal vesicles (d) penis
2. The site of production of ova is
   (a) vulva (b) vagina
   (c) ovaries (d) uterus
3. Which of the following is a barrier to prevent the entry of infection in uterus?
   (a) cervix (b) ovary
   (c) vagina (d) none
4. Pregnancy occurs in the
   (a) vulva (b) vagina
   (c) ovary (d) uterus
5. The site of fertilisation in cattle is called the
   (a) uterus (b) ovary
   (c) infundibulum (d) ampullary-isthamus junction

B. Fill in the Blanks

1. The primary sex organs in cattle are _____.
2. The external part of a female genital tract is _____.
3. The uterus of a cow has a body and _____ uterine horns.
4. _____ is the organ of copulation in female animals.
5. The structure responsible for secretion of hormone estrogen is _____.

C. Mark True or False

1. The vulva is a part of the tubular genitalia of the female genital tract.
2. Infundibulum is a part of the cervix.
3. Oviduct is also known as the organ of copulation in female animals.
4. The cervix acts as a sperm reservoir.
5. The clitoris is a structure homologus to a male penis.

Session 3: Basic Physiology of Reproduction

Reproduction is the process of producing an offspring. The process consists of expression of oestrus in females, mating of male and female, pregnancy, and giving birth to young ones. It is regulated in an orderly manner by chemical messengers called hormones. Hormones are produced in one part of the body (glands) and transported to other parts (target organs) to influence their functions. The main hormones affecting reproduction in animals are gonadotropin releasing hormone (GnRH), follicle stimulating hormone (FSH), luteinising hormone (LH), estrogen, progesterone, oxytocin, and prolactin.

Oestrus and Oestrus Cycle

A female dairy animal is in oestrus when she allows mounting by the male. The chain of events that starts at one oestrus and ends at the next is termed as oestrous cycle. The oestrus cycle consists of four phases as shown in Fig. 4.11.

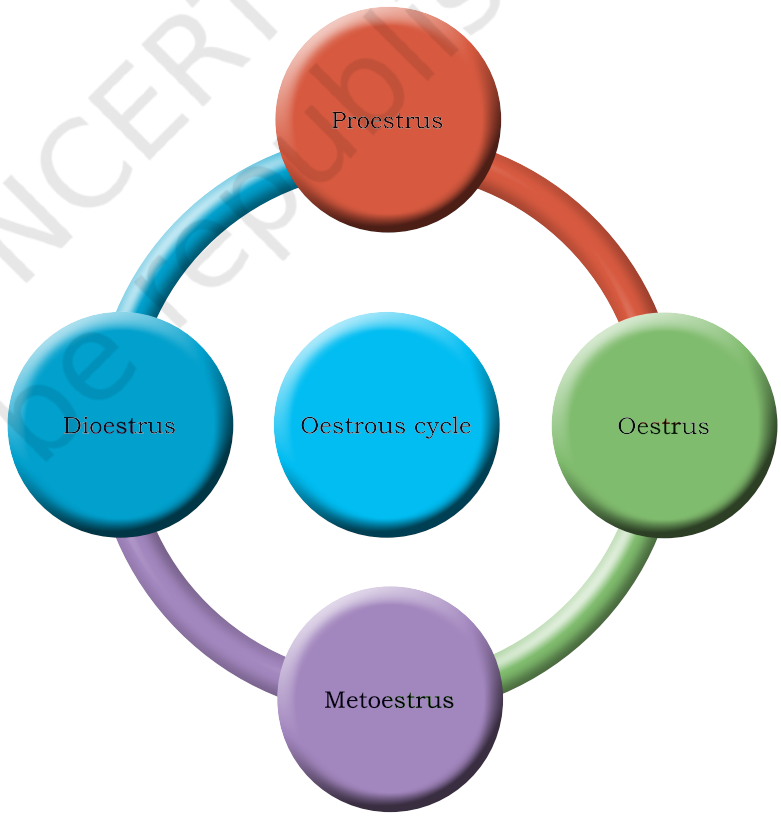


Fig. 4.11: Phases of oestrous cycle

It must be borne in mind that the oestrus cycle is like a relay race where the second phase does not begin until the first phase of the cycle has ended. These four phases of oestrus cycle can be broadly grouped into the following types on the basis of a predominant structure present on the ovary.

(a) Follicular phase

(b) Luteal phase

Follicular Phase of oestrus cycle consists of proestrus and oestrus. A prominent follicle is present on the ovary during this stage.

Proestrus is also known as the preparatory stage or 'building-up phase' of the oestrus cycle. This phase lasts for 3 to 4 days.

Oestrus is the period of sexual receptivity in animals. This is also called 'heat' in common terms. The female animal shows marked sexual desire during this stage. The estrogen level is high during this stage, which is responsible for visually observable signs. Vaginal mucus membrane becomes pink, transparent and mucus discharge is secreted, which usually breaks at the hock joint. The average duration of standing heat is 18 to 24 hours. An oestrus cow stands to allow the male to mount her during the oestrus phase.

Luteal Phase of oestrus cycle consists of metoestrus and dioestrus. It is characterised by the presence of corpus luteum.

Metoestrus is a stage during which the visually observable signs of oestrus disappear. This stage follows oestrus and lasts for 3–4 days. In cattle and buffaloes ovulation occurs approximately 8–10 hours after the end of oestrus, during metoestrus.

Dioestrus is the longest phase of the oestrous cycle. It lasts from day 5 to day 17 of the oestrus cycle. A functional corpus luteum is present during this stage and secretes progesterone.

Practical Exercise

1. Visit a dairy farm and observe animals in different stages of the oestrous cycle.

Check Your Progress

A. Multiple Choice Questions

1. Follicular phase includes _____
   (a) oestrus (b) proestrus
   (c) both a and b (d) metoestrus
2. The shortest phase of the oestrus cycle is _____
   (a) oestrus (b) proestrus
   (c) dioestrus (d) metoestrus
3. The average duration of the oestrus cycle in a cow is
   (a) 5 days (b) 10 days
   (c) 16 days (d) 21 days

4. _____ is the resting phase of the oestrus cycle.

(a) Oestrus (b) Proestrus
(c) Dioestrus (d) Metoestrus

5. _____ is the preparatory phase of the oestrous cycle.

(a) Oestrus (b) Proestrus
(c) Dioestrus (d) Metoestrus

B. Fill in the Blanks

1. _____ is the period of sexual receptivity.
2. _____ hours is the duration of standing heat.
3. _____ is the longest phase of the oestrus cycle.
4. _____ is present on the ovary during the luteal phase of the oestrus cycle and secretes progesterone.
5. The colour of the vaginal mucous membrane during the oestrus is _____.

C. Mark True or False

1. The site of fertilisation in cattle is cervix.
2. Corpus luteum is present on the ovary during the follicular phase.
3. Ovulation in cattle occurs during metoestrus phase of the oestrus cycle.
4. Sexual desire is manifested by the female in the oestrus phase.

Session 4: Basic Animal Breeding

Animal breeding methods have been broadly classified into inbreeding and outbreeding (Fig. 4.12).

Inbreeding

Inbreeding is mating of more closely related animals. It is mating of related animals within the past four to six generations.

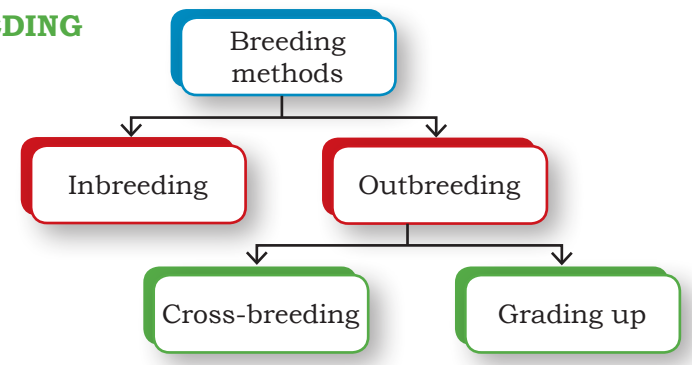


Fig. 4.12: Animal breeding methods

Outbreeding

Outbreeding means breeding of unrelated animals. Outbreeding is classified into the following types.

Cross-breeding: In this system animals of different breeds are mated. For example, Karan Fries cattle have been produced by crossing *Holstein Friesian* (North American) and *Tharparkar* (Indian) (Fig. 4.13). Cross-bred animals show higher growth and vigour as compared to their parents. They usually produce more milk.

Fig. 4.13: Picture of Karan Fries (cross-bred cattle)

Grading up: This is the method of breeding male animals of a particular breed to non-descript females. The offspring, thus produced, is again mated to the male of the same breed as its father. Grading up is used to produce pure-bred animals from non-descript animals after the seventh or eighth generation.

Practical Exercise

1. Visit any livestock farm and enquire about different types of breeding practices.
2. Talk to the animal workers and get acquainted about different types of cross-bred and pure-bred animals in the farm.

Check Your Progress

A. Multiple Choice Questions

1. The phenomenon when two different breeds are mated resulting in progeny with increased vigour is known as

(a) line breeding. (b) cross-breeding.
(c) rotational breeding. (d) grading up.

2. Breeding of sires of a particular breed with non-descript females is known as

(a) back crossing. (b) cross-breeding.
(c) criss-crossing. (d) grading up.

3. Karan Fries is an example of a cross between

(a) Brown Swiss x Jersey.
(b) Holstein Friesian x Sahiwal.
(c) Holstein Friesian x Tharparkar.
(d) None of the above.

4. In grading up, which animal belongs to a non-descript breed?

(a) Female (b) Male
(c) Both (a) and (b) (d) None of the above

5. Which of the following breeding methods is useful for evolving a pure-breed from non-descript cattle?

(a) Inbreeding (b) Outcrossing
(c) Cross-breeding (d) Grading up

B. Fill in the Blanks

1. Breeding among unrelated animals is known as _____.
2. Breeding among closely related animals is known as _____.
3. _____ results in the production of pure-bred animals after the seventh or eighth generation.
4. _____ is the system in which two different breeds are mated.
5. Grading up is a type of _____.

C. Mark True or False

1. Cross-breeding is the mating of closely related animals.
2. Cross-breeding is used to increase vigour and production of offspring.
3. Inbreeding is the mating of unrelated animals.
4. In grading up, a non-descript male is mated to a pure-bred female.
5. Grading up is used to evolve pure-bred animals from the non-descript population.

Session 5: Techniques of Oestrus Detection

An efficient system enables early detection of animals in oestrus. The animals can be bred on time if oestrus detection is proper.

Methods of Oestrus Detection

Oestrus is the only visually observed phase of the oestrus cycle. Fig. 4.14 represents the methods of oestrus detection.

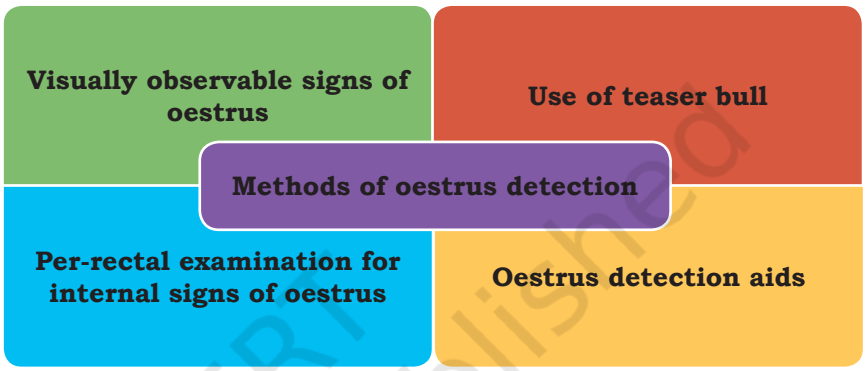


Fig. 4.14: Different methods of oestrus detection

Fig. 4.15: Cow standing still to be mounted

Visually observable signs

The visually observable signs of oestrus can be classified as primary and secondary.

Primary sign of oestrus is when the cow is standing still to be mounted by other cows or bull (Fig. 4.15). This is the most definite sign of oestrus.

Secondary sign of oestrus may not indicate a definite oestrus. The secondary

signs of oestrus are listed in Fig. 4.16 and shown in Figs, 4.17 and 4.18.

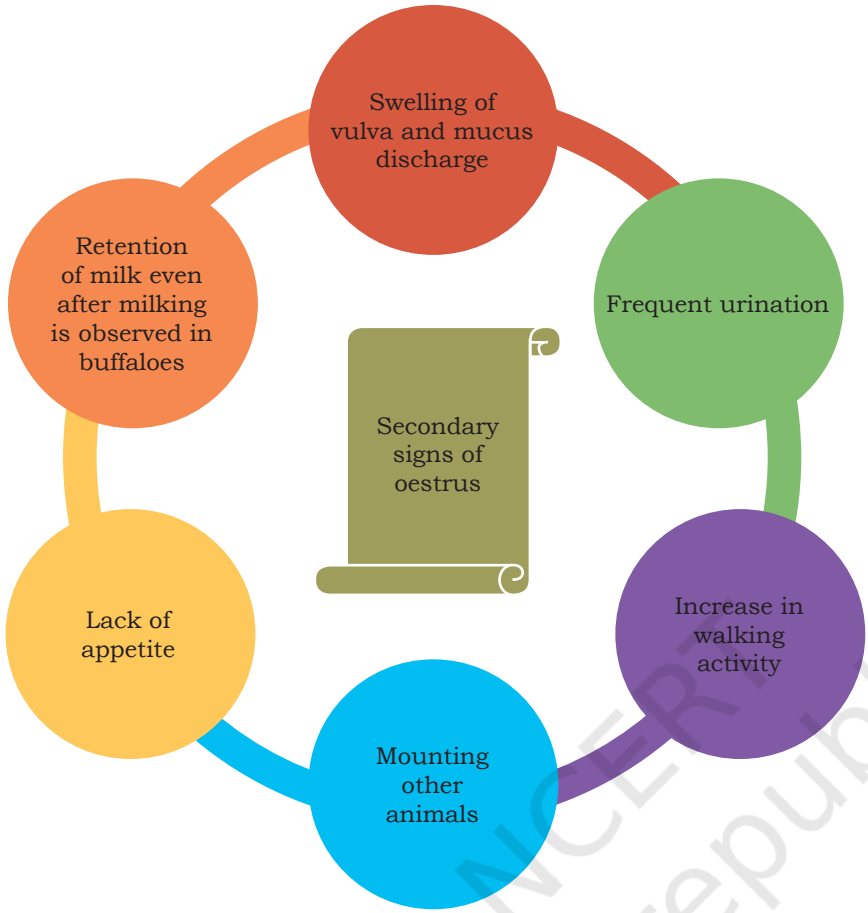


Fig. 4.16: Secondary signs of oestrus

Fig. 4.17: Secondary sign of oestrus (mucus discharge)

Fig. 4.18: Redness of vulvar mucous membrane during oestrus

Use of teaser bull

This is a useful method of oestrus detection in which a teaser bull (an infertile bull, which retains

Fig. 4.19: Teaser buffalo bull used in heat detection

sexual desire or mounting activity) is paraded in the herd twice or thrice daily. The oestrus cows will stand to be mounted by the teaser bull (Fig. 4.19). Oestrus detection using a teaser bull is carried out in the early morning or late evening.

Using oestrus detection aids

The use of heat detection aids improves efficiency of oestrus detection. The following oestrus detection aids are commonly used.

Tail chalk or paint: Chalk or paint is rubbed on the rump and tail heads of the cattle every day (Fig. 4.20). Spreading or disappearance of chalk or paint indicates that the cow has been mounted by her herd mates.

Fig. 4.20: Tail chalk for oestrus detection

Heat mounting detectors: Such types of detectors are glued to hair on the midline just in front of the base of the tail of the female animal. Mounting by other animals squeezes the dye from the reservoir of the detector, which induces a colour change in the dye. This colour change can be easily observed to detect heat in the animal.

Fig. 4.21: Chin ball device and how it is fixed on cattle

Chin ball device: Teaser bulls are used as 'marker animals' and are fitted with chin ball marking devices. When a marker animal presses down with its chin on the back or rump of a cow in oestrus, the valve fitted in the device opens and marker fluid is released (Fig. 4.21).

Pedometer: This is a digital device for calculating the distance covered by the female animal. Females in heat walk twice as much compared to the animal not in heat. Thus, pedometers help in identifying animals in heat (Fig. 4.22).

CCTV Camera: It involves surveillance and recording of animal behaviour in a confined area. It requires evaluation of an entire day's recording.

Electrical conductivity of oestral mucus: Measurement of electrical conductivity of genital secretions with the help of a conductivity meter often detects the animal in true oestrus. It also tells the exact time of insemination.

Fig. 4.22: Pedometer for oestrus detection

Per-rectal examination for confirmation of oestrus

After reaching the preliminary conclusion that the animals are in heat, per-rectal examination of the animal is carried out to confirm the heat status (Fig. 4.23). It is a type of confirmatory diagnosis. Per-rectal examination is performed by restraining the animal in the trevis (an enclosure to restrain the animal for such examination). Per-rectal examination during heat period will reveal open external os cervix. 'Os cervix' is a part of the reproductive tract in a cow or buffalo located in the pelvis. It is the opening in the lower part of the cervix between the uterus and vagina. The cervix is relaxed and soft during oestrus. The uterine horns will be in tone, i.e., they will be tightly curled.

Fig. 4.23: Per-rectal examination of a buffalo for detection of heat

Practical Exercise

1. Visit a livestock farm. Record visually observable signs of oestrus.
2. Talk to the animal workers about day-to-day practices in detection of oestrus.

Check Your Progress

A. Multiple Choice Questions

1. Inaccurate and faulty heat detection leads to
   (a) extended calving intervals.
   (b) delayed insemination.
   (c) reduced conception rates.
   (d) All of the above.
2. Which of the following is a method of heat detection?
   (a) Visually observable signs
   (b) Per-rectal examination
   (c) Use of teaser bull
   (d) All of the above
3. Secondary signs of oestrus include
   (a) frequent urination.
   (b) swelling of the vulva and clear and stringy mucus discharge.
   (c) bellowing.
   (d) All of the above.
4. Common errors in heat detection are
   (a) inadequate time for observation.
   (b) ignoring the heat signs.
   (c) negligence towards heat signs.
   (d) All of the above.
5. Heat observations can be facilitated by
   (a) heat mounting detectors.
   (b) pedometers.
   (c) CCTV camera.
   (d) All of the above.

B. Fill in the Blanks

1. _____ is the only observed phase of the entire oestrus cycle.
2. Primary sign of oestrus is that the cow remains standing _____.
3. Bulls that are infertile but retain sex drive and used for detection of heat are called _____.
4. At the time of oestrus the distance covered by the cow is _____times as compared to a normal cow.
5. External os cervix is _____ during oestrus phase of oestrous cycle.

C. Mark True or False

1. Clear and stringy mucus discharge from vulva is a primary sign of oestrus.
2. Pedometer is an oestrus detection aid.
3. An effective heat detection technique should provide continuous monitoring of a cow.
4. Inseminating a cow on the basis of oestrus signs will result in excellent conception rates.
5. Standing to be mounted is a secondary sign of oestrus.

SESSION 6: ARTIFICIAL INSEMINATION

Artificial Insemination (AI) is a technique of depositing semen into the female uterus or cervix artificially, with the use of instruments.

The union of sperm with ovum is essential for conception. Ovum is released from the ovary 8–12 hours after the end of oestrus. Ovum travels through the fallopian tube and remains viable up to 12–24 hours after release from the ovary. The lifespan of a sperm in the female genital tract is 12–24 hours. If artificial insemination is done after 12 hours of onset of oestrus, there are maximum chances of conception.

ADVANTAGES OF AI

(i) Normally one bull can serve 25 cows by natural service. A single ejaculation of semen, after processing of the same can be used for approximately 500 artificial inseminations.

(ii) The expenditure in rearing the breeding bull by the farmer can also be avoided.

(iii) AI reduces the chances of spreading sexually transmitted diseases like vibriosis, trichomoniasis, etc., in the animals.

(iv) AI reduces the risk of inbreeding if proper records are maintained.

(v) Superior quality germplasm can be transported to different places economically.

(vi) Good quality bulls, which are unable to serve naturally due to injury or certain disease, can be used for semen collection for AI.

REQUIREMENTS OF AI

(i) Proper and accurate heat detection is essential for good results.

(ii) Proper hygiene and sanitation is maintained during the entire process of AI.

(iii) AI requires a skilled technician with proper knowledge of palpation of the female genital tract and handling of semen and liquid nitrogen.

THUMB RULE OF AI

The best time for AI is mid-oestrus which increases the chances of conception. AM-PM is a thumb rule followed for AI in cattle. AM-PM rule means that an animal, which comes in heat in the morning, is inseminated the same evening and an animal which comes in heat in the evening, is inseminated the next morning.

The frozen semen used for AI is stored in a liquid nitrogen container (LN_2 container). The schematic diagram of an LN_2 container is shown in Fig. 4.24.

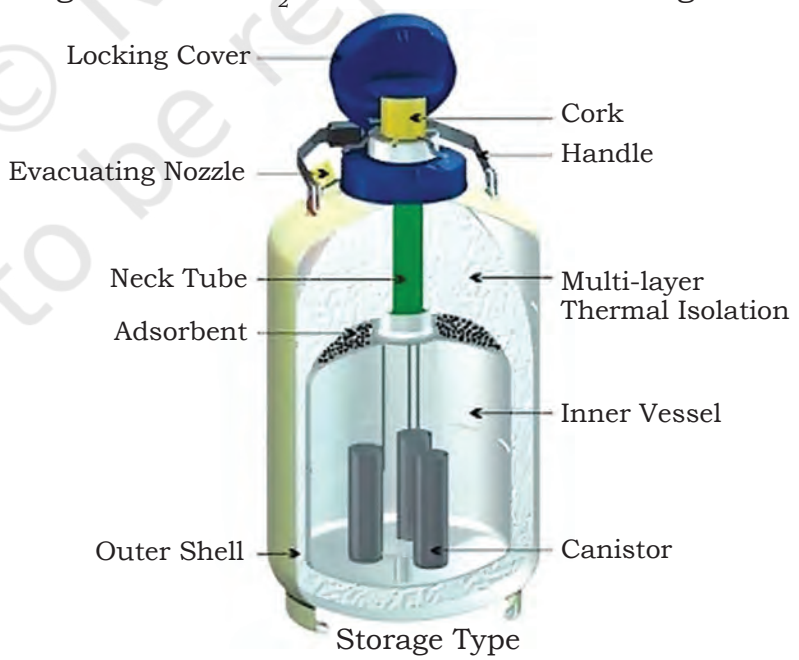


Fig. 4.24: Liquid nitrogen container and its components

RECTOVAGINAL TECHNIQUE OF AI IN CATTLE AND BUFFALO

Out of the many techniques of AI, rectovaginal technique is the most widely used in cattle and buffalo. The important steps of rectovaginal technique of artificial insemination are

(i) thawing of semen

(ii) loading of AI gun

(iii) deposition of semen in female genital tract

Thawing of semen

Before using the frozen semen, it is brought to a liquid state without compromising its quality. This is called thawing. Thawing of frozen semen is done at 37˚C for 30 seconds. The following steps are involved in thawing of frozen semen (Fig. 4.25).

(i) Identifying the canister from which semen straw is to be taken out.

(ii) Removing the lid of the liquid nitrogen (LN_2) container.

(iii) Lifting the canister slightly below the frost line.

(iv) Cooling the tip of the tweezer forceps (used for picking the semen straw) in LN_2 vapour for five seconds.

(v) Grasping the individual straw securely to be removed and lowering the canister back to its actual place.

(vi) If the semen straw is not removed within 10 seconds from the canister, it is again dipped in LN_2 and brought up to the frost line.

(vii) Placing the lid of the container immediately after the removal of straw.

(viii) Shaking the straw in the air to remove LN_2 trapped at factory sealing end of the semen straw.

(ix) Dipping the semen straw in clean warm water (37˚C) for 30 seconds so that the straw is completely submerged in water (the straw is usually placed horizontally in water).

(x) Removing the straw after 30 seconds, wiping it with a paper napkin and noting the details mentioned on the straw such as bull no. and date of filling, name of the semen lab, etc.

LN_2 Container

Lifting the lid of the container

Pre-cooling of tweezer/forceps

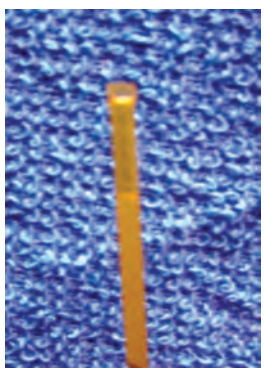
Removing the straw

Shaking the straw in the air

Placing the straw in warm water (37°C)

Wiping of semen straw after thawing

Shaking of semen straw by holding at the laboratory end



Note the air space at the laboratory end

Fig. 4.25: Process of thawing of semen in a stepwise manner

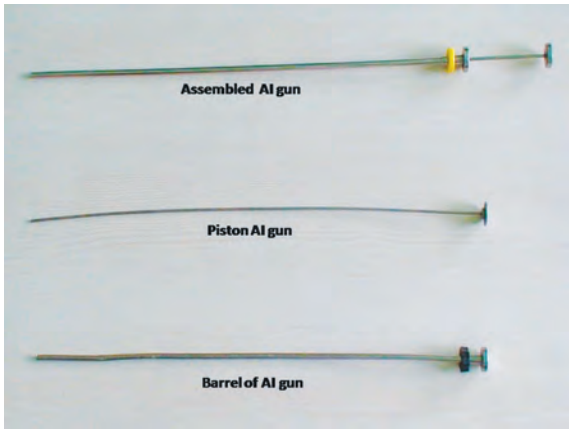


Fig. 4.26: Different parts of an AI gun

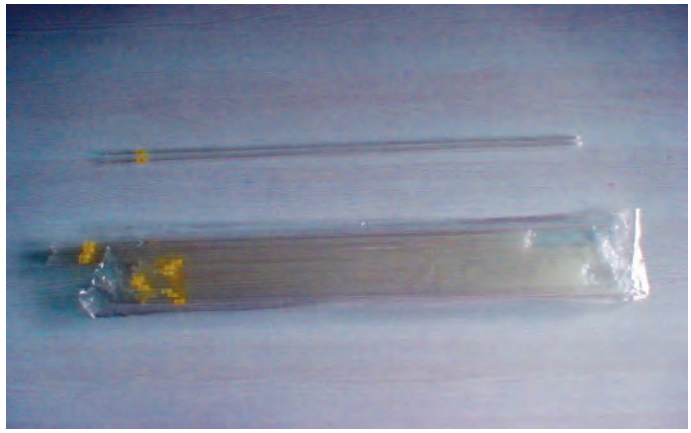


Fig. 4.27: An AI sheath

Fig. 4.28: Material/ instruments required for AI

Fig. 4.29: Loading of a straw in an AI gun

Fig. 4.30: Note the laboratory end on the upper side

Loading of AI gun

The AI gun is loaded in the following manner

(i) The straw is held vertically with the laboratory end on the upper side and shaken in the air to shift the air space to the laboratory end.

(ii) Before loading, the AI gun should be maintained at 37˚C to avoid cold shock to the sperms.

(iii) While loading, the factory sealed end will go inside the AI gun while the laboratory sealed end will be towards the outer end of the gun (Figs. 4.31 and 4.32).

(iv) Cut the straw at a right angle on the laboratory sealed end with a clean scissors (Fig. 4.33).

(v) Fix the AI sheath over the AI gun (Fig. 4.34).

(vi) Lock the sheath with the plastic 'O' lock provided in the AI gun (Fig. 4.35).

Fig. 4.31: The factory end of a semen straw

Fig. 4.32: The laboratory end of a semen straw

Fig. 4.33: Cutting of the straw at the laboratory end

Fig. 4.34: Placing an AI sheath over the AI gun

Fig. 4.35: Locking the AI sheath on the AI gun

(vii) Check if the gun is loaded properly by keeping the gun at eye level and simultaneously moving the piston slowly upwards.

(viii) If the gun is properly loaded then the semen will move slightly upwards.

(ix) If the piston is blocked or it does not move, the gun may be locked.

(x) If movement of meniscus of semen is proper, then cover the AI sheath with a protective sheath.

(xi) Now the AI gun is ready for use (Fig. 4.36).

Fig. 4.36: A loaded AI gun

Deposition of semen in female genital tract

The steps for the deposition of semen (Fig. 4.37) in the female genital tract are

1. The animal is properly restrained in the trevis.
2. The dung is removed from the rectum.
3. Hold the cervix on the floor of the rectum.
4. Once the cervix is held, the external os is located.
5. Once the animal is confirmed to be in heat, the inseminator should thaw the semen as per standard procedure.
6. The inseminator now holds the AI gun in the right hand, with 2–3 fingers to prevent excessive application of pressure while inseminating.
7. The AI gun is passed horizontally forward along the dorsal side of the vaginal wall to avoid its entry into the urethra. It is pushed upto the external os and guided in to the cervix with fingers and the thumb.
8. Once the tip of the gun is in the uterus, the semen is slowly deposited in the uterus by pushing the piston of the AI gun with the help of the thumb.
9. The AI gun is then slowly and carefully withdrawn from the genitalia.

1. Hand inserted inside rectum in the shape of a cone

2. Per-rectal examination in process

3. Hanging of stringy cervicovaginal mucus

4. Checking of redness of vulva

5. Passing of AI gun at 45 degree in the vagina

6. Passing gun straight after it strikes the vaginal folds on the roof

7. Pushing the piston with the right hand to deposit semen in the uterus

Fig. 4.37: Images showing the step-by-step process of AI by rectovaginal technique

Practical Exercise

1. Visit an AI centre and interact with the technician about the set-up and instruments used in the technique.
2. Observe the technique of thawing.

Check Your Progress

A. Multiple Choice Questions

1. In rectovaginal technique
   (a) proper checking of the genital organs is possible.
   (b) AI is done in the uterus.
   (c) conception rate is high.
   (d) All of the above
2. Which of the statement is incorrect?
   (a) AM-PM rule is followed for AI.
   (b) Protective clothing and gumboots should be used for AI.
   (c) Canister should be taken out of container for picking straw.
   (d) Animals not showing signs of heat should not be inseminated.
3. Which of the following statement is true?
   (a) Defective or cracked straws should be discarded.
   (b) Breeding history of an animal should be collected before AI.
   (c) External os is open during oestrus.
   (d) All of these
4. Which of the following should be done while handling semen straw during insemination?
   (a) Semen straw should be thawed at 37˚C.
   (b) Straw should be wiped with a tissue paper.
   (c) Straw should be cut at a right angle.
   (d) All of the above
5. Ideally, AI should be done
   (a) 26 hours after onset of oestrus.
   (b) 12 hours after onset of oestrus.
   (c) 26 hours after the end of oestrus.
   (d) 12 hours after the end of oestrus.

B. Fill in the Blanks

1. AI is aimed at maximum utilisation of superior genetics of _____.
2. AI prevents the spread of _____type of diseases.
3. Animal coming in heat in the evening should be

4. Frozen semen is brought back to a liquid state before insemination by a process called_____.
5. _____ is the most reliable technique of AI in cattle.

C. Mark True or False

1. The lid of the liquid nitrogen canister should be placed back immediately after straw removal.
2. The semen straw should be cut at the laboratory end for insemination.
3. The inseminator should not touch the tip of the AI sheath or shaft of the AI gun.
4. The animal should be inseminated after the end of oestrus.
5. Rectovaginal technique does not require vaginal speculum for AI.

SESSION 7: HANDLING OF LIQUID NITROGEN CONTAINERS AND FROZEN SEMEN

Semen used for artificial insemination (AI) is stored at an ultra-low temperature (-196˚C) in specialised containers called liquid nitrogen (LN_2) containers. The metabolic activities of semen cease at this temperature, which can be revived at the time of AI. Liquid nitrogen (LN_2) containers are double-walled containers. The walls of these containers are made up of high quality insulation material. The space between the outer and inner wall contains vacuum, therefore, these containers should be handled carefully. Improper handling of these containers may cause vacuum loss and will lead to boiling and rapid loss of liquid nitrogen. Liquid nitrogen (LN_2) containers are available in the following sizes—

(a) large size containers are basically used for storage of LN_2 at semen labs.

(b) medium size containers are used by inseminators for storage of frozen semen at farms.

(c) small size containers are used for transportation of frozen semen doses for AI on the field.

A sufficient level of liquid nitrogen should be maintained in the container at all times, so that the

semen straws remain dipped in liquid nitrogen. This is vital for maintaining semen quality. Periodical checking of the liquid nitrogen level should be done. If the level goes down, it should be refilled immediately.

Fig. 4.38: Keep the container upright

Fig. 4.39: Do not keep the container horizontally on the ground

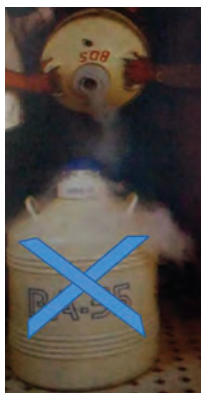


Fig. 4.40: Do not pour liquid nitrogen directly without using a funnel

Fig. 4.41: Always use a funnel to pour LN_2 from one container to the other

Safety and Care during Handling Liquid Nitrogen Containers

The following aspects are taken into consideration while handling the liquid nitrogen containers

(i) Avoid direct contact of LN_2 containers with the hard floor.

(ii) Always keep LN_2 containers in a dry place, on a rubber or wooden plank.

(iii) Always keep the containers in a vertical position in a cool and well ventilated room (Figs. 4.38 and 4.39). Liquid nitrogen is non-toxic and non-inflammable but continuous evaporation of LN_2 in poorly ventilated rooms leads to suffocation.

(iv) Avoid direct exposure of LN_2 containers to sunlight or hot air.

(v) Frost formation on top of the outer shell of the LN_2 container and evaporation of LN_2 is an indicator of vacuum loss.

(vi) Do not tilt or roll the LN_2 container as it may lead to spilling.

(vii) The container should always be kept closed with the neck plug and lid to minimise the LN_2 loss. LN_2 containers should be opened only to retrieve the semen straw or filling LN_2.

(viii) Do not interchange the lid or canister of liquid nitrogen containers.

(ix) A loosely fitted plug may lead to excessive LN_2 loss while tightly fitted one may damage the neck plug.

(x) Avoid scrapping, welding, drilling or punching on the walls of the container.

(xi) Use a funnel to transfer LN_2 in to the container (Figs. 4.40 and 4.41).

(xii) Never overfill the container.

(xiii) Use protective measures (gumboots and gloves) while handling LN_2. Direct exposure of liquid nitrogen (-196˚C) to body parts may lead to frostbite. In case of spillage, use plenty of water immediately to wash the affected part.

(xiv) Use tweezer forceps for removing semen straw from LN_2 container.

(xv) Regularly check LN_2 level in the container with a wooden or solid metal dipstick (Fig. 4.42).

(xvi) Do not stack LN_2 containers one above the other (Fig. 4.43).

(xvii) Utmost care must be taken while transporting and handling liquid nitrogen in public transport or gathering as sudden evaporation of LN_2 may cause chaos leading to accidents.

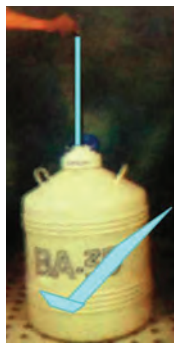


Fig. 4.42: Routinely check the level of LN_2, preferably, twice in a week

Fig. 4.43: Do not stack anything over the container

Measurement of Volume of Liquid Nitrogen in LN_2 Containers

Fig. 4.44 shows various steps to measure the volume of liquid nitrogen in LN_2 containers.

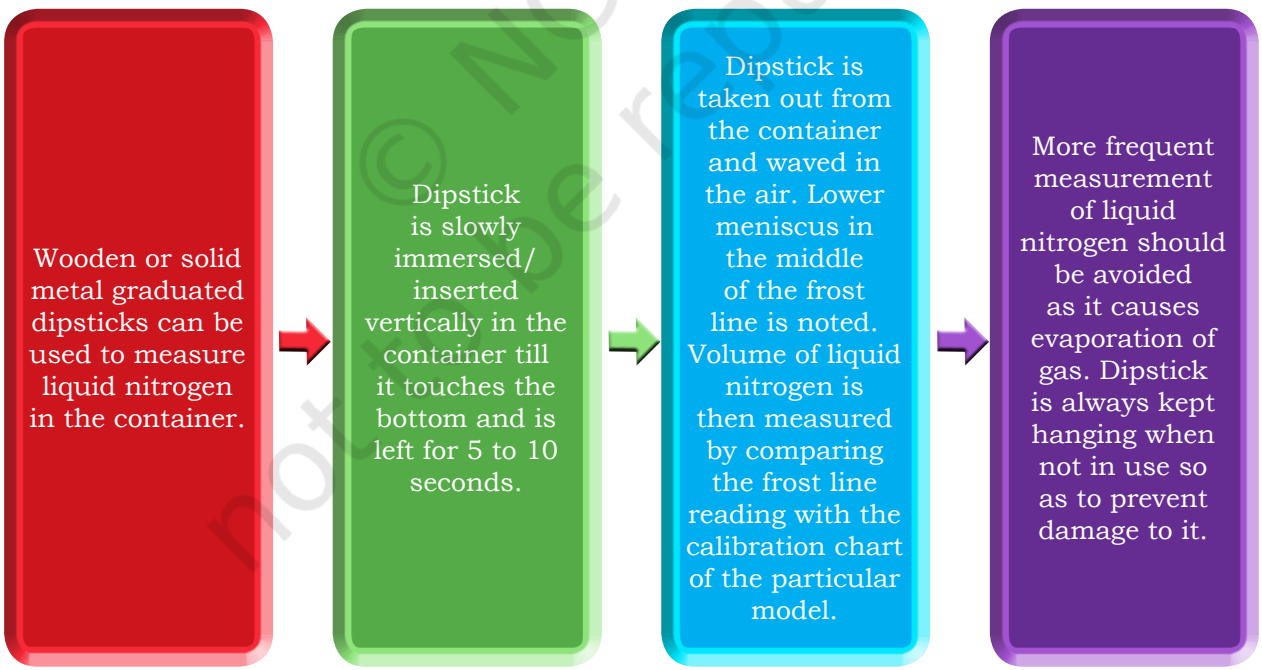


Fig. 4.44: Steps to measure the volume of liquid nitrogen in LN_2 containers

Handling and Maintenance of an AI Gun

The following points (Fig. 4.45) must be considered while handling and maintaining an AI gun.

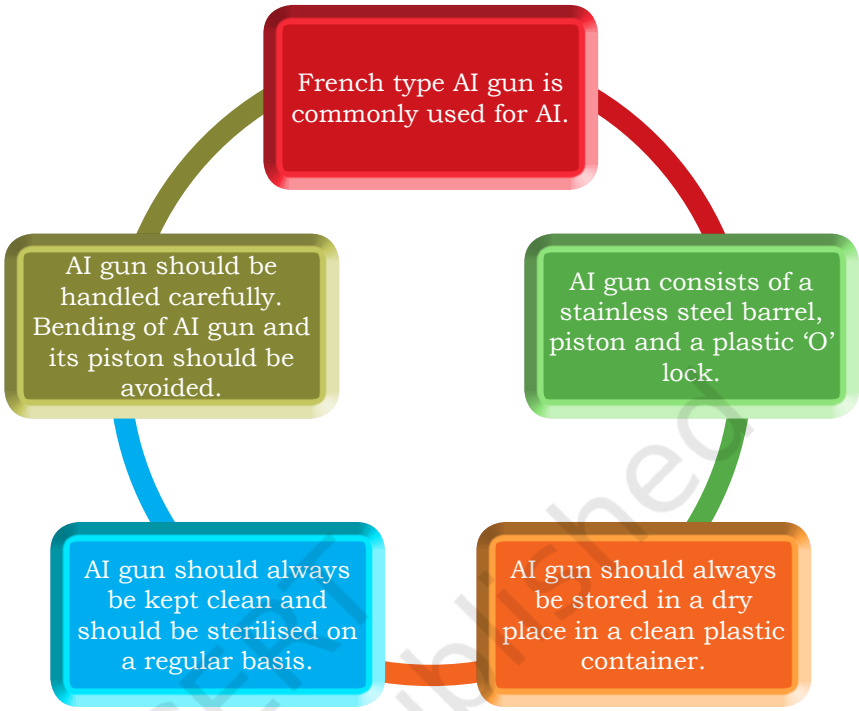


Fig. 4.45: Precautions to be taken while handling an AI gun

Handling of AI Sheath

Fig. 4.46 shows the tips to be followed while handling the AI sheath.

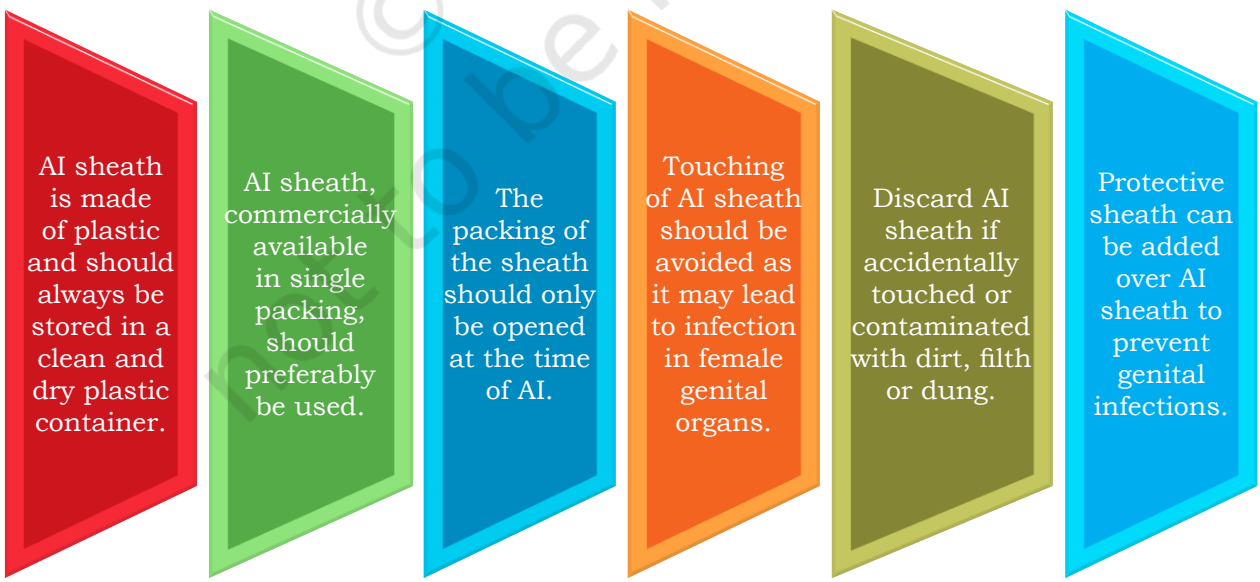


Fig. 4.46: Points to be followed while handling the AI sheath

HANDLING OF SEMEN STRAW

Frozen semen straws should be handled very carefully while retrieving from the LN_2 container during insemination and also during transfer from one tank to another.

Handling of semen straw during retrieval from LN_2 container

(i) Semen straw should not be exposed to high temperature. The canister should be kept below the frost line of the LN_2 container during retrieval of the straw from the container or transfer of semen dose from one container to another.

(ii) The canister from which semen straw is to be taken out should be identified before retrieval from the container.

(iii) Pre-cool the tweezer forceps in LN_2 vapours before removing the desired semen straw from the canister.

(iv) Semen straw should be removed within 10 seconds from the canister raised in LN_2 container below the frost line. If the task of straw removal from canister is not completed in 10 seconds, then the canister should again be lowered in LN_2 and lifted again to complete the task of straw retrieval.

(v) Once removed, the straw should never be placed back into the container as exposure to room temperature will make it useless.

(vi) The canister containing semen straws should immediately be lowered to the desired position after the straw retrieval.

Handling of semen straw during insemination

(i) After thawing, the semen straw should be maintained at 35˚C.

(ii) Semen straw should be wiped with a tissue paper to prevent its rapid cooling.

(iii) The straw should be shaken in air to move air space to the laboratory sealed end. This prevents semen loss while cutting the straw at the laboratory sealed end.

(iv) Semen straw should be cut at a right angle and not obliquely, to prevent semen loss due to backflow while insemination.

(v) Insemination with the straw should be performed within 15 minutes of thawing of semen.

Precautions to be taken while handling semen straw during transfer from one tank to another

(i) Liquid nitrogen containers should be kept side by side before transfer of semen straw.

(ii) Containers should be filled with LN_2 up to an optimum level before transfer.

(iii) Use an appropriate and compatible canister.

(iv) Semen doses should be transferred from one container to the other within five seconds.

(v) Semen straw should not be touched with bare hands while transferring from one container to the other as it may result in thermal injury to the semen.

Practical Exercise

1. Visit any AI Centre. Record the way technicians handle the instruments.
2. Talk to workers in the centre and enquire about handling of frozen semen containers.

Check Your Progress

A. Multiple Choice Questions

1. Semen straws should be thawed at
   (a) 37°C for 30 seconds.
   (b) 47°C for 30 seconds.
   (c) 37°C for 150 seconds.
   (d) 27°C for 30 seconds.
2. Which of the following statement is true?
   (a) Never overfill the container.
   (b) Always keep LN_2 containers on a wooden plank or rubber.
   (c) Do not tilt or roll the LN_2 container.
   (d) All of these.

3. Which of the following statement is false?
   (a) German type AI guns are commonly used for AI nowadays.
   (b) Do not bend an AI gun.
   (c) An AI gun should always be kept in a dry place in a clean container.
   (d) The tip of the gun should not be touched while loading.
4. Which of the following should not be done while handling semen straw during insemination?
   (a) Semen straw should be thawed at 37˚C.
   (b) Straw should be cut at the factory end.
   (c) Straw should be cut at a right angle.
   (d) Straw should be wiped with a tissue paper.
5. Which of the following statement is not correct?
   (a) Dipstick should be kept in a container for 5–10 seconds.
   (b) LN_2 containers are filled upto 20 per cent initially while testing.
   (c) The straw should be taken out of the canister above frost line within one minute.
   (d) Liquid nitrogen is non-toxic and non-inflammable.

B. Fill in the Blanks

1. Temperature of liquid nitrogen for storage of semen straws is_____.
2. _____should be used for pouring liquid nitrogen from one container to the other.
3. Direct exposure of liquid nitrogen to body parts may cause_____.
4. The level of liquid nitrogen in LN_2 containers is measured by a wooden or metal _____.
5. _____ type of AI gun is commonly used for AI in cattle and buffalo.

C. Mark True or False

1. Thermal damage to semen is reversible.
2. Insemination with a thawed semen straw should be performed in 30–45 minutes.
3. Liquid nitrogen containers should be exposed to direct sunlight.
4. Large size AI containers are used for insemination in farms by inseminators.
5. LN_2 containers should be stacked vertically one above the other for storage.

Session 8: Management of Unproductive Animals

Infertility in cattle accounts for major losses. The reproductive efficiency of the animals may be reduced or lost due to infertility, sub-fertility or sterility. The following reproductive disorders frequently affect farm animals.

Infertility is temporary loss of fertility, which may be resumed at a later date.

Sub-fertility is the reduced level of fertility in animals.

Sterility is the complete loss of fertility in animals.

Repeat Breeding

It is a condition where the animals have a normal oestrous cycle and oestrus duration but do not become pregnant in spite of three artificial inseminations with good quality semen or three matings with a fertile bull. Repeat breeding occurs due to the following causes.

AM/PM Rule: If the animal starts exhibiting signs of oestrus in the morning, it should be inseminated in the evening and vice versa.

Improper timing of insemination: Artificial Insemination or breeding in cattle should be done 12 hours after the onset of oestrus. The AM/PM rule is followed for ensuring optimum fertilisation.

Inseminating cattle based on secondary signs of oestrus: If the animals are bred the on basis of secondary signs of oestrus, the possibility of conception is less. For optimum fertility, the animals are bred in standing heat, i.e., when the animal stands still to be mounted by other fellow animals.

Uterine infection: The conception rate is severely affected by uterine infections. Clinical cases of uterine infection are often easily diagnosed by clinical signs like pus mixed mucus discharge and hence can be treated timely. Since sub-clinical cases are difficult to diagnose, they remain untreated and have an adverse effect on the conception rate.

Improper insemination technique: Deposition of semen at the correct site using the correct technique is of utmost importance for ensuring optimum conception rate. The site of semen deposition in cattle is the uterus whereas in goats, semen is deposited in the external os of the cervix. In pigs, the semen is deposited in the uterus.

Embryonic mortality: Early embryonic death occurs due to excessive weight loss or poor body condition, heat stress, protein deficiency and obesity in animals. The deficiency or imbalance of calcium, phosphorus, vitamins A, D, E and carotene are critical for reproduction and embryonic survival. If embryonic death occurs during the first 14–15 days after conception (that is before the implantation of embryo), the length of oestrous cycle is not affected and hence embryonic loss goes unnoticed.

Clinical cases: When infection is visible externally by various signs.

Sub-clinical cases: Cases where mild infection is present but is not visible by means of clinical signs.

General guidelines for the treatment and management of repeat breeding animals

(i) As already discussed in AM/PM rule, AI should be done ideally 12 hours after the onset of oestrous. Repeat breeding due to improper timing of AI is often taken care of by inseminating twice at a 12 or 24-hour interval.

(ii) Energy deficient animals are supplemented with an energy rich diet. Trace minerals are vital for fertility hence, mineral deficiency is corrected by mineral supplementation, 20–30 g twice daily orally.

(iii) Gross overfeeding of grains is avoided. If possible, the cows are provided with adequate amounts of fresh forage.

(iv) Uterine diseases should be diagnosed by testing of blood samples and uterine swabs for presence of microorganisms. Sexual rest of one oestrus cycle helps in the elimination of mild infection.

(v) Semen quality is usually taken for granted. A system should be made for periodic checking of semen quality.

Anoestrus

This is a condition wherein the animal does not exhibit signs of oestrus in the stipulated time. Based on ovarian activity, anoestrus is also classified as true or functional anoestrus. In true anoestrus, the ovaries are smooth and inactive and no palpable structure (corpus luteum or follicles) is present in either of the ovaries on repeated

per-rectal palpation at 11 days interval (Fig. 4.48). In functional anoestrus, a corpus luteum will be present on at least one instance when palpation is performed at an 11-day interval (Fig. 4.47).

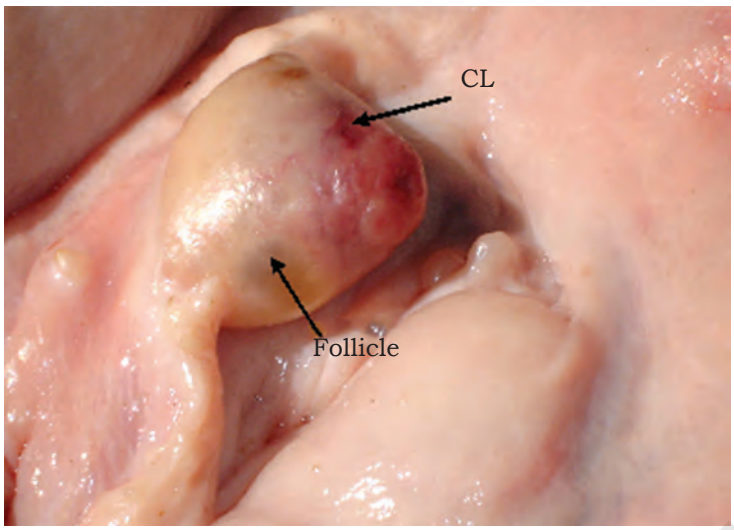


Fig. 4.47: Ovary showing corpus luteum and follicle

Fig. 4.48: Smooth ovaries showing no palpable structure

Anoestrus may occur due to deficiency of energy, minerals, vitamins, stress of production, and hormonal imbalance. Old age and prolonged exposure diseases like tuberculosis, John's disease, chronic parasitic infection, etc., may also lead to reduced body condition or debility hence, cause true anoestrus. Sometimes, animals may show signs of oestrus but it may go unnoticed due to the owner's ignorance. Sometimes, animals in confinement also do not show signs of oestrus.

General guidelines for the management and treatment of anoestrus

(i) Systematic recording of oestrus and other reproductive events is carried out so that all the oestrus animals are detected timely.

(ii) Closely observe cows for heat twice or thrice in a day for at least 20 minutes each time. Oestrus detection is done preferably during cooler parts of the day as heat signs will be more prominent in the evening and early morning than at midday.

(iii) If the cows are in confinement or stanchions, they are turned out in the paddock, at least twice daily.

(iv) If possible, oestrus detection aids like teaser bulls, heat mount device, CCTV camera, etc., are used.

(v) The suspect cows are examined per-rectally at least twice at an 11-day interval to determine the presence or absence of any palpable structure on the ovary and ascertain the cause of anoestrus.

(vi) The animals should be fed a balanced diet. Mineral deficiency should be corrected by supplementation with commercial mineral preparation at the dose rate of 20–30 g twice daily.

(vii) Problem animals should be examined for uterine abnormalities and infections, as the animals may go anoestrus in such conditions. If uterine infections are detected, the same may be corrected by intrauterine administration of antibiotics for 3–5 days.

Cystic Ovaries

Ovarian cysts are characterised as follicles greater than 2.5 cm (approximately 1 inch) in diameter remaining on an ovary for more than 10 days (Fig. 4.49). It is one of the major reproductive disorders affecting the fertility of animals. The deficiency of luteinising hormone is the main cause of cystic ovaries. Nutritional deficiency, high blood estrogen concentration, stress of high milk production and genetic causes are also associated with the incidence of cystic ovaries.

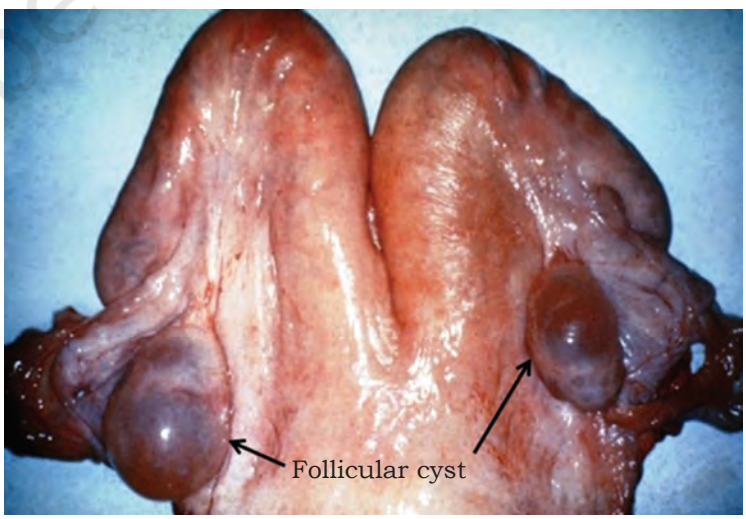


Fig. 4.49: Cystic ovaries in cattle

Cystic ovaries are associated with clinical signs like frequent, prolonged and irregular oestrus signs, abnormally raised tail head and masculine (male

Fig. 4.50: Raised tail head in a cow with cystic ovaries

like) appearance (Fig. 4.50). Animals suffering from cystic ovaries remain infertile till properly treated and have a negative impact on fertility. The treatment is usually done by injecting gonadotropin releasing hormone.

Infections of Female Reproductive Tract

Female genital tract infections are associated with conception failure. Hence, attention should be paid to their early diagnosis and treatment. They are manifested by foul smelling pus mixed with genital discharge. The microorganism present on the animal's body and surroundings may gain entry into its reproductive tract during heat period, at the time of mating with an infected bull or insemination with an unhygienic instrument. A cow giving birth (parturition) in an unsanitary calving area, results in infection of the genital tract. The animal also becomes more prone to uterine infections in cases of abnormal calving when the foetus is removed manually or when the placenta is retained after calving. Undernourished animals with low immunity (body's defence against diseases) are more susceptible to infections.

Fig. 4.51: Aborted buffalo calf with placenta

Abortions

The term abortion refers to expulsion of the foetus before completion of normal duration of pregnancy. The aborted foetuses are usually dead or they die within 24 hours of expulsion from the uterus. If the abortion tends to occur within the initial two months of pregnancy, the embryo is usually reabsorbed by the uterus and the animals do not show any clinical sign. Such cases are often called early embryonic deaths. If abortion occurs after two months, a foetus of recognisable size and placenta is expelled (Fig. 4.51).

Possible causes of early abortions

Early abortion is mainly caused by diseases called trichomoniasis and vibriosis. In later stages, abortions are mainly caused by Brucella organisms and IBR

viruses. Abortion can also occur due to injury during fighting, mounting, sudden fall, etc. Chronic diseases like parasitic infection, malnutrition, tuberculosis, etc. are also responsible for abortion in animals.

Measures for preventing abortions

(i) Regular testing of animals for abortion-causing microorganisms.

(ii) All newly purchased animals should be tested before entry into the existing herd. Ideally, newly purchased animals should be kept in a separate place, away from the main herd, for at least 60 days before their induction into the main herd. During this period, they should be screened for infectious diseases.

(iii) Pregnant animals should not be kept in the same paddock along with non-pregnant animals, as fighting and mounting activity may lead to abortion.

(iv) The aborted material especially stomach content and tissue of foetus and placenta should immediately be sent to the laboratory for diagnosis.

(v) The aborted foetus should immediately be disposed off by burying in the ground along with lime and salt.

(vi) The cattle shed should immediately be disinfected.

(vii) The cow, which has aborted, should immediately be segregated from the herd till it is confirmed negative for infectious organisms responsible for abortion.

Practical Exercise

1. Visit any livestock farm and enquire about common conditions, which affect the fertility of the animals.
2. Talk to the animal workers about day-to-day management of maintaining good fertility in the farm.

Check Your Progress

A. Multiple Choice Questions

1. An animal, with normal or nearly normal oestrus duration and oestrous cycle heat, that fails to conceive even after three inseminations with good quality semen is called _____.
   (a) anoestrous (b) repeat breeder
   (c) cystic (d) one

2. Expulsion of dead foetus _____ of gestation is called abortion.
   (a) at completion (b) after completion
   (c) before completion (d) all
3. _____ organism is mainly responsible for abortion in the later part of gestation.
   (a) Trichomonas (b) Brucella
   (c) Both (d) None
4. Manual rupture of follicle is the treatment of _____ condition.
   (a) repeat breeding (b) anoestrous
   (c) cystic ovaries (d) all
5. Calving in unsanitary calving area predispose the animals to _____.
   (a) cystic ovaries (b) anoestrous
   (c) abortion (d) uterine infection

B. Fill in the Blanks

1. Temporary loss of fertility in animals is called _____.
2. In _____ ovaries are smooth and inactive.
3. In _____ disease condition, the animals have masculine appearance.
4. Early abortions are frequently caused by a disease called _____.
5. The correct time of insemination is _____ hours after the onset of oestrous.

C. Mark True or False

1. For optimum fertility cows should be inseminated based on secondary signs of oestrous.
2. If the animal does not conceive even after six inseminations, it is called repeat breeding.
3. The treatment of true anoestrous can be done using mineral supplementation, 20–30 mg twice daily.
4. The uterine infections without any abnormal uterine discharge are referred to as sub-clinical infection.
5. The uterine infusion of antibiotics should be carried out for three days to treat uterine infection.

SESSION 9: POST-INSEMINATION SUPPORT, DATA RECORDING AND PERFORMANCE MONITORING OF BREEDING SERVICES

Relevant knowledge

For successful implementation of artificial insemination programme, critical evaluation of services and post insemination support is vital.

Post-insemination Advice to Farmer

(a) The animal owner should be asked to closely observe his animal for the next 12–24 hours. The observation should include any abnormal discharge and duration of heat.

(b) The animal should be given extra care after breeding.

(c) Breeding with scrub bulls and non-descript bulls should be avoided during the remaining part of the heat after AI.

(d) If signs of heat persist even after 18–24 hours, AI should be repeated. Else, the animals should be observed for heat symptoms after 18–21 days and also after 36–42 days.

(e) If the animal does not repeat heat after 18–21 days, it should be examined for pregnancy after two months of AI.

(f) Properly record the time of onset of heat, date and time of AI and due date for pregnancy diagnosis on expected date of calving.

Post-insemination Follow-up by the Animal Health Worker

(a) After around 21 days, a follow-up of each inseminated animal should be done to find out whether it has repeated heat.

(b) After two months, a follow-up of every inseminated animal should be done for pregnancy diagnosis and the date and result of the diagnosis should be recorded in a register.

(c) After pregnancy diagnosis, an individual follow-up of each animal should be done and the expected date of calving should be recorded.

(d) All records related to artificial insemination, pregnancy diagnosis, and calving should be meticulously recorded and maintained.

(e) Advise farmers on heat detection, feeding, management and healthcare of animals.

Notes

Significance of Data Recording in AI Programme

Data recording is very important in AI programme. A systematic recording of data enables the animal owner to get his animals examined timely for pregnancy, predict the probable time of next oestrus, diagnose infertility and anoestrus and plan suitable management according to the reproductive stage. Figure 4.52 depicts the advantages of maintaining computerised records.

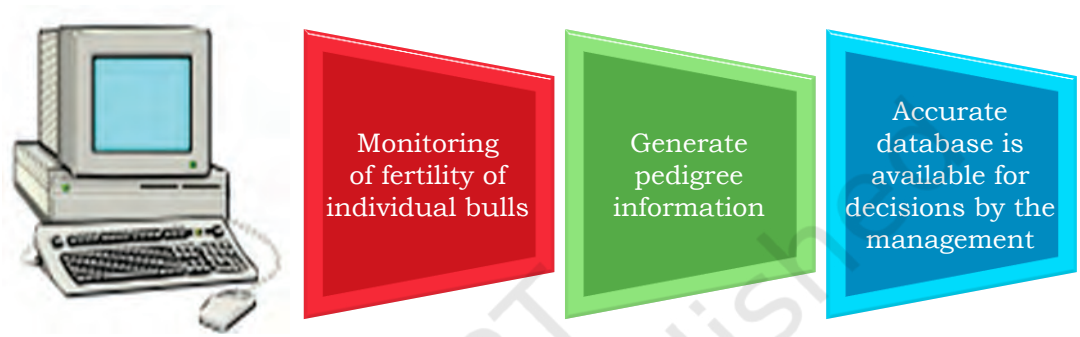


Fig. 4.52: Advantages of computerised records

All the details pertaining to breeding activity should be recorded in the register or computer. Information like identification number of the animal, age, species, breed, parity, date of previous calving and any abnormality associated with it should be recorded. The number of oestrus and inseminations since last calving, oestrus date, oestrus signs, time, date and time of AI and details of the semen used for AI should also be recorded. After AI is done, the expected date of pregnancy diagnosis, results of pregnancy diagnosis, and reproductive disorder (if any) should be recorded.

Evaluating Success and Performance Monitoring of AI Services

This monitoring is the per cent of cows that get pregnant on the first service. The target should be to achieve a conception rate of at least 45 per cent on the first service. The results should be compared with contemporaries working in the same area. The

number of services per conception is another index of breeding performance related to the effectiveness of the insemination technique. It is the total number of services done during a stipulated period of time divided by the total number of pregnancies resulting from those services. A reasonable goal is to maintain a rate of fewer than 2.0 services per conception. It must be noted that other factors in addition to AI technique can affect the conception rate and services per conception.

All inseminators should periodically attend a refresher course to review their technique, learn new developments, and obtain recommendations regarding AI.

Practical Exercise

1. Visit any livestock farm. Study different registers used for keeping farm records.
2. Talk to the animal health workers and learn how to maintain farm records.

Check Your Progress

A. Fill in the Blanks

1. Pregnancy diagnosis should be performed after _____ month/s of AI.
2. The maintenance of an average of _____ number of services per conception is an indicator of optimum reproductive status.
3. The animal should be intensively observed for signs of oestrus after _____ days of breeding.

B. Mark True or False

1. The breeding date record helps in predicting time of pregnancy diagnosis and expected date of calving.
2. If the owner is vigilant, instead of writing records he may be able to remember the date of important events for record keeping.
3. It is ideal to have a pregnancy rate of 45 per cent in the first insemination.
4. After AI, the owner should not observe his animals for the next 12–24 hours.
5. Manual or computerised breeding records of the animals are vital for easy management of the herd.

Glossary

Antibiotics: *A medicine that inhibits the growth of or kills the microorganisms.*

Antiseptic: *Prevents the growth of disease-causing microorganisms*

Appetite: *A natural desire to satisfy a bodily need, especially for food.*

Balanced ration: *Provides proportionate essential nutrients to the animal required for proper nourishment for a 24-hour period.*

Breeding: *The process of mating and production of offspring.*

Calf: *The young one of cattle or buffaloes upto one year of age.*

Calving: *The process of giving birth to a calf.*

Castration: *The removal of testicles of a male animal.*

Consumer: *A person who purchases goods and services for personal use.*

Culling: *Removal of unproductive or unwanted animals from the herd.*

Cyst: *A thin-walled hollow cavity in an animal's body containing a liquid secretion; a sac, vesicle, or bladder.*

Disinfectant: *A chemical liquid that destroys bacteria.*

Draught animal: *Used for pulling heavy loads, eg., horse, bull, etc.*

Eco-friendly: *Not harmful to the environment.*

Embryo: *An unborn in the process of development, from approximately the second to eight weeks after fertilisation.*

Endocrine gland: *These are glands that secrete hormones, directly into the blood rather than through a duct.*

Endoscope: *An instrument introduced into the body to give a view of its internal parts.*

Eructation: *Discharge of gas or of a small quantity of acidic fluid from the stomach through the mouth.*

Extension: *It is the dissemination of useful research findings and ideas among people to bring out desirable socio-economic changes.*

Farmyard manure: *It is produced with cow dung, cow urine, waste feed and fodders, and other dairy wastes.*

Fatigue: *Extreme tiredness resulting from physical exertion or illness.*

Feed additive: *Is a feed supplement that is not present in sufficient quantity in regular diets of the farm animals, which include vitamins, amino acids, fatty acids, and minerals.*

Fertility: *It is the ability to produce a young one.*

Fertilisers: *Are the chemical or natural substances added to soil or land to increase its fertility.*

Flehmen: *It is a behavioural response found in many male mammals characterised by a curling of the upper lip and a raising of the head when they detect the female is in oestrus/heat.*

Germplasm: *Genetic resources such as animal tissues which are maintained for the purpose of animal breeding, etc.*

Growth promoter: *Any medicine that destroys or inhibits bacteria and is administered at a low, sub-therapeutic dose. The use of antibiotics for growth promotion has risen with the intensification of livestock farming.*

Hormones: *A regulatory substance produced in an organism and transported in tissue fluids such as blood to stimulate specific cells or tissues into action.*

Healing: *The process of making or becoming sound or healthy again.*

Heifer: *The young female cattle or female buffaloes from one year of age upto the age of first calving.*

Heredity: *The passage of physical characteristics genetically passed on from one generation to another.*

Immunity: *The ability of an organism to resist a particular infection or toxin by the action of specific antibodies or sensitised white blood cells.*

Infection: *The invasion and multiplication of microorganisms such as bacteria, viruses, and parasites that is not normally present in the body. An infection may cause no symptoms and be sub-clinical, or it may cause symptoms and be clinically apparent.*

Inflammation: *It is a local response to cellular injury that is marked by capillary dilatation, leukocytic infiltration, redness, heat, pain, swelling, and often loss of function. It serves as a mechanism initiating the elimination of noxious agents and of damaged tissue.*

Mastitis: *It is the inflammation of the mammary gland (in the udder) typically due to bacterial infection via teat.*

Maturity: *The state, fact, or period of being mature.*

Mortality: *The state of being subject to death.*

Oestrus: *The phase of oestrous cycle when the animal becomes receptive to male for mating.*

Ovulation: *Discharge of ova or ovules from the ovary.*

Parasite: *It is an organism, which lives in or on another organism (its host) and benefits by deriving nutrients at the other's expense.*

Pathogen: *A bacterium, virus, or other microorganism that can cause disease.*

Pituitary gland: *It is the major endocrine gland located in the brain that is important in controlling growth, development and functioning of the other endocrine glands.*

Prevalence: *It is a measurement of all individuals affected by the disease at a particular time.*

Prophylactic: *A medicine or course of action used to prevent disease.*

Ruminant: *Even-toed hoofed mammal that chews end, e.g., sheep, etc.*

Standing heat: *Standing heat is the most sexually intensive period of the estrous cycle. During this period, cows stand to be mounted by other cows or move forward slightly with the weight of the mounting cow.*

Stress: *It is a state of mental or emotional strain or tension resulting from adverse or demanding circumstances.*

Thawing: *To change from a frozen solid to a liquid by gradual warming.*

Vermicompost: *Use of earthworms to convert organic waste into fertiliser.*

Answer Key

Units	Sessions	Multiple choice questions	Fill in the blanks	True or false
Unit 1	Session 1	1. c	1. Identification	1. FALSE
		2. d	2. 24	2. FALSE
		3. d	3. Organic	3. TRUE
		4. a	4. Input	4. TRUE
		5. a	5. Earthworms	5. TRUE
	Session 2	1. d	1. 30	1. TRUE
		2. d	2. Efficacy	2. FALSE
		3. d	3. Rashitrya Krishi Vikas Yojana	3. TRUE
		4. b	4. Chaff cutter	4. FALSE
		5. a	5. Business	5. TRUE
	Session 3	1. d	1. Vaccination	1. TRUE
		2. d	2. Mobile phone	2. TRUE
		3. d	3. Animal husbandry extension	3. TRUE
		4. c	4. Agmarknet	4. FALSE
		5. d	5. Kisan Call Centre	5. FALSE
Unit 2	Session 1	1. d	1. Rural	1. TRUE
		2. d	2. Farmers/rural people	2. FALSE
		3. a	3. Mass contact	3. FALSE
		4. c	4. 20 to 25	4. FALSE
		5. b	5. Extension	5. TRUE
	Session 2	1. a	1. Profit	1. TRUE
		2. d	2. Plan	2. TRUE
		3. d	3. Diversification	3. FALSE
		4. d	4. Junk value	4. TRUE
		5. d	5. Profit	5. FALSE
	Session 3	1. b	1. Marketing	1. FALSE
		2. a	2. Unorganised	2. FALSE
		3. d	3. Coarse	3. TRUE
		4. d	4. Self-help groups	4. TRUE
		5. d	5. Private/unorganised	5. TRUE
Unit 3	Session 1	1. d	1. Cruelty	1. FASLE
		2. a	2. Performance	2. FALSE
		3. d	3. Prevention of cruelty to animals	3. TRUE
		4. a	4. Birth control programme	4. FALSE
		5. b	5. Chennai	5. FALSE

	Session 2	1. d	1. Exotic	1. TRUE
		2. a	2. Gujarat	2. TRUE
		3. d	3. West Bengal	3. TRUE
		4. a	4. Rajasthan	4. FALSE
		5. a	5. Madhya Pradesh	5. FALSE
	Session 3	1. d	1. Fodder	1. FALSE
		2. d	2. Environment	2. TRUE
		3. d	3. Natural or manmade	3. TRUE
		4. d	4. Preparedness	4. TRUE
		5. a	5. Flood or hurricane	5. TRUE
Unit 4	Session 1	1. c	1. First or second	1. FALSE
		2. b	2. 2/3rd	2. FALSE
		3. a	3. 3	3. FALSE
		4. d	4. Dark black	4. TRUE
		5. c	5. Pin	5. TRUE
	Session 2	1. b	1. Ovaries	1. FALSE
		2. c	2. Vulva	2. FALSE
		3. a	3. Two	3. FALSE
		4. d	4. Vagina	4. TRUE
		5. d	5. Follicle	5. TRUE
	Session 3	1. c	1. Oestrus	1. FALSE
		2. a	2. 15-18 hours	2. FALSE
		3. d	3. Diaestrus	3. TRUE
		4. c	4. Corpus luteum	4. TRUE
		5. b	5. Pink	—
	Session 4	1. b	1. Outbreeding	1. FALSE
		2. d	2. Inbreeding	2. TRUE
		3. d	3. Grading up	3. FALSE
		4. a	4. Cross-breeding	4. FALSE
		5. d	5. Outbreeding	5. TRUE
	Session 5	1. d	1. Oestrus	1. FALSE
		2. d	2. to be mounted	2. TRUE
		3. d	3. Teaser bull	3. TRUE
		4. d	4. Two	4. TRUE
		5. d	5. Open	5. FALSE
	Session 6	1. d	1. Male	1. TRUE
		2. c	2. Sexually transmitted	2. FALSE
		3. d	3. Next morning	3. TRUE
		4. d	4. Thawing	4. FALSE
		5. b	5. Recto-vaginal	5. FALSE

Session 7	1. a	1. -196°C	1. TRUE
	2. d	2. Funnel	2. FALSE
	3. a	3. Frost bite	3. TRUE
	4. b	4. Dipstick	4. FALSE
	5. c	5. French	5. FALSE
Session 8	1. b	1. Infertility	1. TRUE
	2. c	2. True Anoestrous	2. FALSE
	3. b	3. Cystic ovaries	3. TRUE
	4. c	4. Trichomoniasis	4. FALSE
	5. d	5. 12	5. FALSE
Session 9		1. Two months	1. TRUE
		2. Two	2. FALSE
		3. 18–24 days of breeding	3. TRUE
			4. FALSE
			5. TRUE