

Unit

2



Maintaining Healthy Performance of Livestock

INTRODUCTION

Maintaining the health of animals is important for optimum livestock productivity. Like human beings, animals are also susceptible to diseases. Diseases affect the productivity of dairy animals through lowered milk yield, reduced fertility, delayed maturity, reduced feed conversion ratio, etc. This Unit discusses the signs of health, well-being and maintenance of animals, and management practices that need to be followed to maintain animal productivity.



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SESSION 1: MAINTAINING THE WELL-BEING OF DAIRY ANIMALS

Signs of a healthy animal

A healthy animal is active, alert and aware of its surroundings. It has a steady gait, walks on all four feet and does not limp. In case of mild or moderate infection, though the animal will stand on all four feet, it will look dull, depressed and lethargic. There will be discomfort and reluctance in its walking. But in case of severe infection or disease, the animal will lie on the ground for the maximum number of hours and will limp while walking. If the animal stays away from other animals in a herd, it indicates that it is having some health problem. A sick animal is not interested in its surroundings and does not want to move.

Table 2.1: Difference between healthy and sick animal

Healthy animal	Sick animal
Alert	Lethargic and listless
Chews cud	Does not chew cud
Sleek coat	Rough coat
Bright eyes and pink eye membrane	Dull, sunken, and sometimes, watery eyes
Normal faeces and urine	Abnormal faeces and discoloured urine
Normal temperature	High temperature
Steady gait and no limping	Limping
Normal respiration	Laboured breathing or coughing
Stays in herd or flock	Separates self from herd
Eats and drinks normally	Loss of appetite
Normal pulse rate	Abnormal pulse rate



Fig. 2.1(a): Healthy Sahiwal cow



Fig. 2.1(b): Sick Sahiwal cow



Fig. 2.2(a): Healthy Murrah buffalo



Fig. 2.2(b): Sick Murrah buffalo



Animal freedom

Freedom is the basic need of every animal. The various types of animal freedom are as follows.

Freedom for hunger and thirst

It means the animals have access to drinking water and fodder, which are necessary for their health and vigour.

Freedom from discomfort

It means providing a suitable environment, such as shelter and comfortable resting area to the animals.

Freedom from pain, injury or diseases

It relates to treating diseases and injuries in animals, and preventing their occurrence. It also refers to frequent diagnosis and checkups.

Freedom to express normal behaviour

The animals must be provided with adequate care and sheltered in a conducive environment, so that they can behave normally. This entails providing sufficient space for animal movement, ensuring adequate facilities to them and keeping them with other animals of same type.

Freedom from fear and distress

It means the animals must not be subjected to any sort of mental trauma like fear, loneliness, anxiety, etc., and physical suffering like hunger, illness or pain due to sickness or injury, etc. It must be ensured that the animals get the following five basic freedoms.

- To move around
- To groom themselves
- To get up
- To lie down
- To stretch their limbs

Grooming

In natural environment, cows and buffaloes use trees and other abrasive surfaces to scratch and groom themselves. They rub their bodies against walls or other fixed objects in the barn to groom themselves.

Animal welfare

This relates to an animal's health and well-being, and reflects the quality of the life it lives. The evaluation for animal welfare must consider scientific evidence available, concerning their behaviour and functions. Animal welfare refers to how an animal copes mentally and physically with the conditions where it lives. Various signs, which indicate that an animal is healthy, are its life span, less susceptibility to diseases, display of normal behaviour and reproduction. Public concerns about animal welfare are based on various steps being taken for maximising their well-being.

Animal welfare regulations

The Constitution of India emphasises on the protection of animals. According to Article 51A(g) of the Constitution, it is the duty of every citizen of the country to protect and improve the natural environment, including forests, lakes, rivers and wildlife, and have compassion for living creatures. Besides, India is one of the first countries to enact a law forbidding animal cruelty, i.e., Prevention of Cruelty to Animals Act, 1960.

Regular monitoring of animals' health

Observe the animals daily to check for signs of poor health. These may include reduced feed or water intake, lethargy, watery or pale white mucoid discharge from the eyes, inflammation in the eyes and abnormal stool (colour and form). Regular monitoring of the animals' health helps identify, investigate and resolve their health and management problems. Animal health records provide accurate data as regards to diseases, injuries and infections. Careful observation and analysis of the animals' health record help identify their disease trends, review previous health issues, and determine the success rate of treatments and herd health programmes. Rather than self-evaluating the animals' health, it is better to maintain a herd health record as it provides accurate data about the health of all animals in a farm. The following points must be considered once sick animals are identified.



- Isolate the animals, suffering from diseases, in isolation sheds.
- There must be a separate staff to examine and take care of the animals kept in isolation. The staff, examining the animals, must wear protective clothing, boots, gloves and mask.
- Ensure that the staff wash their hands with an antiseptic soap when leaving the isolation area.
- Maintain a record of illness, treatment administered, behavioural changes observed in the animals and mortalities, if any.
- Intensify animal health monitoring during periods when there is an increased risk of diseases and infections.
- Adopt biosecurity measures to prevent the spread of infectious diseases in animals when unusual clinical signs or high mortality is observed.

Maintaining healthy and hygienic conditions

Healthy and hygienic conditions can be maintained by regularly supervising the dairy animals, cleaning their sheds, washing the animals and carrying out post-cleaning operations.

Supervision

- Daily, weekly and fortnightly schedules must be planned to supervise the animals.
- Labourers need to be given clear instructions as regards to animal supervision.
- Documentation must be done regularly.
- Every morning, all animals must be checked, counted and their behaviour be noted down.

Cleaning of sheds

- The floor of all sheds must be physically cleaned daily. Physical cleaning refers to the removal of urine, faecal and other organic material from the area.
- Detergent must be used while cleaning surfaces, and making them free of dirt and debris.

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- All mangers and water troughs must be cleaned daily.
- Sheds, where young calves and pregnant cows and buffaloes are housed, must be cleaned with a disinfectant regularly.
- Waste and soiled bedding need to be disposed in accordance with workplace rules.
- Any damage or maintenance work required must be reported to the supervisor immediately.
- Sick and injured animals need to be isolated, and their sheds be cleaned with a disinfectant.
- Old feed and fodder must be removed, and the troughs must be cleaned daily.
- The housing area must be made clean, safe, comfortable, and free from insect-pests and diseases.
- Entry of flies in the housing area must be controlled as they disturb the animals and adversely affect milk production.
- Clean housing area improves the health of dairy animals and quality of milk production.

Washing of animals

- The animals must be cleaned and washed periodically according to the weather conditions.
- Young calves need to be washed with lukewarm water daily.

Post-cleaning

- The bedding must be changed timely, especially, for young calves, and sick, injured and pregnant animals.
- Absorbent bed material can be used to give a dry feel to the animals.
- Clean equipment must be stored in their respective places.
- All clean grooming tools must be counted and stored.
- Damage to tools or equipment must be reported to the supervisor or concerned authority immediately.



Abnormal behaviour in dairy animals

It refers to a significant change in the behaviour of an animal, i.e., it can become aggressive and irritable, and may even stop eating or drinking. Display of abnormal behaviour in the animal may be indicative of illness, pain or discomfort. Some abnormal responses may be harmful, maladaptive or related to non-conducive environment. It cannot always be implied that an abnormal behaviour or response is necessarily a problem for the animal.

The term 'vice' refers to continued abnormal behaviour of animals in confinement, which causes economic losses to dairy farmers. Vices in animals may be due to various reasons, such as nervousness, mischief, aggression (viciousness) due to fear and exposure to stressful conditions like new handlers, food, environment, etc. Even during lactation period, when dairy animals feed their young ones, all these conditions can make them vicious, causing nutritional deficiencies and restlessness. Once established, vices are difficult to eliminate. Some vices lead to physiological problems, while others may be dangerous to the animals and their handlers, and may even cause destruction to life or property in a farm or field. Therefore, it is important to be able to identify and avoid situations, leading to the development of vices. Major vices in dairy animals are mismothering, nymphomania, wind sucking, kicking and masturbation (in case of bulls).

Mismothering

Cases of mismothering are common among cows and buffaloes. It may be due to a dam (mother) having suffered for a long period because of some chronic health condition or illness, difficult delivery and not being able to stand up for suckling. The calf may also be too weak to suckle.

Nymphomania

Both cows and buffaloes suffer from nymphomania. It is more common in cows than buffaloes. Nymphomania is mostly observed in high-yielding cows. A cow in heat

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for almost the entire day is called a 'nymphomaniac'. Such a cow behaves like a bull, pawing and mounting but refusing to stand for mounting by other cows. It could be an inherited trait.

Wind sucking

It is characterised by air sucked into the gastrointestinal tract and swallowing of excess air (aerophagia). Sometimes, it may be seen with head nodding, crib biting and tongue rolling. This vice is hereditary. It can be corrected by the application of a wind sucker strap or surgical creation of fistula.

Kicking

Sometimes, cows and buffaloes develop the habit of kicking. This may be due to discomfort or no training (breaking-in) given to a heifer prior to calving. If difficult to control, then a 'milkman's knot' or 'kicking trap' may be used as cows and buffaloes kick while being milked. To handle such an animal, its hind legs are tied with a rope in an eight-shaped knot. It is known as 'milkman's knot'.

Masturbation in bulls

It is common, especially, in bulls on a high protein diet. The behaviour can be modified by administering certain treatments, such as castration, spaying (sterilisation in case of female animals by removing the ovaries) and endocrine implants, which help increase production and enable easy handling.

Practical Exercise

Activity

Visit a nearby dairy farm and evaluate the health of cows based on the signs you observe in them.

Material required: writing material

Procedure

- Visit a nearby dairy farm and observe the cows sheltered there.
- Note down the abnormal physical signs you observe in the animals.



- Try to identify the health condition of the animals based on your observations.
- Make a report based on your observations and present it before the class.

Check Your Progress

A. Multiple Choice Questions

- The usual sign of a healthy animal is _____.
 (a) alertness
 (b) bright eyes and pink eye membrane
 (c) sleek coat
 (d) All of the above
- _____ is not an abnormal behaviour.
 (a) Mismothering
 (b) Suckling
 (c) Nymphomania
 (d) Kicking
- Vices may develop in dairy animals due to _____.
 (a) fear
 (b) nutritional deficiencies
 (c) nervousness
 (d) All of the above
- Vices _____.
 (a) cause physiological problems
 (b) are dangerous for the animal itself
 (c) are dangerous for the animal handler
 (d) All of the above
- _____ is not a sign of an unhealthy animal.
 (a) Staying in herd
 (b) Loss of appetite
 (c) Rough coat
 (d) Lethargic and listless

B. Fill in the Blanks

- Animal _____ describes how an animal is coping mentally and physically with the conditions where it lives.
- _____ is characterised by air sucked into the gastrointestinal tract and aerophagia.
- A cow that is in heat the entire day is _____.
- Masturbation in bulls can be corrected by _____.
- To check kicking habit, _____ or _____ may be used.

C. Mark 'True' or 'False'

- Wind sucking is hereditary.
- Nymphomania is common in low-yielding cows.

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- Wind sucking can be corrected by the application of a wind sucker strap.
- Clean housing improves the health of dairy animals and quality of milk production.
- Masturbation is common in bulls on high protein diet.

D. Match the Columns

- | A | B |
|--------------------------------------|--------------------|
| 1. Wind sucking | (a) Sick animals |
| 2. Article 51A(g) | (b) Kicking |
| 3. Isolation shed | (c) Biosecurity |
| 4. Milkman's knot | (d) Aerophagia |
| 5. Prevention and spread of diseases | (e) Animal welfare |

E. Crossword

		³ A				
¹ F			E			M
		R				
		A	⁴ S			
	² V		C	E		
		A				

Across

- It is the basic need of every farm animal.
- It is a term that describes abnormal behaviour in animals.

Down

- Wind sucking
- This is a kind of animal, which is not interested in its surroundings and does not want to move, indicating health problems.



SESSION 2: PREVENTION AND CONTROL OF PARASITIC INFECTIONS

Parasites are organisms that live on or in a host organism and derive nutrients from it. There are two types of parasite — external (ectoparasite) and internal (endoparasite).

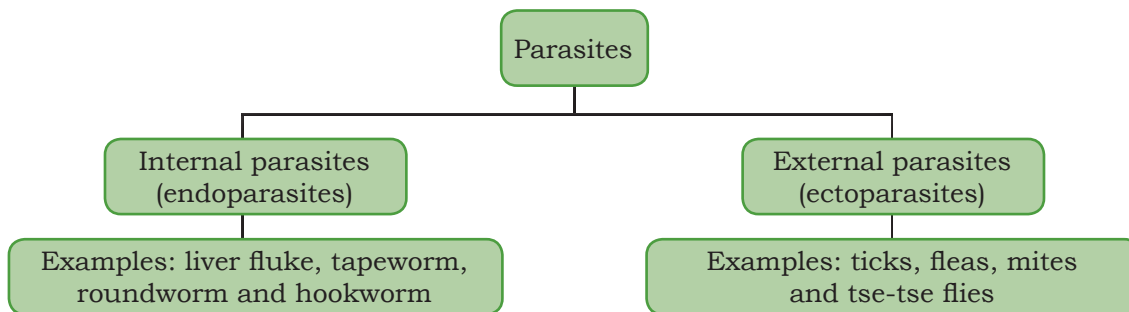


Fig. 2.3: Types of parasite

Parasites cause significant harm to farm animals by causing diseases and infections. They lead to reduced milk yield and weight loss, apart from causing reproductive and clinical problems in dairy animals like rough skin, anaemia and diarrhoea. Besides, a significant cost is incurred on the treatment of the affected animals. Young animals are more susceptible to parasites than adults. Adult animals reared under poor living conditions are also highly susceptible.

Endoparasites (worms)

These are a major problem affecting farm animals. Endoparasites, also called internal parasites or worms, live in the body of a host animal. Eliminating or lowering the rate of parasites in farm animals is an important animal husbandry practice. It can be achieved by de-worming the animals.

These parasites lay eggs in the intestine of the infected animal. When the animal excretes, the eggs of the parasites also come out along with the excreta. As a result, the field, where the animal is grazing and excreting gets contaminated, leading to the spread of infections in other animals, who ingest these harmful parasites or worms while grazing. Due to their grazing behaviour, farm animals are prone to parasitic infections.

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Endoparasites rob the host animal of nutrients and blood. Therefore, it is important to control the occurrence and spread of internal parasites in animals.

De-worming

It is a practice of administering medicines to the infected animals and helping them get rid of internal parasites or worms. The medicines can be administered either orally or through injection. However, it is difficult to completely eradicate worms from a farm. The aim of de-worming is to improve the immunity of the animals and prevent them from catching chronic parasitic infections, thereby, protecting farmers against production losses.

Selection of de-wormer

It has been observed that worms develop resistance against repeated use of a particular de-wormer. Therefore, it is advisable to use de-wormers selectively and wisely. It is recommended that a de-wormer must not be repeated every time. Rather alternative de-wormers must be used. Many de-wormers are available in market but the choice of a de-wormer depends on various factors like age of an animal, its weight and effect of the de-wormer against different parasites. A de-wormer must have the following properties.

- It must cover a wide range of parasites and be active against almost all stages of parasitic growth, i.e., from larva to the adult stage.
- It must not have side effects on the animal. Some drugs may induce vomiting, pain at the injection site or irritation to the skin.
- It must be suitable from practical and economic points of view.
- It must not decompose when exposed to temperature, sunlight and humidity. In other words, it must have a longer shelf life.
- The selected drug must be economical and easily available in market so that dairy farmers can afford it. Besides, it must be easy to use, for example the drug can be fed to the animals by mixing in the feed.



Administering de-wormer

A de-wormer is, usually, administered orally or injected into the animal.

Oral

De-wormers are, usually, available in liquid form, boluses and tablets. Liquid medicines are administered into the infected animal through the mouth with the help of syringes, bottles and drenching guns. Boluses and tablets can be placed deep into the animal's mouth or crushed to powder form, which is then dissolved in water and put into the mouth of the animal with the help of a syringe minus the needle. Sometimes, de-wormers are mixed in the feed. However, in this method, the animal may not always get the required dosage of medicine due to wastage of feed or it may not be able to consume the whole feed. So, it is the least preferred method.

Injection

A number of de-wormers are available as injectable preparations. The prescribed route of injection for a particular de-wormer must be followed strictly.

De-worming schedule

- An animal must be administered a de-wormer from the first week of its life.
- De-worming must be done every month for the first six months, and thereafter, once in three months. Adult cattle can be dewormed once a year.
- A de-worming drug and dosage must be recommended by a veterinarian and be administered under the person's supervision.
- Attention must be paid to dosage to check side effects of a drug on an animal and see to it that it does not develop resistance against the drug.

Ectoparasites

Ectoparasites are organisms that live in or on the skin of an animal but not in the body. They cause damage to the skin, and adversely affect the health and productivity of the animal. Ectoparasites lead to reduced production, in terms of milk, meat and wool,



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thereby, causing huge losses to a farmer. The losses also include the cost that the farmer incurs in the treatment of the ailing animal. These may even cause the death of the animal. Ectoparasites cause harm to livestock throughout the year. But these are most prevalent during summer and rainy seasons.

Harmful effects on dairy animals

Ectoparasites lead to reduced milk yield and retarded growth of the host animal. In some animals, they cause damage to the skin and hair (wool in case of sheep) due to constant rubbing and scratching because of itching. Some diseases are even transmitted to healthy animals from infected ones through ectoparasites. The harmful effects of ectoparasites are shown in Fig. 2.4.

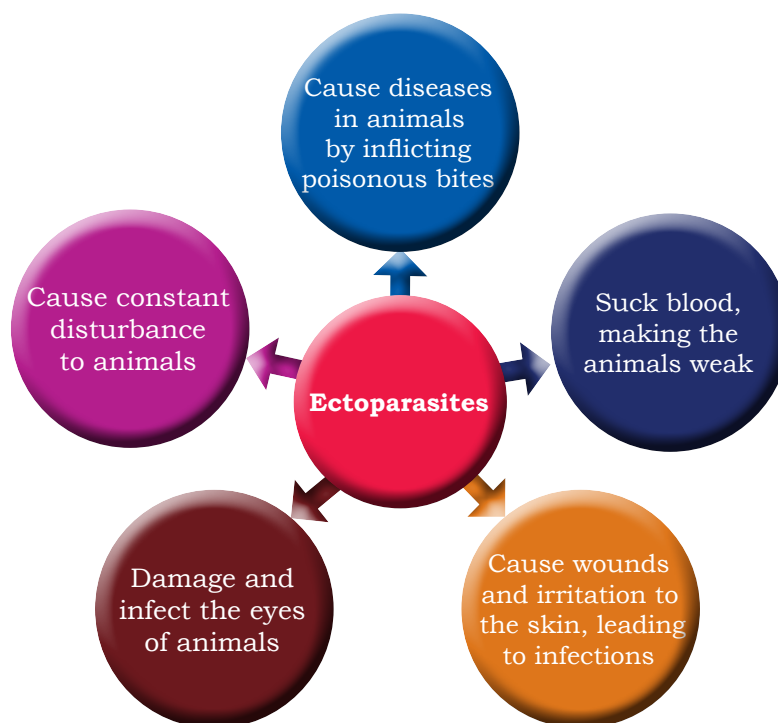


Fig. 2.4: Harmful effects of ectoparasites on animals

Common ectoparasites

Ticks

These thrive on the body of an animal till treated or controlled. They feed on the blood of the host animal. Their bite causes swelling, redness, irritation and itching. They transmit several diseases to the animal.



Mites and lice

They live on the animal's hair and body surface (Fig. 2.5). Lice and mites are permanent residents on the animal's body, and feed on its skin tissues and blood.

Flies

These feed on blood, sweat, skin secretions, tears, saliva, urine and faeces of the animals (Fig. 2.6). They puncture their skin or infest on the wounds. Flies serve as carriers of diseases as they transmit diseases from infected to healthy animals. They also cause irritation and disturbance to the animals, which result in weight gain and reduced milk yield.

Control of ectoparasites

Heavy infestation of ectoparasites results in poor health of the animals. Several medicines for external application are available to check the spread of ectoparasites. However, it is difficult to completely eradicate ectoparasites from a farm. There are several practices directed towards controlling the population of ectoparasites and reducing it to tolerable levels.

Ectoparasite population can be controlled only by adhering to an integrated approach, in which preventive measures are followed in the entire farm, which includes the animals and their sheds. Farmers need to follow effective farm management practices to reduce and check the spread of ectoparasite population. It includes maintaining farm hygiene and health of the animals, trimming grass around the sheds, reducing moisture in and around the sheds by covering the drains, controlling water run-offs and guttering, and ensuring the maintenance and upkeep of sewer lines.

Immediately upon arrival to a farm, all new animals must be treated with ectoparasiticides (agents that kill parasites) to check the occurrence of new parasites in the existing animals. If it is not effective and



Fig. 2.5: Lice lodged in the skin of a buffalo



Fig. 2.6: Flies puncture the animal's skin or infest on wounds.

ectoparasites still manage to find a way to the farm and infect the animals, treat them immediately as per the veterinarian's advice to check their spread. A single dose of ectoparasiticide treatment may not be enough to control the spread of ectoparasites. The first treatment will only kill active parasites present on the animals' body. A second treatment is required after 15–21 days to kill ectoparasites that might have hatched from the eggs since the first treatment. Besides treating the affected animals, it is necessary to clean and disinfect the sheds, paddocks and barns with disinfectants so as to kill the parasites and their eggs.

Despite all these efforts, some active ectoparasites and their eggs may still be found on the ground and walls of animal sheds. These ectoparasites can live on surface for days without nutrition. Therefore, insecticides must be sprayed on buildings, paddocks, barns, etc., every two weeks.

Methods to check ectoparasites

Ectoparasiticides may be applied to animals by several methods. However, these must not be administered to sick animals. Fig. 2.7 shows some of the common methods used for checking the spread of ectoparasites.

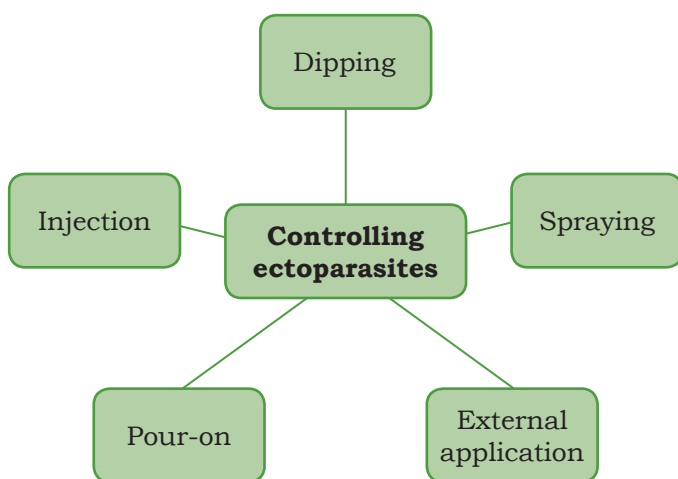


Fig. 2.7: Various methods to control ectoparasites

Dipping

It is preferable for small-sized animals like sheep and goats. It is effective if a large number of animals is to be treated. An affected animal is lifted and dipped into a tank filled with an ectoparasiticide solution, ensuring that its head is also dipped inside. Dipping must be done early in the morning, so that the animal is not immediately exposed to the hot Sun. Dipping is not recommended if heavy rain is expected as the medicine may get washed off.



Spraying or external application

Using sprays is the most common method of applying ectoparasiticides. It is effective, especially, if a small number of animals is to be treated. If a spray is not available, then a recommended medicine may be applied on to the animal with a paint brush or cloth. The affected animal must be tied securely before the medicine is applied. The medicine must be applied from the head to the tail, covering all areas of the body. While applying the medicine, the eyes, nostrils and mouth of the animal must not be exposed.

Pour-on medicine

A small volume of recommended medicine for treating ectoparasite infection is poured along the backline of the animal (Fig. 2.8). The exact quantity of a pour-on medicine to be applied is measured on the basis of the animal's body weight and the extent of parasitic infection. The medicine is measured in micrograms (mcg) with the maximum amount to be administered being 500 mcg. It disperses over the body surface and kills the infesting ectoparasites. It is an effective method of controlling the spread of ectoparasites.



Fig. 2.8: Medicine being poured along the backline of a cow



Fig. 2.9: A medicine being injected into a calf through subcutaneous route

Injection

Some medicines can be injected into the animal through subcutaneous route (Fig. 2.9). These medicines can control a range of parasites (both endoparasites and ectoparasites). These are, generally, more expensive than anti-bacterial, anti-viral or anti-fungal medicines used to treat other infections.

Precautions during medicine application

Appropriate dosage

Always administer the recommended dosage of medicines. Too high concentration may cause harm to the animals, whereas, too low concentration may develop drug resistance in them.

Wear protective clothing

People involved in handling and administering medicines to the animals must wear protective clothing, i.e., mask, goggles, gloves and boots to avoid contact with chemicals. If there is a contact, wash the area immediately with soap and water. Spraying or applying medicines on the animals must not be done in a confined and non-ventilated area.

No dosage to sick animals

Ectoparasitocidal medicines must not be administered to sick animals or those under stress because these may cause further sickness and side-effects in them.

Provide feed and water to animals before dipping

The animal must be provided with sufficient feed and water before being dipped in medicine solution as thirsty or hungry animals can drink the solution or lick their own body, which may be harmful.

Appropriate disposal of leftover medicines

Care must be taken that leftover medicines and chemicals do not contaminate the environment and are disposed of appropriately. Leftover medicines and chemicals must never be disposed into rivers or ponds. These can be drained into pits, which must be at least 150 metre away from water sources.

Cleaning of used equipment

Sprayers and other tools and equipment used in administering medicines to the affected animals must be cleaned immediately after use.



Practical Exercise

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Activity

Identify ectoparasites in a nearby dairy farm.

Material required: forceps, magnifying glass and writing material

Procedure

- Visit a dairy farm in your locality.
- Examine the animals living there for ectoparasites.
- Collect some ectoparasites with the help of forceps.
- Identify the ectoparasites and note down their names in your notebook.
- Present it before the class.

Check Your Progress

A. Multiple Choice Questions

1. The methods of controlling ectoparasites is/are _____.
(a) dipping (b) hand spraying
(c) injection (d) All of the above
2. Insecticides must be sprayed on buildings, paddocks and barns with a suitable chemical every _____.
(a) two weeks (b) two months
(c) three months (d) None of the above
3. Dipping must be done in the _____.
(a) afternoon (b) early morning
(c) evening (d) Any time
4. For effective control of ectoparasites, a second treatment is, usually, required after _____ of the first treatment.
(a) 7–9 days (b) 15–21 days
(c) 1–2 months (d) 3–4 months
5. A person handling and applying ectoparasiticide to animals must wear _____.
(a) only gloves (b) only goggles
(c) only mask (d) All of the above

B. Fill in the Blanks

1. _____ are organisms that live on the skin of other animals.
2. Ticks feed on the _____ of an animal on which it lives.
3. Ectoparasites are responsible for the transmission of _____.
4. For pour-on method, the preparation must be poured along the _____ of an animal.
5. Some ectoparasiticides can be injected into animals through _____ route.



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C. Mark 'True' or 'False'

1. Heavy infestation of ectoparasites is, usually, associated with poor health.
2. A single treatment with ectoparasiticide may be enough for checking the spread of ectoparasites.
3. Dipping of an animal can be carried out in all seasons.
4. Ectoparasitocides must not be administered on to sick animals.
5. Ectoparasite control cannot be achieved by an integrated approach.

D. Match the Columns

A	B
1. Worm	(a) Tank filled with solution
2. Ectoparasite	(b) Applied on the backline of animals
3. Dipping	(c) Administered orally or through injections
4. Pour-on	(d) Endoparasite
5. De-wormer	(e) External parasite

E. Crossword

		¹ P				
² M	O	R		I	N	G
			³ W			
				⁴ F		Y
⁵ H		I				
			M			
		E				

Across

2. Dipping should be done during _____ time.
4. _____ feed on the blood, sweat, skin secretions, tears, saliva, urine and faeces of animals. They puncture the skin directly or infest on wounds of the animals.
5. Mites and lice live on _____.

Down

1. Organisms that live on or in another organism, known as the host, obtain nutrients from the body of the host animal.
3. Another name of internal parasites is _____.



SESSION 3: MANAGEMENT PRACTICES FOR MAINTAINING ANIMAL PRODUCTIVITY

Identification of dairy animals

Record keeping in a livestock farm starts with the identification of animals. It allows a dairy farmer or entrepreneur to maintain records, such as an animal's date of birth, production, health history and other important management information like data on feed, vaccination and body weight. Hence, accurate and precise record provides adequate information to the dairy farmer or entrepreneur to make individual or herd management decisions. Accurate identification of an animal, coupled with its record card, plays an important role in animal breeding and production, as well as, eradication and prevention of several diseases, and food safety. Animal record cards also help trace outstanding or poor performing animals in a farm.

Animal identification methods

There are many animal identification methods as shown in Fig. 2.10. But a method that best fits the needs of a dairy farm must be selected. Tagging is the most commonly used method for the identification of animals.

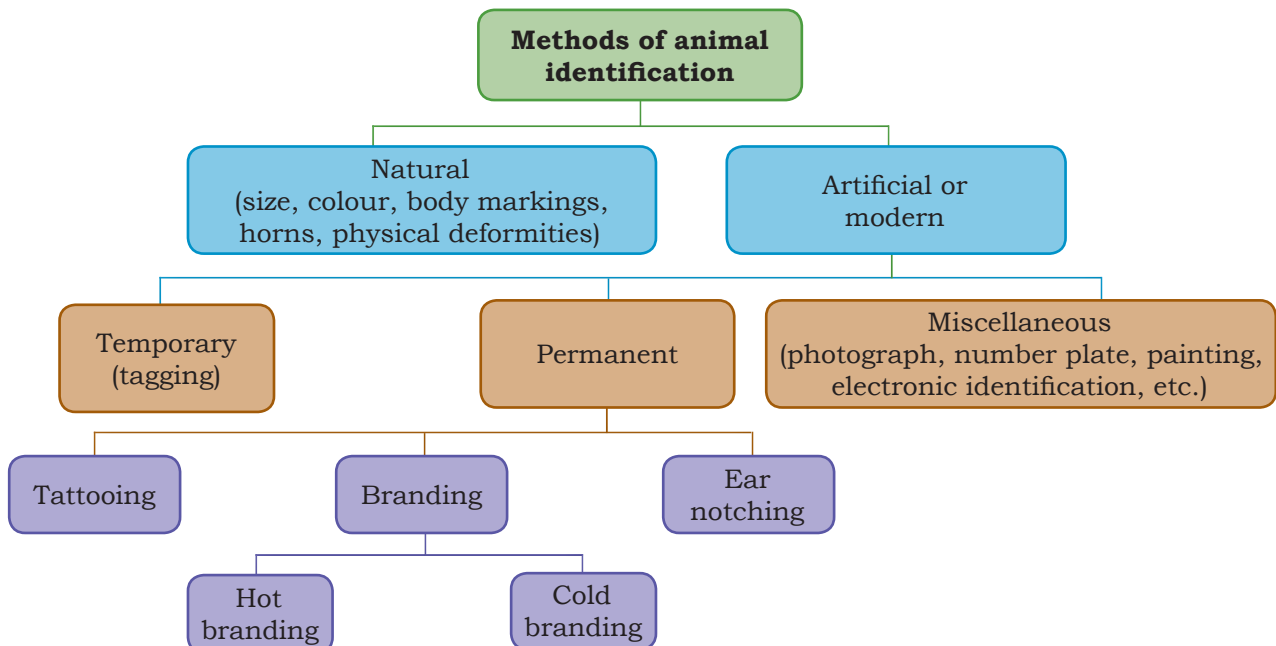


Fig. 2.10: Various methods of animal identification practised in a dairy farm



(a)



(b)

Fig. 2.11 (a and b): A buffalo and calf with an ear tag

Tagging

Ear tags are the most common form of identification used in all farm animals as these are cheap and easy to fix. Besides, the number mentioned on the tag is readable from a distance [Fig. 2.11 (a and b)]. Tags must, preferably, be fixed in the centre of the ear between the second and third cartilage ribs, approximately at a distance of one-half from the base to the tip of the ear. The pliers used for tagging are calibrated to fix the tag in a manner that is not too tight. Tags can be fixed to one or both the ears.

Tattooing

Tattooing is not practised in buffaloes due to their dark skin tone. It is, generally, done at a young age. For tattooing, clean the left ear from the inner side with spirit. Remove surplus hair. Fix a number in the tattooing machine. Apply tattooing ink and tattoo the number using the machine. The tattoo must be applied on a light coloured area of the animal's skin. Prominent veins must not be ruptured in the process. Restrain the animal at the time of tattooing.

Branding

Like tattooing, branding, too, is not practised in buffaloes due to their dark skin tone. 'Branding' refers to administering some mark, either letters (A to Z) or numbers (0 to 9) on the animal's skin with a hot or



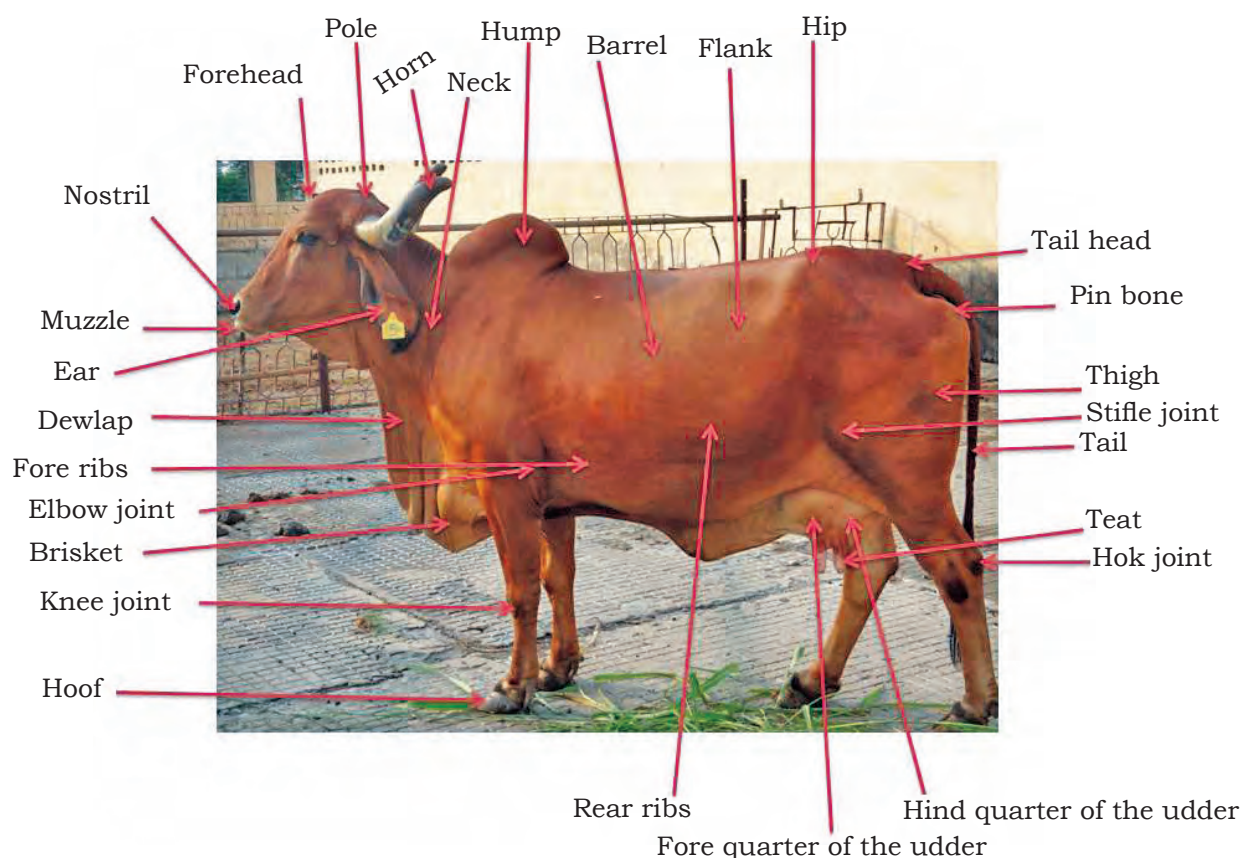


Fig. 2.12: Body parts of a cow

cold iron rod or chemicals. It leaves a permanent scar and damages the epidermal cells of the area. Branding mark can be easily seen from a distance. Heifers need to be at least one-year old for branding. The usual sites for branding are shoulders, hind quarters, cheek and horns of the animal.

Electronic Identification Device

There are several forms of electronic identification that are used. Electronic Identification Device (EID) options include the following.

- Bar-coded, tamper-resistant ear tags
- Radio frequency identification (RFID) ear tags
- Injectable transponders
- Rumen boluses

Heat detection

Heat or 'estrus' is the period of intense sexual urge or excitement experienced by female animals. This is the period when a female accepts a male for mating. When

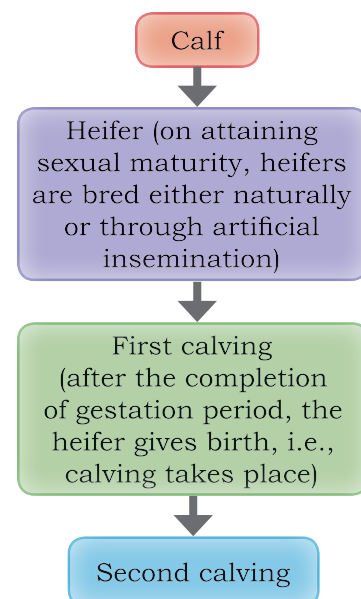


Fig. 2.13: Different stages of reproduction in a cow and buffalo



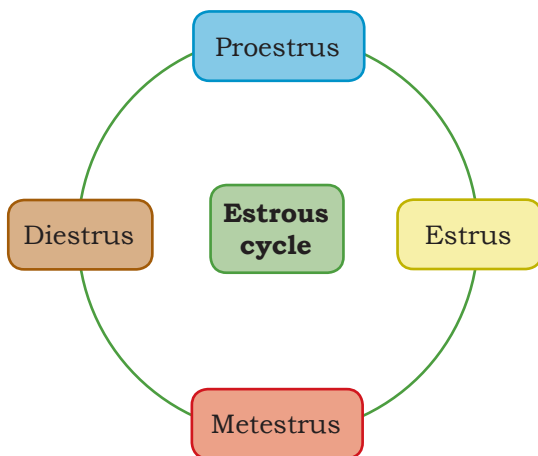


Fig. 2.14: Phases of estrous cycle in cows and buffaloes

the female is in heat, the male can detect it and mating takes place.

In dairy farming, females are reared for milk production. Long term and consistent milk production solely depends on regular and successful reproductive activity by dairy animals. After giving birth, milk production (lactation) starts in females. Therefore, a desirable level of reproductive efficiency must be maintained to get optimum production. A farmer, therefore, has to detect female animals, in heat and ensure that mating takes place at appropriate time for successful conception. Heat detection is one of the toughest tasks in dairy farming.

Estrus is the only observed phase of the entire estrous cycle. The average estrous cycle in cows and buffaloes is 21 days. However, it can be as short as 18 and as long as 24 days. The estrous cycle starts with puberty and continues till successful pregnancy. The four phases of estrous cycle are shown in Fig. 2.14.

Signs of heat (estrus)

Detection of heat is one of the most important and difficult activities in a dairy farm. By simply observing the changes in a female animal's behaviour, one can detect if it is in heat. The signs of heat are classified into primary and secondary (Fig. 2.15).

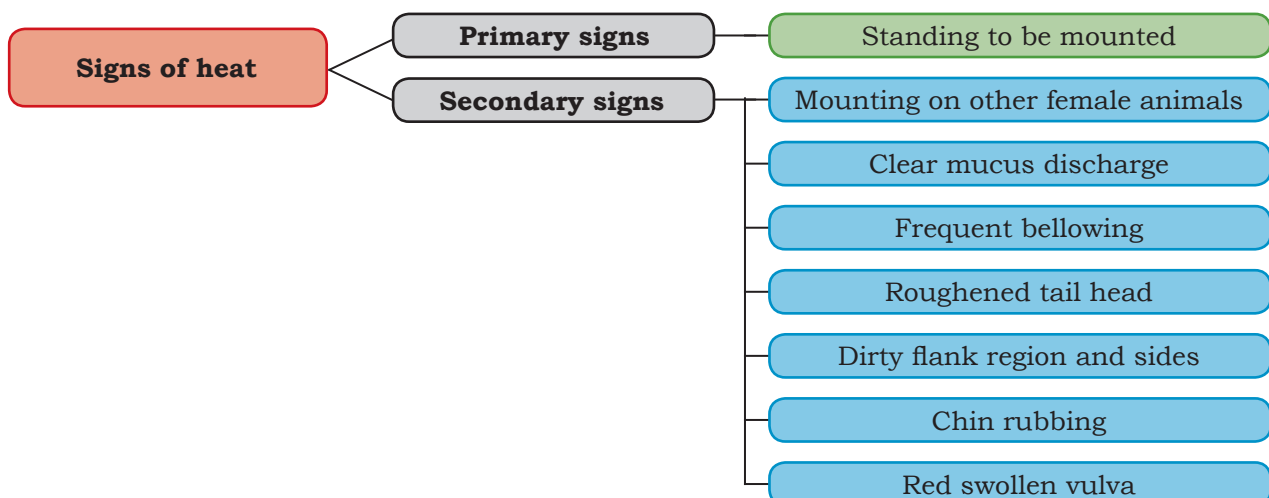


Fig. 2.15: Primary and secondary signs of heat





Fig. 2.16: Primary sign of heat — mounting activity in a buffalo

Heat detection methods

Heat or estrus detection is the most important activity of reproductive management. Accurate heat detection is essential for regular calving. Under natural conditions, a male has the ability to detect a female in heat through sensorial ability and mating takes place. In intensive production system, natural mating is discouraged in dairy animals. Cows and buffaloes are inseminated artificially either by liquid semen or cryo-preserved semen. This process is called 'Artificial Insemination' (AI). As the insemination activity is human driven, it is important to detect the heat period of a cow or buffalo, and conduct AI to ensure pregnancy.

When cows and buffaloes are confined to a place, estrus expression is not intense. Sometimes, it is not visible and may even go unnoticed. Even teaser bulls are unable to detect it at times. Weak estrus activity is closely related to productivity and genetic make-up of the cow or buffalo. If the cow or buffalo is unable to conceive at the apt time, there will be an increase in the 'open period'. As the open period increases, calving interval also increases. As a result, the profitability of a dairy farm decreases drastically.

In developing countries, AI is not a popular method because of inefficient detection. Heat detection can be successful only in the following conditions.

- Accurate identification of cows and buffaloes
- Maintenance of breeding records
- Presence of trained personnel
- Spending sufficient time to observe estrus signs in cattle



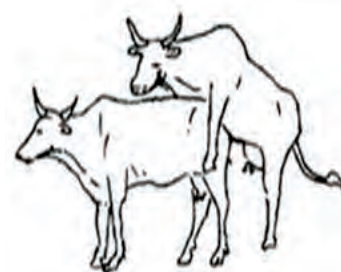
(a) Lips of the animal's vulva are red and swollen



(b) Clear, thin mucus hangs from the vulva



(c) The animal sniffs and is sniffed by others



(d) The animal stands still till in heat

Fig. 2.17 (a-d): Visible signs of estrus in cows and buffaloes

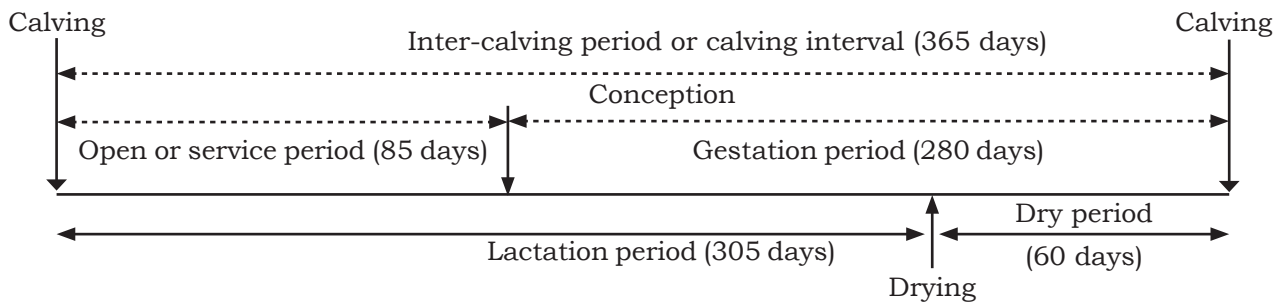


Fig. 2.18: Diagrammatic representation of periods between two successive calvings in a cow

Fig. 2.19 depicts the various methods commonly practised in dairy farms for detecting female animals in heat.

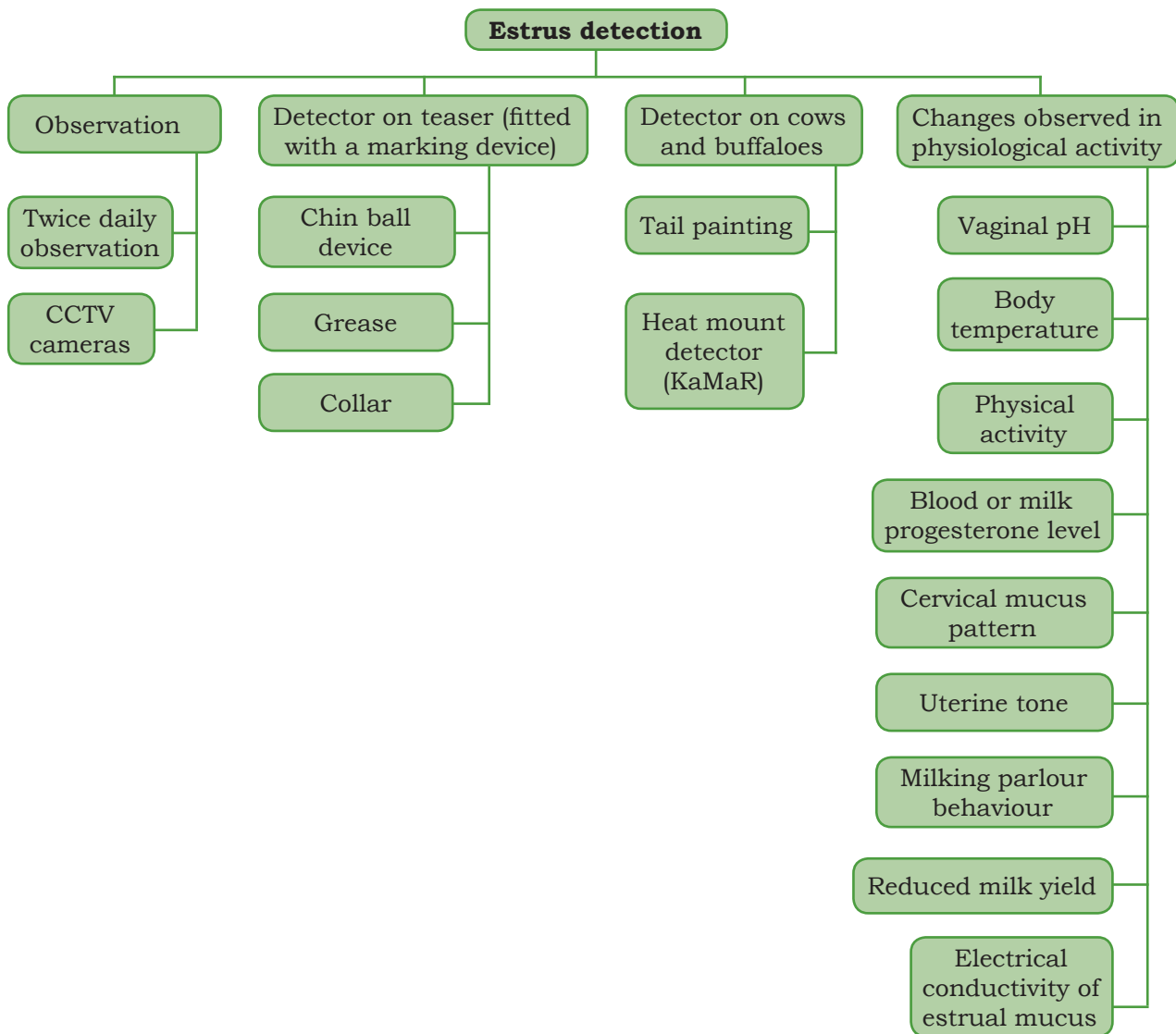


Fig. 2.19: Various heat detection methods practised in a dairy farm



Observation

It is an easy and efficient method for detecting a female animal in heat. Maximum estrus activity occurs from 6 pm to 6 am, and during cooler parts of the day, when farm animals, including cows and buffaloes, are more active. Observation must be carried out for at least 30 minutes at a stretch, two to three times a day, especially, during early morning, late in the evening or at night. Mounting activity in cows and buffaloes in estrus shows that it is not distracted by regular farm activities, such as feeding and milking. Some large commercial farms install CCTV cameras, which record all activities of the animals 24×7. Hence, the cows and buffaloes in estrus can be easily identified. Therefore, it must be ensured that the identification marks on the animals are visible.

Detector on teaser bulls

Usually, bulls or bullocks are used as teasers. Cows and buffaloes, having cystic ovary treated with androstenedione, may also be used for this purpose. Bulls that are surgically vasectomised or have a deflected penis, and bullocks treated with estrogen are, generally, used as teasers. Some farms allow only one teaser in a herd of cows or buffaloes that too at a particular time. A farmer observes and notes down the number of cows or buffaloes mounted by the teaser bull. However, this is possible only in a medium sized farm as there will be only few animals in heat on a particular day. In large farms, the teaser is, usually, fitted with some marking device and allowed to stay with the herd throughout the day, so that it leaves a mark over the cows or buffaloes while mounting. A marking device is attached to the bull's chin (chin ball mating device), brisket (grease) and collar (pad soaked in dye or grease).

Though the teaser is efficient in detecting heat in female animals, this method has some limitations. Extra cost is incurred in feeding and management of teaser bulls like upkeep, medicines and surgery. Sometimes, it becomes dangerous for workers to control the teaser.

Artificial Insemination

Artificial insemination (AI) is a process, wherein, a male animal's semen is collected, processed, stored and artificially introduced into the reproductive tract of female animal showing signs of estrus, so that it conceives. It is called so as it is a human-driven activity. In the natural process, a bull mounts on to a cow or buffalo when the latter is in heat. This process is called 'natural service' (NS).

Advantages

- Superior bulls are used for upgrading and crossbreeding, thereby, improving the overall genetic merit of the herd.
- Even several years after the death of such a bull, its semen can be preserved and used for insemination purpose.
- A dairy farm need not maintain such a bull round the year, thereby, reducing the management cost.
- AI helps in rapid identification of fertility problems in female dairy animals.
- There is decreased risk of disease transmission in artificial insemination.
- The animal handler is safe as there are no aggressive males in the farm.
- The problem of using heavy bulls on younger heifers can be eliminated.
- In AI, the number of bulls required for breeding purpose is reduced considerably.
- Frozen semen technology facilitates cross-country transport of semen instead of bulls.
- The genetic merit of exceptional bulls can be used widely in this method.
- Recent advance technologies like embryo transfer are possible only because of AI.

Disadvantages

- A skilled technician is required for carrying out artificial insemination in female animals, which may add to the farmer's overall cost.



- Detection of animal in heat is mandatory. If signs of estrus go unnoticed, AI may not yield the desired result and may cause a major loss to the farmer as animals are mainly reared for production purpose. Therefore, detection of heat at accurate time is important.
- If an infected bull's semen is used for artificial insemination, it may pose a threat to female animals in the farm. If not detected in time, then chances of disease transmission is high.
- Breakage of 'cold chain' during the transportation of semen affects the success of AI. 'Cold chain' refers to storing and maintenance of semen in cold temperature, i.e., at -196°C in liquid nitrogen.
- It requires more time than natural service.
- Human error in executing the process of AI may adversely affect the fertility of the animals.

When and how to inseminate

The best time to inseminate a cow or buffalo is 12–18 hours after estrus is detected. A common rule of am–pm can be adopted for inseminating the animal. Under this rule, an animal that shows heat in the morning must be inseminated in the evening the same day and one that shows heat in the afternoon needs to be inseminated in the morning the next day.

AI must be done at the appropriate time and place. An ovum is released from the ovary 10–14 hours after the end of heat. The life span of an ovum is 10–12 hours inside the uterus of the cow or buffalo. Therefore, it must be fertilised within 10 hours of ovulation, else it will die. In contrast, spermatozoa are viable for 24 hours at the same place and must undergo some chemical changes (like capacitation) inside the uterus before fertilisation.

Insemination technique

The success of AI depends on the skill of the inseminator, as well as, the sanitary conditions maintained during insemination. Two methods are commonly used for AI — speculum and recto vaginal.

Speculum method

Here, speculum lubricated with paraffin is inserted into the vagina of the animal for dilation. The cervix is detected visually by the use of a headlight torch. An inseminating pipette, containing diluted semen, is inserted into the vagina of the animal. The semen is deposited into the uterus (in front of the cervix). This method is suitable for a less trained person.

Recto vaginal method

This is the most widely used method as it is simple and easy to carry out. Fig. 2.20 shows the steps followed in this method.



Fig. 2.20: Steps followed in recto vaginal AI method



- Step 1: Secure the cow or buffalo in a service crate.
- Step 2: Wear a glove in the left hand and lubricate it with a soft soap. The hand is then inserted into the animal's rectum, making a cone with the fingers and thumb.
- Step 3: Take out dung from the rectum (back raking).
- Step 4: Pull the cervix proximally for easy insertion of the insemination gun.
- Step 5: Palpate the uterus and hold the cervix.
- Step 6: Check redness in the vulva.
- Step 7: Dilate the vulva lips and insert the insemination gun at 45 degree angle.
- Step 8: Push it forward and manipulate the gun to pass through the cervix.
- Step 9 Slowly deposit semen at the entrance of the uterus.

Pregnancy detection in cows and buffaloes

Detection of pregnancy in cows and buffaloes after mating is directly related to their overall productivity, and ultimately, profitability of a dairy farm. Pregnancy diagnosis is based on the exhibition of some signs or detection of certain pregnancy related hormones in the animal.

An animal owner may sometimes get misguided by the signs of pregnancy that the animal shows. Therefore, it is important to observe the animal and check it for pregnancy so as to provide it with better care. If the animal does not get pregnant, it is treated for infertility or other reproductive disorder (if required). This helps in shortening the unproductive period of the animal and also saving its life. If the problem is not curable, then culling is the only way out. The method of pregnancy diagnosis must be affordable and accurate.

Signs of pregnancy

The animal must be carefully observed as many signs do not always give an accurate result. Common signs that indicate pregnancy are as follows.

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Non-return to estrus

If the cow or buffalo does not exhibit estrus 21–24 days after mating or AI, then it can be assumed that it is pregnant.

Increased appetite

The appetite of the animal increases as pregnancy advances.

Tendency to gain weight

Pregnant animals have a tendency to gain weight.

Increased volume of abdomen

In the third trimester of pregnancy, there is a significant increase in the abdominal volume of the animal.

Direct methods of pregnancy detection

As the name suggests, this method involves direct detection of tissues and associated fluids in the foetus either manually or with the help of an electronic equipment.

Per-rectal examination

Per-rectal palpation of female reproductive organ is the most common method of pregnancy diagnosis. It is, usually, performed between 35 and 42 days after mating or AI. Per-rectal examination is a quick method (an experienced person takes 1–2 minutes). It is a reliable and safe method of pregnancy diagnosis. However, per-rectal examination may sometimes provide erroneous information or result due to certain diseased conditions in the uterus like pyometra or mucometra.

Palpation process

The animal is restrained in the service crate. Most people use the left hand for rectal palpation, although either hand may be used. Wear a full sleeve glove on one hand (usually, the left hand) and apply some lubricant. Then, insert the hand gently into the rectum of the cow or buffalo. Rectal contraction prevents the hand to make palpation. So, allow the contractions to pass, and then, palpate the reproductive organs.



Trans rectal ultrasonography

An ultrasound device can be used to carry out per-rectal pregnancy diagnosis. A rectal probe is placed inside the animal's rectum above the uterus. The probe produces sounds that diffuse into the adjacent tissues and reflect to the probe. It generates an electrical pulse and the video is displayed on the monitor kept nearby. A black image is generated by the fluid-filled placenta as the ultrasound is absorbed by the fluid. Besides, light grey or white image is produced by the dense structure of the embryo.

Ultrasonography is a more reliable method than per-rectal examination. It helps in the early diagnosis of pregnancy (25 days after mating or AI) and determination of embryo or foetus viability. Besides, it reduces chances of error (false negatives and positives) in pregnancy diagnosis. However, the high cost of the instrument is a major limitation of this method.

Management of the calf from birth

Cleaning the nostrils

As soon as a calf is born, its mouth and nostrils must to be cleared of 'mucus'. Mucus must be removed from the throat too. Straighten the calf's neck so that the airways are not obstructed. Lifting the calf up by the hind legs will help drain out fluids from its respiratory tract. Cold water may be sprinkled on its face to induce gasp reflex and breathing. The umbilical cord must not be cut until the calf starts breathing. If the calf is not able to breathe, artificial respiration may be administered.

Initiation of breathing

After the calf is born, some stimulation may be required to induce breathing. Stimulate the calf by rubbing it briskly, tapping it on the ribs or tickling its nostrils with a straw. The simplest method to induce breathing is to insert an inch or two of a straw into the calf's nostrils and move it in and out. The calf will shake its head, sneeze and start breathing within 5–10 seconds. This method is also recommended for healthy calves to help clear the lungs.



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Cutting the umbilical cord

The umbilical cord is cut at a distance of 1.5 inch from the body. The cord attached to the calf's body is dipped into a disinfectant like tincture iodine solution. The remaining portion of the umbilical cord is buried in soil.

Colostrum feeding

Colostrum is the thick yellowish fluid secreted by the mammary glands of all mammals, including cows and buffaloes, during the first 4–5 days of parturition (birth of a calf). Being the first milk produced by mammals, it is rich in antibodies, energy, protein, vitamins and minerals, and hence, called 'liquid gold'. Colostrum must be fed thrice a day for the first three days after the calf is born. It precedes the production of 'true milk'. The antibodies present in colostrum protect the newborn from diseases and pathogens during the early days (about one month) of its life. The type of antibodies the colostrum contains depends on the antigens to which the dam was exposed to during vaccination at the time of pregnancy.

The total solid and immunoglobulin content of colostrum vary considerably from one animal to another. Colostrum contains about 24 per cent solid and 6 per cent immunoglobulin content. The immunoglobulin content varies from 2–23 per cent (whole milk, normally, contains less than 0.1 per cent) and is directly related to solid content present in the colostrum, which varies from 17–36 per cent. The appearance of colostrum is an indication of its quality.

A colostrometer is used to indicate the quality of colostrum. It estimates solid content present in the colostrum by measuring specific gravity. Good colostrum has a specific gravity above 1.05.

A calf is born without any immunity (resistance) to infections and diseases. A newborn calf acquires passive immunity when it absorbs the intact immunoglobulins through its intestinal wall. The degree of passive immunity is directly related to the concentration of immunoglobulins in the calf's blood. Calves may not acquire passive immunity when:



- they are not fed enough colostrum.
- they are fed colostrum containing low immunoglobulin content.
- they are not fed colostrum within 30 minutes after birth.
- they lack the ability to absorb immunoglobulins.

Time of first colostrum feeding

A newborn calf must get the first dose of colostrum within 15–30 minutes of birth so that it gets maximum antibodies, followed by the second feeding, approximately 10–12 hours later. In a day, a calf requires colostrum 10 per cent of its body weight. The amount of antibody absorption by the calf depends on the time of colostrum feeding after birth. Antibody absorption through the gut decreases to about 30 per cent within six hours and ceases completely after 24 hours of birth.

Substitute for colostrum

If colostrum is not available to feed the calf due to some reason like death of the dam or the dam being unable to produce it, substitutes can be used. These substitutes are nutritionally not as good as colostrum and lack essential immunoglobulins. One whipped egg, 600 ml of whole milk, 300 ml water and 2 ml castor oil must be mixed to prepare artificial colostrum (Fig. 2.21).

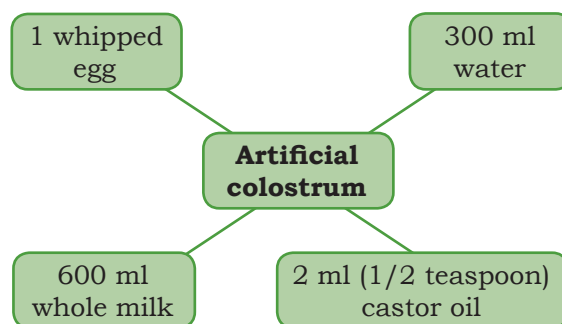


Fig. 2.21: These items are mixed to make artificial colostrum.

Housing

Calves are housed in individual pens until they reach the weaning age. Separate pens prevent the calves from suckling one another and reduce the spread of calfhood diseases. Housing calves individually allows recording a calf's daily feed intake and monitoring it for diarrhoea, other diseases and infections. The pen must be ventilated, cleaned and kept dry. It must be ensured that the calves get fresh air at all times without drafts blowing directly on to them. Ammonia smell indicates that more fresh air is required. Allow more air into the area through broad and continuous openings in the barn to prevent drafts.



The pens need to be bedded in a manner so as to keep the calves comfortable and dry throughout their stay. Sawdust or straw are most commonly used for making the bedding of the animals. Outdoor pens must be partially covered and walled to protect the newborn calves from excess heat, cold, rain and wind. The pens must open to the east so that they get the morning sunlight and shade during warmer parts of the day.

Removal of supernumerary teats

Dairy heifers often have extra teats (supernumerary) in addition to normal ones. Supernumerary teats present no problem if removed when the calf is 1–2 months old. If not, extra teats may interfere with teat cup placement (in case of machine milking). As a result, they become extra functioning milk glands or get infected easily. Extra teats detract from the udder's normal appearance.

Weaning

The literal meaning of the term, weaning, is to start feeding a young animal with feed other than its mother's milk. However, most commonly, weaning is defined as permanent separation of the young one from its mother. The calf may be permanently separated from its mother:

- just after birth.
- while being nursed after first feeding.
- after 2–3 days (colostrum feeding period).
- after 7–8 weeks (up to functional rumen development in the calf).



Fig. 2.22: Weaned calves being kept in a group



The weaned calves can be kept in individual pens or in a group (Fig. 2.22). They must be fed with fresh milk at a temperature of 39–40° C. These calves are taught to suck milk from a pail or a nipple feeder [Fig. 2.23 (a–c)].

Advantages

- It helps maintain a record of the dam's actual milk yield.
- Weaning helps avoid risk of injury to the dam's teats by calves during suckling.
- The risk of complications due to under or over feeding of the calf is negligible post weaning.
- It ensures a hygienic milking process.
- Milking animals, having strong maternal instinct, can be difficult in case of a calf's death. Weaning can help check this problem.
- Weaning allows the calf to be culled at an early age.

Disadvantages

- Weaning is difficult in *desi* (Indian) cows and buffaloes owing to their strong maternal instinct.
- Weaning causes stress in young calves as they are permanently separated from their mothers.
- If milk feeding utensils are not clean, then chances of neonatal diarrhoea in calves increases.
- In weaned calves, the lack of suckling satisfaction may lead to abnormal behaviour like inter-suckling.

Feeding

Feeding ensures rapid growth, health and weight gain in calves. They develop immunity to fight against diseases and infections.



(a) A dairy worker puts two fingers, dipped in milk, into the calf's mouth.



(b) The dairy worker slowly takes the calf's mouth down to the milk vessel with the help of fingers.



(c) The calf learns to suckle milk. The dairy worker slowly withdraws the fingers, encouraging the calf to drink milk from the vessel voluntarily.

Fig. 2.23 (a–c): Training the calf to drink milk

Training the calf to drink or suck milk

Calves may be fed from a nipple bottle, nipple pail or vessel, having a wide opening. One must ensure that the nipple pail or bottle is clean before teaching the calf to suck milk. Raise the nipple while feeding so that the calf keeps its head up while drinking milk.

Training the calf to drink milk from an open pail is easier if it is separated from the dam, i.e., weaned, immediately after birth. Newborn calves that have never been nursed learn quickly. The procedures for teaching the calf to drink milk from an open vessel are as follows.

- Hold the calf and straddle its back.
- Dip two fingers into warm milk, and gradually, draw the calf's head down to the milk while it licks the fingers.
- Remove the fingers when the calf starts drawing milk into its mouth.

Avoid under and over feeding

The amount of feed needs to be adjusted, according to the body weight of the animal rather than its age. The calves of buffaloes are, generally, heavier than those of cows in the same age group. Under feeding of calves causes stunted growth, whereas, over feeding causes digestive problems, which sometimes may even become fatal.

Feeding schedule

As the calf grows, its diet changes from completely liquid to solid, as you may have observed. The different kinds of feed for calves as per their age are shown in Table 2.2.

Table 2.2: Kinds of feed for calves according to age

Age (days)	Colostrum (kg)	Whole milk (kg)	Skimmed milk (kg)	Milk replacer (kg)
1–4	1/10 th of the body weight	—	—	—
5–14	—	1/10 th of the body weight	—	—
15–28	—	1/20 th of the body weight	1/20 th of the body weight	0.1
29–42	—	1	1/10 th of the body weight	0.5



43–56	—	0.5	3	0.5
57–70	—	—	3.5	0.75
71–90	—	—	3	1

Calf starter

The first dry feed offered to calves is called ‘starter’. After few days of birth, the calf must be encouraged to consume dry feed — calf starter and hay — so as to avoid stomach upset and prevent nutritional scours. Dry feed consumption is necessary for the calf to develop a functioning healthy rumen.

Calf starters must not be dusty, mouldy and have a stale or foul smell or flavour as they can adversely affect the animal’s feed intake. A mouldy starter can also adversely affect the calf’s health. The calf starter must be nutritious, easily digestible, palatable, rich in energy content, and contain 18–20 per cent crude protein and less than 7 per cent fibre as low levels of fibrous material add to calf growth. Calf starters must either be coarsely ground, rolled or pelleted. If the starter is finely ground, palatability and feed intake are reduced. Coarse and dry feed promote development of the calf’s first stomach called ‘rumen’ and provide nutrients necessary for animal growth.

Milk replacer

It is a substitute for milk to reduce the cost of calf rearing. It must have nutritional properties equivalent to that of milk. Generally, newborn calves lack enzymes to digest non-milk foodstuff like grains, sugar, vegetables and forages. Therefore, milk replacers are given to them. Milk replacers are made from dried milk and milk by-products like skimmed milk and buttermilk, or with animal or vegetable fats, antibiotics, vitamins and minerals.

A milk replacer must contain at least 22 per cent protein, 15 per cent fat and less than 0.5 per cent crude fibre. It can be given to the calves a fortnight after birth. However, at this age, the calves cannot be kept

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on milk replacer alone. Because of its high fat content (10–25 per cent), it is advisable to mix milk replacer with warm water. The proportion of this mixture and water must be 1:8. Milk replacer may be fed warm but not above 100 °F.

Dehorning

It is the process of removing horns from the bud (disbudding) and preventing their growth. In the process, horn producing tissues are also removed. The process is carried out at an early age. Disbudding can be done up to six months of age. The following are the aims of dehorning.

- To check injury to other animals during fights
- To handle the animals easily without causing any danger to the attendant
- To accommodate more number of animals in less space and feeding area
- To transport the animals easily without the risk of injury to them because of horns
- To feed the animals in group with less interference from dominating animals

Methods of dehorning

Dehorning can be done by various methods, depending on the age of the animal.

Physical methods

Several type of hot iron dehorning tools are available in market. This method is best suited for calves less than two months old. Dehorning by physical methods can be carried out at any time of the year. If carried out correctly, there is no loss of blood or occurrence of wound that can become infected. Some of the tools used for the purpose are as follows.

- Hot iron
- Dehorning knife or spoon (gouge)
- Dehorning tube
- Barne-type dehorner
- Dehorning clippers and saws
- Rubber bands



Chemical (caustic stick or paste) method

This method of dehorning is used in calves aged one to two weeks, during which there is little horn growth. It involves destroying the horn bud tissues by applying caustic paste or using a stick.

Castration

It refers to depriving male animals of their gonadal function by removing their reproductive organs. Castration causes sterilisation (preventing the animals from reproducing), thereby, making the animals docile and easy to handle. Besides, it reduces chances of fight between male animals. Males can be castrated at any time in their lives but it is better at $1-1\frac{1}{2}$ years of age when they are to be used for draft purposes. Burdizzo's castration method is a commonly used method.

Determining the age of animals

Determining the age of the animals is important for the following purposes.

- Selection and purchase of the animal
- Fixing the price of the animal
- Determining the dose of drugs according to the animal's age
- Estimating the age of the animal in the absence of records

Methods to determine age

The actual age of the animals is ascertained from farm records. Indirect ways of determining the approximate age of the animals are used in case records are not available.

Physical appearance

Younger animals are more active than adults. They have light skin tone, smooth coat, and narrow and small hooves. Older animals are large in size, have wide muscle, loose skin, rough coat, larger and wide hooves, and an uneven sole.

Hooves

The hooves of younger animals are relatively smaller in size, smoother and evenly levelled at the sole, while older animals have larger and rough hooves. Besides, their hooves may not be evenly levelled at the sole. However, hooves cannot help ascertain the actual age of the animal. But they may help categorise the animal into age groups, such as very young, yearling, adult, old, etc.



Fig. 2.24: Buffaloes do not have horned rings.

Horned rings

Animals have rings in the horns. In *zebu* (Indian) cows, the first ring appears at the age of three years. The age is calculated as $(n+2)$, where 'n' denotes the number of rings. The formula for calculating the age of an animal is developed on the assumption that the ideal calving interval is one year. One ring is added every year on each calving. This formula is applicable only for females. Sometimes, counting the number of rings becomes difficult. In case of older cattle, where the horns are worn out, this formula cannot be applied. The number of rings in horns gives an indication of the reproductive history of the animal rather than its age, especially, when there is irregular calving or long calving interval.

Formula: Age = $n + 2$ (n = No. of rings)

Dentition

It refers to the study of configuration and confirmation of teeth with reference to their period of eruption through gums. The study of dentition helps ascertain the age of the animal. This method, though not always exact, is reasonably accurate. Recently, a procedure for age determination known as 'mouthing' in cattle has evolved, using eruption time of permanent teeth as the basis.

In animals, teeth serve as organs of prehension and mastication. They are used as weapons of offence and defence. According to their form and location in the mouth, teeth are classified as incisors, canines, premolars and molars. The incisors (central, medial, lateral and corner) are situated in the front. The two



central incisors are called ‘pinchers’, the adjoining ones are the ‘first intermediates’, the third pair is the ‘second intermediates’, and the outer ones are the ‘corners’.

The incisors are prehensile organs in all animals. They are absent in the upper jaw of ruminants (cow, buffalo, sheep, goat, etc.). Instead, they have ‘dental pad’ in the upper jaw. It is a thick, hard gum line that the animal uses for pinching grass and fodder. In the lower jaw, there are eight incisors. In ruminants, the canine teeth are absent. In non-ruminants, canines are behind the incisors and are typical of carnivorous and omnivorous animals.

Canines are used mainly for fighting. There are 24 cheek teeth (premolars and molars), six on each side of the jaw (right upper and lower, and left upper and lower). The anterior three of these six teeth are ‘premolars’ and the posterior three are ‘molars’. The function of the cheek teeth is mastication of food.

Type of teeth: There are two sets of teeth in all species of animals.

(a) Temporary or milk teeth: They may erupt during early life after birth. Deciduous dentition (milk teeth) provides young mammals with a functional, though smaller set of teeth that can be accommodated by its small jaws. Later, these are pushed out by the growth of corresponding permanent teeth.

(b) Permanent teeth: These appear at a certain age and remain throughout the animal’s life.



(a) Central permanent incisors



(b) Medial temporary incisors that have fallen



(c) Medial permanent incisors



(d) Lateral permanent incisors



(e) Corner permanent incisors

Fig. 2.25 (a–e): Different type of teeth in a buffalo

The dental formula¹ of cows, buffaloes, sheep and goats is depicted in Table 2.3.

Table 2.3: Dentition pattern in different livestock species

Species	Temporary/ permanent	Jaw	I	C	P	M	Total	Dental formula
Cows	Temporary teeth	Upper jaw	0	0	3	0	20	$2\left(\frac{0\ 0\ 3\ 0}{4\ 0\ 3\ 0}\right)$
Buffalo		Lower jaw	4	0	3	0		
Sheep	Permanent teeth	Upper jaw	0	0	3	3	32	$2\left(\frac{0\ 0\ 3\ 3}{4\ 0\ 3\ 3}\right)$
Goat		Lower jaw	4	0	3	3		

I: incisors, C: canines, P: premolars and M: molars

¹Dental formula: It expresses the total number of teeth present in a dentition set of a particular species of animal.

An animal's age can be determined by examining the incisors. The calf is born with two central incisors. The other incisors start erupting as it grows. When the calf is five to six months old, all eight temporary incisors erupt. These are replaced by permanent teeth in due course. The permanent teeth are smaller in size as compared to the milk teeth but are broader with a distinct neck between the root and crown, and paler in appearance.

As the animal ages, the teeth start wearing-off. Changes in the teeth at different periods of life indicate the animal's age. At 10 months of age, the central temporary incisors show signs of wearing-off. When the animal is about 15 months old, the two lateral incisors start wearing-off. At the age of about one-and-a-half years, the whole set of milk teeth are flattened. At about two years of age, the two central temporary incisors are replaced by permanent ones. At the age of three years, the two intermediate incisors also get replaced, and at four, the corner incisors are replaced too. When the animal is about five-and-a-half to six years old, the entire set of eight teeth is replaced by permanent ones. When four pairs of incisors are present in an adult animal, there is confusion if the incisors are old, temporary or permanent. The type of incisors can be confirmed by just looking at the cheek teeth. If all six pairs of cheek teeth are present, the incisors are permanent in nature. The eruption of different type of teeth in cattle is shown in Fig. 2.25 (a-e).



Table 2.4: Eruption of different type of teeth in cattle and their age

S. No.	Age of eruption		Incisors	Premolars	Molars
	Cow	Buffalo			
1.	From birth to one month	From birth to four months	All eight temporary incisors	All 12 temporary premolars	—
2.	6 months	9 months	—	—	1 st permanent molar
3.	1 year and 3 to 6 months	1 year and 9 months	—	—	2 nd permanent molar
4.	2 years	2 years and 6 months	Central permanent incisor	—	3 rd permanent molar
5.	2 years and 6 months	3 years	—	1 st and 2 nd permanent premolar	—
6.	3 years	3 years and 6 months	Medial permanent incisor	3 rd permanent premolar	—
7.	4 years	4 years and 6 months	Lateral permanent incisor	—	—
8.	4 years and 6 months	6 years	Corner permanent incisor	—	—

Farm record

The success of livestock farming depends more on management ability rather than hard work. In India, most farmers do not maintain farm records due to illiteracy and lack of awareness. Farm records make it easy for farmers to guide workers, and use machines, livestock and available resources in the best possible way. They may remember important events and data but often the exact information is forgotten. Information about animals, inputs and prices of assets used in the farm are useful in making farm management decisions. Therefore, record keeping is essential for livestock management. Record keeping can be done easily, if animals have some identification mark. Thus, animal records and identification are inseparable.

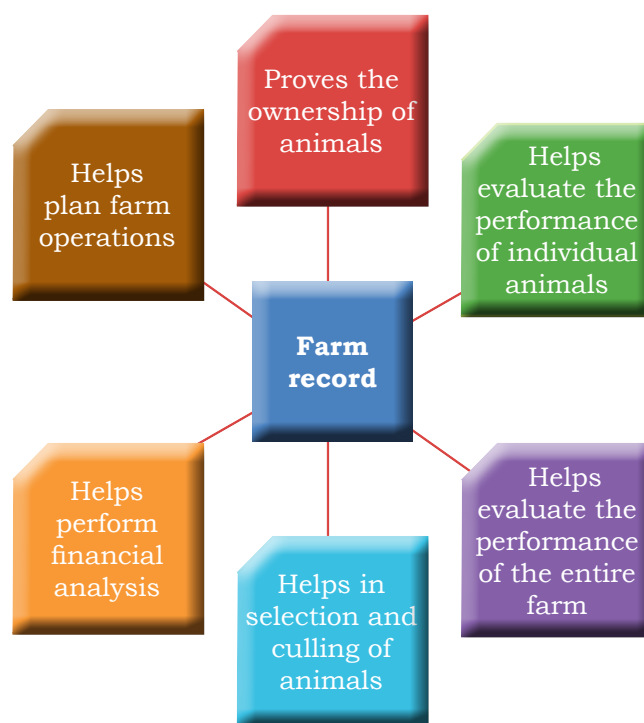


Fig. 2.26: Purposes of maintaining farm record

Characteristics of farm record

A farm record must:

- be easy to maintain.
- provide necessary information.
- avoid duplication.

Types of farm record

There are different types of record that need to be maintained in a livestock farm. A farmer must maintain records relevant to a particular livestock farm. Records of a farm can broadly be classified into three categories (Fig. 2.27).

Technical records	Farm section records	Financial records
<ul style="list-style-type: none">• Daily report register• Artificial insemination or service register• Calving register• Daily milk yield register• Feed stock register• Feeding record• Health record	<ul style="list-style-type: none">• Fodder cultivation register• Field register• Labour register• Muster roll• Tractor logbook• Machinery and equipment book	<ul style="list-style-type: none">• Store stock book• Attendance and pay record book• Feed cost record book• Veterinary expenses record book• Record book for registry cost of fodder seeds• Equipment purchases record book

Fig. 2.27: Classification of farm records

Ways to maintain records

In a livestock farm, records can be maintained in two ways — manually and electronically.

Manual record keeping

In manual record keeping system, various forms are used, varying from pocket size cards to data register.

Electronic record keeping

In electronic record keeping, farm data are maintained in the computer. Data compilation and retrieval are easy in electronically maintained records.

Some of the specimen of different kinds of record maintained in animal farms are given in Table 2.5 (a to j). Farms may develop other records as required.



Table 2.5(a): Breeding record in a dairy farm

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 of drying	Expected date of calving	Actual date of calving	Remark, 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 or non-pregnant	Date	Pregnant or non-pregnant				
1																				
2																				
3																				
4																				
5																				

Table 2.5(b): Calving record in a dairy farm

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



Table 2.5(c): Growth record of young animals in a dairy farm

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)	Remark, if any
				1	2	3	...	22	23	24	
1											
2											
3											
4											
5											

Table 2.5(d): Lactation record in a dairy farm

S. No.	Cow tag number	Lactation number	Date of calving	Date of drying	Lactation yield (kg)	Peak yield (kg)	Date of peak yield	Lactation length (day)	Dry period (day)	Remark, if any
1										
2										
3										
4										
5										

Table 2.5(e): Daily feeding record in a month in a dairy farm

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

Table 2.5(f): Herd strength record maintained on a daily basis in a dairy farm

S. No.	Date	Cows		Heifers	Young males	Bulls	Calves		Total number of animals	Addition of animals		Deduction of animals		Remark, if any
		Milch	Dry				Male	Female		Number	Place	Number	Place	
1														
2														
3														
4														
5														





Table 2.5(g): Record of daily milk yield for a month in a dairy farm

S. No.	Cow tag number	Date of calving	Date										Monthly total milk yield (kg)	Total lactational yield (kg)										
			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																								

Table 2.5(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	Remark, if any
1							
2							
3							
4							
5							

Table 2.5(i): Health checkup record in a dairy farm

S. No.	Date	Name of the test	Disease for which the test is performed	Number of animals tested	Tag numbers of animals	Next due date of checkup	Remark, if any
1							
2							
3							
4							
5							

Table 2.5(j): Herd health record in a dairy farm

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

Practical Exercise

Activity

Visit a nearby dairy farm and note down the calf management practices being followed there.

Material required: animals' birth record, feeding schedule, feed and other relevant records, and writing material

Procedure

- Visit a dairy farm in your area.
- Observe the various calf management practices being followed there.
- Note these down in your notebook.
- Note down the other required data from the farm record book.
- Present it before the class.

Check Your Progress

A. Multiple Choice Questions

- The best time to inseminate an animal is _____ after the initiation of estrus.
 - immediately
 - 4–8 hours
 - 12–18 hours
 - 18–24 hours
- The quantity of colostrum that needs to be fed to a calf is _____.
 - 0.5 kg
 - 1 kg
 - 5 per cent of its body weight
 - 10 per cent of its body weight
- The gestation period of a cow is _____ days.

(a) 260	(b) 280
(c) 310	(d) 340
- A milk replacer must contain at least _____ per cent protein.

(a) 12	(b) 18
(c) 22	(d) 26
- Which of the following properties does colostrum have?
 - Rich in nutrients
 - Low lactose content
 - Rich in antibodies
 - All of the above



B. Fill in the Blanks

1. _____ means removing horns from the bud and preventing their growth.
2. The most common form of identification used in farm animals is _____.
3. The gestation period of a buffalo is _____ days.
4. The estrous cycle of cows is _____ days.

C. Mark 'True' or 'False'

1. Milk replacer is fed to a calf to reduce the cost of rearing.
2. Disbudding is done in adult cows.
3. Colostrum is a type of milk obtained from heifers.
4. Branding is a temporary method of identification.
5. The age of farm animals can be determined by dentition.

D. Match the Columns

A	B
1. Tagging	(a) Generally done at a young age
2. Tattooing	(b) Liquid gold
3. Colostrum	(c) Milk substitute
4. Milk replacer	(d) Dry feed
5. Calf starter	(e) Common form of identifying farm animals

E. Crossword

¹ S	² H			³ W		
⁴ T			S		⁵ R	
A	A				E	
	T					
				I		
E				N	R	
R				G	D	

Across

4. Usually, bull or bullocks are used in a dairy farm.

NOTES

Down

1. The first dry feed offered to calves is called _____.
2. _____ is the period of intense sexual urge or excitement experienced by female animals.
3. Permanent separation of the young from its mother.
4. _____ keeping is an essential part of livestock management.

