

# CHAPTER 4

## Parasites of Farm Animals

### OBJECTIVES

At the end of the chapter, students should be able to:

- â—† state the meaning of parasites.
- â—† list the types of parasites.
- â—† describe the modes of transmission and life cycle of selected parasites of livestock.
- â—† explain the general methods of disease prevention and control.
- â—† control of parasites.

### 4.1 Introduction

Organisms interact with one another in different kinds of relationships in the environment. Such interactions result in different kinds of association which may be mutually beneficial to the two organisms or may be harmful to one of the organisms. Some organisms establish physiological association with the cells or tissues of other organisms to the extent that they have become totally dependent on the other organism. This kind of relationship has evolved over a long time. When one organism depends entirely on another, to obtain shelter, food and nourishment by living either on the surface or inside the body of another organism, the dependent organism is called a **parasite**. The organism which the parasite depends on is called the **host**. Examples of animal parasites are tapeworm, round worms, whip worms, liver fluke, ticks, lice, mites, fleas and flies.

### 4.2 Meaning of Parasite

A parasite is any organism (plant or animal) which lives on the body or inside the body of another organism called the host, in order to derive all its nourishments such as food, shelter and protection. The parasite does not provide any benefit but causes damage or harm to the host in return. Thus, only the parasite derives benefit from the association while the host suffers inconveniences and gets injured or harmed in the process.

All parasites establish physiological association with the tissues of their host organisms by living either on the surface of their body or inside the body and causing harm. The host organism usually belongs to a different species and is often bigger and stronger than the parasite. The parasite derives a suitable living environment or housing from the host while it also causes the host to suffer through introduction of some injurious effects. This could be by direct introduction of toxins which harms the host's body or it may be by deriving nutritional needs from the host which deprives it of the essential food for growth and development.

Parasites cause problems to their hosts especially when their population becomes so high, beyond the level which the body of the host can tolerate. In all cases, the host organism suffers and does not derive any benefit from the association with the parasite. Sometimes, the relationship with the parasite causes the death of the host or drastically reduces its productivity. Farm animals harbour many parasites and troublesome pests. Many animal parasites are also parasites of man.

### 4.3 Types of Parasites

Parasites of livestock either live within the host tissue or attack them externally by attaching themselves to the outer skin of the animals. Parasites which live inside the bodies of their host are called **Endoparasites**, while those living outside are called **Ectoparasites**.

#### 4.3.1 Endoparasites

Endoparasites usually live in particular organs or tissues of the host. They are highly adapted and

much more morphologically modified than the ectoparasites to cope with living inside their hosts. They have developed specialized features such as suckers for strong attachments to the walls of the intestine and a cuticle on their body which prevents them from being killed and dissolved by the digestive enzymes of

their hosts. Examples of endoparasites are the trypanosome, roundworms, tapeworms and the liver fluke. Some parasites have intermediate hosts which help to transmit them.

Some endoparasites are confined in the blood stream while others are found in the alimentary canal and the intestine, while still others are found in organs, such as liver, lungs and nervous systems.

When parasites occur in large numbers, they cause wasting, stunting and death of their hosts.

### 4.3.2 Ectoparasites

Ectoparasites are otherwise called external parasites. These are the parasites that attach on to the body or skin of the host. Ectoparasites are mostly arthropods and the attack may be specific to one host. Many ectoparasites are microscopic while others can be seen with the naked eyes. Some of the common examples of ectoparasites that affect livestock are tick, lice, mites, fleas and flies.



FIGURE 4.1 Selected endoparasites such as roundworms *Ascaris* sp., Tape worm *Taenia saginata*, *Trypanosoma* sp., *Schistosoma* sp., Liver fluke



FIGURE 4.2 Selected ectoparasites such as tick, lice, mites, fleas and flies

### 4.4 Parasite and Host Relationship

Parasites use their hosts in different ways. Some use their hosts for a short period while others live permanently on them. **Temporary parasites** spend only parts of their lives in or on their hosts. For example, external parasites such as ticks, flies, mites, and other arthropods attach to their hosts and then detach later, to live as free-living organisms. Ticks normally live in woods and tall grass but they may climb or cling to a passing animal to feed. They sink their mouthparts into the flesh, take a small amount of blood, and then drop off the host. Most endoparasites such as flatworms and roundworms are **permanent parasites** and they live their entire adult lives inside their hosts.

### 4.5 Life Cycle of Parasites

#### 4.5.1 Endoparasites

The life cycle of a parasite varies with the type of organism whether protozoan, platyhelminth, annelid or arthropod.

##### (i) Tapeworms (*Taenia solium* or *Taenia saginata*)

—↑ Tapeworms are flat worms which range in length from about 13 mm to about 9 m.

—↑ The adult tapeworm is characterized by the presence of head or scolex, equipped with a crown of hooks for attachment to the intestinal lining of its host.

â—† The body consists of numerous "proglottides" which are flat segments from the neck.  
â—† Each proglottid is a sac-like structure containing both male and female reproductive organs (hermaphrodite).

â—† The posterior proglottid is full of eggs when ripe.

â—† Excretion is through the flame cells.

### Life Cycle of Tapeworms

â—† The adult tapeworm lives in the intestine of the animal which is the primary host.

â—† The eggs pass out of the body along with faeces.

â—† When the egg is in the embryonic stage, it is known as oncosphere.

â—† The oncosphere remains on the ground until it is eaten by a pig.

â—† If it is not picked up by a pig, the embryo dies.

â—† Once taken up, the egg passes into the stomach of the pig where the egg shell is digested and the hexacanth embryo is released.

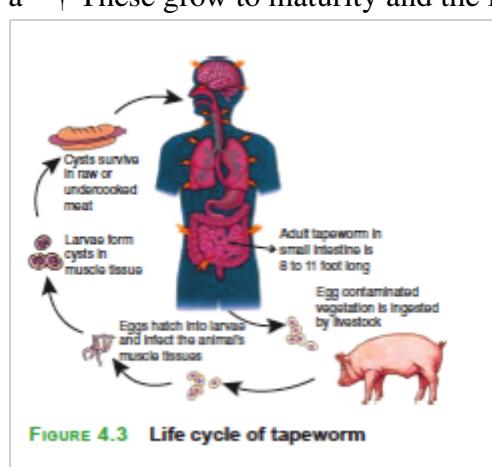
â—† The embryo bores through the wall of the intestine and enters the bloodstream, travels to the heart and finally finds its way into the muscle tissue of the pig.

â—† It then forms a cyst (capsule) or bladder worm.

â—† When man, the primary host, eats improperly cooked pork containing the cysticercus, the cyst is dissolved in the intestine and the scolex attaches itself to the wall of the intestine.

â—† The bladder is dropped off and from the neck, proglottides are multiplied.

â—† These grow to maturity and the life cycle is repeated.



### (ii) Trypanosomes

These are dangerous protozoan parasites which affect animals, particularly in tropical Africa. They affect mostly cattle and are transmitted by the tsetse flies, *Glossina* sp., which are prevalent in some areas of West Africa.

### Life Cycle of Trypanosomes

â—† When a tsetse fly sucks the blood of an infested animal, the blood which is drawn into the gut of the insect contains some trypanosome parasites.

â—† These multiply in the intestine of the insect and within 20 days, they find their way into the salivary glands of the insect.

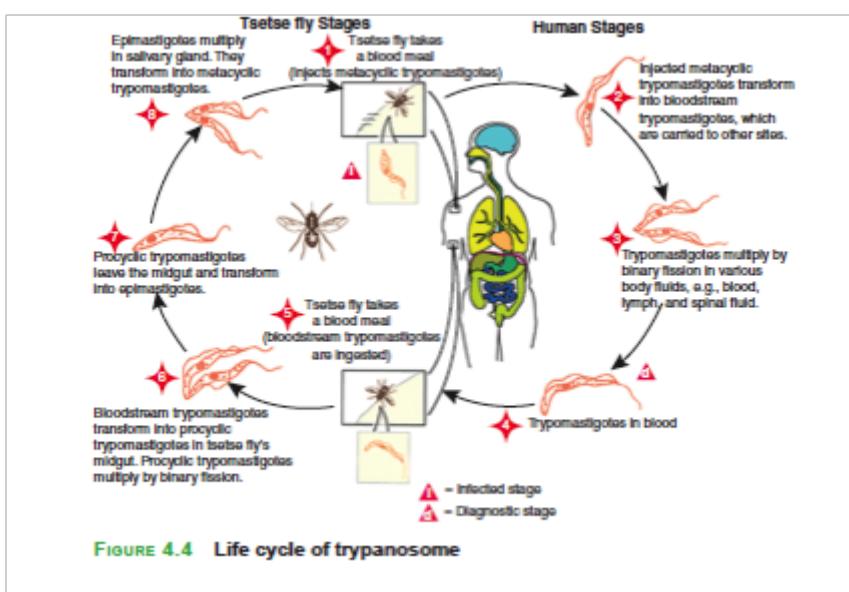


FIGURE 4.4 Life cycle of trypanosome

They then multiply further, and within a month from the time the blood was ingested, infective trypanosome parasites are present along the sides of the salivary gland.

â—† If an infected insect bites an animal, trypanosomes are injected into the blood of the victim since they are contained in the saliva of the insect.

â—† The infective forms of the trypanosomes then multiply in the blood of the host and mix with the blood corpuscles.

â—† The host may show no sign of infection for several weeks, or even months during the multiplication period.

â—† The first sign of infection is the development of fever.

â—† When this occurs, the host becomes weak and anaemic.

â—† Other symptoms include pale mucous membrane, oedema, and loss of weight.

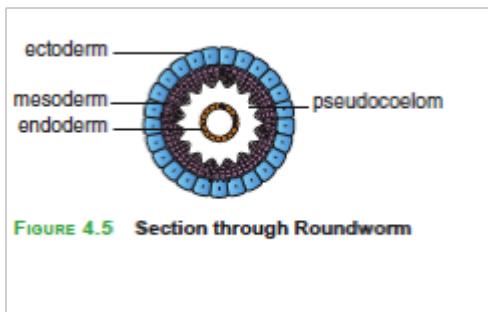


FIGURE 4.5 Section through Roundworm

## Characteristics

â—† It is elongated and cylindrical in shape.

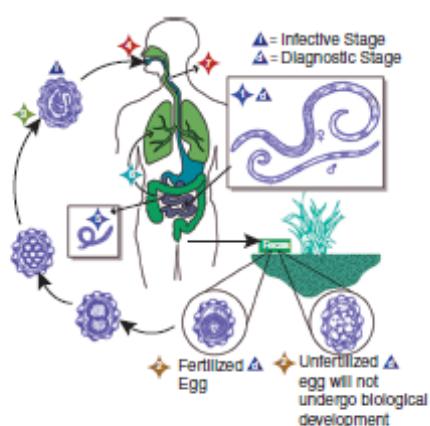
â—† It is whitish in colour.

â—† It is pointed at both ends.

â—† It has a smooth body which is covered with a thick tough enticle.

â—† They are unisex.

â—† The male are smaller in size.



**FIGURE 4.6 Life cycle of roundworm**

- â—† The female can be distinguished by the possession of posterior ends.
- â—† They invade the intestine of most farm animals and human beings.

### **Life Cycle of Roundworms**

- â—† The female adult produces a lot of eggs, which are expelled from the animal as it passes its faeces.
- â—† The egg is contained inside a remarkable resistant shell where the embryo may continue to survive for some time until it hatches.
- â—† When the eggs are picked up by the pigs either through feeding or drinking contaminated water, the shell gets dissolved by the digestive enzymes and the young larvae emerge.
- â—† They pass through the intestine into the blood stream and are transported to various parts of the body until they finally reach the lungs.
- â—† They bore through the lung tissues until they reach the bronchial tubes and ascend into the mouth from where they are returned to the stomach.
- â—† On reaching the intestine, they grow into adult size, feeding upon the food digested by their host.
- â—† They avoid being digested by secreting a substance which counteracts the action of the host enzymes. The cycle is repeated.

### **Economic importance of round worms**

- â—† Reduction in growth of animals
- â—† Loss of appetite and weakness
- â—† Indigestion and constipation
- â—† Organs are destroyed during the migration of young ones.

### **Control**

- â—† Good sanitation of the environment
- â—† Use of appropriate drugs like piperazine as may be recommended by the veterinarian.
- â—† Supply of clean water
- â—† Restriction of animal feeding on contaminated pasture
- â—† Rotational grazing
- â—† Avoid use of farm yard manure to pastures on which animals graze.

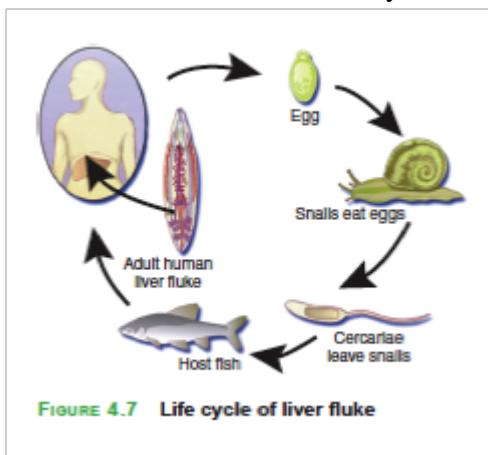
### **(iv) Liver fluke**

The liver fluke is a brownish, flat, leaf like organism. It is about 2 cm in length.

#### **Characteristics**

- â—† It is a hermaphrodite.
- â—† It has snail as a secondary host.
- â—† The fertilized eggs are passed out with the faeces.

- â—† The egg hatches into larva called miracidia.
- â—† The miracidium attaches to the water snail.
- â—† The miracidium loses its cilium and forms sporocyst.
- â—† The sporocyst reproduces by forming a larva called radia (plural radiae).
- â—† It forms a small worm called cercaria.
- â—† When the cercaria leaves the snail, it swims in the water until an animal drinks it along with the water.
- â—† They may encyst on vegetation.
- â—† When ingested during grazing, the cercariae penetrate the skin tissue, into the blood stream and then to the liver and finally settle in the bile duct as liver fluke.



### Life Cycle of Liver Fluke

- â—† The mature eggs are passed from the uterus of the liver fluke into the bile duct of the host animal and transferred to the small intestine.
- â—† The fertilized eggs are passed out together with faeces of the host onto the pasture. Under favourable conditions, the eggs hatch into ciliated larvae known as miracidia.
- â—† Each larva swims about and penetrates into the soft parts of the secondary host, **water snail**. It forces its way into the expanded foot of the snail.
- â—† The larva undergoes some changes and forms a sporocyst. In the sporocyst, the cells divide to form a number of radiae.
- â—† The radiae break away from the sporocyst and after some changes give rise to several cercariae. The cercariae pass out of the snail and are later surrounded by a cyst wall. They are known as metacercariae which now remain in wet area of the pasture.
- â—† When sheep, cattle or goat graze on the pasture the encysted metacercaria is swallowed by the animal with the forage.
- â—† In the intestine of the host, the cyst wall dissolves and the cercaria, now a young fluke, bores through the wall of the intestine and enters the liver, bores through the liver tissue and eventually enters the body cavity. After a few days, the young fluke enters the bile duct.
- â—† Here the liver fluke grows to maturity, where the life cycle is completed.

### Economic importance of liver fluke

- â—† It causes disease called bilharzia or schistosomiasis.
- â—† It leads to loss of blood (anaemia).
- â—† Causes digestive disorder.
- â—† Blocks the bile duct.
- â—† Causes liver rot.
- â—† In severe cases leads to death.

### Control

- â—† Wet pasture should not be consumed by animals since they harbour snail.
- â—† Use of lime on the pasture prevents hatching of the eggs.
- â—† Use of ducks and geese to feed on the snails.

â—† Deworm animals regularly.

## 4.5.2 Ectoparasites

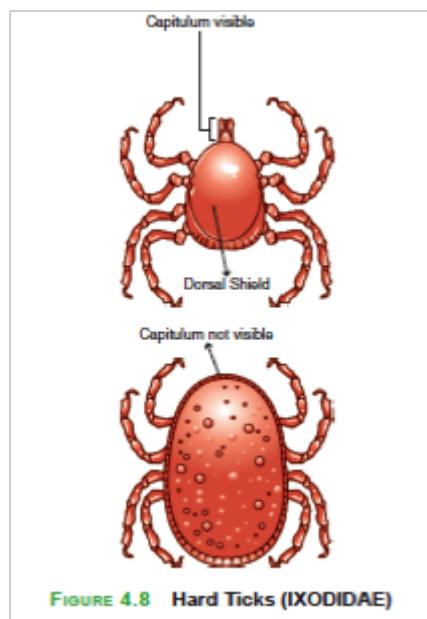
### (i) Ticks

Several species of ticks affect livestock such as cattle, sheep, horses and dogs. Ticks live all their lives attached to the animal and sucking its blood except during the time of moulting and reproduction.

#### Life Cycle of Ticks

1. The hard tick (Ixodidae)

2. The soft tick (Argasidae)



#### Characteristics

â—† Hard cutaneous skin.

â—† Mouth parts and capitulum have projection in front which forms rostrum (false head)

â—† Different sexes

â—† The male is smaller in size while the female is bigger

â—† The female has larger scutum and does suck blood

â—† The male has smaller scutum and does not suck blood

â—† The female utilizes the blood in laying eggs in batches on the ground, bushes and stones after which it dies off.

#### Soft Tick (ARGASIDAE)

â—† Soft bodies covered with projections called mammillae.

â—† Mouth parts hidden inside a groove called camerostome.

â—† Both sexes do not possess scutum.

â—† Feed continuously as adult and nymph.

â—† Most ticks have four stages in their life cycles and these are the egg, larval, nymphal and adult stages.

â—† Each of the different stages requires a different host.

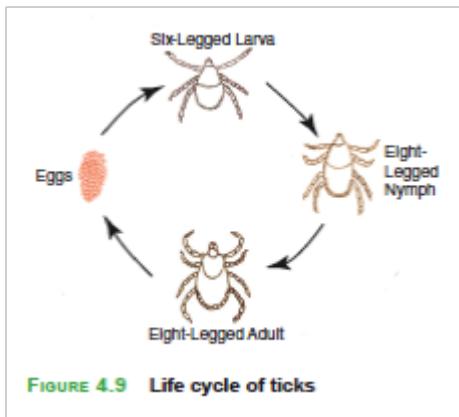
â—† When the female gets gorged with blood, she detaches herself from the host and falls to the ground.

â—† She lays her eggs at the bottom of grasses in the pasture and dies.

â—† The egg hatches into a larva with six legs.

â—† The larva crawls up the grass from where it attaches itself to a passing animal.

â—† The larva feeds on the host and falls off to the ground again.



**FIGURE 4.9** Life cycle of ticks

On the ground it moult into a nymph with eight legs. The nymph crawls up the grass and gets attached to a second host animal, feeds and drops again to the ground where it moult into an adult tick. The adult tick crawls up the grass and gets attached to the third host animal. If the adult is a female, it sinks its mouth immediately into the skin of the host and begins to suck its blood but if the adult is a male, it does not fix itself on the animal immediately but crawls about and seeks for a female to mate. After copulation with the female, it dies off. When the female is gorged with blood, it drops to the ground and lays its eggs, and the whole life cycle is repeated.

### Economic importance of ticks

- â—† Ticks suck the blood of animals causing irritation.
- â—† The wound created as a result of sucking may lead to sores which attract flies.
- â—† In young animals growth is retarded and animals become unproductive and weak.
- â—† In dairy cows, milk production is reduced.
- â—† Heavy infestation brings a lot of damage to the hides.
- â—† Wounds on the udder make the milking of animals difficult.
- â—† Restlessness and loss of weight.
- â—† In sheep, the animal rubs and bites itself, thus destroys its wool.
- â—† Ticks also transmit diseases from animal to animal, for example, cattle tick fever, fowl spirochetosis and babesiosis in cattle, sheep and goats.

### Control

- â—† Handpicking and crushing of ticks on animals or in pasture using rotational grazing.
- â—† Change animal beddings regularly.
- â—† Spraying and dipping in acaricide solution.
- â—† Apply acaricides on breeding places.

### (ii) Lice

Lice are small, wingless insects with flattened bodies. They are specific to their host. Each species is parasitic on only one kind of animal.

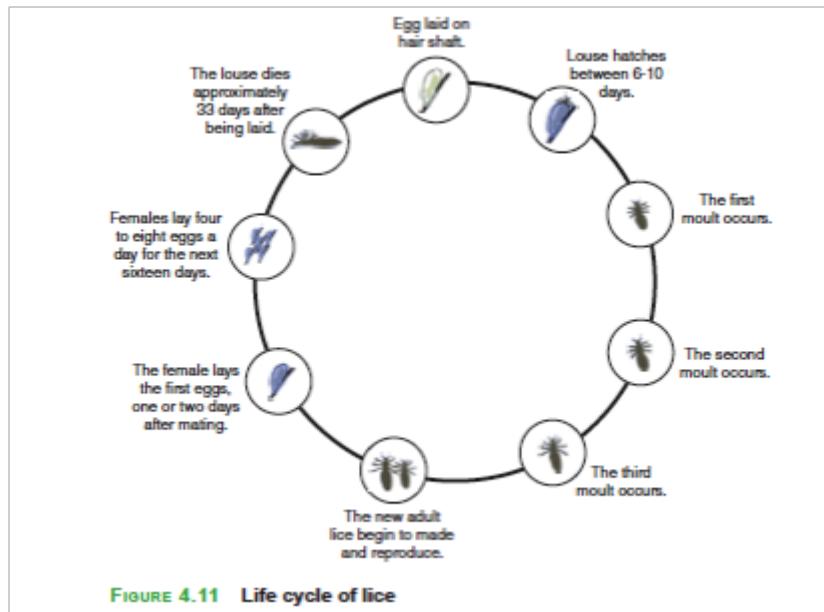
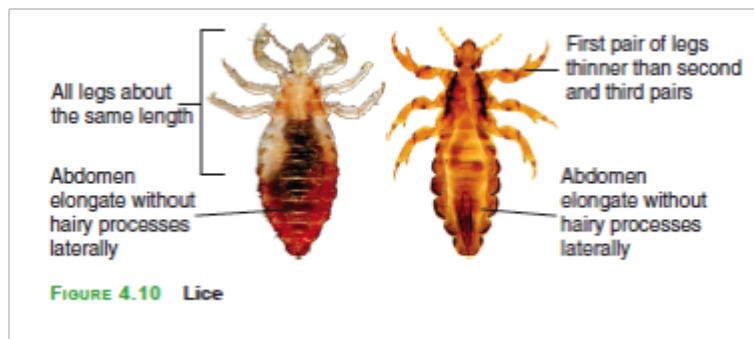
There are two types of lice namely:

1. Those that infest mammals (has sucking mouth parts – Siphonculatus)
2. Those that infest birds otherwise called poultry lice (have chewing mouth parts) Generally lice have three pairs of legs with curved claws on the end of its legs with which they hold firmly to their host.

- â—† Poultry lice are small, usually flattened.
- â—† Each species tend to be specific on the parts of the body they attack.
- â—† Some species have powerful mandibles for biting feathers, hairs and skin layer.
- â—† Some other species suck blood by piercing through the skin of their host.
- â—† They mate, lay their eggs and develop without leaving the host.

## Life Cycle of Lice

- â—† Lice live all their lives on the hosts.
- â—† They lay their eggs (called nits) on the feathers or hair of the host.
- â—† The eggs hatch into nymph which passes through three moults, before reaching maturity in about three weeks.
- â—† The adult male or female lice are transmitted to their host through body contact.



## Economic importance of lice

- â—† Heavy infestation leads to restlessness in animals.
- â—† The animal loses its appetite and does not feed well.
- â—† The animal becomes unproductive and weak.
- â—† Animal suffers itching and irritation and this leads the animal to rub itself against sharp edges resulting in loss of hair and injuries.
- â—† Growth is retarded in young animals and in adults; the quality of the animal product is reduced.
- â—† Lice suck blood leading to anaemia.

## Control

- â—† Overcrowding should be avoided to reduce the incidence of lice infestation.
- â—† Parasites should be controlled and killed by using insecticides.
- â—† Dipping and dusting with appropriate chemicals.

## Prevention and Control of Livestock Diseases and Parasites

Preventive measures are all the practices put in place to hinder the occurrence of the diseases and attacks by the parasites. Control refers to all the measures put in place to bring to the barest minimum the effect of the disease or parasite attack on the host animal.

#### **4.6.1 Preventive measures**

These measures include quarantine, vaccination, inoculation, and farm hygiene (sanitation).

##### **(i) Quarantine**

This measure helps to isolate and keep all animals imported from another country under close observation with the aim of preventing the introduction of foreign diseases.

The animals are allowed entry into the country if they are free from any disease symptom, and, if otherwise, they are destroyed or not permitted into the country.

##### **(ii) Vaccination**

This involves the administration of substances called vaccines to the animal body at different stages of their growth. A vaccine is a fluid containing weak strains of the disease pathogen, which is introduced into the body of the healthy animal either orally or by injection so that the healthy animal can stage immunity (defence mechanism).

##### **(iii) Farm hygiene (sanitation)**

Good sanitation is necessary in maintaining good health. The principles of farm hygiene must be strictly observed to prevent disease outbreak. The following are the principles:

- (a)** Avoid contaminated food and water.
- (b)** Clear and dispose animal faeces.
- (c)** Sick animals should be isolated and treated.
- (d)** Remove and burn infected animals.
- (e)** Animals should be given balance ration so that they can develop immunity against invading pathogen.
- (f)** Spray/dip animals regularly against ectoparasites.
- (g)** Keep animals in clean and wellventilated house.
- (h)** Clearing the bush around the animal house.

#### **4.6.2 Control measures**

**(i)** Infected animals should be eliminated by slaughtering them after which they are burnt.

**(ii)** Regularly deworm animals to control endoparasites.

**(iii)** Seek the advice of the veterinary doctor.

**(iv)** Use resistant breeds where necessary. For example, Ndama and Muturu cattle in the south, because they are resistant to trypanosomiasis which is prevalent there.

**(v)** Spray or dip animals to control ectoparasites.

**(vi)** Practice rotational grazing.

#### **ACTIVITY**

Visit a nearby area and collect samples of parasites such as ticks and intestinal worms. Be sure to wear protective rubber gloves. Draw and label the parasites.

#### **SUMMARY**

— A parasite is any organism (plant or animal) which lives on the body or inside the body of another organism called the **Host**, in order to derive all its nourishments such as food, shelter and protection.

— The parasite does not provide any benefit but causes damage or harm to the host in return.

— Sometimes, the relationship with the parasite causes the death of the host or drastically reduces its productivity.

— Farm animals harbour many parasites and troublesome pests. Many animal parasites are also parasites of man.

— Parasites which live inside the bodies of their host are called **Endoparasites**, while those living outside are called **Ectoparasites**.

— Examples of endoparasites are the trypanosome, roundworms, tapeworms and liver fluke.

Some parasites have intermediate hosts which help to transmit them.

â—† Ectoparasites are the parasites that attach on to the body or skin of the host.

â—† Ectoparasites are mostly arthropods and the attack may be specific to one host.

â—† Many ectoparasites are microscopic while others can be seen with the naked eyes.

â—† Some of the common examples of ectoparasites that affect livestock are tick, lice, mites, fleas and flies.

â—† The life cycle of a parasite varies with the type of organism whether protozoan, platyhelminth, annelid or arthropod.

â—† Preventive measures are all the practices put in place to hinder the occurrence of the diseases and attacks by the parasites.

â—† Control refers to all the measures put in place to bring to the barest minimum the effect of the disease or parasite attack on the host animal.

â—† Good sanitation is necessary in maintaining good health and requires the following:

â— Avoid contaminated food and water.

â— Clear and dispose animal faeces.

â— Sick animals should be isolated and treated.

â— Remove slaughter and burn infected animals

â— Animals should be given balanced ration so that they can develop immunity against invading pathogen

â— Spray/dip animals regularly against ectoparasites.

â— Keep animals in clean and well-ventilated house.

## REVISION QUESTIONS

### ESSAYS

**1.** (a) What is a parasite?

(b) Mention two types of parasites and give two examples each.

**2.** (a) What is vaccination?

(b) List five principles of farm hygiene.

**3.** Describe briefly three control measures that can be taken against parasites of livestock.

**4.** Describe three measures that can be taken to prevent attack of parasites.

**5.** Draw the life cycle of a named endoparasite of livestock

## OBJECTIVE QUESTIONS

**1.** Any organism which depends entirely on another organism, to obtain shelter, food and nourishment is called

(a) parasite.

(b) epiphyte.

(c) thallophyte.

(d) bryophyte.

**2.** An endoparasite is one that lives

(a) outside the host body.

(b) inside the host body tissues.

(c) around the host body.

(d) not on the host.

**3.** An example of an endoparasite is

(a) ringworm.

(b) tick.

(c) lice.

(d) tapeworm.

**4.** Which of the organisms benefit in a parasitic relationship?

(a) Both parasite and host

- (b) Only the host
- (c) Only the parasite
- (d) None of them

**5.** A tapeworm is better adapted to living inside the host because

- (a) it has hooks to attach to the intestinal wall.
- (b) it has cuticle which covers the body and prevents it from being killed and digested.
- (c) it has proglottides which detach and spread the disease.
- (d) All of the above.

**6.** Trypanosomiasis is a dangerous disease that is transmitted by

- (a) dragon flies.
- (b) tsetse fly.
- (c) house fly.
- (d) horse fly.

**7.** An example of a parasite which stays in the blood stream is

- (a) mite.
- (b) trypanosome.
- (c) tick.
- (d) tsetse fly.

**8.** Ectoparasites such as tick which suck blood of animals can cause

- (a) anaemia.
- (b) retarded growth.
- (c) oedema.
- (d) All of the above.

5. d    6. b    7. b    8. d  
1. a    2. b    3. d    4. c

Answers to Objective Questions