

## LESSON 4

### SIGNS OF ILL HEALTH

#### **AIM**

Identify common signs of ill health in different animals.

#### **VITAL SIGNS**

The vital signs include:

- Pulse rate
- Respiration rate
- Body temperature.

These signs should be measured at rest.

In addition to vital signs, the animal owner should continually observe the natural habits and behaviour of stock. Any changes in behaviour should be investigated immediately as it could be due to illness.

The earlier an owner can treat sick animals, the better. Illness causes individual cells in the animal to break down and die. If treatment is started quickly, the cells can be stopped from degenerating. If treatment is delayed, the damage done by illness can be considerable; especially if the affected cells make up an organ.

#### **THE HEALTHY ANIMAL**

The healthy animal is interested in food. It will graze as normal, or in the case of penned animals, look forward to the next feed. The healthy animal will drink its normal amount of water (this is easily checked with penned animals), but more difficult with animals out grazing).

The healthy animal appears bright and alert. It will show its normal response to humans (eg. probably moving away as you approach if it is a grazing animal or approaching if it is very used to human company). Brightness is most apparent in the eyes. The animal will show interest in unusual noises and sights.



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The healthy animal's coat and skin will be supple and in good condition. Hair is one of the first parts of the body to register ill health, and it will also look dull if the animal is lacking some essential vitamins or minerals).

The colour of the mucous membrane is a good indicator of health, as it shows the condition of the blood. Mucous membrane is found around the eye, on the gums, inside the mouth, and at the entrance to the anus. In healthy animals, it should show a salmon pink colouring (but not vivid red).

The healthy animal will pass the normal number of droppings per day; and the droppings will be neither too loose nor too dry for the type of livestock, and will be passed easily. If you press your ear to the side of the animal, you should be able to hear rumbling noises -signs that the digestive system is working. The healthy animal will also pass normal coloured urine.

Ruminants which are in good health will spend the normal number of hours chewing the cud. Healthy animals will also spend a normal number of hours resting each day.

**Normal vital signs are as outlined below:**

Type of Animal	Temperature ° Centigrade	Respiration (Rate/minute)	Pulse Rate (Beats/minute)
Horse	37.7-38.6	8-15/min	36-42
Cattle	38.3-38.8	12-16/min	45-60
Sheep	38.8-40	12-30/min	70-80
Goat	38.8-40	20-30/min	70-80
Pig	38.8-39.4	20-30/min	60-80
Poultry	40-43	12-28/min	250-300
Guinea Pig	39-40	110-150	115-160
Rabbit	39-40	39	123-304

**Physiological Values for Other Animals**

(Data adapted from: *Duke's Physiology of Domestic Animals*, 9th & 10th Ed., Swenson, M.J., Ed., 1977 & 1984; Cornell University Press).

Average Rectal Temperatures (°Celcius):

<b>Cat</b>	38.6
<b>Dog</b>	38.9
<b>Rabbit</b>	39.5

Average Resting Respiratory Rates (breaths/min):

<b>Cat</b>	26	<b>Dog</b>	22
<b>Monkey</b>	40	<b>Guinea pig</b>	90
<b>Hampster</b>	74	<b>Rat</b>	97
<b>Pigeon</b>	26	<b>Rabbit</b>	39

Range of Heart Rates (beats/min):

Bat	100-970	Cat	110-140
Dog	100-130	Elephant	22-53
Goat	70-135	Guinea pig	115-160
Hampster	300-600	Monkey	165-240
Mouse	324-858	Rabbit	123-304
Rat	261-600	Squirrel	96-378

## **SIGNS & SYMPTOMS OF DISEASES**

### **Recognising Ill Health**

There are degrees of ill health ranging from the animal that is merely "off-colour" to one that is desperately ill.

The animal that looks "not quite right" should be observed closely until it appears fully recovered. If it is incubating a serious disease, an early diagnosis could save the animal. By checking the vital signs of the animal, the farmer can receive early warning that something is amiss. Seriously ill animals must receive immediate and urgent veterinary attention.

The first sign that an animal is becoming sick is that it picks at or refuses food. It may drink more or less water than normal, depending on the illness. The eyes will be dull, and on closer inspection, the mucous membranes may have changed colour. Deep red membranes indicate fever; pale membranes show anaemia; yellow membranes indicate a liver disorder, while blue-red membranes show heart and circulatory problems, or pneumonia.

The coat will look dull and dry, and the hairs may stand up (on cattle and goats). The animal might be sweating. A cold sweat indicates pain while a hot sweat indicates fever. If the animal is in pain it will probably be restless (getting up and down and pacing about) and it might even be groaning.

The animal will either scour (eg. pass very loose droppings), or will become constipated and pass no droppings at all. The passing of urine might also cease. A very sick animal will lie down for long periods and will not get up when approached.

The vital signs of a sick animal will change. The temperature may go up or down. A rise in temperature of one or two degrees usually indicates pain, while a rise of more usually indicates infection.

The rate of respiration, and the way the animal breathes could also show changes. With pain or infection, breathing becomes more rapid. In a very sick animal, breathing can be laboured and shallow.

A slightly increased pulse rate suggests pain, while a rapid pulse suggests fever. An irregular pulse can indicate heart trouble. In a very sick animal, the pulse is weak and feeble.

## **DIAGNOSIS OF DISEASES**

In the case of infectious diseases, early and accurate diagnosis is most important.

The early stages of a disease are more easily treated as the germ causing the disease has not gained a strong foothold in the body of the animal, and it is less likely to have produced tissue damage which may be difficult to repair. Moreover, as a disease develops in an infected animal, the longer it is left untreated the greater the risk of the disease spreading to other animals on the farm.

Diagnosis of disease depends to a large extent on the skill and experience of the farmer or the veterinary surgeon. Quite often an accurate diagnosis can only be made by taking samples of blood, mucous, sputum, milk or dung from the animal, and sending these to a veterinary laboratory for examination. For example, dung samples will often show the presence of worms and other internal parasites inside the animal. Blood from an aborted calf might show the presence of bacteria causing spontaneous abortion.

### **How to Take a Blood Smear**

Micro organisms are incredibly tiny. Dust and other particles can easily hide micro organisms when they are magnified together. Moreover, fine dust actually resembles the gall sickness germ! Sometimes the gall sickness germ can be diagnosed because of its position in relation to the blood cells. Fine dust falling indiscriminately on the blood smear makes it doubtful whether one is spotting the gall sickness germ or another dust particle.

Germ are often identified by minute differences.

The smear should be spread very thinly on the glass of a microscope slide so that the organism can firstly be seen, and secondly, be identified.

In making a blood smear:

1. Thoroughly clean 2 or 3 microscope slides. Use methylated spirits if necessary and be sure no dust or greasy marks remain on the glass.
2. Clean the ear of the animal with a damp cloth then nick the edge with scissors or a sharp blade. The nick must be deep enough for blood to flow; not just to drip and quickly clot. It is impossible to make smears with half clotted blood.
3. A drop of blood about the size of a millet seed (no larger) is picked up near one end of the slide. Hold a second slide at an angle (30-50 degrees) to the first and push it lightly along its length to draw the blood behind it in a smooth film.

Don't allow the smear to dry in the sun. Keep it in the shade. When it is thoroughly dry (but not before), wrap it in clean paper upon which the following particulars should be written:

- Owners name
- Address
- Date of sample taken
- By whom forwarded
- Nature of preparation
- Symptoms
- Breed, age and sex of animal
- Disease suspected

Avoid the following Mistakes:

- Do not use a dirty or greasy slide
- Don't allow dirt or dust to settle on the slide
- Don't use too big a drop of blood
- Don't wrap a wet smear
- Don't wrap a smear in dirty paper
- Don't press two wet slides together
- Don't forget to send particulars with the slide.

### **Taking Smears of Pus & Discharges**

The procedure is very similar to collecting a blood smear.

A tiny amount of the required material is gathered onto the end of one slide, and spread thinly over it by pulling another slide, and spread thinly over it by pulling another slide along the first slide. Like blood smears, pus and discharge can be taken when the animal is alive or dead.

Material for smears from the carcass of a suspected Blackleg case is obtained by cutting into the swelling and discoloured muscle on the affected quarter, and picking a small drop of fluid from the cut surface. Spleen smears should also be taken.

### **Taking Tissue Samples**

Smears from glands are made by puncturing one of the large glands in the flank, or in front of the shoulder, with a large, clean hypodermic needle and spreading thinly on a clean slide, the fluid from the cut surface. Spleen smears should also be taken.

Spleen smears are obtained from the carcass by cutting into the spleen, and picking up a small piece of the spleen substance from the cut surface with one corner of the slide. Rub this into a pulp on the second slide near one end and then draw (never push) the blood along the first slide. Pushing the material gathered for smearing makes the smear too thick.

## NOTIFIABLE DISEASES

Some diseases are notifiable in some places. Legally the animal owner is obliged to notify authorities when designated serious diseases (eg. Foot and Mouth, Infectious Equine Anaemia, Tuberculosis etc) are identified. The property and animal may be subject to quarantine in such cases.

## DIFFERENT TYPES OF DISEASES

### VIRUSES

Viruses are extremely difficult to identify. Being so small, they are difficult to isolate or detect, even when their symptoms are prolific. Identification is usually carried out by passing liquid containing a virus through a porcelain filter. This filter holds back most other micro organisms but allows viruses to pass through. The liquid which is collected can then be grown on living tissue. It is often injected into eggs. The culture can later be analysed. Viruses contain a coat or outer layer of protein enclosing a nucleic acid (RNA or DNA). Most viruses that attack animals contain DNA, while those attacking plants usually contain RNA. Viruses occur in three main shapes: spheres, rods and tadpole like shapes.

### Lifecycle

Viruses can only grow inside living cells of other organisms, and they normally need to be inside a specific host (eg. A particular type of virus only affects a particular type of animal). Though they might not grow, viruses can however survive for long periods outside of a host. Viruses multiply by piercing the cell wall of a host then using the material inside the cell to make more viruses.

### Transmission

Viruses can be transmitted in many different ways including:

- By insects such as mosquitos of fleas which take infected blood from one animal to another.
- By wild animals, birds and rodents.
- Through body fluids such as saliva, semen or blood, from one animal to another.
- Through skin contact
- By breathing in droplets in the air (eg. common cold)

### Prevention

It is important to prevent potential carriers of viruses coming in contact with livestock or pets. Where the carrier is restricted to one vector (eg. fleas) control is fairly simple. A preparatory powder, for example, can be dusted onto the host animal to protect it from fleas. When the virus has many carriers, however, it is difficult to prevent all the potential carriers from coming into contact with the host. Protection against the more

serious viral diseases is usually through vaccination. Either an attenuated (mild) strain of the actual virus is injected into the animal, or a similar, but harmless strain is used. For example, the vaccination against foot and mouth makes use of an attenuated strain of the virus. The animal develops antibodies to the virus, and is protected from the disease. Viruses are responsible for some serious livestock diseases including rabies and foot and mouth.

## **BACTERIA**

Although bacteria are larger than viruses, they are still minutely small, making identification very time consuming. (eg. 1 cu. cm of milk can contain 10,000 bacteria. 1 cu.cm. of sour milk can contain up to 32,000 million bacteria).

Bacteria may be identified in a laboratory by the following methods:

### **1. Observing through a Microscope:**

Bacterial cells are first stained with special dyes, so they can be identified under the microscope.

Different bacterial types are classified according to cell shape:

- Cocci - spherical bacteria
- Micrococcus - spherical bacteria that occur singly
- Staphylococci - spherical bacteria that occur in groups (clustered together)
- Streptococci -spherical bacteria that occur in chains (clustered in a long thread)
- Sarcina - spherical bacteria clustered together in cube like packages.
- Bacilli - rod shaped bacteria
- Vibrios - bacteria looking like a "v" shape.
- Spirilla - bacteria that are a spiral or twisted shape.

Some bacteria can form round spores, and these are very difficult to destroy. Spores formed when conditions are poor (eg. normally dry conditions are poor for bacteria). When conditions improve (normally becoming wet), spores return to their vegetative shape and multiply

### **2. Growing a Bacterial Culture:**

Bacteria are grown under ideal temperature and food conditions on special plates, in agar (eg. Agar is a jelly substance containing appropriate nutrients). The dish is incubated in a warm environment such as a heat chamber. Bacteria grow rapidly in a characteristic pattern, according to the type of bacteria present.

### **3. Staining Techniques:**

Bacteria may be first stained with gentian violet and then treated with iodine solution. The whole preparation is then washed with alcohol until no more stain is released. The bacteria are then stained again with a red dye.

Bacteria will react to this process in one of two ways:

- They retain violet dye despite vigorous washing (in which case they are said to be "gram positive"). Gram positive bacteria have very precise food requirements, are less chemically active, and are easier to destroy with chemicals or drugs.
- They lose the violet dye on washing, and take on the red dye (in which case they are said to be "gram negative").

#### **4. Injecting in an animal to cause identifiable affects:**

Injecting bacteria can stimulate production of antibodies specific to the bacteria injected. These antibodies can be introduced into a suspension containing the unidentified bacteria. This will cause characteristic affects which can help identify the bacteria (eg. some types of bacteria move into clumps and settle on the bottom of a suspension in the presence of their antibodies).

### **Characteristics of Bacteria**

Bacteria reproduce by binary fission (eg. One bacterium simply divides down the middle to produce two new bacteria). Under favourable conditions, this activity occurs rapidly. One bacterium can turn into one million in 15 hours. This rate of reproduction can never be sustained however. As the food source depletes, reproduction slows and by products produced by bacteria cause acidification which in turn halts growth.

Bacteria commonly enter a hosts' body by invading a break (eg. wound) in the skin, a membrane or wall. Often this "break" must occur in a specific part of an organ, for a particular type of bacteria. For example, Diphtheria can only enter through the tonsils, while pneumonia can only invade through the walls of the respiratory tract.

Once inside a host, bacteria have to resist the defence mechanisms of the host. If the bacteria manage to overcome this system, they will then set about spreading infection by growing rapidly in the immediate tissues, blood or lymphatic fluid.

Bacteria cause injury in tissue by producing toxins or poisons.

Some toxins are secreted into tissue while the bacteria lives (eg. tetanus), while others are only released when the bacteria dies or breaks up. Many bacterial diseases show an incubation period. This means that some time may elapse before the symptoms of the disease develops. This time reflects the speed at which the invading bacteria are releasing toxins.

The virulence of a bacterium describes its ability to penetrate and reproduce in a hosts tissues or body fluids, and to injure by secretion of toxins. Not all hosts of the same species show the same susceptibility to become diseased.



## **Controlling Bacterial Infection**

Since bacteria must penetrate the skin to cause disease, it follows that wounds in livestock are a potential site for infection. Farmers and pet owners can protect from bacterial invasion by attempting to minimise wounds, and attending to wounds immediately they are detected. Wounds should be washed thoroughly with clean water, to flush away as much bacteria as possible.

The healthy animal will have its own defence system, with which it can fight infection. Sometimes however, the owner may feel the animal would benefit from an extra barrier between the bacteria and the wound (especially if the animal is run down or the wound was very dirty). In this instance, the wound should be treated with an antiseptic. This may take a form such as a sulphur drug, or an antibiotic such as penicillin.

Farmers and pet owners can help prevent bacterial infection by ensuring their livestock receive a well balanced diet. This encourages a strong natural immune system.

There are several serious bacterial diseases of livestock such as Black Leg, Tetanus, Pulpy Kidney, Anthrax, Brucellosis and Botulism.

Vaccination of uninfected animals can prevent these diseases but is of little use once symptoms begin to show. Vaccination must therefore be used as a preventative measure, and not as a treatment. A few of the serious bacterial diseases can be treated after symptoms develop.

Blood containing antibodies to the disease is injected into the infected animal to provide immediate but short lived protection. The blood containing the antibodies is called serum.

## **PROTOZOA**

These are single celled, microscopic animals. They are abundant in damp soil or ground water (eg. ponds). Young adult protozoa reproduce by binary fission (dividing in half), every 3 to 4 days. After several months, protozoa lose the ability to divide and they then change into a spore forming stage, developing a tough, resistant coat.

Spores can remain protected inside this coat for a long time, even in harsh environments (such as dryness and poor temperatures). Examples of protozoan diseases are Malaria, Toxoplasmosis, Coccidiosis and Red Water. Protozoa are commonly transmitted by insects (eg. flies).

### **Control**

Effective control depends on a thorough knowledge of the life history of the organism and the transmitting vector (eg. the insect carrying the disease). Where ticks are the transmitting vector (eg. Theileriosis) dipping can be used to protect animals. Sleeping Sickness (a serious problem in Africa) is controlled by controlling the vector (eg. the tse tse fly) through dipping, spraying and using fly screens on animal enclosures.

Some tick borne diseases are best controlled by a program of both dipping and vaccination. Some diseases are very difficult to control.

## PARASITES

Parasites can include a range of animals (e.g. worms, ticks, mites, fleas).

- **Endoparasites** are parasites that live inside the animal
- **Ectoparasites** are those which live outside of the animal

### WORMS

Nearly all animals are susceptible to some types of worms. Young animals from weaning to 2 years of age are most susceptible. Older animals tend to develop a degree of resistance. If an animal becomes under nourished, or stressed by disease, resistance to worms may deteriorate. Worm infestation is more likely in warm, damp conditions which provide ideal conditions for worm larvae to survive. The higher the stocking rate of livestock (number of animals per acre or hectare) or concentration of animals (in kennels or pens), the greater the chance of worm infestation.

#### Characteristics of Worms

The two classes of worm that concern livestock farmer are Nematodes (roundworms) and Flatworms (tape worms and flukes).

- Roundworms look like cylindrical tubes but are pointed at either end, and have a smooth, white semi stiff skin. They vary in size from 1 mm to 500 mm in length. They can be either male or female.
- Tapeworms are made up of flat segments, and have a rounded head section. Each segment contains male and female reproductive organs. Liver flukes have flattened, oval shapes, and are about 2.5 cm long and 1.2-1.3 mm wide. Like tapeworms, liver flukes have both male and female reproductive organs.

#### Worm Life cycles

- Roundworms have a simple lifecycle. Eggs are deposited in the outside environment in the dung of the host animal. These eggs hatch into small larvae which, in six days, develop to the stage of being able to infect mammalian animals. They climb up blades of grass, and are taken into the host animal when it grazes.
- Tapeworms have a slightly more complicated lifecycle. The tapeworm larvae is first ingested by an intermediate host; a bladder worm. The bladder worm is then ingested by the animal (eg. the final host). In the host, the bladder worm then develops into a tapeworm. Fertilised eggs are then passed out of the animal in dung. They then hatch to produce tapeworm larvae, completing the cycle.
- Flukes make use of an intermediate host - the snail. Snails, and thus flukes, are found in low lying, marshy pastures in areas where temperatures and humidity are high. The fluke goes through a complicated series of larval stages within the snail before being taken up by grazing animals.

## TICKS (KEDS)

These are discussed later in the course.

## MITES


Mites burrow deep into the skin, and are therefore difficult to treat with sprays or lotions. Their bites cause chronic inflammation with a thickening of the skin and hair loss. Injections can be used to allow treatments to reach the mites. Mites can also lead to secondary infections by opening the skin and allowing bacteria to enter. Antibiotics can destroy such secondary infections.

## FLEAS

Fleas suck blood from birds and mammals.

When on a host, the front pair of legs is used to part the fur while the other two pairs are used to walk or run. Contrary to popular belief, fleas rarely jump. It can jump onto a host, but after that it prefers to walk. Fleas are wasteful feeders. Much of the blood they suck from a host passes out in its faeces and is then fed on by flea larvae.

Although the actual flea bite may cause little more than local irritation, fleas can transmit diseases. They can for instance carry the bacterium "Pasteurella pestis", which causes epidemics of bubonic plague.

	<b>SELF ASSESSMENT</b> Perform Self Assessment Test 4.1 If you answer incorrectly, review the notes and try the test again.
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## SET TASK

- Find at least two different sick animals you can observe.
- These might be pets belonging to friends, with mild health problems such as psoriasis on their skin, or arthritis in an old cat or dog. Alternatively they might be a sick animal at a veterinary surgery, or on a farm.
- Observe the behaviour and any other (physical) symptoms in these two animals.
- Make notes of your observations.

	<b>ASSIGNMENT</b> Complete Assignment 4
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