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Dryland Husbandry Project

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We are grateful to Dr. Tegegne Teka, in his capacity as a Regional Project Coordinator of DHP, for his continuous encouragement, genuine ideas and advice during the preparation of the country manuals. Moreover, our thanks are also due to the regional coordinator for his proposal to prepare regional paravet manuals for the four DHP participating countries. His invitation to the authors to get together in Addis Ababa and his close working relationship gave the group great physical and moral support to finalize the training manual.

Our appreciation is also extended to the Executive Secretary and all staff members of OSSREA for their generous help as well as for the friendly atmosphere they created during the preparation of the manual.

Last but not least we would like to thank all people at the DHP country level who helped in one way or another during the preparation of the country manuals and this training manual.

We hope that this manual will be of value to all those who are concerned with the life of animals, specially the trainers of Community Animal Health Workers or paravets in the DHP countries and in other countries.

The Authors
Preface

The Dryland Husbandry Project (DHP) operates in the pastoral areas of Ethiopia, Kenya, Sudan and Uganda. The pastoral and agro-pastoral environments occupy the peripheral areas. Pastoralists live in areas where health services are not available to themselves and to their animals. The conditions of animals determine the standard of living of pastoralists. Poor animal health and lack of veterinary services hinder efforts in livestock production and in poverty alleviation in the pastoral areas. Although traditional healers and herders have found ways of looking after animals through ethnoveterinary practices, the benefits of modern veterinary services have not been used in the pastoral areas. This is because veterinarians are not available in the rural dryland areas. Hence, it is important that intervention is necessary in animal health care to increase animal production and pastoral welfare.

DHP took animal health care as one of its key objectives in its action-oriented activities. This was implemented by training pastoralists and agro-pastoralists as Community Animal Health Workers (CAHW) or as Para-veterinary (Paravet) service providers. Paravets learn the basic elements of what causes, symptoms and treatment of some common animal diseases in a scientific way. Veterinarians keep contact and provide technical advice to paravets. As Paravets carry new ideas to look after animals, they can serve as development agents in the pastoral areas. They could also teach community members on animal health care and could serve as early detectors of animal diseases in the pastoral areas. This information is useful to veterinarians, government institutions and NGOs. Training of Community Animal Health Workers is also an issue of capacity building at the local level.
Community members identify the pastoralists for CAHW/Paravet training. Interested and willing members of the pastoralists are trained. The veterinarians along with knowledgeable people in the pastoral community identify common animal diseases. It is on these identified diseases that professionals would offer training. Those who had knowledge in ethnoveterinary practice were given priority for training. Such an approach would link the local knowledge and practice with that of modern veterinary services in animal health education.

When we come to gender, males in the pastoral and agro-pastoral society mainly conduct ethnoveterinary practices. Because of the social and cultural factors in some societies, paravet training was left to male. In the successive DHP Community Animal Health Workers training, it was only males who attended the programme. DHP raised the issue of female participation in paravet training and discussed the matter with pastoral community members and reached agreement for their participation. The practice of female paravets showed the pastoral community that they could treat animals using modern medicine. The involvement of females in paravet training and practice brought some changes in gender roles in the pastoral and agro-pastoral communities.

A training manual is first prepared on the commonly identified diseases. Senior professionals prepare the manual in the language of the people or the official language of the country. It is on the basis of this manual that Community Animal Health Workers are trained. The manuals have been revised and used for more than five years in all DHP countries. Government institutions and NGOs use the manuals.
This training manual is a combined work of the four manuals that were prepared in the DHP countries. The idea of merging the four country training manuals into one volume presents the common animal diseases, the means of treating them and the approaches used. The other objective of producing this publication is to provide the region with a training manual that has proved useful on the experience of the four DHP countries. This manual contains basic information on body parts and their functions, restraining of animals, methods of diagnosing diseases, causes of disease and their transmission. It also includes disease control and prevention, handling of drugs and their administration, some common diseases, poultry diseases and hygiene, meat inspection, and wound treatment and minor surgical procedures.

This manual is prepared by veterinarians from the University of Khartoum (Sudan), Mekelle University (Ethiopia), University of Nairobi (Kenya), Makerere University (Uganda). Merging the manuals demanded a lot of hard work. OSSREA would like to thank the authors for their unreserved efforts to prepare a manual that would help the trainers and beneficiaries in the four DHP countries and in the region that have similar animal health care problems. Training manuals of this nature are rare in the region. This training manual is perhaps the first publication in the region. We hope that this manual will serve as a basis to further develop future training manuals in the region.

Tegegne Teka
Regional Co-ordinator, DHP
CHAPTER 1

INTRODUCTION

The Dryland Husbandry Project (DHP) has several activities in the participating countries, namely, Ethiopia, Kenya, Sudan and Uganda. One of the major activities of the project is improvement of delivery of veterinary services among the pastoralist communities in the project areas. The chosen areas for participation are dry and located in remote places.

Livestock production is important not only as a source of wealth and income but it is also a mode of life for the pastoral population in DHP countries. In addition to providing food, animals are also used for transport and provision of draught power.

Matters pertaining to prevention and treatment of livestock diseases as well as livestock production are a responsibility of veterinary officers and livestock workers. An important sector of these workers consists of what we call Paravets or Community Based Animal Health Workers (CAHWS). The need to train CAHWS arises because of the inability and unavailability of veterinarians to physically reach all animals due to the vastness of the dryland areas and in many cases, the nomadic lifestyle of the pastoralists.

One might ask: what are the benefits of training paravets? In answer, one should bear in mind that the majority of these paravet trainees come from the pastoral tribes. They, therefore, know much about animal health care. Much of that knowledge, however, is not scientifically sound. The training of these paravets, therefore, aims at giving them suitable information to correct any unsound knowledge they may possess.
This manual has been developed to provide the paravets with knowledge about causes of disease on a scientific basis instead of attributing any disease to mythical causes, for example evil eye and witchcraft. The trainee will further be given information on symptoms, diagnosis and treatment of important diseases, correct doses and administration of drugs.

The training will concentrate on communicable diseases to protect the life of both man and his animals since some animal diseases can be transmitted to man and vice versa. The paravets should be in a position to advise the pastoralists about the dangers of zoonotic diseases.

The principle of selecting paravet trainees should be based on the fact that they are members of the pastoralist community. The community leaders in conjunction with trainers select suitable candidates for training. Preferred are those who can read and write. A paravet should be 18 years and above and both genders (men and women) should be included to ensure women’s participation.

Lastly, we emphasize the importance of continuous working contact between the paravets and veterinary officers. In this way, the programme will be executed properly and the paravets will always be under close supervision by the veterinarians. The paravets form a linkage between the pastoralists and veterinarians. The paravets on their part are required to notify the veterinary authorities of any outbreak of any disease.
CHAPTER 2

BODY PARTS AND THEIR FUNCTIONS

BODY PARTS

Body parts of a camel

1. Foot
2. Toe nail
3. Cleft between toes
4. Fetlock
5. Shin
6. Knee
7. Forearm
8. Elbow pad
9. Boss
10. Chest
11. Shoulder
12. Neck
13. Jaw
14. Lip
15. Nostril
16. Eyebrow
17. Forehead
18. Ears
19. Hollow behind eye
20. Poll gland
21. Hump
22. Ribs
23. Tail
24. Flank
25. Stomach
26. Back pad
Body parts of an ox

1. Throat
2. Knee
3. Penis
4. Testicle
5. Hoof
6. Hock
7. Thigh
8. Hip
9. Tail
10. Rump
11. Loin
12. Chine
13. Neck
14. Back

Body parts of a goat

1. Ear
2. Neck
3. Hip
4. Tail
5. Thigh
6. Hock
7. Testicle
8. Penis
9. Forearm
10. Chest
11. Throat
FUNCTIONS OF BODY PARTS

In the study of all life around us, scientists use an instrument called a microscope. This makes it possible to see very small things that are invisible to the naked eye. Many of the secrets of life have been revealed with the aid of the microscope.

A microscope is a magnifying instrument. It can magnify the original size more than a thousand times.
The Cell

Cells are the smallest living units of the body (that can only be seen with a microscope). Just as bricks are the smallest units of a brick wall, the cell is the smallest unit of the body. There are different types of cells.

A group of similar cells doing the same function is called a tissue. Examples of tissue are nerve, fat, bone, blood, and muscle.

A group of tissues form an organ. Organs form special parts of the body that perform definite functions. Among the important organs of the body are the heart, lungs, stomach, liver, kidney, uterus, and brain.

A group of organs form body systems while a group of systems form an organism.
The Musculo-skeletal System

Animals that have a backbone are called vertebrates. A vertebrate skeleton has axial and appendicular parts. An appendicular skeleton includes the bones of the forelimb and hindlimb. The axial skeleton consists of the vertebrae.

Meat consists mainly of muscle along with varying amount of connective tissue.

Functions of the musculo-skeletal system

The main function of the musculo-skeletal system is locomotion. Others are:
- Protection of the vital organs
- Support the body
- Attachment to muscle
The skin

The skin has three layers:
- The epidermis
- The dermis
- The hypodermis

Hairs are structures of the epidermis, which arise from hair follicles. They cover the body surface of mammals. The skin protects the animal against mechanical injuries. It acts as a sensory organ for touch, temperature and pain stimuli. It aids in temperature regulation through the activity of sweat glands.

Vitamin D is formed in the skin through the action of sunlight. Vitamin D hardens the skeleton.

A cross-section of skin
The blood

Blood is a fluid located within a closed compartment. There are two types of blood cells, namely the red blood cells and white blood cells. These cells are suspended in a fluid called plasma.

The blood acts as a transport medium. Red cells carry oxygen and carbon dioxide gas to and from lungs. White blood cells fight disease.

As blood moves around the body, it:
- Carries water
- Carries nutrients to the cell and waste products away from the cell
- Transports heat from hotter to cooler regions
- Coagulates to block open wounds
The heart is part of the circulatory system. It is divided into four parts. The two upper halves are called auricles while the two lower parts are called ventricles. The four parts communicate through openings or doors called valves.

The main function of the heart is to pump blood to the body.

Blood is pumped through pipes called blood vessels. The blood that is pumped from the heart to different parts of the body is clean and contains many nutrients.

Blood returns from the body to the heart through blood vessels called veins and contains waste materials. The blood vessels that transport clean blood are called arteries.
The Respiratory System

The respiratory system includes:

- The lungs, which are in the thorax
- The trachea in the neck region
- The upper respiratory tract, which includes nostrils and nasal passages

The voice is produced in the larynx.

Animals take oxygen from the air. The oxygen is used to release energy. Then the cells give off carbon dioxide and water. This takes place in all the cells.
The Digestive System

There are three classes of animals on the basis of feeding habit. They are:
- Carnivores
- Herbivores
- Omnivores

Carnivores eat the flesh of other animals. Most of their digestion is enzymatic (e.g. dog, cat, and hyena). Herbivores feed mainly on plant materials (e.g. cow, sheep, goat, and camel). Omnivores feed on both plant and animal matter (e.g. pig, man, and poultry).

The digestive system consists of the mouth, teeth, tongue and long tubular parts:
- The oesophagus
- The stomach
- The small intestine
- The large intestine

The liver and the pancreas are attached to the small intestine.

The food eaten by farm animals, which is in the form of large particles, should be broken down into simpler compounds. The process of breaking down feed into simpler compounds is called digestion. This is done in the alimentary canal.

Digestion may be grouped into three stages:
- Mechanical, which involves chewing and muscular contraction of the alimentary canal
- Chemical, brought about by the juice called enzymes produced along the alimentary canal
- Microbial, through microbes found in the alimentary tract that ferment the food that cannot be digested by the body enzymes

Farm animals digest their food in different ways. Animals such as sheep, goat, cattle and camel have a multiple stomach (four compartments). When the food is first swallowed, it is stored in the first stomach. When the animal is resting, it brings back the food for rumination. The food is re-chewed and mixed with saliva.

Digested food is absorbed into the blood through a process known as absorption. Undigested food passes as faeces.
The Excretory System

Each kidney is a filter that removes wastes as blood passes through it. The kidney removes poisonous wastes from the blood. Wastes are formed all the time in every cell of the animal body.

The animal body is like an engine that breaks down fuel with the help of oxygen that the animal breathe. Every engine produces smoke. The body cells also produce water, carbon dioxide and other wastes such as urea. Some of these wastes pass into the blood and are removed in the kidney.

The filtrate (waste) is called urine, which is stored in the urinary bladder before it leaves the body.

Urinary system of
Female

1. Kidney
2. Ureter
3. Rectum
4. Vagina
5. Vulva
6. Urethra
7. Bladder
8. Uterus

Urinary system of
Male

1. Kidney
2. Ureter
3. Rectum
4. Accessory gland
5. Urethra
6. Sperm duct
7. Bladder
8. Testis
9. Penis
The Reproductive System

The reproductive system of a cow is inside the body of the animal. The cow has a pair of ovaries that produce an ovum every three weeks, if the cow is not pregnant.

The spermatozoa or sperms are the male reproductive cells. They are produced in the testicles. The sperm swims in the uterus and fuses with the egg. This process is called fertilization.

If a cow is not successfully mated, the cycle comes regularly once every 21 days. This is called the oestrus cycle.

Good knowledge of reproduction enables one to select animals for breeding. In this way one will get bigger animals that grow faster and stronger. These will produce more milk and meat and work more, provided they are fed properly.

Oestrus cycle

Most cows come to heat every 18 to 24 days all year round. Most cows are on heat for one day.

The best time to breed is near the end of the heat period. The following are signs that are observed when a cow is on heat:

- String of clear mucus on tail or hind quarters
- Trying to ride other animals
- Wandering around
- Bellowing and crying

If a cow is properly mated, the embryo grows in the uterus and gives birth to a young calf after nine months.
A cow giving birth

Signs of heat
The Nervous System

The nervous system controls the functions of the different systems of the body and their interaction. The nervous control is concerned with the animal's sensations of its external and internal environment and with conscious and unconscious activities.

Nerve impulses are transported to the brain through a network of nerve cells called neurons. The nervous system consists of a network of peripheral neurons, the spinal cord and the brain.

Some controls are voluntary, such as walking. Others are non-voluntary, such as the heartbeat and digestion.
# Body Systems and Organs

<table>
<thead>
<tr>
<th>Body system &amp; organ</th>
<th>Function</th>
<th>Signs of health</th>
<th>Signs of disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Circulatory system, heart &amp; blood</strong></td>
<td>- Regulation of body temperature&lt;br&gt;- Pumping of blood through body&lt;br&gt;- Transport of nutrients &amp; gases (oxygen/carbon dioxide and others)</td>
<td>- Normal heart rate</td>
<td>- Mucous membranes pale&lt;br&gt;- Congested abnormal heart beat&lt;br&gt;- Fever&lt;br&gt;- Cold&lt;br&gt;- Dullness&lt;br&gt;- Swollen lymph nodes</td>
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<td><strong>Liver &amp; gall bladder</strong></td>
<td>- Production of bile for digestion, storage of bile in gall bladder&lt;br&gt;- Filtration of blood to eliminate poisons&lt;br&gt;- Building of nutrients, breakdown of nutrients</td>
<td>- Good digestion&lt;br&gt;- normal stools</td>
<td>- Problems in digestion&lt;br&gt;- Mucous membranes become yellow due to accumulation of toxic substances (poisons stay in body)</td>
</tr>
<tr>
<td><strong>Muscles &amp; skeleton</strong></td>
<td>- Give body frame and shape&lt;br&gt;- Important for movement (coordination) &amp; posture</td>
<td>- Good body condition&lt;br&gt;- Moving around, playing, fighting&lt;br&gt;- Proper co-ordination</td>
<td>Limping, cramping, paralysis, reluctance to move, emaciation &amp; loss of body weight, wounds, fractures</td>
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<td><strong>Reproductive system</strong></td>
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<tr>
<td><strong>Cow:</strong></td>
<td>- Production of new calves&lt;br&gt;- Production of milk&lt;br&gt;- Production of meat</td>
<td>- Normal milk production&lt;br&gt;- Giving birth in regular intervals</td>
<td>- Not giving birth&lt;br&gt;- No or reduced milk production&lt;br&gt;- Discharge&lt;br&gt;- Abortion&lt;br&gt;- Not serving&lt;br&gt;- Swollen testicles/prepuce&lt;br&gt;- Not fertilizing</td>
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<tr>
<td><strong>Ovaries/uterus/vagina/vulva</strong></td>
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<td><strong>Bull:</strong></td>
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<tr>
<td><strong>Testicles/penis</strong></td>
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<tr>
<td><strong>Nervous system: Brain, spinal cord &amp; nerves</strong></td>
<td>- Co-ordination of all body functions e.g. thinking, heartbeat, breathing, eating, walking</td>
<td>- Good body condition&lt;br&gt;- Moving around, playing, fighting, eating, sleeping etc&lt;br&gt;- Proper co-ordination&lt;br&gt;- Animal attentive with normal behaviour</td>
<td>- No feeling of pain&lt;br&gt;- Uncoordinated movement&lt;br&gt;- Paralysis&lt;br&gt;- Turning disease&lt;br&gt;- Abnormal behaviour</td>
</tr>
<tr>
<td>Body system &amp; organ</td>
<td>Function</td>
<td>Signs of health</td>
<td>Signs of disease</td>
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</table>
| **Skin & hair**     | - Protect the inside  
                      - Regulate body temperature  
                      - Enable animals to walk on hard ground |
| **Hooves**          | - Smooth hair coat & skin  
                      - Strong, well formed hooves without cracks |
|                     | Skin and hair:  
                      - Can be affected if the animal is generally sick e.g. has worms, East Coast Fever or Trypanosomosis.  
                      - Rough and starring coat  
                      - Can be sick on its own in case of ectoparasites (lice/mites/ticks) may be seen  
                      - Excoriations, wound, scab and scars due to itching and scratching. In case of fungal infection hairless round spots of greyish colour may be seen.  
                      - In case of bacterial or viral infection you may see nodules, lumps, abscesses, blisters and others  
                      - Udder: Red/hot/painful/swollen/walking in a problem  
                      - Hooves: limping, cracks |
| **Horns**           | Weapons for fighting  
                      Strong shiny horn |
| **Digestive system**| - Uptake of food and water  
                      grinding/swallowing/tasting  
                      - Transport of swallowed food to the stomach  
                      - Storage & digestion  
                      - Absorption of nutrients  
                      Absorption of water  
                      Expulsion of waste from body |
| **Mouth, teeth**    | - Feeding well  
                      - Good appetite  
                      - Chewing curd  
                      - Normal stools  
                      - Good body condition |
| **Tongue**          | - Lack of appetite  
                      - No chewing of curd  
                      - Loss of weight & body condition  
                      - Rough hair coat  
                      - Bloating (swollen abdomen)  
                      - Tinted stool (blood, mucous, pus)  
                      - Diarrhoea  
                      - Constipation |
<table>
<thead>
<tr>
<th>Body system &amp; organ</th>
<th>Function</th>
<th>Signs of health</th>
<th>Signs of disease</th>
</tr>
</thead>
</table>
| Urinary system      | - Regulation of water & minerals of the body  
                      - Removal of waste from the blood  
                      - Storage & excretion of urine  
|                     | Normal urination | Stop of urination  
                      - Painful urination (arched back)  
                      - Blood in the urine |
| Kidneys             |                       |                |
| Bladder             |                       |                |
| Respiratory system  | - Smelling, breathing, intake & filtering of air  
                      - Exchange of gases (uptake of oxygen in exchange for carbon dioxide)  
                      - Production of voice  
|                     | Normal breathing rate | Different breathing pattern, e.g. panting (increased frequency), enforced breathing (use of abdominal muscles) grunting, coughing, sneezing,  
                      - Excretions from nose; mucous, blood, pus  
                      - Open mouth breathing |
| Nose, larynx, trachea, lungs |                       |                |
CHAPTER 3

RESTRAINING ANIMALS

Animals are restrained during examination or treatment. The method of restraint used depends on the temperament of the animal and animal species. Animals can be restrained in a crush or by using robes.

A 15m long robe is required for casting large animals or using special facilities such as twitch. If the animal is to be cast, it should be done on a dust free soft ground or a straw cushioning. Care should be taken to avoid fracture. Animals should not be cast for long time.

Animals can also be restrained using chemicals called anaesthesia.
Restraining the camel in standing position. A, Foreleg ring tie and B, foreleg bend tie.
Steps of restraining the camel in sternal recumbence: A loop is passed on the mandible, then the mouth rope is pulled forward and downward. Simultaneously light stroke on the knee is necessary (I). The previous step is continued until the camel becomes fully recumbent (II), then a rope is passed underneath the hindlegs and tied over the back. The forelegs are also tied while bent (III). Finally, the rope attached to the mouth is pulled forward and downward to keep the neck flat on the ground (IV).

Design of camel crush. Note that ropes are passed over the back and tied to the rings fixed on the floor and additional ropes are tied between the hind and forelegs.
Restraint equipment for the camel: A camel holder (a); a camel muzzle (b).
Casting an ox

Casting a horse
CHAPTER 4

METHODS OF DIAGNOSING DISEASES

Clinical examination of the animal is important to make a diagnosis. Diagnosis is important in order to give correct treatment.

Animals cannot communicate their illness directly. Complaint about a disease comes from an attendant or the owner.

Procedure of clinical examination

Patient's data

The first procedure is taking the patient's data such as the species, age, sex, number affected, number of animals dead, and total number of animals in the area.
History

History taking is an important part of clinical examination. One makes inquiry on whether the animal eats and drinks, the type of faeces, colour of urine, duration of illness, and behaviour.

Any disease which spreads rapidly and affects many animals should be reported to a veterinarian or any government official.

To sum up, history taking by the paravet is an attempt to collect necessary information about the disease case from the owner and to know the reason why an animal is brought to the paravet.

Clinical examination

Inspection: The first step is to inspect the animal from a distance. One looks at the skin. The skin is "the mirror of health". If the animal is healthy, it has a shiny smooth skin. If the animal is sick, the skin looks rough. Usually the body condition is scored as 'good' or 'emaciated'.

Behavior of the animal: One should be able to detect any abnormal behaviour of the animal under examination. An animal may become dull and recumbent, with the neck flexed as in a parturient cow.

An animal may become restless, tend to kick the ground as in colic; or it may be vicious and attack other animals or objects as in rabies.

Wounds associated with convulsion are suggestive of tetanus.

Circling in ruminants can be a sign of a parasite cyst in the brain.
Lameness causes abnormality in gait

Body temperature: Body temperature is measured by inserting a thermometer into the rectum. The thermometer must first be shaken down so that the column of mercury settles at the lowest point (bottom). The thermometer must be greased before being inserted in a spiral movement. It must be held in place by the operator for about two minutes, should the animal kick and damage or dislodge the thermometer. When the thermometer is withdrawn, it is wiped clean with the use of cotton wool, but care must be taken not to touch the mercury reservoir before reading.

Normal body temperature (see Table) varies between species. Under normal conditions, body temperature is slightly higher in pregnant females than in non-pregnant ones, in young than old animals, and in small animals than in large ones. A rise in body temperature may be a result of natural causes such as high humidity, or heavy hair coat. Pathological conditions which are accompanied by a rise in body temperature are those caused by viruses, bacteria, fungi, and some parasites.

Symptoms of infection

The following are the symptoms of an infected animal:
- Sudden onset of disease
- It stops feeding and drinking
- Breathing may be irregular and difficult
- It appears dull
- Production of milk may drop or stop
- It has high body temperature
- It may shiver
• It has dry muzzle
• The hair may erect and the ears may droop
• The heart beat becomes abnormal
• It voids small and abnormally coloured urine
• There may be coughing and nasal discharge
• There may also be excessive salivation and diarrhea

### Normal average temperature of farm animals

<table>
<thead>
<tr>
<th>Species</th>
<th>Normal temperature</th>
<th>Critical temperature</th>
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<tbody>
<tr>
<td>Cattle</td>
<td>38</td>
<td>39</td>
</tr>
<tr>
<td>Sheep</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>Goat</td>
<td>39.5</td>
<td>40.5</td>
</tr>
<tr>
<td>Camel</td>
<td>37</td>
<td>41</td>
</tr>
<tr>
<td>Pig</td>
<td>39</td>
<td>40</td>
</tr>
<tr>
<td>Donkey/Horse</td>
<td>38</td>
<td>39</td>
</tr>
</tbody>
</table>

Pulse rate: In horses, the pulse is taken from the *facial artery* as the artery winds around the ventral border of the molar part of the mandible. In cattle and in camels, the pulse is usually taken from the *median caudal artery* (artery of the tail) about 10cm from the anus. In dogs, cats, sheep, goats, and calves, the pulse is taken from the *femoral artery*, in the medial aspect of the upper part of the thigh.

It is advisable to measure the pulse for more than one minute, and then calculate the number of pulses per minute. When the pulse is being taken, the examiner looks not only for the rate but also for the regularity of the beat. The pulse is felt by putting a finger, or two fingers, on the artery without undue pressure. See the Table below for pulse rates of farm animals.
Many factors tend to affect the frequency of the pulse. Some of these are:

- **Species**: The pulse is higher in animals of small size (e.g. cat) than in animals of large size (e.g. horse)
- **Size and weight**: In members of the same species, the pulse is usually higher in those of smaller size or weight
- **Age**: In newborn and young animals, the rate of the pulse is normally higher than in adult animals of the same species
- **Sex**: The pulse rate is generally higher in females than in males of all species
- **Pregnancy**: The pulse rate increases with the stage of pregnancy
- **Ambient temperature**: Warm environments affect the pulse rate
- **Inflammation**: Pain and rise of body temperature tend to increase pulse rate
- **Fear, excitation**: These also increase the pulse rate

### Pulse rate of farm animals

<table>
<thead>
<tr>
<th>Species</th>
<th>Normal pulse rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>45-80 (120-150 in calves)</td>
</tr>
<tr>
<td>Sheep/goats</td>
<td>70-90</td>
</tr>
<tr>
<td>Camel</td>
<td>30-50</td>
</tr>
<tr>
<td>Horse/Donkey</td>
<td>28-40</td>
</tr>
</tbody>
</table>

Respiration: The examiner should stand behind or at the side of the animal. He should be able to have a good view of the thorax and abdomen.
When observing the act of respiration, it is advisable to concentrate on the following:

- The number of respirations per minute
- The rhythm of the respiratory process
- The characteristics of respiration

Respiratory rate varies between species: (see Table). There are many factors that may speed up the rate of respiration. These factors include excitation, hard work and high environmental temperature. Respiratory rate may increase under disease conditions.

### Respiratory rate of farm animals

<table>
<thead>
<tr>
<th>Species</th>
<th>Normal respiratory rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>10-30</td>
</tr>
<tr>
<td>Sheep</td>
<td>10-20</td>
</tr>
<tr>
<td>Goat</td>
<td>25-35</td>
</tr>
<tr>
<td>Camel</td>
<td>5-12</td>
</tr>
<tr>
<td>Horse/Donkey</td>
<td>8-10</td>
</tr>
<tr>
<td>Pigs</td>
<td>10-20</td>
</tr>
</tbody>
</table>

Auscultation: The method of auscultation is performed for the purpose of detecting abnormal sounds generated in organs. It is used mainly in the examination of the lungs and heart, with the aid of the stethoscope. Sounds that are not heard in the healthy lung or heart indicate a malfunction in one or both these two organs.
Percussion: This is one of the common diagnostic methods. It is used mainly in the examination of the lung, heart and abdominal organs. Percussion is performed with the help of a hammer and pleximeter, or simply by use of hands. The latter is especially used in small animals.
CHAPTER 5

CAUSES OF DISEASE AND TRANSMISSION

Diseases can be defined as any changes in the state of an animal or its organs that affect the proper performance of its normal function. A normal animal has the following characteristics:

- It moves about steadily
- It breathes steadily and easily
- It eats well
- It has a loose shiny skin
- It has bright eyes and moist nose
- It excretes soft dung
- It should be able to reproduce a healthy calf every year
- It should maintain its level of milk production

Pathogens

There are a number of things or agents, which cause or bring disease to animals. These are microbes, parasites, and physical and chemical agents.

Microbes

Microbes are tiny microscopic organisms that may cause a disease. They can be bacteria, viruses or protozoa.

Viruses: Viruses are the smallest micro-organisms. They are unable to reproduce and function outside the body of living things. Because of their very small size they can easily be carried in dust, water and air.
Bacteria: Bacteria are very small organisms. Some are harmful while others are useful. For example, the normal bacteria of the gut help in digestion of fiber.

Bacteria in unfavorable environments produce resistant bodies called spores. Spores can live for many years in soil so causing disease outbreak.

Some bacteria produce toxins and impair body functions by destroying tissues.

Protozoa: Protozoa are parasites. They are small animals that cannot be seen with a naked eye. They are mostly transmitted by flies, mosquitoes, ticks and tsetse flies.

The signs of microbial diseases include the following:
- Sudden onset of disease
- Animals may stop feeding and drinking
- Breathing may be irregular and difficult
- Animals appear dull
- Production of milk may drop or stop
- Animals may have a rise in body temperature
- Animals may shiver

How are microbes transmitted? Infection may come from:
- Carrier animals
- Contaminated soil, water and or feed
- Faecal matter
- Body secretions—nasal discharge, saliva and blood
- Dead animals
Disease may be transmitted in one of the following ways:

- Breathing contaminated air
- Feeding on infected food
- Drinking contaminated water
- Direct contact with sick animal

Other ways of disease transmission include:

- Ticks, flees, flies and lice through sucking blood of infected animal
- Unhygienic milking practices
- Wounds through the skin
- Birth canal
- Navel contamination of young animals
- Use of harness

Some of the factors that predispose animals to disease include:

- Overcrowding
- Poor nutrition
- High environmental temperature
- Deprivation of water
- Unclean surroundings in which micro-organism can survive and multiply
- Fatigue caused by too long trekking
- Age

**Nutritional diseases**

Nutritional diseases arise from lack of nutrients such as protein, vitamin, mineral and carbohydrates.
Nutritional deficiency can occur if the animal does not get enough quantity of feed.

Animals should be provided with water considering the species of the animal and the location.

Adding one tablespoon of urea to every 15 liters of drinking water makes ruminants to grow much better, produce more milk and perform work better.

In addition, green forage and mineral salt should be provided in the form of lick.

Excess feed may cause ruptured stomach, constipation or accumulation of gases in stomach - a condition called bloat.

Poorly stored feed, especially in moist conditions, develops moulds, which can produce poisonous substances.

Some chemicals are poisonous and interfere with body functions.
Hereditary causes of diseases

Some diseases may transcend from parents to offspring, for example, dwarf calves. Parents with known desirable characteristics should be chosen. Some of the characteristics that should be considered are milk, meat and power. Selection can also be done through body conformation. For example, dairy cows are selected based on udder shape and triangular body shape.

Parasitic diseases

Parasites are organisms that depend on others for food. Some parasites live inside the body of the animal while others live outside the body.

The following are some of the damages caused by parasites.

They:

- Deprive animals of digested nutrients
- Suck blood
- Cause mechanical obstruction
- Destroy tissues
- May transmit disease
- Reduce host resistance to other infections
- Cause impaired production

Endoparasites are parasites that live inside the body of animals. They are mainly worms, such as tapeworms, roundworms and flukes.
The main symptoms of worm infestation include the following:

- The animal lacks vigour
- Poor appetite
- Loss of body condition
- The animal shows diarrhea with mucus or worms
- The animal eats soil or other organic matters
- The animal has rough hair coat
- Pale mucous membrane
- Bottle jaw
- Low production of milk
- Poor draft power
- Less number of calves per cow

Ectoparasites are parasites that live outside the body. They consist of flies, lice, ticks and mangemites.
Ectoparasites suck blood of the animal.

They may transmit infectious organisms.

For example, ticks transmit red water, East Coast Fever and dermatophilosis.

They damage the skin by chewing.

They cause itching, and as a result the animal rubs against an object.

They also cause wariness, and as a result the animal cannot feed properly.

Physical causes of disease (trauma) include:

- When animals are fighting
- Injuries caused by objects
- If animals are beaten or if they stumble in sloppy areas
- Automobile accidents and other sharp objects may cause wounds
- Injuries can be inflicted to organs and may include cuts

Wounds are the sites where infections may take place.
Chapter 6

Disease Control and Prevention

Keeping animals healthy is more important than treating the disease. Farmers spend a lot of money to buy medicine for treating their animals.

In order to keep animals healthy, one must observe the animals daily. One should follow the following programs:

- Vaccination
- Deworming
- Disinfecting
- Isolation and Quarantine
- Waste management and disposal
- Disinfection and sterilization

Vaccination

A vaccine produces immunity or protection against a given disease. Vaccination stimulates the production of antibodies. There are different forms of vaccine.

It is important to vaccinate animals because vaccinated animals suffer less and recover faster from the effect of disease.

The following are some of the guidelines for vaccination:

- Vaccines spoil easily, therefore special care and precaution are necessary for their proper use
- Only a person who has special training should vaccinate
- Avoid vaccinating an animal in very hot weather
- Vaccinate before anticipated disease outbreak
• Do not consider vaccination as a substitute for sanitation and other preventive management practices
• Use sterile instruments
• Use the recommended solvent—do not make a substitute
• Avoid contamination with other chemicals
• Do not use leftover vaccines
• Do not vaccinate weak, sick and very young animals
• To avoid contamination, use separate needles for injecting animals and for dissolving the vaccine
• For further information follow the instruction on the packing

The following are the steps in administering a vaccine:
• Assess the health status and the age of the animal
• Restrain the animal properly
• Dissolve and mix the vaccine (with its solvent if needed)
• Clean the preferred site for injection (using alcohol)
• Administer the recommended amount in the right location
• Properly mark vaccinated animals for identification

Vaccines are made from disease causing micro-organisms. They must therefore be handled carefully and stored properly. Improper handling and storage may cause them to lose their effect or make them dangerous agents. They should be refrigerated but not frozen. If there is no refrigerator, ice can be used in a cooler box.

The following are some of the factors that affect the effectiveness of a vaccine:
• Sick animals respond less
• Improper dosage
• Heat stress
• Improper handling of the vaccine
• Improper administration
The table below gives a list of common vaccines of livestock and poultry.

<table>
<thead>
<tr>
<th>Type of vaccine</th>
<th>Animal species</th>
<th>Mode of administration</th>
<th>Duration of protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anthrax</td>
<td>Cattle</td>
<td>Subcutaneous</td>
<td>One year</td>
</tr>
<tr>
<td>Blackleg</td>
<td>Cattle</td>
<td>Subcutaneous</td>
<td>One year</td>
</tr>
<tr>
<td>CBPP</td>
<td>Cattle</td>
<td>Subcutaneous</td>
<td>One year</td>
</tr>
<tr>
<td>FMD</td>
<td>Cattle</td>
<td>Subcutaneous</td>
<td>Lifelong</td>
</tr>
<tr>
<td>Newcastle</td>
<td>Poultry</td>
<td>Oral, intramuscularly</td>
<td>One year</td>
</tr>
<tr>
<td>Pasterellosis bovine</td>
<td>Cattle</td>
<td>Subcutaneous</td>
<td>One year</td>
</tr>
<tr>
<td>Pasterellosis ovine</td>
<td>Sheep</td>
<td>Subcutaneous</td>
<td>One year</td>
</tr>
<tr>
<td>Sheep pox</td>
<td>Sheep</td>
<td>Subcutaneous</td>
<td>Lifelasting</td>
</tr>
<tr>
<td>Rabies</td>
<td>Dog and cat</td>
<td>Subcutaneous</td>
<td>Six months – 3 years</td>
</tr>
<tr>
<td>Rinderpest</td>
<td>Cattle</td>
<td>Subcutaneous</td>
<td>Lifelasting</td>
</tr>
</tbody>
</table>

DEWORMING

Deworming means removing parasite worms from the digestive system, particularly from the stomach, intestine and liver.

Deworming makes the animal grow fast, perform better and produce more milk. It makes the animal more resistant to disease.

The following are the guidelines for avoiding or reducing worm infestation:
• Deworm animals regularly
• Improve grazing management, especially for young animals. Although grazing is essential for the growth of young animals, there is a chance of worm infestation
• Wet, humid and swampy areas are good breeding places for parasites.
• Avoid grazing animals in such an area if possible
• Deworm animals twice per year—one at the beginning of the rainy season and one at the end of the rainy season

When grass has been grazed shortly before by older animals, there should always be three weeks between the last grazing in a paddock and the start of grazing calves in the same paddock. During these three weeks, the eggs laid by the worms will have hatched. But the young worms will die when there is no animal to pick them. These worms will climb on the grass and wait to be swallowed by cattle. Therefore three weeks without grazing the area is necessary to make the grass safe to graze again.

DISINFESTING

Acaricides are used for disinfesting animals. These substances kill or repel ectoparasites such as ticks and lice.

Ticks and lice may be adequately controlled by the following methods:

• Dipping or spraying with acaricides at least twice a week
• Picking ticks by hand from animals and burning them
• Fencing the farm to prevent infestation from other animals
• Keeping poultry in the backyard to pick the dropped ticks—a good example of biological control

Guidelines for spraying animals

The spray chemical must be diluted according to the instruction given by the veterinarian or manufacturer.
If hand spraying is done it should be accompanied by hand dressing. A piece of cloth or brush should be dipped and applied to the body.

Spraying should be thoroughly done all over the body, particularly in the ears, under the tail and between the legs.

The following is the procedure for spraying:
• First spray the back
• Then the two sides of the body
• Next the ventral abdomen
• The extremities and between the claws
• The tail end
• Finally, the head and ears

Handling of acaricides

Most acaricides are harmful to people and animals when they enter the body through the mouth, skin or nose. Therefore necessary care should be taken. The following should be observed:

• If available, rubber gloves and protective clothing are important
• There should be no drinking, eating or smoking during the course work
• Spraying should take place in the open air and not against the wind
• All acaricides and all other forms of drugs should always be kept under lock and key, especially from reach of children
• To avoid accidental poisoning of people and animals, empty containers and unused pesticides should be carefully disposed of, by burying them in a pit far from any water source to avoid contamination
• Drugs should be kept in cool dry place; they should not be exposed to sunlight

The following are signs of pesticide poisoning:

• Swaying
• In-coordination
• Vomiting
• Sleepiness
• Frothy mouth
ISOLATION AND QUARANTINE

Any sick animal must be isolated from the rest of the herd as soon as a disease is suspected.

Quarantine is a governmental regulation for the prevention of the spread of infectious diseases. An animal or animals from infected areas are restricted from mixing with other animals.

Examples of diseases that require quarantine are Rinderpest and Foot and Mouth Disease (FMD).

WASTE MANAGEMENT AND DISPOSAL

Animal wastes should be disposed of properly to control disease and prevent soil, water and air contamination. Dead animals should also be properly disposed of to prevent the spread of infectious disease.
Never open up dead animals, only veterinarians are allowed to do this, to find out the cause of death. Cover dead animals immediately, so that insects and other animals do not feed on them prior to proper disposal. Never deposit carcasses in or near streams, but bury them in a pit or burn them.

**DISINFECTIONS AND STERILIZATION**

Disinfectants are chemicals that kill disease-causing organisms. Disinfectants help to stop spread of disease.

**Guidelines for disinfection**

The following are the guidelines for disinfection:

- Pens and equipment should be disinfected after use to kill germs
- Dirty bedding and dung must be removed
- Use detergent to loosen dirt and organic matter sticking to all surfaces
- Use warm or hot water to increase the cleaning performance
- Remove drinkers and feeders if possible
• Disinfectants are harmless to humans and animals if applied topically at the right concentration. For example, external wounds may be treated
• Wash the udder using disinfectants to prevent spread of mastitis
• Apply disinfectant to the injection sites
• If possible, use gloves when handling undiluted disinfectants
• Do not expose disinfectants to sunlight
• Close the bottles tightly; otherwise the antiseptic will be of little value

Sterilization of instruments

To carry out sterilization of instruments, the following should be done:
• First wash the instruments thoroughly in clean water and detergent, then sterilize them
• This is done by boiling for 20 minutes then placing on sterilized container
• If this is not possible, wash the instruments with clean water and soap
• Soak instruments overnight in alcohol and dry them in air before use
• Syringes, needles, scissors, forceps, knives should be sterilized after use