Training Facilitator Guide on Animal Health Management

E. Kang'the, S.A. Khan, M.N.M. Ibrahim and J. Githinji

(Sindhi & Urdu versions of this manual was Translated by: Deepesh Bhuptani, Barkat Ali, Ubaid Qureshi and Shahzad Iqbal)

June 2020

better lives through livestock
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It is well known that dairy production is influenced to a large extent by the efficiency of feeding practices, animal health management, reproduction, and breeding management. All these practices have a direct impact on productivity, health status, and herd improvement in dairy animals. As such proper dairy management practices are key to sustain productivity and hence the profitability. Under the Sindh Agricultural Growth Project (livestock component) these aspects of dairy cattle and buffalo management were identified as constraints for enhancing milk production. Also, the lack of knowledge of all stakeholders involved in the dairy value chain (DVC) on modern dairy management practices further hindered the productivity of dairy animals.

In order to rectify these gaps in knowledge, the International Livestock Research Institute (ILRI) was recruited under a consultancy agreement in July 2017 with the mandate to capacity build all stakeholders involved in the DVC. ILRI with its knowledge in executing other livestock projects in Pakistan, designed capacity building and training interventions for various stakeholders at Provincial, District, Field level staff, and dairy farmer producer groups. Training materials were prepared by the ILRI team from ILRI publications listed at the end of this manual and finalized after several rounds of discussions with Sindh Livestock Department staff, SAGP-L staff, and Plan International - Pakistan staff. Using these training materials (English/Sindhi/Urdu), over the past 3 years ILRI conducted more than 12000 training programs/activities on various aspects of dairy production to provincial staff, district staff (VOs, Para-vets, LA), and to the 153 MPG members and non-members in the 11 project districts.

The final output of these training is the publication of three Facilitation training guides; namely Feeds and Feeding, Animal Health Management, and Reproduction and Breeding. These training manuals are prepared in English, Sindhi, and Urdu languages.

We are indebted to the Department of Livestock & Fisheries, Government of Sindh, and SAGP-L for their continued support provided during the planning and execution of workshops. We are grateful to participants of the workshops (DFMs, LLS, Deputy Directors of Districts, ILRI Pakistan staff, and Plan Int. staff) for their valuable inputs during discussions in finalizing the Training materials/manuals. We gratefully acknowledge the support provided by Phillip Sambati (Instructional Designer/ILRI Nairobi) for initiating the preparation of the Facilitator Manual template, and Dr. Okeyo Mwai (Senior Scientist, ILRI Nairobi) for conducting the Animal Reproduction and Breeding training, and to ILRI Pakistan Training Associates (Drs. Deepesh, Barkat, Ubaid, and Shahzad) for assisting in preparing the training materials and also with the translations of these manuals into Sindhi and Urdu.

Finally, The World Bank funding through the SAGP-L project for publishing these manuals is gratefully acknowledged.

Prof. Dr. M.N.M. Ibrahim
ILRI Scientist & DG Representative for ILRI in Pakistan
Islamabad, Pakistan
## ABBREVIATIONS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>ILRI</td>
<td>International Livestock Research Institute</td>
</tr>
<tr>
<td>SAGP-L</td>
<td>Sindh Agricultural Growth Project-Livestock Component</td>
</tr>
<tr>
<td>GoS</td>
<td>Government of Sindh</td>
</tr>
<tr>
<td>DVC</td>
<td>Dairy Value Chain</td>
</tr>
<tr>
<td>DFM</td>
<td>District Field Manager</td>
</tr>
<tr>
<td>LLS</td>
<td>Lady Livestock Supervisor</td>
</tr>
<tr>
<td>VO</td>
<td>Veterinary Officer</td>
</tr>
<tr>
<td>SA</td>
<td>Stock Assistant</td>
</tr>
<tr>
<td>LA</td>
<td>Livestock Assistant</td>
</tr>
<tr>
<td>BW</td>
<td>Body weight</td>
</tr>
<tr>
<td>IM</td>
<td>Intramuscular</td>
</tr>
<tr>
<td>IV</td>
<td>Intravenous</td>
</tr>
<tr>
<td>SC</td>
<td>Subcutaneous</td>
</tr>
<tr>
<td>Inj</td>
<td>Injection</td>
</tr>
<tr>
<td>IU</td>
<td>International Unit</td>
</tr>
<tr>
<td>FMD</td>
<td>Foot and Mouth Disease</td>
</tr>
<tr>
<td>FMDV</td>
<td>Foot and Mouth Disease Vaccine</td>
</tr>
<tr>
<td>HS</td>
<td>Hemorrhagic Septicaemia</td>
</tr>
<tr>
<td>HSV</td>
<td>Hemorrhagic Septicaemia Vaccine</td>
</tr>
<tr>
<td>BQ</td>
<td>Black Quarter</td>
</tr>
<tr>
<td>BQV</td>
<td>Black Quarter Vaccine</td>
</tr>
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CHAPTER ONE

COURSE INTRODUCTION
CURRICULUM
This course focuses on Animal Health Management of Cattle and Buffalo cows.
Delivery of this course will take one day with all factors held constant. This includes practical exercises.

The curriculum summary
The following is a summary of sessions and the duration each session will take.

<table>
<thead>
<tr>
<th>Session</th>
<th>Time taken</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal health management</td>
<td>01h00</td>
</tr>
<tr>
<td>Biosecurity</td>
<td>00h30</td>
</tr>
<tr>
<td>Introduction to disease prevention and control</td>
<td>00h30</td>
</tr>
<tr>
<td>Foot and Mouth Disease</td>
<td>00h45</td>
</tr>
<tr>
<td>Haemorrhagic Septicemia</td>
<td>00h45</td>
</tr>
<tr>
<td>Brucellosis</td>
<td>01h00</td>
</tr>
<tr>
<td>Black Leg/ Black Quarter</td>
<td>00h30</td>
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<tr>
<td>Mastitis</td>
<td>00h30</td>
</tr>
<tr>
<td>Fascioliasis</td>
<td>00h30</td>
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<tr>
<td>Lungworm (Parasitic Bronchitis)</td>
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<td>Anaplasmosis</td>
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<tr>
<td>Babesiosis</td>
<td>00h30</td>
</tr>
<tr>
<td>Theileriosis</td>
<td>00h20</td>
</tr>
<tr>
<td>Zoo-Sanitary Measures</td>
<td>01h00</td>
</tr>
</tbody>
</table>
SESSION 1. Introduction to SAGP-L Training

1h00

**Session Objectives**

- Introduce the training to the participants including contextualizing the project:
  - To ensure that participants are clear how their work embeds with the overall objectives of the program
  - To ensure workshop objectives are clear
  - To identify needs and concerns of participants through sharing expectations
  - To introduce participants to each other
  - To establish trust and respect through agreeing on ground rules

**Session Topics**

- Introductions
- Project brief
- Training objectives
- Setting ground rules

**Resources required**

- Flip chart to write ground rules
- Sticky notes for participants to suggest ground rules

**ACTIVITY I: Introductions and establishing training ground rules**

**THE NAME GAME & GROUND RULES**

- What is your name
- Which one animal do you admire and why
- On a sticky note, suggest two ground rules you’d like all participants to follow in this workshop

**ACTIVITY II: Introduce the conversation and scenario approach of this training**

**OFFICER ISMAIL AND FARMER DAWUD**

- Dawud is a small holder dairy farmer who wants to improve his animal’s nutrition and health
- Ismail is a government vet who will advise

---

**Dawood** has been a small holder dairy farmer for years and is interested in improving his production and profits from his small farm.

**Ismail** has a government veterinary officer, he has worked with the community for a long time and understands the difference good animal management can make.

Explain to participants that the training approach will often be in the form of a conversation between a farmer and his extension officer.
CHAPTER TWO

ANIMAL HEALTH AND BIOSECURITY
SESSION 1. Animal Health Management

1h00

**Session Objectives**
By the end of the workshop, the participants will be able to explain what is animal health management and why it is important for the farmer

**Resources required**
Printed out and labeled image of a healthy cow
Sticky notes for learners to write down answers

ACTIVITY I: ANIMAL HEALTH MANAGEMENT

**ANIMAL HEALTH MANAGEMENT**

Why is animal health management important?
Why should the farmer care about animal health management?

What is animal health management and how does it affect or help me as farmer?

The farmer has asked a very good question, animal health management minimizes negative effects of animal diseases on the farmer is categorized into the following:

- Appropriate husbandry
- Good hygiene
- Proper feed and
- Good management

6 out of every 10 human infectious diseases are likely shared with animals

Discussion: *In the plenary, ask participants to give the characteristics of a healthy cattle*

Minutes: 10 minutes
KEY MESSAGES

- Animal Looks active.
- Bright and soft skin
- Bright and active eyes
- Eating fodder correctly
- Passes faeces and urine
- Eats fodder with interest and also it ruminates.

Note: Very good healthy animal eats fodder with interest and also it ruminates.
SESSION 2. Biosecurity

1h00

Session Objectives
By the end of the session, the participants will be able to explain the most important biosecurity measures for a small holder farmer to understand and implement.

Resources required
Printed out images of biosecurity measures as indicated in the session below.

ACTIVITY I: BIOSECURITY

➤ Note: Use Annex 1 (ppt presentation) for VOs and District Staff

BIOSECURITY IN CATTLE

What is biosecurity measures in cattle?

Why is biosecurity measures important to the farmer?

Information:

When animals are in contact with other animals there is often no way to know if they carry disease, this is why it is important to take precautions.

Biosecurity is the steps taken to prevent infectious diseases affecting animals and the people who care for them, examples include:

- Quarantine unsold animal from the market for 15 days
- Quarantine newly arrival animals for 15 days
- Do not mix animals with nomadic flock /herd without disease verification
- Do not send animals for grazing without disease verification with other flocks/herds

Discussion: In a plenary discuss biosecurity measures that can be applied by a small holder farmer in Pakistan.
Minutes: 15 minutes

KEY MESSAGES

• Cleaning of instruments and floor with water spray
• Hygiene and Sanitation
• Repair fences to keep away rodents / Vectors
• Use of Plastic cover on the shoes of newly arrived people
• Use of anthelminthic drugs to kill parasites
• Use of Insecticide spray on the farm regularly
SESSION 3. Introduction to Disease Prevention & Control

Note: For SESSIONS 3 to 14, Use Annex 1 (ppt presentation) for VOs and District Staff training and provide Annex 2 as a Handout

0h30

<table>
<thead>
<tr>
<th>Session Objectives</th>
<th>By the end of the session, the participants will be able to explain to a farmer why disease prevention and control is in their best interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources required</td>
<td>Animal health cards for learners to reference during the lesson</td>
</tr>
</tbody>
</table>

ACTIVITY I: BIOSECURITY

BIOSECURITY IN CATTLE

What is the farmers’ role in disease prevention?
What is your role as an officer in disease prevention?

Information:

Prophylactic Measures

- What is Vaccine?
- Types of Vaccine
- Storage of Vaccine
- Transportation vaccine
- Preparation of vaccine
- Inoculation of vaccine

Discussion: Provide the participants with an animal health card and take them through the contents.
Minutes: 30 minutes
SESSION 4. Foot & Mouth Disease (FMD)

0h45

Session Objectives
By the end of the workshop, the participants will be able to explain to a farmer what FMD disease is, how to identify it and measure the farmer can take to prevent, control and or treat the disease.

Resources required
Handout print outs or display of FMD disease in cattle

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

Foot and mouth disease (FMD) is the most highly contagious viral disease of cloven-footed animals (cattle, buffalo, sheep, and goats). The causative agent of FMD is *Aphthovirus*.

Transmission
- Animals become infected through
- Direct/ or indirect contact
- Inhalation
- Contaminated materials (fodder, drinking water, semen, faeces, urine, equipment, clothes, and skin of animal handlers, vehicles, etc.)

Clinical Signs
- Fever
- Drop in milk production
- Weight Loss
- Loss of Appetite
- Quivering lips and frothing of the mouth
- Cows may develop blisters on the teats.
- Lameness
<table>
<thead>
<tr>
<th>Prevention</th>
</tr>
</thead>
<tbody>
<tr>
<td>• There is no specific treatment for FMD but supportive care may be allowed.</td>
</tr>
<tr>
<td>• Antipyretics or Antibiotics are sheet anchors of the FMD treatments.</td>
</tr>
<tr>
<td>• Use boro glycerine for a lesion in the mouth.</td>
</tr>
<tr>
<td>• Copper sulphate (2-5%) washing feet and then dress it with fly repellent wound dressing. Phenolphthalein + oil can also be used.</td>
</tr>
<tr>
<td>• 15 ml of Lugol iodine in divided doses can be given daily.</td>
</tr>
<tr>
<td>• Vitamin AD3E (15 - 20ml per day for 3 days) can speed up the recovery.</td>
</tr>
<tr>
<td>• Administer 500ml oil, 0.5kg yogurt, and 3 grams of zinc sulphate daily for 5 days.</td>
</tr>
<tr>
<td>• Ring vaccination should be performed to restrict FMD to other villages/herds/areas</td>
</tr>
</tbody>
</table>

**Field use of FMD Vaccine**

- FMD vaccine is temperature-sensitive, so cold conditions (4-8°C) during storage and transport are important (from source to hospital, hospital to the field, and vaccine vials being used in the field).
- For first-timers (calves and adults), always ensure booster vaccination after 3 to 4 weeks of primary dose.
- Calves can be vaccinated at 3 to 4 months of age.
- Never freeze the FMD vaccine.
- For each herd use a separate needle.
SESSION 5. Hemorrhagic Septicemia

By the end of the workshop, the participants will be able to explain to a farmer what Hemorrhagic Septicemia disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

**Resources required**
Print out images of Hemorrhagic Septicemia disease in cattle

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**Prevention** | **Symptoms** | **Treatment**
---|---|---
Hemorrhagic Septicaemia is an acute, fatal, and a bacterial disease of Buffaloes and cattle caused by *Pasteurella multocida*.

Transmission:
- Nasal secretions: Organisms are also not consistently present in sick animals.
- Principally a disease of animals under stress (poor food supply, close herding, and wet conditions contribute to the spread of the disease)
- Direct contact with infected animals and on fomites
- Ingestion or Inhalation

---

**Prevention** | **Symptoms** | **Treatment**
---|---|---
High fever 104-106 °F
- Depression, restlessness and reluctance to move
- Congested mucous membranes
- Respiratory distress
- Salivation and nasal discharge
- Painful, mucopurulent, subcutaneous swelling in the pharyngeal region that extends to the ventral neck and brisket (and sometimes the forelegs)
- Calves may have a hemorrhagic gastroenteritis
- Death can occur with 6-24 hours after the first sign develops and, buffalos are generally more susceptible to HS than cattle.
Treatment is useful against H.S if administered very early disease period because of the majority cases with death occurring from 6-24 hours.

Animal with fever must be treated with IV antimicrobials as soon as possible to quickly obtain systemic bactericidal antimicrobial concentrations.

a) Specific Treatment:
   Inj: Excenel RTU @ 1mg/kg by IM or SC, once every 24 hours for a period of 3 consecutive days.
   Inj: Enrofloxacin Sulphonamide @ 150 mg/kg BW IV daily for 3 days.
   Inj: Oxytetracycline @5-10 mg/kg BW IV or IM daily for 3 days.
   Inj: Sulphonamide @ 150 mg/kg BW IV daily for 3 days

b) Supportive Therapy:
   Inj: Predef 2X @ 10-20mg (5-10mi) IM, Repeat after 12-24 hours if required
   Inj: Ioxin @1ml/ 45kg IM. (Anti-pyretic)
   Inj: Meloxicam Plus @ (Anti-pyretic)

Vaccination protocols

Inactivated vaccines: Vaccination is routinely practiced in endemic areas. The following three preparations are used:

1. Dense bacterins combined with either alum adjuvant or oil adjuvant.
2. Formalin-inactivated bacterins; the oil adjuvant bacterin is thought to protect for up to one year.
3. Alum bacterin for 4-6 months.

Please note that maternal antibody interferes with vaccine efficacy in calves.
### Session Objectives
By the end of the workshop, the participants will be able to explain to a farmer what brucellosis disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

### Resources required
Printed out images of Brucellosis disease in cattle

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

Brucellosis is a highly contagious bacterial disease and bangs disease, causing late term-abortion and infertility in cattle. The causative agent of this disease is Brucella abortus. The disease is also a serious zoonosis, causing undulant fever in humans.

**Transmission**
- Ingestion of contaminated feed or water
- Licking an infected placenta, foetus or genitalia of another cow, after it has aborted
- Infected bulls excrete the organism in their semen
- Congenital transmission may occur through in utero infection

**Clinical Signs:**
- Abortion
- Weak calf born
- Retention of fetal membrane
- Swollen and infected testicles in bulls
- Sign of Infection in membranes
- Stillbirth that is that within 24 hours after calving
Treatment:
There is no treatment of Brucellosis in animals. It can be controlled by vaccination and the entire herd testing with the slaughter of reactors. Quarantine should be imposed by Government authorities until the herd is proven free of disease.

**Zoo-sanitary measures against Brucellosis**
1. Hygienic measures considered during calving.
2. Clear and disinfect the contaminated premises.
3. Hygienic disposal of the uterine discharges, fetus, fetal membrane.
4. Eradication by the test-and-slaughter method.
5. Human brucellosis is best prevented by controlling the infection in animals.
6. Pasteurization of milk from infected animals was an important way to reduce infection in humans.
7. A combination of vaccination, surveillance, and abattoir traceback also undertaken to eradicate brucellosis.
SESSION 7. Black Leg/ Black Quarter

1h00

**Session Objectives**

By the end of the workshop, the participants will be able to explain to a farmer what Black Leg/ Black Quarter disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

**Resources required**

Printed out images of Blackleg disease in cattle

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**Prevention** | **Symptoms** | **Treatment**
---|---|---

Blackleg is a generally fatal bacterial disease of young cattle or sheep of any age manifested by severe inflammation of the muscle and mortality is very high in this disease. It is caused by Clostridium chauvoei (spore-forming, rod-shaped, and gas-producing bacteria).

**Transmission**

- Ingestion of contaminated feed and water
- Contamination of wounds

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**Prevention** | **Symptoms** | **Treatment**
---|---|---

- Lameness
- High fever 104-105 °F
- Contamination of wounds
- Rapid breathing
- Discoloured, dry, or cracked skin.
- Swelling is small, hot and, painful
- Stiff gait and, reluctance to move
- Crepitating swelling often on the hips and, shoulder.
- Head lesions associated with edema and nose bleeding
- The animal usually dies in 12-48 hours,

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<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

- Inj: Procaine Penicillin G @ 22,000 IU/kg IM/SC 24 hrs for 3-5 days
- Inj: Oxytetracycline sprays 5% at the side of the wound.

Zoo-sanitary measures:
1. Diseased cattle should be isolated.
2. Don't allow animals for grazing in the affected area.
3. Burn any contaminated materials, including faeces.
4. Proper disinfection of surgical instruments before the operation.
5. Disinfect any contaminated areas
6. Do not conduct a necropsy or any biopsy on the animal.

Vaccination: Vaccination is a better way for the prevention of the disease.
For previously unvaccinated cattle and sheep, the primary course consists of 2 doses ideally given 4-6 weeks apart in cattle and 4 weeks apart in sheep. This should be followed by a booster dose of 3-4 weeks.

What are the correct dose rates?
- Alum precipitated B.Q. Vaccine 5 ml subcutaneous each year before the rainy season.
- Do not save unused parts of bottles or containers of vaccines for future use, as they can become contaminated with undesirable organisms and/or lose their potency. Destroy any vaccine not used within 24 hours of opening.
SESSION 8. Mastitis

1h00

**Session Objectives**

By the end of the workshop, the participants will be able to explain to a farmer what Mastitis disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

**Resources required**

Printed out images of Mastitis disease in cattle

<table>
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<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
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Mastitis is primarily a management problem that causes inflammation of one or more quarters of the udder. (Mamma = breast and itis = Latin suffix for inflammation). Causative agents are Bacteria (~70%) most common Staphylococcus aureus & Streptococcus. Yeasts and molds (~2%) and Unknown (physical, trauma and weather extremes; ~28%)

**Transmission**

- Damaged teat skin (colonize damaged skin and teat lesions).
- Environment (uninfected quarters by teat cup liners, milker's hands, washcloths, bedding, soil, water, and manure)
- Replacement animals
- Wrong milking procedures. (Injury with inverted thumbs).
- Very dirty and unhygienic milking places, sheds, etc. The animals consistently sit in dirty places.

- The udder such as swelling, heat, hardness, redness, or pain; and
- The milk such as a watery appearance, flakes, clots, or pus.
Mastitis can be treated by:

- In clinical mastitis strip quarter, every 2 hours
- Both heat (15-30 minutes to loosen blockage) and cold (15-30 minutes to bring swelling down) application can be applied for the mastitis treatment.
- Infusion of an antibiotic preparation into the teat canal partially (3-4mm) introduction can give much better treatment results is the normal treatment. (Before infusion, clean, dry and disinfect the teat).
- In acute cases, systemic treatment (antibiotics) may be necessary.

**Note:** Penicillin is the traditional antibiotic used, but Staphylococcus bacteria especially are resistant.

**It can be prevented and controlled by important general hygiene measures:**

- Have a good milking system (prepare cows properly for milking)
- Optimize hygiene, starting directly after birth and insect control.
- Reduce bacteria in the environment (clean housing and bedding).
- Remove ‘sucklers’ from groups of young stock.
- Quarantine replacement heifers.

**Reduce or eliminate associated risk factors:**

- Reduce stress on the animals.
- Optimize nutrition, ventilation, and housing.
SESSION 9. Fascioliasis

1h00

Session Objectives
By the end of the workshop the participants will be able to explain to a farmer what Fascioliasis disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

Resources required
Printed out images of Fascioliasis

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

Fascioliasis belongs to a group of foodborne trematode infections. Causative agent: Two species of trematodes that cause fascioliasis: Fasciola hepatica (ruminant) and F. gigantica are leaf-shaped worms, large enough to be visible to the naked eye.

Transmission
- By drinking larvae-infected water.
- Through snails and flies
- Ingestion of larvae-contaminated pastures with faeces
- Rural areas are more likely to become infected after failure to observe basic hygiene measures.
- Very dirty and unhygienic milking places, sheds, etc. The animals consistently sit in dirty places.
• Fever: usually the first symptom of the disease; 40-42 °C (104-107 °F)
• Abdominal pain.
• Gastrointestinal disturbances: loss of appetite, flatulence, nausea, diarrhea.
• Urticaria.
• Respiratory symptoms (very rare): cough, dyspnoea, chest pain, hemoptysis.
• Hepatomegaly and splenomegaly

Fluke treatment and the age of fluke from which they are effective:

<table>
<thead>
<tr>
<th>Active</th>
<th>Age of fluke killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triclabendazole</td>
<td>All stages</td>
</tr>
<tr>
<td>Albendazole</td>
<td>From 12 weeks</td>
</tr>
<tr>
<td>Closantal</td>
<td>From 8 weeks</td>
</tr>
<tr>
<td>Closantal plus Oxfendazole</td>
<td>From 6 weeks</td>
</tr>
<tr>
<td>Closantal plus Albendazole</td>
<td>From 8 weeks</td>
</tr>
<tr>
<td>Oxylclozanide plus levamisol</td>
<td>From 12 weeks</td>
</tr>
</tbody>
</table>

• Recovery of the infected animal is slow and must be feed nutritious feed to restore body condition and production.

Preventive Measures
• No vaccine is available to protect people against Fasciola infection.
• Prevention through pasture rotation is effective against fluke to protect from snail-infested pasture.
• Information, education, and communication, promoting the cultivation of vegetables/grasses in water free from faecal pollution.
• Environmental measures such as containment of the snail intermediate hosts and drainage of grazing lands.
• Vegetables grown in fields that might have been irrigated with polluted water should be thoroughly cooked before consumption.
• Visceral organs from potentially infected animals should be thoroughly cooked before consumption.
SESSION 10. Lungworm (Parasitic Bronchitis)

1h00

**Session Objectives**
By the end of the workshop, the participants will be able to explain to a farmer what Lungworm (Parasitic Bronchitis) disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

**Resources required**
Printed out images of Lungworm disease in cattle

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

Parasitic bronchitis (husk) is an economically important parasite infection of the bovine respiratory tract. This disease is caused by the nematode, *Dictyocaulus viviparous* (Adult worms are slender and thread-like).

**Transmission**
- Ingestion of larvae-contaminated pastures with faeces.
- By drinking larvae-infected water (Larvae are resistant to the cold).
- People living in rural areas are typically more likely to become infected after failure to observe basic hygiene measures.

![Lungworm Life Cycle Diagram]
<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Severe persistent coughing and respiratory distress and even failure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Moderate coughing with slightly increased respiratory rates to</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Anthelmintic are highly effective against developing fourth-stage larvae and adult *D. viviparous*.
- An anti-inflammatory drug of corticosteroids may be given for a brief period (3 to 10 days) in severe cases.
- Prednisone is usually given (5-10 days) for tissue inflammation.

Good husbandry practices to manage internal parasites.

This include:

1. Clean grazing strategies.
2. A variety of combinations of pasture rotations.
3. Flexible stocking rates (Avoid overstocking).
4. Prophylactic anthelmintic regimens.
5. Treat with an effective anthelmintic drug.
SESSION 11. Anaplasmosis

**1h00**

**Session Objectives**
By the end of the workshop, the participants will be able to explain to a farmer what Anaplasmosis disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease

**Resources required**
Printed out images of Anaplasmosis disease in cattle

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

Anaplasmosis a blood-borne infectious and transmissible protozoan disease also called rickettsial disease. It is in the form of ‘tick fever’ in cattle. Caused usually by the Anaplasma marginale.

Transmission
- Mosquitoes, lice, and the horsefly are mechanical transmitters.
- Contaminated needles or dehorning or other surgical instruments.
- By drinking larvae-infected water and feed
<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaemia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight loss</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breathlessness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jaundice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncoordinated movements</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abortion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Inj: Oxidetacycline @ 20mg/kg Body weight I.M for 3-5 days.
- Inj: Imidocarb propionate @ 2.5mg/100kg Body weight I.M for 3-5 days
- Prednisolone, Vitamin B-complex & mineral mixture parentally as supportive therapy.
SESSION 12. Babesiosis

1h00

**Session Objectives**

By the end of the workshop, the participants will be able to explain to a farmer what Babesiosis disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease.

**Resources required**

Printed out images of Babesiosis disease in cattle.

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
</table>

The disease is also called Texas fever, red water, piroplasmosis, or tick fever is a major tick-borne protozoan parasite disease of cattle. Babesia bovis and Babesia bigemina causes disease in cattle and buffalo (Mostly in buffalo).

**Transmission**

- Disease is transmitted by biting of ticks
- By drinking contaminated water and feed.
- Transfer of parasitaemic blood via veterinary equipment and biting flies.

- Acute babesiosis (Redwater)
- fever which persists through the acute phase, and is accompanied later by
- Anorexia
- Increased respiratory rate (particularly if animals are moved),
- Muscle tremors
• Anaemia
• Pipe-stem diarrhoea and
• Weight loss

<table>
<thead>
<tr>
<th>About</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Inj: Diamazine  @ 3-5mg/kg IM.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Inj: Imidocarb dipropionate @ 1-3mg sub-cutaneously.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• To avoid allergic reaction steroid is injected 5-10 minutes after imidocarb.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Vitamin B-complex @ 50ml and phenylbutazone (an anti-inflammatory drug) are administered parentally as supportive therapy.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Cold therapy to lower the temperature (at high-temperature drugs don’t work)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Preventive measures
• Effective control of tick, mosquitoes, and flies.
• Biological control by keeping pet birds to pick the ticks.
• The access of biting insects to contaminated fresh blood should be prevented.
• Avoid the use of contaminated instruments.
SESSION 13. Theileriosis

1h00

<table>
<thead>
<tr>
<th>Session Objectives</th>
<th>By the end of the workshop, the participants will be able to explain to a farmer what Thileriosis disease is, how to identify it and measures the farmer can take to prevent, control and or treat the disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources required</td>
<td>Printed out images of Thileriosis disease in cattle</td>
</tr>
</tbody>
</table>

**Prevention**

It is a protozoan disease of young exotic and crossbred cattle in indo-Pak and not a contagious disease. Caused by species of Theileria spp belongs to the family: Theileriidae. 1. Theileria parva. 2. Theileria annulata and 3. Theileria mutans.

**Transmission**

- Theileria parva is transmitted by Rhipicephalus appendiculatus
- Theileria annulata transmitted by Hyalomma family Ticks

<table>
<thead>
<tr>
<th>Prevention</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A high temperature (41.2°C) is a common feature in acute cases.</td>
<td>Diarrhoea with blood clots in a calf.</td>
<td>Theileria-annulata-piroplasms-cattle.</td>
</tr>
</tbody>
</table>
Treatment is possible using naphthoquinones but is expensive. Other treatments are:

- Inj: Buparvaquone (Butalex) @ 1 ml / 20kg IM. Repeat after 2 days
- Inj: Oxytetracycline @ 10-20 mg / kg IM for 4-6 days

To avoid allergic reaction steroid is injected 5-10 minutes after imidocarb

In supportive therapy. Dextrose 5% given in severe jaundice

Prophylactic treatment if a tick is present (1ml at age of 7 days and repeat after 1 month)

**Preventive measures**

- Control of ticks
- Access of biting insects to contaminated fresh blood should be prevented
- Avoid the use of contaminated instruments

<table>
<thead>
<tr>
<th>About</th>
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<th>Treatment</th>
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<tbody>
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<td></td>
</tr>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
**SESSION 14. Zoo-Sanitary Measures**

<table>
<thead>
<tr>
<th>Session Objectives</th>
<th>By the end of the workshop, the participants will be able to explain to a farmer the most important zoo-sanitary measures that a farmer can employ in the farm to prevent disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources required</td>
<td>Printed out images of Zoo-Sanitary Measures for the farmer in the farm</td>
</tr>
</tbody>
</table>

1. Keep healthy animals sheltered separately.
2. Separate water and feeding for sick and healthy
3. Separate suckling calves away from sick dams
4. Discourage hospital visits from contagious animals
5. Dead animal buried properly and death disinfected
6. Visitor can spread diseases if not disinfected
7. Sick animal slaughtered than site must be disinfected
8. Awareness programme for farmers on disease spread
ZOO-SANITARY MEASURE

1. Sick animals sheltered separately
   healthy animals within farm or on another farm/shed.

2. Separate water and feeding mangers for sick and healthy animals. Burn left over feed and fodder.

3. Suckling calves should be separated from sick dams.

4. Hospital visit of contagious disease animals should be discouraged.

5. If sick animal slaughtered than site must be disinfected and blood/offals could be buried.

6. Dead animal should be buried properly and death area sprayed with disinfectant/limestone.

7. Veterinarian / Veterinary Assistants / Visitor can become the main source of spreading disease from one farm to another if not disinfected with clothes, body and shoes are not disinfected between visits.

8. Awareness programme for farmers to aware about the possible disease spread causes.
TRAINING MATERIALS
Annex 1: Trainer PowerPoint presentation - VOs and District Staff
Sindh Agricultural Growth Project

Animal Health Management

Session 1: Animal Health and Biosecurity
Session 2: Contagious & Infectious Diseases and Economically Important Animal Diseases

Animal Health Management

WHAT IS ANIMAL HEALTH MANAGEMENT?
The aim of managing animal health is to minimize negative effects of animal diseases on its, Production and welfare, Trade in livestock and livestock products and Human health.

STRATEGIES FOR ANIMAL HEALTH MANAGEMENT
• Appropriate husbandry
• Good hygiene
• Proper feed and
• Good management

Signs Of Good Healthy Animal
1. Animal Looks active.
2. Bright an soft skin
3. Bright and active eyes
4. Eating fodder correctly
5. Passes faeces and urin

Note: Very good healthy animal eats fodder with interest and also it ruminates.

Bio-security Measures

The steps taken to prevent from infectious diseases affecting animals and the people who care for them.
ANIMAL HEALTH CARD INSIDE

Animal Health Management

SESSION 2
Contagious & Infectious Diseases and Economically Important Animal Diseases

FOOT AND MOUTH DISEASE (FMD)

FOOT AND MOUTH DISEASE (FMD) CONTINUE

ETIOLOGY

• Foot and mouth disease (FMD) is most highly communicable viral disease of cloven-footed animals (cattle, buffalo, sheep and goats).
• Causative Agent: Aphthovirus a RNA virus which belongs to family: Picornaviridae.
• Serotypes: There are seven serotypes (A, Asia1, O, C, SAT1, SAT2, SAT3). Sub serotypes: Over 100 serotypes. Vaccination against one serotype doesn’t protect the animal against other serotypes.
• FMD serotypes and sub-serotypes prevailing in Pakistan, O-Pain Asia II, A-Turkey 06 & Asia I Sindh 08. (Source: FAO Project GC9/PAK/123/USA)
• Morbidity Rate: 80-100%
• Mortality Rate: Not usually fatal in Adults, in young animal 20-30%.

Introduction and Etiology

• Foot and mouth disease (FMD) is most highly communicable viral disease of cloven-footed animals (cattle, buffalo, sheep and goats). Disease causative agent is Aphthovirus.

Transmission

Animals become infected through:
• Direct/ indirect contact.
• Inhalation.
• Animal products.
• Contaminated materials (fodder, drinking water, semen, faeces, urine, equipments, clothes and skin of animal handlers and vehicles etc).
• Artificial insemination or Natural

Clinal Sign

Transmission

Animals become infected through:
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• Artificial insemination or Natural
FOOT AND MOUTH DISEASE (FMD) CONTINUE

CLINICAL SIGN SUMMARY

- Fever: 103-106°F.
- Dullness & Anorexia
- Salivation profusely and nasal Discharge
- Development of single or multiple vesicles (Blister) of 2mm to 10cm on: Tongue, hard palate, dental pad, lips, gums, muzzle, coronary band, inter digital cleft, and teats in lactating cows.
- Sudden drop in milk production.
- Feet vesicles can lead to chronic lameness.
- Abortion in pregnant animals
- More severe in exotic & cross breeds (Panting in summer) than indigenous breeds.
- In sheep and goats signs are mild.

Incubation Period: 2 - 10 Days

POST-MORTEM FINDINGS

- In young animals:
  Focal necrosis of cardiac muscle (Grey or yellow streaking on myocardium) “Tiger heart”.
- In adult animals:
  Ulcerative lesions on tongue, palate, gums, pillars of the rumen and feet.

FOOT AND MOUTH DISEASE (FMD) CONTINUE

DIAGNOSIS

Samples of Choice in Case of FMD
1. Vesicular fluid (Ideal but difficult to collect).
2. Epithelial tissue (excellent).
3. Ideally, about 1gm of epithelial tissue should be collected from an un-ruptured or recently ruptured vesicles.
4. Blood (only for sero diagnosis-NSP/SP serology).

Preservation of Samples
- A simple and suitable transport medium is buffer glycerol.
- A simple and suitable transport medium is PBS: pH 7.2 with Glycerol in equal ratio VV

OIE Approved Laboratory Tests
1. Antigen detection: (ELISA, RT-PCR & Virus isolation)
2. Antibody detection: (ELISA & VNT)

FOOT AND MOUTH DISEASE (FMD) CONTINUE

TREATMENT

- There is no specific treatment for FMD but supportive care may be allowed.
- Antipyretics or Antibiotics are sheet anchors of the FMD treatments.
- Use bongliverine for lesion in mouth.
- Copper sulphate (2-5%) washing feet and than dress it with fly repellent wound dressing. Phenolphtalein + oil can also be used.
- 15 ml of lugol iodine in divided doses can be given daily.
- Vitamin AD3E (15 - 20ml per day for 3 days) can speed up the recovery.
- Administer 500ml oil, 0.5kg yoghurt and 3 grams of zinc sulphate daily for 5 days.
- Ring vaccination should be performed to restrict FMD to other villages/herds/areas.

FOOT AND MOUTH DISEASE (FMD) CONTINUE

FIELD USE OF FMD VACCINE

- FMD vaccine is temperature sensitive, so cold conditions (4-8°C) during storage and transport are important (from source to hospital, hospital to field, vaccine vials being used in field).
- For first timers (calves and adults), always ensure booster vaccination after 3 to 4 weeks of primary dose.
- Calves can be vaccinated at 3 to 4 months of age.
- Never freeze FMD vaccine.
- For each herd use a separate needle.

HAEMORRHAGIC SEPTICEMIA (HS)

Hemorrhagic Septicaemia is an acute, fatal, and a bacterial disease of Buffaloes and cattle caused by Pasteurella multocida.
**CLINICAL SIGN SUMMARY**

Most cases are acute or peracute. The following signs are seen:

- High fever 104–106°F (40–41.1°C)
- Depression & restlessness
- Congested mucous membranes
- Respiratory distress
- Salivation and nasal discharge
- Painful, mucopurulent, subcutaneous swelling in the pharyngeal region that extends to the ventral neck and brisket (and sometimes the forelegs).
- Calves may have a haemorrhagic gastro-enteritis
- Reluctance to move
- Death may occur within 8–24 hr after the first signs develop.
- Buffaloos are generally more susceptible to HS than cattle.

**TRANSMISSION**

**Sources of the agent:**

- **Blood:** Septicaemia in HS occurs at the terminal stage of the disease, therefore, blood samples taken from sick animals before death may not always contain *P. multocida* organisms.
- **Nasal secretions:** Organisms are also not consistently present in sick animals.
- Animals become infected through:
  - Principally a disease of animals under stress (poor food supply, close herding and wet conditions contribute to the spread of the disease).
  - Direct contact with infected animals and on fomites.
  - Ingestion or inhalation.
  - In endemic areas, 5% of cattle and water buffalo may normally be carriers.
  - Worst epidemics during rainy season, in animals in poor physical condition
  - *P. multocida* can survive for hours and possibly days in damp soil or water; viable organisms are not found in the soil or pastures after 2–3 weeks.
  - Biting arthropods do not seem to be significant vectors.

**DIAGNOSIS**

Samples of choice in case of HS:

1. In freshly dead animals, a heparinized blood sample or swab should be collected from the heart (other viscera organs may also be sample) and a nasal swab within a few hours of death.
2. A long bone from an animal that have been dead for a long time.
3. Blood can be taken from jugular vein and spleen and bone marrow samples.
4. Tips of ears (from live animal only).

Preservation of samples:

- Blood samples should be placed in a standard transport medium and transported on ice packs.

**OE Approved Laboratory Tests**

- Serotyping methods: Includes the rapid slide agglutination test, indirect haemagglutination test, Somatic antigen agglutination test, Agar gel immunodiffusion and Counter immunoelectrophoresis.
- Isolation: From the blood or bone marrow (cultural and biological methods).
- Identification: Biochemical, Serological and Molecular methods.

**TREATMENT**

- Treatment is useful against HS if administered very early disease period.
- Animal with fever must be treated with IV antimicrobials quickly to obtain systemic bactericidal antimicrobial concentrations.

  **a) Specific Treatment:**
  - Inj: Excenel RTU @ 150mg/kg by IM/SC, once every 24 hours for 3 consecutive days
  - Inj: Sulphonamide @150 mg/kg B.wtIV daily for 3 days.
  - Inj: Oxytetracycline @5-10 mg/kg B.wt IV or IM daily for 3 days.

  **b) Supportive Therapy:**
  - Inj: Predex 2K @ 10-20mg (10ml) IM, Repeat after 12-24 hr if required
  - Inj: loxin @1ml/ 45kg IM (Anti-pyretic)
  - Inj: Avil/ Cadizin @ 5 – 10 ml I.M. (Anti-histamine)
**VACCINATION PROTOCOLS:**

- **Inactivated vaccines:**
  Vaccination is routinely practiced in endemic areas. Three preparations are used:
  1. Dense bacterins combined with either alum adjuvant or oil adjuvant.
  2. Formalin-inactivated bacterins; the oil adjuvant bacterin is thought to provide protection for up to one year.
  3. Alum bacterin for 4-6 months.
- **Maternal antibody interferes with vaccine efficacy in calves**

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**ETIOLOGY**

- Brucellosis is a highly contagious bacterial disease and bangs disease, causing late term-abortion and infertility in cattle. The disease is also a serious zoonosis, causing undulant fever in humans.

**Causative agent:** Caused by genus: Brucella belongs to family: Brucellaceae which consist of 8 species according to antigenic variation & primary host.

<table>
<thead>
<tr>
<th>Cattle by Brucella abortus</th>
<th>Sheep &amp; goats by Brucella melitensis.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep by Brucella ovis</td>
<td>Wood rats by Brucella neotomae</td>
</tr>
<tr>
<td>Dog by Brucella canis</td>
<td>Marine mammals by Brucella cetaceae &amp; B. pinnipedialis</td>
</tr>
</tbody>
</table>

- It is still an uncontrolled serious public health problem in many developing countries

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**CLINICAL SIGNS**

- **In Cattle:**
  - **Abortion.** Usually occurs at about 5-7 months. Full-term calves may die soon after birth. Abortion rates in herds vary from 30% to 80%.
  - **Retained placenta and secondary metritis** is common and may lead to permanent sterility.
  - In bulls (orchitis, epididymitis, seminal vesiculitis and hygromas) in chronically affected herds.
  - Localization of bacteria in the joints causing arthritis, particularly of the carpal joints, occur in some animals in chronically affected herds.

---

**POSTMORTEM FINDINGS**

- A. Intense fibrin deposition on the pleural and peritoneal surfaces, and purulent fluid in thoracic cavity.
- B. White spots in the lung parenchyma measuring between 0.1 mm and 0.5 mm in diameter, and purulent fluid in thoracic cavity.
- C. Placenta exhibiting red areas in interstices/interlobular regions & well-defined yellowish-white round areas on the cotyledonal surface.
TRANSMISSION

1. Ingestion of contaminated feed or water.
2. Spread by dogs, rats, flies, boots, vehicles, the milking machine and other equipment used in the barn.
3. Licking an infected placenta, foetus or genitalia of another cow, after it has aborted.
4. Infected bulls may excrete the organism in their semen.
5. Congenital transmission may occur through in utero infection.
6. Humans are infected through handling infected cows or their tissues (humans through cuts in the skin, or through mucous membranes).
7. Through consumption of unpasteurized milk.

DIAGNOSIS

Sample of choice for Brucellosis:

- Live animals:
  - Milk samples, semen and arthritic or hygroma fluids.
  - Blood samples (for serum) from a number of cows in the herd, together with a pooled milk sample
- At post-mortem:
  - Samples of lymph nodes, spleen, mammary gland and uterine tissues from cows

Laboratorial Tests:

- Serology Tests: Serum agglutination test (SAT), complement fixation test (CFT), ELISA (CELSA), 2-mercaptoethanol test (2ME). Agar gel immunodiffusion test (AGID) and Fluorescence polarization assay (FPA) etc.
- Molecular Tests: PCR, Southern blot and Pulse-field gel electrophoresis.

TREATMENT

Etiotropic Therapy:

Tetracycline 1.2 – 2.0 ml/day and Chlortetracycl 2.0 – 3.0 ml/day
(Combination of both these drugs for the period of average 2 weeks)

ZOO-SANITARY MEASURES

1. Hygienic measures considered during calving.
2. Clear and disinfect the contaminated premises.
3. Hygienic disposal of the uterine discharges, fetus, fetal membrane.
4. Eradication by test-and-slaughter method.
5. Human brucellosis is best prevented by controlling the infection in animals.
6. Pasteurization of milk from infected animals was an important way to reduce infection in humans.
7. Combination of vaccination, surveillance and abattoir trace back also undertaken to eradicate brucellosis.

BLACK LEG/ BLACK QUARTER

http://www.fao.org/docrep/003/x1700e/PP05.jpg

ETIOLOGY:

- Blackleg is a generally fatal bacterial disease of young cattle or sheep of any age manifested by severe inflammation of the muscle.
- Found in cattle as young as 2 months old, most losses occur in cattle between 6 months and 2 years of age. Disease is sporadic in nature.
- Causative Agent: It is caused by Clostridium chauvoei (spore forming, rod shaped, gas producing bacteria) belongs to family: Clostridiaceae.
- Mortality is high.
CLINICAL SIGNS:

- High fever (41°C)
- Lameness
- Loss of appetite
- Rapid breathing
- Discoloured, dry or cracked skin.
- Swelling is small, hot and painful.
- Stiff gait and reluctance to move
- Crepitating swellings often on the hips and shoulder.
- Head lesions associated with edema and nose bleeding
- In sheep gaseous crepitation cannot be felt before death
- Animal usually die in 12 to 48 hours.

TRANSMISSION

Animals become infected through
The disease is not transmitted directly from sick animals to healthy animals.

Disease spreads through:
- Ingestion of contaminated feed
- Contamination of wounds.

In sheep wounding as a result of shearing, tail docking, castration, injury to ewes at lambing or infection of the navel soon after birth.

DIAGNOSIS

Samples of Choice in Case of B.Q
- Tissues or fluid from the swelling should be taken as soon after death as possible.

Laboratival Tests:
1. The fluorescent antibody test for C. chauvoei is rapid and reliable.
2. PCR is available and very good for clinical samples.

TREATMENT

Treatment is generally unsuccessful.
Specific antitoxin and antibiotics are rarely effective in the treatment of this disease.

Inj: Procaine Penicillin G @ 22,000 IU/kg IM/SC 24 hrs for 3-5 days.
Inj: Oxytetracycline spray 5% at the side of wound.
ZOO-SANITY MEASURES

**General measures:**
1. Diseased cattle should be isolated.
2. Don’t allow grazing in affected area.
3. Burn any contaminated materials, including feces.
4. Proper disinfection of surgical instruments prior to operation.
5. Disinfect any contaminated areas
6. Do not conduct a necropsy or any biopsy on the animal.

VACCINES

**Vaccination:** Vaccination is a better way for the prevention of the disease. For previously unvaccinated cattle and sheep, the primary course consists of 2 doses ideally given 4–6 weeks apart in cattle and 4 weeks apart in sheep. This should be followed by a booster dose 12 months later.

**What are the correct dose rates?**
- Alum precipitated B.Q. Vaccine 5 ml subcut each year before rainy season.
- Glanvac® 6 1ml for sheep
- Ultravac® 5 in 1 1ml for sheep/2ml for cattle
- Ultravac® 7 in 1 2.5ml for cattle
- Do not save unused parts of bottles or containers of vaccines for future use, as they can become contaminated with undesirable organisms and/or lose their potency. Destroy any vaccine not used within 24 hours of opening.

MASTITIS

Mastitis is primarily a management problem caused inflammation of one or more quarters of the udder. (Mamma = breast and its = Latin suffix for inflammation).

**Caustive agent:** Bacteria (~70%) most common Staphylococcus aureus & Streptococcus. Yeasts and molds (~2%) and Unknown (physical, trauma and weather extremes; ~28%)
- The most costly disease affecting dairy dairy cattle throughout the world.
- Intramammary infection: 60% of all heifers, First lactation: 16% clinical mastitis & After calving: 30% occur within 14 days.

**Animal health:** Loss of functional quarter, lowered milk production
**Human health:** Poor quality milk and antibiotic residues in milk.

CLINICAL SIGNS

There are two type of the Mastitis. 1. Sub-clinical & 2. Clinical Mastitis

Sub-clinical mastitis: Presence of an infection without apparent signs of local inflammation or systemic involvement.
- ~90-95% of all mastitis cases, Udder and milk appears normal but lowered milk output (~10%)
- Elevated SCC (score 3-5) and for longer duration

Clinical mastitis:
- ~ 5-10% of all mastitis cases, inflamed red udder with pain, clumps and clots in milk. It is further Acute and Chronic type.

**Acute type:** Major type with bad milk (Purulent or bloody exudate from teats), loss of appetite, depression and animal tends to lie down chronic type.

**Chronic type:** Cow appears healthy & Bad milk (watery pale fluid)
**TRANSMISSION:**

Infection is transmitted by:
1. Damaged teat skin (colonize damaged skin and teat lesions).
2. Environment (uninfected quarters by teat cup liners, milkers’ hands, washcloths, bedding, soil, water and manure).
3. Flies
4. ‘Sucklers’ (animals that suckle other animals) in a group of young stock.
5. Replacement animals
7. Very dirty and unhygienic milking places, sheds etc. The animals consistently sit in dirty places.

**DIAGNOSIS**

Sample of choice for mastitis:
- Fresh, unrefrigerated milk can be tested for up to 12 hours and refrigerated milk can be tested for up to 36 hours.

Laboratyls Tests/ Methods:
- Visual method
- Direct method
- Indirect method
- CMT, SCC, Stir cup test, Surf filled mastitis test.
- Bromothymol Blue (BTB) test, Simplified Resazurin Rennet Test Modified Whiteside test, Wisconsin Mastitis test,
- Electrical Conductivity test and Culture method test.

**TREATMENT**

Mastitis can be treated by:
- In clinical mastitis strip quarter every 2 hours
- Both heat (15-30 minutes to loosen blockage) and cold (15-30 minutes to bring swelling down) application can be applied for the mastitis treatment.
- Infusion of an antibiotic preparation into the teat canal partially (3–4mm) introduction can give much better treatment results is the normal treatment. (Before infusion, clean, dry and disinfect the teat).
- In acute cases, systemic treatment (antibiotics) may be necessary.

Note: Penicillin is the traditional antibiotic used, but Staphylococcus bacteria especially are resistant.

**ZOO-SANITARY MEASURES**

- It can be prevented and controlled by important general hygiene measures:
  - Have a good milking system (prepare cows properly for milking)
  - Optimise hygiene, starting directly after birth and insect control.
  - Reduce bacteria in environment (clean housing and bedding).
  - Remove ‘sucklers’ from groups of young stock.
  - Quarantine replacement heifers.

Reduce or eliminate associated risk factors:
- Reduce stress on the animals.
- Optimise nutrition, ventilation and housing.
Annex 2: Handout for VOs and District Staff on Economically important Diseases
FASCIOLIASIS

1. Fascioliasis is a zoonotic disease that affects humans and livestock. It is caused by the liver fluke Fasciola hepatica.
2. The disease is transmitted through the ingestion of food or water contaminated with metacercariae, the larval stage of the parasite.
3. Symptoms include digestive upset, fever, and jaundice.
4. Prevention involves avoiding contaminated water and food, and maintaining good hygiene practices.

TRANSMISSION

1. Infection in the environment is usually perpetuated by animals.
2. Consuming larvae-contaminated uncooked vegetables.
3. By drinking larvae-infected water.
4. Rural areas are more likely to become infected after failure to observe basic hygiene measures.
**Clinical Sign**

**Post-mortem Findings**

**Diagnosis**

Sample of Choice

- Diagnosis of fascioliasis may be suspected on the basis of the clinical picture. Confirmation relies on different types of diagnostic techniques.

- The most widely used diagnostic approach is direct detection of Fasciola eggs, by light-microscopic examination of faeces.

**An Overview of Lifecycle**

**Treatment**

- Fluke treatment and the age of fluke from which they are effective:

<table>
<thead>
<tr>
<th>Active</th>
<th>Age of Fluke killed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Triclabendazole</td>
<td>All ages</td>
</tr>
<tr>
<td>Albendazole</td>
<td>from 12 weeks</td>
</tr>
<tr>
<td>Closantel</td>
<td>from 16 weeks</td>
</tr>
<tr>
<td>Closantel plus Oxendazole</td>
<td>from 8 weeks</td>
</tr>
<tr>
<td>Closantel plus Albendazole</td>
<td>from 8 weeks</td>
</tr>
<tr>
<td>Oxyclozanide plus levamisole</td>
<td>from 12 weeks</td>
</tr>
</tbody>
</table>

- Recovery of the infected animal is slow and must be feed nutritious feed to restore body condition and production.

**Preventive Measure:**

1. No vaccine is available to protect people against Fasciola infection.
2. Prevention through pasture rotation is effective against fluke to protect from snail-infested pasture.
3. Information, education and communication, promoting cultivation of vegetables/grasses in water free from faecal pollution.
4. Environmental measures such as containment of the snail intermediate hosts and drainage of grazing lands.
5. Vegetables grown in fields that might have been irrigated with polluted water should be thoroughly cooked before consumption.
6. Visceral organs from potentially infected animals should be thoroughly cooked before consumption.
LUNGWORM (PARASITIC BRONCHITIS)

ETIOLOGY
Parasitic bronchitis (husk) is an economically important parasite infection of the bovine respiratory tract. Mortality occurs in heavy infections.

Causative agent: This disease is caused by the nematode, *Dictyocaulus viviparus* (Adult worms are slender and thread-like) belongs to family: Dictyocaulidae.

- Most commonly seen in first year grazing cattle in late summer and autumn.

CLINICAL SIGN

CLINICAL SIGN SUMMARY
- Elevated temperature (40 - 41 °C).
- Rapid shallow breathing which in later stages becomes laboured breathing.
- Coughing and nasal discharge.
- Weight loss.
- Cyanosis.
- Recumbency.

POST-MORTEM FINDINGS
- Enlarged lung lymph nodes
- Lung edema and emphysema

TRANSMISSION
- Ingestion of larvae-contaminated pastures with faeces.
- By drinking larvae-infected water (Larvae are resistant to the cold).
- People living in rural areas are typically more likely to become infected after failure to observe basic hygiene measures.
DIAGNOSIS

Disease occurs in young calves. If an animal is suspected of lungworm infection, there are many ways to detect this parasitic infection such as performing one or more of the following techniques:

- Diagnosis is based on the clinical signs and grazing history.
- A complete medical history including lung auscultation (stethoscope examination).
- Fecal examination for detection of ova or larvae,
- Examination of respiratory secretions for ova or larvae.
- ELISA test can be used to detect antibodies to D. viviparous.

TREATMENT

- Anthelmintics are highly effective against developing fourth-stage larvae and adult D. viviparous.
- An anti-inflammatory drug of corticosteroids may be given for a brief period (3 to 10 days) in severe cases.
- Prednisone is usually given (5–10 days) for tissue inflammation.

PREVENTIVE MEASURE:

- Better husbandry practices to manage internal parasites.
- This include:
  1. Clean grazing strategies.
  2. A variety of combinations of pasture rotations.
  3. Flexible stocking rates (avoid overstocking).
  4. Prophylactic anthelmintic regimens.
  5. Treat with an effective anthelmintic drug.

ANAPLASMOSIS

- Anaplasmosis a blood borne infectious and transmissible protozoan disease also called rickettsial disease. It is in form of ‘tick fever’ in cattle.
- Causative Agent: Caused usually by the Anaplasma marginale and sometimes by Anaplasma centrale obligate intracellular parasites belongs to family: Ehrlichiae. A phagocytophilum has recently been reported to infect cattle.
- Bovine anaplasmosis is of economic significance in the cattle industry. Occurs in tropical and subtropical regions worldwide.
- In animals <1 yr old anaplasmosis is usually subclinical, in yearlings and 2-yr-olds it is moderately severe, and in older cattle it is severe and often fatal.
**Clinical Signs**
1. High fever 106°F (41°C).
2. Anemia.
3. Weakness and respiratory distress after exercise.
4. Depression and anorexia.
5. Jaundice and frequently a marked loss of condition.
6. Frequent urination (Brown due presence of bile pigment) and constipation.
7. Decreased milk production.
8. Edematous swelling of the limbs
10. Severely affected animals may die.

**Post-Mortem Findings**
- Lymph Nodes Appear Brown
- Enlarged spleen (three times normal size)

**Transmission**
- **Biological Vector:**
  - Boophilus species of ticks (60%) transmit anaplasmosis.
- **Physical Vector:**
  - Mosquitoes, lice and the horsefly are mechanical transmitters.
  - Contaminated needles or dehorning or other surgical instruments.

**An Overview of Lifecycle**
- Feed injection of vector larvae.
- Replication in several tissues within the host.
- Feed acquisition of lifecycle hypoxophase.
- Hypoxophase RNP.

**Diagnosis**
**Samples of Choice**
1. Blood from ear vein.

**Laboratory Tests**
- Microscopic examination of stained blood smears.
- Serological testing (Molecular amplification techniques of rickettsial DNA).
- PCR & ELISA
TREATMENT

- Inj: Ox tetracycline @ 20mg/kg Body weight I.M for 3-5 days.
- Inj: Imidocarb propionate @ 2.5mg/100kg B.w I.M for 3-5 days
- Prednisolone, vitamin B-complex & mineral mixture paraentally as supportive therapy.

ETIOLOGY

The disease is also called Texas fever, red water, piroplasmosis, or tick fever is a major tick-borne protozoan parasites disease of cattle. Older animals are more acutely affected (clinical babesiosis is rare in cattle younger than six months).

Causative Agent: Caused by Babesia spp. belongs to family Babesidae.
- Babesia bovis cause disease in cattle and buffalo.
- Babesia bigemina cause disease in cattle and buffalo (Mostly in buffalo).
- The cattle tick, Boophilus microplus, is the vector for babesiosis.
- Mortality up to 50% or over.

CLINICAL SIGN

- High fever (41.5°C)
- Reddened and injected mucous membranes at the early stages and later, anaemic mucous membranes.
- Anorexia
- Depression
- Increased respiratory rate particularly following exertion
- Muscle tremor
- Reluctance to move.
- Hemoglobinuria (Dark reddish brown urine in the terminal stage)
- Sometimes signs of cerebral derangement (circling, head pressing, mania & convulsions).
- Mortality depending on age, breed etc....

POST-MORTEM FINDINGS

- Splenomegaly and jaundice
- Red/coffee-colored urine in urinary bladder
TRANSMISSION

Incubation period of disease is 7–10 days.

*Babesia bovis* is transmitted by larval stages of ticks (1% of total RBCs infected).

*Babesia bigemina* is transmitted by nymph stages of ticks (10% of total RBCs infected).

- Transfer of parasitaemic blood via veterinary equipment and biting flies.

![Image of cattle and ticks](image)

AN OVERVIEW OF LIFECYCLE

Transmission of *Babesia* sp. by *Rhipicephalus microplus*

DIAGNOSIS

Samples of Choice

1. Blood approximately 5 ml of blood sample from jugular.
2. Brain, liver, kidney and lungs biopsies also have been used in the diagnosis.

Laboratory Tests

- Microscopic examination of stained blood smears.
- Antibodies against *Babesia* sp. may appear in the blood of infected cattle within 1 to 3 weeks and are sought by complement fixation (CF) or indirect FA tests.
- PCR and ELISA

TREATMENT

- Inj: Diamazine @ 3-5mg/kg IM.
- Inj: Imidacarb dipropionate @ 1-3mg sub-cutaneously.
- To avoid allergic reaction steroid is injected 5-10 minutes after imidacarb.
- Vitamin B-complex @ 50ml and phenylbutazone (anti-inflammatory drug) are administered paraentally as supportive therapy.
- Cold therapy to lower the temperature (at high temperature drugs don’t work)

PREVENTIVE MEASURE:

- Effective control of tick, mosquitoes and flies.
- Biological control by keeping pet birds to pick the ticks.
- The access of biting insects to contaminated fresh blood should be prevented.
- Avoid use of contaminated instruments.

THEILERIOSIS

![Image of cattle with theileriosis](image)
ETIOLOGY

It is a protozoan disease of young exotic and crossbred cattle in Indo-Pak and not a contagious disease.

Causative agent: Caused by species of Theileria spp belongs to family Theileriidae. Two most pathogenic and economically important species are:

* **Theileria parva** causing East Coast Fever (ECF) and occurs 13 countries in sub-Saharan Africa.
* **Theileria annulata** causing Tropical Theileriosis or Mediterranean Coast Fever (MCF) occurring in southern Europe as well as North Africa and Asia.

CLINICAL SIGN

**CLINICAL SIGN SUMMARY**

- Augmentation of lymph nodes,
- High fever and anorexia,
- Nasal and ocular discharge,
- Dyspnoea,
- Diarrhoea,
- Emaciation, weakness and recumbency,
- Drop in milk yield,
- Death occurs after 7-10 days in 90% of cases.

TRANSMISSION

- By infected animals.
- Ixodid tick (High temperature and high humidity for tick growth)
- **Theileria parva** transmitted by *Rhipicephalus appendiculatus*.
- **Theileria annulata** transmitted by *Hyalomma anatolicum anatolicum*, *Hyalomma detritum* and *Hyalomma excavatum*.
- Life cycle is completed in lymphocytes (Schizontes) and in RBCs (Piroplasm)

AN OVERVIEW OF LIFECYCLE
**DIAGNOSIS**

**Samples of Choice**
- Blood approximately 5 ml of blood sample from jugular vein conserved by EDTA.
- Biopsy material of lymph nodes or liver.

**Laboratory Tests**
- **Agent identification**: Microscopic examination of stained blood and PCR.
- **Detection of immune response**: Indirect fluorescent antibody test and ELISA.

---

**TREATMENT**

- Treatment is possible using naphthoquinones but is expensive. Other treatments are:
  - Inj: Buparvaquone (Butalex) @ 1 ml / 20kg IM. Repeat after 2 days.
  - Inj: Oxytetracycline @ 10-20 mg / kg IM for 4-6 days.
- To avoid allergic reaction steroid is injected 5-10 minutes after imidocarb.
- In supportive therapy. Dextrose 5% given in severe jaundice.
- Prophylactic treatment if tick is present (1ml at age of 7 days and repeat after 1 month).

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**PREVENTIVE MEASURE:**

- Control of ticks.
- Access of biting insects to contaminated fresh blood should be prevented.
- Avoid use of contaminated instruments.

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Annex 3: Hand out for MPG farmer Training
Sindh Agriculture Growth Project

Animal Health & Management

Part 1: Animal Health & Biosecurity Measures
Part 2: Contagious & Infectious Diseases
Part 3: Economically Important Diseases

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Animal Health Management

The aim of managing animal health is to minimize the negative effects of animal diseases on its:
Production and welfare
Trade-in livestock and its products and Human health.

STRATEGIES FOR ANIMAL HEALTH AND GOOD MANAGEMENT:
• Appropriate husbandry
• Good hygiene
• Proper feed and
• Good management

SIGNS OF HEALTHY ANIMAL
1. Norm vital signs
2. Alertness
3. Shiny moist skin
4. Bright active eyes
5. Normal food intake
6. Normal feces and urine
7. Animals look free from all anxiety

Note: All healthy animals should eat eagerly when fed and ruminants should be seen chewing their cud.

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Biosecurity is in our hands.

The steps should be taken to prevent from infectious & contagious diseases that effecting animals & humans who care for them.

Quarantine unsold animals from the market for 15 days.

Quarantine newly arrival animals for 15 days.

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Properly vaccinate the animals with proper dose and in a proper way.
**ANIMAL HEALTH CARD**

**Prevention Is Better Than Care**

<table>
<thead>
<tr>
<th>Name of MPG:</th>
<th>Farmer's Name</th>
<th>CNIC No</th>
<th>Cell No</th>
<th>Types of Animals</th>
<th>Last three years No's of Death Animals</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

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Foot & Mouth Disease

Introduction of Disease & Etiology:

Foot and mouth disease (FMD) is most highly communicable viral disease of cloven-footed animals (cattle, buffalo, sheep and goats). Causative Agent: **Aphthovirus**

Sign & Symptoms:

Transmission:

- Direct/ or indirect contact.
- Inhalation.
- Animal products.
- Artificial insemination or Natural
- Contaminated materials (fodder, drinking water, semen, faeces, urine, equipments, clothes and skin of animal handlers and vehicles etc).

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HAEMORRHAGIC SEPTICEMIA (HS)

Introduction of Disease & Etiology:

Hemorrhagic Septicaemia is an acute, fatal, and a bacterial disease of Buffaloes and cattle caused by *Pasteurella multocida*.

Sign & Symptoms:

Transmission:

1. Breathing and air contact
2. Infests animal’s through mucosal discharge

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Brucellosis

Introduction of Disease & Etiology:

Other name of this disease is Abortion, Contagious disease of the reproductive system. Caused by: *Brucella abortus*

Sign & Symptoms:

Transmission:

1. Contaminated food & water.
2. The disease spread from affected cow & Bull during natural mating
3. Through air
4. Through affected animals secretion & excretion
5. Enter in the body through skin and wound.
Black Quarter or Black Leg

Introduction of Disease & Etiology

Black quarter is the fatal disease in this occur in cow, buffalo, sheep & goats are affected. Caused by: *Clostridium chouwei*

Sign & Symptoms:

Transmission:

1. Contaminated feed.
2. Infected animal’s wound
Mastitis

Introduction of Disease & Etiology:

Mastitis is commonly known as swelling of the udder. This disease known with different traditional names.

This disease is caused by different types of bacteria.

Sign & Symptoms:

Transmission:
1. Farm not properly cleaned.
2. Hands not properly washed before milking.
3. After milking udder’s is not properly washed.
4. Different types of bacteria.
5. Transmission through teats.

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FASCIOLIASIS

Introduction of Disease & Etiology:
It belongs to a group of foodborne trematode infections. It is a zoonotic common disease of liver flukes caused by two species of parasitic flatworms or trematodes that mainly affect the liver.
This disease caused by a specific type of *Fasciola hepatica*

Sign & Symptoms:

Transmission:
1. Through snails, flies contact.
2. Contaminated food & water.
3. Rainy or pond water.
4. Grazing on contaminated land.
5. Unhygienic farm

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LUNG WORM

Introduction of Disease & Etiology:
Parasitic bronchitis (husk) is an economically important parasitic infection of the bovine respiratory tract. Mortality occurs in heavy infections. This disease is caused by the nematode, *Dictyocaulus viviparous*.

Sign & Symptoms:

Transmission:
1. **Through contaminated feed**
2. **Grazing on contaminated land.**
3. **Grasses surrounding the lakes & pond.**

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TICK FEVER

Introduction of Disease & Etiology:
Anaplasmosis is a blood borne infection and transmissible protozoan disease also called rickettial disease. It is in form of ‘tick fever’ in cattle.
Disease in cows & buffaloes caused usually by Anaplasma marginale.

Sign & Symptoms:

Transmission:
1. Through tick bite.
2. Through flies.
3. Contaminated food & water

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BABESIOSIS

Introduction of Disease & Etiology:

The disease is also called Texas fever, red water, piroplasmosis or tick fever. A major tick-borne protozoan parasites disease of cattle. Older animals are more acutely affected. Clinical babesiosis is rare in cattle younger than six months. Caused by: *Babesia bovis*

Sign & Symptoms:

Transmission:

1. Incubation period: 7-10 days
2. Through tick infestation.
3. Contaminated food & water.
4. Unhygienic farm

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THEILERIOSIS

Introduction of Disease & Etiology:

It is a protozoan disease of young exotic and crossbred cattle in Indo-Pak and not a contagious disease. Caused by species of *Theileria* spp belongs to Family: Theileridae.

Three most pathogenic and economically important species are:


Sign & Symptoms:

![Cows affected by Theileriosis](image)

Transmission:

This disease caused by a specific tick i.e. *Hyloma*.

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ZOO-SANITARY

Separate water and feeding mangers for sick and healthy animals.

Isolate healthy animals within farm or on another farm/shed.

Hospital visit of sick animals should be discouraged.

Neonatal/suckling calves should not be suckled or feed sick animal milk.

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Dead animals should be buried properly and death areas sprayed with disinfectant/lime stone.

If sick animal slaughtered than site must be disinfected and blood/offals could be buried.

Veterinarian / Veterinary Assistants can become the main source of spreading disease from one farm to another if not disinfected with clothes, body and shoes are not disinfected between visits.

Awareness programme for farmers to aware about the possible disease spread causes.

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LIST OF ILRI PUBLICATIONS IN PAKISTAN

Reports, Manuals/Books, Technical/Research publications, Software produced by ILRI in Pakistan

➢ (Inquiries on these publications pl contact. Prof. M.N.M. Ibrahim: m.ibrahim@cgiar.org or mnm1946@gmail.com)

Reports

1 Dairy Value Chain Rapid Assessment: Tools for Participatory rural appraisal with Glossary - English & Urdu Terminologies (ILRI-AIP -Pub:001)
2 Dairy Value Chain Rapid Assessment in District of Punjab: Challenges and way Forward (ILRI-AIP -Pub:002)
3 Assessment and Evaluation of Constraints faced by Dairy Farmers and Khyber Pakhtunkhwa (ILRI-AIP -Pub:003)
5 Compendium of Economically Important Ruminant Diseases in Pakistan (ILRI-AIP -Pub:005)
6 Training manual on Modern Reproductive Technologies (ILRI-AIP -Pub:006)
7 Livestock Production in Mountainous Regions of Pakistan: A case study on district Bagh, Azad Jammu & Kashmir (ILRI-AIP -Pub:007)
8 Rapid Assessment of Small Ruminant Value Chain in Chakwal District, Pakistan (ILRI-AIP -Pub: 008a)
9 Small Ruminant Value Chain-Rapid Assessment: Village Level Case Studies from District Bahawalpur, Pakistan (ILRI-AIP -Pub: 008b)
10 Participatory Rural Appraisal with Female Livestock Farmers of District Swat, Khyber Pakhtunkhwa (ILRI-AIP -Pub: 009)
12 Constraints for Long Term Development of Dairy Farming in Sindh and Balochistan: Livestock Management Perspective (ILRI-AIP -Pub: 011)
13 Livestock farming systems in Sindh: Challenges and way forward for formation of formal Milk Producer Groups (ILRI-AIP -Pub: 012)
14 Fodder Marketing Systems of Punjab: Impediments and Way forward (ILRI-AIP -Pub. 013)
15 Inception Workshop Report of the Sindh Agricultural Growth Project. (ILRI-SAGPL - Report 01)
16 Report on Training District Livestock Department Staff (DDL, ADL, VO’S, DFM’S, LLS & ILRI NATIONAL STAFF) on Dairy Production Technologies (ILRI-SAGPL - Report 02)
17 Report on Training District Field Extension Staff (AI Technicians, Livestock Inspectors, Stock Assistants, Livestock Assistants, LAB Technicians) on Dairy Production Technologies (ILRI-SAGPL - Report 03)
19 Report on Training of MPG (153) members on Animal Reproduction and Breeding (ILRI-SAGPL - Report 05)
20 Report on Awareness Programs conducted in Model MPGs for members & non-members on “Farmer Centered Knowledge Sharing Program on Capacity Building Activities” (ILRI-SAGPL- Report 06).

Manuals/Books

1 Judging and Selection in Sahiwal Cattle (ILRI-AIP)
2 Judging and Selection in Beetal Goats (ILRI-AIP)
3 Nachi Goats: Judging and Selection Guide (ILRI-AIP)
4 A Training Manual on Artificial Insemination in Goats (English & Sindhi)
5 Feeding Dairy Cattle and Buffaloes: Training Manual for Extension Workers in Pakistan (English, Urdu & Sindhi) (ILRI-AIP/SAGPL)
6 Feeding Tables for Ruminants in Pakistan - English (ILRI-AIP)
7 Compendium for Forages and Feed Resources for Ruminants in Pakistan (English) - ILRI-SAGPL
8 Training Facilitator Guide on Animal Health Management (English, Urdu, Sindhi) - ILRI-SAGPL
9 Training Facilitator Guide on Feeds and Feeding (English, Urdu, Sindhi) - ILRI-SAGPL
10 Training Facilitator Guide on Reproduction & Breeding (English, Urdu, Sindhi) - ILRI-SAGPL

75
Glossary of Technical terms used in Animal Science - English-Udu-Sindhi (ILRI-SAGPL)

Technical Reports


Training Materials

1. Feeding Chart – Cattle (English, Urdu & Sindhi) - ILRI-AIP & SAGPL
2. Feeding Chart – Buffaloes (English, Urdu & Sindhi) - ILRI-AIP & SAGPL
3. Cow Calendar (English, Urdu & Sindhi) - ILRI-SAGPL.

Posters 4x3

1. ILRI Thematic areas
2. Artificial Insemination in Goat
3. Capacity Building: Way Forward to Change Mindset
4. Conventional and improved fodder production systems in Chakwal, Punjab
5. Herbal anthelmintic paves the way for economic control of internal parasites
6. Overview of Livestock sector in Sindh: Finding of snapshot and Forage surveys
7. Hydroponic: For Water and Land Scarce Areas?
8. Importance of free access to water and feed
9. Improved feeding management during reproductive stages of small ruminants leads to higher productivity.
11. Snapshot of the Dairy Sector in Balochistan
14. Vaccination calendar for small and large ruminants in Punjab.
15. Volunteer Farmer Training Models: Solution for Dilemma
17. Maize Silage Quality Assessment in Punjab
18. Guide to use the “feed chart” for Milking Cattle & Buffalo
19. Milk-in (Treble purpose) plastic can for milking, checking mastitis and transport.
20. Monitoring and Evaluation and Learning Plan

Fact sheets

1. Digestion in the rumen
2. Management of calves
3. Management of heifers
4. Oestrus cycle and heat detection
5. The in-calf cow
6. Fresh cow problems
7. Management of dry cows
8. Dry cow therapy - Mastitis control
9. Body condition scoring of dairy animals (cattle & Buffaloes)
10. The process of milking
11. Clean milk production
12. Water for dairy animals
13. Taking girth measurements & estimating Live Weight
14. Roughages for dairy cattle & buffaloes
15. Impact of free access to water & balanced feed on milk production
16. Feeding concentrates to dairy cattle and buffaloes
17. Minerals and dairy animals
18. Urea- Molasses-Mineral Lick Blocks
Pasture production

20 Mott grass: Cultivation and Nutritive Value for Ruminants
21 Rye grass: Cultivation and Nutritive Value for Ruminants
22 Rhodes grass: Cultivation and Nutritive Value for Ruminants
22(a) Rhodes grass (Tolghar): Cultivation and Nutritive Value for Ruminants
23 Alfalfa (Lucerne): Cultivation and Nutritive Value for Ruminants
24 Berseem: Cultivation and Nutritive Value for Ruminants
25 Sorghum: Cultivation and Nutritive Value for Ruminants
26 Para grass: Cultivation and Nutritive Value for Ruminants
27 Kallar grass: Cultivation and Nutritive Value for Ruminants
28 Oats: Cultivation and Nutritive Value for Ruminants
29 Jantar (Sesbania): Cultivation and Nutritive Value for Ruminants
30 Shaftal: Cultivation and Nutritive Value for Ruminants
31 Couch Grass: Cultivation and Nutritive Value for Ruminants

Diseases

1 Deworming (English & Urdu)
2 Vaccination (English & Urdu)
3 Tetanus (English & Urdu)
4 Pneumonia (English & Urdu)
5 Parasitic Injection (English & Urdu)
6 Mastitis (English & Urdu)
7 Foot and Mouth Disease-FMD (English & Urdu)
8 Esophageal Choke (English & Urdu)
9 Diarrhea (English & Urdu)
10 Bloat (English & Urdu)

Software

1. Ration Formulation for Cattle and Buffaloes using Pakistan Feeds for Animal Nutritionist and Veterinary Officers (Excel software) - ILRI-AIP
2. Ration Formulation for Cattle and Buffaloes using common feeds available in Pakistan for Extension staff and progressive farmers (Android and Web-based applications) - ILRI-SAGPL
3. Milk price calculator for MPG Milk Technicians (Android based)
4. Herd Management software for Farms and Progressive Farmers (Android and Web-based applications) - ILRI-SAGPL
Q & A on Animal Health Management

1. **What Step Do You Know for proper Animal Health Management?**
   - Appropriate husbandry
   - Good hygiene
   - Proper feed
   - Good management and
   - Proper Urination and Faeces discharge

2. **How you differentiate Healthy & Sick Animals?**
   - Rumination, Shiny Skin, Brighter Eyes, Look Active & Proper Urination & Defecation

3. **What do you know about Bio Security?**
   - The steps taken to prevent from infectious diseases affecting animals and the people who care for them.

4. **What are the Important Steps should be taken follow biosecurity plan?**
   - Quarantine newly arrival animals for 15 days.
   - Do not send animals for grazing with other flock/herd.
   - No dirt on boots
   - Quarantine unsold animal from the market.
   - Use of drench in order to kill the parasitic worms.

5. **What is role of farmer in Vaccination?**
   - Vaccine Knowledge. Dose, Route, Cold chain system,
   - Timing (early morning Late Evening)
   - Use of Proper syringes & Proper Needle, Proper Record Keeping in Health Card.

6. **Do you have any Knowledge about animal Disease?**
   - Yes we have the Knowledge of the Animal diseases such as:
     - F.M.D, H.S, Liver Fluke, Mastitis, Black Quarter and Brucellosis etc.

7. **Which animal disease do you know?**
   - Share Sign & symptoms

8. **What type of diseases effect on milk production?**
   - FMD, Mastitis, Liver Fluke etc etc

9. **What Important steps should be taken from farmer when animal get Disease?**
   - Isolate healthy animals within farm or on another farm/shed.
   - Separate water and feeding mangers for sick and healthy animals. Burn left over feed and fodder, disinfect these.
   - Hospital visit of sick animals should be discouraged.
   - Dead animal should be buried properly and death area sprayed with disinfectant/limestone.
   - Awareness programme for farmers to aware about the possible disease spread causes.
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