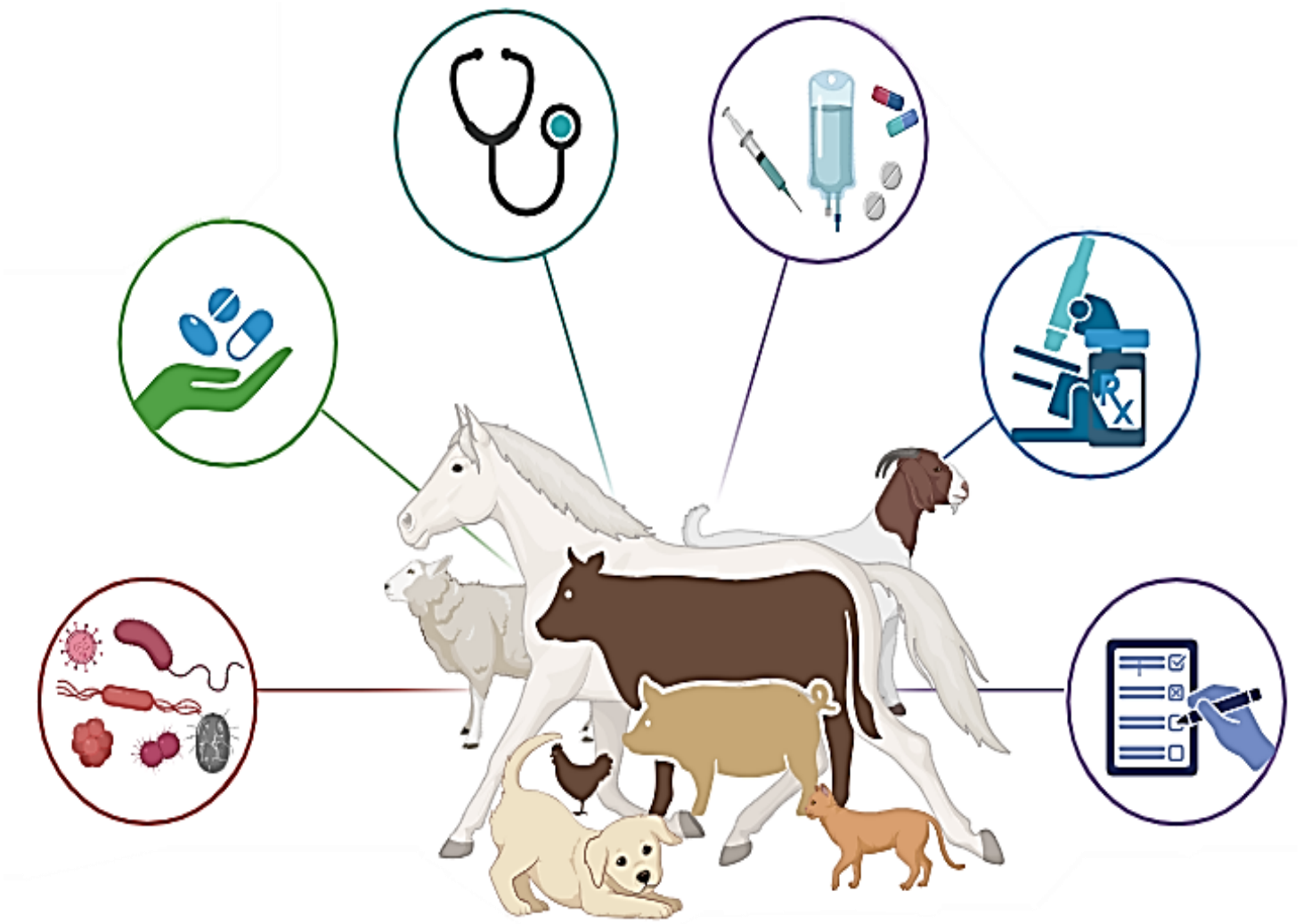
ROYAL GOVERNMENT OF BHUTAN
Ministry of Agriculture and Livestock
Department of Livestock



Standard Treatment Guidelines
2ND EDITION
2025

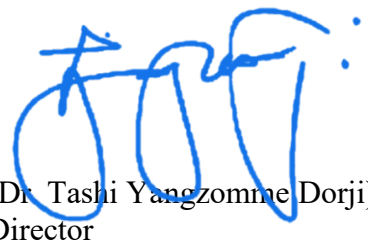
Foreword

The Standard Treatment Guidelines (STG) have been developed to provide veterinary professionals with a comprehensive reference for making informed decisions regarding appropriate treatments for various clinical conditions. This document focuses on common and significant diseases, as well as metabolic conditions frequently encountered in the field. Each disease or condition is systematically arranged by system and microorganism, detailing the etiology, clinical signs, symptoms, and treatment protocols. Additionally, preventive measures and control strategies for infectious diseases have been incorporated to enhance field applicability. Basic guidelines on assessing general animal health and conducting clinical examinations are also covered.

To facilitate accurate clinical correlation, this guideline includes reference values for normal physiological parameters such as body temperature, pulse, and respiration rates. Furthermore, vaccination schedule and treatment are based on the essential veterinary drug list to ensure easy access to critical medications and standardized treatment regime across the country. The document is designed to serve as a practical reference for para-veterinarians working in the field, support academic purposes, and assist new professionals embarking on their veterinary careers.

I am pleased to acknowledge the pivotal role played by the National Center for Animal Health and National Veterinary Hospital, College of Natural Resources and Department of Livestock, in leading the development of this guideline.

It is my sincere hope that review and update of the edition of the Standard Treatment Guidelines will serve as an invaluable resource for all those engaged in animal healthcare, contributing to improved veterinary practices and better animal welfare.



(Dr. Tashi Yangzomme Dorji)
Director
Department of Livestock
Ministry of Agriculture & Livestock

CONTRIBUTORS

We would like to express our deepest gratitude to the following officials for their valuable contributions in reviewing and updating the standard treatment guidelines (STG).

- *GENERAL AND SYSTEMIC CONDITIONS*

Dr. Narayan Pokhrel
Dr. Dezang Wangchuk
Dr. Karma Choezang

- *METABOLIC DISEASES, POISONING AND FLUID THERAPY*

Dr. Jigme Tenzin
Dr. Rinchen Tshering

- *BACTERIAL DISEASES*

Dr. Tenzin Wangchuk
Dr. Shelkar Chhettri
Dr. Jamtsho

- *VIRAL DISEASES*

Dr. Kinzang Chedup
Dr. Cheten Norbu
Dr. Jigme Tshewang

- *PARASITIC DISEASES*

Dr. Lungten
Dr. Sonam Choden
Dr. Tshering Dendup

- *POULTRY DISEASES*

Dr. N.K Thapa
Dr. Nima Gyeltshen
Dr. Thukten Chophel

- *ANNEXURE*

Dr. Tshering Choden

- *VACCINATION SCHEDULE*

Dr. Basant Sharma
Dr. Tshering Choden

- *AMRoH TECHNICAL ASSISTANCE*

Dr. Harriet Thornton

- *Cover Design*

Dr. Tshering Choden

- ***Compiled and edited by:***

Dr. Tenzin Wangchuk
Dr. Tshering Choden
Dr. Karma Choezang

GLOSSARY
Acronyms

AMR	Antimicrobial resistance
AMU	Antimicrobial use
BID	*bis in die*, twice a day
BW	Body Weight
CNR	College of Natural Recourse
FAO	Food and Agriculture Organization of the United Nations
IM	Intramuscular
IU	International Unit
IV	Intravenous
MIC	Minimum Inhibitory Concentration
MoH	Ministry of Health
NCAH	National Centre for Animal Health
NRL	National Reference Laboratory
NVH	National Veterinary Hospital
OD	*quaque die*: Once a day
OIE	World Organization for Animal Health
PO	*Per os:* by mouth
QID	*quarter in die*: Four times a day
RLDC	Regional Livestock Development Centre
RVH & EC	Regional Veterinary Hospital & Epidemiology Center
SC	Subcutaneous
SOS	*Si Opus Sit:* As and when required
TID	*ter in die*: three times a day
WHO	World Health Organization
WP	Withdrawal Period

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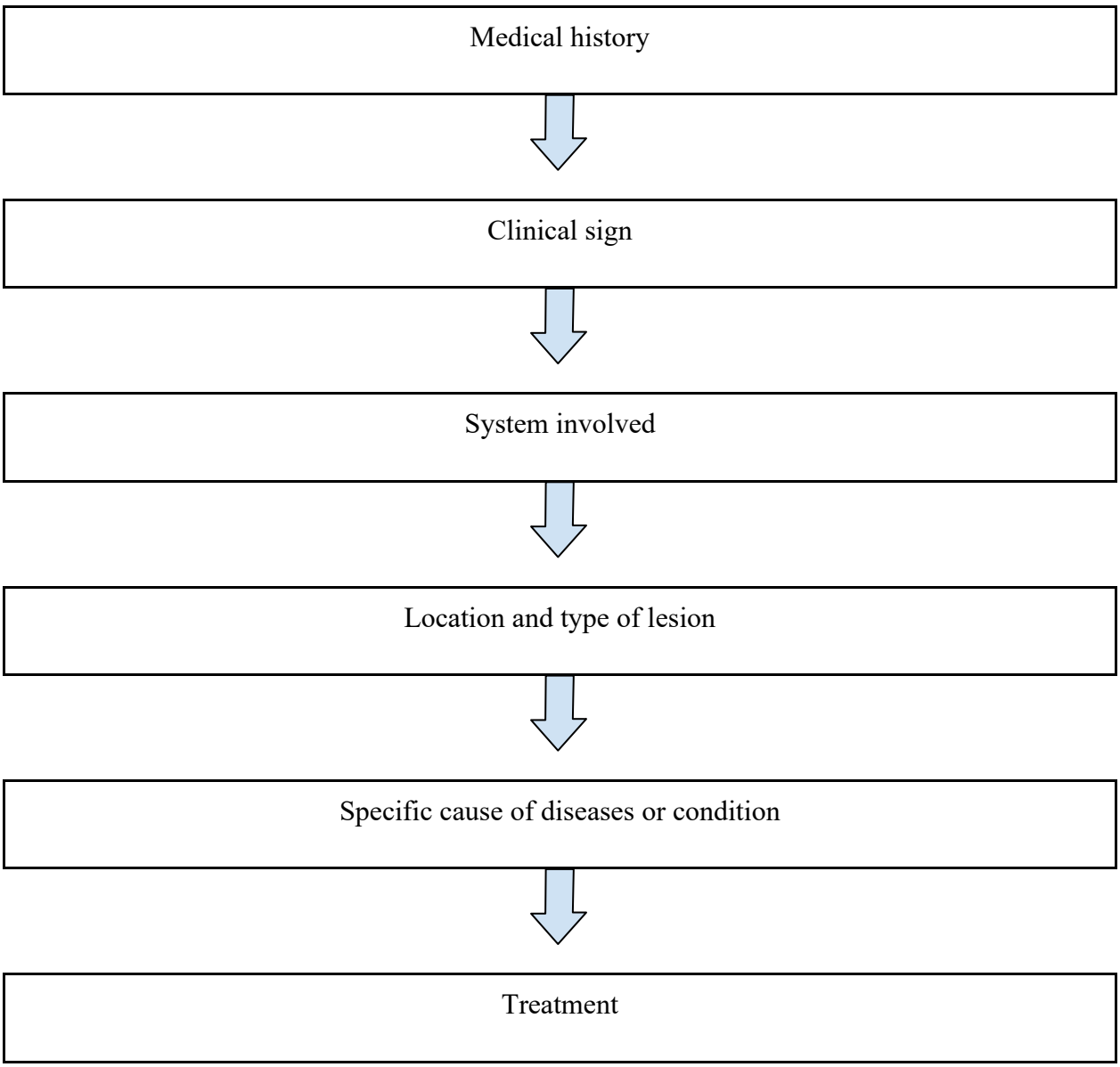

1. GENERAL SIGNS OF GOOD HEALTH IN ANIMALS

1.1 Appearance of the animal

The healthy animal is alert and aware of its surroundings. It should stand on all of its feet. For instance, bending of legs indicates rickets and an emaciated body is suggestive of chronic diseases.

An animal or a bird that is dull/depressed/excited/ruffled feather/droopy or keeping aloof is suggestive of disease.

1.2 Movement (gait)

The healthy animal will walk easily and steadily with all of its feet taking its weight. Steps should be regular.

Lameness, stiffness, extension and flexion of limbs and speed of movement can be examined in relation with diseases of the skeleton. Range of movement diminishes in arthritis and laminitis. Circling is commonly noticed in gid, listeriosis and ketosis.

Horses normally stand during the day. If you go near an animal that is lying down it should stand up quickly otherwise it has health problems.

1.3 Head

The eyes should be clear, bright and alert with no discharge at the corners. The mucous membrane of the healthy animal should be pink and bright.

The normal ears must be clean with little or no odor and without any discharge. Most animals have erect ears which move in the direction of any sound. If any tilting or shaking of its head then the animal may be having infection/disorder in the ear.

In most of the animals, the nose/muzzle/snout is normally moist and cool with no discharge.

There should be no saliva dripping from the mouth. If chewing is slow or incomplete, there may be a problem with the teeth. Lesions such as blisters and ulcers can occur in Foot-and-Mouth Disease (FMD).

1.4 The coat and skin

The hair coat of the animal will be smooth and shiny. In cattle, the presence of lick marks indicates good health. In febrile conditions hair may be erect and in all chronic disturbances in nutrition, hair becomes rough, lusterless, dry and coarse. Alopecia (loss of hair) may occur due to diseases like ringworm, scabies etc. but periodic shedding of hair should not be regarded as abnormal.

In poultry the feathers should be smooth and glossy and not ruffled. In pigs a curly tail is a sign of good health while scaly skin points to health problems.

1.5 Behavior

Diseased animals often behave differently from healthy ones. Animals affected by abdominal pain frequently lie down and get up, kick at their flank, and may roll. Changes in the tone of bark, hyper-excitability, or dullness can be indicative of rabies.

1.6 Breathing

Breathing should be smooth and regular at rest. Respiratory movements can be observed at the right flank. Any change in the rate indicates respiratory involvement. Thoracic respiration is seen in animals suffering from acute peritonitis, while abdominal respiration is observed in pleurisy. Double expiratory movements are seen in horses with emphysema.

1.7 Defecation

Variation in quantity and quality of defecation is indicative of digestive disturbances of various origins such as infection, parasitism, nutritional imbalance and nervous manifestation. Diarrhea and constipation are commonly encountered symptoms.

1.8 Urination

The urine should be clear and the animal shows no signs of pain or difficulty in urinating. Horses, mules and donkeys can have thick yellow urine which is normal. Frequent urination is associated with painful conditions of the urinary tract or estrus, while dribbling of urine occurs as a result of paralysis or obstruction of the urethra or its sphincter.

1.9 Appetite and Rumination

The animal should eat and drink normally. Failure to eat is an obvious sign of ill health. Absence of rumination is also indicative of disease in ruminants.

1.10 Milk Production

In milking animals, a sudden change in the amount of milk produced may indicate a health problem. Any sign of blood or other substances in the milk suggests an infection in the udder. There should be no swelling of the udder, and it should not cause pain when touched.

2. GENERAL EXAMINATION

2.1 Palpation

Direct palpation with the fingers or indirect palpation with a probe is aimed at determining the size, consistency, temperature and sensitivity of a lesion or organ.

Terms used to describe palpation findings include the following: a) doughy (when the structure pits on pressure, as in edema, normal ruminal content), b) firm (like lymph node, liver and kidney), c) hard (bonelike), d) fluctuating (when the structure is soft, elastic and undulates on pressure but does not pit) and e) emphysematous (when the structure is puffy and swollen, and moves and crackles under pressure because of the presence of gas in the tissue).

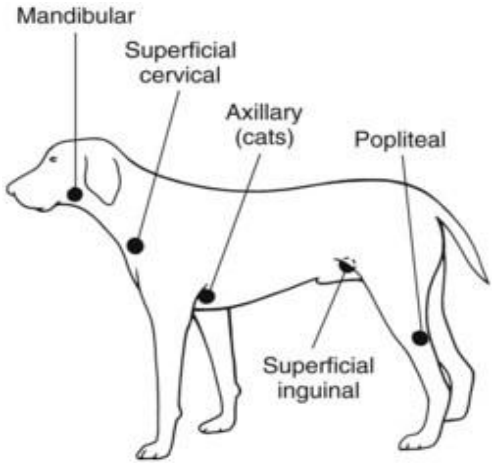

Figure 1: Superficial lymph node (Ref)

2.2 Percussion

In percussion, the body surface is struck so as to set deep parts in vibration and cause them to emit audible sounds. The sounds vary with the density of the parts set in vibration and may be classified as follows: a) resonant (the sound emitted by organs containing air, e.g., normal lung), b) tympanitic (a drum-like note emitted by an organ containing gas under pressure such as a tympanitic rumen or cecum), c) dull (the sound emitted by solid organs such as heart and liver).

Percussion can be performed with the fingers using one hand as a plexor and one as a pleximeter. In large animals a pleximeter hammer on a pleximeter disk is recommended for consistency.

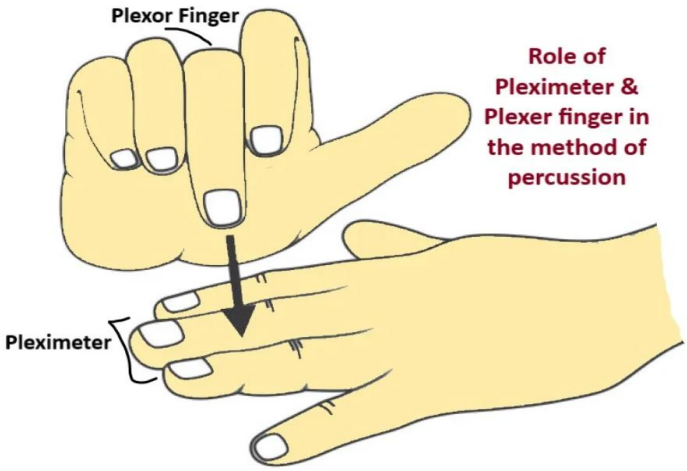

Figure 2: Technique of percussion (Ref)

2.3 Auscultation

Auscultation in animals refers to the process of listening to internal body sounds, typically using a stethoscope, to assess the heart, lungs, gastrointestinal system, and other internal organs.

Figure 3: Auscultation region for small and large animals. (Reference: Fig a) and Fig b)

2.3.1 Heart Auscultation:

Purpose: To assess heart sounds (rate, rhythm, and murmurs) and detect abnormalities like arrhythmias, heart murmurs, or heart failure.

- Location:
  - Dogs and Cats: Listen over the left side of the chest, typically just behind the elbow, at the heart base and apex (4th–6th intercostal spaces.)
  - Large Animals (Horses, Cows): Horses- on the left side, over the heart's apex near the elbow; Cows- at the left side, just behind the elbow as well, where the heart's sounds are most prominent.

- Indication:
    - Heart Rate: Normal resting heart rate varies by species (e.g., dogs: 60-120 bpm, cats: 140-220 bpm, horses: 28-40 bpm, cows: 60-80 bpm).
    - Rhythm: Look for irregularities like arrhythmias (irregular heartbeats).
    - Murmurs: These can indicate heart valve issues or abnormal blood flow (e.g., mitral valve insufficiency, patent ductus arteriosus).

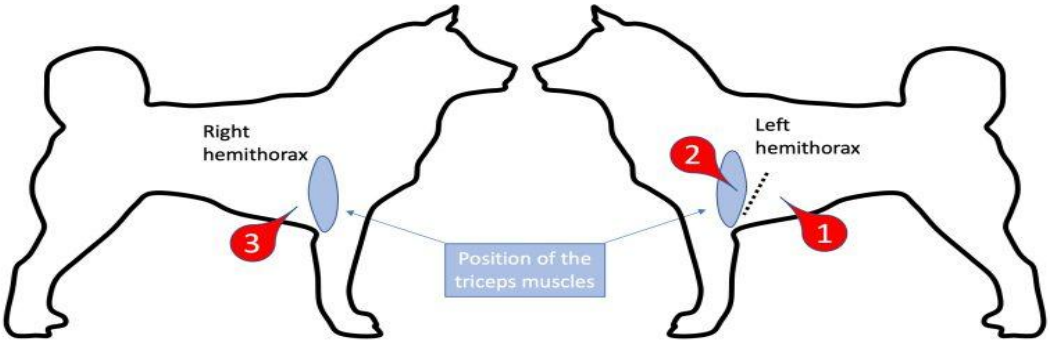

Figure 4: The key points of auscultation in dogs on both sides of the chest: (1) left apex; (2) left base; (3) right apex. The right base is also worth auscultating, but is less important in terms of formulating differential diagnoses (Ref)

2.3.2 Lung Auscultation:

Purpose: To evaluate lung sounds for normal airflow or signs of respiratory distress, infection, or fluid buildup (e.g., pneumonia, pleural effusion).

Location:

- Cranial lung field: Just above and behind the shoulder.
- Middle lung field: Lateral to the costochondral junction at the mid-thorax.
- Caudal lung field: Near the last few ribs, extending to the thoracic cage's dorsal aspect.

Indication:

- Normal Breath Sounds: These should be soft and non-labored.
- Abnormal Sounds:
    1. Crackles: Indicate fluid in the airways, often seen in pneumonia or pulmonary edema.
    2. Wheezes: Suggest constriction of the airways, such as in asthma or bronchitis.
    3. Absent or Decreased Lung Sounds: May indicate pleural effusion, pneumothorax, or atelectasis (lung collapse).
    4. Stridor: A high-pitched sound often associated with upper airway obstruction.

2.3.3 Gastrointestinal/Abdominal Auscultation

Purpose: To assess the movement and function of the gastrointestinal (GI) tract and detect abnormalities like ileus (lack of movement), bowel sounds, or digestive issues.

- Location:
  - Dogs and Cats: Auscultate the abdomen, listening over the stomach, intestines, and colon for normal or abnormal sounds.
  - Large Animals (Horses, Cows): Auscultate the abdomen in all four quadrants.
- Indications:
  - Normal Bowel Sounds: These should be intermittent, gurgling sounds indicating normal peristalsis.
  - Hypoactive or Absent Sounds: May indicate ileus, constipation, or obstruction.
  - Hyperactive Sounds: Can suggest diarrhea or gastrointestinal inflammation.
  - Pings (in Ruminants): In cows and other ruminants, "pinging" sounds heard in the left abdomen can indicate ruminal distension or displaced abomasum.

2.3.4 Tracheal and Bronchial Auscultation

Purpose: To assess for obstructions, respiratory infections, or inflammation in the upper airways and bronchi.

- Location:
  - Dogs and Cats: Auscultate along the trachea and bronchi in the cervical region, and then move down the thoracic cavity.
  - Large Animals: Check the trachea for signs of obstruction or irritation.
- Indication:
  - Harsh, High-pitched Sounds: May suggest tracheal obstruction or inflammation.
  - Coughing or Gagging Sounds: Could be indicative of respiratory infection or irritation (e.g., kennel cough).

2.4 Recording Physiological Parameters

2.4.1 Body temperature in different species

We use a thermometer to measure the temperature of the body. The unit of measurement is either degrees centigrade (°C) or degree Fahrenheit (°F). We measure the body temperature of animals by placing a thermometer in the rectum.

Table no. 1: *Range of body temperature*

Species	Normal temperature (°F)	Critical point (°F)	Normal temperature (°C)	Critical point to (°C)
Cattle	101.5	103	38	39
Horses	100.5	102	38	39
Sheep/Goats	101.5	104.5	38	40
Pigs	102	103.5	39	40
Poultry	107	109	41	42
Dogs	100.6	102	38	39
Cats	100	102.5	37	39

2.4.2 Pulse rate in different species

Pulse rate is slightly slower than the normal heart rate.

Table no. 2: *Site and location of normal pulse range*

Species	Artery	Site	Normal Pulse rate
Cattle	Coccygeal artery	On the underside of the base of tail	40-80 per min
Horse	External maxillary artery	On the inside of cheek	35-40 per min
Sheep & goat	Femoral artery	On the inside of the top of back leg	70-130 per min
Pigs	Femoral artery	On the inside of the top of back leg	60-90 per min
Dog	Femoral artery	On the inside of top of back leg	80-160 per min
Cat	Femoral artery	On the inside of top of back leg	110-200 per min

**Remember that the pulse will be higher in the young and small sized animal. To take the pulse you should feel for it with the first two fingers of the hand.*

2.4.3 Respiration rate in different species

Table no. 3: *Respiration rate*

Species	Respiration rate (per min)	Species	Respiration rate (per min)
Cattle	10-30	Sheep & goat	15-35
Pig	10-20	Horse	8-10
Dog	20-40	Cat	30-40

2.4.4 Assessment of severity of degree of dehydration

Table no. 4: *Degree and assessment of dehydration*

BW loss (%)	Sunken eyes & shrunken face	Skin fold test (sec)	PCV (%)	Fluid requirements (ml/kg BW) to replace deficit)
4-6	Not detectable	-	40-45	20-25
6-8	++	2-4	50	30-50
8-10	+++	6-10	55	50-80
10-12	++++	20-45	60	80-120
12-15	+++++	Prolonged period	<60	>120

3. GENERAL SYSTEMIC CONDITIONS

3.1 History Recording

The Animal, The History and The Environment are the main components of the History recording which in turn would aid veterinarians to infer the clear picture of the conditions of the animals.

General inspection, Distant inspection, close inspection are the important aspects when taking history from the animals which includes following parameters.

- Feed intake
- Water intake
- Respiration
- Defecation
- Urination
- Milk production
- Gait
- Posture
- Growth

The History- Includes details about past illnesses, case fatality rates, and mortality rates. It also covers prior treatments, control strategies, preventive measures, and previous exposures.

The environment- where animals live play a significant role in the development of various conditions. Outdoor factors such as climate, soil type, topography, and population density, along with indoor factors like hygiene, ventilation, and lighting, help veterinarians analyze the history associated with the current condition.

3.2 Fever, hypothermia, and hypothermia

Fever is an elevation of core body temperature above that normally main-tained by an animal and is independent of the effects of ambient conditions on body temperature.

It is important to realize that fever is a combination of hyperthermia and infection or inflam-mation that results from an elevated set- point for temperature regulation.

Table no: 5: *Difference between fever, hyperthermia and hypothermia:*

Indicator	Fever	Hyperthermia	Hypothermia
Setting	Infectious (septic and aseptic), FUO	Environmental, increased production/decreased dissipation	Environmental, decreased production/increased dissipation.
Thermoregulation	Normal	Impaired	Impaired
Temperature Set points	less than 105 Fahrenheit	More than 105 Fahrenheit	Less than 96 Fahrenheit.
Shivering	Present	Absent	Present
Breathing	-	-	Difficult breathing
Heart rate	Increased	Increased	Increased
Treatment	Refer below	Refer below	Refer below

**FUO- Fever of unknown origin*

a) *Treatment for Fever:*

Initially avoid using antimicrobials indiscriminately. Use antipyretic for 24 hours and re-examine the temperature. If the fever still exists, then rationally narrow down the causes of fever and start the therapy as per clinical findings.

Table no. 6: *Treatment regimen for fever*

Options	*Species*	*Drugs*	*Dose*	*Route*	*Frequency*	*Duration*
1. Initially avoid using antimicrobials. Use antipyretic.	All species	Meloxicam	0.1-0.2mg/kg	IM, IV, SC	OD	Two days
	Large ruminants	Meloxicam + paracetamol bolus	1-2 boli	PO	BID	SOS
	Small ruminants		½ boli	PO	BID	SOS
2. Use antimicrobials if antipyretic does not work or if systemic infection is suspected	Cattle, sheep, goat, horse, pigs	Oxytetracycline LA,	20mg/kg	IM	OD	Repeat after 48 hours
	Dog, cat	Oxytetracycline SA	10-20mg/kg	IM, IV	OD	5 days

** Note: paracetamol, meloxicam, carprofen should be used cautiously with the cat subcutaneously as it has got hepatotoxic effects. Therefore, the meloxicam shall be used twice with a tapering dose.*

b) Treatment for hyperthermia

Antipyretics should be used with caution because fever is a protective mechanism and lowering the body temperature may be detrimental in an animal with an infectious disease.

Table no. 7: *Treatment regimen for hyperthermia*

Options	*Species*	*Drugs*	*Dose*	*Route, Frequency, Duration*		
1. Passive cooling	Large ruminants	Splashing with cool water	NA	External Application	OD	SOS
	Small ruminants	Applying ice packs	NA	External Application	OD	SOS
2. Active cooling (IV fluids)	Large ruminants	NS, RL, DNS	500-1000 ml	IV	OD	SOS
	Small ruminants	NS, RL, DNS	100-500ml	IV	OD	SOS
3. Use antipyretic.	All species	Meloxicam	0.1-0.2mg/kg	IM, IV, SC	OD	Two days
	Large ruminants	Meloxicam + paracetamol bolus	1-2 boli	PO	BID	SOS
	Small ruminants		½ boli	PO	BID	SOS

***** *Note: The paracetamol and tramadol should be used cautiously with the cat subcutaneously as it has got hepatotoxic effects. Therefore, the meloxicam shall be used twice with a tapering dose.*

c) Treatment for hypothermia

Table no. 8*: Treatment regimen for hypothermia*

Options	*Species*	*Drugs*	*Dose*	*Route*	*Frequency*	*Duration*
1. Passive warming	*Large ruminants*	*Splashing with warm water*	*SOS*	*external*	*SOS*	*SOS*
	Small ruminants	*Applying hot packs*	*SOS*	*external*	*SOS*	*SOS*
1. Active warming (IV fluids)	*Large ruminants*	*NS, RL, DNS*	*500-1000 ml*	*IV*	*OD*	*SOS*
	Small ruminants	*NS, RL, DNS*	*100-500 ml*	*IV*	*OD*	*SOS*

3.3 Pain and its Management

Pain can be defined as awareness or perception of a noxious stimulus that is potentially damaging to the tissue.

Etiology

1. Trauma.
2. Swelling/inflammation.
3. Infections

Clinical signs & symptoms

1. Abnormality in posture/gait.
2. Grunting/moaning.
3. Redness
4. Bleeding

Treatment

Pain caused by various conditions can be alleviated through basic pain management using any of the following analgesics:

Table no. 9: *Choice of analgesic for pain management*

Option	*Drugs*	*Species*	*Dose*	*Route*	*Frequency*	*Duration*
1	*Meloxicam*	*All species*	*0.2-0.3mg/kg*	*IM, IV, SC*	*Once/day*	*3 days*
2	*Flunixin magnum*	*LA*	*1.1-2.2mg/kg*		*Once/day*	*3 days*
3	*Paracetamol*		*10mg/kg or 1-2 boli*	*IM, IV, SC, PO*	*Once/day*	*3 days*
4	*Tramadol*	*SA*	*25 mg/kg*	*IM, IV, SC*	*Twice/day*	*3 days*
5	*Carprofen*		*2-4mg/kg*	*Oral*	*Once/day*	*3 days*
6	*Ketamine*		*10mcg/kg/min*	*IV (CRI)*	*Once/day*	*For acute pain (SOS)*
7	*Dexamethasone*	*SA*	*0.5-2mg *full dose*	*IV, IM*	*Once/day*	*3 days with tapering dose*
		LA	*10-30mg*full dose*	*IV, IM*	*Once/day*	
8	*Prednisolone*	*SA*	*0.5-1mg/kg*	*IV, IM*	*Once a day*	*3 days with tapering dose*
		LA	*10-20mg*full dose*	*IV, IM*	*Once a day*	

Note: * *CRI- constant rate infusion, SA- small animal, LA- large animal*

3.4 Vomiting

Vomiting is forceful ejection of gastric contents and occasionally proximal small intestine contents through the mouth. It is also known as emesis. It is more common in dogs & cats than in other species. In horses, vomiting is a terminal sign and is noticed in acute gastric dilation.

Etiology

- Sudden change in diet. Ingestion of foreign material (garbage, plant leaves etc).
- Drug induced.
- Toxic substances.
- Metabolic disorders (diabetes, hepatic disease, renal disease).
- Gastritis and ulcer.
- Infectious cause (Parvovirus infection, parasitic infection).

Clinical Signs & symptoms

- Vomiting.

Treatment

1. Remove the initiating cause.
2. Antiemetics (Any drug listed below can be used)
    - Metoclopramide: Dog & Cat 0.2 mg/kg BW once daily IM/IV/SC OR
    - Ondansetron: Dog & Cat 0.5 mg/kg BW IV OR
    - Promethazine: Dogs 1.5–2.5 mg/kg BW PO/IM/IV.

Discontinue medication or else give symptomatic treatment

Symptomatic treatment

Use of antiemetics should be done judiciously since they mask the progression of life-threatening disorders such as intestinal obstruction.

3. Correction of fluid, electrolyte and acid-base imbalance.
    - Normal saline (preferential choice of fluid)
    - Ringers lactate OR
    - DNS solutions

3.5 Acute Vomiting

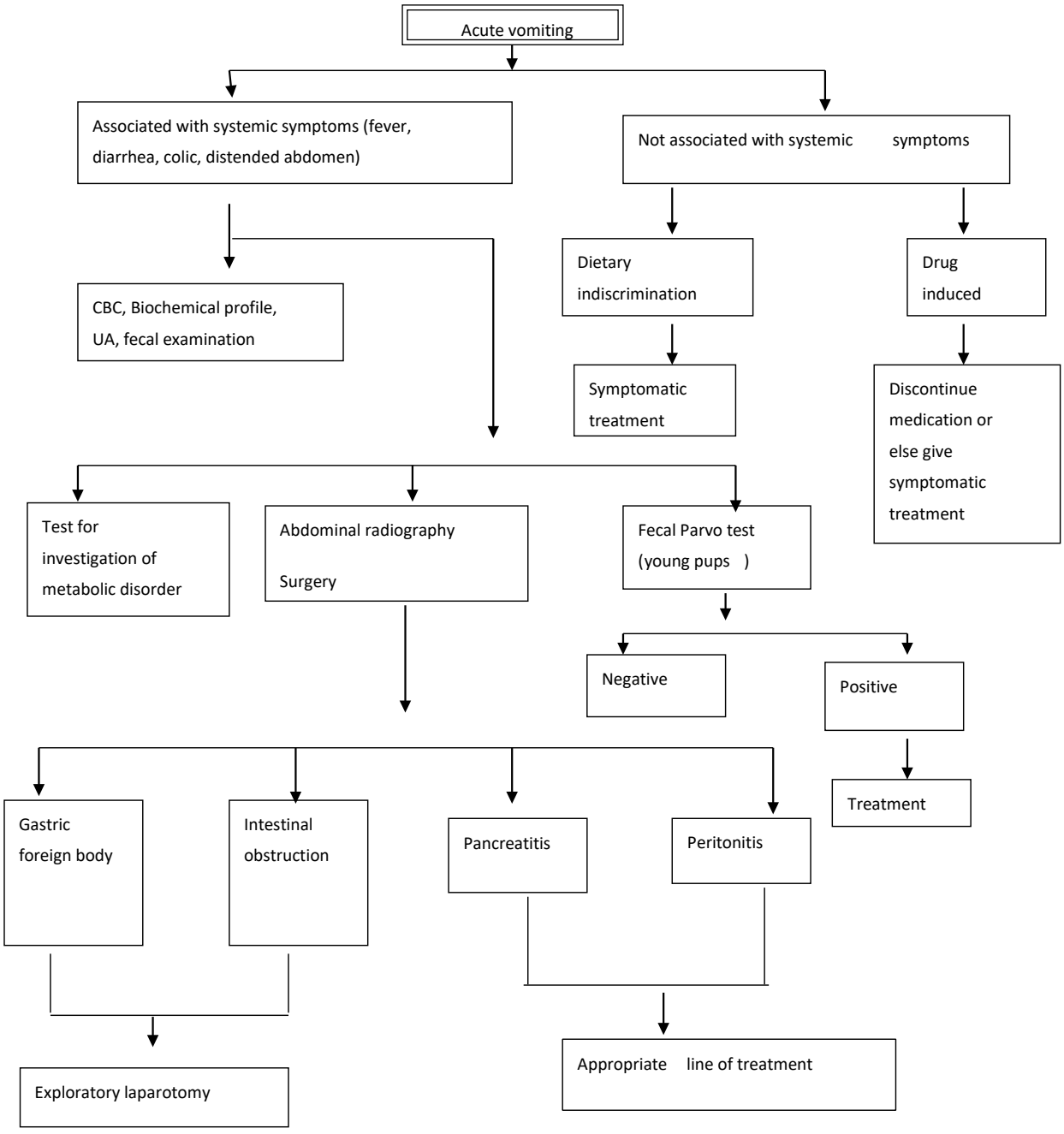

Figure 5: Algorithm for diagnosis of acute vomiting (Textbook of Clinical Veterinary Medi- cine, ICAR)

3.6 Oedema

Edema is the abnormal accumulation of fluid in the interstitial spaces of tissues or body cavities, leading to swelling. It is not a disease but a symptom of an underlying condition.

Types of Edema:

Localized Edema:

- Confined to a specific area (e.g., a limb or organ).
- Causes: Injury, infection, or inflammation (e.g., cellulitis, insect bite).

Generalized Edema:

- Widespread swelling throughout the body, also called anasarca.
- Causes: Severe conditions like heart failure, kidney failure, or liver disease.

Dependent Edema:

- Occurs in areas of the body influenced by gravity (e.g., legs, feet when standing).
- Common in patients with venous insufficiency or prolonged immobility.

Pitting vs. Non-Pitting Edema:

- Pitting Edema: Leaves an indentation when pressure is applied (e.g., heart failure, protein deficiencies).

Non-Pitting Edema: Does not leave an indentation (e.g., lymphedema, myxedema).

Etiology:

1. Cardiovascular Causes:
    - Congestive heart failure (increased venous pressure).
2. Renal Causes:
    - Kidney diseases (e.g., nephrotic syndrome, acute glomerulonephritis).
3. Hepatic Causes:
    - Liver diseases like cirrhosis (reduced albumin production).
4. Lymphatic Obstruction:
    - Lymphedema due to blockages in the lymphatic system (e.g., surgery, cancer).
5. Infections/Inflammation:
    - Localized swelling due to increased vascular permeability.
6. Nutritional Deficiencies:
    - Protein-energy malnutrition (e.g., hypoalbuminemia in Kwashiorkor).
7. Allergic Reactions:
    - Angioedema caused by hypersensitivity.
8. Medications:
    - Steroids, calcium channel blockers, or NSAIDs.

Clinical signs and symptoms:

- Swelling of affected areas (e.g., limbs, abdomen, or face).
- Tight or shiny skin over the swollen region.

- Pitting on pressure (in pitting edema).
- Weight gain (due to fluid retention).
- Shortness of breath if associated with pulmonary edema.

Treatment

- Treatment of oedema should be aimed at correcting the primary cause.
- Chronic congestive heart failure can be treated with digoxin.
- Hypoproteinemia can be treated by administrating appropriate anthelmintic and vitamin & mineral supplement.
- Diuretics administration
- Frusemide: Cattle & Horse 1-2 mg/kg BW, Dog & Cat 2-4 mg/kg BW and Pig 5 mg/kg BW PO, IM, IV.
- Ascites: Aspiration of fluid and furosemide administration.
- Amino acids infusions.

4. DISEASES OF DIGESTIVE SYSTEM

4.1 Stomatitis

It is the inflammation of oral mucosa.

Etiology

a) Physical cause
   - Faulty drenching.
   - Injury due to foreign material including spines, awns etc.
   - Mal-eruption /malocclusion of teeth.
   - Ingestion of moldy and rotten straw or hay.

b) Chemical cause
   - Irritant drugs (e.g.-chloral hydrate.)
   - Ingestion of disinfectants (e.g.- bleaching powder, phenol etc.)
   - Licking of counter irritants applied to skin.

c) Infectious causes (Bacteria, Viruses & Mycotic agents) Cattle:
   - *Fusobacterium necrophorum.*
   - Actinobacillosis (wooden tongue).
   - Actinomycosis (lumpy jaw) FMD, Vesicular stomatitis.
   - Sheep & Goat:
     1) PPR (peste de petites ruminantes).
     2) Blue tongue.
     3) FMD.
     4) Sheep pox.
   - Horses:
     1. Vesicular stomatitis.
     2. *Actinobacillus* sp.
   - Pigs:

1. Vesicular stomatitis.
2. FMD.
3. Swine vesicular disease.

- Dogs:

    1. As a secondary disorder in CD, leptospirosis & uremia.

- Cats:

    1. Feline Panleukopenia virus, calcivirus and herpes virus infections.

Clinical signs & symptoms

- Presence of ulcers, vesicles, erosions, granulomas in oral mucosa.
- Secondary lesions like micro-abscesses.
- Swelling of face, throat or lymph nodes.
- Reduced feed intake or slow mastication, lip smacking.
- Salivation.
- Halitosis.
- Shrinking of tongue.

Treatment

- Cleaning of the oral cavity with antiseptic solutions: 0.1-0.2% chlorhexidine OR 0.5-1% sodium bicarbonate OR sodium carbonate or sodium hydroxide OR 1:1,000 potassium permanganate OR 2% boric acid OR 2% alum.
- Application of mild antiseptic colutory (mouth wash): 2% suspension of copper sulphate solution OR 1% suspension of sulphonamide in glycerine.
- *Administration of broad-spectrum antibiotics*
  Amoxicillin: Dog & Cat 12-22mg/kg BW PO BID for 1 week and Cattle, horse, goat and pig 20mg/kg BW PO BID for 1 week (need basis).

- Cauterization of long-standing ulcers with silver nitrate stick OR iodine tincture.
- Supportive treatment with IV fluids, soft palatable feed, anti- inflammatory drugs
- Meloxicam: Dog 0.2 mg/kg BW PO IV, IM on day 2 onward 0.1 mg/kg BW PO Cat: 0.3 mg/kg BW SC, IV on day 2 onward 0.05 mg/kg BW PO OR Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO, SC one dose. Swine: 0.4 mg/kg BW PO, IM. Equine: 0.6 mg/kg BW PO, IV all for 2-3days.

4.2 Pharyngitis

It is the inflammation of the pharynx.

Etiology

- Physical causes.

- Faulty drenching.
- Ingestion of caustic or irritant substances or foreign bodies.

Infectious causes as follows:

a) Cattle:

- Actinobacillosis.
- IBR (Infectious bovine rhinotrachitis).

b) Horse:

- Strangles.
- Anthrax.
- Equine influenza.

c) Pig:

- Anthrax.
- Aujeszky's disease etc.

d) Dogs:

- *Bordetella bronchiseptica* (kennel cough).

Clinical signs & symptoms

- Evinces pain while swallowing and may cough up feed resulting in inappetence or anorexia.
- Throat may be swollen.
- Nasal discharge at times containing blood or feed.
- ü Painful cough.
- Nasal regurgitation.
- Stretching of neck.
- Drooling of saliva.
- Swelling of retropharyngeal and parotid lymph nodes.
- Protrusion of the tongue.

Treatment

- A soft palatable diet.
- Animals to be kept in a well ventilated, warm and clean premise.
- Pharyngitis of viral or bacterial origin should be treated with *NSAIDs*
  Meloxicam: Dog 0.2 mg/kg BW PO IV, IM on day 2 onward 0.1 mg/kg BW PO Cat: 0.3 mg/kg BW SC IV, on day 2 onward 0.05 mg/kg BW PO OR Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO, SC one dose. Swine: 0.4 mg/kg BW PO, IM. Equine: 0.6 mg/kg BW PO, IV all for 2-3days.

- Benzathine Penicillin: All species: 22000IU/Kg BW OD repeat after 2 days. OR Strepto-penicillin: large animal 2ml/50kg BW IM, OD for 3-5 days and small animal 1ml/5kg BW IM OD for 3-5days.
- A parenteral fluid support in case the animals go off feed. D5 OR DNS: Large animals 50ml/kg/day and small animals 60ml/ kg/day IV.
- Vitamin A and C for better healing of mucosa.
- Inhalation of tincture benzoic to soften the viscid exudates.

4.3 Esophagitis

It is inflammation of the esophagus.

Etiology

- Ingestion of irritant, caustic and foreign body.
- Drenching of too hot or cold substances.
- Faulty insertion of stomach tube.

Clinical signs & symptoms

- Drooling of saliva
- Nasal regurgitation and coughing up feed.

Treatment

- Withhold feed for 2 days.
- Parenteral administration of intravenous fluids.
- D5 OR DNS: Large animals 50ml/kg/day and small animals 60ml/ kg/day IV.
- Dogs & Cats: Omeprazole 1mg/ kg BW IV to reduce gastric acidity and Metoclopramide 0.2-0.5mg/kg BW BID IM/IV/SC for gastric emptying
- *Antibiotics*
  Benzathine Penicillin: All species: 22000IU/Kg BW OD repeat after 2 days. OR *Strepto-penicillin*: large animal 2ml/50kg BW IM, OD for 3-5 days and small animal 1ml/5kg BW IM OD for 3-5days.

- *Analgesics* (NSAID)
- Meloxicam: Dog 0.2 mg/kg BW PO IV, IM on day 2 onward 0.1 mg/kg BW PO Cat: 0.3 mg/kg BW SC IV, on day 2 onward 0.05 mg/kg BW PO OR Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO, SC one dose. Swine: 0.4 mg/kg BW PO, IM. Equine: 0.6 mg/kg BW PO, IV all for 2-3days.

4.4 Choke

It refers to the obstruction of the esophagus by food masses and foreign bodies.

Etiology

Cattle:

- Rapid ingestion of food materials such as potato, apple, turnip etc.
- Foreign body ingestion

Dogs & Cats:

- Ingestion of indigestible foreign material such as chicken bones, fish hooks etc.

Clinical Signs & symptoms

- Salivation and coughing.
- Restlessness and anxiety.
- Swelling at the neck (except on horses).

Treatment

- Removal of foreign body with the help of forceps.
- Using a stomach tube to push the obstructing object into the rumen.
- If these methods fail, surgical removal of foreign bodies is advised.

4.5 Simple Indigestion/Inappetence

Simple indigestion is a minor disturbance in ruminant gastrointestinal (GI) function that occurs most commonly in cattle and rarely in sheep and goats.

Etiology

- Ingestion of highly digestible feed in large quantity (e.g. grain)
- Ingestion of indigestible feed, moldy feed, frozen feed or industrial waste products, insufficient drinking water.
- Abrupt change in the quality or quantity of the diet.
- Prolonged treatment with sulfonamides or antibiotics.

Clinical signs & symptoms

- Anorexia.
- Ruminal stasis.
- The feces are soft to watery and foul smelling.
- Absence or reduction in ruminal movement, moderate distension of rumen, rumen may be slightly tympanic or doughy.

Treatment

- Drenching approximately 20 liters of warm water or warm saline solution, along with massaging the rumen, helps restore rumen function. Alternatively, administering magnesium sulfate at a dose of 0.5–1.0 kg dissolved in water as a drench can be used.
- Liver tonic powder: Cattle & Horse 40-50gm BID for at least two days. In foal, calf & pig 20-25 gm BID and Sheep & Goat 10-15 gm OD, PO OR
- Rumenotoric / stomachic powder: Cattle, Horse & Mule 40 to 60 gm as a bolus or electuary BID, calf, colt, heifer and adult pig 20 to 30 gm as a bolus or electuary BID and Sheep & Goat 10 to 15 gm as a bolus or electuary BID OR
- Antimony Potassium Tartrate + $FeSO_4$ + $CoSO_4$ + CoCL: Sheep ½ to 1 bolus OD, PO and Cattle and Buffaloes 3-4 boli OD, PO
- B complex: large animals 5-10ml IM and Small animals 0.1 to 1ml IM OD for 3 days.
- Parenteral fluid such as D5 OR DNS (supportive therapy).
- *Cud transfer* (4-8L of ruminal fluid) in patients with a history of prolonged anorexia and weakness.

4.6 Lactic acidosis (Carbohydrate engorgement)

It is an acute disease of ruminants caused due to ingestion of highly fermentable carbohydrate rich food.

Etiology

- Ingestion of large quantities of carbohydrate rich grains like wheat, rice, corn, barley or dough (*ritual cake*).
- Excessive feeding of jackfruit, turnip or potatoes.

Clinical signs & symptoms

- Restlessness, kicking at the belly, frequently lying down & getting up.
- Enlarged rumen with abdominal pain.
- Sudden anorexia.
- Complete ruminal stasis.
- Animals become dull.
- Stumbling gait/in-coordination, muscle tremor, recumbency and death within 24-72hrs.
- Tachycardia and increased pulse rate.
- Death may occur in 24-72 hours.

Treatment

- In mild cases: Administer magnesium hydroxide 500g/450 kg BW in 10 liters boiled water orally.

- In moderate cases: Sodium bicarbonate (5%) 5 liters for 450 kg animal during initial 30 mins, followed by 1.3% of sodium carbonate in saline may be given 60L for 450kg IV.
- Parenteral fluids like RL or DNS to correct dehydration.
- Dexamethasone: Cattle 10-30mg (total dose) IM/IV (should not give along with NSAID).
- Analgesic
  Meloxicam: Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO/SC one dose. Swine: 0.4 mg/kg BW PO, IM

- Antihistamine
  Chlorpheniramine maleate Cattle 30-50 mg (total dose) IM.

- In severe cases: *rumenotomy and cud transfer* (10-20L of ruminal fluid).

Prevention

- Accidental access to concentrates for which cattle have developed an appetite, in quantities to which they are unaccustomed, should be avoided.
- Feedlot cattle should be introduced gradually to concentrate rations over a period of 2–3 weeks, beginning with a mixture of ≤50% concentrate in the milled feed containing roughage.

4.7 Bloat (Ruminal Tympany)

It refers to excessive accumulation of gas in rumen. It occurs due to excessive production of gas or obstruction of the process of eructation.

Frothy bloat (Primary): Persistent foam mixed with ruminal contents.

Etiology

- Plant poisoning.
- Esophageal obstruction.
- Hypocalcemia.
- Tetanus.
- Anaphylaxis etc.

Clinical signs & symptoms

- Distention of flank or entire abdomen mostly on left side.
- Frequent defecation of feces & urination.
- Severe dyspnea.
- Extension of head.
- Protrusion of tongue.
- Excessive salivation.
- Ruminal movements cease.
- Inappetence followed by anorexia.
- At times projectile vomiting

- Frequent lying down and getting up.
- Kicking of belly.

Treatment

- In severe cases TROCARIZATION must be done or perform emergency rumenotomy.
- In mild cases, 16G needles can be used to relieve the gas.
- Administer liquid paraffin (8-10 ml/kg)/castor oil/mineral oil or 150-200 gm sodium bicarbonate in water orally OR Turpentine oil 20-30ml with linseed oil orally OR Silica in Dimethicone: Large animal 100 - 200ml dilute with equal quantity of water and Small animal 20 - 30 ml dilute with equal quantity of water.
- Anti-bloat powder
  Cattle, Buffalo, Horse: 80 gm, PO, calf, foal, and heifer: 40 gm and Pig, Sheep & Goat: 20-25 gm PO

- In Gaseous bloat – the dose to be suspended in 250ml of lukewarm water.
- In Frothy bloat – the dose to be suspended in 250-500ml edible oil.

4.8 Traumatic Reticulo-peritonitis (TRP)

Traumatic reticulo-peritonitis, is a relatively common disease in adult cattle caused by the ingestion and migration of a foreign body in the reticulum. Cattle are more likely to ingest foreign bodies than small ruminants since they do not use their lips for prehension and are more likely to eat a chopped feed.

Etiology

Occurs as a result of ingestion of sharp foreign bodies such as nails, needles, barbed wire etc.

Clinical signs & symptoms

- Anorexia.
- Reluctant to move.
- Walk slowly.
- Arching back.
- Infrequent urination and defecation.
- Mild fever.
- Elevated pulse rate.
- Shallow respiratory rate.
- No ruminal movements.
- No rumination and no eructation.
- On palpation of the flank region the rumen feels doughy.
- Constipation.
- Brisket region oedema.

- Pole test: On pressure of the xiphoid region with the pole, the animal evinces pain.
- Reduction of milk yield by less than 33%.

Treatment

- Immobilization of patients on an inclined plain with elevated fore quarter (avoids further penetration).
- Rumenotomy and removal of foreign bodies. (Surgical intervention)
- Administration of systemic antibiotics
  Sulphadimidine 100mg/kg BW PO/IV OR Benzathine Penicillin: All species: 22000IU/Kg BW OD repeat after 2 days. OR Strepto-penicillin: large animal 2ml/50kg BW IM, OD for 3-5 days and small animal 1ml/5kg BW IM OD for 3-5days.

- Immobilization of foreign bodies with magnets (bar magnet or magnet concealed inside gelatin).
- Analgesics
  Meloxicam: Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO, SC one dose. Flunixin meglumine 1.1-2.2mg/kg IM, IV OD for 3 days.

4.9 Traumatic Pericarditis

Perforation of pericardial sac by sharp foreign body from the reticulum causing pericarditis.

Etiology

Perforation of pericardial sac by a sharp foreign body like nails, wires from the reticulum.

Clinical signs & symptoms

- Anorexia.
- Diarrhea.
- Teeth grinding and salivation
- The posture of the back is arched.
- Elbows abducted.
- Shallow respiration.
- Submandibular, brisket and ventral oedema.
- Conjunctival oedema.
- Fever.
- Tachycardia.

Treatment

- Administration of systemic antibiotics to prevent flaring of peritonitis or pleuritis with penicillin 22,000 IU/kg/day IM.
- Meloxicam: 0.5 mg/kg BW PO, IV, SC
- Rumenotomy and removal of foreign bodies.
- Supportive fluid therapy.

4.10 Gastritis / Abomasitis (Large animals)

It is inflammation of the monogastric stomach/abomasum in ruminants. The condition may not be prominent in large animals.

Etiology

- Physical causes like overfeeding of inferior quality feed, ingestion of foreign objects, ingestion of poisonous plants and food allergy.
- Chemical causes like ingestion of irritant chemicals, fungal toxins and prolonged use of steroids and phenylbutazone.
- Infective causes like salmonellosis, Leptospirosis, foot and mouth disease, African swine fever, infectious canine hepatitis and various endoparasites loads.

Clinical signs & symptoms

- In cases of severe inflammation, pigs, horses, and ruminants may vomit
- Inappetence.
- Abdominal pain.

Treatment

- Withdrawal of food.
- Fluid therapy.
- Gastric sedatives e.g., magnesium hydroxide or carbonate, kaolin, pectin, charcoal every 2-3 hours.
- Administer mineral oil to empty the alimentary tract.

4.11 Gastritis (Small animals)

It refers to inflammation of the stomach.

Etiology

- Viruses, bacteria and parasites.
- Ingestion of foreign materials such as spoiled food, stones, plastic etc.

Clinical signs & symptoms

- Persistent vomiting.
- Lethargy.

Treatment

- Dietary restriction-withdraw water for first 12 hours and food for first 24 hours.
- Antiemetics

  Metoclopramide: Dog & Cat 0.2-0.5mg/kg BW OD IM, IV, SC OR Ondansetron: Dog & Cat 0.5mg/kg BW IV OR Promethazine: Dogs: 1.5-2.5mg/kg BW, PO, IM, IV.

- Antacids
  Ranitidine: Dog & Cat 1-2mg/kg BW, PO, IM, IV, SC BID OR Pantoprazole: Dog & Cat 0.7-1mg/kg BW IM/IVOD OR Aluminum hydroxide 10-30mg/kg BW, PO, TID

- Parenteral fluids like DNS, NS, RL if there are dehydration or electrolyte imbalances.
- Antibiotics are only advised if the cause is of infectious origin
- Amoxicillin: Dog & Cat 11-22mg/kg BW, BID, PO, IM for 5-7days

4.12 Enteritis (Diarrhea)

It is inflammation of the intestinal mucus membrane and manifested by varying degrees of diarrhea, dehydration, abdominal pain, bloat and anorexia.

Etiology

- Ingestion of excessive amounts of feed, moldy feed or changes in diet.
- Bacteria: *E. coli*, S*almonella*, *Clostridium perfingeneses* type E & C, *M. paratuberculosis*, *Proteus* sp.
- Virus: Bovine Viral diarrhea, Bovine malignant catarrh, Canine Parvovirus, Distemper virus, Coronavirus, Hog cholera virus.
- Fungus: Candida sp, Protozoa: Eimeria sp, Helminth: Amphistomiasis, liver fluke, Ascarasis, toxocara etc.
- Chemical agents: poisoning of mercury, lead, copper, oxalates, iron etc. dietary deficiency of copper.

Clinical signs & symptoms

- The major clinical findings are fever, diarrhoea, anorexia, dehydration, depression, and abdominal pain.
- The following type of faeces can be seen depending on the etiological agents:
  1. Colibacillosis: Chalky white, watery or pasty.
  2. Johne's disease: thick pea soup without any mucosal shreds or mucus.
  3. Canine coronavirus: Awfully foul smelling.
  4. Canine parvovirus: Pancake-like faeces.
- In parasitic enteritis, diarrhea occurs without fever. In amphistomiasis, the feces are watery and foul-smelling. Hypoproteinemia and subcutaneous edema are also observed in parasitic enteritis.

Treatment

- Primary cause (physical and chemical agents) of enteritis should be removed as far as practicable.
- Antidiarrhoeal powder
    1. Cattle & Horse :30 to 50 gm BID, PO
    2. Calf, Sheep, Colt, Pig :6 to 10 gm BID, PO.
    3. Dog & Piglet: 2 - 3 gm BID, Poultry :0.5 to 1% mixed with the feed.
- Loperamide: Dog & Cat 0.1mg/kg BW BID, PO
- The actual cause of diarrhoea should be detected before providing specific treatment.
- Parasitic enteritis: Use a broad-spectrum Anthelmintic drug:

  Albendazole: Cattle, Horse, Sheep, Goat & Pig (Nematode & Cestode) 5mg/kg BW, PO as single dose and Flukes 7.5 mg/kg BW, PO Dog & Cat 25-50 mg/kg PO for 3-5 days OR Fenbendazole: Cattle, Sheep, Goat, Horse & Pig 5-7.5mg/kg BW single dose PO, Dog 50mg/kg BW for three days Oral, Cat 30mg/kg BW for three days Oral and Birds 10-15mg/kg Oral. In Dog & Cat: Praziquantel + Pyrantel pamoate + Febantel 1 tablet/10kg BW, PO.

- Bacterial enteritis: Antibiotics
  Sulfadimidine: Cattle, Sheep, Goat & Pigs 200mg/kg BW PO, IV for 3-5days OR OTC-LA 20mg/kg BW IM (1-2 doses with interval of 3-4days). OR

- Parenteral fluids DNS, Dextrose 5% or RL to correct dehydration & electrolyte imbalance.
  Large animals 50 ml/kg BW IV and Small animals 60ml/kg BW IV.

- Vitamin B complex injection
  Large animals 5-10 ml IM and Small animals 0.1-1 ml IM.

4.13 Constipation

It is defined as infrequent or absence of passage of feces characterized by straining at defecation and by retention of hard feces in the colon and rectum.

Etiology

- It occurs due to reduced peristaltic movement of GIT (Gastrointestinal tract), reduced hepatic function, and peritonitis.
- Impaction of the large intestine, and change of diet & weather.
- Chronic dehydration, ingestion of less fibrous feed and fodder, less water intake, chronic zinc poisoning and in the terminal stage of pregnancy in cattle.

Clinical signs & symptoms

- Repeated straining attempts for defecation but fails.
- Scanty hard dry faeces with mucus and blood stained.

- Abdominal pain arched back, loss of appetite, sunken eye, and rough body coat and became weak.
- Vomiting and nervous signs are seen in advanced cases.
- Per rectum exploration reveals the engorged hard mass which contains mucus.
- Animals may die due to toxemia.

Treatment

- Magnesium sulphate: Cattle administer 150-200gm with water orally OR
- Liquid paraffin: Dog 4 - 30ml orally for 3 to 5 days, Pig 60 - 300ml orally for 3 to 5 days and Horse & cattle 750ml orally for 3 to 5 days.
- Rectal enema in pets.
- Vitamin B complex.
- Parenteral fluids.
- Highly palatable fibrous feed and fodder are to be offered with plenty of drinking water.
- Mineral oils such as Liquid paraffin and glycerin
- Lactulose 5-10 ml per dog/cat PO.

4.14 Equine Colic

Equine colic is a condition of severe abdominal discomfort characterized by pawing, rolling and sometimes the inability to defecate.

Etiology

- Gastric impaction.
- Intestinal obstruction.
- Ascarid infection.
- Massive strongyle infection.
- Rupture of stomach or intestine.

Clinical signs & symptoms

- Restlessness.
- Pawing or stamping, kicking at the belly.
- Lying down & getting up, lying on the back, groaning & sweating.

Treatment

- NSAIDS
  Flunixin meglumine 1.1-2.2mg/kg BW IV OD for 3 days.

- If colic is due to impaction of GI tract, administer mineral oil.
- Fluid therapy
  Good management practices, especially regular dental care, provide clean feed and drinking water and regular deworming.

- Drenching using a naso-gastric tube with warm water.

4.15 Ascites

It is accumulation of non-inflammatory fluid in the peritoneal cavity characterized by bilateral distension of the lower abdomen.

Etiology

- Increase in hydrostatic pressure in capillaries (Cardiac insufficiency, CHF & passive congestion).
- Fall in osmotic pressure of blood.
- Obstruction of lymphatic vessels or
- Damage to capillary walls.
- Hypoproteinemia.

Clinical signs & symptoms

- Symmetrical bilateral distension of lower abdomen.

Treatment

- Hypoproteinemia associated with parasitic infection should be treated with broad spectrum anthelmintic in addition to giving a protein rich diet.
- Diuretic
- Frusemide: Small animals 2-4mg/kg BW IM, OD for 2-5 days & Large animals 1-2mg/kg BW IM, OD for 2-5days.
- Removal of fluid by puncturing the abdomen using 16G needle & 10- 20ml syringe. The fluid should never be drained completely at a time since it may produce shock.
- Broad spectrum antibiotics may be given to prevent bacterial contamination of peritoneum.

4.16 Jaundice

Jaundice is also referred to as icterus, and is an important clinical manifestation to liver diseases and biliary system. It is characterized by deposition of bilirubin leading to yellow coloration of plasma, visible mucus membranes and other tissues.

Etiology

It can be of three types

- Hemolytic/pre-hepatic jaundice (causes):
    1. Haemoprotozoan (Anaplasmosis, babesiosis), leptospirosis, bacillary hemoglobinuria and infectious anemia.
    2. Viral infections

3. Chronic copper poisoning, selenium toxicity and excessive ingestion of brassica plants or berseem.

- Hepatocellular/intrahepatic jaundice (causes):
  1. Infectious & toxic agents
  2. Deficiency of vitamin E or selenium
- Obstructive/post-hepatic jaundice (causes):
  1. Biliary calculi and infection with nematodes or trematodes.

Clinical signs & symptoms

- Yellowish discoloration of mucus membranes and skin.
- Urine becomes dark colored.
- Anorexia, anemia, muscular weakness and mental depression.

Treatment

- The primary cause of the disease should be treated.
- Dietary management helps in early recovery of the case. Affected animals should be given a highly palatable and laxative diet containing excessive carbohydrates and rich in calcium salts. The diet should have a minimum amount of fats.
- Vitamin B complex
  Large animals 5-10ml, IM and Small animals 1-2ml IM for 4-6 days.

- Liver tonic powder
  Cattle & Horse 40-50gm BID, PO for 2- 3 days Foal, calf & pig 20-25 gm BID and Sheep & goat 10-15 gm PO for 1 week.

4.17 Hypoglycemia

Hypoglycemia refers to an abnormally low level of glucose (sugar) in the blood. It is a potentially life-threatening condition that can affect animals of all species and ages, but it is particularly common in young, small-breed puppies, diabetic animals, and those with metabolic disorders.

Etiology

- Xylitol toxicity
- Islet cell tumor (tumor of pancreas)
- Hepatic neoplasia
- Diabetic related
- Infections

Clinical signs and symptoms

- Weakness or lethargy.
- Seizures or muscle tremors.
- Disorientation or ataxia (
- Pale gums.
- Increased heart rate or rapid breathing.

- Hypothermia
- Collapse or unconscious

Treatment

- Treat for primary cause
- During an emergency case administer glucose: Rub corn syrup, honey, or sugar solution on the animal's gums if the animal is conscious.
- Anticonvulsant: Diazepam 0.5-1mg/kg BW IM, IV stat (per-rectal insertion of diazepam can have prolong effect)
- Other supportive therapy

50% Dextrose, 0.5 -1 ml/kg diluted in normal saline (1:2-1:4) over IV 5–10 minutes.

Final dextrose concentration required in saline solution	Volume of 50% dextrose Required (ml)	Volume of 0.9% saline required (ml)
25%	250	250
10%	100	400
5%	50	450
2.5%	25	475

*Best made up in a 500 ml bottle of 0.9% saline; remove volume of dextrose to be added; then add the 50% dextrose and mix well before setting up the CRI.

Precaution: Hypertonic solution (10% or 25%) may result in phlebitis so administer only via peripheral veins(e.g. cephalic) in emergency situations and flush with adequate amounts of saline.

5. DISEASES OF RESPIRATORY SYSTEM

5.1 Rhinitis

It is inflammation of nasal mucosa. Rhinitis usually occurs in conjunction with inflammation of other parts of the respiratory tract. It is present as a minor lesion in most bacterial and viral pneumonia but the diseases listed are those in which it occurs as an obvious and important part of the syndrome.

Etiology

a) Cattle:
   - Catarrhal rhinitis in infectious bovine rhinotracheitis, adenoviruses 1, 2 and 3 and respiratory syncytial virus infections

- Ulcerative/erosive rhinitis in bovine malignant catarrh, mucosal disease, rinderpest
- Rhinosporidiosis is caused by fungi, the blood fluke (Schistosoma nasalis) and the supposedly allergic 'summer snuffles' also known as atopic rhinitis.
- Familial allergic rhinitis in cattle in which the progeny of affected cows is susceptible to allergic rhinitis
- Bovine nasal eosinophilic granuloma due to Nocardia Sp

b) Horse
- Glanders, strangles, and epizootic lymphangitis
  Infections with the viruses of equine viral rhinopneumonitis (*herpesvirus- 1*), *equine viral arteritis, influenza H3N8 equine rhinovirus, parainfluenza virus, reovirus, adenovirus*
- Chronic rhinitis claimed to be caused by dust in dusty stables, and acute rhinitis occurring after inhalation of smoke and fumes
- Nasal granulomas due to chronic infections with *Pseudallescheria boydii* and *Aspergillus*, *Conidiobolus and Mucoraceous fungi*

c) Sheep and goats
- Melioidosis, bluetongue, rarely contagious ecthyma and sheep pox, *Oestrus ovis* and Elaeophora *schneideri* infestations
- Allergic rhinitis,
- Purulent rhinitis and otitis associated with P aeruginosa in sheep showered with contaminated wash.

d) Pig-
- Atrophic rhinitis, inclusion body rhinitis, swine influenza, some outbreaks of Aujeszky's disease

Predisposing factors

- Exposure of animals to cold and humid weather.
- Housing of animals in an ill ventilated shed.
- Inhalation of dust, smoke and other factory fumes.
- Sudden change in the environmental temperature (from too hot to too cold)
- Stress and strain.

Clinical signs & symptoms

- Nasal discharge may vary from serous, mucoid, muco-purulent and it may also be hemorrhagic or caseous.
- Discharge may be copious or scanty.
- Elevation of body temperature.
- General malaise and sneezing are evident.
- Enlarged submaxillary lymph nodes.

Treatment.

- Nasal irrigation with Normal saline.
- Antibiotics

1. Streptopenicillin: Large animals 2ml/50kg BW IM BID for 5 days (WP, Milk 72 hours, Meat 30 days) & Small animals 1ml/5kg BW IM BID for 3-5days
2. Oxytetracycline LA, (OTC): Cattle, Sheep, Goat & Horse 20 mg/kg BW 0D every 72 hours and Dog and Cat 10 mg/kg BW OD for 3-5 days.

- Antihistamines (Chlorpheniramine maleate:
    1. Cattle 30-50 mg (total dose) IM, BID.
    2. Dog and Cat 0.025 - 0.5 mg/kg BW BID PO, IM, SC
- Medicated inhalation (nebulizer): Tincture benzoin, tincture camphor are used in hot water.
- Analgesics: Meloxicam Dog 0.2 mg/kg BW PO IV/IM, on day 2 onward 0.1 mg/kg BW PO Cat: 0.3 mg/kg BW SC IV, on day 2 onward 0.05 mg/kg BW PO OR Large ruminants: 0.5 mg/kg BW PO/IV/SC, Small ruminants: 1 mg/kg BW PO/SC one dose. Swine: 0.4 mg/kg BW PO/IM, Equine: 0.6 mg/kg BW PO/IV all for 2-3days.
- Meloxicam +paracetamol bolus large animal 1-2 boli PO, OD and small animal ½ boli PO, OD.

5.2 Cough

It is a sudden noisy expulsion of air from the lungs that clears the air passages. It is a common symptom of upper respiratory infection or bronchitis or pneumonia.

Etiology

- Respiratory tract infections
- Worm infestation

Treatment

- Anticough powder:
    1. Cattle and horse 30 to 40g PO, OD BID SOS in calf, Sheep, Colt
    2. Pig 6 to 12g PO, OD BID SOS
    3. Dog and piglet 2 to 4g.

**Note: Refer the product insert for its usage.*

- Cough syrups for Dog & Cat 2-5ml PO, SOS (Refer product insert)
- Antihistamines: Chlorpheniramine maleate:
    1. Cattle 30-50 mg (total dose) IM, BID.
    2. Dog and Cat 0.25- 0.5 mg/kg BW BID PO, IM, SC
- Anthelmintics (if the cause is parasitic in origin)
    1. Fenbendazole:
       Cattle, Sheep, Goat, Horse & Pig 10mg/kg BW PO, OD,

    2. Praziquentel + febantel + pyrental
       Dog 1 tab/10kg BW, PO, OD

Cat 1 tab/10kgBW, PO, OD

- Antibiotics (if the cause is infectious in origin)

1. Streptopenicillin:
   Large animals 2ml/50kg BW, IM, BID for 5 days (WP, Milk 72 hours, Meat 30 days)

   Small animals 1ml/5kg BW, IM, BID for 5 days.

2. Oxytetracycline LA, (OTC): Cattle, Sheep, Goat & Horse 20 mg/kg BW 0D every 72 hours and Dog and Cat 10 mg/kg BW OD for 3-5 days.

5.3 Pneumonia

It is an inflammation of the lungs.

Etiology

- Expose animals to damp places & cold environments.
- Housing in an ill ventilated room.
- Long transport by ship or train/truck.
- Severe hunger & malnutrition.
- Sudden changes in the weather condition.
- Physical agents- inhalation of dust, irritating vapours etc.
- Bacterial & viral agents, parasitic & fungal agents:
  Bacterial agents like *Corynebacterium pyogenes*, *Klebsiella pneumonia*, *Mycoplasma mycoides, Stretococcus equi, Pseudomonas spp, Haemophilus suis, Pasteurella multocida, Bordetella bronchiseptica*.

- Viral agents like Equine infectious pleuropneumonia, Adenovirus, sheep pox, Canine distemper, Infectious canine hepatitis virus.
- Fungal agents like *Aspergillus fumigate, Histoplasma spp, Cryptococcus neoformans*.
- Parasitic agents like *Dictyocaulus viviparus, Toxoplasma gondii, Ancylostoma caninum, Toxocara canis*.

Clinical signs & symptoms

- In *bacterial pneumonia*: Rapid shallow respiration, rise in body temp, anorexia, dullness, loss of body condition, moist, painful & progressive cough, nasal discharges; serous/mucoid/purulent. On auscultation vesicular murmur is heard, dry rales in chronic cases.
- In *viral pneumonia*: Dry unproductive cough, nasal discharges, off feed, dehydration & emaciation. On auscultation increased vesicular murmur & increased bronchial tone.

- In *parasitic pneumonia*: Cough becomes more frequent gradually and distressing, serous/mucoid nasal discharges, diarrhoea, temperature remain in normal range. Auscultation reveals moist & crepitant rales.
- *Mycotic pneumonia*: Short moist cough, thick mucoid nasal discharges, hemorrhaging nasal discharges, dehydration & anaemia. On auscultation harsh respiratory sounds.
- *Aspiration pneumonia:* History of faulty drenching, nasal discharges with thick mucoid purulent, animals reluctant to lie down, evidence of pain on palpation and percussion, protrusion of tongue and mouth, and on auscultation reveals typical moist(bubbling) rales and occasional splashing sound.

Treatment

- Bacterial pneumonia: Antibiotics
    1. Benzathine Penicillin large animals 22,000 IU/kg BW every 72 hours and small animals 22,000 IU/kg BW, IM, OD for 3-5 days.
    2. Streptopenicillin:
       Large animals: 2ml/50kg BW, IM, BID for 5 days (WP, Milk 72 hours, Meat 30 days)

       Small animals: 1ml/5kg BW, IM, BID for 5 days.

    3. Oxytetracycline (OTC) LA: Cattle, Sheep, Goat& Horse: 20 mg/kg BW OD every 72 hours
    4. Azithromycin: Dog and cat 10mg/kg BW, PO /IM, BID for 3-5 days OR Enrofloxacin: Dog & Cat 5mg/kg BW, OD, SC/IV/IM for 3-5 days.
- In Parasitic pneumonia
    1. Fenbendazole: Cattle, Sheep, Goat, Horse & Pig 10mg/kg BW PO, OD,
    2. Albendazole 10mg/kg PO, OD once only.
    3. Praziquentel+febantel+pyrental: Dog 1tab/10kg BW, PO, OD
    4. Cat 1tab/10kg BW, PO, OD or Albendazole 25-50mg/kg, BW, OD for once only.

  *Note: do not use Albendazole in the first stage of pregnancy.

- In Fungal pneumonia:
    1. Itraconazole Dog & Cat 5mg/kg BW, PO, OD for 4-20 weeks OR
    2. Ketoconazole Dog and cat 10mg/kg BW, PO, OD for 4-20 weeks.
- Antihistamines
    1. Chlorpheniramine maleate

       Cattle 30-50 mg (total dose) IM, BID.

       Dog and Cat 0.25- 0.5 mg/kg BW BID PO/IM/SC

- Anticough powder:
    1. Cattle and horse 30 to 40g, PO, OD, BID, SOS.
    2. calf, Sheep, Colt and Pig 6 to 12g PO, OD BID, SOS
    3. Dog and piglet 2 to 4g

- Cough syrups for Dog & Cat 2-5ml PO, BID, SOS (Refer product insert)

5.4 Epistaxis (Nasal Bleeding)

It is bleeding from the nostrils.

Etiology

- Foreign body.
- Trauma.
- Granulomatous growth or nasal polyps or ulceration of mucous membrane.
- Clotting disorders (thrombocytopenia, coagulation defect, von Willebrand's diseases) due to rodenticide poisoning.
- Infections- (ehrlichiosis)
- DIC (Disseminated intravascular coagulation)
- Liver failure
- Hemophilia
- Drugs (NSAIDs)

Clinical signs and symptoms

- Bleeding from nose
- Pale mucous membranes
- Dehydration or shock
- Rapid breathing.

Treatment

- Primary causes should be corrected.
- Hemostats. (Any of the following drug can be used)
    1. Butorphase 0.5-1 ml total dose IM SOS
    2. Adrenochrome monosemicarbazone for Large Animal- 20-25mg total dose and for Small Animal- 5-10mg (total dose) IM, IV SOS
    3. Etamsylate/Cyclonamine 250-500 mg (total dose) IM, IV QID until bleeding is subsided
    4. Adrenaline Topical application OR insert cotton soaked with adrenaline inside the nostril and restrain the animal with star gazing posture.
- Parenteral fluid therapy (refers to the fluid therapy chapter)
- *Blood transfusion:* Blood can be collected from another animal of the same species. For the first transfusion, cross-matching of donor & recipient blood is not necessary but it should be done during subsequent transfusion OR
- Vitamin K: Horse & cattle 0.5-2.5mg/kg BW, BID, IM/SC, SOS. Dog & Cat 0.25-2.5 mg/kg BW IM, SC, SOS
- Application of ice pack on the head in dogs & cats.

5.5 Chronic Obstructive Pulmonary Disease (COPD)

COPD, also known as “Heaves” or Recurrent Airway Obstruction, is a common condition affecting horses, ponies and donkeys of most breeds and ages, and occurs mainly in the winter.

Etiology

- There are many substances that a horse can be allergic to, the most common being the fungal spores found on hay or straw, hence why COPD is usually seen when horses are stabled in the winter. Dusty stables, barns and arenas, or even dusty shavings, can also be implicated.
- Infectious (Bacterial, viral and fungal)

Clinical signs & symptoms

- Increased breathlessness.
- Frequent coughing.
- Wheezing with mucopurulent nasal discharge.
- Tightness in the chest.

Treatment

- Mucolytics.
- Glucocorticoids (Prednisolone 0.5-1mg/kg, IM, OD for 3-5 days with tapering doses.
- Anticough powder 30 to 40g PO, OD, once or twice (refer product insert)
- Anthelmintics: Fenbendazole- Cattle, Sheep, Goat, Horse & Pig 10 mg/kg BW PO, OD.
- Antibiotics (if the cause is infectious in origin)
- Streptopenicillin:
  Large animals: 2ml/50kg BW, IM, BID for 3-5 days (WP, Milk 72 hours, Meat 30 days)

Prevention

- Affected animals should be kept in dust or dirt free and well-ventilated space, dusty feeds and water should be avoided.
- Adequate comfortable bedding, easily digestible diet and fresh water should be provided.

6. DISEASES OF CARDIOVASCULAR SYSTEM

6.1 Heart Failure

It refers to failure of the heart to pump blood effectively to tissues. It can be either acute heart failure or congestive heart failure.

6.1.1 Acute Heart Failure

Etiology

- Defect in filling, failure of heart to pump blood due to severe tachycardia/bradycardia.
- Ingestion of certain poisonous plants.

Clinical Signs & symptoms

- Dyspnea, staggering, falling and death within a few minutes of the first appearance of signs.
- On auscultation of heart could heart abnormal heart sound.
- Acute heart failure is often considered as the cause of death in many horses that die suddenly during training or racing.

Treatment

It is impractical to treat acute heart failure due to the very short duration of disease.

6.1.2 Congestive (chronic) Heart Failure (CHF)

Etiology

- Any defect of the pericardium, myocardium or endocardium which interferes with the blood flow.

Clinical Signs & symptoms

- Right side CHF: deep respiration, listlessness, depression, staggering gait, exercise intolerance, increased heart rate, ascites, hydrothorax and hydropericardium.
- Left side CHF: increase in rate & depth of respiration, coughing & prominent moist crackles at the base of lungs.

Treatment

- Cardiac Glycoside
- Digoxin

Table no. 10: Dose regimen for digoxin

Species	Total dose	Administration schedule	Daily maintenance dose
Dog (orally)	0.11-0.22mg/kg	0.022-0.044mg/kg BID for 2 day	0.011mg/k 12 hourly
Dog (parentally)	0.022-0.044mg/kg	TID	Oral digoxin 0.011 mg/ kg q 12 hrs

- Diuretics (Oedema): Frusemide
    1. Cattle & Horse 1-2mg/kg BW once or twice daily IM, IV for 3-5 days.
    2. Dog & Cat 2-4mg/kg BW once or twice daily IM, IV for 3-5 days.
    3. Pig 5mg/kg BW once or twice daily IM, IV for 3-5 days.

6.2 Hemorrhage/Bleeding

It refers to the escape of all blood constituents from blood vessels or the vascular system.

Etiology

- Trauma.
- Infectious agents.
- Toxins.

Clinical Signs & symptoms

- Weak.
- Anaemic.
- Panting

Treatment

- For external bleeding, apply tourniquet or pressure bandage at the site along with local hemostatic adrenaline.
- Hemostats (any of the following drug can be used)
    1. Botropase 0.5-1 ml total dose IM SOS
    2. Adrenochrome monosemi carbazone for LA- 20-25 mg total dose and for SA- 5-10mg total dose IM, IV SOS
    3. Etamsylate/Cyclonamine 250-500 mg IM, IV QID until bleeding is subsided
    4. Vitamin K: Horse & cattle 0.5-2.5mg/kg BW BID, IM, SC, SOS. Dog & Cat 0.25-2.5mg/kg BW IM, SC SOS.
    5. Adrenaline topical application
- Parenteral fluid therapy (Refer to fluid therapy chapter)

- Blood transfusion: Blood can be collected from another animal of the same species. For the first transfusion, cross-matching of donor & recipient blood is not necessary but it should be done during subsequent transfusion OR
- Vitamin K: Horse & cattle 0.5-2.5mg/kg BW, BID, IM/SC, SOS. Dog & Cat 0.25-2.5mg/kg BW IM, SC, SOS.

6.3 Anemia

Anemia is defined as reduction in the amount of hemoglobin per unit of blood.

Etiology

- Severe wound injury, epistaxis, surgical bleeding.
- Poisoning -Brakern fern and warfarin.
- Parasitic- Endoparasitic infection or heavy ectoparasite infection.
- Deficiency -Vitamin K and C and prothrombin, copper, cobalt, iron and choline.
- Bacterial- Leptospirosis, babesiosis, anaplasmosis.

Clinical Signs & symptoms

- Muscular weakness, dullness, pale mucosa inappetence and get exhausted easily.
- Tachycardia (increased heart rate).

Treatment

- Nonpatent hematinic mixture (till the primary cause is not identified): Hematinic for adult cattle as follows: Ferric sulphate - 80g Cupric sulphate - 20g Cobalt sulphate - 2g Mix and give 1/10th of above daily as electuary.
- For vitamin and mineral deficiency, supplement with B complex and liver extract for cattle, buffalo and horses 5-10ml twice weekly and for dogs and cats 0.25-0.5 ml IM twice weekly.
- As a mineral supplement CoFeCu 1 tab for 20 days orally for large animals.
- I*ron deficiency:* Supplement with Iron dextran.
  Cattle and Horse 5-10ml weekly, piglets 150mg (3ml) at 3 days old and repeated after 3 weeks age with 100mg and Dogs 1-2 ml (22mg) weekly (do not excess more than 3 shots).

- Treat the primary cause of the disease.

a) Parasitic

1. *Endoparasites*

*Deworm the animals.

- Large Animal:
  Albendazole: Horses & Cattle 10mg/kg, PO once only OR Fenbendazole 10mg/kg BW PO, OD once only.

- Small Animal
  Dogs 25-50mg/ kg BW, PO once only.

  Piperazine: Dogs 110-200mg/kg BW PO OD once only.

  Praziquantel 5-7.5 mg/kg BW PO OD once only

  Praziquantel+pyrantel pomoate+febantel combination 1 tab/10 kg BW.

b) *Ectoparasite:* spray the animal with 1% deltamethrin/cypermethrin or amitraz.
c) *Hemoprotozoa* infection like babesiosis or anaplasmosis, treat the animal with Diminazine aceturate 8-16mg/kg BW IM. Usually, one dose is sufficient to bring clinical recovery (Bayrinil) BW OR with Oxytetracycline 20 mg/kg BW OD every 72 hours

7. URO-GENITAL SYSTEM

7.1 Urinary Tract Infection (UTI)

Urinary tract infection is an infection that affects any part of the urinary system, including the urethra, bladder, ureters, or kidneys.

Types of UTIs:

1. Lower UTI:
   - Involves the urethra and bladder.
   - Examples: Cystitis (bladder infection), Urethritis (urethral infection).
2. Upper UTI:
   - Involves the ureters and kidneys.
   - Examples: Pyelonephritis (kidney infection).

Etiology

- Bacterial infection: *E coli, Corynebacterium renale* in cattle & *Eubacterium suis* in swine.
- Trauma to bladder along with urine stagnation,
- Urinary calculi (Cystolith and Urolith)

Clinical Signs & symptoms

- Pain during urination.
- Stranguria (difficult urination)
- Polyuria (frequent urination) and poly-dyspia (increase water intake)
- Attempting to urinate but producing only small quantities of urine.
- Cloudy urine
- Blood in urine (Hematuria).

Treatment

- Antibiotic *(Any one of the following*)
    1. Trimethoprim-sulfamethoxazole: Cattle 25mg/kg BW PO, IM, IV Horse 22mg/kg BW IV, 30mg/kg BW PO and Dog & Cat 15mg/kg BW PO BID oral for 3-5days OR
    2. OTC-LA: Large animals 20 mg/kg BW OD every 72 hours OR
    3. Amoxicillin large animal 7-15 mg/kg BW, PO, BID for 3-5 days. Small animal 11-22mg/kg BW, PO, BID for 3-5 days.
    4. Enrofloxacin: Dogs 10 mg/kg BW PO, IM OD for 3-5 days. (Based on urine culture)
- Parenteral fluid therapy should be provided so that physical flushing of the bladder occurs frequently.
- Anti-inflammatory drugs
    1. Meloxicam: Dog 0.2 mg/kg BW PO IV, IM on day 2 onward 0.1 mg/kg BW PO Cat: 0.3 mg/kg BW SC IV, on day 2 onward 0.05 mg/kg BW PO OR Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO, SC one dose. Swine: 0.4 mg/kg BW PO, IM. Equine: 0.6 mg/kg BW PO, IV all for 2-3days. OR
    2. Carprofen tablet: 2-4mg/kg BW PO OD for 3 days

7.2 Urinary Incontinence in dogs

Urinary incontinence is the involuntary leakage of urine in dogs, meaning they cannot control their bladder.

Etiology

- UTI (Cystitis).
- Weak bladder sphincter (common in aging female dogs).
- Estrogen insufficiency in spayed dogs
- Excessive water consumption due to diabetes &kidney disease.
- Urinary stones.
- Spinal disease.
- Congenital.
- Urinary bladder or urethral abnormalities
- Prostate disease such as benign prostate hyperplasia, infection or cancer.

Signs & symptoms

- Dripping urine with or without pain.
- Involuntary leakage of urine

Treatment

- UTI: Refer treatment for UTI.
- Supportive treatment: Vitamin B complex (Neurotonics) 0.5-1ml IM, IV OD for a few weeks.

- Urinary stones (calculi): Cystotomy (The surgical removal of stones within the bladder is referred to as cystotomy, meaning an opening of the bladder)
- Treat urinary tract infection; use diet to dissolve stones unless there is an obstruction; surgical removal if there is an obstruction.
- For prostate disease - Castration of a dog is a potential solution.

7.3 Hematuria

It refers to the presence of blood in the urine.

Etiology:

- Glomerulonephritis, cystitis, urolithiasis and bladder neoplasms.1`
- Bracken fern poisoning.
- Protozoal disease- babesiosis, leishmaniasis and trypanosomosis
- Bacterial disease: leptospirosis
- Injury or trauma to urinary bladder

Clinical signs & symptoms

Urine stained with blood.

On sedimentation the RBC will settle down whereas in hemoglobinuria there won't be separation between the RBC and other components.

Inappetence.

**These signs and symptom need further investigation*

Treatment

- Rule out the primary cause.
- Hexamine 4-8gm and sodium acid phosphate 30g or boric acid 15g. Sodium acid phosphate or boric acid is to be given 4 hours before the administration of hexamine. Hexamine has no action in alkaline urine, so Sodium acid phosphate is added to acidify the urine of Herbivores.
- Supportive treatment: B complex injection 8-10 ml /cattle IM.
- Hemostats. (any of the following drug can be used)
    1. Botropase 0.5-1ml total dose IM SOS
    2. Adrenochrome monosemi carbazone for LA- 20-25mg total dose and for SA- 5-10mg total dose IM, IV SOS
    3. Etamsylate/Cyclonamine 250-500mg total dose IM, IV QID until bleeding is subsided
    4. Vitamin K: Horse & cattle 0.5-2.5mg/kg BW, BID, IM, SC, SOS. Dog & Cat 0.25-2.5mg/kg BW IM, SC SOS.

7.4 Hemoglobinuria

Hemoglobinuria is defined as excretion of hemoglobin in the urine.

Etiology

- Bacillary hemoglobinuria- *Clostridium hemolyticum.*
- Hemoprotozoan infections- Babesiosis.
- Metabolic disease (post parturient hemoglobinuria).
- Snake bite (hemotoxic).
- Azoturia or Monday morning disease in horses.

Clinical Signs & symptoms

- Passing of coffee colored urine.
- On sedimentation the RBC will settle down in hematuria whereas in hemoglobinuria there won't be separation between the RBC and other components.

Treatment

- *Treat the primary cause*
- Blood Protozoan: Diamenazine aceturate 8-16mg/kg BW IM. Usually, one dose is sufficient to bring clinical recovery.
- Bacillary hemoglobinuria: Benzathine Penicillin 22,000 IU/kg BW every 72 hours OR
- OTC-LA 20 mg/kg BW OD every 72 hours
- Supportive therapy.

7.5 Metritis & Endometritis

Metritis is inflammation of the uterus and Endometritis is inflammation of the endometrial lining of the uterus and it is usually due to an infection.

Etiology

- Bacterial infection: *Corynebacterium, Streptococcous, Staphylococcous, E coli., Brucellosis*
- Trauma during dystocia.
- Mechanical injury during AI.
- Retention of placenta
- Cesarean section
- Cystitis

Clinical signs & symptoms

- Depressed & anorectic.
- Fever.
- Abdominal pain
- Excessive thirst or dehydration
- Vaginal discharge (mucopurulent / serosanguineous with foul smell).

- Vomiting - small animals.
- Infertility in chronic cases.

Treatment

- Antibiotic
    1. Cattle, Sheep, Goat& Horse: Oxytetracycline LA, (OTC): 20 mg/kg BW OD every 72 hours
    2. Small animal Oxytetracycline SA 10 mg/kg BW IM, SC, OD for 3-5 days.
- Large animal & small animal: Infuse Povidone iodine 5-10 ml into each uterine horn (it is not recommended in acute metritis and purpura metritis).
- For evacuation of uterine contents PGF2a 0.25mg/kg BW SC BID for 2-3days OR Oxytocin 75-100 IU BW IM, IV.

7.6 Orchitis

It is inflammation of the testes.

Etiology

- Traumatic injury.
- Bacterial (Brucella), fungal and viral infections.
- Excessive licking in dogs.
- Autoimmune disease

Clinical signs & symptoms

- Swelling and enlargement of testicles.
- Pain or tenderness of the scrotum
- Discharges from prepuce or scrotum
- Fever and lethargy

Treatment

- Analgesics/anti-inflammatory
    1. Meloxicam: Dog 0.2 mg/kg BW PO IV, IM, on day 2 onward 0.1 mg/kg BW PO Cat: 0.3 mg/kg BW SC, OD, on day 2 onward 0.05 mg/kg BW PO OR Large ruminants: 0.5 mg/kg BW PO, IV, SC. Small ruminants: 1 mg/kg BW PO, SC one dose. Swine: 0.4 mg/kg BW PO, IM, Equine: 0.6 mg/kg BW PO, IV all for 2-3days
    2. Meloxicam +paracetamol bolus: large animal 1-2 boli PO, OD and small animal ½ boli PO, OD
- Antihistamines: Chlorpheniramine maleate: Cattle Cattle 30-50 mg (total dose) IM, BID Dog and Cat 0.025 - 0.5 mg/kg BW BID PO, IM, SC
- Hot fomentation (A cloth imbibed with hot water is locally applied around the inflamed area).
- Antibiotic (Infectious cause)

1. StreptoPenicillin: Dog 1ml/5kg BW IM BID for 3-5days OR OTC SA 10 mg/kg BW OD for 3-5 days.
2. OTC-LA in large animals 20 mg/kg BW 0D every 72 hours and Dog and Cat 10 mg/kg BW OD for 3-5 days.
3. Cephalexin: small animal 20-30 mg/kg BW, PO, BID for 3-5 days OR
4. Gentamicin: Dog 9-14 mg/kg BW OD IM, IV for 3-5 days and Cat 5-8 mg/kg BW OD IM. IV for 3-5 days.

7.7 Anoestrum condition

Anestrus refers to the period of sexual and reproductive inactivity in female animals when they do not exhibit estrous (heat) cycles.

Types of anestrus

a) Pathological- Follicular cysts, Luteal cysts, Ovarian hypoplasia (underdeveloped ovaries, infections and hormonal imbalance).
b) Silent estrus- commonly found in buffalo.
c) Nutritional anestrous
d) Seasonal anestrous

Etiology

- Abnormalities of reproductive endocrine control.
- Nutritional imbalance and poor management.
- Pregnancy.
- Ovarian inactivity.
- Failure to observe heat signs.
- Ovulation that is not accompanied by signs of estrus (silent heat).
- Cystic ovarian disease (luteal cyst).
- Bacterial or viral infections

Clinical signs & symptoms

- Heat signs not seen since the time of calving.
- On rectal examination the ovaries will be smooth, flat and inactive.

Treatment

- Proper nutrition.
- Proper management.
- Micro-nutrient supplementation.
- Reduction of stress to the animal.
- Hormonal treatment (GnRH) Buserelin 5ml IM and estrus synchronization after examination.
- For luteal cyst: Prostaglandin PGF2a 2ml IM, SC, 1.3ml IV stat.

7.8 Repeat Breeder

A repeat breeder is an animal that has normal estrous cycles, with no clinical abnormalities, but has failed to conceive after at least two successive inseminations.

Etiology

- Early embryonic death
- Failure fertilization
- Failure to observe heat
- Errors in artificial insemination techniques
- Failure of proper storage of frozen semen

Clinical signs & symptoms

- Animals come into heat again and again.

Treatment

- Follow proper timing of insemination & proper technique. (Thumb rule: if the cow comes to heat in the evening it should be inseminated in the next morning and if the cow comes to heat in the morning it should be inseminated in the evening or 8-12 hrs after the onset signs of heat)
- Advocate hormonal therapy: Busereline 5-15ml IM stat (depending on the condition of follicular cyst).
- Prostaglandins PGF2a 2-5ml IM/SC stat.

7.9 Pyometra

Pyometra is a serious and potentially life-threatening condition characterized by progressive accumulation of pus or mucopurulent matter in the uterus and by the persistence of functional luteal tissue in the ovary.

Etiology

- Uterine infection during estrus.
- Abortion.
- ROP.
- Cystitis

Clinical signs & symptoms

- In Cattle:

1. Presence of intermittent vaginal discharge. The pus is usually thick mucoid and creamy, and yellow, white, or greenish-gray in color.
2. In a cow, on rectal palpation the uterine horns will be enlarged and distended.
3. Absence of cyclical activity.
4.

- In Dogs & cats pyometra can be open or closed.

1. Lethargy, depression, pyrexia, anorexia, vomiting, diarrhea, polydipsia, and polyuria
2. A serosanguineous to mucopurulent vaginal discharge can be seen if the cervix is open.
3. Vaginal discharge may be the only clinical finding in some patients.
4. In patients with closed-cervix pyometra, vaginal discharge may not be present. Dogs with closed-cervix pyometra are often more seriously ill at the time of diagnosis than those with open-cervix pyometra.

Treatment

- In Cattle:

1. Advocate hormonal therapy: natural prostaglandin PGF2 alpha 5ml IM OR
2. Insert intrauterine with normal saline and 2% povidone iodine for 5-7 days OR
3. Insert intrauterine urea and antibiotic bolus once a day for 5 days
4. Parenteral treatment with broad spectrum antibiotics if the infection is systemic. OTC- LA in large animals20 mg/kg BW OD every 72 hours and Dog and Cat 10 mg/kg BW OD for 3-5 days.

- In dogs and cats:

1. Ovariohysterectomy (surgical removal of uterus with ovaries) is the procedure of choice for the treatment of pyometra.
2. Hormonal therapy in open pyometra: natural prostaglandin PGF2 alpha 0.2mg/kg BW IM.
3. Parenteral treatment with broad spectrum antibiotics if the infection is systemic. Oxytetracycline SA 10-20 mg/kg BW OD for 3-5 days OR

   Cephalexin: 20-30 mg/kg BW, PO, BID for 3-5 days OR

   Gentamicin: Dog 9-14 mg/kg BW OD IM, IV for 3-5 days and Cat 5-8 mg/kg BW OD IM, IV for 3-5 days.

7.10 Pseudopregnancy in dogs

Pseudopregnancy or False pregnancy or Pseudocyesis is a common condition where a non-pregnant female dog exhibits signs of pregnancy, lactation or nursing.

Etiology

Pseudopregnancy is caused by hormonal changes in the reproductive cycle, particularly during the diestrus phase, when:

- *The corpus luteum (CL) on the ovary produces high levels of progesterone.*
- *When the CL regresses, there is a relative increase in prolactin levels, which mimics the hormonal state of pregnancy and triggers false pregnancy symptoms.*

Clinical signs & symptoms

- Dogs may exhibit mothering of toys, nesting, or even aggression.
- Weight gain
- Mild vaginal discharge
- Mammary development and milk production.

Treatment

- Once a dog is showing signs of pseudopregnancy, reducing the stimulation for the behaviors may reduce their duration. Removing toys and stopping self-nursing behavior by placing e-collars may be helpful.
- Most cases do not require medical treatment and resolve with time. This may take a few weeks.
- Diuretic: Frusemide 2-4mg/kg BW BIDIM for few days to reduce fluid retention and stop lactation.
- Prolactin-suppressing drugs (anti-prolactin) such as dopamine agonists such as Cabergoline 0.005mg/kg BW for 4-6 days oral OR Bromocriptine 0.01mg/kg BW BID for 10 days PO.
- Ovariohysterectomy of dogs which are not used for breeding.

7.11 Retention of Placenta (ROP)

Retention of placenta occurs when the fetal membranes (placenta) fail to be expelled from the uterus within the normal timeframe (24hr) after delivery.

Etiology

- Failure of normal process of expulsion of fetal membranes.
- Premature and twin birth.
- Abortion and placentitis.
- Uterine inertia due to hormonal imbalances and hypocalcemia.
- Hereditary predisposition.

Clinical signs & symptoms

- Fetal membranes hanging from vagina.
- Slight inappetence with or without fever
- Cows that fail to expel fetal membranes within 24 hrs. or so are likely to retain for 7-10 days as uterine contraction ceases after 36 hrs. after birth of the calf.

Treatment

- Oxytocin 40IU IV stat & manual removal after 20 mins OR
- Manual removal of fetal membrane if the rectal temperature is normal
- Place urea and antibiotic boli 2 in each uterine horn.
- Uterine tonic (Utrosafe powder): Cows 50-60g, Mares 30-40g, Sheep & goat 8-12g PO.
- Antihistamine
    1. Cattle 30-50 mg total dose IM, SC SOS.

- Analgesics
    2. Meloxicam: All species 0.2-0.4mg/kg BW IM/IV/SC SOS.
- *Any one of the broad-spectrum antibiotics (in case of sepsis)*

    Oxytetracycline (LA): Cattle20 mg/kg BW OD every 72 hours and Dog and Cat 10 mg/kg BW OD for 3-5 days.

    Ampicillin & cloxacillin: large animal 6-10mg/kg BW IM, BID for 3-5 days.

7.12 Mummification and Macerated fetus

Mummification is a condition wherein fetal fluid and soft tissue is reabsorbed leaving just a mass of bone and skin tightly enclosed by the contracted uterine wall. The fetus does not decompose significantly because of the absence of bacterial infection, leaving a dry, shrunken, and leathery fetus.

Etiology

- Genetic factor, recessive genes
- Hormonal abnormalities
- Torsion of umbilical cord
- Infectious cause (viral)

Maceration is the process by which a fetus or fetal tissues undergo softening and decomposition due to bacterial infection after death.

Etiology

- Infectious cause- Bacterial
- Prolong retention of fetus
- Failure of uterine contraction
- Trauma or injury.

Clinical signs and symptoms

- No external symptoms.
- Prolonged gestation period
- This could occur at any time of gestation more commonly from 3rd month of gestation. However, this condition is not diagnosed until the end of gestation period as the owner thinks that the animal is pregnant.
- This condition can only be diagnosed by a per-rectal examination.

Treatment

- Manual removal or Surgical intervention after confirmation.
- Natural prostaglandin: PGF2 alpha 5 ml IM stat.

- Broad spectrum antibiotics to control secondary infection.
  Streptopenicillin 2.5g/animal IM OD for 5-7days.

7.13 Uterine torsion

It refers to the twisting of the uterus along its longitudinal axis, resulting in partial or complete obstruction of blood flow and difficulty in parturition (delivery). It is a common obstetrical emergency in many species, particularly in cattle, but can also occur in horses, sheep, goats, and other animals.

Types: a) Post cervix uterine torsion (after cervix)

b) Pre-cervix uterine torsion (before cervix)

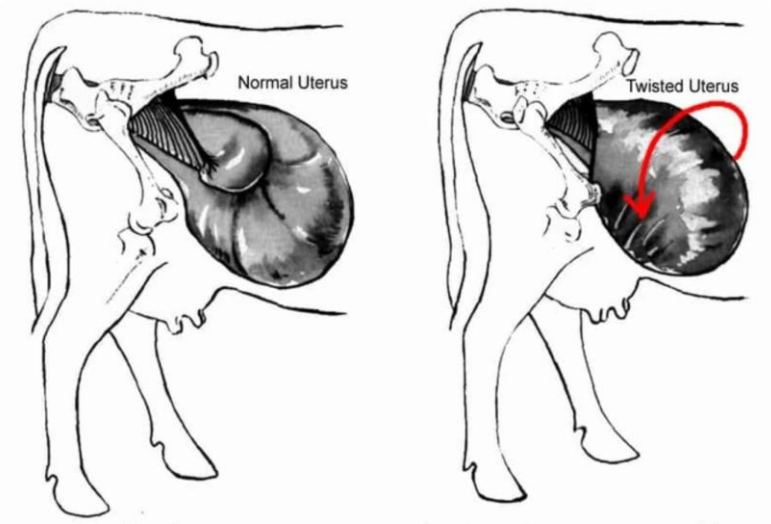

Figure no. 6: Uterine torsion (Ref)

Etiology

- Late pregnancy gestation
- Excessive fetal movement
- Abnormal uterine anatomy
- Weak ligament
- External factors

Clinical signs and symptoms

- Restlessness or discomfort
- Repeatedly lying and standing up
- Failure to progress in labor despite uterine contractions.
- Reduced appetite and lethargy.
- Rectal or Vaginal Examination Findings:

- Twisting or displacement of the cervix.
- Tight or spiraled vaginal walls, depending on the degree of torsion.

Treatment

- Manual correction
- Rolling of cow (Modified Shaffer's Plankton method)
- With supportive therapy.
- Surgical intervention

7.14 Hemogalactia

It refers to passing of blood or blood clots in milk.

Etiology

- Trauma/injury to udder.
- Acute or per-acute mastitis.

Clinical signs & symptoms

- Blood or blood clots in milk.

Treatment

- Calcium borogluconate 150-250ml/cow IV, SC (this will help in clotting).
- Hemostat: Adrenochrome monosemi carbazone for LA- 20-25mg total dose IM, IV SOS
- Acute & per-acute mastitis: Refer treatment for mastitis.

7.15 Hypogalactia and Agalactia

Hypogalactia refers to reduction in milk production and agalactia refers to absence of milk production.

Etiology

- Physiological Causes (incomplete development of udder)
- Nutritional Deficiencies
- Stress Factors (environmental, physical stress)
- Infectious Causes (mastitis)
- Metabolic Disorders
- Poor Management Practices (infrequent milking or incomplete milking)
- Genetic Factors

Treatment

- Oxytocin 10-20 IU to let down of milk OR
- Metoclopramide 10ml/cow IM OD for 3 days. It brings about sedative effects and stimulates release of prolactin. OR
- Chlorpromazine 250mg/cow BID, PO 1-2 hours before milking for 5-7days. This drug brings about psychological balancing effect and makes the animal calm and quiet so that oxytocin and prolactin are released to let down of milk OR
- Vitamin and mineral mixture.

7.16 Mastitis

Inflammation of mammary gland (udder).

Etiology

Bacteria: *Staphylococcus spp, Streptococcus spp, Escherichia coli, Corynebacterium spp, etc.*

Virus: IBR, BVD, FMD.

Fungi and yeast: *Trichophyton, Aspergillus, Candida* spp

Clinical signs & symptoms

- Clinical mastitis: Swelling of udder with redness, hard & fibrous. Pain on palpation of udder. The secretions can be watery and blood tinged initially, but later on, it may be yellowish and pus like.
- Subclinical mastitis: No local inflammation or systemic involvement, Transient episodes of abnormal milk may appear Infections may persist for entire lactations or the life of the cow, to be confirmed with California Mastitis Test (CMT) Somatic Cell Counts (SCC): CMT, SCC ≥ 200,000 cells/ml.

Treatment

To overcome the etiological agent, antibacterial agent should be given both parenterally and intramammarily.

- Streptococcal and Staphylococcal mastitis: Procaine Penicillin100,000 IU Streptomycin sulphate 100mg, sulphamerazine 500mg, hydrocortisone acetate 20mg (combined) 1 tube in every infected quarter intramammary infusion for one day and if necessary, treatment may be repeated on one or two occasions at intervals of 48 hours (WP: 3 days in milk) OR Cloxacillin 200mg and Ampicillin 75mg (combined) 1 tube intramammary infusion in each infected quarter for three consecutive milking twice a day (WP: 3 days in milk)
- Parenteral Antibiotic: Streptopenicillin 2.5g/animal IM for 3-5 days.

Rx in case of Coliform mastitis:

- Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.
- Analgesics/anti-inflammatory: Meloxicam: 0.5 mg/kg BW IM/IV/SC OR Meloxicam + Paracetamol bolus: large ruminants 1-2boli twice daily Oral and Small ruminants ½ boli twice daily Oral.

Prevention & control

Good hygienic measures. Cows and barn should be kept clean and all excretions disposed off properly. Regular application of disinfectant solution in barn.

7.17 Udder Oedema

It is swelling of udder and is commonly seen in high yielding cows just a few days before parturition or immediately after parturition.

Etiology

- Physiological changes during late gestation.
- Mastitis.
- Hormonal changes
- Reduced lymphatic drainage
- Dietary imbalance

Clinical signs & symptoms

- Excessive fluid accumulation in the interstitial spaces of udder and subcutaneous tissue surrounding the udder.

Treatment

- Diuretics: Cattle 1-2mg/kg BW once or twice daily IM IV.
- Magnesium sulphate: glycerin at 1:1 ratio may be applied topically as hygroscopic (to reduce oedema) substance paste may be applied to udder for withdrawal of fluid.
- Analgesics
  Meloxicam: All species 0.2-0.4mg/kg BW IM/IV/SC stat.
  Meloxicam +paracetamol bolus Large animal 1-2 boli PO, OD and small animal ½ boli PO, OD
- Cold fomentation using ice packs.
- Warm salt water fomentation if drugs are not available.

7.18 Transmissible venereal tumor (TVT) in dogs

A transmissible venereal tumor is a naturally occurring tumor that is sexually transmitted from one dog to another. TVT is usually seen in young, intact (non-neutered) dogs.

Etiology

- Cancerous cell

Clinical signs and symptoms

- Friable *cauliflower-like, pedunculated, nodular, papillary, or multilobulated in appearance* can be seen in the external genital of bitch and penis of the dog.
- Bloody or serosanguinous discharges from the affected part
- Licking or scratching of affected part
- Lesions in the nasal cavity causing sneezing or nasal discharge.

Treatment

- Vincristine sulphate 0.025mg/kg BW OD strict IV at weekly interval for 4 weeks OR Methotrexate 0.3-0.8mg/kg BW strict IV weekly interval for 4 weeks
- Ranitidine 0.5-2mg/kg BW IV, IM, SC stat
- Surgical intervention may be tried if possible.
- Avoid breeding such animals.

8. DISEASES OF NERVOUS SYSTEM

8.1 Paralysis

Paraplegia- paralysis of hind quarter. Quadriplegia- all four legs are affected. Diplegia-both sides of the body are affected.

Hemiplegia- loss of function affecting one side of the body only along with anterior or posterior part of the limb of that particular side.

Etiology

- Toxic & metabolic diseases of the nervous system like tick poisoning, snake bite, tetanus and hypomagnesemia tetany, focal inflammatory, neoplastic and traumatic lesions in the motor pathway.
- Mechanical injury/fall on blunt objects affecting nerves/loss of function of nerves.

Treatment

- Nursing is very much essential to alleviate the paralytic condition
- Animal should be given complete rest
- Recumbent animals should be placed on bedding made of straw, sacs or blankets.

- Fluid and electrolytes should be given through parental route (Refer fluid therapy chapter)
- Frequent turning of animal is required otherwise there is possibility of bed sore as well as other complications like hypostatic congestion of lungs
- Massage of affected part with liniment
- Injection Vitamin containing Riboflavin B1, Pyridoxine B6, Nicotinamide B9 & Cyanacobalamin B12 (Neurobion Forte): Large animal 5-10ml IM, OD for 5-7 days and small animal 0.5ml -1ml IM, OD, 5-7 days with Prednisolone 0.5mg/kg BW PO, IM for 3 weeks with tapering doses.
- Electrical stimulation therapy (laser & ultrasonography)
- Tick paralysis: Ivermectin 0.2mg/kg BW SC.

8.2 Epilepsy (Seizure/fits)

Epilepsy is a condition of the brain causing seizure and a seizure is disruption of the electrical communication between the neurons. It is common in dogs and cats but rare in large animals. The prolonged untreated seizures or status epilepticus can cause hypoxic damage to the CNS and tissues. Breed predisposition, first seizures occur at the age of 6 months to 5 years of age. Seizures occur in females during the oestrus and pregnancy. Epilepsy may be Idiopathic, Grand mal and Status epilepticus.

- Idiopathic epilepsy is any non-progressive intracranial disorder that induces recurrent seizures activity
- Grand mal seizures are characterized by tonic and clonic muscle contraction along with salivation and muscle fasciculation.
- Status epilepticus is a state of continual seizure, which may cause permanent neurological damage or death.

Etiology

- Intracranial causes*:*

Head injury, congenital malformation of the brain, inflammation of meninges, brain tumor.

- Extracranial causes

Toxins, Metabolic diseases (hypoglycemia, liver disease, kidney disease hypokalemia, electrolyte disturbances).

Clinical signs and symptoms.

- Loss of consciousness
- Drooling
- Biting
- Defecation and urination

- Mydriasis
- Paddling
- Twitching
- Involuntary movement

Treatment

- Anticonvulsants
    - Phenobarbitone (drug of choice for epilepsy): Dog 1-2.5mg/kg PO BID for 30 days & Cat 1.5-3mg/ kg PO BID for 2-3 weeks days OR
    - Diazepam: Dogs & Cats 0.5-1mg/kg IV SOS OR Levetiracetam 20mg/kg PO QID for 2-3 weeks.
    - Diazepam per-rectal insertion can provide prolonged effect

8.3 Hepatic-Encephalopathy

Hepatic encephalopathy is a metabolic neurologic disorder that develops secondary to liver disease. When the liver cannot work properly, it causes changes in blood chemistry that alter normal brain function. Although all the changes are not completely understood, high levels of ammonia, which are toxic to cells of the nervous system, appear to play a major role in the development of hepatic encephalopathy.

Etiology

- Portosystemic shunt (PSS), a condition that prevents blood from being filtered by the liver.
- Acute liver failure and with severe liver disease, such as hepatic lipidosis in cats.

Clinical signs and symptoms

- The clinical signs of HE is varied and may appear shortly after a pet eats. Pets may seem dull, have an unsteady gait, drool heavily, and seizures may occur. Some pets will cry or whine, experience muscle tremors and/or sudden blindness, or might press their heads into objects.
- The underlying liver disease may cause weight loss, decreased appetite, jaundice (yellowing of the whites of the eyes and gums), vomiting, diarrhea, and increased urination.
- There are five grades of HE that range in increasing severity from Grade 0 (no clinical signs) to Grade 4 (severe lethargy, coma).

Treatment

- In severe and acute (sudden), intravenous therapy that includes mannitol or hypertonic saline to reduce edema (swelling) in the brain and L-ornithine L-aspartate (LOLA) to decrease ammonia levels.
- Anticonvulsant to control Seizures –

Phenobarbitone (drug of choice for epilepsy): Dog 1-2.5mg/kg, PO, BID for 30 days & Cat 1.5-3mg/ kg, PO, BID for few weeks days OR
Diazepam: Dogs & Cats 0.5-1mg/kg, IV, SOS, OR
Levetiracetam 20mg/kg, PO, QID for 2-3 weeks.

- Enemas may be used to reduce colon bacteria that produce protein metabolites that can be absorbed into the blood worsening hepatic encephalopathy. The protein content of the diet is decreased to help lower the quantities of protein breakdown products, such as ammonia, that contribute to the signs of HE.
- Antibiotics-
  Amoxicillin +clavulanate 12.5-25mg/kg BW PO, QID for 3-5 days OR metronidazole 10 mg/kg BW BID, slow IV for 3-5 days
- Lactulose 15-30ml, PO, QID and adjust the dosage until semi-formed stools are produced to alter the bacterial population within the intestines and further decrease the production of certain protein metabolites, including ammonia.
- Zinc supplementation and probiotics may also be recommended to help lower ammonia levels.
- Hepatoprotective supplements. S-adenosylmethionine (Denosyl®, Zentonil®), vitamin E, milk thistle (silymarin), and ursodeoxycholic acid (Ursodiol®).

9. MUSCULO SKELETAL SYSTEM

9.1 Lameness

Lameness is an abnormal gait or stance of an animal that is the result of dysfunction of the locomotor system.

Etiology

- Laminitis, foot rot, dislocation, patellar luxation, joint-ill, fractures, etc.
- Muscle strain and sprain.

Clinical signs & symptoms

- Pain.
- Lameness.

Treatment

Differentiate the causes of lameness as lameness may be due to Laminitis, injury to the obturator nerve, polyarthritis, synovitis, bursitis, MPL (medial patellar luxation, etc.)

- Analgesics /anti-inflammatory
  Meloxicam: All species 0.2-0.4mg/kg, IM, IV, SC OD for 2 days.
  Large animals- Meloxicam +paracetamol 1-2 boli PO, BID, SOS.
  Small animals- Meloxicam+Paracetamol ½ boli PO, BID, SOS.

- Vitamin containing Riboflavin B1, Pyridoxine B6, Nicotinamide B9 & Cyanacobalamin B12 (Neurobion Forte): Large animal 5-10ml IM, OD for 5-7 days and small animal 0.5ml -1ml IM, OD 5-7 days.
- Treatment should continue for 2-3days or until the symptoms subside.
- Apply and massage turpentine liniments over the affected area OR
- Advise for hot fomentation OR
- Foot bath can be advised: 5% copper or zinc sulphate solution or with 3-5 % formalin can be used in case of interdigital dermatitis and foot rot.
- Antibiotics if the cause is infectious.

9.2 Rickets & Osteomalacia

Rickets: It is a defective mineralization or calcification of bones before epiphyseal closure in young animals.

Osteomalacia: It is softening or defective bone mineralization due to Vitamin D deficiency in adult animals.

Etiology

- Deficiency of calcium, phosphorus or vitamin D or combinations of any the above.
- Disease of the young animals.

Clinical Signs & symptoms

- Stunted growth, bowed leg, enlargement of limb joints (especially fore-limb).

Treatment

- Supplementation of "Ca" by oral feeding.
- Dog & cat 20-100mg/kg BW PO, OD for two weeks.
- Vitamin D therapy: Dogs 7000-14000 IU/kg, IM once a week for 3 weeks.
- Cattle, horse &pig 15000-30000IU/kg, IM on alternate days for 1 week OR
- Supplement deficient diet with calcium, phosphorus or vitamin D.

9.3 Arthritis

It is inflammation of the joint.

Etiology

- Trauma.
- Bacterial infection-staphylococci, streptococci and coliform infections.
- Immune mediated arthritis.

Clinical signs & symptoms

- Pain, joints are thickened, swollen and hot.
- Lameness.
- Crepitation sound on movement of the joint.

Treatment

Analgesics/anti-inflammatory

- Meloxicam: All species 0.2-0.4mg/kg, IM, IV, SC OD for 2 days.
- Large animals- Meloxicam +paracetamol 1-2 boli, PO, BID, SOS.
- Small animals- Meloxicam+Paracetamol ½ boli, PO, BID, SOS.

Steroids:

- Dexamethazone:
  Cattle & horse 10-30mg/kg IM, IV SOS & 2-10mg Intra- articular (total dose), SOS
  Dog 0.5-2mg/kg IM, IV SOS
  Cat 0.25-0.5mg/kg IM, IV SOS
  Dog & cat 0.25-5mg Intra-articular (total dose), SOS
- Apply and massage turpentine liniments over the affected area.
- Cold and hot water fomentation can be applied.
- Vitamin B complex.
- Vitamin containing Riboflavin B1, Pyridoxine B6, Nicotinamide B9 & Cyanacobalamin B12 (Neurobion Forte): Large animal 5-10ml IM, OD for 5-7 days and small animal 0.5ml -1ml IM, OD 5-7 days.
- Antibiotic if cause is infectious

9.4 Fracture

A fracture is a dissolution of bony continuity with or without displacement of the fragments, soft tissue damage, torn vessels, bruised muscles, lacerated periosteum, contused nerves, compromised locomotor function.

Etiology

- Fall from the height
- Trauma
- Motor vehicle accidents
- Direct blow

Clinical signs and symptoms.

- Loss of function or dysfunction-Affected limb cannot be used – lameness
- Pain – due to tissue damage, in incomplete fracture this is only seen Local trauma – at the site there may be swelling, hematoma.
- Deformity – abnormal shape of limb, shortened due to overlap
- Crepitus – on palpation broken edges of bone rub and crepitate

- Abnormal mobility- movement in unusual direction
- Fever – seen 24- 48 hours after fracture
- Anaemia – Due to severe hemorrhage, vascular damage
- Shock – Hypovolemic shock due to haemorrhage
- Nerve damage- nerves at the site may be injured.

Incidence of fracture.

- Dogs - fracture of femur and pelvis are more common
- Bovine: fracture of tibia, humerus, metatarsus and pelvis
- Equines: fracture of tibia, ulna, humerus, metacarpus and metatarsus
- Sheep and goat: fracture of tibia, humerus, metatarsus and pelvis

Treatment

- Principles of fracture treatment are reduction, retention and immobilization.
    1. Reduction – fractured end of bones is placed into contact
    2. Retention – keeping the broken ends of bone in contact
    3. Immobilization – Not allowing the broken ends of bone to move.
- Postoperative pain management and antibiotic course.
- Vitamin and Mineral supplement
  **Use antibiotic only if there is an open fracture*

9.5 Hip Dysplasia in canine

Canine Hip Dysplasia (CHD) is a genetic malformation of the hip joint where the femoral head (the ball of the thigh bone) does not fit properly into the acetabulum (the socket of the hip bone).

Etiology

- Genetics (large breed dogs)
- Excessive growth rate
- Obesity
- Improper nutrition

Clinical signs and Symptoms:

- Limping or lameness:
- Difficulty rising or climbing stairs
- Reduced activity or exercise intolerance
- Waddling gait
- Pain

Treatment

- Non-Surgical Treatments:

- Weight Management: Maintaining an ideal body weight is crucial to reduce stress on the hip joint.
- Anti-inflammatory and analgesic: Meloxicam: All species 0.2-0.4mg/kg, IM, IV, SC OD for 2 days. Large animals- Meloxicam +paracetamol 1-2 boli, PO, BID, SOS. Small animals- Meloxicam+Paracetamol ½ boli, PO, BID, SOS.
- Vitamin B complex: Vitamin containing Riboflavin B1, Pyridoxine B6, Nicotinamide B9 & Cyanacobalamin B12 (Neurobion Forte): Large animal 5-10ml IM, OD for 5-7 days and small animal 0.5ml -1ml IM, OD 5-7 days.

- Joint Supplements: Glucosamine, chondroitin sulfate, and omega-3 fatty acids can support joint health and reduce inflammation.

- Physical Therapy: Exercise and rehabilitation can strengthen the muscles surrounding the hip joint and improve range of motion. Hydrotherapy is often a good option for dogs with CHD.

- *Surgical Treatments (In severe cases):*

  - Femoral Head Ostectomy (FHO): In this procedure, the femoral head (the ball of the joint) is removed entirely. The body forms a "false joint" where the muscles around the hip take over the function of the removed joint.
  - Postoperative pain management with antibiotic course (restrict the movement for 2 weeks with physiotherapy)

10. DISEASES OF SKIN

10.1 Dermatitis

It is inflammation of skin.

Etiology

- *Non-infectious*
  1. Physical injury in the form of trauma, laceration or abrasion.
  2. Irritant chemicals.
  3. Nutritional deficiency: fatty acids, vitamin A, E & B complex and zinc.
  4. Allergy.
  5. Endocrinal disease: hypothyroidism in dogs
- Infectious
  1. Bacterial- Streptococcus spp., Staphylococcus spp., Escherichia coli, Pseudomonas.
  2. Fungal- Malassezia pachyydermatitis
  3. Viral- Pox virus, LSD
  4. Metazoan- CLM (cutaneous larva migraines, myasis)
  5. Acral dermatitis (Demodex, Sarcoptes, Psoroptes, Chorioptes, Otodectes cyanotis, Cheletiella)

Clinical Signs & symptoms

- Alopecia (hair fall), pruritic (itching).
- Keratinization (thickening of skin).
- Foul odor.
- Exudation.
- Reddening of skin (contact dermatitis).
- Excoriation of skin
- Pruritus
- Scabs

Treatment

- Bacterial dermatitis
  Streptopenicillin: Large animals 2ml/50kg BW IM, BID for 5 days (WP, Milk 72 hours, Meat 30 days). Small animals: 1ml/5kg BW IM, BID for 5 days.
  Large animals: Amoxicillin 7-15mg/kg BW PO, BID for 5 days.
  Small animals: amoxicillin +clavulanate 12.5-25mg/kg BW PO, QID for 5-7 days
- Fungal dermatitis: Itraconazole; Dog & Cat 5mg/kg BW PO, OD for 4-20 weeks or Ketoconazole Dog and cat 10mg/kg BW PO, OD for 4-20 weeks.
- Parasitic dermatitis
  Ivermectin: All species 0.2mg/kg BW SC, OD once a week for four weeks except for demodectic dermatitis.
  Small animal: Ivermectin 0.2mg/kg BW PO, OD for 10 days.
  Topical application: Amitraz

Animals	Ticks	Mites & lice
Cattle Sheep & Goats	2ml/L of water	2ml/L of water
	2ml/L of water	4ml/L of water
Pigs	4ml/L of water	4ml/L of water

Deltamethrin: To be used as dip or spray. Against ticks: 2ml/liter of water tropically, SOS. Mites: 4ml/liter of water, Tropically, SOS. Lice: 1ml/liter of water, topically, SOS. Flies: 2ml/ liter of water, topically, SOS. For curative purposes, 2 treatments at 12 to 15 days interval are necessary.

- Allergic dermatitis
- Antihistamine; Cattle 30-50 mg (total dose) IM, BID. Dog and Cat 0.025 - 0.5 mg/kg BW BID PO, IM, SC
- Steroid; Prednisolone: Dog & Cat 5mg/kg BW IM, OD every two months in case of allergic dermatitis.

- Advice use of medicated shampoos in pet animals.
- Vitamin & mineral supplement in diet.
- Advice not to use human shampoos or soaps.
- Avoid daily baths (once after two weeks).

10.2 Pyotraumatic Dermatitis (acute moist dermatitis, hot spots)

Pyotraumatic dermatitis is an acute and rapidly developing surface bacterial skin infection that occurs secondary to self-inflicted trauma.

Etiology

- It is a bacterial skin infection that occurs secondary to self- inflicted trauma.

Clinical Signs & symptoms

- Erythemia, alopecia and weepy eroded skin with well demarcated margins.

Treatment

- Identify the underlying cause.
- The lesion should be clipped and cleaned with Normal saline and Povidone iodine.
- Antipruritic; Prednisolone: Dog & Cat 5mg/kg BW, IM, OD every two months in case of allergic dermatitis.
- If the lesion is surrounded by papules or pustules antibiotic. Amoxicillin 11-22 mg/kg BW PO, BID for 3-5 days.

10.3 Abscess

Abscess is a collection of pus that has built up within the tissue of the body.

Etiology

- Bacterial infection.

Clinical Signs & symptoms

- Localized, often painful swelling or abscess with a crusted over puncture wound from which a purulent material may drain.

Treatment

- The abscess should be clipped, lanced and cleaned with 0.025%chlorhexidine.
- Antibiotics:
    1. Small animals: amoxicillin +clavulanate 12.5-25mg/kg BW PO, BID for 3-5 days OR
    2. Streptopenicillin:

Large animals 2ml/50kg BW IM, BID for 5 days (WP, Milk 72 hours, Meat 30 days)
Small animals 1ml/5kg BW IM, BID for 5 days.

10.4 Pruritus

It is an unpleasant sensation within the skin that provokes the desire to scratch due to allergens or due to mediators (histamine, bradykinins, proteases released by bacteria, fungi, etc.)

Etiology

- Parasites,
- Infections,
- Allergic skin diseases,
- Miscellaneous causes (eg, cutaneous neoplasia).
- Many diseases that are nonpruritic (eg, endocrinopathies) become pruritic when the animal develops secondary bacterial or yeast infections.

Clinical signs and symptoms.

- Hair loss
- Scaling
- Scales piercing hairs
- Odor
- Greasy seborrhea.

Treatment

- Topical antimicrobial shampoo therapy (2% chlorhexidine) daily or every other day.
- Oral antibiotic therapy should be used only with evidence of an infection confirmed on culture and susceptibility testing.
- Systemic antifungal: Itraconazole Dog & Cat 5mg/kg BW PO, OD for 4-20 weeks or Ketoconazole Dog and cat 10mg/kg BW PO, OD for 4-20 weeks.
- Anti-histamines; Chlorpheniramine maleate: Cattle 30-50mg (total dose) IM, OD, SOS. Dog 0.2 -0.4mg/kg BW BID PO, IM, SC SOS. Cat 2mg/cat BID, PO, IM, SC, OD, SOS.

- Anthelmintics for parasitic pruritus. Ivermectin: All species 0.2mg/kg BW SC, OD once a week for four weeks except for demodectic dermatitis.
  Small animal: Ivermectin 0.2mg/kg, BW PO, OD for 10 days.
- Dietary management
- Essential fatty acids in the diet
- Corticosteroids
  Prednisolone: Dog & Cat 5mg/kg BW, IM, OD every two months in case of allergic dermatitis.
- Vitamin B complex:

Riboflavin B1, Pyridoxine B6, Nicotinamide B9 & Cyanocobalamin B12 (Neurobion Forte): Large animal 5-10ml IM, OD for 5-7 days and small animal 0.5ml -1ml IM, OD 5-7 days.

10.5 Alopecia

Alopecia is the partial or complete lack of hairs in areas where they are normally present. It can be congenital or acquired.

Inflammatory acquired alopecia is the most common cause of alopecia. Pruritus or pain is a common cause of acquired inflammatory alopecia in animals.

Etiology

- Nutritional deficiencies (particularly protein deficiencies),
- Hypothyroidism,
- Hyperadrenocorticism (Cushing)
- Hypoadrenocorticism (Addison)
- Hormonal (excessive estrogen production or administration (hyper-estrogenism, Sertoli cell tumors, estrogen injections for mis-mating).
- Temporary alopecia in horses, sheep, and dogs can occur during pregnancy, lactation, or several weeks after a severe illness or fever.

Clinical signs and symptom

- Congenital or hereditary hair loss is commonly symmetric and not accompanied by many inflammatory changes; in some cases, the areas of hair loss are localized to one region (eg, ear flaps) or to well-demarcated areas.
- Acquired Alopecia may be focal, multifocal, symmetric, or generalized. Inflammatory changes such as hyperpigmentation, lichenification, erythema, scaling, excessive shedding, and pruritus are common.
- In endocrine alopecias, the hair loss usually develops in a symmetric pattern, often in wear areas first; pruritus is uncommon unless there is a secondary infection.

Treatment

- The root causes of alopecia should be treated first.

10.6 Wound and its management

A wound is a disruption or break in the integrity of the skin or underlying tissues caused by physical, chemical, or biological factors. It can involve damage to the skin, muscles, tendons, or even deeper structures like bones and internal organs.

Types of wounds:

a) Open Wound: The skin is broken, exposing underlying tissues (e.g., cuts, lacerations).

b) Closed Wound: The skin remains intact, but there is underlying tissue damage (e.g., bruises, contusions).

Etiology

- Surgical
- Trauma or bite
- Chemical
- Infections

Clinical signs and symptoms

- Pain
- Hematoma
- Bleeding (open wound)
- Shock (in severe case)
- Swelling
- Limping or lameness
- Pus or serosanguinous discharges

Treatment

Wound management:

1. Wound Cleaning
    - Clip hair around the wound.
    - Flush with sterile saline or diluted antiseptic (chlorhexidine/povidone-iodine).
    - Remove debris and dead tissue (debridement).
2. Infection Control
    - Apply antiseptics.
    - Use topical or systemic antibiotics based on contamination or infection.
3. Wound Closure
    - Primary closure: Immediate suturing for clean wounds or fresh wound within 6 hours
    - Delayed closure: For contaminated wounds after cleaning.
    - Secondary intention: Allow natural healing in large or infected wounds.
4. Dressing and Bandaging
    - Apply appropriate dressing (non-adherent, moist, or absorbent).
    - Bandage with 3 protective layers to prevent contamination and promote healing.

    Wound bandaging should include three protective layers:
    a) Primary Layer: Utilizes moist wound healing techniques or wet-to-dry dressing.
    b) Secondary Layer: Comprises cotton rolls and bandages to provide cushioning and absorb exudate.
    c) Tertiary Layer: Secured with adhesive tape to protect and hold the bandage in place.

5. Pain Management
    - Administer analgesics (NSAIDs, opioids) as needed.

6. Aftercare and Monitoring
    - Regularly check for signs of infection (redness, swelling, discharge).
    - Change dressings as required.
    - Prevent self-trauma (e.g., use an Elizabethan collar).

11. DISEASES OF EYE & EAR

11.1 Conjunctivitis (Red eye)

It is an inflammation of the conjunctival mucous membrane.

Etiology

- Foreign body or injury
- Infectious cause

Clinical Signs & symptoms

- Ocular discharges, pain on touch, redness and swelling of mucosa.
- Regional lymph nodes may be enlarged in case of bacterial infection.
- Dull & depressed.
- Blepharospasm in severe case
- Photophobia.

Treatment

- Correction of primary cause.
- Irrigate eye with sterile normal saline at least 3-4 times a day until the infection subsides.
- Foreign bodies should be removed with care if any.
- Antiseptic eye lotion/wash with 1% boric acid solution.
- Eye drops / antibiotic-based eye ointment. Gentamicin eye drop. Apply 1-2 drops BID for a week OR Chloramphenicol eye ointment. BID for a week.
- Ketorolac eyedrop 1-2drop BID for a week
- Meloxicam: Large animals: 0.5 mg/kg BW PO IV, SC. Dog: 0.2 mg/kg BW PO IV, on day 2 onward 0.1 mg/kg BW PO, Cat: 0.3 mg/kg BW SC, IV, on day 2 onward 0.05 mg/kg BW PO. Small ruminants: 1 mg/kg BW PO SC one dose. Equine: 0.6 mg/kg BW PO IV, Swine: 0.4 mg/kg BW PO IM
- Keep animals away from light sources.

11.2 Keratitis

Keratitis is the inflammation of the cornea, the clear, outermost layer of the eye, which can result in pain, redness, and vision impairment.

Etiology

- Foreign body, trauma and dryness
- Infectious causes (bacterial, viral, fungal, parasitic
- Immune mediated disease

Clinical signs & symptoms

- Photophobia, lacrimation, blepharon-spasm and cloudiness of cornea/ corneal opacity.
- Corneal ulceration is often not visible to the naked eye but can be accurately diagnosed using a fluorescein dye test.

Figure 7: Procedure to examine ulceration of cornea (Ref)

Treatment

- Irrigate eye with sterile normal saline at least 3-4 times a day until the infection subsides followed by boric acid 1% OR
- Remove the exudates using saline or 3% Sodium Bicarbonate.
- Eye drops / antibiotic-based eye ointment. Gentamicin eye drop. Apply 1-2 drops BID for a week or Chloramphenicol eye ointment
- Vitamin A therapy: Dogs 10,000IU/dog PO for 3 days OR
- Dexamethasone OR Prednisolone 0.2- 0.5ml for 5-7days by subconjunctival route has been found useful for clear the opaque lesions.
- Animals should be confined in dark places.
- Keratoconjunctivitis sicca its treatment

11.3 Cataract

It is opacity of lens, characterized by milky appearance of lens, bluish lens, or white or gray appearance.

Etiology

- Direct or indirect trauma.
- Electrocution of animals.
- Toxins.
- Metabolic disturbances like diabetes.
- Genetic

Clinical signs & symptoms

- Lens becomes grey-white or amber colour.
- Blind.

Treatment

- Irrigate eye with sterile normal saline at least 3-4 times a day until the infection subside.
- Eye drops / antibiotic-based eye ointment. Gentamicin eye drop. Apply 1-2 drops twice daily for a week or Chloramphenicol eye ointment.
- Surgical treatment is necessary.

11.4 Glaucoma

Glaucoma is a disease condition of the eye characterized by marked rise in the intraocular pressure. It is seen in dogs but is very rare in other animals.

Etiology

- Increased production or decreased drainage of aqueous humor.

Signs & symptoms

- There is severe pain.
- Vision is greatly reduced.
- Lacrimation.

Treatment

Diuretic: Large animals: Frusemide 1-2mg/Kg BW IM and Small animals 2-4mg/kg BW IM for a few days.

Eye drop/ointment/gel: Chloramphenicol ointment for application

11.5 Otitis

It is an inflammation of different parts of the ear.

Etiology

- Bacterial infection.
- Ear mites: *Otodectes cynotis*.

Clinical signs & symptoms

- Discharges from the ear, pain on touch, scratching and shaking of ears.

Treatment

- Ear mite infection: Ivermectin 0.2mg/kg BW, SC
- Clean the ear with hydrogen peroxide solution1.5%.
- Antibiotic ear drops: Gentamicin ear drop. Apply 1-2 drops twice daily till the infection subsides.
- Streptopenicillin: Large animals 2ml/50kg BW IM, BID for 5 days (WP, Milk 72 hours, Meat 30 days). Small animals: 1ml/5kg BW IM, BID for 5 days.

11.6 Aural Hematoma

It is a collection of blood under the skin of the ear flap of a dog.

Etiology

- Trauma.
- Ear infections.
- Insect bites

Clinical signs & symptoms

- Round or oval fluctuating swelling of the ear. Swelling may be medial or lateral side of the ear.

Treatment

- Surgical intervention is required to drain out the accumulated blood OR
- Aspiration of the fluid can be done with the help of a syringe and needle.
- Inject 2ml cortisone and wrap the ear close to the head for 1 week.

12. NON-INFECTOIUS/METABOLIC SYNDROME

12.1 Bovine Ketosis (Acetonemia / Hypoglycemia)

Ketosis is a metabolic disorder that occurs in cattle when energy demands (e.g. high milk production) exceed energy intake and result in a negative energy balance. Ketonic cows often have low blood glucose (blood sugar) concentrations.

Etiology

Negative energy balance due to increased energy demand for milk production usually in the first few weeks of lactation.

Clinical signs & symptoms

- Wasting form
    - Gradual decrease in milk yield and appetite over 2 - 4 days
    - De-inclination to move (lethargy)
    - Woody appearance (loss of cutaneous elasticity resulting from disappearance of subcutaneous fat)
- Nervous form
    - Abnormal licking and chewing with salivation
    - Walking in circle
    - Crossing of legs
    - Head pushing and aimless wandering
    - Vigorous of licking of skin and inanimate objects
    - Hyperesthesia (bellowing on being pinched or stroked)

Treatment

- 50% Dextrose: 500 ml IV stat (This solution is very hyperosmotic and must be administered IV to avoid adverse effects of perivascular administration)
- Corticosteroids are not recommended for treatment of ketosis.
- B-complex: 8 - 10 mL IM stat
- Glycerine: 300 - 500 ml PO, OD, 5 days

12.2 Pregnancy Toxemia / Kidding Sickness

This is the metabolic disorders of the sheep and goat in the final stages of gestation (1 - 3 weeks before parturition) as a result of inappropriate metabolism of carbohydrates and fats characterized by hypoglycemia, ketonemia, and low liver glycogen.

Etiology

- Inadequate nutrition during late gestation (insufficient energy density of the ration and decreased rumen capacity)

- Obese or having twins or triplet Low level of blood glucose level.
- Insufficient energy gained during pregnancy.
- Hypoglycemia is the root cause.

Clinical Signs & symptoms

- Disinclination to move
- Separation from herd
- Appear as blind
- Teeth grinding
- Convulsions

Treatment

- Dextrose 5%, 60 - 120 ml, IV stat
- Glycerin, 100 ml, PO, OD for 3 days
- Dextrose 5%, 60 - 120 ml, IV stat
- Induction of premature parturition or caesarean section for late term.
- Injection B complex & Liver extract, 2 - 5ml deep IM twice weekly.

12.3 Milk Fever (Parturient Paresis/Hypocalcemia)

Parturient paresis is an acute to per-acute, afebrile, flaccid paralysis of mature dairy cows that occurs most commonly at or soon after parturition. It is manifest by general muscular weakness, recumbency, circulatory collapse and depression of consciousness.

Etiology

Hypocalcemia just before, around, or after parturition.

Clinical signs & symptoms

There are three progressively worse stages

- Stage I
    - Restlessness
    - muscle fasciculation (twitching) over shoulder and neck
    - cool skin
    - anorexia
    - rumen atony with mild bloat
    - insecure gait
- Stage II
    - General muscle weakness leading to sternal recumbency with head resting on the chest sternal recumbency with head resting on the chest.
    - mental depression,
    - dilated pupils
    - weak heartbeat and pulse

    - increased heart rate
    - dry muzzle
    - dry feces
    - hypothermia.
- Stage III
    - lateral recumbency
    - severe obtundation
    - severe rumen bloat
    - Barely audible heart
    - tachycardia
    - circulatory collapse
    - coma and death

Treatment

- Calcium borogluconate at 2.2 g/100 kg slow IV and SC (half and half, respectively) (see Figure 3).
- Oral supplementation of commercial calcium preparation as per label.

Caution

- Auscultate the heart as you administer calcium as cardiac arrhythmias may develop.
- Warm the calcium solution to match the body temperature.

Note: 450 ml of calcium borogluconate will supply 8.3 g of calcium.

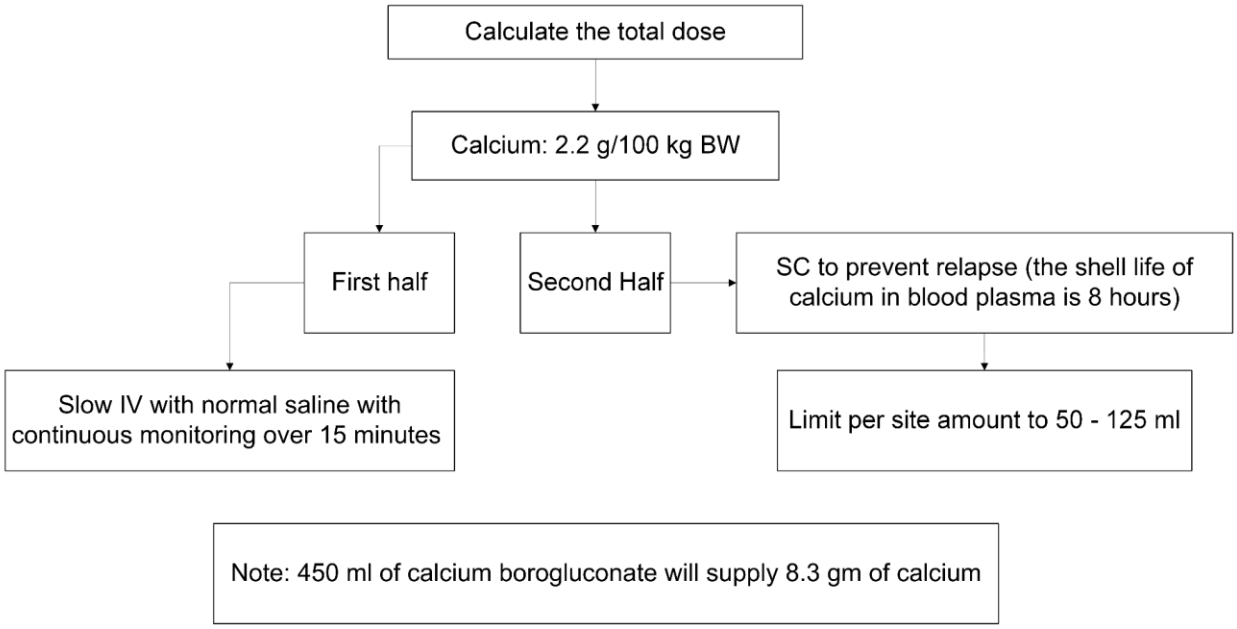

Figure 8. Dosing and treatment guideline of calcium borogluconate in milk fever in cattle.

Prevention and control

- Reduce dietary calcium intake 2 - 3 weeks before calving to 20 gm calcium per cow per day
- Partial milking during first few days
- Oral calcium supplementation
- Vitamin D supplementation during gestation

12.4 Eclampsia

Eclampsia is an acute, life-threatening condition that usually occurs at peak lactation, 2–3 weeks after whelping. Small-breed bitches with large litters are most often affected. It is an acute condition usually occurring 2-4 weeks after whelping in bitches.

Etiology

- Excess loss of calcium in milk.
- Inadequate dietary calcium intake.
- Small breeds are highly susceptible and small bitches with large litter are more prone to the disease.

Clinical signs & symptoms

- Panting and restlessness
- Hyperesthesia
- Salivation
- Stiffness/limb pain
- Ataxia
- Hyperthermia
- Tachycardia
- Facial pruritus
- Restlessness, muscle tremors and violent seizures
- Panting

Diagnosis

- Signalment (typically a small-breed dog nursing a large litter at peak lactation)
- Clinical sign

Treatment

- Calcium gluconate, 0.5 - 1.5ml/kg BW diluted with normal saline slow IV over 10 - 30 minutes.
- Once the animal is stable, the dose of calcium gluconate needed for initial control of tetany may be diluted in an equal volume of normal (0.9%) saline and given subcutaneously every 8 hours to prevent relapse.
- Meloxicam, 0.5 mg/kg BW IV stat.

- Not to let puppies or kittens nurse for 12-24 hours after the bitch or queen is treated for hypocalcemia (Support with milk supplement).

Note: Corticosteroids lower serum calcium and, therefore, are contraindicated. They may interfere with intestinal calcium transport and increase urinary loss of calcium.

12.5 Downer's Cow syndrome

Downer cow syndrome is ischemic necrosis of large muscles of pelvic limbs secondary to prolonged recumbency usually associated with milk fever and/or any other causes of recumbency.

Etiology

- Ischemic myopathy of large muscles of pelvic limbs
- Ischemic neuropathies of obturator or sciatic nerve or its branches secondary to prolonged recumbency
- Complication of milk fever or dystocia
- Injury of bones, joints, and muscles.

Clinical signs & symptoms

- Unable to stand following treatment for milk fever
- Sternal recumbency
- Normal mental status
- Normal vital signs
- Appetite and thirst normal or mildly decreased.

Treatment

- Treatment of primary cause as indicated

Supportive care

- Move cow off concrete floor onto soft bedding
- Oral fluid therapy in dehydrated or anorectic cows
- Roll recumbent cow from one side to the other q4-8h
- Meloxicam, 0.5 mg/kg IV single dose.
- Dexamethasone (0.2 to 0.3 mg/kg IV as a single dose)
- Host cows that make attempts to stand

Prevention and control

Close monitoring of periparturient cows for signs of milk fever.

12.6 Azoturia/Monday Morning Sickness

It is disease of horses occurring during exercise or work after a period of inactivity on full ration characterized by myoglobinuria and muscular degeneration.

Etiology

- Mainly occurs in horse with good ration following prolonged resting and suddenly brought to exercise/work.
- Large store of glycogen is laid down in muscles during a period of idleness and when the horse work or exercise, the glycogen is rapidly metabolized into lactic acid.
- Nutritional deficiency of vitamin E and Selenium have been suggested as a cause

Clinical signs & symptoms

- Signs develop shortly after onset of exercise
- Dog sitting posture followed by lateral recumbency
- Excessive sweating
- Tachypnea
- Tachycardia
- Muscle fasciculation (twitching)
- Reluctance and refusal to move
- Firm, painful lumbar and gluteal muscles
- Dark-brown or coffee colour urine (due to presence of myoglobin)

Treatment

- Immediate withdrawal from work and avoid further exercise
- Hot fomentation on the affected parts
- Effort to keep the horse standing (slinging is suggested)
- Flunixin meglumine, 1.1 - 2.2 mg/kg BW IM/IV OD, repeated for 3 - 5 days
- Chlorpheniramine maleate, 5 - 10 ml IM OD, repeat for 3 - 5 days

12.7 Hypomagnesaemia/Lactation tetany/Grass tetany

It is a highly fatal disease of adult ruminants and is characterized by hypomagnesaemia, muscular spasms, hyperexcitability, convulsions and rapid death.

Etiology

- Low magnesium concentration in the diet.
- Presence of competing cations such as potassium and sodium that affect magnesium absorption.

Clinical signs & symptoms

- Incoordination
- Staggering gait
- Hyperesthesia
- Twitching of muscles
- Convulsions
- Frothing of mouth
- Champing of jaws
- Nystagmus (eyes move rapidly and uncontrollably)

Treatment

- Combined calcium–magnesium preparation containing 1.86% W/V calcium and 5% magnesium hypophosphite
    - Cattle: 250 - 450 ml slow IV mixed in normal saline with continuous monitoring of heart.
    - Sheep/Goat: 50 ml slow IV mixed in normal saline with continuous monitoring of heart.

Prevention & Control

Commercial Magnesium supplementation as per manufacturer label.

13. POISONING

13.1 Urea Poisoning

Ingestion of excess urea or NPN

Etiology

Ingestion of excess urea or other sources of nonprotein nitrogen (NPN).

Clinical sign and symptoms

- Muscle tremors (especially of the face and ears)
- Abdominal pain
- Frothy salivation
- Tremors progress to incoordination and weakness

Treatment

- Advice owner to drench iced (0–4°C) water 20 - 40 L in adult cattle.
- Ruminal infusion of 5% acetic acid (vinegar, 0.5- 2 L in sheep and goats and 2–8 L in cattle, stat.

13.2 Bracken Fern Poisoning / Bovine Enzootic Hematuria (BEH)

It is a chronic non-infectious disease of ruminants caused by bracken fern intoxication and is characterized by passage of red urine.

Etiology

- Toxic factors present in bracken fern *Pteridium aquilinum.* Depends on dose and duration of exposure, usually prolonged.

Clinical signs and symptoms

- Intermittent red urine (hematuria) with or without clots
- Anemia
- Rapid weight loss
- Fever (41°–43°C)
- Weak
- Gradual production loss
- Ulcers and hemorrhages in the nose.
- Melena (blood in faces)
- Respiratory problems
- Bleeding if there is small wound or insect bites as coagulation is prolonged
- Acute infection, mortality > 90%

Treatment

- Reduce exposure to the bracken fern
- Sodium acid phosphate, 30 gm PO, OD, 4 hours before hexamine, for 4 - 10 days or boric acid, 15 gm
- Hexamine, 4 - 8 gm, PO, OD, for 4 - 10 days
- In horse
    - Thiamine solution, 5 mg/kg BW, every 3 hours interval initially. Repeated IM for several days. Continue oral supplementation for 1 - 2 weeks or SC injection, 100 - 200 mg OD for 6 days

Supportive therapy

- Calcium borogluconate, 150 ml, IV for 2 - 3 injections
- Adrenaline, 10 ml, IM stat
- Chlorpheniramine maleate, 10 ml, alternate days for 4 - 5 injections
- Gentamicin, 2 - 4 mg/kg BW IM OD, for 7 days
- Large Animals
    - Etamsylate, 250 - 500 mg IM/IV QID (total dose) or
    - Adrenochrome, 20 - 25 mg (total dose)
- Small animals
    - Adenochrome, 5 - 10 mg IM (total dose)
- Vitamin and amino acids, 5 - 10 mg/animal/day for 1 - 2 weeks

Prevention

- Reduce exposure to bracken fern

13.3 Chuuduk/Blue-green algae poisoning in Yaks

Blue green algae poisoning in yaks in the high altitudes in the country is caused by the algal toxins accumulated in stagnant water ponds during winter season when the yaks migrate downhill.

Etiology

Cyanobacterial toxins of Anabaena & Lyngbia sp.

Clinical signs & symptoms

- Inappetence.
- Unable to graze.
- Foul smelling of breath and paralysis of hindquarters just before death.

Treatment

- Modified universal antidote:
    - Activated charcoal - 250g, Magnesium sulphate - 500g, Light Magnesium oxide-250g, Kaolin-250g & Liv 52- 250g. Give - 50g/animal twice daily orally.
- Antihistamine
    - Chlorpeniramine maleate - 30 - 50mg (total dose) IM.
- Neurotinic
    - Vitamin B - 10-15ml IM.

13.4 Pyrrolizidine alkaloid poisoning in Yaks

It is a chronic disease caused by the ingestion of senecio and crotalaria plants and is characterized by photosensitization, alopecia and cirrhosis.

Etiology

Ingestion of Senecio and Crotalaria sp plants

Clinical Signs & Symptoms

- Dullness with occasional periods of excitability and frenzy.
- Severe diarrhoea.
- Photosensitization with alopecia and skin lesions.

Treatment

Further intake of toxic plant material must be prevented.
Universal antidote

- Activated charcoal - 500g, Magnesium sulphate - 500g, Liv52 -100g & honey. Divide into three parts and give twice daily orally till the animal passes diarrheic dung.
- Antihistamine:
    - Chlorpheniramine maleate, 30 - 50mg (total dose) IM.
- Antiseptic dressing of wound.
- Vitamin B complex, 5 -10 ml IM.
- Supportive fluid therapy.

13.5 Oak Poisoning in Cattle

Oak poisoning in cattle is caused by ingestion of considerable number of tender leaves of oak plant especially during late winter to end of spring during scarcity of feed and fodder.

Etiology

Ingestion of considerable number of tender leaves of oak plant Quercus Sp.

Clinical signs & symptoms

- Dull & reduced appetite.
- Animal passes hard faeces with lot of mucus and blackish blood specks.

Treatment

- Activated charcoal, 100 g & Kaolin - 100g. Divide into three parts and give three times in day orally.
- Sodium bicarbonate, 360 g. Divide into three parts and give twice daily for three days.
- Antihistamine
    - Chlorpheniramine, 30 - 50mg (total dose) IM for 3 days.

13.6 Adha-Rukha Disease in Equine

It is an alkaloid intoxication disease of equines all over the country caused by prolonged ingestion of Ageretera sp plant and is characterized by respiratory distress.

Etiology

Ingestion of *Ageretera sp* plant.

Clinical signs & symptoms

- Inappetence & panting.
- Inability of the horse to climb uphill with the usual load.
- Coughing & respiratory distress.

Treatment

- There is no treatment for chronic condition.
- Once the animal has been diagnosed with Adha-Rukha disease, the standard line of treatment is aimed at prolonging the lifespan of the animal.
- Anti-inflammatory
    - Flunixin meglumine, 1.1-2.2 mg/kg BW OD for 3 -5 days.
- Antibiotic:
    - Streptopenicillin, 1500 IU/kg BW IM for 7days.
- Anthelmintic
    - Levamisole, 7.5 mg/kg BW Oral/SC.

13.7 Lantana camara Phototoxicity in Livestock

It is common in lower altitudes especially in plain area in the country characterized by phototoxic skin lesions and hepatic insufficiency.

Etiology
Lantana camara

Clinical signs & symptoms

- Anorexia.
- Constipation.
- Oedematous swelling of ear & face.
- Patches of eruptions on the skin.
- Incoordination.
- Curled ear & pealing of dry skin.

Treatment

- Antidote
    - Activated charcoal - 500g, Magnesium ulphate - 500g, Liv 52 - 100g & Honey. Mix and divide into three parts and give twice daily till the animal passes diarrheic dung.
- Antiseptic dressing of wound.

14. INFECTIOUS / BACTERIAL DISEASES

14.1 Anthrax

Anthrax is a noncontagious zoonotic disease commonly seen in domestic and wild herbivores but can also be seen in humans exposed to infected animals or animal products.

Etiology

- *Bacillus anthracis:* large, gram-positive, aerobic, spore-forming.

Clinical signs & symptoms

- Sudden death (often within 2 to 3 hours of being apparently normal).
- High temperature, difficulty breathing, collapse and convulsions before death. This occurs over a period of 24 hours.
- After death blood does not clot, resulting in a small amount of bloody discharge from the nose, mouth and other natural openings.

Treatment

Animals at risk should be immediately treated with a long-acting antibiotic to stop all potential incubating infections, followed by vaccination 7–10 days after treatment.

- Long-acting antibiotic: Benzathine Penicillin 22,000 IU/kg BW OD IM OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.

Prevention & control

Never open the carcass of animal suspected for Anthrax. For further details, refer guidelines for preparedness, surveillance and control of Anthrax in human and animals in Bhutan, 2013.

14.2 Hemorrhagic Septicemia (Pasteurellosis)

Hemorrhagic septicemia is a disease of cattle & buffalo resulting due to distress and leading to high mortality, but antimicrobial treatment in the early stages of the disease can reduce mortality. Respiratory system is affected in this disease.

Etiology

- *Pasteurella multocida.*

Clinical signs & symptoms

- Anorexia
- Fever (104°–106°F)
- Oedema of the neck & brisket region
- Labored breathing (dyspnoea)

- Cough
- Mucopurulent nasal and ocular discharges
- Hypersalivation
- Sudden death

Treatment

- Antibiotic: Sulfadimidine 100 mg/kg BW IV for 3 - 5 days OR Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.
- Antihistamine: Chlorpheniramine maleate 30-50 mg (total dose) IM OD for 3 days.
- Meloxicam 0.5 mg/kg BW PO, IV, IM, SC OD for 3 days.
- Fluid therapy: NS 50 ml/kg/day.
- Vitamin B complex 5-10ml IM.

Prevention & control

The infected animals should be isolated and treated separately. Vaccination (refer annual HS + BQ vaccination schedule).

14.3 Black Quarter (BQ)/ Black Leg

It is a disease of cattle & sheep characterized by high rise of body temperature, emphysematous sero-hemorrhagic swelling of the heavy muscles and lameness.

Etiology: Gram-positive anaerobic spore forming bacteria, *Clostridium chauvoei.*

Clinical signs & symptoms

- Severe lameness, especially in the hind legs.
- Fever, but by the time clinical signs are obvious, body temperature may be normal or subnormal.
- Crepitant swellings in the hip, shoulder, chest, back, neck.
- Decreased blood supply to affected areas, skin becomes cold and insensitive. (Supply of oxygen)
- Tremors.

Treatment

- Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.
- Meloxicam: 0.5 mg/kg BW PO, IM, IV, SC OD for 3 days.

Prevention & control

- Good hygienic measures should be followed along with isolation of the infected animals.

- Dead animals should be burnt or buried deep.
- Vaccination (refer schedule).
- In an outbreak all cattle in the remainder of the herd should be vaccinated immediately and injected with penicillin 10,000 IU/kg BW to prevent new cases for as long as 14 days.

14.4 Bacillary Hemoglobinuria

It is an acute, highly fatal toxemia of cattle and sheep characterized by high rise of body temperature, jaundice and hemoglobinuria.

Etiology: Clostridium haemolyticum

Clinical signs & symptoms

- Rise in body temperature.
- Depression.
- Weakness & anorexia.
- Brisket oedema.
- Jaundice & passing of coffee coloured urine.
- Pregnant cows often abort.

Treatment

- Antibiotic: Benzathine penicillin 22000 IU/kg BW IM for 3 – 5 days OR Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.
- Fluid therapy in the early stages of infection.

Prevention & control

Vaccination. The carcases of animals dying of the disease should be disposed of by burning or deep burial.

14.5 Navel ill & Joint ill

Naval ill refers to inflammation of umbilical vein or umbilical cord and joint ill refers to inflammation of one or more joints. Both the conditions occur simultaneously and joint ill may follow navel ill. It commonly occurs immediately after the birth of young ones of all the species of domestic animals.

Etiology: E coli, Proteus spp*, Brucella* spp*, Campylobacter* spp*, Leptospira* spp

Clinical signs & symptoms

- Swelling, redness, or discharge at the navel

- Painful abscesses or creamy white pus at the navel
- Lameness or arthritis
- Cloudy eyes
- Poor appetite or diarrhoea
- Fever

Treatment

- Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours
- Meloxicam 0.5 mg/kg BW PO, IV, IM, SC OD for 3 days.
- Abscess should be surgically opened to drain out and treated with suitable antiseptics.

Prevention & control

- Disinfect the navel and cord as soon as possible after birth.
- Ensure calves receive adequate colostrum within the first two hours of life.
- Maintain good hygiene at calving time.

14.6 Brucellosis

Brucellosis is a contagious disease characterized by inflammatory response of reticuloendothelial system and placenta during pregnancy resulting in death and expulsion of the fetus. It is of zoonotic importance.

Etiology

- *Brucella abortus* in cattle, sheep & pigs.
- *B. ovis* in sheep.
- *B. canis* in dog.
- *B. melitensis* in cattle, sheep & pigs. *B suis* in pigs.

Clinical signs & symptoms

- Abortion (normally 3rd trimester of pregnancy).
- Temporary or permanent sterility.
- Orchitis.
- Retention of placenta.
- Lameness.
- Metritis.

Treatment

- No practical treatment is available. Control programs must rely on detection of infected herds and preventing infection infiltrating "clean" herds.

- Eventual eradication depends on repeated testing and culling of all positive animals.

Prevention & control

For the eradication of brucellosis, test and cull method is widely adopted. For more information refer National Brucellosis Prevention, Control and Elimination Plan 2022.

14.7 Tuberculosis

It is a chronic contagious disease of animals.

Etiology: Mycobacterium tuberculosis & M bovis.

Clinical signs & symptoms

- Loss of body weight.
- Dyspnoea.
- Increased respiration rate.
- Persistent painful dry hacking cough.

Treatment

Treatment of bovine tuberculosis is not recommended due to its infectious nature. If an animal is found to be infected, it should be disposed culled from the herd (like in Brucellosis).

Prevention & control

- Many countries have eradicated or controlled bovine TB through a test-and-cull method. Disinfection of feeding trough, watering utensils, milking pans and animal premises.
- Newly purchased animals should be tested before allowing them to mix with the rest of the animals in the herd.

14.8 Paratuberculosis (Johne's disease)

It is chronic infectious disease of ruminants.

Etiology: Mycobacterium paratuberculosis

Clinical signs & symptoms

- Emaciation.
- Submandibular oedema.
- Chronic diarrhoea.

Treatment

- Antibiotic: Streptomycin 10 mg/kg BW IM OD for 3 – 5 days.
- Meloxicam 0.5 mg/kg BW PO, IV, IM, SC OD for 3 days.

Prevention & control

- Isolation & segregation of infected animals. Frequent harrowing of pasture fields.
- Prevent contamination of feed and drinking water by feces.
- Disinfection of premises and utensils.
- Proper disposal of animal dung.

14.9 Foot Rot

Foot rot is a sporadic infection of the soft tissues in interdigital cleft of the foot in dairy and beef cattle, creating a sudden onset of mild to severe lameness. Commonly seen in hind limbs.

Etiology:

- Injury to the interdigital skin provides a portal of entry for infection. Maceration of the skin by water, feces and urine may predispose to injuries.
- Out of all the gram-negative anaerobic bacteria, the most common pathogen associated with foot rot is *Fusobacterium necrophorum or Dichelobacter nodosus*.

Clinical signs & symptoms:

- Lameness, swelling of infected hoof, lesions in interdigital cleft, and foul smell.

Treatment:

- Benzathine Penicillin 22,000 IU/kg BW OD IM OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.
- Foot bath: 5% copper or zinc sulphate solution or with 3-5% formalin.
- Advise for hot fomentation.
- Topical application of fly repellent or antibiotic ointment or spray.
- Wound dressing according to the severity of the infection.

Prevention & control:

- Animal should be placed on clean, dry, and smooth surface in indoor conditions.
- Use of foot bath.

14.10 Actinomycosis (Lumpy Jaw)

Chronic bacterial disease of hard tissues characterized by swelling, abscess & osteitis in cattle. Jaw bones are mainly affected, interfering prehension and mastication. It's also called as Lumpy jaw.

Etiology:

- Primarily caused by *Actinomyces bovis,* a Gram-positive anaerobic bacterium.

Clinical signs & symptoms:

- Granulomatous abscess that is chronic, localised, progressive, and frequently seen in maxillae, mandible, or other bone tissues of the head region.
- Swellings and pus discharge
- Difficulty in mastication leading to anorexia.

Treatment:

- Cleaning of oral cavity with antiseptic solutions: 0.1-0.2% chlorhexidine OR 0.5-1% sodium bicarbonate OR sodium carbonate or sodium hydroxide OR 1:1000 potassium permanganate OR 2% boric acid OR 2% alum.
- Application of mild antiseptic collutory (mouthwash): 2% suspension of copper sulphate solution OR 1% suspension of sulphonamide in glycerine.
- Administration of broad-spectrum antibiotics: Amoxicillin: Cattle 7 – 15 mg/kg BW BID PO 3 – 5 days OR Oxytetracycline SA 10 mg/Kg BW/day OD 3 - 5 days.
- Cauterization of long-standing ulcers with silver nitrate stick or iodine tincture.
- Supportive treatment with IV fluids, soft palatable feed, and anti-inflammatory drugs like Meloxicam 0.5 mg/kg BW PO/IM/IV/SC for 3 days.

Prevention & control:

- Although there is no vaccine available, regular veterinary inspections and immediate treatment of any lesions or wounds are required to prevent secondary infections.
- To reduce transmission, clean and disinfect the dwelling space, feeding troughs, and water supplies on a regular basis.
- Proper waste management is required to prevent the building up of organic material in areas where the pathogens can thrive.
- Strictly adhere to biosecurity protocols.

14.11 Actinobacillosis (Wooden Tongue)

Actinobacillosis is an infectious disease of domestic animals characterized by inflammation of tongue & and soft tissues around the neck, head, oral cavity, pharyngeal lymph nodes, oesophageal groove & nasal cavity.

Etiology

Gram negative, non-motile, and commensal bacteria in buccal cavity, *Actinobacillus lignieresii.* (in cattle and sheep)

Clinical signs & symptoms

- Profuse salivation.
- Swollen tongue, hard at the base, tip apparently normal, painful response on touch.
- Ulcers or nodules are present in the tongue.
- Enlarged Submandibular lymph nodes.

Treatment

- Surgical debulking of lesion, drainage of the abscess and dressing of the wound with Iodine. (Aseptic treatment)
- Regular wound dressing until the wound subsides.
- Supportive care with fluid therapy.
- Sodium iodide is the treatment of choice in ruminant Actinobacillosis. Intravenous sodium iodide (70 mg/kg of a 10% to 20% solution) is given once and then repeated 1–2 times at 7- to 10-day intervals.
- Systemic antibacterial agents, such as penicillin, ampicillin, and tetracyclines may be effective and are primarily recommended in severe cases of Actinobacillosis or in cases refractory to sodium iodide therapy.
- Long-acting antibiotic: Benzathine Penicillin 22,000 IU/kg BW OD IM OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.

Prevention & control

- In ruminants, wooden tongue is prevented primarily by avoiding coarse, stemmy feedstuffs and pastures full of hard, penetrating plant awns (ie, foxtails or thistles).

14.12 Calf Scour

It is an increase in the water content, frequency, and volume of feces in calves under one month old, commonly the single biggest cause of mortality in cattle.

Etiology

Multifactorial: Infectious and Non-Infectious

A. Non-infectious: Unhygienic and poor nutrition.
B. Infectious:
    - Viruses: *Rotavirus, Coronavirus, BVD*
    - Parasites (protozoa): *Cryptosporidium parvum, Coccidia, Giardia*
    - Bacteria: *Enterotoxigenic E. coli, Salmonella, Clostridium perfringens*
C. Other factors:
    - Environmental: Management practices and hygiene, Weather conditions
    - Calf: Calf age and immune status (lack of this passive transfer of immunity)

Clinical signs & symptoms

- Diarrhea (dirty tail)
- Dehydration (sunken eyes, slow skin tent, more than two seconds)
- Depression and weakness (ead down, ears down, not willing to stand for a long time)
- Fever or, in late stages of disease, cold extremities (ears and legs)
- Loss of suckle reflex (Indicates severe disease)
- Metabolic acidosis: breathe rapidly to reduce carbon dioxide in the blood; this partially corrects the acidosis and this rapid breathing is often confused with signs of pneumonia

Treatment

- Reversing dehydration by providing fluids. (Intravenous of 0.9% saline and 8.4% hypertonic saline bicarbonate solution)
- Meeting energy requirements (milk feeds or energy supplements)
- Providing intestinal protectants such as kaolin
- Providing a warm, dry environment for the calf
- Treating with antibiotics if warranted by the diagnosis (when bacteria are the cause).
- Azithromycin 10 mg/kg BW PO OD for 3-5days OR Sulfadimidine 100 mg/kg BW IV OR Metronidazole 10mg/kg BW PO, BD for 3-5days (Metronidazole not recommended in food producing animals)

Prevention & control

- Ensure that all calves get colostrum within the first six hours.
- Reduce pathogen exposure: Hygiene and management.
- Provide a balanced mineral program to the mother cows prior to and after calving to ensure that the cow has the foundation for normal electrolyte balance and milk production.

14.13 Infectious Keratoconjunctivitis (Pink Eye)

Infectious keratoconjunctivitis is a highly contagious ocular disease of cattle, yak, mithun, sheep and goat. The disease transmits through direct contact with nasal or ocular discharges or mechanically through vectors like *Musca domestica* (Common house fly).

Etiology

Gram-negative bacteria, *Moraxella bo*vis.

Clinical signs & symptoms

- Profuse lacrimation from the affected eye
- Conjunctivitis

- Blepharospasms
- Drooping of eyelids
- Matting of eyelashes
- Corneal opacity
- Keratitis and corneal ulceration
- Complete blindness

Treatment

- Irrigate the eye with sterile normal saline at least 3-4 times a day until the infection subsides.
- Antiseptic eye lotion/wash with 1% boric acid solution.
- Antibiotic eye drops/ointment: Gentamicin eye drop. Apply 1-2 drops twice daily for a week OR Chloramphenicol eye ointment. Apply twice daily for a week.
- Oxytetracycline 5-10 mg/Kg BW. IM OD for 5 days.
- Flunixin 1.1-2.2 mg/kg BW IM, slow IV, OD for 3 days.
- Vitamin A 440 IU/kg BW IM once in a week may be given for better response.
- Keep animals away from light sources.

Prevention & control

- It's essential to keep the affected animal away from direct sunlight.
- Isolation of infected animals from the rest of the herd.
- Fly control is essential in the barn.

14.14 Tetanus (Lock jaw)

Tetanus is caused by the neurotoxin produced by *Clostridium tetani*, which is found in soil and intestinal tracts and usually introduced into tissues through deep puncture wounds. The toxin causes a generalized muscular spastic paralysis.

Etiology: Clostridium tetani

Clinical signs & symptoms

- Localized stiffness, often involving the masseter muscles and muscles of the neck, the hind limbs, and the region of the infected wound.
- Spasms of head muscles cause difficulty in prehension and mastication of food (lockjaw).
- In horses, the ears are erect, the tail stiff and extended, the anterior nares dilated, and the third eyelid prolapsed. Difficulty in walking, turning, and backing. Spasms of the neck and back muscles cause extension of the head and neck, while stiffness of the leg muscles causes the animal to assume a "sawhorse" stance.

Treatment

- Isolation of the animal.
- Tetanus anti toxin 100000 to 200000 units IV usually should be given before the disease is fully developed.
- Prophylactic tetanus toxin 1500 to 3000 units especially at the time of castration and deep penetrating wounds.

Prevention & control

- The animals should be vaccinated with tetanus toxoid 5 – 10 ml IM.

14.15 Strangles (Equine Distemper)

Strangles is an infectious, contagious diseases of Equines. It is highly host-adapted and produces clinical signs only in horses, donkeys and mules. The severity is more in horses than in donkeys and mules.

Etiology

Streptococcus equi equi, a Gram-positive coccus bacterium.

Clinical signs & symptoms

- Incubation period is 3-14 days.
- The first sign of infection is fever (103ºF-106ºF), mucoid to mucopurulent nasal discharge, depression, cough and submandibular lymphadenopathy.
- Difficulty in swallowing, inspiratory respiratory noise and extended head and neck.
- Metastatic strangles (bastard strangles) is characterized by abscessation in other lymph nodes of the body, particularly in the abdomen.

Treatment

- Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days.
- Flunixin meglumine (1.1 – 2.2 mg/kg IM/IV) once daily.
- Warm compresses/hot fomentation over the sites to lymphadenopathy to facilitate the maturation of abscess.
- Rupture and drainage of matured abscess followed by flushing with dilute (3%-5%) povidone-iodine.

Prevention & control

Isolation of the clinically affected horses, disinfection of the contaminated equipment.

14.16 Enterotoxaemia

Clostridium perfringens enterotoxin (CPE) is the principal toxin involved in *C. perfringens* foodborne illness and is associated with non-foodborne diarrheal disease in different animals. *C. perfringens* also produces a necrotizing toxin associated with necrotic enteritis in poultry and dogs, colitis in horses, and diarrhea in pigs.

Etiology: Clostridium perfringens Type B and C

Clinical signs & symptoms

- In calves, there is acute diarrhea, dysentery, abdominal pain, seizures, and opisthotonos.
- Lamb dysentery is an acute disease of lambs < 3 weeks old.
- Fetid, blood-tinged diarrhea is common, and death usually occurs within a few days.

Treatment

Treatment is usually ineffective because of the severity of the disease but, if attempted, includes administration of specific hyperimmune sera and oral antimicrobials.

- Antibiotic: Sulphadimidine 200mg/kg (2 boli/50kg) Oral followed by 1boli/50kg for further 2 days only OR Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days
- Universal antidote: Activated charcoal 2 parts, Magnesium oxide 1 part, Kaolin 1 part and tannic acid 1 part. Give 30-100g twice daily, orally for 2-3days.

  Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days OR alternatively with Oxytetracycline LA 20 mg/kg BW IM OD every 72 hours.

Prevention & control

- Vaccination (refer schedule).

14.17 Leptospirosis

- Leptospirosis is a febrile disease of zoonotic importance.

Etiology

- *Leptospira icterohemorrhagiae* in cattle, pigs, horses, dogs & cats.
- *L. pomona* in cattle, sheep, pigs, horses.
- *L. canicola* in dogs, cats, cattle, pigs & horses.

Clinical signs & symptoms

- Dogs:
  - Clinical signs due to acute kidney injury: Lethargy, anorexia, vomiting, abdominal pain, polyuria, oliguria or anuria.

- Clinical signs due to acute liver damage: icterus, vomiting, anorexia, lethargy, hemoglobinuria.
- Other clinical signs: muscle pain, stiffness, weakness, trembling and reluctance to move.

- Ruminants:
  - Abortion at any term of the pregnancy, birth of a weak offspring, embryo loss and estrus repetition, blood-tinged milk production in lactating cows.

Treatment

Cattle & pigs:

- Antibiotic: Streptomycin 10 mg/kg BW IM twice daily for treatment of systemic infection and Streptomycin 25mg/kg BW single injection for elimination of *Leptospira* in cattle & pigs OR Oxytetracycline 10mg/kg BW IM/IV for 3-5days.
- Blood transfusion 5-10 L/450kg BW are indicated for treatment of haemolytic anemia.
- Fluid therapy: Vitamin B complex 5 -10 ml IM.

Dogs:

- Antibiotic: Doxycycline 5-10mg/kg BW BID PO for 2 weeks. In dogs that cannot tolerate Doxycycline, start with Penicillins followed by Doxycycline for 2 weeks Ampicillin 22mg/kg BW IV TID for 2 weeks OR Streptopenicillin 40000 IU/kg IM OR Enrofloxacin 2.5-5mg/kg BW PO, IM for 1-3 weeks plus Ampicillin.
- Antiemetic (anti-vomition): Metoclopramide 0.2mg/kg BW IM/IV.
- Antidiarrheal: Metronidazole 10mg/kg BW BID PO, IV OR Loperamide 0.2mg/kg BW PO.
- Fluid therapy: DNS, RL, NS, D5.
- For inappetence: B Complex 0.2-0.5ml IM/IV.
- Meloxicam 0.5 mg/kg BW in cattle, 0.2 mg/kg BW in dog, 0.3 mg/kg BW in cat, 1 mg/kg BW one dose in small ruminants, 0.6 mg/kg BW in equine, 0.4 mg/kg BW in swine IM, IV, SC, PO OD for 3 days
- Antacids: Omeprazole 0.1 mg/kg BW IV BID OR Ranitidine 0.5 mg/kg BW IM, IV, SC OD for 3 days.
- Blood transfusion may also be necessary if your dog has been severely hemorrhaging.

Prevention & control

- The control of leptospirosis depends upon elimination of carrier animals, appropriate hygienic measures to control spread of infection and vaccination of susceptible animals.
- In an outbreak of the disease in cattle the simultaneous treatment of all animals with dihydrostreptomycin 25mg/kg BW and vaccination with the causative serotype bacterins have been successful in preventing new cases and especially abortion when pregnant cattle are involved.
- DHPPi+L vaccination of dogs (refer vaccination schedule).

14.18 Mycoplasmal Pneumonia

It is a contagious disease of swine with persistent dry cough and impairment of growth.

Etiology

- Mycoplasma hypopneumoniae

Clinical signs & symptoms

- Acute respiratory distress and coughing.
- Anorectic and unthriftiness.

Treatment

- Antibiotic: Doxycycline 5 mg/kg BW OD BID or 10 mg/kg BW OD for 3 - 5 days in dogs.
- Fluids therapy and vitamin supplement.

Prevention & control

- Observing strict bio-security measures.

14.19 Swine Erysipelas (Diamond Skin Disease)

It is also called as Diamond Skin Disease, and is commonly seen in growing and older pigs.

Etiology:

A Gram-positive bacterium, *Erysipelothrix rhusiopathiae* which is found in the tonsils of pigs.

Clinical signs & symptoms:

- Acute form: there may be sudden death without showing clinical signs, fever (104 – 108°*F), and reluctant to move. Abortion in pregnant sows.*
- Sub-acute form: presence of classic cutaneous rhomboid urticaria (diamond skin) mostly observed on the back, rump or shoulders.
- Chronic form: lameness, arthritis, and endocarditis.

Treatment:

- Benzathine Penicillin 22,000 IU/kg BW OD IM for 3 – 5 days.
  - When injecting large numbers of affected pigs is impractical, tetracyclines delivered in the feed or water may be useful.
- Meloxicam 0.4 mg/kg BW PO IM for 2 – 3 days.

- Treatment of chronic infections is usually ineffective and not cost effective.

Prevention & control:

Effective disease prevention and control need standard farm biosecurity protocols, such as good management practice. Currently, vaccination for this disease is not practiced in the country.

14.20 Glasser's Disease

It is an acute infectious disease of pigs commonly characterized by fibrinous polyserositis and polyarthritis, but septicemia with sudden death and bronchopneumonia also can occur.

Etiology

- *Haemophilus suis* or *H. parasuis.*

Clinical signs & symptoms

- High fever (41.5°C [106.7°F])
- Severe coughing
- Abdominal breathing
- Swollen joints
- CNS signs such lateral decubitus (lying down), paddling, and trembling

Treatment

- Antibiotics: Benzathine penicillin: 22000IU/kg BW, IM OD every after 48 hours once. Sulphadimidine100mg/kg BW for 5 days OR Tetracycline hydrochloride 22 mg/kg BW Oral for 5-7days.

Prevention & control

- Isolation of sick animals and treatment.
- Reduce stress.
- Disinfection of premises.
- All- in, all-out husbandry.

14.21 Kennel cough (Infectious Tracheobronchitis)

Kennel cough is a disease caused due to inflammation of upper airways. It is a mild, self-limiting disease but may progress to fatal bronchopneumonia in puppies to chronic bronchitis in debilitated or aged dogs. Illness spreads rapidly among susceptible dogs in confinement.

Etiology

There are multiple causes of the condition – viral, bacterial, mycoplasmal, stress and environmental factors.

Bacterial agents: *Bordetella bronchiseptica*, *Pseudomonas* spp, *E.* coli, *Klebsiella pneumoniae*, *Mycoplasma* spp.

Clinical signs & symptoms

- Strong cough with a honking (goose honk) which may be followed by retching and gagging'
- Sneezing, runny nose, lethargy
- Partial anorexia
- More severe signs including fever, purulent nasal discharge, depression, anorexia and a productive cough, especially in puppies, indicates secondary infections.

Treatment

Self-limiting, and antibiotics are usually not needed unless there is evidence of pneumonia, if needed:

- Amoxicillin/clavulanic acid tablet 12.5–25 mg/kg BW PO BID for 3 to 5 days OR Doxycycline 5 mg/kg BW BID or 10 mg/kg BW OD PO BID for 5 – 7 days.
- If the cough is persistent, hydrocodone at 0.22 mg/kg BW, PO, every 6–12 hours OR Butorphanol at 0.5 mg/kg, PO, every 6–12 hours, or both as needed.
- Supportive therapy: Fluids & multivitamin.

Prevention & control

- Isolation of sick animal.
- Vaccination for Kennel cough is not practised in Bhutan.

14.22 Pyoderma

Pyoderma literally means "pus in the skin" and can be caused by infectious, inflammatory, and/or neoplastic etiologies; any condition that results in the accumulation of neutrophilic exudate can be termed a pyoderma. Pyodermas are common in dogs and less common in cats.

Etiology

- The primary pathogen of dogs is *Staphylococcus pseudintermedius*.

Clinical signs and symptoms

Pyoderma can be classified based on the depth of infection: surface, superficial, or deep.

In dogs, superficial pyoderma commonly appears as follows:

- Multifocal areas of alopecia
- Follicular papules or pustules
- Epidermal collarettes
- Crusts and scales
- The trunk and abdomen are most often affected
- The hallmarks of deep pyoderma in dogs are pain, crusting, odor, and exudation of blood and pus.

Treatment (dogs and cats)

- Identifying and controlling the underlying cause is critical to avoid recurrence.
- Since Staphylococcus pseudintermedius, the most common pathogen associated with pyoderma, produces beta-lactamase, empirical use of penicillin, amoxicillin, and ampicillin should be avoided.

Most strains are also resistant to tetracycline and streptomycin.

As a consideration for systemic therapy, antimicrobial agents can be classified into first- and second-tier drugs. Treatment with second-tier agents, such as fluoroquinolones, should always be based on bacterial culture and sensitivity results. Duration of therapy is important for successful management.

First-tier drugs include:

- Clindamycin: Dogs and cats: 5.5 mg/kg BW PO BID for 5 – 7 days.
- Cephalexin: Dogs: 20 – 30 mg/kg BW PO BID for 5 – 7 days. In cats: 15-20 mg/kg BW PO BID for 5 – 7 days.
- Amoxicillin/clavulanic acid tablet 12.5–25 mg/kg BW PO BID for 5 – 7 days
- Potentiated sulfonamides.
- Treatment with second-tier agents, such as fluoroquinolones, should always be based on bacterial culture and sensitivity results.
- Following pet shampoos, creams, gels, ointments, and mousses are available.
    - Chlorhexidine (2%–4)
    - Benzoyl peroxide (2.5%–3%)

15 VIRAL DISEASES

A) Large and small ruminants

15.1 Foot & Mouth Disease (FMD)

It is an acute, highly contagious disease of all cloven-footed animals such as cattle, sheep, goat, pig and yak.

Etiology: Apthovirus

Clinical signs & symptoms

Cattle:

- High fever that declines rapidly after 2 or 3 days
- Excessive salivation ("smacking "jaw movement in cattle)
- Vesicles and ruptured lesions on the muzzle, inside the mouth, on feet (interdigital space) and teats
- Reduced milk production

Pig:

- Severe lameness is the more prominent sign
- Myocarditis is more common in young pig than calves

Sheep and Goat:

- Often show mild or subclinical signs of lameness

Treatment (Supportive treatment):

- Antiseptic mouth wash with potassium permanganate, 2% alum and application of boroglycerine paint. Foot lesions should be washed with 2% copper sulphate and 5-10% formalin.
- Antihistamine: Chlorpheniramine maleate30-50mg (cattle- total dose) IM PO BID
- Antipyretic: Meloxicam 0.5mg/kg BW IM OD (cattle), 1mg/kg BW PO SC OD (sheep and goat) 0.4mg/kg BW PO IM OD (pig)
- Multivitamin supplement (B-complex injection 5-10ml/100 kg BW and Mineral mixture powder-refer product label for dosage).
- OTC-LA 20mg/kg BW IM SC every 72 hrs if needed (for the prevention of secondary bacterial infection)

Prevention & control

Refer (National FMD Prevention and Control Guidelines).

15.2 Lumpy Skin disease (LSD)

LSD is a vector-borne pox (Capri poxvirus) disease of domestic cattle and Asian water buffalo that is characterized by the appearance of skin nodules.

Etiology: Capri poxvirus

Clinical signs and symptoms

The incubation period varies between 4 to 14 days, and it may be up to 5 weeks. And clinical signs include:

- Enlargement of subscapular and pre-femoral lymph nodes
- Persistent high fever (> 104F) accompanied by a sharp drop in milk yield.
- Lacrimation and nasal discharge
- Eruption of skin nodules
- Edema on the udder and legs
- Lameness, recumbency, and sometimes death.
- Pneumonia due to secondary bacterial infection.

Treatment:

- Antipyretic: Meloxicam injection 0.5mg per kg body weight IM OD SOS OR Flunixin Meglumine 1.2-2.2 mg per kg body weight IM or Bolus Meloxicam+Paracetamol 1 to 2 boli (large), ½ bolus (young animal) OD SOS.
- Antihistamine injection: Chlorpheniramine maleate 30-50mg IM/PO, BID (cattle- total dose)
- Intravenous infusion: DNS/RL 50-60 ml/kg BW.
- Multivitamin supplement: B-complex injection 5-10 ml (total dose) IM OD, and mineral mixture powder (for dosage, refer to the product label)).
- Ulcerative wound treatment with topical ointments, topical spray-containing vector repellent, and antiseptic solutions.
- Antibiotic: OTC-LA 20 mg/kg BW IM, every 72 hours or Benzathine Penicillin 22000 IU/kg BW IM every 72 hours (to prevent secondary bacterial infection)

Prevention and Control

Refer (The National Lumpy Skin Disease Prevention and Control Plan)

15.3 Peste des Petits Ruminants (PPR)

It is an acute, highly contagious viral disease of goats, sheep manifesting fever, necrotic stomatitis, enteritis, pneumonia, oculonasal purulent discharge and death.

Etiology: Morbillivirus

Clinical signs & symptoms

- High fever (104F-106F),
- Discrete necrotic areas develop in mouth and extend over the entire oral mucosa,
- Serous discharge from nostrils and eyes (mating of the eyelids),
- Excessive salivation,
- Diarrhoea and dysentery,
- Respiratory signs include dyspnoea, sneezing and coughing,

- Abortions in pregnant goats, and sometimes death.

Treatment (Supportive treatment)

- Fluid therapy: DNS & RL 50-60ml/kg BW IV.
- Vitamin B complex 3-6ml IM.
- Antipyretic: Meloxicam injection 0.5mg per kg body weight IM, IV, PO OD SOS or Flunixin Meglumine 1.2-2.2 mg per kg body weight IM, IV.
- Antihistamine: Chlorpheniramine maleate 30-50mg IM, PO BID (cattle- total dose)
- Antidiarrhoeal powder (refer to the product label).
- Antibiotics: Streptopenicillin 2ml/50kg BW IM OR Oxytetracycline(short-acting) 10mg/kg BW IM, IV, OD for 5 days OR OTC-LA 20mg/kg BW IM, SC every 72 hours if needed.

Prevention & control

- Isolation and treatment of diseased animals.
- Vaccination.
- Refer to (the National PPR Prevention and Elimination Plan.)

15.4 Warts (Bovine Papillomatosis)

A wart is a small, rough growth resembling a cauliflower or a solid blister. It is commonly seen in cattle, horses and dogs. It is a self-self-limiting disease.

Etiology: Papillomavirus

Clinical signs & symptoms

Warts appear as solid outgrowths of the epidermis and occur most commonly on the head, around the eyes, neck, and shoulder in cattle and horses.

In dogs, warts usually appear on lips and spread to buccal mucosa and tongue.

Treatment.

The disease is usually self-limiting.

- Autohaemotherapy-20 ml of blood is collected and injected deep 10 IM 10 S/C, at a weekly interval for 4 weeks, and Chlorpheniramine maleate 30-50mg total dose IM, PO BID
  OR Lithium antimony thiomalate: Cattle & horse 15ml deep IM, at alternate days on 3-4 occasions.

  OR Ivermectin Injection 1ml/50kg BW 0.2mg/kg BW on 3 occasions at two weeks intervals.

  OR combination of the above drugs where efficiency is proven effective.

OR Autogenous vaccine prepared from wart tissue 20-25ml SC. Repeat once or twice at weekly intervals.

- Apply a tourniquet on the wart in dogs.
- Surgical removal.

15.5 Rabies

Rabies is an acute viral encephalomyelitis that may affect any warm-blooded animal.

Etiology: Lyssavirus

Clinical signs & symptoms.

- Furious from: very aggressive, attack and bite any objects, do not obey their master ("mad-dog syndrome")
- Dumb/Paralytic form: The paralytic form of rabies is manifested by ataxia and paralysis of the throat, often with profuse salivation, inability to swallow, dropping of the lower jaw, and paralysis progresses rapidly to all parts of the body, and coma and death follow in a few hours.

In both cases, extensive drooling is due to paralysis of the muscles used for swallowing.

Milk production ceases abruptly in dairy cattle. Animals may appear hypersensitive. The affected cattle may exhibit abnormal bellowing which may continue intermittently or voiceless attempts to bellow described as yawning.

Treatment

No treatment should be attempted after the clinical signs are evident. The management of wounds is very important if a dog has been bitten by a rabid dog.

Prevention & control

Refer National Rabies Prevention and control guidelines.

15.6 Infectious Bovine Rhinotracheitis (IBR)

Infectious Bovine Rhinotracheitis (IBR) is an acute, highly contagious cattle disease characterized by fever, rhinotracheitis, conjunctivitis, encephalitis, abortion and pustular vulvovaginitis.

Etiology: A highly contagious disease caused by herpes virus (BHV).

Two forms:

- Respiratory form (IBR)
- Reproductive form (IPV)

Clinical signs & symptoms

Respiratory form:

The onset is sudden, fever (107ºF), reddening of the nose (Red nose), serous and purulent discharge from nose and eyes. Salivation, shallow ulcers on nasal mucosa, and sometimes conjunctivitis, and occasionally death within 24 hrs.

Reproductive form:

Abortion during the early stage of gestation (3rd to 4th month of gestation). Painful urination, grey translucent raised foci which ulcerate later and are found on the mucous membrane of vulva, vagina, (Infectious pustule vulva vaginitis-IPV) prepuce, and penis (infectious pustular balanoposthitis-IPB.

Treatment (Supportive treatment)

1. Strong Tr. Iodine paints on the mucous membrane of the vulva and vagina in the case of reproductive form.
2. Broad spectrum antibiotics to control secondary bacterial pneumonia. (OTC-LA 20mg/kg BW, IM/SC, every 72 hours if needed.

B) Equine species

15.7 Equine Infectious Anemia (EIA)

Equine infectious anemia (EIA) is a vector-borne, non-contagious, infectious disease of horses and other Equidae. It is caused by an RNA virus classified in the Lentivirus genus, family Retroviridae.

Etiology: Lentivirus of Retroviridae family.

Clinical signs & symptoms

Acute form (last 1-3 days): fever (105ºF), and depression.

Chronic form: recurring episodes of fever, anemia, jaundice, petechial on mucous membranes, epistaxis, dependent edema, muscle weakness, and loss of condition

Treatment (Supportive treatment)

There is no treatment (The confirmed cases of the disease are lifelong carriers of the virus; they are usually euthanized or permanently isolated)

- Iron dextran 1-2 ml/ 100 kg BW
- Oral hematinic mixture containing copper, cobalt, and iron salts.

- Broad spectrum antibiotics- Oxytetracycline-SA 6.6mg/kg BW IM/IV OD for 3 to 5 days.

Prevention & control

- Isolate the suspected or sick animals from the healthy horses
- Provide fresh drinking water and a good nutritional diet.
- Proper disinfection of stable and use of insect repellent to control vector.

15.8 Equine Influenza

It is an acute contagious disease characterized by rapidly rising temperature, great prostration, congestion, and edema of the conjunctiva often involving the respiratory and other systems.

Etiology: Influenza A virus

Clinical signs and Symptoms

Simple uncomplicated case:

- Rapid rising temperature higher than 106ºF.
- Great depression and anorexia.
- Slight watery discharge from eyes and nostrils.
- A mild cough.

Complicated cases:

- Pink eye form: photophobia, swelling of the eyelids and conjunctiva, which is of a brownish–red color, severe pink eye, profuse tear.
- Respiratory form: harsh, dry, painful, congestion of nasal mucosa, first serous and later mucopurulent discharge from the nose. Sub-maxillary and suppurate.
- Circulatory form: pericarditis and endocarditis with swelling independent parts.
- Abdominal form: flatulence, constipation, transient colic, enteritis, diarrhoea, and nephritis.
- Rheumatoid form: it affects muscle, joints, tendons and tendon sheath, oedema of the legs.

Treatment (Supportive treatment)

- NSAIDs: Meloxicam 0.5mg per kg BW IM, PO SOS.
- For secondary bacterial complications- Penicillin G 22000IU/kg BW IM every 72 hours.
- Boric lotion and ointment for eye lesions.

Prevention & control

- The infected or suspected cases should be isolated from the healthy horses and kept in insect-proof houses.
- Since mares may transmit the disease to their offspring, such animals should not be used for breeding purposes.
- Proper disinfection of infected stables and equipment.

C) Swine species.

15.9 Classical Swine Fever/Hog cholera

It is an acute highly contagious viral disease affecting pigs of all ages characterized by rapid and sudden onset, high mortality, and mortality with generalized hemorrhages.

Etiology: Toga virus (RNA virus)

Clinical signs & symptoms

It usually appears in three forms viz per-acute, acute, and chronic forms.

Per-acute form: Most common in young pigs. The disease onset is rapid and fatally ends within 24 hours.

Acute form: Sharp rise in body temperature (Fever > 41°C, 105.8°F), death occurs within 10 days after infection, constipation, followed by diarrhea and vomiting is common.

Necropsy findings: widespread petechial and ecchymotic hemorrhages, especially in lymph nodes (e.g., mandibular, retropharyngeal, gastrohepatic), tonsils, larynx, kidneys, spleen, urinary bladder, and ileum, infarction may be observed, particularly in the periphery of the spleen. Macroscopically, in addition to the lesions described above, "button" ulcers may develop in the intestine, particularly near the ileocecal junction.

Chronic forms: characterized by high fever, staggering gait, cough, diarrhea, purple discoloration of the skin, and death. In chronic forms of CSF, after an initial acute febrile phase, infected animals may show an apparent recovery but then relapse, with anorexia, depression, fever, and progressive loss of condition (ie, marked weight loss).

Treatment

No specific treatment against the virus.

1. Antipyretic: Meloxicam 0.4mg/kg BW SOS.
2. Antihistamine: Chlorpheniramine maleate30-50mg IM PO BID
3. B-complex: 5-7ml IM.

Prevention & control

- Vaccination.
- Isolation of infected or suspected animals from healthy ones.
- Proper disinfection of pens of infected pigs.

15.10 African Swine Fever (ASF)

ASF is a highly contagious viral disease of domestic and wild pigs, manifesting itself as hemorrhagic fever with mortalities that can approach 100 percent. ASF is a serious transboundary animal disease (TAD) with the potential for rapid international spread.

Etiology: Asfivirus

Clinical signs and symptoms

The clinical signs of ASF may occur in per acute, acute, subacute, and chronic forms. The incubation period for ASF is variable but is usually between five and fifteen days. In the acute form, pigs develop a high temperature (40.5ºC or 105ºF), then become dull and go off their food. Other symptoms can vary but will include some or all of the following:

- Vomiting
- Diarrhoea (sometimes bloody)
- Reddening or darkening of the skin, particularly ears and snout, and ventral abdomen.
- Gummed up eyes
- labored breathing and coughing
- Weakness and unwillingness to stand
- Nasal frothing.
- Abortion, stillbirths, and weak litter.
- Salmonellosis and poisoning.

Necropsy findings: Enlarged and hemorrhagic gastrohepatic lymph node, Hemorrhagic gastritis, Enlarged and hemorrhagic spleen, Excess yellow peritoneal and other body cavity fluid, Excess yellowish pericardial fluid, and marked multiple hemorrhages over kidney cortex.

Treatment:

No specific treatment against the virus.

Prevention and control

(Refer to National ASF Prevention and Control Plan)

D) Canine species

15.11 Canine Distemper (CD)

Canine distemper is a highly contagious, systemic, viral disease of carnivores. Puppies younger than 4 months, born to mothers who haven't been vaccinated against the virus, are extremely susceptible.

Etiology: Morbillivirus.

The highest incidence of the disease occurs in unvaccinated puppies 6 to 12 weeks of age, at which time maternal antibodies fall below protective levels.

Clinical signs & symptoms

- Fever.
- Pulmonary/Respiratory form: lacrimation and nasal discharge.
- Digestive form: vomiting, foul-smelling watery to mucus blood-tinged diarrhea.
- Ocular form: swelling of eyelids, conjunctivitis, and purulent ocular discharge.
- Cutaneous form: pustules on the belly and inner side of the thigh and skin of foot pads and nose become hard (referred to as hard pad).
- Nervous form: excitement and convulsions.

Treatment (Supportive treatment)

- Fluid and Electrolyte Therapy: RL, DNS, and NS- refer to the fluid therapy section for dosage.
- Antipyretics: Meloxicam 0.2mg/kg BW PO IV on day 2 onward 0.1mg/kg BW OR Paracetamol (10 mg/kg PO BID).
- Anti-emetics: Metoclopramide 0.2–0.5 mg/kg IM, IV BID OR Promethazine 1-2.5mg kg BW BID PO OR Ondansetron 0.5mg/kg BW IV SOS.
- Antacids: Ranitidine 0.5 mg/kg BW SC, IV BID OR Omeprazole 0.5-1mg/kg BW BID, PO, IV
- Anticonvulsants: Diazepam (0.5–2 mg/kg IV) or Phenobarbital (2–5 mg/kg orally, BID).
- Vitamin Supplements: B-complex 0.1-1ml (total dose) IV, IM
- Nervine tonic
- Antibiotic (Ampicillin-cloxacillin 22mg/kg BW IV TID for 1 week OR Amoxycillin-clavulanate 12.5–25 mg/kg BID PO, IM for 5 days OR Bezenthine penicillin 22,000 IU/kg BW IM injection only, every 72 hours

Prevention & control

- Isolation of sick dogs and treatment.
- Disinfection of premises.
- DHPPi+L vaccination (above 45 days of age, booster after 21 days and then annually)

15.12 Parvo Viral Enteritis (PVE)

It is a very contagious and potentially fatal viral disease seen in dogs. Most commonly, parvovirus causes gastroenteritis, or inflammation of the stomach and intestines.

Etiology: Canine parvovirus type -2

Parvo affects dogs of all ages, but most cases occur in puppies 6 to 20 weeks of age.

Clinical signs & symptoms

- Fever (104-105F)
- Pups with severe abdominal pain exhibit a tucked-up abdomen.
- Vomiting
- Foul Muddy-colored diarrhoeic feces.
- Death usually occurs as early as 2 days after the onset of illness.
- Dehydration

Treatment:

- Antipyretic: meloxicam 0.2 mg/kg BW PO, IV on day 2 onward 0.1mg/kg BW (after the animal is fully rehydrated)
- Fluid therapy: RL, NS, and DNS 50-60ml/kg BW IV
- Antiemetic: Metoclopramide 0.2-0.5mg/kg BW IM, IV TID OR Ondansetron 0.5mg/kg BW IV
- Antidiarrhoeal: Loperamide 0.2mg/kg BW PO.
- B complex 0.1-1ml (total dose as per the size of animal) IM, IV SOS.
- Antacids: Ranitidine 0.5 mg/kg BW SC/IV BID OR Omeprazole 0.5-1mg/kg BW BID PO, IV
- Broad-Spectrum Antibiotics: Amoxicillin-Clavulanate 12.5-25 mg/kg PO, IV, IM BID for 5 days, or Ampicillin 20-30 mg/kg IV BID for 5 days
- Gastric protectant: Sucralfate 2-3ml PO OD for 7 days.
- Vitamin C (Ascorbic acid) 0.1-1ml (Total dose)

Note: Puppies and dogs should not be fed or allowed to drink until the vomiting has stopped.

Prevention & control

- Isolation of sick dogs and treatment.
- Disinfection of premises.
- DHPPi+L vaccination.

15.13 Infectious Canine Hepatitis (ICH)

Infectious canine hepatitis (ICH) is a worldwide, contagious disease of dogs and primarily affects the liver, kidneys, and blood vessels.

Etiology: Canine adenovirus-1.

Dogs are more susceptible up to 1 year of age.

Clinical signs & symptoms

The incubation period is 4–9 days.

The signs include:

- Fever of > 40°C (104°F), which lasts 1–6 days and is usually biphasic.
- lethargy, thirst, or anorexia,
- conjunctivitis,
- serious oculonasal discharge, or corneal clouding (blue eye),
- abdominal pain and vomiting, including hematemesis,
- Diarrhoea
- coagulopathy or vasculitis, such as petechial of the oral mucosa

Treatment (Supportive treatment)

- Fluid Therapy: Use isotonic fluids (e.g., Ringer's Lactate or Normal Saline, and DNS 50-6ml/kg BW)
- Analgesic: Meloxicam 0.2mg/kg BW PO, IV on day 2 onward 0.1mg/kg BW
- Anti-histamine: Chlorpheniramine maleate 0.2-2mg (total dose) IM, PO
- Antibiotic: Amoxicillin-clavulanate: 20-25 mg/kg PO, IM BID for 5 days.

1. Ant-emetic: Metoclopramide 0.2 to 0.5mg/kg BW PO, IM, IV TID.
2. Vitamin K 1-5 mg/kg SC BID SOS.
3. Antacids: Ranitidine 0.5 mg/kg BW SC, IV BID OR Omeprazole 0.5-1mg/kg BW BID PO, IV.
4. Multivitamin (B-complex injection), OR Liver-tonic Syrup (3-5ml PO BID 2 weeks).
5. Antidiarrhoeal: Loperamide 0.2mg/kg BW PO.

Prevention & Control

- Isolation of sick dogs and treatment.
- Disinfection of premises.
- DHPPi+L vaccination.

E) Feline species.

15.14 Feline Panleukopenia

Also known as Feline Parvoviral Enteritis is a highly contagious, often fatal, viral disease of felines that is seen worldwide. Highly infectious in weaned kittens with reduced maternal antibody level.

Etiology: Feline parvovirus / Feline panleukopenia virus.

Clinical signs & symptoms

- Fever, lethargy, depression, anorexia
- Diarrhoea and sometimes bloody colored.
- Abdominal pain
- Vomiting
- Severe dehydration.
- Anemia.

Treatment

There is no specific antiviral treatment available.

- Antibiotic: Ampicillin-cloxacillin 22mg/kg BW IV BID for 5 days, Ampicillin (20 mg/kg, BID) could be given in combination with enrofloxacin 0.5mg/kg BW BID for 5 days or Amoxycillin-clavulate 10-15mg/kg BW IM, IV for 5 days.
- Antidiarrhoeal: Loperamide 0.2mg/kg BW PO SOS.
- Fluid therapy: DNS, RL, NS, D5 (refer to the fluid therapy section for the dose).
- For inappetence: B-complex 0.2-1ml (total dose) IV, IM.
- Analgesic/antipyretic: Meloxicam 0.3 mg/kg BW SC, IM, IV on day 2 onward 0.05mg/kg BW
- Antacids: Ranitidine 1-2mg/kg BW IM, IV OR Omeprazole 0.5-1mg/kg BW BID PO, IV.
- Antiemetic: Metoclopramide 0.2-0.5mg/kg BW BID TID.

Prevention & control.

- Vaccination: 6 - 8 weeks- primary, 10- 12 weeks- Booster, annually (with Feligen or Felocel)
- Isolation of infected animals and treatment.
- Disinfection of premises.

15.15 Feline Viral Rhinotracheitis

FVR is a highly contagious infectious disease affecting cats, and a major cause of upper respiratory infections (URI)

Etiology: Feline herpes virus type- 1 (FHV-1).

Clinical signs & symptoms

- Fever, lethargy and loss of appetite.
- Nasal congestion and sudden uncontrollable sneezing attacks.
- Clear, yellow, or green nasal and eye discharge
- Excessive eye blinking and squinting.
- Redness around and in the eye.

Treatment:

- Antihistamine Injection: (Chlorpheniramine maleate 0.2-2mg (total dose) PO, IM SOS.
- Intravenous infusion for rehydration: RL, and NS (refer the fluid therapy section for the dosage)
- Nasal and ocular irrigation with Normal saline and application of eye ointment and saline nose drops.
- NSAIDs: meloxicam 0.3 mg/kg BW SC, IM, IV on day 2 onward 0.05mg/kg BW
- Antibiotic: Ampicillin 22mg/kg BW BID IV for 1 week OR Amoxycillin-clavulante 25mg/kg OD PO 5days

Prevention & control

- Vaccination: 6 - 8 weeks- primary, 10- 12 weeks- Booster, annually (with Feligen or Felocel)
- Isolation of infected animals and treatment.
- Disinfection of premises.

16 PARASITIC AND FUNGAL DISEASES

16.1 Strongylosis

It is a parasitic disease of strongyle species affecting mainly the digestive system of livestock.

Etiology
Strongylus sp., Haemonchus sp., Trichostrongylus sp., Oestartgia sp., Trichuris sp., Nematodirus sp.
Clinical sign and symptoms

- Diarrhea
- Anemia
- Emaciation
- Oedema (bottle jaw)

Treatment
Cattle

- Fenbendazole 5-7.5mg/kg BW PO OD SOS OR
- Albendazole 10mg/kg BW PO SOS

Sheep, goat and equine

- Fenbendazole 5-7.5mg/kg BW PO OD SOS OR
- Albendazole 25-50mg/kg BW PO OD SOS

Dog

- Albendazole 25-50 mg/kg BW PO OD OR

- Pyrantel pamoate + Febantel 50mg/kg BW PO OD 3 days

Cat

- Pyrantel pamoate + Febantel 30mg/kg BW PO OD 3 days

Prevention and control

The control of nematode infestation is mainly through regular deworming regime and prevented through rotational grazing and maintaining the health of animals.

16.2 Ascariasis

It is an endoparasitic disease affecting dogs, cats, pigs, cattle and buffaloes.

Etiology: Ascaris suum (pigs), *Toxocara canis* (Dogs), *Toxocara cati* (Cats), *Toxocara vitulorum* (Cattle and buffalo)

Clinical signs and symptoms

- Diarrhea
- Obstructive jaundice
- Intestinal obstruction,
- Pot belly in pups.

Lesions: Petechial hemorrhages in lungs and fibrotic spots on the liver (milk spots).

Treatment

Cattle, Sheep, Goat, Horse & Pig

- Fenbendazole 5-7.5mg/kg BW PO OD SOS OR
- Albendazole 5mg/kg BW PO OD SOS

Dog

- Piperazine citrate 10-200mg/kg BW OD OR
- Albendazole 25-50 mg/kg BW PO OD 3-5 days OR
- Pyrantel pamoate + Febantel 50mg/kg BW PO OD 3 days

Cat

- Pyrantel pamoate + Febantel 30mg/kg BW PO OD 3 days

16.3 Canine thelaziasis

Canine thelaziasis is an arthropod-borne disease caused by nematodes that infect the eyes of domestic dogs and cats.

Etiology: Thelazia callipaeda

Clinical signs and symptoms

- Excessive lacrimation
- conjunctivitis
- Hyperemia
- keratitis with corneal opacity and ulceration

Treatment

- Ivermectin 0.2 mg/kg BW SC OD SOS OR
- Ivermectin 0.2 mg/kg BW OD PO SOS

- Manual removal of worms can be done with care.

16.4 Dirofilariasis

It is a heartworm disease primarily affecting the heart and lungs of dogs and cats transmitted by mosquitoes.

Etiology: Dirofilaria immitis

Clinical signs and symptoms

- Deep soft cough
- Haemoptysis
- Anemia
- Dark brown colour faeces

Treatment

- Ivermectin 0.2 mg/kg BW SC OD SOS OR
- Levamisole 10 mg/kg BW PO OD 15-20 days OR
- Doxycycline 10mg/kg BW IM OD 30 days OR can be used in combination with Ivermectin

16.5 Dipylidiosis

It is a zoonotic cestode primarily affecting dogs and cats.

Etiology: Dipyllidium caninum.

Clinical signs and symptoms

- Scooting behavior
- Anal pruritus in heavy infection.

Treatment

- Praziquantal 5-7.5mg/kg BW PO OD SOS

Prevention and control

- Flea control with spot on products.

16.6 Hump sore / Stephanofilariasis

It is a common chronic skin disorder of cattle endemic to the humid tropical climate of Bhutan. Hump sore is typically present in and around the hump region and rarely in the udder, sternal area and other parts of the body.

Etiology: Stephanofilaria assamensis

Clinical signs and symptoms

- Alopecia and dermatitis of varying degree
- Typical hump sore lesions

Treatment:

- Ivermectin 0.2 mg/kg BW SC every 2 weeks 3 doses

16.7 Gid

It is a parasitic disease of yaks and sheep caused by the larval stage of dog tapeworm.

Etiology: Coenurus cerebralis, a larval or intermediate stage of *Taenia multiceps*

Clinical signs and symptoms

- blindness, ataxia, muscle tremors, nystagmus,
- excitability and collapse,
- dullness and clumsiness,
- head pressing and circling in the direction of the cyst.

Treatment: No specific treatment.

- Albendazole 10mg/kg BW OD PO (Avoid in pregnant animals)
- Surgical operation may be attempted to remove the cyst.

Prevention and control

The best remedy is to prevent the infection through effective preventive measures to prevent infection.

Deworming of the dogs

- Praziquantel 5-7.5 mg/kg BW OD PO every month 3 doses

Awareness campaign on the disease and the role of dogs in the spread of the adult stage of *Taenia multiceps.* In the area with yaks, all the yak herders are advised to bury the faeces of the dogs in soil so that it should not contaminate the pasture.

16.8 Fascioliasis

It is an infection of ruminants mainly cattle and sheep with zoonotic importance.

Etiology: Fasciola hepatica, Fasciola gigantica

Clinical signs and symptoms:

- Sudden death in acute form
- weight loss, reduced milk yield, pallor and submandibular edema in chronic form.

Treatment:

Effective against both mature and immature flukes/Drug of choice for acute Fasciolosis

Cattle

- Triclabendazole 12 mg/kg BW OD PO

Sheep & Goat

- Triclabendazole 10 mg/kg BW OD PO

Effective against mature fluke

Cattle:

- Albendazole 10 mg/kg BW OD PO

Sheep & Goat:

- Albendazole 7.5 mg/kg BW OD PO

Cattle, sheep and goat:

- Levamisole + Oxyclozanide 10 mg/kg BW OD PO

Supportive therapy with liver-tonics.

16.9 Schistosomiasis

It is a disease caused by blood flukes of livestock with zoonotic importance.

Etiology: Schistosoma bovis, Schistosoma japonicum

Clinical signs and symptoms:

- Watery diarrhea with or without blood stain and mucus,
- Anorexia, anemia and emaciation.

Treatment

- Praziquantel 5 -7mg/kg BW PO OD SOS

Prevention and control

The control of snail population and regular deworming is important.

16.10 Trypanosomiasis

It is a protozoal disease mainly of horses and cattle transmitted through biting flies.

Etiology: Trypanosoma sp.

Clinical signs and symptoms:

- Intermittent fever
- Anemia and weight loss

Treatment:

- Quinapyramine 3-5mg/kg BW SC OD OR
- Diminazine aceturate 3.5-7mg/kg BW IM/SC alternative days 3 doses

16.11 Babesiosis

It is a tick-borne infectious disease of cattle, horse, sheep, goats, dogs and pigs.
Etiology: Babesiosis sp.

Clinical Signs & symptoms:

- Fever
- Increased respiratory and heart rates
- Jaundice and coffee colored urine

Treatment
Cattle, Sheep, Goat, Horse

- Diminazen aceturate 8-16mg/kg BW IM OD (Usually one dose is sufficient to bring clinical recovery) AND
- Vitamin B complex 5-10ml IM OD

Dogs

- Doxycycline 10mg/kg BW OD PO for 7 days and
- Vitamin B complex 0.5 -2ml IM OD

16.12 Theileriosis

It is a tickborne disease of cattle, sheep and goats.
Etiology: Theileria sp.

Clinical Signs & symptoms:

- High fever
- Enlargement of prescapular lymph node
- Anaemia.

Treatment

- Buparvaquone (drug of choice) 2.5mg/kg BW IM. A second injection may be given if parasitemia is high OR
- Oxytetracycline - LA 20mg/kg BW IM OD every 72 hours and
- Vitamin B complex 5-10ml IM OD 5 days

Prevention & control

- Control tick population using acaricides.
- Management of pastures through rotational grazing.

16.13 Anaplasmosis

It is an infectious disease of cattle, sheep and goats characterized by debility, anemia and jaundice.

Etiology: Anaplasma sp

Clinical Signs & symptoms

- Continuous or intermittent fever,
- Inappetence,
- Weakness and jaundice.

Treatment

Cattle, Sheep and goat

- Oxtetracycline -LA 20mg/kg kg IM OD and repeated after 72 hours if required OR
- Oxytetracycline - SA 10mg/kg BW IM/slow IV OD for 3-5days AND
- Vitamin B complex 5-10ml IM OD for 3 days AND
- Fluid therapy.

Prevention & control

- Control tick population using acaricides.

16.14 Canine Ehrlichiosis

It is a tick borne rickettsial disease of canines but can occur with equines and ruminants also.

Etiology: *Erlichia canis*

Clinical signs & symptoms:

Anorexia, depression, loss of stamina, stiffness and reluctance to walk, coughing and dyspnea.

Treatment

- Doxycycline 5 mg/kg BW I/M OD for 10-14 days OR
- Oxytetracycline-SA 10mg/kg BW Oral/IM/IV BID for 2 weeks in acute infection and for 1-2 months in chronic infection AND
- Vitamin B complex 0.5-1ml IM 3 days AND
- Fluid therapy.

Prevention & control

- Tick control.
- Chemoprophylaxis of dogs in endemic areas by using tetracycline

16.15 Coccidiosis

It is a disease of young livestock that chiefly affects the intestine.

Etiology: *Eimeria sp., Isospora sp.*

Clinical Signs & symptoms:

- Diarrhea or dysentery with blood mucus,
- Emaciation and anemia,
- Drop in production and high mortality.

Treatment

Calves & lambs

- Sulfadimidine 100 mg/kg BW IM OD days OR
- Amprolium + sulphaquinoxoline 10mg/kg BW PO OD 5 days

Sheep

- Amprolium + sulphaquinoxoline 50mg/kg BW PO OD 5 days

Goats

- Amprolium + sulphaquinoxoline 100mg/kg BW PO OD 5 days

Pigs

- Amprolium + sulphaquinoxoline 25-56mg/kg BW for 5 days.

**For poultry, refer to the products.*

Prevention & control

- Separation of young and adult animals.
- Avoid overcrowding.
- Disposal of infected materials properly.
- Coccidiostat drugs can be mixed in feed and water and given as prophylactic treatment.

16.16 Malasseziasis

Malesseziasis is a skin disease caused by yeast in dogs.

Etiology: Malassezia pachydermatis

Clinical signs & symptoms:

- Moderate to severe pruritus
- Generalized alopecia
- Seborrhoea.

Treatment
- Ketoconazole 10mg/kg BW PO OD 4 weeks OR
- Itraconazole 5 mg/kg BW OD PO for 3-4 weeks
- Antifungal shampoo.

16.17 Demodectic Mange

It is a skin disease caused by Demodex mites. It affects pigs, canines, bovines and equines.

Etiology: Demodex sp.

Clinical signs & symptoms:
Alopecia, hyperpigmentation and scaling.

Treatment
All species
- Ivermectin 0.2mg/kg BW SC OD 5-7 days AND

Dog
- Chlorpheniramine 0.25-0.5mg/kg BW IM/SC for 3-5 days

Cattle
- Chlorpheniramine 30-50mg (total dose) IM/S/C OD for 3-5 days

In case of secondary bacterial infection
- Cephalexin 20-30mg/kg BW BID PO for 7-10 days

16.18 Sarcoptic Mange

It is a skin disease caused by Sarcoptic mites. It affects all domestic animals.

Etiology: Sarcoptes scabiei

Clinical signs & symptoms:
Scale or crust formation, alopecia, pruritus, thickened and wrinkled skin.

Treatment

All species
- Ivermectin 0.2mg/kg BW SC 3-5 shots on weekly interval AND

Cattle:
- Chlorpheniramine 30-50mg (total dose) IM/SC/PO

Dog
- Chlorpheniramine 0.2-0.4mg/kg BW IM/SC/PO for 3-5 days
- Topical shampoos for dogs.

16.19 Flea Allergy Dermatitis (FAD)

It is an allergic reaction of dogs and cats due to flea bites marked by skin inflammation, hair loss and itching. It is common in dogs and cats and most prevalent during summer.

Etiology: Ctenocephalides canis (dog), Ctenocephalides felis (cats).

Clinical signs & symptoms:

Pruritic, papular, crusting eruptions.

Treatment

Dog and Cat

- Chlorpheniramine 0.2-0.4mg/kg BW IM/SC for 3-5 days
- Flea drops and medicated shampoo for topical application.

Dog

- Prednisolone 0.5-1 mg/kg BW PO BID for 3 days and then OD for next 3 days and every 48 hours for next 3 days (Tapering dose)

Cat

- Prednisolone 2.25-5 mg/kg BW PO BID for 3 days and then OD for next 3 days and every 48 hours for next 3 days (Tapering dose)

16.20 Dermatophytosis (Ringworm)

It is the infection of hair shafts and stratum corneum caused by keratinophilic fungi.

Etiology: Epidermophyton sp., Microsporum sp.and Trichophyton sp.

Clinical Signs and symptoms: Alopecia, erythema,scaling,crusting and broken hairs.

Treatment

Cat and Dog:

- Ketoconazole 10mg/kg BW OD PO for 3-4 weeks OR
- Itraconazole 5 mg/kg BW OD PO for 3-4 weeks
- Clotrimazole ointment and antifungal shampoos for dogs and cats.

16.21 Cattle Grub/Warble/Hypodermosis

It refers to infestation with warble flies.

Etiology: Larvae stages of the flies *Hypoderma sp.*

Clinical Signs & symptoms:

- Penetration of newly hatched larvae may produce hypodermal rash.

Treatment:

- Ivermectin 0.2mg/kg BW SC OD
- Pour on products or dips or sprays: Deltamethrin or Flumethrin 1ml/1L of water or as per product specifications.

16.22 Tick infestation:

Tick infestation is a significant challenge for the bovines due to direct and indirect impacts on health and production of animals.

Etiology

Rhipicephalus microplus, Rhipicephalus haemaphysaloides, Haemaphysalis bispinosa,

Haemaphysalis spinigera, Amblyomma testudinarium

Clinical signs and symptoms: Irritation, anemia, skin wound and act as carrier of diseases.

Treatment and control

Topical application:

- Deltamethrin 2-4 ml in 1 litre of water.
- Flumethrin 1% 1ml/10kg BW.

17 FLUID THERAPY

Body Fluid Compartment

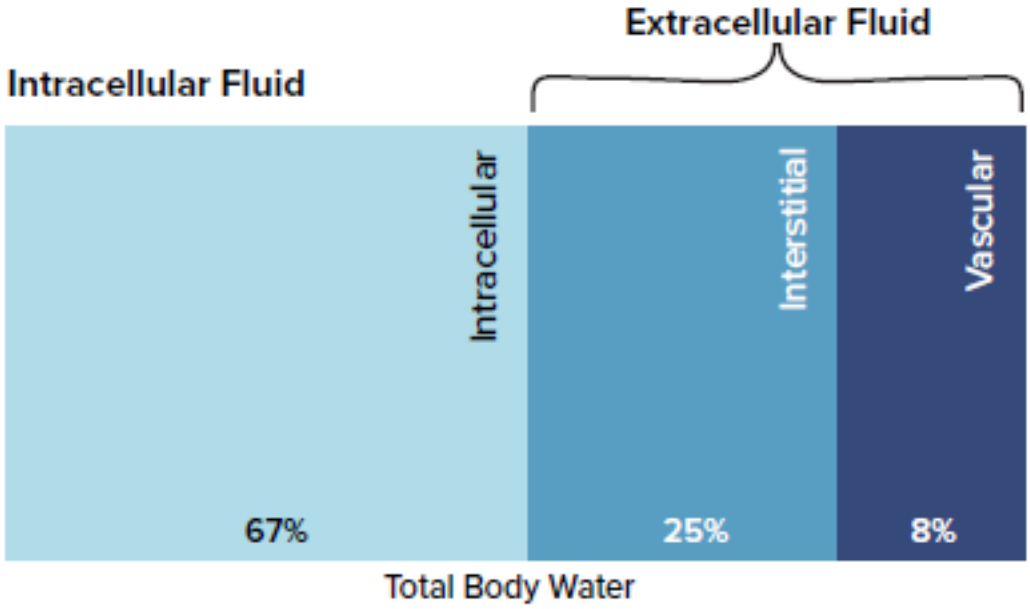

Figure 9*: Normal body fluid compartment*

Why Fluid Therapy?

Fluid therapy is given for following reason:

1. Resuscitation fluid: to replace fluid loss from intravascular fluid compartment (hypovolemic shock)
2. Rehydration fluid: to replace fluid loss from interstitial fluid compartment (Dehydration)
3. Maintenance fluid: to provide water and major electrolytes to replace the physiologic losses that occur through urine, feces, and evaporation.

17.1Small Animals

Table 11: *Stages and Clinical Signs of Hypovolemic Shock*

	CRT	Heart rate	Pulse	MM	Extremities	Behaviour
Compensatory						
Dogs	1 - 2s	Increased	Pounding	Normal or Red	Normal	Mild anxiety
Decompensatory						
Dogs	>2s or absent	Increased or decreased	Weak	Pale to white	Cool to touch	Signs of confusion, unresponsiveness, lethargy
Cats	>2s or absent	Decreased	Weak	Pale to white	Cool to touch	Signs of confusion, unresponsiveness, lethargy

Note: MM: Mucous membrane, CRT: Capillary refill time; Compensatory: *a compensatory mechanism is activated through increased heart rate and systemic vascular resistance; Decompensatory: As shock progresses, compensatory mechanisms begin to fail, leading to inadequate perfusion and potential organ dysfunction. In compensatory, the signs are rarely observable for cats.*

Fluid resuscitation plan

Fluid resuscitation can be done using Ringer's lactate and 0.9% saline. The details of treatment is given below (Figure 1).

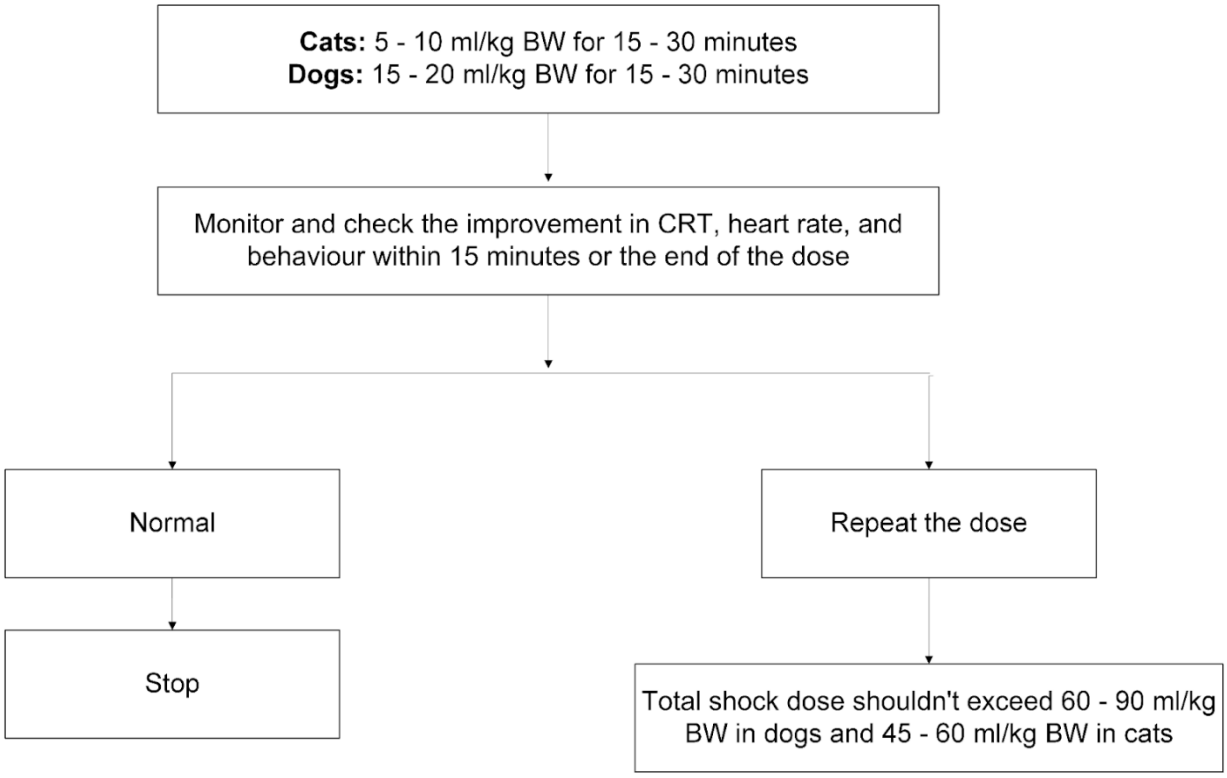

Figure 10: *Treatment plan for hypovolemic shock.*

Table 12: Assessment of dehydration

Estimated % Dehydration	Physical examination finding
< 5%	Not detectable
6 - 8%	Dry mucous membranes Decreased skin tent (>2 sec)
8 - 10%	Retracted globes within orbit
10 - 12%	Persistent skin tent Dull cornea

*Note:It is important to note that there is substantial clinical variation in the correlation between clinical signs and degree of dehydration, so this is an estimate only

Calculation of fluid deficit

Fluid Deficit (L) = % Dehydration (in decimal) x Body Weight (kg) OR
Fluid Deficit (ml) = % Dehydration (number) x Body Weight (kg) x 10

Example:
A 10 kg dog is presented with dry mucous membranes and a prolonged skin tent with eyeball in normal position. Calculate the fluid deficit for rehydration.

Determine % dehydration based on physical examination findings: 7%

Fluid Deficit (L) = 7/100 x 10
= 0.7 L
Fluid Deficit (ml) = 7 x 10 x 10
= 700 ml

Use online calculator here: https://digital.dechra.com/Fluid_Calculator/index.html

Maintenance fluid requirement

Dog: 60 ml/kg BW/ day.
Cat: 40 ml/kg BW/ day.

Table 13: Fluid of choice for common clinical conditions

Clinical Condition	Change in water/electrolyte/pH	Need to supply	Fluid of choice	Comments
Diarrhoea	Loss of water and elctrolyte	Water and electrolye		
	Loss of K + through GI tract	K +	Ringer's Lactate	
	Metabolic acidosis	Bicarbonate/Lactate		
Vomiting	Loss of water and elctrolyte	Water and elctrolyte	0.9 % NS1	If vomiting progress K+ will be lost and must be replaced by administration of RL.
	Metabolic Alkalosis			
Anorexia	Primary water loss	Water	5% Dextrose2	Prolonged anorexia leads to K + loss; RL must be given
Urinary Tract Obstruction	K+ accumulation (Hyperkalemia)	Water and electrolyte	Normal Saline3	Hyperkalemia is life threatening; ensure fluid administered doesn't contain K+

Fluid therapy during anesthesia

Fluid therapy is recommended in patients undergoing general anesthesia primarily to counteract the vasodilation and decreased cardiac output induced by the anesthetics, as well as to uphold catheter patency.
Administer balanced isotonic crystalloid fluids using the following guidelines:

- Dog: 5-10 ml/kg/hr (In dogs with normal cardiac and renal function).

- Cat: 3–5 mL/kg/hr (in cats with normal cardiac and renal function)

Hypoglycaemia

Clinical signs:

- Letharg
- Ataxia
- Seizure
- Weakness

50% Dextrose, 0.5 -1 ml/kg diluted in normal saline (1:2-1:4) over IV 5–10 minutes.

Final dextrose concentration required in saline solution	Volume of 50% dextrose Required (ml)	Volume of 0.9% saline required (ml)
25%	250	250
10%	100	400
5%	50	450
2.5%	25	475

*Best made up in a 500 ml bottle of 0.9% saline; remove volume of dextrose to be added; then add the 50% dextrose and mix well before setting up the CRI.

Precaution: Hypertonic solution (10% or 25%) may result in phlebitis so administer only via peripheral veins(e.g. cephalic) in emergency situations and flush with adequate amounts of saline.

17.2Large Animals Fluid Therapy

Dehydration

Table 14: *Estimation of dehydration of calves using eyeball recession and skin tent*

% dehydration	0	2	4	6	8	10	12	14
Eyeball recession (mm)	0	1	2	3	4	6	7	8
Skin-tent duration (s)	2	3	4	5	6	7	8	10

Calculation of fluid deficit

Fluid Deficit (L) = % Dehydration (in decimal) x Body Weight (kg)

Note, generally, the Ringers' lactate and 0.9% saline is recommended at 100 - 150 ml/kg BW (for the duration of first 4 to 6 hours).

Maintenance fluid requirement

The maintenance fluid can be given at 60 - 80 ml/kg BW per 24 hours.

Calculation of fluid deficit

Fluid Deficit (L) = % Dehydration (in decimal) x Body Weight (kg)

Fluid Therapy Plan for calves

- Total fluid=Fluid Deficit + Maintenance Requirement

The total fluid can be administered IV with continuous monitoring of vital parameters.

Fluid therapy plan for Adult Cattle

For adult cattle the total calculated dose of fluid can be given orally with a stomach pump. However, if the animal is recumbent quarter dosing modality presented in the flow chart below must be used as orogastric tubing is not recommended in large animals.

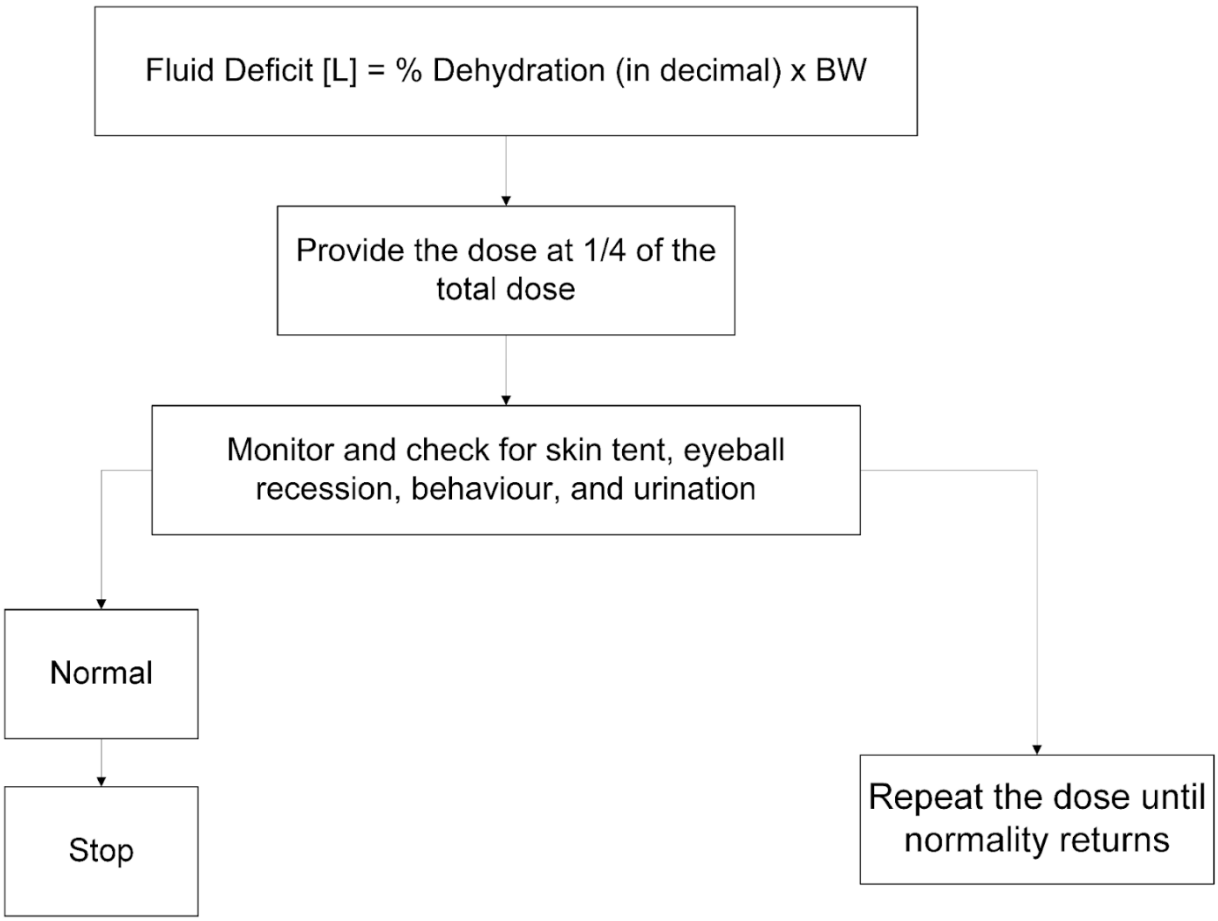

Figure 11. *Flowchart for fluid therapy in for recumbent adult cattle..*

Horse

Table 15: *Fluid therapy dosing recommendation for adult horses*

Indication	Fluid type	Dose	Comments
Resuscitation	Ringers' lactate, 0.9% saline	10 - 20 ml/kg repeated as necessary to stabilize	At each dose, check the perfusion markers or physiology of the animal. Caution is required for anuric or oliguric renal failure or heard disease.
Maintenance	Ringers' lactate, 0.9% saline	40 - 60 ml/kg/day	

17.3Fluid Overload

The assessment of dehydration is simply an estimate, therefore continuous monitoring of the patient for fluid overload is very important.

Clinical signs of fluid overload

- Increased body weight (>10%)
- Tissue edema (intermandibular area, limbs, paws, dependent regions, chemosis)
- Serous nasal discharge
- Serous discharge from endotracheal tube in anesthetized patients
- Increased respiratory rate or
- Reduced SPO2
- Gastrointestinal signs (abdominal distention, vomiting, diarrhea, inappetence, anorexia)

Management of fluid overload

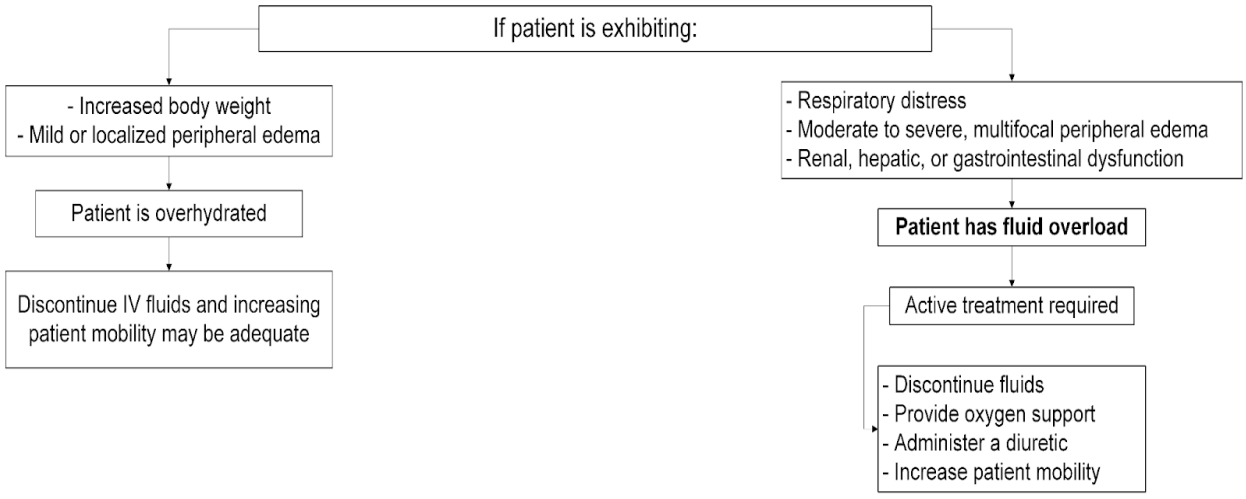

Figure 12: *Management of fluid overload*

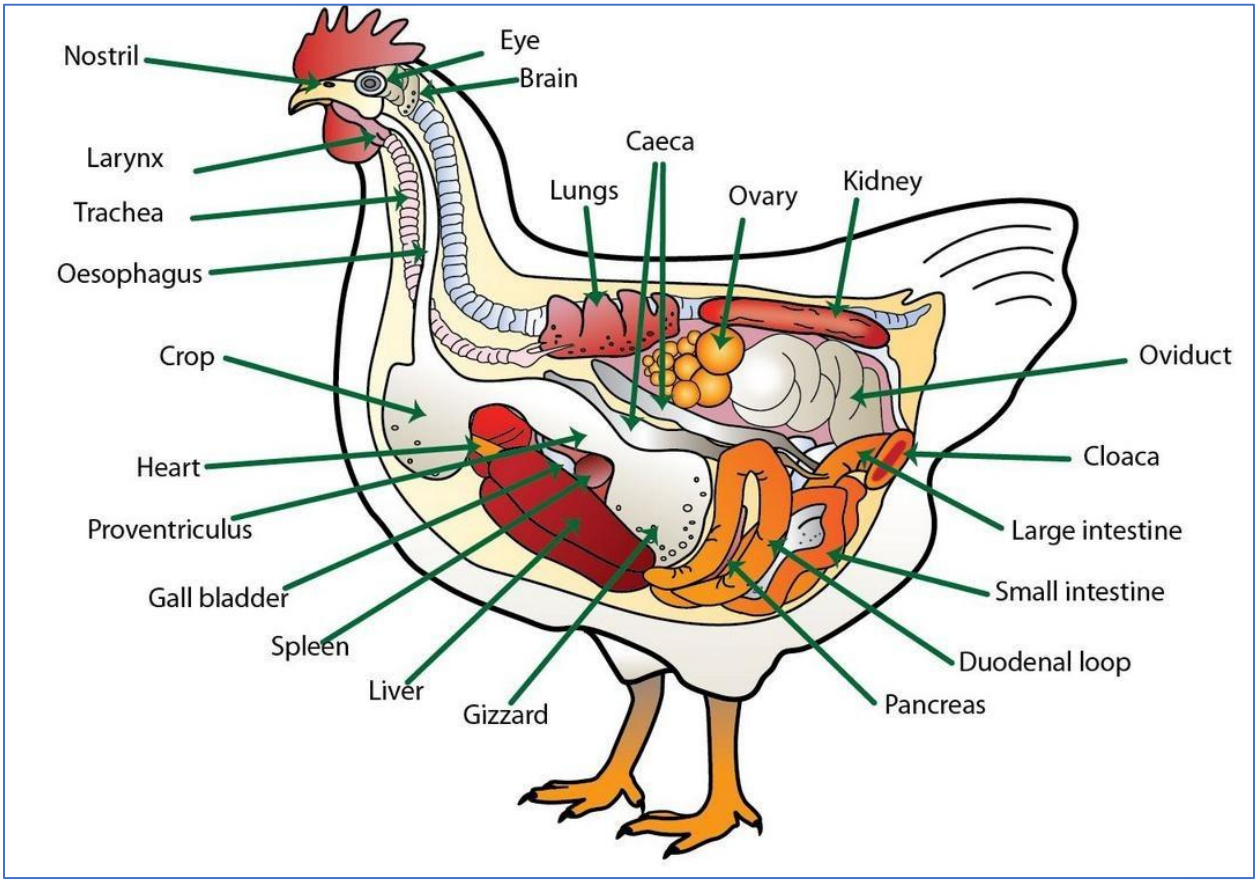

Figure 13: *Overview representation of the internal organs/ different system of the female chicken*

18 POULTRY DISEASES

Good management practices and importance of Biosecurity in poultry farming

Farm Biosecurity

A set of farm protocols designed to prevent the exposure of poultry birds to pathogenic microorganisms. Its main aim is to reduce the introduction and transmission of pathogens into and between the farms. The activities include measures like isolation, vehicle control, water, feed

and environmental quality, worker hygiene, pest control, cleanliness, vaccination, and monitoring that help keep pathogens out of the farm and prevent their entry.

Basically, the biosecurity activities are classified into the following categories

1. Structural biosecurity

Structural biosecurity encompasses all aspects related to infrastructural facilities and equipment, restricting entry of unwanted visitors as well as other domestic and wild animals, poultry housing

design and orientation, drainage systems, feed storage, dead bird disposal, change rooms, and washroom facilities for workers.

2. Operational biosecurity

It deals with the regular protocols and procedures that are followed in regular day-to-day operations such as personnel entry, vehicle entry and disinfection, pest control, waste disposal, etc. It is the final line of protection against the incursion of pathogenic microorganisms.

Treatment Regime

The general line of treatment for all bacterial and viral poultry diseases applies the same treatment regimen as below

- Sulphadiazine & trimethoprim powder 5g in 10 litres of water orally OD/BID for 3-5 days, WP 5-10 days in both meat and egg OR
- Tetracycline HCL powder 5g in 4.5 litres of water orally OD/BID for 5-7 days, WP 5-7 days in both meat and egg
- For supportive, amino-acid and multivitamin supplementation either in feed or water as per direction of the manufacturer
- Amino acid 10% solution 1ml/10kg body BW or as per direction of the manufacturer.

A) INFECTIOUS DISEASES

I. BACTERIAL DISEASES

18.1Fowl Cholera

Fowl cholera is a contagious disease caused by gram-negative bacteria that affects domesticated and wild birds. It usually appears as a septicaemic disease associated with high morbidity and mortality in birds between the ages of 12 and 18 weeks.

Etiology: Pasterurella multocida

Clinical Signs & symptoms

- Acute Form
    - Sudden death without prior symptoms.
    - Cyanosis (bluish discolouration of combs and wattles).
    - white watery and greenish diarrhoea.
    - Depression, anorexia, and ruffled feathers.
- Chronic Form
    - Swollen wattles, joints, and footpads.

- Nasal discharge and conjunctivitis.

Pathognomonic Lesion

- Swollen wattles filled with purulent exudate.
- Fibrinous pericarditis and air sacculitis.

Prevention and Control

- Good management practices.

18.2Fowl Typhoid

Fowl typhoid is a septicemic disease of domesticated birds caused by gram-negative bacteria. The course may be acute or chronic.

Etiology: Salmonella gallinarium

clinical signs and symptoms

- Acute Fowl Typhoid
- Sudden death in healthy-looking birds.
- Depression, drooping wings, ruffled feathers.
- Decreased feed and water consumption.
- Pale comb and wattles.
- Diarrhea Greenish-yellow droppings.

Chronic Fowl Typhoid

- Reduced growth in young birds.
- Lethargy and weight loss.
- Drop in egg production in layers.

Pathognomonic Lesion

- Enlarged, bile-stained liver with necrotic foci.

Prevention & Control

- Good management practices.

18.3Pullorum Disease

Pullorum disease is an infectious disease of avian species caused by, a gram-negative bacterium. It is most commonly spread by true egg transmission. In chicks and poults, it usually occurs in an acute systemic form, but in adults, it is most often localised and chronic.

Etiology: Salmonella pullorum

Clinical signs & symptoms

Acute form

- Sudden death, high fever, and depression

Chronic form

- Poor appetite, weight loss, pale comb and wattle, diarrhoea (which can be greenish), and swollen abdomen due to peritonitis. Infected birds may have a drop in egg production.

Pathognomonic Lesion

- White nodules in the liver and spleen.

Prevention & Control

- Good management practices.
- Only eggs from flocks free of Pullorum disease should be introduced into hatcheries.
- Fumigation of incubators & hatchers with formaldehyde.

18.4Chronic Respiratory Disease (CRD)

Chronic respiratory disease is a common respiratory disease caused primarily b*y gram-negative bacteria*, and secondary by E. coli.

Etiology: Mycoplasma gallisepticum

Clinical signs & symptoms

Respiratory Signs

- Nasal discharge.
- Sneezing and coughing.
- Rales (rattling sounds during breathing).
- Swelling of the infraorbital sinuses.

General Symptoms

- Poor appetite and weight loss.
- Decreased egg production and egg quality.
- Weakness and lethargy.
- Watery or foamy eyes.

Pathognomonic lesion

- Tracheitis Inflammation of the trachea, with thickened walls and mucus.
- Sinusitis Swelling and fluid in the infraorbital sinuses.
- Air sacculitis Thickened and cloudy air sacs with exudate.
- Bronchitis Inflammation and mucus in the bronchi.

Prevention & control

- Good management practices.

18.5Infectious Coryza

Infectious coryza is an acute respiratory disease of chickens caused by gram-negative bacteria and it may occur in growing chickens and layers.

Etiology: Avibactam gallinarium

Clinical signs & symptoms

Acute Form

- Swelling of the face, wattles, and infraorbital sinuses.
- Foul-smelling nasal discharge (serous to mucoid).
- Conjunctivitis and watery eyes.
- Sneezing and difficulty breathing.
- Reduced feed intake and lethargy.

Chronic Form

- Prolonged respiratory symptoms with swelling of the head.
- Stunted growth in younger birds.
- Drop egg production in layers (up to 40-50%).

Pathognomonic Lesion

- Swollen infraorbital sinuses filled with yellow, caseous material.
- Nasal discharge and conjunctivitis.
- Facial oedema.

Prevention & control

Good management practices.

18.6Colibacillosis

It is a common bacterial disease in poultry caused by certain pathogenic strains of gram-negative bacteria.

Etiology: Escherichia coli (*E. coli*)

Forms

- Acute Septicemia
    - Rapid death with few clinical signs.
    - High mortality rates.
- Respiratory Form
    - Associated with poor air quality.

- Signs include respiratory distress, nasal discharge, and rales.

- Localized Infections
    - Airsacculitis Inflammation of the air sacs, commonly seen in broilers.
    - Pericarditis Inflammation of the pericardium.
    - Perihepatitis Inflammation of the liver surface.
    - Cellulitis Subcutaneous infections, often seen at processing plants.
- Enteritis
    - Intestinal infection causing diarrhoea and reduced feed conversion.
- Omphalitis (Yolk Sac Infection)
    - Common in chicks due to contamination during hatching.

Clinical Signs and Symptoms

- Depression, ruffled feathers, and inappetence.
- Laboured breathing and nasal discharge.
- Swollen joints and lameness in some cases.
- Mortality in severe outbreaks.

Pathognomonic Lesion

- Fibrinous perihepatitis and pericarditis (often called "polyserositis").
- Airsacculitis.

Prevention and Control

- Good Management Practices

II. VIRAL DISEASES

18.7Fowl Pox

Fowl pox is a common viral disease of domestic birds. It is a slow-spreading disease characterized by the development of discrete, nodular, proliferative skin lesions on the un feathered parts of the body or fibrin-necrotic proliferative lesions in the mucus membranes of the upper respiratory tract, mouth, and oesophagus. this disease infects birds of both sexes, of all ages and breeds.

Etiology: Avipox-virus

Clinical Signs & symptom

The disease occurs mainly in two forms viz wet form (diphtheric from) and dry form (skin form)

Dry form (Skin form)

15 Lesions (changes) appear on the un-feathered skin of the head, neck, comb, wattles, eyelids, legs, and feet.

16 The lesions on the head, combs, and wattles are usually wart-like (nodular) in appearance, and yellow to dark brown

Wet form (Diphtheric form)

- most cases of diphtheritic fowl pox are characterized by the formation of massive yellow cheesy necrotic masses in the larynx and adjacent trachea

Treatment and control

- It is difficult to treat affected birds. The most effective method to control the disease is by vaccination.

18.8Marek's Disease

Marek's disease (MD) is a tumour-causing viral disease of chickens. It is characterized by marked enlargement of the nerves, or marked enlargement of the liver, spleen, and kidneys due to diffuse growth of certain cells. Marek's disease appears almost exclusively confined to female birds.

Etiology: Herpes virus

Clinical Signs & symptoms

- Affects chickens most commonly between 12 and 24 weeks of age.
- Paralysis of the wings and legs. Severely affected birds are unable to stand. Some may lie on their side with one leg stretched forward and the other backward.
- Torticollis can be seen when the cervical nerves are affected. Mortality varies from 5 to 50 % in unvaccinated birds.

Treatment and control

- There is no treatment for Marek's disease, and vaccination of day-old chicks is an effective method of control. Strict sanitary principles to avoid early exposure of young chickens.

18.9Avian Influenza (Bird flu)

Avian influenza is a highly contagious viral disease, which may cause up to 100% mortality in domestic fowls. The disease affects the respiratory, digestive and or nervous system.

Etiology; Orthomyxovirus- type A.

Clinical Signs & symptoms

- These vary from none to mild to serious respiratory and neurological symptoms with depression and death. Mortality from a few percent to 100%. Decrease in production.
- Comb and wattle can become cyanotic. Later on, oedema, and hemorrhagic necrosis can be seen, mainly in the head region.
- Carcasses can be severely dehydrated.

Treatment & control

There is no treatment. Refer HPAI guidelines for control.

18.10 New Castel Disease (NCD)

It is an acute rapidly transmitting viral disease of domestic poultry and other avian species. It is characterized by high mortality, respiratory signs, nervous disorders and sudden drop in egg production.

Etiology: Paramyxo group-I virus (DNA virus)

Clinical Signs & symptoms

- Respiratory symptoms: Sneezing, coughing, gasping, nasal discharge, difficulty breathing, and snoring
- Gastrointestinal symptoms: Greenish, watery diarrhea, decreased food and water intake
- Nervous symptoms: Paralysis, convulsions, tremors, drooping wings, twisting of the head and neck, circling, and complete stiffness
- Swollen tissues: Swelling around the eyes and neck, and swollen combs and wattles
- Decreased egg production: Reduced egg production, and eggs that are soft shelled and malformed
- Depression: Marked depression and loss of appetite
- Ruffled feathers: Ruffled feathers
- Sudden death: Sudden death and increased death loss in a flock

Treatment & control

There is no treatment for this disease. Timely vaccination is the only reliable control method. Proper burial of dead birds followed by proper disinfection of the affected areas.

18.11 Infectious Bursal Disease (IBD)/ Gumboro disease

It is an infectious and immunosuppressive viral disease of young chickens that has lymphoid tissue as its primary target. The viruses have an attraction for cells of bursa of fabricus and cause depletion of this organ.

Etiology; Birna-virus

Clinical Signs & symptoms

- Disease of susceptible young chickens, generally 3 to 6 weeks old.

- Severe depression, Whitish watery diarrhoea, Soiled vent feathers, Anorexia, Trembling and in coordination, inflamed vents and vents pecking Ruffled feathers.
- Losses vary and can reach a 5 to 50 % mortality of chickens aged 3 to 6 weeks old.

Treatment & Control

- No therapeutic treatment. Hygiene and Sanitary precautions as applied to prevent the spread of infections.
- Timely vaccination is must to develop immunity. Proper burial of dead birds followed by proper disinfection of the affected areas is recommended.

18.12 Infectious Bronchitis

It is an acute, highly contagious viral respiratory disease of chickens characterized by tracheal rales, coughing and sneezing.

Etiology: Coronaviruses

Clinical Signs & symptoms

- Coughing, sneezing, rales, nasal and ocular discharge.
- There is weakness, depression and huddling near the heat source

Treatment & control

- No specific medical treatment for infectious bronchitis So, control depends on a good immunity by vaccination and good farm management practices.

18.13 Infectious Laryngo-Tracheitis (ILT)

It is an acute disease of chickens characterized by signs of respiratory depression, gasping, and expectoration of bloody exudate.

Etiology: Herpes virus

Clinical Signs & symptoms

Acute infection

- Nasal discharge.
- Moisty rales followed by coughing and gasping.
- Bloody mucous from nostrils and mouth.

High morbidity and considerable mortality are common. Mortality as high as 50%-70% has been reported, but mortality usually is in the 10%- 20% range.

Mild form

- Drop in egg production.

- Watery eyes, (bloody) conjunctivitis.
- Swelling of sinuses.
- Persistent nasal discharge.
  Morbidity may be as low as 5%.

Generally, the course of the disease varies with severity of the lesions and most chickens recover in 10 to 14 days, but extremes of 14 weeks.

Treatment & control

- No specific medical treatment.

18.14 Lymphoid Leukosis

Lymphoid leukosis is characterized by marked enlargement of the liver. The disease occurs any time after 16 weeks of age. The incidence is highest at about sexual maturity. Lymphoid leukosis is usually a problem of laying hens.

Etiology: Alpharetroviruses

Clinical Signs and symptoms

The symptoms are non-specific,

- The birds are usually pale and emaciated and show loss of appetite.
- The comb may be pale, shriveled, and of bluish discoloration (cyanotic).
- Diarrhoea may occur and wattles may be pale.
- The abdomen is usually very large because of the massive liver.

lymphoid leukosis can be made. Such tumours in bursa are absent in Marek's disease.

Treatment and control

- no specific medical treatment

III. MYCOTIC INFECTION

18.15 Aspergillosis/ Brooder pneumonia

Aspergillosis is a mycotic disease caused by the fungus affecting all species of birds. it is usually a disease of very young chicks.

Etiology: Aspergillus fumigatus

*F*ound in litter, and feed. Infection occurs predominantly by inhalation; however, the agent also penetrates eggs and infects embryos

Clinical Signs & Symptoms

- Acute Aspergillosis occurs in young birds manifested by respiratory distress and reduced feed intake.
- The chronic form occurs in mature birds, which is manifested by reduced feed intake.
- Most frequent clinical signs are dyspnea, gasping, hyperpnea, cyanosis and usually without rales.
- Other signs include diarrhea, anorexia, somnolence, progressive emaciation; increased thirst and few animals show nervous signs.

Pulmonary lesions include cream-colored plaques a few millimeters to several centimeters in diameter, which may occur in the larynx, air sacs, liver, intestines, and occasionally the brain and mediastinal canthus of the eye.

Treatment, Prevention & Control

- Treatment of Aspergillosis is usually ineffective.
- Control measures at farm level include improving ventilation, eliminating infection sources (using mold-free litter, bedding material for nest boxes and feed), avoiding wet litter, adding fungistatic to the feed and following strict cleaning and disinfection procedures.
- Thorough cleaning and fumigation of contaminated areas in the hatcheries with formaldehyde should be implemented to eliminate Aspergillus spores.

Public health significance Aspergillosis is zoonotic which is transmitted via inhalation or ingestion. Hence, adequate precaution should be taken.

IV. PARASITIC DISEASE

18.16 Histomoniasis (Black head disease)

It is a protozoan disease mainly affecting turkey and affects other bird species such as chicken, peafowl, pheasant and game birds.

Etiology: Histomonas meleagridis

Clinical Signs & symptoms

- In chickens, the course of the disease is less severe, but it can still cause lesions in the ceca and liver and a significant drop in egg production
- Depression, inappetence and poor growth, sulphur-yellow diarrhoea and cyanosis of the head.

Classic lesions resulting from *Histomonas meleagridis* infection usually are Caseous cheese-like cecal core focal necrosis resulting in target-like liver lesions. The presence of liver lesions is pathognomonic for this disease.

Treatment

- No drugs are currently approved for use as treatments for histomoniasis in developed countries.
- Metronidazole 0.5g/Kg of feed (WP meat 11 days, eggs 14 days)
- Frequent worming with albendazole, Fenbendazole to reduce exposure to *heterakid* worms that carry the infection.

Prevention & control

- Exclusion of domestic chickens from turkey raising operations is essential, since chickens may harbour large number of eggs laying cecal worms.
- Rearing turkey indoors.
- During the outbreak, removal of the birds from a contaminated premise to a clean area may be helpful or thick covering of the contaminated area with deep litter may reduce spread of the disease.

18.17 Coccidiosis

Coccidiosis is a common protozoan disease in domestic birds and other fowl, characterized by enteritis and bloody diarrhoea.

Etiology: Protozoa, *Eimeria are E. acervulina, E. maxima, E. tenella, E. necatrix, E. brunetti, E. preacox, E. mitis, and E. mivati.*

Clinical Signs & Symptoms

- Signs of coccidiosis range from decreased growth rate in many sick birds, severe bloody diarrhoea, and high mortality.
- The coccidial infections are readily confirmed by demonstration of oocysts in faeces or intestinal scrapings. In postmortem, bloody caeca cores may be seen in the caecum.

Treatments

- Amprolium+Sulfaquinoxaline powder, 100g/200 litres of drinking water or 100g for 250 birds of 6 weeks age or 200 birds of 8, weeks age for continual three days then water must be given only for two days, and the treatment must be repeated for another three days.
- WP Meat- 28 days, eggs 3 days OR

  Diaveridine+Sulfaquinoxaline powder- 100 g per 200 litres of water, for 5 – 7 days (equivalent to 2500 chickens of 5 weeks of age or 1500 chickens of 10 weeks of age or 800 layers)
- WP meat 10 days, for eggs 10 days

18.18 Helminthiasis

It is an infection caused by members of the nematoda (roundworms) or Cestoda (tapeworms, flatworms)

Etiology

- Roundworms Ascaridia (large roundworms), Heterakis (caecal worms), and Capillaria spp.(hairworms), *Syngamus trachea* (gapeworm).
- Tapeworms *Davainea proglottina* (small tapeworms), *Raillietina*(large tapeworms).

Clinical Signs and Symptoms

- Clinical signs include general unthriftiness
- inactivity,
- depressed appetite,
- diarrhoea and
- suppressed growth
- In severe cases, death may result

Treatment

For roundworms

- Piperazine citrate, dosage per 100 Birds
  - Under 7 weeks of age 40mL Piperazine in 2L water
  - 7 - 8 weeks of age 50mL Piperazine in 2L water
  - 9 - 12 weeks of age 60mL Piperazine in 5L water
  - 13 - 16 weeks of age 60mL Piperazine in 7L water

    - 17 - 20 weeks of age 70mL Piperazine in 9L water
    - Over 20 weeks of age 90mL Piperazine in 11L water.
- Fenbendazole 10–50 mg/kg every 24 hours for 3–5 days or as a single dose of 20–100 mg/kg, or when added to the drinking water at 125 mg/L for 5 days or to the feed at 100 mg/kg (extra-label dosages)
- Tetramisole Hcl 0.1-0.2g per liter of drinking water. or 15 -20mg/Kg BW in water single dose. WP meat 7 days, eggs 4 days

For other nematodes and tapeworms,

- Fenbendazole 10–50 mg/kg every 24 hours for 3–5 days or as a single dose of 20–100 mg/kg, or when added to the drinking water at 125 mg/L for 5 days or to the feed at 100 mg/kg (extra-label dosages) WP meat 7 days, eggs 7 days

Prevention & Control

- Helminthiasis is an infestation with parasitic worms and usually does not cause clinical signs. Hence, control relies on improvement of management and sanitation.
- Very few compounds are approved for use in chickens and turkeys and should only be used in severe cases.

V. ECTOPARASITES

18.19 Red Mite

Commonly, poultry red mite (PRM) or chicken mite, infests chickens, turkeys, pigeons, canaries, and various wild birds worldwide. These bloodsucking mites will also bite people but cannot survive on or infest them. Can severely affect the productivity in the egg-laying/breeding hens.

Etiology: Dermanyssus gallinae

Clinical Signs & Symptoms

Poultry red mites come out to feed on poultry at night and during the daytime they normally hide in cracks and crevices under manure, and on roosts of the chicken house, where they deposit eggs.

- Reductions in egg production, feed conversion efficiency, body weight gains, and egg size,
- Increased mortality,
- stress, weight loss, anaemia,
- Head scratching, feather pecking or cannibalism
- compromised immunity.

To see if the flock is being affected by this external parasite, the flock should be examined at night using a flashlight

Treatment

- Deltamethring 6ml/L of water as spray directly on the bird and coop, focusing on the vent area, roosts, walls, and nest boxes.
- Flumethrin 1% solution, direct application on the skin (W.P meat 5 days)

Prevention & Control

- Regular cleaning disturbs the cracks and crevices where red mites hide,
- Exclude wild birds and rodents from your flock, as they can be a source of red mites.

18.20 Fowl Ticks

Argas persicus species of ticks are found active in poultry houses during warm, dry weather and all stages may be found hiding in cracks and crevices during the day.

Clinical signs & symptoms

- Weight loss, depression, toxaemia, and paralysis.
- Decreased egg production
- Red spots can be seen on the skin where the ticks have fed.
- Because the ticks are nocturnal, the birds may show some uneasiness when roosting.
- Production may be severely depressed.

Treatment & Control

- After cleaning, poultry sheds should be treated thoroughly (using a high-pressure sprayer) with acaricides like Deltamethrin spray, with 0.05-0.1% solution is applied to ceilings, walls, and suspended objects using a pressurized or power sprayer. WP meat 7 days

18.21 Lice

Heavy infestation of poultry and other avian species with *Mallophagia* lice can occur.

Clinical Signs & Symptoms

- Reduced egg production and weight loss are observed in infected poultry.
- The skin irritations can also lead to secondary bacterial infections.

Eggs or adult lice could be observed on the skin or feathers.

Treatment & control

- Apply acaricides same as in ticks above for treatment and control of lice.

18.22 Mycotoxicosis

Mycotoxicosis is a disease caused by toxic fungal metabolites that result from fungi growing in grains and feeds.

Etiology

Aflatoxin-highly toxic, carcinogenic fungal metabolites produced by *Aspergillus flavus*, *A. parasiticus*

Fusariotoxins (Trichothecenes, fumonisins, and zearalenone)- produced by Fusarium spp.

Ochratoxins-Nephrotoxic metabolites are produced chiefly by *Penicillium viridicatum* and *Aspergillus ochraceous,*

Citrinin-produced by numerous species of *Penicillium* and *Aspergillus.*

Clinical Signs & Symptoms

Aflatoxicosis

- Unthriftiness to high morbidity and mortality
- The liver may be acutely reddened due to necrosis and congestion or yellow discolouration due to lipid accumulation; it may have haemorrhages of various sizes and patterns.
- In chronic aflatoxicosis, the liver may be discoloured yellow to grey and atrophied.

Fusariotoxicosis

- Feed refusal due to caustic injury of the oral mucosa
- In laying hens, egg production may decrease, accompanied by depression, recumbency, feed refusal, and cyanosis of the comb and wattles.
- Deformity of the bones may occur in others.

Ochratoxicosis

- Huddling, hypothermia, diarrhoea, rapid weight loss, and death are common.
- Sublethal intoxication can seriously impair weight gain, feed conversion, pigmentation, carcass yield, egg production, fertility, and hatchability.

It is nephrotoxic causing renal disease but also affects the liver, immune system, and bone marrow.

Citrinin toxicosis

- Spontaneous citrinin mycotoxicosis causes a diuresis that is manifested as watery faecal droppings and reductions in weight gain.
- At necropsy, lesions involve chiefly the kidney.

Mycotoxicosis is suspected when the history, signs, and lesions are suggestive of feed intoxication. However, it needs to be confirmed through feed tests and other laboratory tests.

Treatment and control

- There is no specific treatment for the toxicosis
- The toxic feed should not be fed to poultry
- In individual birds, activated charcoal can be given in the feed.
- Feed stores should have sufficient ventilation to avoid high relative humidity

B) NON-INFECTIOUS DISEASES

18.23 Ascites Syndrome

Ascites is an accumulation of noninflammatory transudate in one or more of the peritoneal cavities or potential spaces.

Etiology

- Right ventricular failure or hepatic fibrosis.
- Liver damage is also caused by Aflatoxin or by toxins from Crotalaria or by Clostridium perfringens

Clinical Signs & Symptoms

- Affected broilers are cyanotic; the abdominal skin may be red, and peripheral vessels congested.
- Redundant growth in body weight.
- Increased respiratory rate and reduced exercise tolerance.
- Birds frequently die lying on their back.

In the postmortem, enlarged or thickened right ventricles are observed.

Treatment & Control

- Reduce the feed thereby reducing the birds' oxygen requirement by slowing growth or reducing feed intake.
- Ascites due to other factors (eg, lung damage, liver damage, etc) can be prevented by avoiding the etiologic agents involved.

18.24 Cannibalism

Cannibalism is a common vice of chickens and turkeys, often manifested as vent-picking or picking at unfeathered skin on the head, comb, wattles, or toes.

Etiology

- Overcrowding, excessive light,
- Nutritional imbalances, mineral and vitamin deficiencies
- Fat pullets where mucosa protrudes from the vent during and after egg laying,
- Insufficient feeder space,
- Skin injuries
- Failure to remove dead birds daily

Treatment, Prevention & Control

- Mange the etiologies
- Trim the tip of the beak at one-day old and repeat between 6 and 12 weeks of age. Cautery often is required to provide hemostasis

18.25 Calcium and Phosphorus Deficiency

Calcium deficiency is common in hand-fed animals, especially pigs and poultry. The optimum Ca-P ratio for growing chicks and pigs lies between 11 and 21. For laying hens greater Ca is required.

Clinical Signs & Symptom

- Abnormalities in the bones, subnormal growth
- Reduced egg production
- Depressed appetite and efficiency of feed use
- Thin or soft eggs

Treatment, prevention & Control

- Direct supplement with 0.9% Ca and 0.7% P for starting chicks (0-8 weeks) and for growing chicks (up to 18 weeks) with 0.6% and 0.4%, respectively.

18.26 Manganese Deficiency

A deficiency of manganese in the diet of young growing chickens is one of the causes of perosis and of thin-shelled eggs and poor hatchability and osteochondrosis.

Clinical Signs & Symptoms

- Perosis-malformation of the hock joint in young chicks; usually the joint is swollen and flattened, and sometimes the achilles tendon slips from its condyles.
- The tibia and the tarsometatarsus of one or both legs may bend near the joint and rotate laterally.
- A shortening and thickening of the long bones of the legs and wings.
- In adult chicken the shells of their eggs tend to become thinner and less resistant to breakage.

Treatment & Control

- Inclusion of 30-40 mg of manganese/kg in feed .
- For prevention, feed should contain all necessary nutrients, especially manganese, choline, niacin, biotin, and folic acid.

18.27 Vitamin D Deficiency

Vitamin D is required for the normal absorption and metabolism of calcium and phosphorus. Thus, a deficiency can result in rickets in young growing chickens and in osteoporosis and poor eggshell quality in laying hens.

Clinical Signs

- Young chicken and turkeys have a tendency to rest frequently in a squatting position, disinclination to walk, and a stiff gait.
- Other signs are retarded growth, enlarged hock joints, beading at the ends of the ribs, marked softening of the beak and the feathers become ruffled.
- Laying chickens thinning of their eggshells, and if severe prompt reduction of egg production and hatchability, the breast bones become noticeably less rigid, and there may be beading at the rib ends.
- The lesions in young chickens and turkey are soft bones and enlarged parathyroid gland. In adult chickens, the bones tend to become rarefied (osteoporotic) rather than soft.

Treatment & Control

- Dry, stabilized forms of vitamin D3 are added to commercial diets to provide three times the normally recommended level for a period of ~3 wk.
- In cases of severe mycotoxicosis, a water-miscible form of vitamin D is administered in the drinking water to provide about three times the amount normally supplied in the diet.

18.28 Riboflavin Deficiency

Due to no inclusion of some of the ingredients in poultry feed, a deficiency may result.

Etiology

Deficiency of Riboflavin

Clinical signs & symptoms

- Young chicks, of 1-week-old, exhibit curling of the toes, inability to walk and sometimes diarrhoea.

Treatment & Control

- Vitamin B preparations cure rapidly
- For prevention, provide adequate vitamin B levels in feeds.

ANNEXURE

Assessment of Dehydration:

- The interstitial fluid compartment is clinically evaluated by examining mucous membrane moisture, skin tent response, eye position, and corneal moisture as well as other parameters.
- Loss of interstitial volume causes mucous membranes to become “sticky” when touched (tacky); decreased subcutaneous fluidity, identified by decreased skin turgor (decreased skin elasticity evidenced by increased skin tent); and, when severe, results in dry corneas and retraction of the eye within the orbit.
- The clinician must estimate the degree of dehydration as a percentage of body weight in kilograms based on these parameters.
- It is important to note that there is substantial clinical variation in the correlation between clinical signs and degree of dehydration, so this is an estimate only.
- Testing skin turgor over the top of the sagittal crest may be a standardized area that is less influenced by subcutaneous fat and body position and can be repeatedly evaluated.
- Skin tent is falsely increased by obesity; falsely decreased by cachexia and in geriatric patients.
- Skin tent is an unreliable hydration assessment in neonates because their skin’s high water and fat content increases elasticity.
- Hypersalivation may seem to have moist mucous membranes but in reality may be suffering from dehydration. Healthy dogs that pant heavily may have dry gums but be adequately hydrated.
- Therefore, the % dehydration must be estimated based on all the clinical parameters.

Vaccination schedule against Poultry Diseases

Sl. No.	Vaccine	Dosage	Route	Primary (First) vaccination	Booster	Re-vaccination	Remarks
1.	Marek	0.2 ml	S/C, at lower neck region	Day old	Not required		Government and private Parent and grandparent farms with Day Old Chicks (DOC) production
2.	Infectious Bursal Disease (IBD) *(Gumboro)*	0.03 ml *(1 drop using the standard dropper)*	Intra-ocular	3 days old	14 days old in drinking water	28 days old in drinking water	Booster at 31-35 days old may be an optional unless there is high incidence of the disease in older birds
3.	New Castle Disease (B_1)	0.03 ml *(1 drop using the standard dropper)*	Nasal /Eye drop	7 days old		Revaccination at 2 week and 18 weeks age is optional and company recommends mandatory vaccination in endemic areas.	
4.	Fowl Pox	0.02 ml	- Wing web	6 weeks old	14 weeks	In recurrent Fowl Pox problematic flocks, vaccination by I/M route is preferred	
		0.2 ml	- I/M				
5.	New Castle Disease (R_2B)	0.5 ml	S/C or I/M	8 weeks old	16 weeks old	Annually	

Dilution of vaccine for administration through drinking water for different doses of Infectious Bursal Disease Vaccine

Age of birds (days)	Volume of Water for dilution (in Liters)					
	5000 Doses	2000	1000	500	200	100
14-18	30-40	15-20	8-10	4-5	2-3	1
21-28	50-60	25-30	10-12	5-6	3-4	2
35-40	80-90	40-45	15-20	8-10	5-6	3

Source: https://www.nvi.com.et/products/vaccines-against/poultry-diseases/ibd-gumboro/

Vaccination schedule for livestock *(Cattle, Yak Sheep, Goat and Pig)*

Sl. No.	Vaccine	Species	Dosage	Route	Primary (First) vaccination	Booster	Re-vaccination	Remarks
1.	Anthrax spore vaccine (live)	Cattle, buffalo, Sheep, goat & pigs	1 ml	S/C	Vaccinate above 3 months old in endemic areas	Not required	Annually during March-April in endemic areas for the next three years *(Page No. 7 of Anthrax Guidelines 2003)*	
2.	Raksha HS+BQ combined vaccine	Cattle, buffalo, Yaks & calves	3 ml	S/C (mid-neck region)	3 months and above	Not required	Annually (Do at least 21 days before migration in Cattle and Yaks and or in April in farms before the onset of monsoon or in Spring season).	Annual vaccination for next three years in disease outbreak confirmed herds/areas.
3.	Foot and Mouth Disease vaccine (RakshaOvac)	Cattle, buffalo, Yaks & pig	2 ml	I/M	3 months and above	1 month after primary vaccination	Biannual vaccination in High-Risk zones in Cattle, Yak, Buffaloes, Pig, Sheep and Goats during	Follow the NFMDPCP 2020 document. *(Annexure 2; Page 51 for risk-*

Sl. No.	Vaccine	Species	Dosage	Route	Primary (First) vaccination	Booster	Re-vaccination	Remarks
		Sheep & Goats	1 ml	I/M		(calfhood Vaccinatio n)	September-October and March-April. Annual vaccination in cattle, yak, and buffaloes during September -October in Medium risk zones as per the NFMDPCP 2020.	*based vaccination at the dzongkhag and gewog wise; 7.4 Vaccination program-Page 29-32.)*
4.	Classical Swine Fever	Pigs	1 ml	S/C	After weaning (45-60 days)	Not required	Annually	Standard as per company protocol.
5.	Peste des Petits Ruminants (PPR)	Sheep & Goat	1 ml	S/C (mid-neck region)	4 months	Not required	Vaccination only during outbreak. No mass vaccination.	Follow NPPR-PCCCEP 2020 document.
6.	Lumpy Skin Disease	Cattle, Buffalo es and Yaks	2ml	S/C	Atter one month age in calves.	Annually	Annually	Follow the SOP for LSD vaccination for further details.

Vaccination schedule for Dogs

Schedule	DHPPiL vaccine	Anti-Rabies Vaccine	Route
Primary	6-8 weeks of age	12 weeks of age	SC/IM
1st Booster	After 3 weeks from primary dose	After 3 weeks from primary	SC/IM
2nd Booster	After 3 weeks from 1st booster dose	NA	SC/IM
Annual	Annually	Annually	SC/IM

***Note**: Two vaccines may be given during the same visit in a healthy animal; however, they must be administered at different sites or via different routes.*

Vaccination schedule for Cats

Schedule	Feline panleucopaenia virus (FPLV), Feline herpes virus (FHV) and Feline calicivirus (FCV) vaccine	Anti-Rabies Vaccine	Route
Primary	6-8 weeks of age	12 weeks of age	SC/IM
1st Booster	After 3 weeks from primary dose	After 3 weeks from primary	SC/IM
2nd Booster	After 3 weeks from 1st booster dose	NA	SC/IM
Annual	Annually	Annually	SC/IM

For Anti-Rabies vaccination follow the brief reference as per NRPCP 2017:
Mminimum of 70% of the total dog population in high-risk zone annually in pet and stray Refer- 3.2. Prevention strategy and 3.2.2. V vaccination program-page no. 29 to 34 of NRPCP 2017).
As per NRPCP 2017-1-month primary, two boosters after 1 month and three months and then annually; minimum 70% coverage in owned, stray dogs and cats).

For Post Exposure Prophylaxis (PEP) for cattle and dog (Day 0,3,7,14 and 28 1ml S/C or I/M) under strict biosafety precautions.

Sl. No.	Vaccine	Species	Dosage	Route	Primary (First) vaccination	Booster	Re-vaccination	Remarks
2.	DHPPi+L		1 ml	S/C or I/M	More than 45 days	After 3 weeks (21 day)	Annually	To be purchased by the owner

Deworming Schedule in Cats and Dogs

Age / Stage	Dogs	Cats
Puppies / Kittens	Start at 2 weeks, then repeat every 2 weeks until 12 weeks	Start at 3 weeks, then repeat every 2 weeks until 9 weeks
Up to 6 months	Deworm monthly until 6 months	
Adults	Deworm every 3–6 months (quarterly in high-risk areas)	
Pregnant / Lactating	Deworm with vet-recommended safe product	

REFERENCES

1. Aiello, S. E., Moses, M. A., & Allen, D. G. (Eds.). (2016). *The Merck Veterinary Manual*. White Station, NJ, USA: Merck & Company, Incorporated.

2. Constable, P. D., Trefz, F. M., Sen, I., Berchtold, J., Nouri, M., Smith, G., & Grünberg, W. (2021). Intravenous and oral fluid therapy in neonatal calves with diarrhea or sepsis and in adult cattle. *Frontiers in veterinary science*, *7*, 603358.

3. Wagner, S. A., & Schimek, D. E. (2010). Evaluation of the effect of bolus administration of 50% dextrose solution on measures of electrolyte and energy balance in postpartum dairy cows. *American journal of veterinary research*, *71*(9), 1074-1080.

4. Nelson, R. W., & Couto, C. G. (2019). *Small Animal Internal Medicine-E-Book: Small Animal Internal Medicine-E-Book*. Elsevier Health Sciences.

5. Ettinger, S. J., & Feldman, E. C. (2010). *Textbook of Veterinary Internal Medicine-eBook: Textbook of Veterinary Internal Medicine-eBook*. Elsevier health sciences.

6. Aiello, S. E., Moses, M. A., & Allen, D. G. (Eds.). (2016). *The Merck Veterinary Manual*. White Station, NJ, USA: Merck & Company, Incorporated.

7. Constable, P. D., Trefz, F. M., Sen, I., Berchtold, J., Nouri, M., Smith, G., & Grünberg, W. (2021). Intravenous and oral fluid therapy in neonatal calves with diarrhea or sepsis and in adult cattle. *Frontiers in veterinary science*, *7*, 603358.

8. Crabtree, N. E., & Epstein, K. L. (2021). Current concepts in fluid therapy in horses. *Frontiers in Veterinary Science*, *8*, 648774.

9. Donohoe, C. (2012). *Fluid therapy for veterinary technicians and nurses*. John Wiley & Sons.

10. Ettinger, S. J., Feldman, E. C., & Cote, E. (Eds.). (2024). *Textbook of Veterinary Internal Medicine-Inkling E-Book: Ettinger's Textbook of Veterinary Internal Medicine-eBook*. Elsevier health sciences.

11. Moore, P. H. (2004). *Fluid therapy for veterinary nurses and technicians*. Amsterdam: ElsevierPardo, M., Spencer, E., Odunayo, A., Ramirez, M. L., Rudloff, E., Shafford, H., ... & Wolff, E. (2024). 2024 AAHA fluid therapy guidelines for dogs and cats. *Journal of the American Animal Hospital Association*, *60*(4), 131-163.

12. Nelson, R. W., & Couto, C. G. (2020). *Small animal internal medicine* (6th ed.). Elsevier. https://doi.org/10.1016/B978-0-323-67694-6.00001-7

13. Radostits, O. M., Gay, C. C., Hinchcliff, K. W., & Constable, P. D. (2007). *Veterinary medicine: A textbook of the diseases of cattle, horses, sheep, pigs, and goats* (10th ed., Vols. 1–2). Saunders Elsevier.
14. Roussel, A. J. (2014). Fluid therapy in mature cattle. *Vet Clin North Am Food Anim Pract*, *30*(2), 429-439.

15. Fuchs, K. D. M., Pereira, K. H. N. P., Xavier, G. M., Mendonça, J. C., Barreto, R. O., Silva, R. C., ... & Lourenço, M. L. G. (2024). Neonatal hypoglycemia in dogs—pathophysiology, risk factors, diagnosis and treatment. *Frontiers in Veterinary Science*, *11*, 1345933.
16. Harvey, A., Séverine Tasker, & British Small Animal Veterinary Association. (2013). BSAVA manual of feline practice : a foundation manual. British Small Animal Veterinary Association.