DVM DOCTORS

P R E S E N T S

A KEY GUIDE FOR

PCS (Provincial Civil Service)

Held By

Punjab Public Service Commission (PPSC)

&

ALL OTHER INSTITUTIONAL
COMPREHENSIVE EXAMS

Compiled & Presented by:

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Sole Distributor:
UNIVERSITY PHOTOSTAT
Liaquat Hall, University of Agriculture, Faisalabad

Introductory Edition

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PCS (Provincial Civil Service)

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For Veterinary Graduates

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DEDICATED TO

The Veterinarians for their Sense of Dedication and Commitment towards the Dumb Animals

VETERINARY SCIENCE THROUGH AGES

- First written record of veterinary medicine from ancient Egypt was provided by Kahum Papyrus (1900 BC).
- First mention of Rabies was reported in Eshuna code of 2300 B.C.
- Ashoka (269-232 B.C.) made compulsory provision of charitable animal hospitals.
- First veterinary school at Lyon in France in 1761 (France).
- In 1776, second veterinary school at Alfort near Paris.
- Royal charter (1844) recognized the Veterinary Art as a profession.

Historic Milestones/Discoveries

- Louis Pasteur - coined term vaccine; Fowl cholera vaccine, Rabbies vaccine, Anthrax vaccine, and concept of attenuation.
- Paul Ehrlich - Antibody production, Humoral theory, Acid fast staining, Father of chemotherapy.
- Edward Jenner – Small pox vaccination
- Waksman – Streptomycin discovery
- Bruce – Malta fever
- Loeffer and Shutz – Glander
- Moore – Fowl typhoid
- Nicolaier – Tetanus
- Ricketts – Rocky spotted mountain fever
- Bordet – Complement discovery
- Loffer – Swine erysipelas
- A. Flemming – First antibiotics as Penicillin
- J. Lister – Aseptic surgery, Carbolic acid
- R. Bucchim – Father of Pharmacology
- M.J.B. Orfla – Father of Toxicology
- Otto-lewi – Neurotransmitter discovery
- O.W. Holmes – Coined term Anaesthesia
- Rudolphi – Father of Parasitology
- Virchow – Father of Cellular Pathology
- Kohler & Milstein – Hybridoma (Monoclonal antibodies) technique
- E. Porter – Structure of antibodies
- Landsteiner – Blood Group
- Celsus – Four cardinal signs of inflammation

COMMON PHYSIOLOGICAL VALUES OF VARIOUS DOMESTICATED LIVESTOCK

Particulars	**Cattle**	**Buffalo**	**Sheep**	**Goat**	**Horse**
Rectal Temperature (F^o)	101.5	101.0	103.0	103.0	100.5
Normal Pulse Rate/min	50-70	48-65	70-80	70-80	30-40
Normal Resp. Rate/min	20-30	20-28	20-30	20-30	10-16
Age at First Service (mo)	15-18	24-27	8-12	8-12	16-18
Gestation Period (days)	283	304	150	150	340

Particulars	Dog	Cat	Camel	Fowl
Rectal Temperature (F^o)	101-102	101.0	99.5	107.0
Normal Pulse Rate/min	70-130	110-130	30-50	120-160
Normal Resp. Rate/min	15-30	20-30	10-12	15-50
Age at First Service (mo)	6-12	6-15	--	--
Gestation Period (days)	63	56	370	21 (hatch)

SCIENTIFIC NAMES OF ANIMALS

Common Name	Scientific Name
Alpaca	Llama pacos
Ass	Equus asinus
Buffalo	Bubalus bubalis
Camel	Camelus dromedarianus (Single hump)
	Camelus bacterianus (Double hump)
Cat	Felis domesticus
Cattle	Bos indicus / Bos taurus
Dog	Canisfamilaris
Goat	Capra hircus
Guanaco	Lama guanicoe
Horse	Equus caballus
Llama	Llama glama
Mithun	Bos gaurus
Pig	Sus scrofa
Rabbit	Oryctolagus cuniculus
Reindeer	Rangifer tarandus
Sheep	Ovis aries
Vicuna	Vicugna vicugna
Yalk	Bos grunniens

SCIENTIFIC NAMES OF BIRDS

Common Name	Scientific Name
Chicken	Gallus domesticus
Duck	Anas platyrhynchos
Geese	Anser anser
Golden eagle	Aquila chrysactes
Guinea fowl	Numida meleagris
Muscovy	Cainna maschata
Ostrich	Struthio camelus
Pea fowl (peacock)	Pavo cristatus
Pigeon	Columba livia
Pheasants	Phasians colchrices
Quail	Coturnix spp.

Red horned owl	Bubo bubo
Screech owl	Tyto albo
Swan	Cygnus spp.
Turkey	Meleagris gallopovo

COMMON AND COLLOQUIAL TERMS USED FOR DIFFERENT CONDITIONS/DISEASES

Sr.	Colloquial Term	Equivalent English Term	Explanation (if any)
1.		--	A non specific condition characterized by decrease in appetite, halitosis in some cases, slight depression, decrease in production. It is perhaps due to presence of noctious agents in blood and organs.
2.		Hydropsy	--
3.		--	To push air into the vagina for letdown of milk
4.		--	Wheat bran, bread crums, oil cakes, or gram hulls etc with wheat straw is given to animal when there is shortage of green fodder.
5.		Uterine torsion	--
6.		Prolapse	--
7.		Debility	--
8.		Canine distemper in dog	--
9.		Surra in camel	Trypanosomiasis in camel
10.		Strangles	--
11.		Glanders	--
12.		Diarrhea	--
13.		Bovine Ephemeral Fever	--
14.		Drench	--
15.		Pregnant	--
16.		Non-pregnant	--
16.		Cow heifer	--
17.		Yearling cow bull	--
18.		Female cow calf	--
19.		Male cow calf	--
20.		Female buffalo calf	--
21.		Male buffalo calf	--
22.		Exotic	--
23.		Early lactation	--
24.		Edema	--
25.		--	Cow/buffalo near to end of lactation
26.		Pyometra	--
27.		Docile	--
28.		Halter	--

29.		Muzzle	--
30.		Maize fodder	--
31.		Three teater	Animal having three teats
32.		Two teater	Animal having two teats
33.		Foal	
34.		--	Black buffalo with blue eyes
35.		--	Black buffalo with black eyes
36.		--	Tumor on third eyelid
37.		Worms/Parasite	--
38.		--	Lesions at the teat opening
39.		--	Panj Kalyan + Blue eyes
40.		Leather halter	--
41.		Constipation	Animal is unable to defecate
42.		Red water	--
43.		FMD	Foot and Mouth Disease
44.		Abortion	--
45.		Abomasal displacement	--
46.		Actinobacillosis	--
47.		Actinomycosis	--
48.		Alopecia	--
49.		Anemia	--
51.		Anoestrus	--
52.		Anthrax	--
53.		Arthritis	--
54.		Aural hematoma	--
55.		Bed sore	--
56.		Skipping of one milking to show that a cow/buffalo is producing more milk that the actual should on a plan of regular evening and morning milk.	

WATER-BORN DISEASES

1. Amoebiasis	2. Anthrax
3. Black Quarter	4. Bordetellosis
5. Borreliosis	6. Bovine Contagious Abortion
7. Brucellosis	8. Compylobacteriosis
9. Cholera	10. E.coli Infection
11. Fasciolosis	12. Giardiasis
13. Hog cholera	14. Infectious canine distemper
15. Influenza	16. Jaundice
17. Johne's disease	18. Kidney worm infection
19. Leptospirosis	20. Parasitic bronchitis
21. Parasitic gastroenteritis	22. Parvovirus infection
23. Pasteurellosis	24. Salmonellosis
25. Schistosomiasis	26. Swine erysipelas
27. Trachoma	28. Tuberculosis
29. Vibrio cholera	30. Viral hepatitis

MILK-BORN DISEASES

1. Anthrax	2. Cholera
3. Diphtheria	4. Dysentery
5. Foot and Mouth Disease	6. Gastro-enteritis
7. Mastitis	8. Milk sickness
9. Paratyphoid fever	10. Scarlet fever
11. Septic sore throat	12. Small pox
13. Tuberculosis	14. Typhoid fever
15. Undulant fever	

AIR-BORN DISEASES

1. Air pollution syndrome	2. Allergy rhinitis
3. Aspergillosis	4. Asthma
5. Cancer	6. Canine distemper
7. Carbon monoxide poisoning	8. CBPP (Contag. Bov. Pleuro Pneum)
9. CCPP (Con. Caprine Pleu. Pneum)	10. Chronic Respiratory Disease (CRD)
11. Dermatitis	12. Equine influenza
13. Equine viral rhinopneumonitis	14. Fluorosis
15. Fowl cholera	16. Hay fever
17. Histoplasmosis	18. Immuno-suppression
19. Infectious bronchitis	20. Infectious Bovine Rhinotracheitis
21. Infectious Bursal Disease	22. Marek's Disease
23. Newcastle Disease	24. Papillomatosis
25. Paramyxovirus type III infection	26. Plumbism
27. Q-fever	28. Sever acute respiratory syndrome
29. Sheep pox and Goat pox	30. Swine influenza
31. Tuberculosis	32. Psittacosis

FOOD-BORN DISEASES

1. Bacillary dysentery	2. Brucellosis
3. Cholera	4. E. coli infection
5. Diphtheria	6. Q-fever
7. Staphylococcal enterotoxic gastritis	8. Streptococcal infections
9. Tick-borne encephalitis	10. Tuberculosis
11. Typhoid fever	12. Paratyphoid fever

DISEASES OF LIVESTOCK; Common Name & Causative Agent

A) VIRAL DISEASES

Name of Disease	Synonym	Causative Agent
Foot and Mouth Disease	FMD; Apthous fever	Apthovirus, Picornaviridae
Rinderpest	Cattle plague; Bovine	Rinderpest virus of family

	typhus	Paramyxoviridae
Peste Des Petitis Ruminants	PPR; Pseudorinderpest, Kata, Goat plague	Morbillivirus of family Paramyxoviridae
Bovine Viral Diarrhea	BVD; Mucosal disease	Pestivirus of family Togaviridae
Malignant Catarrhal Fever	MCF; Catarrhal fever; Gangrenous coryza	Gamma herpesvirus
Blue Tongue	Sore mouth; Epizootic catarrh; Pseudo FMD	Orbivirus of family Reoviridae
Vesicular Stomatitis	Mouth thrush; Sporadic aptha; Estomatitis	VS virus of family Rhabdoviridae
Ephemeral Fever	Three day sickness; Stiff sickness	EF virus of family Rhabdoviridae
Infectious Bovine Rhinotracheitis	IBR; Red nose; Necrotic rhinitis	Bovine herpes virus-I
Pseudo rabies	Aujeszky's disease; Mad itch	Herpes virus
Cow pox	Variola vaccina	Cow pox virus
Goat pox	Variola capra	Capri pox virus
Sheep pox	Ovine px; Variola ovina	Capri pox virus
Swine pox	Variola suilla; Contagious impetigo	Sui pox virus
Horse pox	Variola equine; Contagious pustular stomatitis	Equi pox virus
Pseudo cow pox	Milker's nodules; Ring sore	Para pox virus
Swine Fever	Hog cholera; Peste porcine	Togavirus
Vesicular Exanthema	--	Calicivirus
African Swine Fever	African pig disease; Wart hog disease	Irido virus
Transmissible Gastroenteritis	T.G.E.	Corona virus
Japanese Encephalitis	--	Arbovirus of family Togaviridae
Contagious Ecthyma	Contagious pustular dermatitis; ORF; Scabby mouth	ORF virus of family Poxviridae
Maedi	Progressive interstitial pneumonia	Lentivirus of family Retroviridae
Pulmonary Adenomatosis	Jaagsiekte	Not yet defined
Bovine Leukosis	Bovine lymphosarcoma	Bovine leukemia virus of family Retroviridae
Corona virus infection	CCV; Viral gastroenetritis	Corona virus
Equine Influenza	Equine distemper; Typhoid fever; Pink eye	Myxovirus
Equine Infectious Anemia	EIA; Swamp fever	EIA virus; Lentivirus of family Retroviridae
Pulmonary Disease in Horse	Chronic obstructive pulmonary disease (COPD)	Multifactorial
Respiratory Disease Complex	Kennel cough	Borderella bronchoseptica

in Dog		
Equine Viral Rhinopneumonia	Rhinopneumonitis; Equine viral abortion	Equine herpes virus -I
Scrapie	Rida; Tremblante du mouton	Prion
Louping ill	Ovine encephalomyelitis	Flavivirus of family Togaviridae
Bovine Spongiform Encephalopathy	BSE; Mad cow disease	Prion
Canine Distemper	Hard pad disease; Canine influenza	Canine distemper virus of family Paramyxoviridae
Infectious Canine Hepatitis	Rubarth's disease; Contagious hepatitis	Adenovirus I & II of family adenoviridae
Rabies	Mad dog; Hydrophobia; Jalatanka; Lyssa	Lyssa virus of family Rhabdoviridae
Rotavirus Diarrhea	--	Retavirus of family Rotaviridae
Parvovirus Infection in Dog	--	Parvovirus of family Parvoviridae
Feline Panleukopenia	Feline distemper; Feline parvovirus; Feline ataxia	DNA virus
Respiratory Disease Complex in Cat	Cat flu, FVR;	Feline herpes virus-I
Feline Leukemia	Lymphosarcoma	Retrovirus

B) BACTERIAL DISEASES

Name of disease	**Synonym**	**Causative Agent**
Anthrax	Splenic fever; Charbon; Wool sorter's disease	Bacillus anthracis
Hemorrhagic Septicemia	Pasteurellosis; Shipping fever; Stockyard disease	Pasteurella multocida
Brucellosis	Bang's disease; Infectious abortion; Enzootic abortion	B.abortus, B. melitensis, B. suis, B. ovis, B. canis
Tuberculosis	Pearl's disease; Pthisis; Scrofula	Mycobacterium spp.
Paratuberculosis	Johne's disease; Chronic bacillary dysentery	Mycobacterium paratuberculosis
Leptospirosis	Weil's disease; Stuttgart disease; Rice field worker's disease; Canine typhus	Leptospira spp. (L.interrogans, L.pomona, L.canicola, L.hardjo)
Listeriosis	Circling disease; Silage disease	Listeria monocytogenes
Colibacillosis	Calf scour; White disease; Calf septicemia	Eschericia coli (E.coli)
Salmonellosis	Paratyphoid	S. typhimurium, S.dublin
Actinomycosis	Lumpy jaw	Actinomyces bovis
Actinobacillosis	Wooden tongue; Timber	Actinobacillus lignieresi

	tongue; Big head	
Dermatophylosis	Mycotic dermatitis; Senekobo disease of cattle, Lumpy wool of sheep	Dermatophilus congolensis
Swine Erysipelas	Diamond skin disease	Erysipelas rhusiopathiae
Compylobacteriosis	Vibriosis	Campylobacter foetus
Glanders	Farcy; Malleus; Morve; Pacin; Carn	Pseudomonas mallei
Strangles	Equine distemper; Infectious adenitis	Streptococcus equi
Exudate Epidermitis	Greasy pig disease	Staphylococcus hyos
Impetigo	--	Staphylococcus aureus
Glasser's disease	Infectious polyarthritis	Haemophilus suis
Ulcerative Lymphangitis	Ulcerative cellulitis; Caseous lymphadenitis	Corynebacterium pseudotuberculosis
Foot Rot	Infectious pododermatitis	Spherophorus necrophorus
Infectious Kerato Conjunctivitis	Pink eye; Infectious keratitis	Moraxella bovis
Black Quarter	Black leg; Quarter ill; Symptomatic anthrax	Clostridium chauvoei
Tetanus	Lock jaw	Clostridium tetani
Enterotoxemia	--	Clostridium perfringens
Bacillary Hemoglobinurea	Red water disease; Infectious hemoglobinuria	Clostridium hemolyticum
Botuslim	Limber neck; Loin disease	Clostridium botulinum
Braxy	Brad sot	Clostridium septicum
Infectious Necrotic Hepatitis	Black disease	Clostridium novyi
Malignant Edema	--	Clostridium septicum
Joint Ill	Naval ill; Poly arthritis; Omphalitis, Urachitis	Mixed etiological agents (E.coli, Strepto, Staph, Actino, Enterococcus)
Mastitis	Mammitis; Mammite	A no. of organisms involved
Lyme Disease	--	Borrelia burgdorferi
Contagious Bovine Pleuropneumonia	CBPP; Lung plague; Lung sickness	Mycoplasma mycoides var mycoides
Contagious Caprine Pleuropneumonia	CCPP; Pleuropneumonia contagiosa	Mycoplasma mycoides caprae

C) FUNGAL DISEASES

Name of disease	**Synonym**	**Causative Agent**
Dermatophytosis	Ringworm;	Trichophyton verrucosum
Rhinosporidiosis	--	Rhinosporidia seeberi
Sporotrichosis	--	Sporotrichum schenckii
Nocardiosis	Bovine farcy; Mycotic lymphangitis	Nocardia farcinicus
Aspergillosis	--	Aspergillus spp.
Aflatoxicosis	Myotoxicosis	Aspergillus flavus

Candidiasis	Moniliasis	Candida albicans
Phycomycosis	Mucormycosis; Zygomycosis	Mucorales spp.

D) PARASITIC DISEASES

Name of Disease	Synonym	Causative Agent
Amphistomiasis	Stomach fluke disease	Paramphistomum cervi
Schistosomiasis	Nasa	Sschistostoma bovis
Hepatic Fascioliasis	Liver fluke disease	Fasciola hepatica
Esophagostomosis	Nodule worm disease	E. radiatum, E. columbianum
Bovine Verminous Bronchitis	Verminous pneumonia	Dictyocaulus viviparous
Coenurosis	Gid; Sturdy	Ceonurus cerebralis
Echinococcosis	--	Echinococcus granulosus
Hemonchosis	--	Hemonchus contortus
Ascariasis	--	A. vitulorum, A. canis

E) PROTOZOAN & RICKETTSIAL DISEASE

Name of Disease	Synonym	Causative Agent
Anaplasmosis	Gall Sickness	Anaplasma marginale
Ehrlichiosis	Canine rickettsiosis	Ehrlichia canis
Babesiosis	Tick fever; Texas fever; Splenic fever; Red fever	B. bigemina, B. bovis, B.equi, B. cabalii
Theileriosis	East coast fever; Rhodesian tick fever	Theileria parva, T. annulata, T.mutans
Trypanosomiasis	Surra	Trypanosoma evansi
Leishmaniasis	--	Leishmania donovani
Toxoplasmosis	--	Toxoplasma gondi
Cryptosporidiosis	--	Cryptosporidium parvum

DISEASES OF POULTRY; Common Name & Causative Agent

Name of Disease	Synonym	Causative Agent
Marek's Disease	Range paralysis; Neural lymphomatosis	MD virus; Herpes virus
Newcastle Disease	Ranikhet disease; Avian pneumoencephalitis	Paramyxovirus group I
Infectious Bronchitis	IB	IBV of family Coronaviridae
Avian Encephalomyelitis	AE; Epidemic tremor; New England disease	Picornavirus of family Picornaviridae
Fowl Plague	Avian influenza	AI virus of family Orthomyxoviridae
Infectious Laryngotracheitis	ILT; Avian diphtheria	ILT virus of family Herpesviridiae

Avian Leukosis Complex	ALC; Avian sarcoma; Big liver disease;	Rotavirus type C of subfamily Oncovirinae
Infectious Bursal Disease	IBD; Gumboro disease	IBD virus of family Birnaviridae
Avian Influenza	--	Influenza A virus of family Orthomyxoviridae
Chicken Infectious Anemia	CIA;	CIA virus of family Circoviridae
Avian Collibacillosis	Colisepticemia;E.coli infection	Escherichia coli
Avian Pasteurellosis	Fowl cholera; Avian cholera	Pasteurella multocida
Fowl Typhoid	Infectious leukemia	Salmonella gallinarum
Fowl Paratyphoid	Avian salmonellosis	Salmonella typhimurium
Pullorum Disease	Bacillary white diarrhea	Salmonella pullorum
Chronic Respiratory Disease	MG infection	Mycoplasma gallisepticum
Coccidiosis in Poultry	--	Eimeria spp. (e.g. E.tenella)

INCUBATION PERIODS OF COMMON DISEASES

Diseases	**Range (Days)**	**Average (Days)**
Anaplasmosis	17-48	30
Anthrax	5-10	7
Babesiosis	7-21	--
Black quarter	1-5	--
Brucellosis	21-180	60-120
Contagious ecthyma	5-8	--
Canine distemper	3-7	4
Foot and Mouth Disease	2-10	3
Glanders	30-90	30
Hemorrhagic Septicemia	2-5	3
Influenza (equine)	3-10	4
Influenza (piglets)	2-7	--
Johne's disease	30-730	90
Leptospirosis	7-9	8
Malignant oedema	2-5	3
Pox (sheep, cow)	2-7	--
Pustular dermatitis	4-7	--
Rabies (all animals)	9-450	30-90
Rinderpest	3-9	3
Strangles	3-8	--
Swine erysipelas	1-5	--
Tetanus	7-21	15
Trypanosomiasis	4-13	7
Tuberculosis	30-90	30
Vibriosis	20-60	35

ORIGIN OF ORGANS

Ectoderm	Mesoderm	Endoderm
Epidermis, hair, nail and lens	All type of muscles	Pharynx epithelium
Epithelium of sensory organs, enamel, mouth, and anal canal	Blood, bone marrow	Larynx, Lungs
Nervous tissue	Lymphoid tissue, Blood vessels Body cavities Kidney, Ureter Gonads Joint cavities	Digestive tube Bladder Vagina Urethra

CRANIAL NERVES

No.	Name	Type
1.	Olfactory	Sensory
2.	Optic	Sensory
3.	Occulomotor	Motor
4.	Trochlear	Motor
5.	Trigeminal	Mixed
6.	Abducens	Motor
7.	Facial	Mixed
8.	Glossopharyngeal	Mixed
9.	Vagus	Mixed
10.	Spinal Accessory	Motor
11.	Hypoglossal	Motor

TYPE OF BODY JOINTS

Sr.	Type of Joints	Example
1.	Ginglymus (hinge) joint	Fetlock joint
2.	Arthrodial (plane) joint	Joints between adjacent carpals a
3.	Trochoid (pivot) joint	Atlanto-axial joint
4.	Enarthrodial(ball & socket) joint	Coxo-femoral joint
5.	Suture joint	Skull bone joints
6.	Synsarcosis	Joints between scapula and bony thorax
7.	Syndesmoses	Joint of shaft of split bones & canon bone of horse

IMPORTANT JOINTS OF BODY

Name of Joint	Between the bone
Stifle joint	Femur and tibia
Hip joint	Pelvis and femur
Shoulder joint	Scapula and humerus
Elbow joint	Humerus and radius

Fetlock joint	Metacarpus and proximal phalanx
Pastern joint	Proximal phalanx and middle phalanx
Coffin joint	Middle phalanx and distal phalanx

SYNONYMS OF BONES / PROCESSES

Real Name	**Synonyms**
Tuber coxae	Point of hip or hook bone
Tuber ischii	Pin bone
Metacarpal	Canon
First phalanx	Long pastern bone
Second phalanx	Short pastern bone
Third phalanx	Coffin bone
Oleocranon process	Point of elbow

SITE OF THORACOCENTESIS

Animal	**Right (ICS)**	**Left (ICS)**
Horse	6^{th}	7^{th}
Cattle and Sheep	5^{th}	6^{th}
Dog and Cat	6^{th}	7^{th}

LIVER BIOPSY

Animal	**Site**
Horse	Right dorsal half, 11^{th} – 14^{th} ICS
Cattle & Sheep	Upper third right side, 11^{th} ICS
Dog, Cat, Pig	Last 2 ICS close to the costal arch

SITE FOR PULSE RECORDING

Horse	Lower jaw, where the external maxillary artery is continued across the face as facial artery.
Cattle	Coccygeal artery on either side of the under aspect of tail.
Sheep, Goat, Dog, Cat	Femoral artery inside the hind limb, more than the half way between stifle and hip joint
Fowl	Wing artery on the inner aspect of the wing

SUTURE MATERIALS

Category	Example
Absorbable (organic)	Catgut, Fascia lata, Kangaroo tendon, cargile membrane, Amniotic membrane, Polyglycolic acid (Dexon)
Non-absorbable a) Organic b) Inorganic c) Synthetic	 Cotton, Silk, Silk warm gut, Horse hair, Linen, Umbilical tape Metallic, suture wire, steel wire, Wound clips, Pin suture. Nylon, Terelene, Vetafil, Polyester, Surgilene

ABSORBABLE SUTURE MATERIAL

Name	Obtained from
Cat gut	Submucosa of small intestine of sheep
Kangaroo tendon	Tendon of tail of Kangaroo
Cargile membrane	Bovine caecum
Collagen	Bovine flexor tendon filament
Amniotic membrane	Foetal amnion

VETERBRAL COLUMN IN DIFFERENT ANIMALS

Species	Cervical	Thoracic	Lumber	Sacral	Coccygeal
Horse	7	18	6	5	15-20
Cattle	7	13	6	5	18-20
Sheep	7	13	6-7	4	16-18
Hog	7	14-15	6-7	4	20-23
Chicken	14	7	14 (fused)	6	--
Human	7	12	5	5	4

TYPE OF MUSCLES

Sr.	Type of Muscles	Example
1.	Flexor	Biceps brachii for elbow
2.	Extensor	Triceps brachii for elbow
3.	Sphincter striated	Obricularis oculi
4.	Cutaneous muscle	Cutaneous trunchi muscle
5.	Antagonistic	Biceps brachii and brachialis
6.	Synergists	Triceps brachii and Anconeus

SENSATION AND NERVE ENDINGS

Sensation	Receiving nerve endings
Touch	Meissner's corpuscles, Morke's discs
Deep pressure	Vater Pacinian corpuscles
Heat	Corpuscles of Ruffini
Cold	Krause end bulbs
Muscle sense	Neurotendinous organ

TASTE PERCEPTION IN TONGUE

Area of tongue	Type of taste
Base	Bitter
Lateral side	Sour, salt
Tip	Sweet or salt

CARCASS CHARACTERISTICS

Parameters	Horse	Ox
Side length	Unusual	Lesser
Muscular development of hind quarter	Great	Less
Thoracic cavity	Longer	Shorter
Ribs	18 pairs	13 pairs
Superior spinous process of first six vertebrae	Markedly developed	Less developed
Extension of ulna	Up to half the length of radius	Articulates with carpus
Articulation among last three lumber vertebral	Articulates	Do not articulate
Flesh	Dark bluish red, sweet taste, fibrous	Lacks blue tinge

CARCASS CHARACTERISTICS

Features	Sheep	Goat
Back and withers	Round and well fleshed	Sharp, little flesh
Thorax	Barrel shaped	Flattened laterally
Tail	Fairly broad	Thin
Radius	1 1/4 times length of metacarpus	Twice as long as metacarpus
Scapula	Short and broad	Long
Flesh	Pale red and fine	Dark red of coarse with goaty odour

IODINE VALUE OF MEAT

Animal species	Iodine value of meat
Horse	71-86%
Ox	38-46%
Sheep	35-46%
Pig	50-70%
Good Lard	66%

REFRACTIVE INDEX OF MEAT

Animal species	R.I. of meat fat
Horse	53.5
Ox	< 40
Pig	< 51.9

BLOOD AS % OF LIVE BODY WEIGHT

Species	Cattle	Calves	Pigs	Sheep	Lamb
% of blood	3-4	5-6	3-4	4-4.5	3.5-4

TIME OF EGG FORMATION IN THE CHICKEN

Part of egg formed	Site of formation	Time of formation
Yolk	Ovary	7-9 hours
Thick mucin	Infundibulum	15-30 minutes
Albumin	Magnum	2-3 hours
Shell membrane	Isthmus	1.5 hours
Watery solution	Shell gland	3-5 hours
Shell	Shell gland	19-20 hours
Bloom (mucus)	Vagina	1-10 minutes

COMPOSITION OF MILK AND EGG

Nutrients	Milk	Egg
Water (gm)	87	60
Protein (gm)	4	12
Fat (gm)	3.5	4
Calcium (mg)	118	48
Phosphorus (mg)	93	180
Iron (mg)	Trace	2.1
Vit. A (IU)	140	1080
Riboflavin (mg)	0.17	0.27
Niacin (mg)	0.11	0.07

DUNG AND URINE EXCRETION IN DIFFERENT SPECIES

Type of Animals	Dung (kg)	Urine (kg)
Horse	16.10	3.6
Cattle	23.50	9.0
Sheep	1.13	0.60
Pig	2.70	1.5
Poultry	0.04	--

APPEARANCE OF CONJUNCTIVA IN DIFFERENT SPECIES

Animals	Conjunctival colour
Cattle, buffalo, and sheep	Light pink
Horse	Pale pink/ roseate
Pigs	Reddish
Dogs	Pale Pink
Cats	Pale

PERCENT CAPACITY OF RUMINANT STOMACH

Animals	Rumen	Reticulum	Omasum	Abomasum
Cattle and buffalo	55	5-7	26-30	13-14

Sheep and goat	62	11	5	22-23

RUMINANT STOMACH

Part of Stomach	Remarks
Rumen	Largest compartment of stomach, on left side. Dorsal sac is the largest sac of rumen. Lined by glandless stratified squamous epithelium (Turkish towel appearance). Rumen liquor has pH 5.8 to 6.8, also known as Paunch. Temperature inside rumen is 39 C.
Reticulum	Also called Honey comb. Made up of stratified squamous epithelium located immediately behind diaphragm in opposition to heart. Inside temperature is 39 C.
Omasum	Primary function is to remove water by about 50% and to absorb VFAs. (Absent in Camel)
Abomasum	True stomach. Glandular. pH = 2.0. Enzymatic digestive site. It is similar to fundic region of non-ruminant stomach.

PANCREATIC JUICE

Sr.	Parameters	Components
1	Enzyme precursors	Trypsinogen, Chymotrypsinogen
2	Active enzyme	Elastase, Amylase, Lipase
3	Cations	Sodium, Potassium, Calcium
4	pH	7.5-8.0

DIGESTIVE JUICE

Secretion	Source	Target	Contents	Remarks
Saliva	Salivary glands	Mouth	Amylase, salt, mucus water	Break starch into dextrin and maltose
Gastric juice	Gastric glands	Stomach	HCl, Pepsinogen, Renin, Mucus	Milk curdling, Protein protease and peptones
Bile	Liver	Small intestine	Bile pigments, bile salts	Fat emulsification, Neutralize chyme
Pancreatic juice	Pancreas	Small intestine	Lipase, Amylase, Trypsinogen and Chymotrypsin	Fat degradation, starch and dextrin break into maltose, amino acids liberation
Intestinal juice	Duodenal glands and goblet cells	Small intestine	Enterokinase, Peptidase, Maltase, Sucrose, and Lactase	Splits amino acid, maltose, sucrose and lactose

VARIATION IN THE COLOUR OF FECES

Animals	Conditions	Colour
Calves	Unweaned	Yellowish-brown or grey
	Diarrhea	Whitish or yellowish
Adult	Grazing on pasture	Dark green (loose)
Cattle/Buffalo	Stall feeding	Brownish
	Constriction of bile duct	Pale to grey
	Acute acidosis (Grains overload)	Yellowish-brown
	Excess bile	Yellowish
	Poor ration, Ketosis	Brown-black surface
	Occult blood	Dark brown or tarry
	Blood from caudal intestine	Dark red

BLOOD CHEMISTRY CHART

Blood constituents	Variation	Associated diseases
Blood glucose	Decrease	Hypoglycemia, Ketosis, Starvation
	Increase	Diabetes mellitus, Hyperglycemia, Hypoinsulinemia
Urea nitrogen	Increase	Nephritis, Urinary calculi
Creatinine	Increase	Severe renal damage, Wasting disease, Increased protein breakdown
Bilirubin	Increase	Intra/extra biliary obstruction, Severe hepatopathy or hemolysis
Calcium	Decrease	Milk fever, Hypocalcemia, Osteoporosis
	Increase	Hyperthyroidism, Hypervitaminosis D_3
Phosphorus	Decrease	Hypophosphatamia, Osteomalasia,
	Increase	Bone fracture healing, advance chronic renal insufficiency
Magnesium	Decrease	Hypomagnesemia, Grass tetnay, Whole milk tetany in calves
Ketone	Increase	Ketosis, Starvation, Advance diabetic mellitus
Alkaline phosphatase	Increase	Bone repair, Fracture healing
Aspartate amino-transferase (AST)	Increase	Myocardial necrosis, Muscle dystrophy, Hepatitis, Azoturia
LDH & CPK	Increase	Liver damage, Carbon tetrachloride toxicosis
Sodium	Decrease	Muscular dystrophy and Muscle damage
Potassium	Decrease	Vomition, Diarrhea, Low intake
	Increase	Hyperkalemia, Acidosis
Chloride	Decrease	Vomition, Diarrhea, Low intake of salt
Bicarbonates	Decrease	Acidosis, Grain engorgement
	Increase	Alkalosis, Urea toxicity, Amonia toxicosis

CHROMOSOME NUMBERS

Species	Chromosomes		Male	Female
	Pairs	Total		

Man	23	46	XY	XX
Horse	32	64	XY	XX
Cattle	30	60	XY	XX
Buffalo	24	48	XY	XX
Sheep	27	54	XY	XX
Goat	30	60	XY	XX
Swine, Cat	19	38	XY	XX
Dog	39	78	XY	XX
Poultry	39	78	ZZ	ZW

CLASSES OF CARBOHYDRATES

Class	**Examples**
1. Monosaccharides	
a) Pentoses ($C_5H_{10}O_5$)	Arabinose, Xylose, Ribose
b) Hexoses ($C_5H_{12}O_6$)	Glucose, Fructose, Galactose, Mannose.
2. Disaccharides ($C_{12}H_{22}O_{11}$)	Sucrose, Maltose, Lactose, Cellobiose
3. Trisaccharides ($C_{18}H_{32}O_{16}$)	Raffinose
4. Polysaccharides	
a) Pentosans ($C_5H_{10}O_{16}$)x	Araban, Xylan
b) Hexosans ($C_6H_{10}O_5$)x	Dextrin, Starch, Cellulose, Insulin, Glycogen
c) Mixed type	Mimicellulose, Pectingums, Mucilages

MINERALS

Macro-Minerals	**Micro-Minerals**
Calcium	Iron
Phosphorus	Copper
Sodium	Zinc
Potassium	Cobalt
Magnesium	Iodine
Sulphur	Manganese
Chlorine	Selenium Molybdenum Fluorine, Vanadium, Chromium, Silicone

QUARANTINE PERIOD

Disease	**Species**	**Period (OIE guidelines)**
Infectious bronchitis	Fowl	28 days
Rabies	Dog, Cat	4 months
Bacterial infection	Zebra	2 weeks
Fowl cholera	Poultry	14 days
Fowl typhoid	Poultry	28 days
African swine fever	Swine	40 days
Newcastle Disease	Birds	21 days
Fowl Plaque	Wild birds	21 days
Chlamydiosis	Pigeon	45 days

Aspergillosis	Psittacine birds	45 days
Rinder pest	Cattle	21 days
CBPP	Bovine	180 days
Anaplasmosis	Ruminants	100 days
Tuberculosis	Bovine	3 months
Enzootic bovine leucosis	Bovine	4 months
Hemorrhagic Septicemia (H.S.)	Cattle	28 days
Infectious bovine rhinotracheitis	Bovine	30 days
Swine fever	Swine	6 weeks
Porcine brucellosis	Swine	30 days
Swine Transmissible Gastroenteritis	Swine	28 days
Pox	Sheep, Goat	30 days
Blue Tongue	Sheep	40 days
CCPP	Sheep	180 days
Dourine	Horse	28 days
Glanders	Horse	28 days
Salmonellosis	Pregnant mares	6 weeks
Equine Influenza	Equine	28 days
Japanese Encephalitis	Domestic and wild pig	28 days
Contagious Equine Metritis	Equine	30 days

DENTAL FORMULA

Species	**Deciduous or Temporary** **2 x [ICPM/ICPM]**	**Permanent** **2 x [ICPM/ICPM]**
Horse	3030 = 24 3030	3133 = 40 (Male) 3133 3033 = 36 (Female) 3033
Cattle, Buffalo, Sheep, Goat	0030 = 20 4030	0033 = 32 4033
Cat	3130 = 26 3120	3131 = 30 3121
Dog	3130 = 28 3130	3142 = 42 3143
Pig	3130 = 28 3130	3143 = 44 3143
Camel	1130 = 26 3120	1133 = 34 3123

MOUTH GAGS

Name	**Animals**
Varnell's gag	Horse
Butler's gag	Horse
Haussman's gag	Horse
Probang (Wooden) gag	Cattle
Spring gag	Dog

INFLAMMATION

Sr.	Terms	Organ/Structure
1.	Myelitis	Spinal cord
2.	Pachymeningitis	Dura mater
3.	Leptomeningitis	Pia mater
4.	Poliomyelitis	Greymater in brain
5.	Typhilitis	Caecum
6.	Proctitis	Rectum
7.	Oophoritis	Ovary
8.	Salpingitis	Oviduct
9.	Metritis	Uterus
10.	Orchitis	Testes
11.	Posthitis	Prepuce
12.	Balanitis	Glans penis
13.	Gonitis	Stifle joint
14.	Coxitis	Hip joint
15.	Bursitis	Bursa over joint
16.	Acne	Sebaceous gland
17.	Laminitis	Laminae of hoof
18.	Blephritis	Eyelid
19.	Stye or Hordeolum	Eyelid hair follicle
20.	Keratitis	Cornea
21.	Iridocyclitis or Anterior uveitis	Iris and Ciliary body
22.	Phlebitis	Veins
23.	Omphalitis	Navel
24.	Adenitis	Gland
25.	Lymphangitis	Lymph vessel
26.	Rhinitis	Nasal mucosa
27.	Pneumonia	Lungs (also Pneumonitis)
28.	Sialadenitis	Salivary glands
29.	Cholangitis	Bile duct
30.	Cholecystitis	Gall bladder
31.	Ingluvitis	Crop (bird)
32.	Pyelonephritis	Pelvis and parenchyma of kidney
33.	Cystitis	Urinary bladder

MEDICAL TERMINOLOGY

1.	Hyperorexia	Increased appetite
2.	Polyorexia	Increased food intake
3.	Inappetance	Partial absence of appetite
4.	Anorexia	Complete absence of appetite
5.	Anophagia	Decreased food intake
6.	Allotriophagia	Abnormal appetite
7.	Osteophagia	Chewing of bone
8.	Infantophagia	Eating of young
9.	Coprophagia	Eating of feces

DIFFERENCE BETWEEN SMALL INTESTINE DIARRHEA AND LARGE INTESTINE DIARRHEA

Characteristics	Small Intestine	Large Intestine
Frequency of defecation	No change	Increased
Fecal volume	Increased	Decreased
Urgency	Absent	Present
Tenesmus	Absent	Present
Mucus in feces	Absent	Present
Blood in feces	Dark black (Malena)	Red (Fresh)
Weight loss	May be	Rare

TYPES OF PLACENTA

Sr.	Type of Placenta	Gross Shape	Example
1	Epitheliochorial	Diffuse	Horse, Donkey, Pig
2	Syndesmochorial	Cotyledonary	Cattle, Sheep, Goat
3	Endotheliochorial	Zonary or Discoid	Dog, Cat, Ferret
4	Hemochorial	Zonary or Discoid	Primates
5	Hemoendothelial	Shperoidal or Discoid	Rat, Rabbit

ANTIBACTERIAL AGENTS

Category	Classes	Example
Penicillin	Narrow spectrum (β-lactamase sensitive)	Penicillin G Penicillin V
	Narrow spectrum (β-lactamase resistant)	Oxacillin Cloxacillin Flucloxacillin Methicillin Temocillin
	Broad spectrum β-lactamase sensitive)	Ampicillin Amoxicillin
	Broad spectrum (β-lactamase resistant)	Carbenicillin Ticarcillin Piperacillin
	Potentiated	Amoxicillin-clauvulanate
Cephalopsorins	1st Generation	Cephalothin Cephalexin Cefadoxil
	2nd Generation	Cefamandole Cefoxitin Cefuroxime
	3rd Generation	Ceftriaxone Ceftiofur Cefotaxime

Aminoglycocides	Narrow spectrum	Streptomycin Dihydrostreptomycin
	Broad spectrum	Neomycin Framycetin Kanamycin
	Miscellaneous	Apramycin Spectinomycin
Quinolones	Quinolone carboxylic acid	Enrofloxacin Norfloxacin Ciprofloxacin Pefloxacin Oxolinic acid
	Naphthyridine C.A.	Enoxin, Nalidixic acid
	Cinnoline C.A.	Cinoxin
	Pyridopyriminine C.A.	Pipemidic acid
	Quinolizine C.A.	Flumequine
Sulphonamide and Combination	Standard use SLD	Sulfathiazole Sulfadimidine Sulfamerazine Sulfadimethoxine
	SLD for uterine tract infection	Sulfoxazole Sulfisomidine
	SLD for digestive tract	Sulfaguanidine
	Potentiated SLD	SLD + Diminopyrimidine SLD + Pyrimethamine
	Topical SLD	Sulfacetamide Mafenide, Silver sulfadiazine, Sulfathiazole
Tetracycline	Natural	Oxytetracycline, Chlortetracycline, Demethylchlortetracycline
	Semi synthetic	Tetracycline, Methacycline, Rolitetracycline Minocycline Doxycycline
Chloramphenicol		Thiamphenicol, Chlorphenicol Florphenicol
Macrolides	14-membered lactone ring group	Erythromycin, Oleandomycin, Troleandomycin
	16-membered lactone ring	Spiramycin, Josamycin, Tylosin
Lincosamides		Lincomycin, Clindamycin
Miscellanous		Polymixin, Bacitracin, Vancomycin, Novobiocin, Timulin, Rifamycin, Nitrofurans Nitroimidazoles.

ANTIFUNGAL AGENTS

Class	Example	Spectra
Polyene macrolides	Amphotericin B Nystatin, Pimaricin	Broad
Imidazole	Ketocanazole Itracanazole, Thiabendazole Fluconazole	Systemic
Flucytosine		Cryptococcal meningitis, Candidiasis, Aspergillosis
Griseofulvin		Trichophyton, Microsporum
Local/ topical agent	Tincture of iodine, Phenol, KI, $CuSO_4$, Gentian, Violet, Nystatin, Tiacetin, Polynoxylin, Olamine.	

ANTIVIRAL AGENTS

Name	Spectrum	Example
Pyrimidine nucleosides	Herpes simplex	Trifluridine Idoxuridine
Purine nucleosides	Herpes encephalitis s	Vidarabine Acyclovir Deoxyacyclovir
Ribovirin	DNA & RNA virus Adeno, Herpes, Orthomyxo, Paramyxo, Pox, Picorna, Reovirus	
Azidothymidine	Retro virus (AIDS)	
Amentadine	Pseudorabies, Influenza C	
Interferone	Wide spectrum	

ANTHELMINTICS

Class	Example
Inhibitors of tubulin polymerization	Benzimidazoles, Probenzimidazole
Uncouplers of oxidative phosphorylation	Salicylanilides
Inhibitors of enzymes in glycolytic pathway	Clorsulon
Cholinesterase inhibitors	Organo-phosphorus (Coumaphos, Dichlorvos, Haloxon, Trichlorofon)
Cholinergic Agonist	Imidathiazoles (Levamisole, Tetramisole) Pyrimidines (Morantel, Oxantel, Pyrantel)
Muscle hyperpolarization	Piperazine
Potentiation of inhibitory transmitters	Macrocycliclactones (Ivermectin, Doramectin, Milbemycin, Moxidectin)

PRE-ANAESTHETIC AGENTS

Type	Example
Anticholinergics	Atropine sulphate Hyoscine Glycopyrrolate
Morphine & derivatives	Morphine, Pethidine, Fetanyl, Etorphine, Pentazocine, Methadone
Tranquilizers	Chlorpromazine HCl (Largactil), Triflupromazine HCl (Siquil), Promethazine HCl (Phenergan), Droperidol Acetylpromazine Xylazine, Detomidine
Neurolaptanalgesics	Fentanyl citrate + Droperidol + Methadone + Acepromazine

DOSES OF IMPORTANT DRUGS

Name of Drug	Dog	Horse	Cattle/Buffalo
Atropine sulphate	0.02 mg/kg IM	40-60 mg IM	--
Pentazocine (mg/kg)	--	0.5-4.0 orally	--
Etorphine	2 μ/kg for wild animals		
Meperidine HCl	5-10 mg/kg	1 mg/kg upto 1 gm	1 mg/kg upto 1 gm
Largactil	0.5-1 mg/kg IM	0.4 mg/kg IM	1 mg/kg IM
Xylazine	1-2 mg/kg IM	--	--
Ketamine HCl	10-20 mg/kg IM	--	--
Propofol	6 mg/kg IV	2 mg/kg IV	--
Chloral hydrate	--	6.5g/50 kg IV	90-100 mg/kg IV

EMERGENCY DRUGS AND THEIR ANTAGONISTS

Drug	Antagonist / Antidote
Atropine	Physostigmine
Morphine	Nalloxone
Pentobarbital sodium	Yohimbine
Organo-phosphorus compound	PAM
5-OH Tryptamine	Methysergide, LSD, Ergot alkaloid
Kallikrien	Aprotonin
Angiotensin	Saralosin
Heparin	Toluidine Potamine
Vitamin K	Coumarine
Alcohol	$NaHCO_3$, or Na-citrate
Aercoline	Atropine sulphate
Aspirin	$NaHCO_3$, Coramine
Barbiturate	Amphetamine
Barium	$MgSO_4$
Belladona	Tannic acid
Benzoic acid	Siquil, Diuretics

Bromides	Chlorides
Camphor	Siquil, Saline diuretics
Castor oil	Lavage, Atropine sulphate
Ephedrine	Lavage, Emetics
Chloroform	O_2, Coramine, Ca-borogluconate
Formaldehyde	Lavage, Na-carbonate
Digitalis	Lavage, Propranolol, Na_2SO_4
Coumarine	Vit. K
Iron toxicosis	Deferoxamine
Inorganic phosphorus	$CuSO_4$

ANIMAL DISEASES AND THEIR NICKNAMES

Diseases	**Nickname (Synonym)**
Anaplasmosis	Gall sickness
Hemobartenellosis	Feline infectious anemia
Schistosomiasis	Bilharzia
Trypanosoma cruzi infection	Chagas disease
Trypanosoma evansi infection	Surra
Trypanosoma equiperdum infection	Dourine
Cutanoeus asthenia	Ehlers danlos syndrome Rubber puppy disease
Streptococcal lymphadenitis in pigs	Jowl abscess
Dirofilariasis	Heart worm disease
High mountain disease	Brisket disease; Pulmonary hypertensive heart disease
Clostridium piliforme disease	Tyzzer's disease
Brachygnathia	Parrot mouth (in horse)
Prognathia	Sow mouth (in horses)
Ankyloglossia	Bird tongue
Epitheliogenesis imperfect	Smooth tongue
Epulis	Gingival hyperplasia
Segmented aplasia	Rectal agenesis
Lipomatosis	Abnormal fat necrosis
Bloat	Ruminal tympany
Lactic acidosis	Grain overload
Hardware disease	Traumatic gastritis or Traumatic reticuloperitonitis
Fasciola magna infection	Giant liver fluke infection
Dirocoelium dendriticum infection	Lancet fluke infection
Eurytrema infection	Pancreatic fluke infection
Paramphistome infection	Rumen fluke infection or Conical fluke infec.
Trichostrongylus axei infection	Hair worm infection
Theiler's disease	Serum hepatitis idiopathic acute hepatitis
Black disease	Infectious necrotic hepatitis
Equine ehrlichial colitis	Potomac horse fever
Escherichia coli enterotoxemia	Edema disease
Porcine proliferative enteritis	Ilietis or Porcine intestinal adenomatosis

Slavery mouth / Slavers / Rattle Belly	Watery mouth disease (lambs) by E.coli
Vincent's stomatitis or Trenchmouth	Necrotizing ulcerative gingivostomatitis
Spirocerca lupi infection	Esophageal worm infection
Trichiuris infection	Whipworm infection
Ancylostoma caninum infection	Hook worm infection
Acanthocephalus infection	Thorny headed worm infection
Blepheritis	Eyelid inflammation
Dacrocystitis	Lacrimal sac inflammation
Pink eye	Infectious opthalmia
Cushing's disease	Hyperadrenocorticism
Addison's disease	Hypoadrenocorticism
Actinobacillus lignieresii infection	Wooden tongue
Actinomyces bovis infection	Lumpy jaw
Splenic fever or Charbon or Milzbrand	Anthrax
Borreliosis	Lyme disease
Bacillary hemoglobinuria	Redwater disease
Clostridium chauvoei infection	Black leg disease
Clostridium novyi infection	Big head disease
Lamziekte	Botulism
Pulpy kidney disease	Type D enterotoxemia
Akabane disease	Akabane virus infection
Hairy shaiker disease	Border disease (Pestivirus)
Leptospirosis	Redwater disease of calves
Listeriosis or Listerellosis	Circling disease
Yersiniosis	Plague
Tularemia	Francisella tularemia
Swamp fever	Equine infectious anemia
Equine typhoid	Equine viral arteritis
Glanders	Farcy
Swine fever	Hog cholera
Glasser's disease	Infectious polyarthritis
Coronaviral encephalomyelitis	Vomiting and washing disease
Ondiri disease	Bovine petechial fever
Three day sickness	Ephemeral fever
Thrombotic meningoencephalitis	Hemophilus sominus disease
Cowdriosis	Heartwater disease
Snotsiektte	Cattarrhal fever or Gangrenous coryza
Johne's disease	Paratuberculosis
Rinderpest	Cattle plague
Canine distemper	Hardpad disease
Feline distemper	Feline panleucopenia

DURATION OF ESTRUS AND OPTIMAL BREEDING SEASON

Species	Cycle type	Cycle length	Duration of estrus	Optimal breeding time
Horse	Seasonally polyestrus (early spring to summer)	19-26 days	6 days	Last few days, should be bred at 2 days interval
Cattle	Polyestrus all year	21 days	18 hours	Insemination from midestrus until 6 hrs after end of estrus
Sheep	Seasonally polyestrus (early fall to winter)	16.5 days	24-48 hours	18-20 hr after onset of estrus
Goat	Seasonally polyestrus (early fall to winter)	19 days	2-3 days	Daily during estrus
Pig	Polyestrus all year	21 days	2-3 days	~ 24 hrs after onset of estrus
Dog	Un-seasonally monoestrus	3.5-13 months	2-21 days	From day 2 of estrus and on alternate days thereafter until end of estrus
Cat	Induces ovulation Seasonally polyestrus (spring and early fall)	14-21 days	6-7 days	Daily from day 2 of estrus

VACCINATION SCHEDULE FOR CATTLE/BUFFALO

Disease	Vaccine	Time for vaccination	Dose rate	Route
Haemorrhagic Septicemia (HS)	HS oil based vaccine (NIAB)	Preferably in May/June	3 ml (L.A) 2 ml (S.A)	SC
Black Quarter	Polyvalent BQ vaccine	March/April	5 ml	SC
Anthrax	Anthrax spore vaccine	August	1 ml SC	SC
Rinderpest	Rinderpest vaccine	1st injection at 6 mo & 2nd at 2 yrs of age	1 ml	SC
FMD	FMD (VRI)	February/March and September/October	1 ml / 100 kg	SC
	FMD (Marial)	At start of winter season	3 ml (L.A) 2 ml (S.A)	SC
Rabies	Rabies	Post exposure	32 ml daily for 14 days	SC or IM

VACCINATION SCHEDULE FOR SHEEP/GOAT

Disease	Vaccine	Time for vaccination	Dose rate
Enterotoxemia	Enterotoxemia	January and July	2-3 ml
Anthrax	Anthrax	February or Rainy season	0.5 ml
Sheep Pox / Goat Pox	Sheep Pox / Goat Pox	March and September	1 ml S/C or 0.5 ml IM
FMD	FMD	February and August	1-3 ml S/C
Pleuro-pneumonia	Pleuro-pneumonia	October/November	1 ml S/C

Rabies	Rabies	Post exposure	10 ml daily for 7 days

VACCINATION SCHEDULE FOR DOG

Age	Vaccination
6-8 week	Hexa dog (CD, canine hepatitis, parvovirus, leptospirosis, parainfluenza)
9-12 week	Booster dose of hexa dog
12 + week	Rabies vaccination
13-16 week	Repeat hexa dog + rabies vaccination
Repeat it annually	

VACCINATION SCHEDULE FOR CAT

Age	Vaccination
8 week	Falovac® (Feline rhinotrachitis, feline panleukopenia, feline calcivirus)
12 week	Repeat Falovac®
16 week	Rabies + booster of Falovac®

VACCINATION SCHEDULE FOR POULTRY

A) LAYERS

Vaccine	Age	Route of Administration
Marek's disease	1 day	Intransal/ Intra ocular
Ranikhet disease (F-strain)	4-10 days	Intra ocular / Intra nasal
Gumboro disease	18-21 days	Intra ocular / Drinking water
Infectious bronchitis	24-48 days	Intra ocular / Drinking water
Ranikhet disease (Booster)	5 – 6 weeks	Intra ocular/ Drinking water
Ranikhet (R_2B strain)	8-9 weeks	Subcutaneous
Fowl pox	10-11 weeks	Scratching
Infectious bronchitis (booster)	14-16 weeks	Intra ocular / Drinking water
Fowl pox (Booster)	16-17 weeks	Scratching / Intramuscular
Ranikhet disease (Killed)	18-19 weeks	Intramuscular / Subcutaneous
Ranikhet and Bronchitis (Combined vaccine)	40 wks & above	Drinking water
Gumboro disease	45-50 weeks	Intramuscular / Subcutaneous

B) BROILER

Vaccine	Age	Route of administration
Marek's disease	1 day	Subcutaneous
Ranikhet disease (F-strain)	4-10 days	Intra ocular / Intra nasal
Gumboro disease	18-21 days	Intra ocular / Drinking water
Ranikhet disease (Booster)	30-35 days	Intra ocular / Intra nasal / Drinking water

ANIMAL GENETIC RESOURCES OF PAKISTAN

A) Buffalo

Breed Name	Synonym	Utility	Geographic Distribution
Kundhi		Milk, meat	Mainly in Sindh, but also in Punjab and Balochistan
Azi-Kheli		Milk, meat	Swat valley of KPK
Nili		Milk, meat	Mainly in Punjab but also in metro colonies of other provinces
Nili-Ravi		Milk, meat	Mainly in Punjab but also in metro colonies of other provinces
Ravi		Milk, meat	Mainly in Punjab but also in metro colonies of other provinces

B) Cattle

Breed Name	Synonym	Utility	Geographic Distribution
Achai	--	Dairy and draught	KPK
Bhagnari	Nari	Heavy draught	Balochistan
Cholistani	--	Dairy	Punjab
Dajal	--	Medium draught	Punjab
Desi	Non-descript	Dairy and draught	All over Pakistan
Dhanni	Pothwari	Medium draught	Punjab
Gibrali	--	Dairy and draught	KPK
Hariana	--	Draught	Punjab
Hissar	--	Draught	Punjab
Kankraj	--	Medium draught	Sindh and Punjab
Lohani	--	Light draught	KPK and Punjab
Red Sindhi	Malir, Sindhi	Dairy	Sindh and Balochistan
Rojhan	--	Light draught	Punjab
Sahiwal	Lola, Montgomery	Dairy	Punjab
Thari	Tharparkar, Grey Sindhi	Dairy and draught	Sindh

C) Sheep

Breed Name	Synonym	Utility	Geographic Distribution
Baghdale		Mutton, Wool	Punjab
Balkhi		Mutton, Wool, Fat	KPK
Baltastani		Mutton, Wool	Northern areas
Balochi		Mutton, Wool, Fat	Balochistan
Bibrik	Bugti	Mutton, Wool, Fat	Balochistan
Buchi	Bahawalpuri	Mutton, Wool	Punjab
Cholistani	Bekaneri	Mutton, Wool	Punjab
Damani		Mutton, Wool, Milk	KPK
Dumbi		Mutton, Wool, Fat	Sindh
Gojal		Mutton, Wool, Fat	Northern areas
Harnai	Dumari	Mutton, Wool, Fat	Balochistan
Hashtnagri		Mutton, Wool, Fat	KPK

Hissardale		Mutton, Wool	Punjab
Kachhi	Kutchhi	Mutton, Wool, Milk	Sindh
Kaghani		Mutton, Wool	KPK
Kail		Mutton, Wool	AJK
Kajli		Mutton, Wool	Punjab
Kali		Mutton, Wool	AJK
Khijloo	Haleenjoo	Mutton, Wool, Fat	Punjab
Kohai Ghizer		Mutton, Wool, Fat	Northern areas
Kooka		Mutton, Wool	Sindh
Latti	Salt range	Mutton, Wool, Fat	Punjab
Lohi	Parkanni, Lamochar	Mutton, Wool	Punjab
Michni		Mutton, Wool, Fat	KPK
Pahari		Mutton, Wool	AJK
Pak-awassi		Mutton, Wool, Fat	Punjab, Sindh
Pak-karakul		Mutton, Wool	Punjab, Balochistan
Poonchi		Mutton, Wool	AJK
Rukhshani		Mutton, Wool, Fat	Balochistan
Sipli		Mutton, Wool	Punjab
Thalli		Mutton, Wool	Punjab
Tirahi	Afridi	Mutton, Wool, Fat	KPK
Waziri		Mutton, Wool, Fat	KPK

D) Goat

Breed Name	Synonym	Utility	Geographic Distribution
Baltistani		Meat, Milk, Hair	AJK
Barbari	Bari	Meat, Milk	Sindh, Punjab
Beetal		Meat, Milk	Punjab
Beiari	Chamber	Meat, Milk	AJK
Buchi		Meat, Milk, Hair	AJK
Bugi Toori	Sindh Desi	Meat, Milk, Hair	Sindh
Bujri		Meat, Milk, Hair	Sindh
Chuppar	Kohistani, Jablu	Meat, Milk, Hair	Sindh, Balochistan
Damani		Meat, Milk, Hair	KPK
Dera Din Panah		Meat, Milk, Hair	Punjab
Desi	Jattal	Meat, Milk, Hair	AJK
Gaddi		Meat, Milk, Hair	KPK, AJK
Hairy		Meat, Milk, Hair	Punjab
Jarakheil		Meat, Milk	AJK
Jattan		Meat, Milk	Sindh
Kaccchan		Meat, Milk	Sindh
Kaghani		Meat, Milk, Hair	Punjab, Northern Areas
Kail		Meat, Milk, Hair	AJK
Kajli	Kajlee, Pahari	Meat, Milk, Hair	Punjab, Balochistan
Kamori		Meat, Milk	Sindh
Khurassani	Baluchi	Meat, Milk, Hair	Balochistan
Kohai Ghizer		Meat, Milk, Hair	Northern areas
Kooti		Meat, Milk, Hair	AJK

Kurri		Meat, Milk	Sindh
Labri		Meat, Milk, Hair	AJK
Lehri		Meat, Milk, Hair	Balochistan
Lohri		Meat, Milk, Hair	Sindh
Nachi	Bikneri	Meat, Milk, Hair	Punjab
Pak-Angora		Mohair	Punjab
Pateri		Meat, Milk	Sindh
Piamiri		Meat, Milk, Hair	Northern areas
Potohari	Salt range	Meat, Milk	AJK, Punjab
Shurri		Meat, Milk, Hair	AJK
Tapri	Lappi	Meat, Milk	Sindh
Teddy		Meat, Milk	Punjab, AJK
Tharki	Tharri	Meat, Milk	Sindh

E) Camel

Breed Name	Synonym	Utility	Geographic Distribution
Bagri	Booja	Meat, Milk, Draught	Punjab
Bikarai	Mehra, Mereeha	Meat, Milk, Draught	Punjab
Brahvi		Meat, Milk, Draught	Balochistan
Brela	Thalocha	Meat, Milk, Draught	Punjab
Campbelpuri		Meat, Milk, Draught	Punjab
Dhatti	Thari	Meat, Milk, Draught	Sindh
Gaddi		Meat, Milk, Draught	KPK
Gulmani		Meat, Milk, Draught	KPK
Kacchi		Meat, Milk, Draught	Balochistan
Kala-chitta		Meat, Milk, Draught	Punjab
Khader		Meat, Milk, Draught	KPK
Kharai		Meat, Milk, Draught	Sindh
Kharani		Meat, Milk, Draught	Balochistan
Larri	Sindhi	Meat, Milk, Draught	Sindh
Lassi		Meat, Milk, Draught	Balochistan
Makrani		Meat, Milk, Draught	Balochistan
Maya		Meat, Milk, Draught	KPK
Pishin		Meat, Milk, Draught	Balochistan
Rodbari		Meat, Milk, Draught	Balochistan
Sakrai		Meat, Milk, Draught	Sindh
Pak Bactrian		Meat, Milk, Draught	Northern Area

F) Horses

Breed Name	Synonym	Utility	Geographic Distribution
Anmol		Sport	Punjab
Balochi		Sport	Balochistan
Heerzai		Sport	Balochistan
Kajlan		Sport	Punjab
Kakka Biralawala		Sport	Punjab
Morna		Sport	Punjab
Siaen	Shien	Sport	Punjab
Makra	Sindh Desi	Sport	Sindh

Pak Thoroughbred		Sport	All over Pakistan
Waziri		Sport	KPK

G) Chicken

Breed Name	Synonym	Utility	Geographic Distribution
Aseel		Sport	All over Pakistan
Desi		Egg, Meat	All over Pakistan
Lyallpur Silver Black		Egg, Meat	UAF
Naked Neck	Ring Neck, Ghoni	Egg, Meat	All over Pakistan

COMMON POISONINGS AND THEIR MANAGEMENT

Poisons	Source of Poisons	Important signs	Treatment
A. Inorganic and Organic Chemicals			
Acids	---	---	● Do not use stomach tube or emetics ● Neutralize acid using chalk, magnesium carbonate, solution of sodium bicarb., lime water, oils. ● For oxalic acid, use calcium preparations, chalk and lime water.
Alkalis	---	---	Dilute via acids (vinegar), demulcents, eggs, milk, linseed or castor oil.
Antihistamines	---	---	Artificial respiration, respiratory and CNS stimulant; if convulsions, use small doses of barbiturates (IV). Animal should be kept in dark room.
Aspirin	---	---	Emetics, respiratory stimulants and artificial respiration.
Barbiturates	---	---	Emetics, artificial respiration, nikethamide (coramine), strychnine.
Carbon monoxide	Coal gas	Difficult respiration, coma, pale mucous membrane and cherry red colored blood.	● Nikethamide as respiratory analeptic. ● Oxygen containing 5% carbon dioxide.
Copper	● Administration of large doses of	**Acute cases**: there is vomiting in dog	● Symptomatic treatment for shock and gastro-intestinal

	copper sulphate, ● Contamination of drinking water or pasture top dressed with copper containing products.	(vomitus contain much mucous and green to blue colour), abdominal pain, diarrhea, collapse and death within 20 hrs. **Chronic cases**: Hemoglobinuria and jaundice.	sedatives ● In affected lambs 100 mg ammonium molybdate and 1 gm sodium sulphate orally for 3 to 5 days.
Cyanides (Hydrocyanic Acid)	● During summer drought immature sorghum is eaten by cattle. ● Eaten the material which is high in cyanide content.	Depression, staggering gait, muscle tremors, opisthotonus and dyspnoea. There may be hyper aesthesia, dilation of pupil, and bloat in recumbency.	● Sheep: 1 gm sodium nitrate and 2.5 gm sodium thiosulphate in 50 ml water IV. ● Cattle: 3 gm sodium nitrate and 15 gm sodium thiosulphate in 200 ml water IV alongwith 30 gm sodium thiosulphate orally at hourly interval. Other treatment includes respiratory stimulants and artificial respiration.
Fluorine	● Ingestion of pasture contaminated with fluorine (top dressing) with phosphate limestone or feeding of phosphate rock supplements). ● Drinking of water from deep wells.	**Acute**: Gastroenteritis, vomiting, dyspnoea. Muscle tremor, pupilary dilation and hyper aesthesia. **Chronic**: Dental lesions, lameness and stiffness with painful gait, pain is evinced on pressure over limb bones.	● Aluminium sulphate: 20 gm orally daily for prevention of chronic fluorosis and larger dose for treatment. ● Calcium salt intravenously.
Nitrate and Nitrites	● Fertilizers contain nitrates. ● Plant raised on high nitrogenous manures. ● Accidental poisoning with sodium or potassium nitrate.	Salivation, abdominal pain, diarrhea and vomiting. Dyspnoea, muscle tremors, staggering gait, cyanosis and convulsions.	Methylene blue 1-2mg/kg body weight IV as 1% solution. Treatment should be repeated when large amount of toxic material has been ingested.
Strychnine/ Nuxvomica	Accidental over dosing with strychnine preparations. Used for killing	Reflex excitement, titanic convulsions, opisthotonus and protrusion of eye balls, Death due to	● Sedation of animal with chlorpromazine hydrochloride or chloral hydrate or barbiturates. ● Tannic acid orally to

	animals with bad intentions.	respiratory arrest.	precipitate the alkaloid.
Sodium chloride	Drinking of saline water	Vomiting, diarrhea, abdominal pain, blindness	Toxic feed and water must be removed immediately. Symptomatic treatment such as gastro-intestinal sedatives and isotonic fluid should be given.
Urea	● Accidental intake of urea. ● Feeding of large quantity of urea in feed (feed additive as a cheap protein)	Severe abdominal pain, muscle tremor, incoordination, dyspnoea, bloat and violent struggling and bellowing	● Oral administration of weak acid such as vinegar or 5% acetic acid. ● Parenteral administration of calcium and magnesium salts.

B. Anthelmintic Poisoning

Carbon tetra-chloride	Accidental administration into respiratory tract or oral administration of massive dose	Immediate effects are staggering, falling, collapse, convulsions and death due to respiratory failure. If animal survive, there is depression, muscular, weakness, diarrhea and jaundice.	● Artificial respiration and respiratory centre stimulants. ● Supportive treatment for hepatitis. ● Parenteral administration of calcium solution and glucose solution.
Phenothiazine	Accidental over dosing in animals	● Photosensitization, keratitis, (accumulation of phenothiazine sulphoxide in aqueous humor of eye and produce white opacity of the cornea due to sunrays). ● Hemolytic anemia ● Abortion, ataxia and paralytic	● Affected animal should be kept in dark place. ● Antiseptic eye ointment and 500,000 IU vitamin A orally for prevention of eye infection. ● Blood transfusion and fluid therapy
Hexachlorethane	Accidental over dosing for the treatment of fascioliasis	Ataxia, dullness, abdominal pain and diarrhea, in severe cases the signs are identical of milk fever.	● Administration of Calcium borogluconate
C. Insecticides Ingestion			
Chlorinated	● Accidental	Increased	● Saline purgative and

hydrocarbons (such as D.D.T., B.H.C., heptachlor, chlordane)	intake ● Spray of dipping to control the ectoparasite. ● Consumption of the treated seed by animals.	excitability and irritability, muscular tremor, weakness, paralysis and convulsions.	activated charcoal (about 5 lbs). Avoid oily purgative. ● Sodium phenobarbital 5 gm per day. ● Atropine sulphate (0.05 mg/kg) IM. ● Calcium salt parenterally.
Organophosphate (such as malathione etc.)	● Accidental intake ● Spray on the pasture, orchards etc ● Spray/dipping of the animal	**Chronic**: Salivation, dyspnoea, diarrhea, stiffness of muscle. **Acute**: Profuse salivation, protrusion of tongue, bloat, collapse and death.	● Atropine sulphate (double dose) 0.25 mg/kg b.wt. 1/3rd IV and remaining IM ● Saline purgative ● Fluid therapy ● Chloral hydrate or phenobarbitone inj
D. Poisonous Plants			
Aflatoxicosis (toxin of aspergillus spp.)	Intake of contaminated groundnuts and sorghum grain and corn etc.	Hepatic insufficiency, blindness, walking in circles, frequent falling, teeth grinding, diarrhea with blood and mucus, severe tenesmus, finally convulsion and abortion in pregnant animals.	● Symptomatic treatment. ● Infected grain, if given to the animal should be treated with ammonia.
Bracken fern *(Pteridium aquilina)*	Ingestion of bracken fern	Loss of condition, dryness and slackness of the skin, high fever, drooling of saliva, bleeding from the nose, eyes and vagina. Hematuria, petechial haemorrhage on udder mucosa and skin. Edema of throat region and dyspnoea.	● Butyl alcohol (bone marrow stimulant) 1.0 gm in combination with antibiotics IV or SC. Thiamine hydrochloride.
Ergot *(Claviceps purpurea* – Ergot of rye)	Ingestion of fodder and grain infested with ergot	**Chronic**: Dry gangrene of the extremities of limbs, tail and ear.	No treatment Except: ● Infested grain should be with drawn ● Vasodilator drugs be used

		Lameness, and recumbency. **Acute**: Convulsions, staggering and tendency to fall. Intermittent blindness, paralysis and coma.	
Lantana *(Lantana camara)*	Feeding of the plant	Sever constipation in early stages, hemorrhagic gastroenteritis, weakness, photosensitization and jaundice.	● Keep the animal in dark place. ● Purgative ● Glucose saline and liver tonic
Oak *(Quercus spp)*	Feeding the oak plants	Ventral edema, polyuria, abdominal pain and constipation followed by the passage of feces containing mucus and blood.	● Calcium hydroxide (15% of the ration) is an effective antidote. ● Liquid paraffin with milk
Sweet Clover *(Melilotus spp.)*	Ingestion of mouldy sweet clover hay which contains dicoumaral).	Extensive hemorrhage in subcutaneous tissue, muscles, anemia and increased clotting time.	● Stop feeding of damaged hay. ● Vitamin K, 2000 mg IV
E. Plant byproduct Poisoning			
Soybean Meal	When it is prepared by trichloroethylene extraction	Aplastic anemia, leucopenia and damage to vascular endothelium	As in the Bracken fern poisoning
Linseed Cake	It contains high content of "cyanide".	● Same as in cyanide poisoning. ● High incidence of goiter in newborn lamb, if ewe fed large quantity of cake during pregnancy.	Cake can be detoxificated by soaking and then boiling for 10 minute to eliminate the hydrocyanic acid.
Cottonseed Cake	It contains phenolic substances	Damage to the myocardium and liver	Cooking of the cake or addition of 1% calcium hydroxide or 0.1% ferrous sulphate for detoxication.

FLUID THERAPY

Indications of Fluid Therapy

1. Shock
2. Diarrhea-sever or prolonged
3. Anorexia as a result of pyrexia, digestive disorders and post operative condition
4. Rumen acidosis; Engorgement of grain leads to ketosis, dehydration
5. Vomition – severe or prolonged
6. Burns
7. Endocrine disorders
8. Alkalosis
9. Renal insufficiency
10. Abomasal displacement and torsion

The percentage of loss of fluid can be assessed by following rule of thumb:

4-6 % dehydration	No sign of dehydration
6-8 % dehydration	Moderate dehydration with sunken eyes, 2-4 second skin fold test
8-12 % dehydration	Sever dehydration skin fold test 20-45 seconds

Route of Administration

The selection of the route of route for fluid therapy will depends on certain considerations:

a) Kind of disease and its severity
b) Extent of dehydration
c) Condition of the patient
d) Organic function of the patient
e) Type of electrolyte imbalance
f) Time and equipment available

Solutions Commonly Used:

1) **Dextrose solution:** are available in 2.5%, 5%, 10% and 25% concentration., but 5% solution is isotonic an used in routine practice.

   Indications:
   - To avoid dehydration, depletion of liver glucose, ketosis, excess tissue catabolism
   - In renal, hepatic, cardiac and gastrointestinal diseases
   - To accelerate sodium excretion
   - To increase intracranial pressure only hypertonic solution be used.

   Contraindications:
   - Never give more than 5% dextrose solution in ketosis.
   - The higher percentage will increase ketosis rather than curing.
   - Never give in case of milk fever
   - Do not give following blood transfusion

2) **Sodium Chloride (0.9% solution)**

   Indications:
   - Excessive salivation called "Pantar" and digestive disturbances
   - Vomition
   - Pyloric obstruction
   - Abomasal disorders
   - Heat stroke
   - Alkalosis due to fluid loss

Contraindications:
- Never give in ascitis and edema

3) Ringer's Solution

Indications:
- Dehydration
- Slight alkalosis or hypochloremia

Contraindications:
- Milk fever

4) Lactated Ringer's Solution

Indications:
- Slight acidosis
- Dehydration
- Burn, infection and peritoneal disorders
- To counteract the excess use of acidifying solution.

Contraindications:
- Liver dysfunction
- Congestive heart failure
- Anorexia due to shock
- Severe metabolic alkalosis
- Rumen acidosis

5) Sodium lactate Solution:

Indications:
- To induce quick alkalinity of urine, prior giving sulpha drugs
- To avoid renal damage and hemoglobinuria after blood transfusion
- In case of myohemoglobinuria in horses
- Metabolic acidosis not of anoxic origin
- At the dose rate of 25 ml/kg body weight Intravenously

Contraindications:
- Vomition
- Hepatic disorders
- Respiratory alkalosis
- Lactic acidosis

6) Acid Sodium Phosphate Solution

Indications:
- Use in post parturient hemoglobinuria especially in buffaloes at dose rate of 60 gram acid sodium phosphate in 800 ml distilled water given intravenously very slowly. The same dose given SC 12 hours interval for 3 times.

GLOSSARY

Nutrition:
It is study of quality and quantity of nutrients for particular stage of animal for particular goal. Goal is to optimize productivity.

Nutrients:
The chemical substance found in feed that can be used and are necessary for maintenance, production and health of the animal.
Main classes of nutrients are: Water, Carbohydrates, Protein, Fat, Minerals and Vitamins.

Forages:
Vegetative portion of plant fed to the animal in fresh, dried or ensiled state.
Although most forages are roughages.

Conversely many forages such as corncobs, straws are not forages.

Roughages:

These are feeding stuffs which are bulky and contain more than 18% crude fiber and less conc. of energy yielding nutrients. These as high in fiber content and low in energy (1-1.4 mcal/kg of DM). Example: Straws, green fodder, hay, silage

Concentrate:

These are feed stuffs which contain less than 18% crude fiber and less bulky and rich in energy yielding nutrients. These are low in fiber contents and high in energy (1.5-2.2 Mcal/kg of DM). Example: Cereal grains, oil seeds.

Health:

Health is a state of an individual living in complete harmony with his environment/ surroundings.

Disease:

It is a condition in which an individual shows an anatomical, chemical or physiological deviation from the normal.

Illness:

Illness is the reaction of an individual to disease in the form of illness.

Hemostasis:

It is the mechanism by which body keeps equilibrium between health and disease.

Pathology:

It is the study of the anatomical, chemical and physiological alteration from the normal as a result of disease in animals.

Oncology:

It is the study of cancer/tumor/neoplasms.

Etiology:

It is the study of causation of disease.

Diagnosis:

It is an art of precisely knowing the cause of a particular disease

Symptoms:

Any subjective evidence of disease of animal characterized by an indication of altered bodily or mental state as told by owner (complaints of the patients).

Signs:

These are indication of the existence of something, any objective evidence of disease, perceptible to veterinarian.

Syndrome:

A combination of symptoms caused by altered physiological process involve a no. of causative agents.

Lesion:

It is a pathological alteration in structure/ function that can be detectable.

Pathogenesis:

It is the progressive development of a disease process. It starts with the entry of causal agent in body and ends either with the recovery or death.

Incubation period:

It is the time that elapses between the action of a cause and manifestation of disease.

Course of disease:

It is the duration for which the disease process remains till fate either in the form of recovery or death of animal.

Prognosis:

It is an estimate by a clinician of probable severity or outcome of disease.

Morbidity rate:
It is the percentage/proportion of affected animals out of the total population in a particular disease outbreak.
Mortality rate:
It is the percentage/proportion of animals out of total population, died due to disease in a particular disease outbreak.
Case fatality rate:
It is the percentage/proportion of animals died among the affected animals.
Biospsy:
It is the examination of tissue received from the living animals.
Infection:
It is the invasion of the tissues of the body by pathogenic organisms resulting in the development of a disease.
Infestation:
It is the superficial attack of any parasite/organism on the surface of the body.
Pathogenicity:
It is the capability of an organism for producing a disease.
Virulence:
Virulence is the degree of invasiveness of pathogenic organism.

BACTERIAL DISEASES

Mastitis

Causative agents: Staphylococcus aureus, Streptococcus aglactiae --- These are most prevalent bacteria, Others are: Corynebacterium bovis, Mycoplasma bovis
Diagnostic Tests:
Bulk tank somatic cell count (at herd level), California mastitis test (distinguish into peracute, acute, subacute and subclinical mastitis); it is negative when SCC is < 200,000 and positive when SCC > 200,000
Treatment:
Sulfonamide or ampicillin (parentral)
Cefoperazone, Penicillin G and neomycin in combination [intra-mammary]

Strangles

Syn: Equine distemper
It is highly contagious disease, mostly affect horses of young age
Causative agent: Streptococus equi
Signs: Acute onset of fever, anorexia, depression, submandibular and pharyngeal lymphadenopathy with abscessation and upon rupture, there is copious purulent discharge (it may be unilateral or bilateral)
Treatment:
Penicillin, Local treatment of abscess

Anthrax

Syn: Spleenic fever
Causative agent: Bacillus anthracis
Signs: Fever, septicemia, edema at throat abdomen and flank region, Exudation of tarry blood from the body orifices, failure of body to clot, absence of rigor mortis

Rx:
Penicillin @ 20,000 IU per kg bwt twice daily or Streptomycin @ 8-10 g/day or Oxytetracycline @ 5 mg/kg bwt per day IM

Tetanus

Causative agent: Clostridium tetani; releases exotoxins which are: i) Tetanospasmin ii) Tetanolysin
Signs: Condition is associated with the history of wound. Other signs are third eyelid prolapse, body muscle stiffness, lock jaw
Rx:
Penicillin (in larger doses), Chlorpromazine (muscle relaxant) @ 1 mg/kg IM, Hydration status maintained by passing stomach tube and pouring water directly into the stomach, to relieve the animal from urination, pass urine catheter.

Black Leg

Causative agent: Clostridium chauvoei
Cattle of 6 month to 2 years age and rapidly growing with high plan of nutrition are most susceptible.
Rx:
High doses of penicillin and surgical debridement

Bacillary Haemoglobinuria

Causative agent: Clostrodium hemolyticum; releases neurotoxins and hemolytic betatoxin
Signs: Toxemia, Fever, Hemoglobinuria
Rx: Penicillin, Tetracycline

Hemorrhagic Septicemia

Syn: Barbone disease,
Causative agent: Pasteurella multocida ; normal inhabitant of respiratory tract
Transmission: direct contact by droplets
Signs: High temperature (106-107 F), Profused salivation, Warm painful swelling around throat and throat, Dyspnoea
Rx: Sulfonamide

Brucellosis

Syn: Bang's disease (As causative agent was discovered by Bang (A scientist)
Zoonosis: Man suffered from undulant fever (also called malta fever , severe headache and pain in back.
Causative agent: Brucella abortus, B. mellitensis, B. suis
Intracellular bacteria which can survive and multiply within the cells of macrophage system.
Signs: It causes abortion after 5^{th} month of pregnancy
Rx: No specific treatment
Vaccination: Single 5 ml dose of B.abortus strain 19 is used for vaccination given SC at from 2 to 6 month of age.

Tuberculosis

Causative agent: Mycobacterium tuberculosis (in human), Mycobacterium bovis (in bovine)
Signs: Progressive emaciation, Fluctuation in temperature, Pharyngeal obstruction etc.
Test: Tuberculin test (Single intradermal test)

Rx: Isoniazid @ 20mg/kg bwt orally
Test and slaughter policy for eradication
Vaccination: Bacillus calmette guerine (BCG)

Paratuberculosis

Syn: Johne's disease
Causative agent: Mycobacterium paratuberculosis
Signs: Progressive emaciation over several weeks, Chronic intractable diarrhea which does not respond to any treatment, Corrugation of intestinal wall.
A distinguish characteristic of Johne's disease is that infection occurs in animal at an early age, usually under 30 days of age and clinical disease does not occur until 3-5 years of age.
Rx: No effective treatment, Isoniazid @ 20mg/kg up to 100 days. Streptomycin is also effective.
Tests: (i) Johnin Intradermal Test (ii) Johnin Intravenous Test

Actinomycosis

Syn: Lumpy Jaw
Causative agent: Actinomyces bovis; normal inhabitant of the bovine mouth.
Signs: Initially pointless hard immovable swelling onmandible or maxilla usually at the level of central molar teeth. Eventually discharge small amounts of pus through one or more openings in skin.
Rx: Surgical debridement, Iodides and/or Sulfonamide orally or parenterally

Actinobacillosis
Syn: Wooden tongue
Causative agent: Actinobicillus lignieresii; normal inhabitant of alimentary tract.
Signs: Difficulty in swelling, nodules in cattle and of lips in sheep. Big head
Rx: Sodium iodide 1 g/12 kg can be given IV as 10% solution in one does both for cattle and sheep. At least one or two further treatments are at 10-14 days intervals are required for bony lesions. **Note**: Abortion occasionally occurs following the treatment of heavily pregnant cows with sodium iodide.

Infectious Foot Rot (in Sheep)

Causative agent: Fusiformus necrophorum
Serious outbreaks in wet sand warm weather.
Signs: Interdigital dermatitis, underrunning of horn, medial aspect of claw, strong smell of necrotic horn, very severe lameness, walk on knees.
Rx: Topical treatment. Zinc sulfate solution 10% + sodium lauryl sulfate 2%. Sheep stood for one hour in a footbath. Thirsty sheep may drink the footbath solution and die due to zinc toxicity. Antibiotic treatment; Procaine penicillin single IM of 70,000 IU/kg or 70 mg/kg.
Dihydrostreptomycin single IM or Long acting Oxytetracycline single IM dose @ 20mg/kg.

Postparturient Hemoglobinuria

It is due to dietary phosphorus deficiency.
Signs: Hemoglobinuria, inappetance, reduced milk production, No fever.
Rx: IV administration of 60 gm of Sodium acid phosphate in 300 ml distilled water and similar dose SC. Further SC injections at 12 hourly intervals on three occasions and similar daily doses by mouth.

Babesiosis

Syn: Texas fever, Redwater fever, Cattle tick fever
Causative agent: Babesia spp. [B.bigemina, B. equi]
Transmit by blood sucking ticks of Boophilus spp.
Signs: Anemia, Hemoglobinuria, Jaundice, Fever, Heavy case fatality rate
Rx: Imidocarb (Imizole) @ 2mg/kg bwt, Diminazine aceturate is affective in sheep @ 12 mg/kg bwt as a single dose.

Fusobacterium necrophorum is normal inhabitant of oral cavity and causes inflammation and necrosis, injury of the mucosa of oral cavity, pharynx and larynx
Rx: Debridement of ulcer, Application of solution of tincture of iodine, Oral administration of Sulfamethazine @ 150 mg/kg bwt for 3-5 days.

Glanders

Causative agent: Pseudomonas mallei
Signs: Acute/ Chronic. Penumonia, Nodular ulcers in respiratory tract and on the skin.
The disease is highly fatal, nasal discharge.
Rx: Sulfadiazine and Sulfadimidine for 20 days
Tests: Mallein Test [Mallein reagent 0.1 ml is injected in lower aye lid and observed after 48 hrs. Swelling of eyelid confirms the +ve case].

Contagious Caprine Pleuropneumonia (CCPP)

A disease of Caprine (Goat), it is not transmissible to cattle and sheep.
Causative agent: Mycoplasma capriculum
Signs: Cough, Dyspnoea, Lagging, Lying down a lot, Fever 105-106 F and in terminated stages, there is mouth breathing tongue protrusion and frothy salivation.
Rx: Tylosin tartrate @ 10mg/kg bwt or Oxatetracycline @ 15mg/kg bwt per day

RICKETTSIAL DISEASES

Tick Borne Fever

C**ausative agen**t: Ehrlichia phagoctophilia
Signs: Fever, Depression, Lethargy, Polypnoea, & Fall in milk production in cattle, Abortion
Rx: Oxytetracycline @ 10mg/kg bwt IV

Q- Fever

Causative agent: Coxiella burnetti
Signs: Clinically inapparent and presents mainly as abortion in sheep
Rx: Perhaps Oxytetracycline is effective

Brucellosis

Predilaction sites are gravid uterus, mammary lymph node, mammary glands and testes.
Signs: Swelling of mammary lymph nodes, Abortion, Mastitis, Orchitis
Tests: Rose Bengal Test, Milk Ring Test

VIRAL DISEASES

Foot and Mouth Disease (FMD)

Syn: Apthous fever, Contagious aptha

FMD is an acute febrile highly contagious disease of cloven footed animals.

It is characterized by vesicular eruption on the epithelium of buccal cavity, tongue, nares, muzzle, feet, teats and udder.

Etiology:

FMD virus (Apthovirus) --- > Family: Picornaviridae; strains found in Pakistan is Asia-1, O, A, C. Virus may remain viable the extent of one year in infected premises. Virus is resistant to common disinfectants. It is destroyed by sodium hydroxide (NaOH), formalin (1-2%) and sodium carbonate (4%). The virus can be preserved in glycerin phosphate buffer with a pH of 7.6. The virus is considered as smallest known virus of animal origin.

Transmission:

Through direct contact with infected animals from infective materials, food stuffs, feeding utensils, waterers etc. Spread through air ways like human influenza virus can also take place. The infection imposes a high spread during the cooler season when the air remains in damp condition. The virus initially settle in the cells of the dorsal surface of the soft palate or on the lateral wall of the pharynx following the entry.

Clinical Findings:

Morbidity: 100%, Incubation period : 2-8 days

Virus multiplies in blood stream -- > viremia --- > temp goes 104 to 106 F following peak temperature characteristic vesicles appear in the oral mucosa (vesicular stomatitis), interdigital space, udder etc. at this stage there is reduction in temperature, profuse salivation, and lameness. Drooling of slimy, ropy salivation and protrusion of the tongue are the futures in this stage; lesions appear in the junction of hoof. In severe case, there is shedding of the hooves. Suckling calf usually die as a result of myocarditis and myocardial degeneration.

Post-FMD complexes:

Penting --- > due to lesions in pituitary gland and thermoregulation (endocrine disturbance), anemia, slower growth of hairs, mastitis, diabetes mellitus.

Treatment:

No specific treatment

Antiseptic mouth wash with potassium permagnate, sodium carbonate, boric acid and glycerin may be applied. Antiseptic may be given on foot lesions and mammary tissues.

Vaccination:

Commercially polyvalent vaccines is used which contain O,A, C, Asia-I strains.

Rinderpest

Syn: Cattle plaque

It is an acute or sub-acute febrile, highly contagious disease of even toed ungulates. It is predominantly a fatal disease of cattle and buffalo characterized by necrotic stomatitis, gastroenteritis, dehydration and destruction of lymphocytes.

Etiology:

Rinderpest virus -- > Genus Morbillivirus -- > family Paramyxoviridae (Latine “morbi” denotes measles). Virus is spherical with diameter 100-300. virus can be destroyed by ultraviolet light and is heat sensitive.

Transmission:

Same like FMD. Feces is the main source of infection. Virus can remain alive upto 8 month in faces. Rinderpest virus got tremendous affinity to lymphoid tissue and epithelial tissues/cells of GIT and respiratory tract. Virus cause destruction of lymphocytes in tissues -- > leucopenia.

Clinical Findings:

Temperature 104 F, Photophobia, Muzzle is dry and there is profuse serious nasal and lacrimal discharge which later on muco-purulent. Necrotic lesion in mucous membrane of oral cavity. The chief sites of oral lesions comprise of inside of the lowerlip and adjacent gums, the cheeks near the commissures of lips; under the tip of the tongue and the back of the hard palate. There is diarrhea and abdominal pain.

Rx:

Rinderpest antiserum @ 1ml / kg IV. Antibiotic, symptomatic fluid and electrolyte therapy.

Peste Des Petitis Ruminants (PPR)

Syn: Pseudorinderpest, Goat plaque, PPR (plaque as per French phrase in small ruminants); KATA

It is an acute to subacute highly contagious disease of small ruminants having resemblance to rinderpest characterized by fever, diarrhea, nasal discharge.

The virus belong to Genus Morbillivirus and Family Paramyxoviridae same genus and family as that of Canine distemper, Rinderpest and Measle virus of human. The virus has tremendous affinity for epithelial cells of GIT and lymphoid tissue.

Transmission: Some like rinderpest.

On entry, the virus invades the retropharyngeal lymph nodes and mucosa.

Bovine Viral Diarrhea (BVD)

Syn: Mucosal disease complex

BVD is a subacute, acute, or inapparent contagious disease having the manifestation of high rise of temperature and diarrhea; Pathological features of which are comprised of erosion of the mouth, esophagus, rumen, abdomen and intestine. Diarrhea and erosion of GIT.

Etiology:

BVD virus --- > Genus: Pestivirus and Family: Togaviridae

Host susceptible: Principally noted in Cattle, less in buffalo, deer and wild ruminants.

Transmission: occur during all seasons but more in rainy and winter season.

Animal of all ages are affected but more in 6 to 24 months of age.

Blue Tongue

It is an infectious non-contagious (arthropod-borne) viral disease of domestic and wild animals. This is predominately a disease of sheep but occasionally cattle, and goat are affected. The disease is characterized by high fever, catarrhal inflammation of buccal mucous membrane (stomatitis) and nasal mucous membrane (catarrhal rhinitis), cyanotic and bluish appearance of tongue; painful hoof; a pink line appear on coronet which is absent in FMD.

Etiology:

Blue tongue virus --- > Genus: Obrivirus --- > Family: Reoviridae

Transmission:

Virus spread through blood sucking midges of the genus culicoides and mosquitoes also.

Ephemeral Fever

Syn: Three days sickness

It is an arthropod transmitted disease of cattle characterized by high temperature, stiffness, lameness, muscular tremor with spontaneous recovery.

Cow Pox

It is a contagious eruptive skin disease of cattl . It is mild cutaneous disease where the lesions are mostly confined to udder and teat. The disease is transmissible to human beings.

Etiology:
Cowpox virus --- > Genus: Orthopoxvirus --- > Family Poxviridae
Transmission: Direct contact, via hands of milkers and also by insects

Equine Influenza

It is an acute febrile highly infectious disease of horses characterized by general septicemia, respiratory problem accompanied by severe persistent + dry cough, nasal discharge.
Etiology:
Equine influenza virus --- > Genus Influenza virus --- > Family Orthomyxoviridae

Bovine Spongiform Encephalopathy

It is a progressive transmissible neurological disease of bovine characterized by sponge like destruction of brain.
Etiology:
BSE is caused by poorly understood type of infectious protein particle called "Prion".
It has also zoonotic importance.
Signs:
Initially abnormal gait particularly hind limb locomotion, behavioral disorders, ataxia, hyperesthesia, excessive salivation, pruritis, rubbing of head, incoordination, restricted stride.
Rx: Not yet possible.
Amphotericin B is somewhat helpful delay the disease but not cure.
Control: Ban on feeding of ruminant derived protein feed.

Canine Distemper

It is an acute highly infectious viral disease of carnivores characterized by diphasic fever, ocular and nasal catarrh and frequent cutaneous eruptions. This infection is often manifested by bronchopneumonia, gastroenteritis and encephalitis.
Forms of CD

i) Pulmonary form: Oculo-nasal discharge, pharyngitis, bronchitis. Broncho-pneumonia is the common feature. The pulmonary form is more prevalent than the digestive form.
ii) Digestive form: Loss of appetite, vomition, abdominal pain, semisolid or loose feces, hemorrhagic enteritis is common in young pups.
iii) Ocular form: Swollen eyelids, conjunctivitis, and purulent discharge from eyes.
iv) Nervous form: Restlessness, excitement, chewing movement, excessive salivation and convulsion.
Lymphopenia is the distinct feature of canine distemper. The muscular spasm may be observed in the lips, alae nasii, cheeks, jaws, head, neck or limb muscles.
v) Cutaneous form: Appearance of rash, vesicles and pustules.
In some cases, skin of foot pads and nose become hard due to hyperkeratosis and the condition is described as "Hard Pad Disease".
There may be vesiculo-pustular eruptions on the ventral aspect of the abdomen and on the inner parts of thighs.

Rx:
Symptomatic; Anti CD-serum to control the neurological damage.
Sedative and anticonvulsants should be given

Rabies

It is an acute viral infection in man and other warm blooded animals.

Etiology:
Rabies virus, Genus Lyssa virus and Family Rhabdoviridae
It is a bullet shaped virus; Alkali, sunlight and moderate heat destroy virus.
It can be preserved in 50% glycerol.
Pathogenesis:
Following bite, virus is deposited in the depth of wound in the infected saliva. Then local replication of virus in the epithelial cells or myocytes; move centripetally to the central nervous system; nervous pathways @ 3mm/hr virus invade ganglion cells and then centrifugally to the peripheral nerves.
Stage of excitement:
In this stage, the excitability and irritability increases and dog become very much aggressive. This period may last for 1-7 days. At the onset the dog may hide in dark place due to photophobia. Change in bark due to paralysis of the vocal cord. There is drooling of saliva.
Dumb form:
This form is known as paralytic form. In this form, there is paralysis of lower jaw, tongue, larynx, and hind quarter. The dogs are not capable to bite man and other animals on their feces. Rabies in cats is usually more furious in form than dog. Cat used to bite man and other animals on their faces.
Rx:
No specific treatment for clinical rabies; we can use sedative some drugs like Vinkristin, Scopolamide hydrobromide give good response against rabies virus in experimental animals.
The site of bite should be washed with running water and soap.

Parvovirus Infection in Dogs

It is characterized by enteritis and myocarditis with high morbidity rate (upto 100%) and frequent mortality (upto10%).
Etiology:
Parvovirus, Genus Parvovirus and Family Parvoviridae
Clinical Findings:
There are two forms of this disease:

a) Parvovirus enteritis:
   Hemorrhagic gastroenteritis, serious in pups, vomition, and diarrhea. Polydipsia, Frothy yellow colored vomitus, retching and restlessness. The animal is then pass brownish semi-solid feces admixed with excess mucus followed by foeted haemorrhagic diarrhea.
b) Parvovirus myocarditis

ENDOPARASITIC INFESTATIONS

Schistosomiasis

Syn: Nasa
It is a trematodal infection of cattle, sheep, goat, dog and man caused by schistosoma worms.
Causative Agent: Schistosoma bovis
Life Cycle:
Ovigerous female penetrate deeply into the small vessels of mucus or submucus of the intestine -- > eggs in the capillaries --- > eggs pass out of the body through the feces --- > Hatching of eggs in water releasing miracidium --- > penetrate the intermediate host (i.e. Snail) --- > development inside the intermediate host into cercariae -- > cercarie come out of

the body of the snail and move in the water --- > animals which come to the water hording are attached by cercariae, it either penetrate the body or taken place by animals through drinking water. Cercariae penetrate the blood vessels and reach their site of predilection via genera blood circulation.

Intestinal Schistosomiasis

Acute form of schistosomiasis, because of presence of large number of ovigerous females in blood vessels and passage of large number eggs through intestinal wall, severe hemorrhagic lesions appear in the wall of posterior part of small intestine and caecum particularly.

In chronic cases, there is scar formation and destruction of intestinal glands which affect the general health condition of animal.

Rx:

For intestinal and hepatic schistosomiasis, Praziquantal @ 20 mg / kg orally for 3 days.

Clinical Findings:

In acute case, profuse diarrhea or dysentery. In chronic case, animal becomes emaciated, anemic and eosinophilia.

Nasal Schistosomiasis

Adult parasites reach the veins of the nasal mucosa and cause rhinitis. Eggs cause small abscess on the mucous membrane of nasal cavity by sloughing out from the blood vessels. Fibrous tissue develops and leads to the large cauliflower like growth in the nasal passage. These are actually granulomatous growth. Common in cattle than buffaloes. The condition is known as “Nasal granuloma” in local language “Nasa”.

Clinical Findings:

Typical symptoms is rhinitis, muco-purulent discharge along with coryza, sneezing and dyspnoea. When large granuloma develop typical snoring sound which is audible from a reasonable distance.

Rx:

Tarter emetic @ 2 mg/kg SC or IM daily for 6 days. Copper sulphate is also effective to control the snails and is mixed in water.

Hepatic Fascioliasis

Syn: Liver fluke disease

Etiology: Fasciola hepatica – in hilly areas (sheep liver fluke)

Fasciola gigantica – in plane areas (deer liver fluke)

Life Cycle:

Bile duct (adult lay eggs) --- > pass out through feces --- > hatch to Miracidium (larval form) --- > take up by snail -- > convert to sporocyte in the body of snail --- > form to Radiae --- > Cercarie -- > encapsulate to form Metacercarie -- > contaminate the fodder and grass -- > taken up by foragers -- > go to intestine --- > reach the hepatic portal vein (via duodenum) --- > Liver --- > Bile duct where it matures to form adult fluke.

Female lays egg 20,000 per day. Life cycle completes in 16 to 17 weeks.

Pathogenesis:

The metacercariae penetrate through intestinal wall and reach peritoneal cavity. They migrate towards liver through peritoneum and then migrate through the liver parenchyma.

Acute fascioliasis

It is found in sheep, not in cattle. Acute form is rare and chronic is common. In acute form, there is traumatic hepatitis due to migration of large no. of metacercariae.

Chronic fascioliasis

It is found in all types of animals of all ages including man. Common pathogenesis is progressive biliary cirrhosis of liver followed by hard fibrotic liver. Wall of bile duct becomes thickened. In cattle, depletion of calcium in bile duct is common pathogenesis. In

cattle bile duct protrude out of the surface of the liver giving it a clay pipe appearance which is popularly known as “Pipe stem”.

Clinical Findings:

Acute fascioliasis in sheep most common occur as sudden death with discharge of frothy blood, through nostrils and anus.

In chronic form, animal becomes lazy, mucous membranes become pale and skin becomes dry, subsequently edema starts developing particularly below the mandibles and the condition is known as bottle jaw condition. In cattle, most common symptoms are digestive disturbance, emaciation, constipation with animal feeding very difficulty in defecation and followed by diarrhea in extreme cases.

Diagnosis:

Symptoms, if parasite in bile duct, findings of eggs in feces.

Rx:

Triclabendazole in specific compound for use in sheep and cattle @ 10 mg/kg in sheep and 12 mg/k g in cattle. It is highly effective against all stage of fluke.

Rafaxonide @ 7.5 mg/kg (80-90% effective).

Albendazole @ 7.5 mg/kg in sheep and 10 mg/kg in cattle. It is effective against adult fluke.

Dictylocaulus viviparous is the only lungworm of cattle which is most of the time, treated with albendazole successfully. Trichinella spiralis is found in muscles.

TAPEWORM INFESTATIONS

Cestodes (tapeworms) belonging to Moniezia spp. in ruminants and Anocephala spp in horses. Transmission by ingestion of infected free living pasture mites.

Signs:

Large no. of tapeworms form closely packed ball in the intestine and may cause obstruction, digestive disturbances including constipation, mild diarrhea and dysentery. Animal occasionally move in circle and show masticatory movement of jaw. In horses, enlargement of belly and symptoms of colic may appear.

Rx:

Albendazole @ 10 mg/kg for horses; Praziquantal @ 1 mg/kg

Coenurosis

Syn: Gid, Sturdy

This condition is caused by invasion of the brain and spinal cord by the intermediate stage (i.e. coenurus cerebralis) of cestode “Taenia multiceps” which inhabits the intestine of dogs and wild canidae (intermediate hosts). Disease can occur in sheep, goat, cattle, horses and wild ruminants. Clinically it is primarily a disease of sheep and occasionally cattle.

Clinical Findings:

Ataxia, Muscle tremor, Excitability and Collapse. The most obvious sign in slowly developing partial or complete blindness in one eye.

Dullness, Head pressing, incomplete mastication, and periodic epileptiform convulsion are the usual signs. If the cyst is present on the spinal cord, there is gradual development of paresis and eventually inability to rise. If cyst is in brain then there is deviation of head and circling. The neurological signs are referred to as “Gid or Staggers”.

Diagnosis:

On the basis of signs and particularly characteristic gid movement

Rx:

Surgical drainage of cyst

Haemonchosis in Ruminants

Syn: Barber pole disease
It is one of the most pathogenic blood sucking nematodal infestation of sheep gat and cattle. It occurs in the forestomach (abomasum) of the above animals.
Etiology:
Haemonchus placei; in cattle (10,000 eggs per day)
Haemonchus contortus; in sheep and goat
Life Cycle:
Eggs in feces --- > hatch in favorable condition (27 C – 36 C) and high moisture --- > After 1st and 2nd stage, 3rd infective larval stage come out --- > ingested by the animal while grazing --- > become adult in abomasum.
No intermediate host. It is more common in hot and humid season.
Clinical Findings:
Acute form of disease is found in lambs and young sheep. There is loose bloody diarrhea; mucus membrane and conjunctiva are extremely pale due to severe anemia.

VETERINARY MEDICINE

Rx of acute mastitis:

Udder infusions:
For lactating: Ampicillin + Na-cloxacillin
For dry animals: Benzathin + Cloxacillin
For G-ve bacteria: Furazolidone in procaine penicillin

Modern Rx of mastitis

TMP + Sulphadiazine
Penicillin G intramammary for 5 days at evening

Hemorrhagic Septicemia (H.S)

Syn: Barbone
Spp affected: Cattle, buffalo, swine, sheep
It is an acute, subacute infectious disease of septicemic nature, which is characterized by
i) Acute gastroenteritis ii) Subacute edema iii) Serifibrinous pleuropneumonia
iv) Edema of intra-alveolar tissues
Causative agent: Pasteurella spp., P.boviseptica (Cattle), P.bubalospetica (Buffalo)
PM lesions: Subacute edema of head, neck thorax, and throat. Serofibrinous exudate in the subcutaneous tissues of the head, neck throat dewlap and thorax. Edema of buccal and pharyngeal mucosa. Swelling of tongue. Hemorrhagic gastroenteritis. Petechial hemorrhages on tissues and membranes. Enlargement of lymphatic glands. Hemorrhagic endocarditis and serofibrinous pericarditis.
Pectoral or thoracic form:
Thoracic cavity contains serous or sero-fibrinous exudate. Visceral pleura studded with hemorrhages. Lungs are edematous
Clinical sings: Temp up to 106 F, constipation --> thin fluid containing flakes and blood mucus or fibrin. Head, neck, thorax, dewlap are swollen, hot, tense, and painful. Buccal membrane is edematous and tongue swollen, rendering deglutition difficult. Laboured respiration. Death from asphyxia or exhaustion due to the severe gastroenteritis.

Pneumonic form:
Prostration, Drooping ears, Congested hemorrhagic mucosa, Protruded tongue, Open mouth, Sever dyspnoeae.
Rx: i) OTC, IV @ 1 mg/kg bwt for 3 days ii) Chloramphenicol, IV @ 10 mg/kg bwt 3 times for 3 days iii) Penicillin dihydrostreptomycin @ 30,000 IU, IM for 3 days iv) Sulfamethazine @ 150 mg/kg bwt IV for 3 days v) Ampicillin @ 10 mg/kg bwt, every 24 hours
Mass Medication: a) Sulfamethazine @ 100 mg/kg bwt in drinking water daily for 7 days
b) OTC @ 3-5 mg/kg bwt in cattle feed for 7 days
H.S Vaccine produce immunity for 2 months. Bipolar organism and does not release exotoxins. Most susceptible age is 6 mo to 2 years

Tetanus
Rx: i) ATS @ 30,000 IU, IM, 3 times or after every 12 hrs ii) ATS @ 5000 IU in subrachnoid space once iii) Largactil (Chlorpromazine), IM iv) Procaine penicillin @ 50,000 IU, IM v) Benzyl penicillin @ 50,000 IU, IV
In calf, tetanus vaccine should be adopted first in 2 ½ month of age and breed in 3 month of age.

Black Leg
Syn: Black quarter, Myonecrosis
Causative agent: Clostridium chauvoie; G +ve anaerobes, normal inhabitant of GIT and soil.
Species affected: cattle, sheep, goat, horses. In cattle, the microorganism is endogenous but in sheep and oat, it enters by shearing and tail docking.
It causes edematous swelling of muscles of neck, shoulder, back, gluteal muscles (myonecrosis or gangrenous necrosis) with crepitating sounds and foul odour from the necrotic areas. There are two toxins; alpha toxin and beta toxin.
Disease is characterized by myonecrosis, acute lameness, rising fever, muscle tremors, and ultimately death of the animal. Autolysis proceeds rapidly.
Rx: Procaine penicillin, IM @ 40000 IU repeat after every 6 hours. Benzyl penicillin IV @ 45000 IU repeat after every 4 hours.
Vaccination: *Clostridium chauvoie* killed vaccine can be used.

Botulism
Syn: Forage poisoning, Shaker foal syndrome
It is caused by Clostridium botulinum type D. Forage spoiled, spoiled food, hay spoiled in humid environment. Organism produce toxins that paralysis "motor paralysis". Paralysis of masticatory, perineal muscles, tone of GIT also decreased. Animal becomes recumbent.
DDx: Tetanus
Rx: Botulinum toxoids are available

Enterotoxemia
Syn: Pulpy kidney disease
Etiology: It is caused by Clostridium perfrigens type D, G +ve organism
Signs: Clinically, high fever, diarrhea (pasting of hind quarter), Mostly affects lambs, kids and calves. Lush green fodders, grains, highly milk feed are pre-disposing to this disease.
The toxins are produced in the intestine and absorbed in blood. The kidney becomes pulp like so called "pulpy kidney" because organism affects the kidney and causes necrosis of glomeruli. Glucosurea, high fever, diarrhea, convulsion and death within 2 to 4 hours.
The organism causes sloughing of the intestine and diarrhea.

Rx: Penicillin, OTC (orally @ 10 mg)
Vaccination: 1st at 3 months, 2nd at 4 months, 3rd repeat twice a year.
Dam vaccination: 2 month before parturition.

Bacillary Hemoglobinuria

It is caused by Clostridium hemolyticum
Signs: Clinically high fever, hb-urea, dysentery, acute abdominal pain, dyspnoea.
Cattle and sheep are mostly affected. Organism releases toxin "phospholipase C" a beta toxin
Abdominal pain is due to necrosis of intestinal epithelium. Severe anemia is de to loss of blood from urine and faeces.
Rx: Penicillin, OTC
Important Note: Deworming with Triclabendzole to kill the liver flukes because liverflukes provides the anaerobic conditions.

Malignant Edema

It is caused by "Clostridium septicum".
Wounds are source of infection. Malignant edema in sheep is called as "Braxy or big head" because of edema on head. Malignant edema should be differentiated from black quarter on the basis of gas gangrene in BQ.
Rx: Penicillin, OTC, and washing of wounds with hydrogen peroxide (H_2O_2).

Anthrax

Syn: Splenic fever, Wool sorter's disease
Anthrax is an infectious, septicemic, zoonotic disease which is caused by a Gram +ve rod shaped bacteria which can be killed by steam sterilization or burning.
Pathogenicity is due to four factors; (i) Lethal factor (ii) Edema factor (iii) Protective antigen (iv) poly-n-glutamate capsule. This capsule has activity to prevent the phagocytic engulfment. Edema factor has edema producing activity. Lethal factors are lethal to leukocytes especially phagocytes. Protective antigen is the binding domain of the anthrax toxins. A combination of all these factors causes anthrax.
Clinical Signs: (a) Sudden death (b) High fever, Ruminal stasis, Hemoglobinuria, Bloody diarrhea, Bloody milk, Dyspnoea, Collapse. (c) Sever colic and bisket edema in horse (d) Splenic fever (i.e. spleen is enlarged, dark black in color.
Anthrax is a Greek word; mean "Coal" – dark color of lesions and blood.
Anthrax vaccine: Stern strain (a non-capsulated toxigenic strain)
Source of anthrax: (i) alkaline soil (ii) Contaminated animal byproducts (skin hides, bones and wool)
Forms of Clinical Disease: There are three forms of disease; (a) cutaneous (there is formation of papules, vesicles and pustules) (b) pulmonary form (c) intestinal form

Actinobacillosis

Syn: Wooden tongue
A disease of zoonotic importance
Etiology: it is caused by; Actinobacillus ligneresii; Gram –ve rods. The causative agent penetrates through abrasions of the mouth.
Disease is characterized by pyogranulomatous lesions on the tongue, gums, palate, and associated lymph glands. There is sulphur granules formation.
Wooden tongue is the disease of cattle and sheep.
Rx: (i) Na-iodide, IV @ 1 gm / 12 kg bwt (ii) Washing with tinc. Iodine and glycerin.

(iii) Penicillin can also be used.

Actinomycosis

Syn: Lympy jaw
Causative agent: It is caused by "Actinomyces bovis". It is caused by wound disease involving bones especially of maxilla and mandible. In maxilla lesions, there is suppurative ostitis.

Listeriosis

Syn: Circling disease
Causative agent: It is caused by "Listeria monocytogenes" which is acquired through contaminated silage. Clinically it is characterized by encephalitis, meningitis, enteritis, abortion in last trimester and uveitis/opthalmitis. Microabscesses in encephalitis is characteristic feature of this disease. It has zoonotic impact and effect mainly sheep and then other ruminants.
Rx: Cholortetracycline or penicillin, IV is very effective.
DDx: (i) Scrapie (ii) Gid (iii) Polioencephalomalacia

Paratuberculosis

Syn: Johne's disease
Causative agent: It is caused by "Mycobacterium paratuberculosis".
It is a chronic, progressive and diarrhoeal disease. It effects all the ruminants especially newborn calves, and young animals but the clinical disease occur over 2 years.
Clinically watery diarrhea, emaciation and weight loss.
The organism has long incubation period and disease remain subclinical and organisms shed through feces and milk.
Rx: (i) Streptomycin @ 50mg/kg IM (ii) Isoniazid @ 20mg/kg IM
Vaccination: Vallee's vaccine is used
Johnin Test: In this test, organism causes delayed type of hypersensitivity reaction. Inject Johnin extract I/D. If it will increase thickness, indicates positive case.

Tuberculosis

Causative agent: It is caused by "Mycobacterium bovis" – A zoonotic disease
It is also called chronic debilitating disease.
Body weight loss, weakness, anorexia, generalized emaciation, low grade fever. In pulmonary form, chronic intermittent cough, dyspnoea, Tachypnoea. Lesions are called "tubercles". In advanced cases, all the lymph nodes may contain tubercles granulomatous lesions.
Rx: Sreptomycin, Isoniazid, and Paraminosalvic may be used for treatment.
Tuberculin Test: is used for diagnostic and screening purpose. Inject 0.05 ml tuberculin intradermally (I/D). +ve case is indicated by increased thickness of the skin.

Glanders

Causative agent: Pseudomonas mallei – an obligate parasite and live in the host.
The disease is acute in ass, subacute in mule, and chronic in horse. Horses acquired infection by ingestion and inhalation. The organism deposits in lymphatic tissues. In pulmonary tissue, it first forms microscopic inflammatory foci, then macroscopic nodules, then larger, chronic granuloma + diffused interstitial pneumonia accompany this process.

At any point during these events, organisms go to air ways -- > upper respiratory tract -- > produce nodules in nasal cavity --- > nodules rupture to produce characteristic punched out ulcers -- > ulcer discharge a gluey, purulent exudate -- > congested and hemorrhagic mucus membrane of the nasal cavity.
Bacilli also infect the tissues of limbs where they give rise to "Farcy". Farcy comprises a "chronic lymphangitis" (Farcy cords) and "Lymphadenitis" (Farcy buds). These lesions rupture to produce purulent exudate.
In occult glander, the pulmonary lesions are provoked by stress -- > leading to disseminate in the body and release to the exterior.
Mallein Test: Inject intradermally mullein reagent in eyelid. Swelling of eyelid within 24 hours confirms the positive case of glanders.

Strangles

Causative agent: "Streptococcus equi"
Strangles is a suppurative lymphadenitis of head and neck of horses. Disease is common and sever in young horses and foals.
S. equi is transmitted when discharges from nose or abscesses contaminate food and water, when affected foals suckle the mammary glands, direct nose to nose contact also transmits.
Pathogenesis: Mouth/nose -- > Lymph nodes -- > all is found in one or more lymph nodes that drain the pharyngeal/tonsillar region.
Failure of phagocytosis is due to (i) M protein (ii) Hyaluronic acid (iii) Leukocidal toxins.
Incubation period is 13 to 14 days. Clinically, it is characterized by onset of sudden fever (40C), loss of appetite, halitosis, difficulty in swallowing, intermittent cough, extension of head and neck, swelling in the submandibular and a supralaryngeal areas, nasal discharge, inflammation of lymphoid nodules of soft palate and tonsillar areas. After 3-5 days swelling in the intramandibular or suprapharyngeal areas may increase because of lymphostasis and enlargement of affected lymph nodes.
The occlusive effect of lymph node enlargement is the source of disease description "Strangles" – Suffocation.
Sometimes abscesses in affected lymph nodes rupture. Suprapharyngeal abscesses drain into pharyngeal area resulting in a copious flow of purulent material. This drainage into guttural pouch matastasis of purulent material result in abscess formation in other locations such as lungs, brain, thoracic and abdominal lymph nodes. This is called "bastard strangles".
The second complication during and after recovery is purpura haemorrhagica; which is an immune complex mediated vasculitis that occurs at 2-4 week, paralysis of left recurrent laryngeal nerve and anemia occurs.
Rx: (i) Penicillin (ii) Abscess drainage (iii) Fly repellent (iv) Corticosteroids (for purpura hemorrhagica).

EQUINE DISEASES

(a) Viral Diseases

(i) Equine influenza
(ii) Equine rhinovirus --- > upper respiratory tract
(iii) African horse sickness (Genus: orbivirus) --- > respiratory/circulatory
(iv) Vesicular stomatitis --- > vesicles on foot and mouth
(v) Equine infectious anemia (Family: Retroviridae, Genus: Lentiviru) HIV like

(b) Bacterial Diseases

(i) Tetanus --- > Clostridium tetani
(ii) Anthrax ---- > Bacillus anthracis

(iii) Strangles ---- > Streptococcus equi
(iv) Glanders ---- > Pseudomonas mallei
(v) Contagious equine metritis --- > Taylorella equigenitalis
(vi) Mastitis --- > Streptococcus zooepidermicus

(c) Parasitic Diseases

Parasite	Specie	Adult site	Larva site
Long strangyles	Strongylus vulgaris	Large intestine	Arteries/ liver
	Triodontophorus spp.	Large intestine	Intestinal wall
Small strangyles	Trichonma spp.	LI	Intestinal wall
Round worms	Parascarus equinum	SI	Liver, lung
Thread worms	Strongyloides westerni	SI	Lung
Lung worms	Dictylocaulus spp.	Respiratory passage	Lymphatics
Pinworms	Oxyuris equi	LI	Intestinal wall
Tapeworms	Anoplocephala spp	SI / LI	---
Bots	Gastrophilus spp.	Flies in environment	Stomach

Colic

Abdominal pain; visceral pain

Types of Colic

i) **Spasmodic coli:**
Increase in peristaltic movement and spasm occur. Intermittent bouts of pain with period of relaxation.

ii) **Impactive colic:**
Impaction of bowl with dry and partial digested feed contents, bowl lumen distended and its motility reduced. There is continuous pain.

iii) **Obstructive colic:**
Passage of ingesta is obstructed either due to torsion or intussusceptions. There is continuous pain.

iv) **Flatulent colic:**
It is also known as intestinal tympany or tympanitis.
There is distension of bowl lumen due to gas accumulation

v) Idiopathic colic;
No obvious cause or lesion is found.

PROTOZOAL DISEASES

Trypanosomiasis

Nagana
Caused by Trypanosoma congolense, It is transmitted by tsetse flies.
Signs: intermittent fever, anemia, weight loss, edema of limbs and genitalia.

Surra
Caused by Trypanosoma evansi. It is transmitted by biting flies.
Sings: same as above + progressive paralysis of hindquarter in chronic cases.

Dourine:
Caused by Trypanosoma equiperdum. It is transmitted by coitus [mating]
Signs: Genital and ventral edema, progressive emaciation, ascending motor paralysis.

Babesiosis

Caused by B. equi and B. caballi

DDx: Equine infectious anemia, Equine viral arteritis, Purpoura hemorrhagica.

Immunological Disorders

i) Severe combined immune deficiency (SCID); its hereditary
It is caused by EHV-I in which immuno-suppression can occur.

Vaccines for Horses

i) Influenza vaccines
ii) EHV-I
iii) Tetanus [Clostridium tetani]
iv) Strangles

DDx of Cattle Diseases in which Redwater Comes:

(i) Enzootic hematuria:
Grazing "Broken" There is hematuria with no pus.
(ii) Enzootic bovine pyelonephritis:
Intermittent hematuria, + pyuria caused by "Corynebacterium renale" in cattle.
(iii) Babesiosis: Fever 41 C
(iv) Postparturient hemoglobinurea:
Low phosphate or low copper diet [no temperature increase from normal]
(v) Bacillary hemoglobinurea;
Diarrhea + Abdominal pain + Fever 41 C. Mortality is 100 %.
(vi) Leptospirosis:
Caused by L. pomona. Mostly calves are affected. There is mucosal petechiation.
(vii) Chronic copper poisoning:
Hemoglobinurea, acute death

LIST OF DRUGS USED IN VETERINARY MEDICINE

ANTIPROTOZOALS

Babesiosis: Imidocarb @ 3mg / kg bwt
Diminazine @ 3-5 mg/kg bwt S/C
Quinuronium sulphate [Acaprine, Babesan] @ 0.4 mg/kg bwt
Tryan Blue [Fresh] @ 1-4 gm / kg bwt

Trypanocidals:
Suramine [Antrypol] @ 10 mg/kg bwt
Diminazine @ 8 mg / kg bwt S/C

Anti- Giardia, Amoeba, Blantidtium, Trichomonas:
Metronidazole; in canine dysentery @ 50 mg/kg wt orally for 5 days
In bovine trichomoniasis: @ 75 mg/kg bwt IV 3 times a day

Anitcoccidals:
Suplhaquinoxalone
Amprolium

ANTIPARASITIC

Ascaricidals:
Piperazine

Against Roundworms:
Thiabendazole

Broadspactrum Antiparasitic:

Albendazole, Fenbendazole, Mebendazole, [Benzimedazole]
Tetramizole
Levamisole
Pyrental pamoate [Combantrin]

Against Nematodes, Ectoparasites and Heartworms:
Ivermectin

Taenicidal: Niclosamides

Flukicidals (Against Liver Fluke]:
Oxyclosanide @ 15 mg /kg bwt orally

Broodicidal: Preziquantal @ 5 mg/kg bwt for cat/dog mostly

ANTIFUNGALS
Nystatin [Against Streptomyces Neursei]
Griseofulvin [Against Penicillium spp]

Synthetic:
Coltrimazole
Amphotericin B
Ketokenazole

ANTIVIRALS
Cyclovir
Acyclovir
Amantadine
Ribavirale [Against Hepatitis B & C viruses]

RESPIRATORY STIMULANTS
Nikthamide
Amphetamine Sulphate

ANEMETICS
Dimenhydramine
Diphenhydramine
Cyclizine
Meclizine

EMETICS
Apomorphine
Conc. HCl solution

ECBOLICS [Uterine Contractors]
Oxytocin
PGF2 alpha [Dinoprost]

DIURETICS
Furosemide [Lasix]
Mannitole

HELMINTHOLOGY

Study of HELMINTHS

Helminthology; consists of Study of
(i) Platyhelminthes: **[**Flukes, Tepworms, Flateworms]
(ii) Nemathelminthes [Roundworms]

Platyhelminthes are hermaphrodite. These include:
(a) Trematodes
(b) Cestodes
Nemathelminthes includes:
(a) Nematodes

Nematode	Trematode	Cestode
Round worm	Flat worms	Tapeworms
Spindle shaped	Leaf shaped	Ribbon shaped
No segment	No segment	Segmented
Unisexual	Hermaphrodite	Hermaphrodite
Alimentary canal present	Present	Absent

Trematodes: [Flatworms]

(i) ***Fasciola hepatica***: [Liver fluke] snail is intermediate host.
Condition is known as Bottle jaw (edema in intermandibular space)
(ii) ***Fasciola gigentica***:
(iii) Schistosoma japonicum: lives in mesenteric and portal vessels of man and animals. Causes Hematuria.

Cestodes: [Tapeworms]

(i) Raillietina tetragona
(ii) Dipylidium caninum (common tapeworm of dogs)
(iii) Hymenolepis nana (dwarf tapeworm of dogs)
(iv) Taenia solium
(v) Taenia saginata
(vi) Echinococcus granulosis; form the hydatid cyst

Nematodes: [Roundworms]

(i) Ascarus lumbricoids
(ii) Parascaris
(iii) Oxyuris equi
(iv) Toxocara vitulorum
(v) Strongyloides : palisade worms
Haemonchus contortus; stomach worm or wireworm of ruminants
(vi) Dictylocaulus pilaria [Lungworms]: in bronchi of sheep
(vii) Habronema: cutaneous habronema is also called "summer sores" or Bursati or "Granular dermatitis"; habronema larvae
(viii) Dicrofilaria immitus [Heartworms]; occurs in dog and cat, and right ventricle of fox, and there is pulmonary stasis.

Nematodes in Blood Exam

a) Dirofilaria immitus; Heart worm of dog, cat and fox
b) Dipetalonema reconditum; S/cut worm of dog
c) Stearia cervi; Peritoneal worm of cattle.

CESTODES

Sexually mature form found in intestine of vertebrate
Segmented body, segment called proglottid
Larvae; 6 hooked larvae called hexacanth
Intermediate host; vertebrate and intervertebrate
Head is termed scolex

Larval Forms

Also called metacestodes
Non-budding forms

a) Procercoid (1st larval stage in arthropod)
b) Plerocercoid
c) Cysticercoid
d) Cysticercus
e) Strobilocercus
f) Coenurus
g) Hydatid

ENTOMOLOGY

i. Insects; Lices etc
ii. Arachnids: Ticks & Mites

INSECTS

(1) Lices:
(a) Hematopinus suis; Pig sucking lice
(b) Haematopinus eurysternus: Cattle lice
(c) Lignocanthus vituli: Long nose cattle louse

(2) Bugs:
(a) Cimex lecturalis; Bed bug

(3) Beetles

(4) Fleas
(a) Pulex irritans

(5) Biting midges or Punkies and Flies
(a) Mosquitoes
(b) Black flies or buffalo gnats
(c) Sand flies
(d) Horse flies; involve in the transmission of causative agents of anthrax, equine infectious anemia, Surra, Nagana.
(e) Common house flies: involve in the transmission of causative agents of typhoid fever, cholera, tuberculosis, dysentery, anthrax.
(f) Stable flies; Blood suckers e.g. Stomoxys; involve in transmission of habronema, equine infectious anemia, anthrax.
(g) Buffalo flies
(h) Horn flies
(i) Tsetse flies; causes Sleeping sickness of man and Nagana
(j) Blow flies
(k) Blue bottle flies

(l) "Strike" by Lucilia, Calliphora, Phormia.
- Callitroga causes myasis of man and is called screwworms
- Tumbu flies
- Sarcophaginae: Flesh flies
- Gastrophilus: Horse bots
- Oestrus ovis: Sheep nasal fly; Called as "False Gid".
- Hypoderma; Ox warbles

ARACHNIDS
(1) Mites
(2) Ticks
(a) Argus persicus (Fowl tick); causes Tick paralysis and transmits Borrelia ancirina (Spirochaetosis).
(b) Spinose ear tick
(c) Eyeless tampans; live in sands under trees.
(d) Hard Ticks [Ixodes]
Ixodes recinus transmits red water; caused by Babesia divergens and B.bovis or B.bigemina
Hard ticks are involved in:
- Tick borne fever of sheep
- Viruses of loping ill
- Coxiella burnetii
- Tick paralysis
- Staphylococcus aureus
- Anaplasma marginale
- Spirochaetosis
- Canine pirpoplasmosis [Rephicephalus sanguinus]
- Redwater billiary fever [Babesia equi]

Dermacenter reticularis (in Asia)
Transmits Babesia spp.

Protozoal Diseases

(1) Babesiosis: Red water fever; caused by B.bovis, B.bigemina
(2) Anaplasmosis: rickettsial disease caused by A.marginale& A.ovis(Sheep/Goat
(3) Coccidiosis: Caused by Eimeria bovis, E. arloingi (sheep & goat)
(4) Toxoplasmosis: Caused by Toxoplasma gondii
(5) Dourine: Caused by Trypanosoma equiperdum
(6) Surra: Caused by Trypanosoma evansi

Babesiosis [Redwater fever]

Caused by B.bovis and B.bigemina (Intra-erythrocytic Protozoa)
Mostly Cattle, buffalo, sheep and horses are affected.
Transmitted by ticks as following:
- Boophilus microphilus
- Rhiphicephalus spp.
- Dermacenter spp.
- Ixodes ricinus

Characterized by Anemia, Jaundice, Hemoglobinemia, Hemoglobinurea, and ultimately Death of the animal due to anemic anorexia.

This intra-erythrocytic parasite causes intravascular hemolysis.
Diseases is transmitted by ticks, and mostly found in high temperature, humidity and rain fall zones of the world.
Incubation period of disease is 2 o 3 weeks.
Signs and Symptoms:
Anorexia, Depression, Cessation of rumination, Decreased milk production, Weakness, Membranes are pale.

Anaplasmosis

Caused by Reckettsial agent "Anaplasma marginale" in Cattle and "Anaplasma ovis" in Sheep and Goat.
Clinical disease is in cattle and subclinical in sheep and goat.
Signs are same as that of babesiosis but hemoglobinurea is absent in anaplasmosis.
Long incubation period as compared to that of babesiosis: about 1 to 5 weeks.
It is also a tick-borne disease.
Treatment: Oxytetracycline @ 6-10 mg/kg bwt

Toxoplasmosis

Zoonotic problem
Caused by "Toxoplasma gondii"
It is a contagious disease of all species including man.
Clinically it is manifested chiefly by abortion and still birth in ewes and in all other species with encephalitis, pneumonia and neonatal mortality.
Treatment: Sulfadiazine

Dourine

It is a contagious disease transmitted by Coitus.
Characterized by inflammation of external genitalia, cutaneous lesions and paralysis.

PROTOZOAL DISEASES

Babesiosis

Syn: Tick fever, Piroplasmosis
Etiology: Babesia bigemina, and Babesia bovis
Transmission: by Ticks esp. of spp. Boophilus
Hosts: Cattle is the most common. Others are buffalo, sheep and horse
Pathogenesis: Multiplication in peripheral blood vessels --- > intramuscular hemolysis
Clinical Signs:
High fever, Hemoglobinurea, Anorexia, Conjunctival mucus membrane is brick red colored in initial stage but pale in later or terminal stages. There is low PCV [packed cell volume] value due to hemolysis of RBCs.
Treatment:

(i) Imidocarb dipropionate
(ii) Diminazine
(iii) Oxytetracycline

Theileriosis

Syn: East cost fever, Red water disease
Etiology: Theileria parva and Theileria annulata
Transmission: by Ticks esp of Hyalamma Specie
Hosts: Mostly Cattle
Clinical Signs:
High temperature, Enlargement of regional and superficial lymph nodes, Tense ball like eyes with watery lacrimation. Nasal secretions also come out.

Trypanosomiasis

Syn: Surra – in horses, Pheta – in camels
Etiology: Trypanosoma evansi
Transmitted by Biting flies (Tabanus flies)
In human, it causes sleeping sickness
Clinical Signs:
Intermittent fever, Sever petechial hemorrhages on serosal membrane and lymph nodes
Spleen is swollen, Anorexia
Diagnosis:
wet stained blood smear is used for under microscope diagnose of parasite.
Treatment:
Surramine, Cymelarsen.

Dourine

It is a venereal disease
Etiology; Trypanosoma equiperdum
Host: Horses
Clinical Signs:
Gross edema of genitalia, Mucopurulent discharge from urethra, vaginal discharge in females
Treatment:
Quinapyramine sulfate

POULTRY DISEASES

DISEASES OF CHICKEN CORRELATED WITH AGE

BROILERS, PULLETS, LAYERS

Typical losses to 7 weeks of age are 4-5%. Losses in the first two weeks account for 30-50% of total mortality.

BROODING PERIOD (0-2 Weeks)

1. Mortality
   a) Management
   b) Starvation/ dehydration – floor temperature, water management
   c) Navel and yolk sac infection: *Salmonellosis*, *E.coli*, *Staphylococcus*, *Proteus* etc.
   d) Vaccine contamination
   e) Improper incubation conditions: small, weak hatchling or increased susceptibility to infections.

2. Respiratory disease
    a) Aspergillosis (Brooder pneumonia)
    b) Vaccine problems (Respiratory reaction)
3. CNS Disease
    a) Avian Encephalomyelitis
    b) Encephalomalacia
    c) Poor vaccine placement (Pox, MDV)
    d) Spiking Mortality
4. Nutritional Deficiencies
    a) Rickets
    b) Others
5. Eye diseases
    a) Ammonia burns
    b) Mycotic Keratoconjunctivitis

GROWING PERIOD (2-8)

1. Mortality
    a) Coccidiosis
    b) Aspergillosis
    c) Ascites
    d) Marek's disease
    e) Clinical infectious bursal disease (IBD)
    f) Inclusion body hepatitis / Aplastic anemia
    g) Ulcerative enteritis
    h) Necrotic enteritis
    i) Chicken infectious anemia
    j) Gangrenous dermatitis
    k) Blackhead
2. Respiratory disease
    a) Mycoplasmosis
    b) Newcastle disease
    c) Infectious bronchitis
    d) Infectious laryngotracheitis
    e) Colisepticemia
    f) Avian influenza
3. Lameness
    a) Tibial dyschondroplasia
    b) Long bone distortion (Valgus-varus deformaties)
    c) Infectious synovitis
    d) Bumblefoot
    e) Viral arthritis
    f) Osteomyelitis
    g) Staphylococcosis/ Other septic arthrides
    h) Spondylolisthesis
    i) Rickets
    j) Ionophore/ 3-Nitro-toxicity
4. Skin disease
    a) Gangrenous dermatitis
    b) Fowl pox
    c) Exudative diathesis

   d) Skin leukosis
5. CNS disease
   a) Avian encephalomyelitis
   b) Nutritional encephalomalacia
   c) Newcastle disease
   d) Marek's disease
6. Others
   a) Roundworms
   b) Toxicities - Mycotoxin, Botulism, Ionophore, 3- Nitro, etc.
   c) Crop Mycosis
   d) Cellulitis
   e) Swollen head syndrome
   f) Inflammatory process
   g) Immunosuppression – IBD, CIA

PULLET PERIOD (8-20 weeks)

1. Neoplastic diseases
   a) Marek's disease
   b) Avian leukosis
2. Respiratory diseases
   a) Infectious coryza
   b) Infectious laryngotracheitis
   c) Mycoplasmosis
   d) Infectious bronchitis
   e) Newcastle disease
   f) Avian influenza
3. Systemic diseases
   a) Fowl cholera

LAYERS (>20 weeks)

1. Neoplasia
   a) Lymphoid luekosis
   b) Carcinoma
   c) Sarcoma
   d) Marek's disease
2. Respiratory diseases
   a) Newcastle disease
   b) Avian influenza
   c) Infectious bronchitis
   d) Mycoplasmosis
   e) Infectious coryza
   f) Laryngotracheitis
3. Egg production drops
   a) Newcastle disease
   b) Avian influenza
   c) Avian encephalomyelitis
   d) Infectious bronchitis
   e) Mycoplasmosa gallisepticum
   f) Infectious coryza

g) Nutrition / Management
4. Salpingitis / Peritonitis
5. Cage layer fatigue
6. Fowl mites
7. Fatty liver hemorrhagic syndrome
8. Parasitism: Capillariasis, Heterakis, Roundworm etc.
9. Uterovaginal prolapsed
10. Fowl cholera

SPORADIC DISEASES

1. Tuberculosis
2. Botulism
3. Streptococcosis
4. Arbovirus infection
5. Pullorum/Typhoid
6. Other parasitic diseases

Infectious Bursal Disease [IBD]

Syn: Gumboro
Etiology: Birnaviridae
Mostly young birds of 6 weeks age are affected. Broiler less affected than layers. At early age, bursa of fibricious does not produce B-cells – immunosuppression
Disease span is: 6-7 days. Morbidity may reaches up to 100%
Clinical Signs:
Birds sit with closed eyes and are unable to stand, drink and eat.
Whitish or yellowish diarrhea on vent -- > bird pick their vent -- > blood mixed diarrhea -- > shivering
Lesions:
Dehydration is noted by shrunken lesions on legs, claws and joints are visible.
Hemorrhages on thigh and pectoral muscles.
Bursa of fibricious swollen -- > yellow exudate
Opening bursa, hemorrhages and exudate
Kidney suffer from nephrosis -- > swollen and large
Spleen becomes enlarged
Treatment: No specific treatment
Diuretics, Sugar in water to provide energy

Newcastle Disease (ND)

Etiology: Avulavirus (Family Paramyxoviridae). ND virus is of three types depending upon pathogenecity.

Velogenic: Highly pathogenic – 100% mortality
Mesogenic: Intermediate pathogenic – mostly affect young birds
Lentogenic Produce subclinical signs only in young birds

No vertical transmission because infected eggs do not hatch.
Clinical Signs:
Increased respiration – fluid from nostrils
Mouth paralysis -- > increased temperature
Greenish diarrhea --- > Opisthotoc torticollis
Wings drop --- > lame bird

Lesions:
Hemorrhages on ventricular surfaces, caecal surface, serosa of the intestine and gizzard.
Petechial hemorrhages ulcers on intestine
In caecum, caecal tonsils become congested.
Congestion in trachea
Vaccine:
Valogenic --- > Rockin strains
Mesogenic --- > Mukteswar strains
Lentogenic --- > Lasota strains

Avian Influenza

Syn: Fowl plaque
Etiology: Orthomyxovirus; three types of virus A, B, C
Two antigens; HA (Hemagglutinin) NA (Neuraminidase)
No vertical transmission
Clinical Signs:
Mild respiratory signs, sneezing. Swelling of head and face. Diarrhea.
Lesions:
Congestive, hemorrhagic necrotic changes in skin. Hemorrhages on digestive tract.
Vaccination:
No vaccination because there is frequent mutations.

PROTOZOA

Entamoeba histolytica; causes amoebic dysentery in man, dog, cat etc.
Entamoeba coli: affects man, dog, pig and other primates.
Sarcocysts spp.; found in striated and heart muscles
Cooccidiosis: There are 3 pathogenic genera:

i) Isospora (2 sporocyst and each have 4 sporozoites)
ii) Eimeria (4 sporocyst and each have 2 sporozoites)
iii) Tuzzeria (8 free sporozoites)

Eimeria: affect sheep, goat, cattle, buffalo, cat, horse and poultry.
Chicken: E. tenella (Cecal cocci), Intestinal cocci (E.brunetti)
Cattle: E. bovis, E. zuerni
Dog: Isospora

Toxoplasma gondii
Affects rodents, cat and dog. Affects brain, heart, liver, lung and spleen.

Plasmodium
Mammals, reptiles, and birds
In erythrocytes and endothelial cells of inner organs
Vector: Culex (birds), Anopheles (Mammals)

Leishminia
Man, dog, rodents, guinea pig
Found in macrophages, reticuloendothelial cells.
Vector: Sand fly, phelbotomus and lutzomyia
Species: L.braziliansis, L.chagasi, L.maxicana, L.donovani

Trypanosomiasis
Parasites of circulatory system and tissue fluid
Vector: Tsetse fly of Glossina species
Stercorarian: spread via faeces
Salivarian: spread via saliva
Species:
T. evansi, T. gambience, T. bruci, T. cruzi, T. equiperdum
Diseases:

i) Surra
ii) Chagas disease
iii) Sleeping sickness
iv) African trypanosomiasis
v) Dourine

VIRAL DISEASES

Blue Tongue

Caused by orbivirus
Primiraly disease of sheep
Spread by flies (culicoides) and mosquitoes (ades) and tick (ornithodorous)
Characteristic stomatitis, rhinitis, and lameness
Clinical signs:
Increased body temperature (105-106 F), sneezing, coughing, salivation, redness of nasal mucosa, nasal secretion, blood tained frothy, saliva, edema of gums, ulcer formation at border of tongue, lesions of foot (coronitis + laminitis), wry neck (head toward side lacrimation).

PPR (Peste Des Petitis Ruminants)

Syn: Goat plaque, KATA,
Caused by Morbillivirus, family Paramyxoviridae
Clinical Findings:
Acute: Goat, 106-107 F, purulent nasal discharge, necrotic lesion in mouth, swollen lips, profuse diarrhea, coughing, dyspnoea, pneumonia
Sub-acute: sheep die in 24 hours, less signs are evident

Scrapie

Caused by Infectious proteinacious particles which are very strong stay against boiling
Characterized by pruritis, abnormal gait, mostly chronic. Causes vaculation of neurons in spinal cord, pons, mid brain etc. There are tremors, locomoter disorders, pruritis, change in behavior, hematoma on ear and swelling of face.
Scrapie scratch reaction:
Nibbling, licking, abnormality of gait

Tropical Theileriasis

Protozoal disease
Caused by Theileria parva
Transmitted by tick of spp Rephiciphalus
Hence, life cycle involves 2 hosts

Clinical Findings
Generalized swelling of draining LN throughout the body, fever, anorexia, depression, dullness, corneal opacity.
Rx: OTC @ 20 mg/kg

Anaplasmosis

Rickettsial/protozoal disease
Caused by Anaplasma centrale (more severe)
Anaplasma marginale (less severe)
Transmitted by ticks spp. of Boophilus, Ixodes, Rephicepalus and Hyalomma
Clinical findings:
Fluctuating fever, pale mucous membrane, yellowish urine, jaundice, pregnant animal may abort, decrease in milk production, emaciation.
Rx:
OTC @ 20 mg/kg, and Imizole @ 2-5 ml/100 kg

BACTERIAL DISEASES

Mastitis

Inflammation of mammary glands (udders and teats)
Characterized by changes in udder and milk composition (physical, chemical, bacteriological), neutrophils in milk increase.
Major pathogens:
Staph aureus, Streptococcus aglactiae, E.coli (70% contribution by first two agents)
Minor pathogens:
Pseudomonas, fungal agents (aspergillus, yeast), corynebacterium

Less in buffalo but more severe (sphincter is tight)
48% decrease in milk yield during production, also medical changes.
Phases:
Invasion, Infectious, Inflammation
Tests:
California milk test (CMT), Surf field milk test (SFMT)
Abnormalities in udder:
Diffused --- > localized -- > fibrosis --- > gangrene
Abscess formation in calves, atrophy
Rx:
Inj. Gentamycin, Enrofloxacin, Oxytetracycline, Intramammary – Procaine penicillin (400000 IU) + 30 ml distilled water + 1 ml steroid in non-preg. animal + merocin (fibrolytic agent) 1 ml.

Contagious bovine pleuro-pneumonia (CBPP)

Caused by Mycoplasma mycoids – small colony
Large colony caused CCPP (Contagious caprine pleuro-pneumonia)
Affect pleura + lungs
Peracute: Sudden death is observed
Acute: High temperature/fever (107 F), This infection may be sub acute
Rx:
Tylosine is more effective

Tick pyemia of lamb

Enzootic – Staphylococcus
Transmitted by ticks of Ixodes spp.
Affects lambs of 2 to 10 week age
It may cause sudden death

Contagious bovine pyelonephritis

Caused by Corynebacterium renale
Affects kidneys, and upper urinary tract
Clinical findings:
Hematuria, colic signs, forceful urination, pyouria, depression, decrease milk production
Rx: Penicillin is the drug of choice

Caseous Lymphadenitis

Caused by Corynebacterium paratuberculosis (intracellular parasite of monocytes/macrophages). External abscessation of lymph nodes (initially pus is greenish, but latter on calcification gives onion appearance to abscess and can distinguishable)
Internal abscessation (liver, intestine, brain and spinal cord)

Anthrax

Syn: Wool sorter disease
Caused by Bacillus anthracis (Facultative anaerobe)
3 toxins (edema factor- I, Lethal factor II, Protective antigen III)
Rx: Curable if detected at early stage, Penicillin @ 20,000 IU

Listeriosis

Syn: Circling disease, Silage sickness,
Caused by Gram +ve bacterial agent,; Listeria monocytogenes
There are four forms;

(a) Encephalitis (necrosis in brain)
(b) Septicemia (MOP in pregnant animals, placentitis, and ultimately death)
(c) Abortion
(d) Mastitis

Rx and Control:
Penicillin @ 44,000 IU / kg IM STD for 7 days

Black Leg/Quarter

Syn: Clostridial myonecrosis
Caused by Clostridium chuvie
It produces alpha, beta, gamma and delta toxins
Clinical Findings:
Fever, lameness, stiffness of hind limb muscle, skin becomes dry and darker in color.
Causative agents get entry by deep injury mostly in hilly and sandy areas.

VIRAL DISEASES

Canine Distemper

Syn: Hard pad disease, Canine influenza
Characterized by diphasic fever, ocular and nasal catarrhal discharge, frequent cutaneous eruption. Due to secondary infection, there may be pneumonia, diarrhea.
Etiology:
RNA –virus, Canine distemper virus, family Paramyxoviridae; which is closely associated with Measles virus of human and rinderpest virus of cattle.
Clinical Findings:
Viremic diphasic fever, skin redness and pustules, gastroenteritis resulting to diarrhea, respiratory problem (pneumonia), reproductive form, nervous form
Vaccine;
1st : 6-8 wk 2nd: 12-14 wk 3rd: 16 wk
Dam vaccine: 1 month before whelping

Infectious Canine Hepatitis

Syn: Canine adenovirus hepatitis, contagious hepatitis, Blue eye disease,
Blue eyes subside in 7 to 10 days.
There are four forms of disease;
Mild: mild increase in normal body temperature, mild photophobia, enlarged tonsils, sudden recovery is being observed
Acute: Increased temperature, depression, sceleral edema, conjunctivitis, lacrimation
Per-acute: Sudden collapse, > 104 F temperature, vomiting, diarrhea, animal falls and rolls.
Chronic: Vomiting, purulent nasal discharge, recovered animal becomes carrier, nervous signs. Blueness eye due to cloudness of cornea

Canine Parvovirus

Syn: Panleukopenia of dog, Hemorrhagic enteritis
Caused by Parvo-virus, which causes depletion of B and T lymphocytes
Clinical findings:
Vomting, diarrhea, anorexia, dysentery, pale mucous membrane, gastroenteritis, myocarditis leading to heart arrest.
Forms:
Enteric Congestive heart failure Acute sudden heart failure
Vaccinations

2nd month	12-14 week	from vaccinated dam
1st at 15 day	2.5 month	from non-vaccinated dam

Rabies

Cold blooded are carriers.
Caused by Lyssa virus, belong to family Rhabdoviridae
There are three forms;
Prodromal: 1-3 days; excited animal, stay in corners, dilated pupil, decrease corneal reflex
Furious: 7-10 days: Over-excited, hypersalivation, muscular in-coordination, tremors, convulsions.
Dumb/**Paralytic**; 2-10 days: Ascending paralysis/centripetal paralysis, (H, FQ, Head and neck), No skin and GIT reflexes
Vaccination:
1st at 3 month, then after 1 month, then after 1 month, then after 1 year.
Reservoirs: Bats and vampires

Equine Viral Arteritis

Caused by Togavirus
Characterized by edema, inflammation of vessels, fluid accumulation in body cavities, persistent high fever, lacrimation, spasm, abortion in pregnant animals,
Transmitted by Coitus
Postmortem findings
Multifocal myometritis

Vasicular Stomatitis

Caused by vasicular stomatitis virus of family Rhabdoviridae.
Attack on oral mucosa, and coronary band, vesicles develop, which upon rupture becomes ulcers. Nasopharynx ulcers, epistaxis, and hoof may shed.

Equine Herpes Virus Infection

EHV-1 (more pathogenic) than EHV-II
Infection may be associated with:
a) Respiratory system b) Reproductive system or c) Nervous system

Dermatophylosis

Syn: Ringworm disease
Fungal infection Cause by Trichophytom equinum, T. versicosum and T. microsporum.
Clinical findings
Patchy alopecia, urticaria, pruritis, itching, pain
Use any skin ointments which may effective against fungal infection, Wash by 0.5% solution of Sodium hypochlorite.

Anhydrosis/Puff/DryCoat/Non-Sweating Syndrome

Due to beta 2 adrenergic stimulation,
Caused by 1) hyperkeratinization 2) Hyperthyroidism 23) Heat exertion
Clinical Findings:
Decreased appetite, increased pulse rate, tachypnoea, increased temperature and alopecia.

METABOLIC DISORDERS

Postparturient Hemoglobinurea

Due to low phosphate and copper dietary intake
Rx: (i) 5 liter blood
(ii) Na-acid phosphate, IV 60gm+ 300 ml water for 5 days
(ii) Dicalcium phosphate orally

Milk Fever

Normal serum calcium level: 4-5 mg/dL
Abnormal level: 1.5-3.0 mg/dL
Condition is characterized by hypocalcemia, weakness, depression of consciousness.
Low calcium level around parturition due to (i) Ca released in clostrum (ii) Intestine can not absorb sufficient calcium (iii) Skeleton can not fulfill the requirement of Ca+.
Along with Hypocalcemia, hypophosphatemia and hypomagnecimia may be accompanied.

Clinical Stages: There are three clinical stages.
Stage I:
Excitement with hypersensitivity
Muscular tremors of hind and forelimbs
Stage II:
Sternal recumbancy
Rectal temperature is subnormal (97-101 F)
Cow unable to rise
Stage III:
Stage of lateral recumbancy
Heart sounds inaudible

Treatment:
Ca-borogluconate, IV 25% solution @ 500-1000 ml.

Paralytic Myoglobinurea
Called "Azoturia"
A Metabolic Disorder of horses occurring during exercise after a period of inactivity on full ration. It is characterized by myoglobinurea and muscular degeneration.

Tympany / Bloat
Tympany is an accumulation of gas in the rumen while bloat is the accumulation of gas along with frothy foams.
Caused by leguminous plants + high concentrate ration + ruminal stasis
Treatment:
(i) T.T. oil (ii) Linseed oil (iii) Carbacol Injection 1-3 ml S/C (iv) Nux vomica powder
(v) As last resort, use Trocar and Canula to save the life of the animal

VIRAL DISEASES

PPR [Peste Des Petitis Ruminants]
Also known as "KATA"
Signs and Symptoms:
(i) High fever
(ii) Grey to yellowish discharge from eyes and nose
(iii) Diarrhea
(iv) Pinpoint grey or red lesions in lining of mouth
(v) Pale grey area and dead tissue mout
(vi) Thick cheesy material covering gums
(vii) Lips may appear swollen
(viii) In later stages, nodules or crusts may appear around the mouth resembling contagious pustular dermatitis.
(ix) Finally animal died due to pneumonia, difficult breathing and coughing.

Rinderpest
Signs and Symptoms:
(i) Fever, loss of appetite, depression, decreased milk production
(ii) Running eyes and nose

(iii) Erosions develop in mouth (gum, tongue, cheeks and palate) and leave areas of dead tissues.
(iv) Discharge from eyes and nose become grey yellow and foul smell.
(v) Severe diarrhea
(vi) Dehydration and death

FMD (Foot and Mouth Disease)

Signs and Symptoms:

(i) Fever, loss of appetite, and decreased milk production
(ii) Depression, heavy salivation, reluctance to move (lameness)
(iii) In the mouth (lips, tongue, gums, cheeks and palate) blisters develop which rupture and leave erosions.
(iv) Blisters + erosions are also formed on the hooves. They may become infected and hoof may loosen and become deformed.
(v) Sometimes, blisters and sores are seen on the teats and udders.
(vi) Pregnant animal may abort
(vii) Young animal may die

Treatment Strategy:

(i) Isolation of infected animal from other healthy animals
(ii) Amoxicillin @ 1 ml / 10 kg bwt
(iii) Mouth wash with Gentian violet [1 part] + Glycerin [100 part]
(iv) Foot bath with phenyl formalin + $CuSO_4$ (2%)

ANIMAL REPRODUCTION

Ovaries:

In Cattle, Buffalo, Sheep and Goat, ovaries are oval-shaped. In Mare, kidney-shaped and in Camel, these are like a bunch of grapes.

Cervix:

In mare and camel, no cervical rings. In mare, there are conspicuous folds in mucosa.

Age of Puberty

Specie	Age of Puberty (in Months)
Cattle	7-11 [Exotic breeds]
	24 [Sahiwal breed]
Buffalo	30
Sheep, Goat	5-9
	12 [Beetle breed]
Horse	18
Cat	6-12
Bitch	7-16

Ovulation Time

Cattle, Buffalo	10-15 hrs after the end of estrus
Sheep, Goat	24-36 hrs before the end of estrus

Heat Signs

(i) Dirty rumps
(ii) Streaks of saliva by licking on flanks
(iii) Rises her tail and move side wise
(iv) Animal licks vulva of other animal and would like to be licked by other animals and put chin on the back of other
(v) Frequent urination

Nervous Signs

(vi) Refuse to eat
(vii) Bellowing
(viii) More walking 2-4 times more than normal
(ix) Discharge of mucous from vulva
(x) Decreased milk production

External Signs

(xi) Swelling of vulva
(xii) Butting

Most reliable sign of heat is "Stands to be mounted". Heat without any estrus sign (external) is called "Silent heat".

Length/ Duration of Estrus Period

Cow, Buffalo	16-18 hrs
Sheep	36 hrs
Goat	36-48 hrs
Mare	7 days
Bitch	10 days
Cat	8-10 days
Camel	10-12 days

In Cattle, and Camel length of estrus period depends upon mating, it stops within 1-2 days after mating.

Breeding Season

Majority of buffaloes show heat in:	October, November
Majority of cattle show heat in:	April, May
Sheep and Goat ; Short day breeder	October, November
Mare ; Long day breeder	Mid February – March
Cat; Long day breeder	--
Bitch : Two breeding seasons in year	October, November & March, April

Seasonally Polyestrus

These animals which have many estrous cycles during particular season of the year e.g. Mare, Sheep and Goat.

Non-Seasonal Polyestrus

In these animals, estrus cycle continue through out the year e.g. Cattle and Buffalo

Mono-estrus

Estrus cycle occurs once in a season. E.g. Bitch, Cat and Wild animals

CL dependant animals for Progesterone
Cattle, Buffalo, Goat -- > If we remove CL, abortion will occur

Placenta dependant animals for Progesterone
Mare

Different Stages of Estrus Cycle

Proestrus	2-3 days
Estrus	
Metestrus	3-5 days
Diestrus	It is the longest period of cycle; 10-14 days. This is the period of CL.

Follicular Phase:
Proestrus and estrus periods are collectively called “Follicular phase” or “Estrogenic phase”. During this phase, estrogen level is more than progesterone.

Luteal Phase:
Metestrus and Diestrus periods are collectively called “Luteal phase” or “Progestrone phase”. Natural C.L. diameter is about 2-3 cm

Length of Estrus Cycle in Bovine

Cow	21 days
Heifer	20 days
Range	17-24 days

Nymphomenia
There is hypersensitivity due to cystic ovarian disease [COD]. Female appear like bull, pitch of voice is also bullish, and there is relaxation of sacroschiatic ligament.

Fertile Life

Specie	Sperm	Oocyte
Cattle	24-48 hrs	12-24 hrs
Sheep	24-48 hrs	16-24 hrs
Mare	72-120 hrs	6-8 hrs
Human	24-48 hrs	6-24 hrs

In Bovine, ovulation can occur at any point on the ovary except hilus and part of the ovary which is attached to the broad ligament.
In Mare, ovulation can only occur at “ovulation fossa”.
In Camel, ovulation can occur alternatively right and left ovary.
In Cattle, 60% ovulations occur from right ovary.
Basic role in the ovulation process is of LH [Leutinizing hormone].

Sponatenous Ovulators
Ovulation take place automatically (special stimulations are not required) e.g. Cattle, Buffalo, Mare, Bitch

Induce Ovulators

These animals require certain special stimulus for ovulation e.g. Camel, Cat, Rabbit.
In these animals, ovulation needs first copulation as stimulus (physical vaginal stimulation) – it is required for surge release of hormone.

Gestation Periods of Different Farm Animals

Cattle
Buffalo

Nulli-parous Animals

The animals which has not given birth to any young one

Primiparous Animals

The animals that calved for first time in their life

Differential Point

In Rabies, animal start bellowing continuously but in estrus, intermittent bellowing.
Restlessness in both, off feed, decreased milk production in both.
Estrogen alongwith progesterone cause appearance of pronounced estrus.
First estrus at puberty and after parturition is silent because there is no or very low progesterone level at that time.

Act of Parturition

Calving	Cattle/Buffalo
Foaling	Mare
Whelping	Bitch
Ferrowing	Swine

Signs of Approaching Parturition

(i) Relaxation of sacroschiatic ligament
(ii) Vulva size increased 2-4 times
(iii) Enlargement of udder
(iv) Opaque, yellow turbid discharge from teats
(v) Stringy mucous discharge from cervix (vulva)
(vi) Anorexia
(vii) Reslessness
(viii) Frequent sitting and standing
(ix) Arching back
(x) Kicking at belly
(xi) Sweating in flank region and below elbow before 4-6 hrs

Role of Hormones in Parturition

Estrogen

i) Stimulate release of PGF2a from the uterus
ii) Primes the uterus for effect of oxytocin
iii) Primes the cervix for effect of relaxin

PGF2a

i) CL lysis
ii) Strong uterine contraction

Relaxin
i) Relaxation of cervix

Oxytocin
i) Strong uterine contraction for fetal expulsion

Stages of Parturition

First stage	Dilatation of cervix	3-8 hours (cattle/buffalo), 2-6 hours (sheep/goat) 1/2 – 4 hour (mare)
Second stage	Expulsion of fetus	1/2 – 1 hour (cattle/buffalo), 4 hours (heifer) 1/2 -2 hour (sheep/goat), 10-30 min (mare)
Third stage	Expulsion of placenta	2-8 hours (cattle/ buffalo), 1/2-3 hours (mares)

Puerperal Period (Involution period): Time to complete uterine involution.

Foal heat: Mare comes into heat 10-13 days after parturition, Mating at this time may have very less chances of conception.

REPRODUCTIVE BIOTECHNOLOGY

Artificial Insamination (AI)

It is started in 1954 in UVAS. In 1962, technology was accepted by government. A major semen production units in Pakistan.

Advantages:

i) Increase bull efficiency
ii) Increase potential for genetic selection
iii) Decrease inbreeding chances
iv) Discourage disease transmission
v) It provides facility at the door step
vi) Semen can be stored for years
vii) Helps in progeny testing

Success of A.I. depends on:

a) Time of insemination
b) Proper heat detection

Mare: Insamination done 36 hrs before ovulation time and ovulation occurs 24-48 hrs before end of estrus. Follicle size: 35-40 mm

No. of Sperms per Semen Dose:

Fresh: 10 million Frozen: 20-25 million

Methods of Semen Collection

1. Recovery Method:
   Advantage: Maximum ejaculate can be obtained
   Disadvantage: Sperm loss and deterioration
2. Massage Method:
   Disadvantage: Semen is not balance in composition.
3. Electro-ejaculation:
   Mostly in ram/buck
   Disadvantage: Urine contamination
4. Using Artificial Vagina (AV) – Temperature (42-44 C)

Gross Evaluation of Semen

i) Volume: depends on the sexual excitement and activity
   Decreased: young male, excessive use of bull, incomplete ejaculation, failure of ejaculation, bilateral seminal vesiculitis
   Increased volume relates with: Maturity of bull, body size of animal, reproductive health and vigor of male animal
ii) General appearance:
   Creamy (Grade 2), Light Cream (1)
iii) Presence of any foreign particle
iv) pH of semen (6.5-7.2 is ideal one)

Macroscopic Examination

i) Mass Activity:
   It reflects sperm concentration and viability
ii) Motility percentage: 2.9% Sodium citrate solution is used.

80-100	Very Good
60-80	Good
40-60	Fair
20-40	Poor
0-20	Very Poor

iii) Concentration of sperms; by using hemocytometer

Extenders for Semen:
MYG, LYG, LFGY, FYG and Sodium citrate – egg yolk extender

Cystic Ovarian Disease (COD)

There are three types of cysts on ovary;

(i) Follicular cyst:

Follicles develop on ovary and after attaining a size of maturity (2 cm) persist on ovary for a period of 1 week or more in the absence of functional CL
There is complete deficiency of CL in this case.
Rx: LH injection, (hCG has function like LH) – Inj. Physex given IV @ 300 IU

(ii) Luteal cyst:

It is unilateral single cyst on the ovary; leathery appearance due to lutinization. It is due to problem in release of LH.

(iii) Cystic Corpora Lutea:

It is a CL with centrally fluid filled cavity.

Causes:

(a) Hormonal imbalance (insufficiency in release of preovulatory LH surge).
(b) Stress factors
(c) Toxins and infections
(d) Secondary to uterine infection
(e) Exotic breeds are more prone to COD
(f) Nutritional stress
(g) Increased milk production

Treatment:
PMSG or hCG (5,000 to 10,000 IU) or use GnRH preparations.

Metritis
Inflammation of metrium and pus form, no persistent CL, cervix is partially open.

Pyometra
It is due to infection, damage to endometrium, PGs not released and CL persist, cervix is closed.

Infection of Uterus at Open Period
Predisposing factors are unhygienic mating, ascending infection, wrong time insemination and other malpractices.

Types:
Three categories based on exudation, load of infection.

i) Endometritis
It is of three types;

c) **1st degree endometritis:**
Inflammation changes occur, mucus + pus in estrus period, most infection occur in this period, uterus less hard.
Dx: At the time of insemination
Rx: Lugol's iodine is not given in pus condition but if 1st degree becomes chronic and wall becomes thick then lugol's iodine can be given.
Post A.I. single antibiotic non irritating inj can be given.

d) **2nd degree endometritis:**
Mucopurulent discharge even after estrus period, swelling of uterus is more resembling a pregnant (1- 1 ½ month) uterus, uterine wall thickened and swollen.
Rx: Antibiotic given for 7 days, Rest for a cycle, then Lugol's iodine can be given after 10-15 days to generate new endometrium, endometrium has secretory function. Antibiotic @ 40-50 ml given I/U in separate horns (half + half) – Streptomycin, Oxytetracycline may be used for this purpose.

e) **3rd degree endometritis:**
Uterus size increased like 2 to 3 months pregnancy, cervix is closed, pyometra, persistent CL.
Rx: PGF2 alpha given for luteolysis of persistent CL. First E_2 (stilboestrol) given for flushing @ 1ml in buffalo -- > make 50 ml solution and given intrauterine.

Important Points:
- Calving interval in buffalo is more than cow which is 470 days while it is 365 days in cow.
- 1 cm size graffian follicle going to ovulate
- 1 cc = 1 ml = 10 IU

Infertility
Temporary failure of reproductive efficiency due to any abnormality e.g. endometritis, COD

Sterility

Absolute loss of reproductive ability in male or female e.g. Bilateral hypoplasia (congenital), Fallopian tube blockade, ovario-bursal adhesion.

Fertility
Ability to conceive, to carry viable fetus. By normal calving interval, calving rate, we measure the fertility.

Freemartin
In case of Freemartin, ovum contains both ovarian and testicular tissue. Freemartin is a classical example of intersex, in cattle when co-twin produced -- > male develop normal while female does not.

Salpingitis
Inflammation of fallopian tube

Endometritis
Uterine mucosa is involved; most common cause in open period.

Metritis
When entire thickness of uterus is involved (uterine mucosa + myometrium)

Perimetritis:
When serosa is also involved

Parametritis
Adjacent tissue + uterus is involved in inflammatory process.

Synchronization
Causing animals to be in heat at the same time. It is done by two methods;

(i) Termination of Functional CL:
Use following drugs; Lutalyse @ 5 ml / animal, Estromate @ 2ml / animal, Dalmazine @ 2 ml IM, Dinoprost (PGF2 alpha0

(ii) P_4- containing Devices:
These are used which block the release of gonadotropins (GnRH and FSH, LH) for 10-14 days. When progesterone is spontaneously removed the gonadotropins are released in more amount and cause ovarian rebounce.
Devices: PRID , CIDR – Animals comes to heat after 2-3 days after removal.

Methods of Estrus Detection
(i) Visual observation
(ii) K-Mar heat mount patch
Capsules having dye in it are placed on rump of animal, when animal is jumped by other animal, it rupture and impart color to back of the animal.
(iii) Putting of yellow mark on back of animal
Color is rubbed off when animal is jumped by other animal
(iv) Use of teaser bull : penis deviated
(v) Chin ball: can be used on bulls, when it jumps it colours the hook of female.
(vi) Pedometer:

When animal in heat, it travel more (2-4 times), activity is observed through this device.

(vii) Trained dogs: doing their job by smelling pheromones

(viii) Use of close circuit cameras

(ix) Detection of hormones:
Progesterone concentration decreased in milk during heat. It should be < 5 ng for heat. P4 conc. is also used for early pregnancy diagnosis.

Misconception and Abortion

24-48 hrs --- > 40-30 mg DES (Diethylstilboestrol) or 4-8 mg Estradiol
2- 7 days --- > oxytocin @ 100- 200 IU, IM
After development of CL , we can give PGF2 alpha, it causes regression of CL.

1- 5 month --- > PGF2 alpha
2- 6-8 month --- > PGF2 alpha + Corticosteroid (Dexamethasone)

After 5 month, PG for CL and Dexa for placental source of progesterone is destroyed because at that time, animal has two sources of P4.

Procreation

Creation of new individual from existing one.

Early Embryonic Death:

Mostly occur between 8-19 days after mating

Factors:

(i) Nutrition
(ii) Age
(iii) Cytogenic abnormalities i.e. chromosomal abnormalities.
(iv) Immunological factors: embryo is considered as foreign body. Abortion occur due to not developing immunosuppression.
(v) Environment of uterus:
(vi) Hormonal imbalance
(vii) Time of A.I. and Sire Infertility

Important Note:

In case of hydroallantoic placenta is affected but in hydroamnios, fetus is affected.

Causes of Abortion

1- Non-infectious i.e. Genetic (Chromosomal abnormalities)
2- Infectious --- > Different diseases
3- Nutritional --- > Starvation, Deficiency of vit. A, E, D, selenium, iodine. Toxication of plants and weeds.
4- Hormonal imbalance: ---- > P4 defficiency, E2 increased, Costricosteroids
5- Physical Causes:
    a) Rectal palpation
    b) Transportation
    c) Making animal to run
    d) Major surgery
    e) Hyperthermia
    f) Allergies
    g) Shock

BACTERIAL DISEASES WHICH CAUSE ABORTION

Brucellosis

Contagious abortion

Time of abortion:

Abortion occur in second half of pregnancy.

Clinical findings:

There is placentitis, retention of fetal membranes after abortion, uterine atonicity causes secondary bacterial infection.

Brucellosis causes infertility by introduction of infection from infected bull (bacteria resides in testicles, epididymus, seminal vesicles).

Treatment:

Vaccination, 4-8 mon calf should be vaccinated with Brucella 51 strain vaccine.

Trichomoniasis

It is venereal disease which is transmitted by coitus of infected bull; remains carrier throughout the life but cow recovers spontaneously after infection.

Infection is characterized by:

(i) Low pregnancy rate
(ii) Mucopurulent vulvular discharge
(iii) Early abortion
(iv) Pyometra
(v) Edometritis
(vi) Vaginitis

Visible abortion occur at 2 to 4 months of gestation.

Treatment:

Metronidazole is best choice for treatment.

Vibrioisis

Bulls remain permanently infected.

Infertility, increased no. of services per conception, early embryonic loss/mortality

Disease spread through coitus or improperly handled semen.

Clinical findings:

Abortion is less common (occasionally occur). Organism is found in female genital tract, fetus, placenta, prepuce and semen.

After 13 weeks, local immunity is developed.

Diagnosis:

Agglutination test

Treatment:

Streptomycin at dose rate 25 mg/kg, Dihydrostreptomycin also gives good results.

Leptospirosis

Caused by L. Pomona, L. canicola, L. icterohemorrhagica

There is elevated body temperature, fetal death, abortion, still birth and birth of weak calf.

Increased fever with icterus , hemoglobinurea. In some herds, abortion occurs after "leptospira mastitis".

Transmission is through mucus membrane, abraded skin and urine of infected cattle.

Treatment

Vaccination of all pregnant animals. Dihydrostreptomycin @ 25 mg/kg is effective.

VIRAL DISEASES WHICH CAUSE ABORTION

Bovine Viral Diarrhea (BVD)

Caused by Pestivirus of Family Flaviviridae. It causes abortion and fertility in the animals.
Infection can be characterized by pyrexia, leucopenia, viremia, watery diarrhea, buccal ulcers, nasal discharge.

Effect of reproduction:

Venereal transmission, and Transplacental infection
There may be abortion or mummification. Transmission is through oculo-nasal discharge, saliva, urine and feces.

Treatment and Control:

Extensive culling is recommended.

Infectious Bovine Rhinotracheitis (IBR)

Caused by bovine herpes virus (BHV)
It causes acute respiratory disease with conjunctivitis. It causes infectious pustular vulvovaginitis, abortion and infertility. Infection transmitted venereally.
Sweling of vulva -- > congested -- > vesicles -- > pustules -- > ulcers formation and release of muco-purulent discharge.
Similar lesions are found on penile integument and perpetual mucosa and prepitual discharge.
Abortion occurs in late pregnancy.

Treatment:

Amolient creams on vulva and prepuce.

IMPORTANT TERMINOLOGY

Gynecology

It is a branch of science which deals with female reproduction during non-pregnant period.

Andrology

It covers physiological and pathological aspects of male reproduction (word “Andrology” is derived from androgens).

Theriogenology

It is the branch of veterinary medicine which covers all aspects of male and female reproduction. Dr. Bartlett introduced this term for the first time.

Dystokia

It means “Difficult birth”

Eutokia

When delivery of fetus is normal and spontaneous

Primiparous

Animal giving birth to young one for first time

Multiparous
Animal going to parturite 2nd or subsequent delivery

Nulliparous:
Female which yet has not given birth to any young one.

Causes of Dystokia
1. **Maternal**
   (i) Uterus: There may be:
      a) Primary uterine inertia
      b) Secondary uterine inertia
      c) Rupture of uterus
      d) Torsion of uterus
   (ii) Cervix: There may be extensive fibrosis
   (iii) Vagina: Young age, Any tumor, injury or fibrosis
2. **Fetal**
   (i) Oversize
   (ii) Disposition

To treat uterine inertia: we inject Ca- boronate + OT, 20 IU if position of fetus is right
Schaffer's method of rotation is used to correct the torsion.
Schaffer's plank dimension: 15 feet long, 1 feet wide and 2 inch thick – wooden plank

Prolapse
It may be
i) Vaginal prolapse ii) Vagino-cervical prolapse iii) Uterine prolapse
For correction: we can use:
1% solution of $KMnO_4$ for antiseptic wash, Apply cream like Kenadex, it contains Neomycin + Dexamethasone, Replacement of mass, OT injection given after replacement about 50 ml, Then Use Truss for prevention
Give pain killer (Diclofenic sodium) and antibiotics

Torsion
"Rotation of the uterus on its long axis with twisting of anterior vagina"
Uterine torsion is the complication of 1st stage of labor or early 2nd stage of labor.

Causes:
(h) Instability of bovine uterus which results from greater curvature of the organ being dorsal and the uterus being disposed anteriorly to its suspension of broad ligament.
(i) Incordinate fetal movement in which fetus try to adjust itself to its normal posture in response to myometrial contraction.
(j) Uterine instability (180 degree).
(k) Frequent sitting and standing behavior of water buffalo
(l) Jumping of buffalo/cow

Types:
1. **Right-sided torsion:**
   Right ligament moves downward
2. **Left-side torsion:**
   Left ligament moves downward

Anatomical Structures:

Oviduct:
It has three parts; a) Infundibulum b) Ampula c) Isthmus

Uterus:
It has three layers; i) Endometrium b) Myometrium c) Serosa

Placentome:
Cruncle (from uterus) + Cotyledon (from placenta) + Villi

Cervix:
Cervical rings varies from 2-5

Broad Ligament

It consists of following parts:

a) Mesosalpinx: Part of B.L. which is attached or support the fallopian tube
b) Mesometrium: Part of B.L. which supports the uterus (especially horns and body)
c) Mesovarian: Part of B.L. which supports the ovaries.
d) Inter-cornual: It is present between the horns

Pregnancy Diagnosis by Rectal Palpation

1) Asymmetry of horns
2) Fluctuation of pregnant horn; At day 30, the quantity of fluid is 30-60 ml
3) Conceptus (embryo): On day 30, conceptus can be felt, it ranges from 0.8 to 1 cm
4) Fetal Membranes: 3 distinct membranes (from outside)
   i) Chorion ii) Allantois c) Amnion

Placentomes
Placentomes are more prominent at the base of the horn. These are present throughout the uterus in 4 rows; 2 dorsal and 2 ventral.

Fetal Ballottement
Strike the horn, the fetus will strike back your hand.

Feeling of Freemitus
Feeling of buzzing bee sound on uterine artery at 4-5 mon of pregnancy.

Teratology
Study of developmental defects of the growing fetus

Obstetrical Instruments

For Respulsion and Rotation

(i) William's crutch repeller
(ii) Binz's repeller
(iii) Fatal rotator or Uterine detorsion rod

For Traction

(iv) Cords and bands
(v) Handles and chains
(vi) Hooks (i.e. pointed and blunt)
(vii) Krey's hook

(viii) Forceps

For Sectioning

(ix) Obstetrical knives
(x) Obstetrical spatula
(xi) Obstetrical chisel
(xii) Obstetrical hooks
(xiii) Fetotome

Size of Fetus

Age of fetus	Size (resemblance)
2 month	Mouse
3 month	Rat
4 month	Small cat
5 month	Large cat
6 month	Beagle dog
7 month to onward	Parts of the fetus may be palpated

Fetal Membrane Slip Test

Time to perform	Result
32 days	Small thread in 1 horn
45 days	Small strings in 1 horn
60 days	Strings in both horns
70 days	Large strings in both horns

Size of Placentomes

Gestation	Size of placentome (cm)	Resemblance
75 days	1 – 1.5	Pea size
100 days	1.5 – 2.5	Dime
115 days	2.5 – 3.0	Nickle
125 days	3.0 – 4.0	Quarter
150 days	4.0 – 5.0	Half dollar
180 days	5.0 – 6.0	Silver dollar

Palpable structure during different stages of pregnancy

Stage (day)	Ut. Position	Ut. Diameter (cm)	Palpable structures
35 – 40	Pelvic floor	Slightly enlarged	Uterine asymmetry, +ve fetal membrane slip test
45 -50	Pelvic floor	5.0 – 6.5	Same as above
60	Pelvis / abd	6.5 – 7.0	Same as above
90	Abdomen	8.0 – 10.0	Small placentomes, fetus
120	Abdomen	12.0	Samll placentomes, fetus, freemitis
150	Abdomen	18.0	Fetus, freemitis

Clinical Use of Important Reproductive Hormones

GnRH

(For release of FSH and LH)

Buserelin @ 10-20 g IM [Dalmerilin]

Indications:

a) Follicular cyst
b) Acyclicity
c) Anovulation

PMSG/eCG

(FSH-like action)
Inj. Folligon @ 1500-3000 IU
Indication:

a) Superovulation in embryo transfer

hCG/LH

Stimulates follicular maturation and leutinization
Physex Leo @ 1500-3000 IU I/M
Indications:

a) Anovulation
b) Ovarian cysts
c) Repeat breeder

Oxytocin

Oxytocin @ 10 IU I/M
Indications:

a) Milk let down
b) Myometrial contraction during parturition and post-parturition

PGF-2α

Luteolytic effect
Dinoprost @ 25-35 mg IM
Indications:

a) Induction of parturition
b) Induction of abortion and mummified fetus
c) Treatment of pyometra
d) Treatment of endometritis
e) Ovarian cyst

Clinical Use of Reproductive Hormones

Hormones are organic physiological substances. All reproductive processes are driven by hormones.
Hormone:
Hormone is a chemical substance that regulates certain activity of its target tissue (target is specific tissue which has receptors for the effect of the hormone).
Receptor:
Receptor is a special molecule present on the cell that binds with hormone to bring the required effect of the hormone.
Hormones are organic physiological substances. All reproductive processes are driven by hormones. When problem is there in the effect of hormone function then it also indicates that the problem may lie due to the number of receptors present at target site.

GnRH (Gonadotropin Releasing Hormone)

- GnRH is the mother reproductive hormone. It is a deca-peptide hormone.
- It is secreted from hypothalamus which is 1/300 part of the brain. It is the part of *diencephalon* present at the base of the brain.
- Hypothalamus has three areas: a) Preoptic nucleus, b) Suprachiasmatic nucleus (SCN), c) Anterior hypothalamic area (AHA).
- Hypothalamus is made up of neurons, secretion occur from cluster of cell bodies and gonadotrops in the pituitary are the target cells.
- It controls hunger, anger, emotions and sexual process and pleasure.

Factors which STIMULATE GnRH secretions

These factors can be divided into two categories, viz.: External or environmental and Internal or endogenous.

External Factors:

- Good balanced nutrition
- Viewing sexually attractive individual of opposite sex
- Weather (pleasant) especially in seasonal breeders. Long day is favourable for mare. Short day is favourable for sheep.
- Favourable, comfortable and stress free environment.

Internal Factors:

- Epinephrine & Nor-epinephrine.
- Melatonin favours the release of GnRH
- Coitus in Cat (physical stimulation to vagina)
- In cats and camels the sexual stimulation favors the release of GnRH as they are induced ovulators.
- ↓↓↓ Progesterone (P_4) and ↑↑↑ Estrogen (E_2) in acyclic females.
- Sight and Hearing of sexually attractive individuals. (especially for males)
- Pheromones favor the release of GnRH.

Factors which SUPPRESS GnRH secretions:

External Factors:

- Stress and Depression
- Starvation
- Prolonged sickness and Acute pain

Internal Factors:

- *Prolactin* (a hormone) suppress the secretion of GnRH.
- *Opoids* i.e. β-endorphins, secreted while suckling, thus suppress the release of GnRH
- ↑↑↑ *Progesterone* (P_4) will lead to low *GnRH* production.
- Low Estrogen (*estradiol 17β*) will lead to low production of *GnRH*. *Estradiol 17β* is needed for animal to be in heat.

Clinical Uses of GnRH

Managemental Uses of GnRH

- To enhance puberty in pre-pubertal age heifers. (To bring puberty earlier).
- To induce cyclicity in post-pubertal age heifers, if ovaries are of normal size.
- To induce cyclicity in postpartum females or early ovarian rebounce in postpartum females.
- To minimize the incidence of follicular cysts in postpartum females.

In high yielder cows, incidence of follicular cysts is high in postpartum period; due to low LH secretion. So all postpartum females must receive single shot pf GnRH 20 days after parturition.

Follicle on ovary ---> ↑ estrogen ---> LH will release upon GnRH stimulation.
No follicle on ovary ---- > ↓ estrogen --- > FSH will release upon GnRH stimulation

- To improve conception rate, give a single shot of GnRH at the time of AI. It will cause release of LH surge and ovulation will occur at time, so improve the conception rate. There is about 5-10 % increase in conception rate.
- To improve pregnancy rate, give a single shot of GnRH 10-12 days post-AI. It will cause release of LH which ultimately acts on luteal cells of CL in order to stimulate the activity of CL for progesterone release.
- It is used in heat synchronization regime.

Clinical Uses of GnRH

- To treat ovarian follicular cyst
- To curtail the prolonged heat period in mare. GnRH will cause release of LH, thus ovulation will occur. For this purpose, it is injected at 5^{th} day of heat (estrus).
- To curtail the prolonged proestrus in bitch. In proestrus, bitch discharged blood out of vulva, so heat comes when blood discharge from vulva stops and female start accepting the male. Proestrus period in bitch is normally 10-12 days. In bitch, certain level of progesterone is also needed to come in heat, so inject GnRH after 10 days of proestrus, it will cause release of LH which ultimately luteinize the follicular cells and start releasing progesterone (Normally luteinization begins before ovulation in bitch).
- To treat the cases of delayed ovulation; because of property of GnRH to release bulk amount of LH hormone. Fertlization failure is because of delayed ovulation, so a single shot of GnRH at the time of AI or service will solve this problem and increase the fertilization rate.

Products of GnRH

These are categorized into two types:

i) Natural GnRH
ii) Synthetic GnRH

Natural GnRH Preparations

It is very difficult to get natural GnRH because of its so short half life. No clinical use has been reported, synthetic preparations are only available.

Synthetic GnRH Preparations

>> **Gonadrolin**:

Its structure is similar to that of natural GnRH. It is available with different trade names in the market: Cystorelin® and Factel® [50 μg/ml]

>> **GnRH analogues**:

Such preparations are: Buserilin [Receptal® 4 µg/ml by Hoest; Conceptal® 4 µg/ml by Star], Lecirelin [Dalmarelin® 25 µg/ml]

Dose rate:
>> Gonadrolin:
Normal dose(for post AI or service, and follicular growth etc.): 250 µg/cow IM
Dose for treatment of follicular cyst: 500 µg/ml IM
>> Buserilin:
Normal dose (for post AI or service and follicular growth etc.): 20 µg/cow IM
Dose for treatment of follicular cyst: 40 µg/cow IM
>> Lecirelin:
Normal dose(for post AI or service and follicular growth etc.): 50 µg/cow IM
Dose for treatment of follicular cyst: 100 µg/cow IM

Precaution:
- You must wait for 8-10 days after treatment. If no effect, then repeat it.
- You also do attention on nutrition of animal from 1 month before treatment. Protein and mineral mixtures must be provided to animal in their ration.
- Animal with poor body condition usually does not respond optimally to hormonal treatment.

Gonadotropins

These are of two types:
i) Pituitary gonadotropins: FSH & LH
ii) Placental gonadotropins: hCG & eCG

FSH, LH, eCG and hCG are gonadotropic hormones. These are members of family glycoprotein.These hormones are made up of alpha and beta carbohydrates molecule chains. These two chains are linked by covalent bonds. Alpha subunit is same in all these four hormones having 92 amino acids but beta subunit is different which is responsible for biological function. But alpha is also needed. Without a subunit the structure is incomplete and can not perform its function.

Half life of Gonadotropins:

Pituitary gonadotropins:	FSH:	2 hours	LH:	2 hours
Placental gonadotropins:	eCG:	>3 days	hCG:	>12 hours

Comparative Features of pituitary and placental gonadotropins

Pituitary Gonadotropins (FSH, LH)	Placental Gonadotropins (eCG, hCG)
Less half life	Long half life
Costly	Cheap
Low CH_2O contents	High CH_2O contents

FSH:
Follicotopin
Growth of follicle from secondary to tertiary follicle
It plays major role in synthesis of estradiole
Target is ovary
Source of natural FSH is pituitary of porcine or bovine. It is also produced now a days through genetic engineering by inserting FSH producing gene into the E.coli organism.

LH:
Final growth of follicle, ovulation, formation of CL, maintenance of CL. Target is ovary and CL. Source of natural LH is porcine or bovine pituitary.

eCG/PMSG:
Its action is like FSH in all animals except in mare where its action is LH like. It is released in mare at 40 day pregnancy by endometrial cups (specific structure formed by trophoblast cells of embryo) by day 70 of pregnancy PMSG reaches to peak level i.e. 100 IU per ml of plasma and this peak persist up to 3rd month. During 4th month capacity of production reduces gradually and in 5th month it stops. No PMSG as endometrial cups are destroyed (destruction start in 4th but completed in 5th month). Fetus is 50% foreign for mother. In uterus local immune system becomes weak that it does not attack fetus. Pg weakens local immune system. Maternal system recognizes endometrial cups, kill them gradually, upto 5th month all dead no PMSG.

hCG:
Acton is LH like. Embryo starts production of HCG by day 10th of pregnancy because it implements with endometrium by that time. The outermost cells (trophoblast) start producing hCG. At day 90 the peak production of hCG is seen. At 5th month its production decreases but low level 22 IU per ml of plasma of hCG continues to be produced in it till end of pregnancy. It is leuteolytic hormone. Embryo is responsible for its own life by producing the sufficient level of the hCG.
PMSG is a bigger molecule. It can not pass through kidney so can not pass through the urine and can not be detected. So blood is used to extract the PMSG.
hCG will pass through kidney in the urine and can be separated from urine of the pregnant human female.

Clinical Use of FSH:

- Infertility due to failure of follicular growth
- It is used for superovulation

Dose of FSH:
Available preparations: FSH-P®, Follitropin®
Follicular growth: 5 mg IM, 12 hourly for 2 days
For superovulation: 5 mg IM, 12 hourly for 4-5 days

Clinical Use of PMSG:

- Infertility due to failure of follicular growth
- It is used for superovulation

Dose of PMSG:
Available preparations: Gestyl ® (by Organon), Folligon ®, Fostim®
Follicular growth: 1000 IU, IM
For superovulation: 2500-3000 IU, IM once in a cow

Clinical Use of LH:

- For treatment of follicular cyst
- For treatment of delayed ovulation

Dose of LH:
Available preparation: Lutropin®
For delayed ovulation: 12.5 mg, IM

For treatment of follicular cyst: 25 mg, IM

Clinical Use of hCG:

- For treatment of follicular cyst
- For treatment of delayed ovulation
- Used in the Rig test

Dose of hCG:
Available preparations: Pregnyl® (by Organon), IVF-C® (by LG)
For delayed ovulation: 5000 IU, IV
For follicular cyst: 10,000 IU, IV

Rig Test

Purpose: To confirm the suspected cases of cryptorchidsm
Action: hCG simulate the production of testosterone in blood
Take blood sample (Sample A) 30 min before giving the injection of hCG.
Then give a challenge dose of hCG i.e. 10,000 IU
Collect the blood sample (Sample B) again 30 min after giving the injection.
Compare the both samples (A& B) for the level of testosterone.
Result: High rise in testosterone level in descendant testes but no difference is seen in cryptorchidsm.
For testicular descent in pups: give a dose of 500 IU per pup, 2 times in a week for 4 week.

Prostaglandins

It is group of hormone like substances, derived from fatty acids mainly from arechidonic acid (essential FA). Arechidonic acid is 20 C polyunsaturated fatty acids with a cyclopentane ring in its structure. There are different classes of prostaglandins depending upon its structure. Mostly fatty acids are involved in inflammatory process. They perform functions as in blood pressure, reproductive organ, respiratory system, digestive system. Prostaglandins are ubiquitous in nature (all over the body). Histamine is stored as pre form in the body but prostaglandin is synthesized when it is needed on the basis of enzyme involved.
First prostaglandin was found in human semen by Swedish physiologist Von Euler in early 1930s (1931). He wanted to know effect of semen on uterus (mice uterus was used that showed contraction by semen effect). Histamine and ACH were two substances known that caused smooth muscle contraction but human semen does not have these two. So later he found the protate gland that causes contraction, present in the seminal plasma. In 1934 prostaglandin name was given to it. In 1959 Eliasson gave idea that prostaglandin comes from seminal vesicle not prostate gland and causes myometric contraction. Similar substance is released by many tissues.
There are different types of prostaglandins as A, B, D, E, F, I. E and F are important in reproduction. In male it may help in ejaculation of semen form male duct system. During 1960s animal scientists came to know that old CL regresses before new cycle starts. In 1969, Niswander et all found that in sheep the prostaglandin of endometrial origin causes cyclic regression of the CL. In 1972, in horses same thing found to kill CL. So prostaglandin of endometrial origin is luteolytic.
Function:

- Cyclic regression of CL. Due to strong vasoconstriction blood supply is reduced to CL and physical death of CL occurs. (at 17-18 day of cycle abundant PGF2α is released and drained by uteroovarian veins, directly passes from vein to artery and

regress CL without entering general circulation. When we take blood from jugular vein, it does not contain prostaglandin).

- PGE2α is luteotropic, favours the growth of CL. It is vasodilator and increases blood supply
- Helps in transmission of semen in duct system
- In male prostaglandin causes smooth muscle contraction for ejaculation of semen.
- Involved in ovulation. It is produced in follicle causing contraction of myoepithelial cells of follicular wall. (Indomethacien is substance injected into follicle, ineffective enzyme, no PGF2α and no ovulation. So PGF2α is important for ovulation). Increased the pressure of follicle fluid, thinning of wall and contraction of wall leads to rupturing of follicle. (In endometrium release of PGF2 is activated by estrogen and oxytocin).
- At the time of parturition it softens the cervix and cervix is easily is expandable.
- Involved in first phase of parturition. PGF2α produced in placentome under the effect of increased level of estrogen.
- Fetal placental expulsion is also by the role of PGF2 α. At the fisrt stage labour it reaches its maximum concentration then its production decreases but contractions remain for placental expulsion and lochial discharge (It is blood mixed discharge from uterus that comes from 10-15 days after parturition).

Sources of PGF2α:

In female endometrium
Fetoplacental unit during parturition
Myometrium (parturition)
Grafian follicle (during ovulation)

Uses:

All its uses are based on its two primary effects/uses as the regression of CL and myomerial contraction. So uses are

- Treatment of acyclic animal due to persistent CL
- Treatment of luteal cyst
- Estrus synchronization (2 injections of PGF2 11 days apart)
- Induction of parturition. We use corticosteroids also along with it to finish all sources of progesterone.
- Termination of pathological pregnancies (as fetal mummification, fetal maceration, hydroamnios, aydroallontois)
- Termination of unwanted pregnancies. CL remains for 5-6 days insensitive to PGF2α, so give PGF2α after 7 days of ovulation to avoid pregnancy. Response of CL to PGF2α is better for 10-11 days aged CL than 7-8 days aged. Because receptors are not much effective on CL. Upto 150 days alone PGF2α can be used but after that corticosteroids are also used because placenta is also the source of progesterone and both CL and placenta should be regressed.
- Prevention of pregnancy. After day 10 the superficial attachment occurs but after 22 when attachment has occurred then it is difficult to remove because now here the firm contact has been established.
- For the treatment of pyometra because CL persists in this problem; so the CL is regressed by PGF2α, cervix is relaxed and E2 is then given.
- In mild or first degree endometritis - uterus is soft, cycle is normal, history of repeat breeding; so check for small flakes, so give some PGF2α.
- In silent estrous. Estrous without behavioral signs of estrous or weak heat signs,
- In reported anestrus - animal not coming heat according to owner/failure to notice signs or male in herd is unable to detect estrus also called subestrus; give PGF2α after

3 days animal will show sign. Progesterone assay can be carried out to know the presence of functional CL. If functional CL is present, give luteolytic dose. Luteolytic dose can also be given 72 hours before insemination. Animal comes into heat 48-120 hours. More than 70% comes in 72-96 hours, 30% in 48 hours and the later in 96 hours

Brands of PGF2α:

Dinprost- is generic name of synthetic PGF2α. Luteolytic dose in cow is 25 mg I/M (lutalyse, 5 ml contains 25 mg). In mare *5 mg or 1 ml*

PGF2α Analogues:

Cloprostenol (500 µg IM or ½ mg or 2 ml) - estromate (ICI), cyclomate (star), prostenol (Selmor)

Fluprostenol - equimate (1 ml, 250 µg)

Fenprostenol

Luprestenol

D-clorprostenol (being dextrorotatory) - Delmazine its lutalytic dose is 150 µg or 0.15mg in cow and 75 µg in mare. (2 ml in cattle, 1 ml in mare)

Mare should be administered PGF2α under supervision of doctor. Diarrhea, sweating, increased respiration may occur within 20 minutes. We can use spasmolytic in advance or after that if show any complication in mare. PGF2 α is strong bronchocontractor. In bitch, PGF2α is used in case of pyometra for 2-3 days. As leuteolytic it is not effective in bitch.

Estrogen

Chemically it is steroid (having 4 ringed 17 C structure). It is female sex hormone.

Cholesterol (27 C) → Progestin (P_4) (21 C) → androgens (19 C) (male sex hormone) → estrogen (18 C)

All steroid hormones are derived from the cholesterol which is a 27 C molecule. In stallion normally large amount of estrogen is secreted in urine which is converted from testosterone. It is released by grafian follicle of ovary and cortex of adrenal gland. In some male dogs the estrogen may be produced. Here the sertoli cell tumor is the cause that results in high estrogen level and other dog will attract them. E2 is also produced in brain and adipose tissue. In placenta more amount of E1 is produced and it goes to featus (mytogenic) and help in fetal growth. When puberty is around to occur then increased reproductive tract development due to E2. In sheep and cow specially seen that in brain there is centre on which E2 works. Priming of progesterone before E2 work on brain is necessary for behavioral estrus. That is why silent estrus is seen first time.

E1 (estrone), E2 (estradiol), E3 (estriol), other are equilin and equilinium (in mare), most important is E2 estradiol. These are steroidal estrogens. Plants have non steroidal estrogen.

Functions:

- Androgens, if in high concentration, bring secondary sex characters prominent in the female.
- In fetus responsible for neural development which is different from male. LH surge release centre in brain is only in female and this is because of neural development difference.
- E2 is responsible for secondary sex characteristics
- E2 causes behavioral heat signs in all animals
- E2 causes release of pre ovulatory surge of LH
- E2 softens the cervix
- Prime uterus for the oxytocin and PGF2α

- Brings more blood to reproductive system, increases tonicity of uterus at the time of heat. So uterus becomes more resistant to contamination or infection; leads to growth of uterus.
- Pelvic ligament dilation
- Mammary gland development
- Decrease the chances of infection
- During pregnancy, E1 (estrone) level increases, so indicate pregnancy.
- At the time of estrus it causes increase blood flow to uterine lumen, promotes the growth of endometrium, favors production of mucous through mucous glands, causes relaxation of cervix, increases water content in reproductive tract, increases tonicity of myometrium (uterine contractability increases) and increases capillary bed of uterine wall. Minute capillaries develop in proestrus and break of capillaries in estrus (some animals show post estrus bleeding).
- At the time of parturition it favours or stimulates the secretion of PGF2α, increases contractability of uterus and softening of cervix and relaxation of ligaments.

Preparations:

E2 (estradiol) or E2 -17 β. It has hydroxyl group. Its forms as ester include Benzoat, valerate, cypionate, propionate, dipropionate.

E2 - 17 β 1 mg per ml

Veterinary product is agofollin (E2 diprpionate) (1 mg/ml)

DES diethylestilbesterol (non steroid estrogen) (10 mg/ml) (I/M or Intrauterine infusions are given). It is 10 times less potent than estradiol.

E2-17 β and DES are thick and oily so use needle of bigger guage.

Tablets: ethynil estradiol 50 µg, 100 µg, 1 mg

E2 is high at proestrus and beginning of heat. E2 in heat is 30 pg per ml of plasma (sufficient to cause heat).

Clinical Uses:

- Prevention of pregnancy: in cow E2-17 β 4-8 mg per animal, DES 40-80 mg per animal. In cow within 24-48 hours post mating. In bitch 3-7 days post mating three injections of E2-17 β 300-500 µg per animal or 10 µg per Kg. Half to one mg DES in bitch. It will slow down the movement of fertilized egg or embryo to uterus from fallopian tube by causing swelling and will not let the embryo to come into uterus at proper time. E2 is not preferred if PGF2α is available. Buffalo are more sensitive to estrogen. In buffalo it produces more side effects as low milk yield, excessive relaxation of pelvic ligament which may lead to vaginal prolapse, pronounced heat signs. There is ½ to ¾ less milk. It is regained within 5-7 days.
- Termination of pregnancies: Success rate is more upto 5 month. DES 100-150 mg per cow and 5-10 days post injection abortion occurs.
- In male dogs the treatment of prostate hyperplasia. In this condition dog feels difficulty in urination. Tablets ethynil (estradiol acetate) 50 µg-1mg tablets, daily 1 mg or 100 µg is given. So dogs are hypersexual and prostate gland grows due to testosterone effect so the estradiol will block the site of the testosterone to block its effect on gland. Surgical treatment is better.
- Intra uterine infusion use in case of the pyometra. After PGF2α is used at day one. Then at day three 2-3 infusions after 48 hours (1 ml or 10 mg DES + 30-40 ml of distilled water) then give antibiotics for 5-7 days consecutively.
- *Non antibiotic treatment of endometritis ½ to 1 ml infusion. But PGF2α is drug of choice*
- It may help in the treatment of torsion to avoid twist in fresh cases of less degree for purpose of cervical dilation. If old case then no response because of low blood supply

and tissue devitalized. After rolling open the cervix by giving estrogen. For cervical dilation 50 mg i/m after correction of torsion. After 12 hours there will be releasing.

- In heifers some times cervix is short. So difficult to give antibiotic infusion. So give infusion of 5 mg DES.
- E2 Anabolic Effect: Zeranol (capsule like) has estrogen like effect implanted in ear for 3 months in cow and steer and give weight gain effect. Zeranol is produced by a fungus.
  Ralgro (salt is zeranol) has anabolic effect in cattle, sheep, goat has 10-15% more weight gain than the untreated animals.

In acute puerperal metritis (fever, off feed) estridol is contraindicated. Because blood supply increases by giving estradiol and it causes toxin absorption through this area

Progesterone

It is steroid hormone. Its main source is CL. Before puberty it comes from adrenal cortex. Its effects are seen after puberty. When animal becomes cyclic, its production starts. Just after ovulation its concentration gradually increases. In cow ovulation occurs at day two. Then becomes carpus hemorrhagic and ruptured follicle is converted into CL and complete CL after 4 days and at day 5 CL is embedded in ovarian tissue and is soft. Normally 0.2-0.5 ng/ml of plasma on heat day. At day 17-18 CL is regressing and progesterone concentration starts decreasing. Cyclic cow on day 17 has more than or equal to 5 ng/ml of plasma in cyclic cow.

PGF2α when comes then CL start decreasing abruptly. Animal having high concentration of progesterone at estrus have not good conception rate. It affects the transport of gametes.. At day 5 there is more than or equal to 2 ng/ml of plasma. In cattle buffalo maximum concentration of progesterone is at day 10-12.

Developing CL 2-5 day
Growing CL 6-10/11 day or young CL (2-5 ng progesterone)
Mature CL 10-17 day (max. progesterone >5 ng)
Regressing CL 17-18-21 day (decrease P4 < 5ng)
Regressed CL on hat day (minimum P4 < 0.5 ng)

Functions:

- Progesterone and estrogen are antagonist. They work together during gestation period. As the pregnancy advances for uterus growth estrogen is accelerating. Progesterone suppresses the heat. Estrogen is in higher concentration at the time of estrus, stimulates GnRH and causes the release of LH surge. In proestrus estrogen increasing and progesterone decreasing and it causes negative effect on GnRH.
- P_4 causes the maintenance of pregnancy, stops cyclic activity by suppressing gonadotropin release, puts negative effect on the hypothalamus and anterior pituitary and does not let the ovulation to occur. Progesterone also suppresses the heat signs. Progesterone released from the CL in non pregnant animals and in pregnant animals it also comes from placenta.
- P_4 suppresses the uterus contraction, so it maintains the pregnancy in contrast to estrogen that increases the uterus contraction.
- P_4 suppresses the local immune system response (suppresses infiltration).
- P_4 stimulates secretary activity of endometrium that helps in nourishment of early embryo as the fetus get nutrition from uterine milk (in form of nutrients).
- P_4 helps in closure of cervix and formation of the pregnancy seal (thick gummy mucus plug formed within the cervix).
- E2 forms the liquefied mucien form the thick mucine.

- During advancement of pregnancy estrogen and progesterone have synergistic effect as growth of uterus.
- It helps in maternal behaviour in females.

Clinical Uses:

- Estrus synchronization PRID, CIDR
  PRID = P_4 (1.55g) + estradiol benzoate (10 mg)
  CIDR has 1.99g P4.
- Progesterone sponges kept in vagina, held with string outside, that act as artificial CL and keep the animal under progesterone effect and suppress the gonadotrophin release. It is kept for 14 days and then when it is removed, animal comes to heat after 1-4 days. (E2 in higher doses may act as luteolytic effect on growing CL).
- PRID also causes low conception rate as the gamete transportation is adversely affected. So decided to keep it for 9 days instead of 14 days and also give a single shot of PGF2α 24 hours before the removal of devices.
- Synthetic progesterone a norgestamate is used for estrus synchronization as ear implant or injection. It preparation is sycnhromat B. it has ear implant + norgestamate injection + estradiol. Estradiol has luteolytic function and interferes with CL formation. It is kept for 9 days.
- Used for the suppression of heat in female animals. As in show animals 5-6 days before expected date of heat give allyltrenbolon (altrenogest, regumate) as a feed mixed progesterone source (2.2 mg/ml) and dose required in mare is 33 mg per mare per day for 15 days. 5-7 days after removal animal comes to heat.
- P_4 also used to get delay heat (means to postponed estrus). This can be used in synchronization of mare. (Rgumate contains allyltrebolone)
- In bitch and cat P_4 will interrupt the heat and postpone the heat. As the bitch enters in proestrus (bleeding starts) give the tablet (medroxy progesterone acetate salt. (Proestrus in bitch is 9-10 days). Dose rate is 10-20 mg daily for *four* days then give half dose (5-10 mg) for next 12 days.
- During anestrus period 5-10 mg for 40-60 days this is given. But the long term effect may cause the problem. Cystic endometrial hyperplasia will appear. This can lead to the pyometra in bitches.
- Also used as synthetic product melengestrol acetate (MGA) in feed mix for heifers (feedlot heifers) to get growth promoting effects.
  In ruminants we need N balance maintenance. In cyclic heifer it stops ovulation, the follicles will form of bigger size and release more estrogen for a longer time thus have the anabolic effect on growth.
- In human being it may act as the contraceptive

PCS - Questions

1. Which breed of goat is imported from Bangladesh?
2. Which breed of cattle in Pakistan is called “Lola” and why?
3. Buffalo show more silent heat as compared to cattle, why?
4. Why vaccine is not effective against protozoal diseases?
5. How we can maximize the nutritive value of wheat straw?
6. What is mastitis? How we can identify under microscope?
7. What are common names of BQ, PPR and Rinderpest?
8. Difference between fodder and forage?
9. What is fat percentage of buffalo and cattle milk?

10. Express the CP and TDN formulae and apparatus used for their determination?
11. What is meant by "Punjkalian"?
12. Why the colour of the buffalo is black?
13. What is difference between heat stroke and fever?
14. Why antipyretics are not effective in case of heat stroke?
15. What is meant by Black gold of Pakistan?
16. Name the tick-borne diseases?
17. What is the difference between feed efficiency and FCR?
18. Name the summer and winter forages?
19. Which feed should be used to increase fat contents of milk?
20. If Pakistan wants to import the semen, from which country it should be imported New Zealand or Australia?
21. Define hormone, enzyme and pheromone?
22. If there is an outbreak of FMD in a herd, from where sample should be taken and medium used?
23. Name the disease which is most prevalent in dairy industry?
24. What is difference between contagious and infectious disease?
25. What is difference between anthraponosis and zoonosis?
26. What is difference between hematuria and hemoglobinuria?
27. Why buffalo swim more than other animals like cattle?
28. What is difference between ewe and doe?
29. Term triple P "PPP" stands for, in reproduction?
30. Is there any increase in temperature of an animal infected with rabies-virus?
31. What is speed of rabies virus to propagate during incubation period?
32. What is difference between bellowing and wallowing?
33. In which disease, mandibular edema is more pronounced and why it occurs?
34. What is flushing?
35. How fumigation is done and what is the ratio in its composition?
36. What is omphalitis?
37. Why vaccine is not effective against mastitis?
38. What is love hormone?
39. What is the clinical use of oxytocin in male animals?
40. Why postparturient hemoglobinuria occur and what is its treatment?
41. In international ranking, what is the position of Pakistan in milk producing countries?
42. What is meant by white revolution?
43. In case of BQ (black quarter) which muscle(s) is/are more affected?
44. Where BQ occurrence is more, in hilly areas or plain areas?
45. Normal physiological body temperature of chicken?
46. How horse sleep? and what is stay apparatus?
47. Enlist dairy breeds of Goat found in Punjab?
48. Enlist dairy breeds of Cattle of Pakistan?
49. "Pak Angora" breed is developed by the cross of which breeds?
50. What is mohair?
51. How parasite harm the animal/host?
52. What are the side effects using overdose of different dewormers?
53. What would happen if antibiotics are used long time?
54. What would happen if steroids are used long time?
55. In case of pneumonia, steroid show good result, what is the reason?
56. Why tetracycline is contraindicated in cats?
57. How many serotypes of FMD are found? Which one is more common in Pakistan?

58. What is difference between cruncle and cotyledon?
59. What is "Erythritol"?
60. What is the internal temperature of AV?
61. What is the difference between Flehman's and Ferguson's reflex?
62. What are the side effects of oyxtocin use in reproduction of animals?
63. First heat of life or after parturition, in cattle/buffalo is always silent, why?
64. Why the color of the milk is white?
65. What is difference between sterile and infertile?
66. Overdose of steroids cause hardening of inflammation but normally it should be anti-inflammatory, why?
67. What are the clinical uses of magnesium sulphate in veterinary practice?
68. What is the difference between trypanosomiasis and trypanosomiosis?
69. What is the mode of action of oxyclozanide and levamisole?
70. Which part of digestive tract of horse is absent?
71. Which part of ruminant stomach is absent in camel?
72. What is vaccination schedule of buffalo and cattle?
73. Toxocara vitulorum – what is signs and symptoms, and route of transmission?
74. Site of infection; Paramphistomiasis and fascioliasis?
75. What is Monday morning disease?
76. Name the Milk-borne diseases?
77. Enlist more pronounced signs of tetanus?
78. EPG stands for?
79. PVMC stands for?
80. PCS stands for?
81. Which part of the stomach of ruminant is called true stomach and why?
82. Differentiate between secretion and excretion?
83. What are major causes of RFM (placental retention)?
84. Different period of fodder shortage in Pakistan?
85. Different precautionary measures to control ticks on farm level?
86. What you will suggest to improve dairy industry in Pakistan?
87. What is the breeding season of buffalo and cattle?
88. Define poultry?
89. What is meaning of FCR = 1.5?
90. Define medicine?
91. What is bleating?
92. What are causes of vaccine failure in field condition?
93. How many types of vaccine available, on adjuvant?
94. Name the few drugs that can be used to start/enhance the rumen motility?
95. Name the few life saving drugs?
96. Difference between anti-dote and agonist?
97. Difference between tympany and bloat?
98. Difference between fermentation and respiration?
99. What is meant by F_1 generation in breeding plan?
100. Can we vaccinate a pregnant female?
101. A calf is presented to you, showing excessive salivation and there is no temperature, what is your diagnosis?
102. BIPP stands for? and what is its use?
103. What is heifer?
104. Apparently what are differences between cattle and buffalo?
105. Common or vernacular names of Tetanus, Mastitis and Milk fever?

106. Why hemonchus contortus is called Barber pool worm?
107. Why dog keep up one hind leg during act of urination? After the age of 1 year?
108. How tie is formed during copulation of in canine (in dog)?
109. TVT stands for? What is its effect on chromosomal number?
110. Why camel always urinate with extended hind legs?
111. Define puberty?
112. Difference between estrus cycle and estrus period?
113. Define; line breeding, inbreeding and cross breeding?
114. Difference between hematoma and edema?
115. Difference between abscess and pus?
116. Define the terms; veal, white meat, beef, mutton.
117. Difference between cream, ointment and lotion?
118. What are antibiotics?
119. What are losses due to external parasites?
120. If liver of animal is damaged; what would be the signs and symptoms?
121. Difference between signs and symptoms?
122. How you will differentiate between fungal diarrhea and diarrhea in Johne's disease?
123. What is rigor mortis?
124. Why putrefaction occur in dead animals?
125. Define infection and infestation?
126. What is elective surgery?
127. What is vaccination schedule for broiler (poultry)?
128. What are five freedoms of animal in welfare point of view?
129. Define livestock?
130. What are the main problems in development of dairy industry of Pakistan?
131. Why exotic dairy breeds of cattle not perform well according to standard?
132. What are the problems faced by exotic dairy breeds in Pakistan?
133. What is the reason that some people are not ready to adopt AI technique for animals?
134. How we can stop the fungal growth in silage?
135. The big problem in poultry is "Mycotoxins" Name the two mycotoxins?
136. What is the relation between pH and fungal growth and bacterial growth?
137. Why extremities are cool in case of fever?
138. What is thawing? What is its effect on sperm life?
139. Define fever and hyperthermia?
140. What is mode of action of ivermectin and its dose?
141. Why Ivermectin is not effective against liverfluke?
142. Define Pathology?
143. What is procedure of progeny testing?
144. How you will differentiate between hematuria and hemoglobinuria?
145. Different uses of $KMNO_4$ in vet practice?
146. Normal rumen motility per min in case of cattle and goat?
147. No antibiotic is recommended in ruminant orally, why?
148. What is major difference between large intestine of bovine and equine?
149. What is colostrum and its composition?
150. What are the causes of dystockia from fetal side?
151. Define exocrine and endocrine gland with examples?
152. Why are different types of placenta in animals?
153. Enlist five cardinal signs of inflammation?
154. What is Os-cardis and Os-penis?
155. Define architis and salpingitis?

156. Name the hormone which starts reproduction (mother hormone)
157. Apparently what is the difference between sheep and goat?
158. What is gestation period in camel?
159. Define cloning.
160. In case of tetanus, what is the major issue for death of animal?
161. From where prostaglandin is secreted in buffalo/cattle?
162. Name the reservoir hosts of rabies virus (Lyssavirus). How it comes in dog?
163. In case of insecticide poisoning, is there any increase in body temperature?
164. What is gross tetany and how it occurs?
165. What is difference between regurgitation and rumination?
166. What would be the result (side effects) of overdose of different dewormers?
167. What is difference between serum and plasma?
168. Does rabbit do regurgitation?
169. Why antipyretics are not effective against hyperthermia or heat stroke?
170. Drugs contraindicated in Cat:
    Tetracycline, Chloramphenicol, Aminoglycosides
    Gresiofulvin, Amphotericin B
    Aspirin, Dipyron
    Phenylbutazone
    Acetominophen
    Opiate derivatives.

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