PHARMACY

THEORY NOTES

FOR

VETERINARY AND LIVESTOCK DEVELOPMENT DIPLOMA (1st year)

M.R.
COLLEGE OF VETERINARY SCIENCES
Estd. 2017
विद्यया विन्द्यते अमृतम्

M. R. COLLEGE OF VETERINARY SCIENCES

(Affiliated to LUVAS, Hisar) Hassanpur, Jhajjar

Helpline: 9991822929, 9050922929, 9050022929

Website: mrveterinarycollege.edu.in E-mail: mrcvsjhajjar@gmail.com

CHAPTER – 1

History and definitions

1. **Pharmacy:-** Compounding and dispensing of drugs is known as pharmacy.
2. **Drug:**- It is a substance other than food, which may be a chemical or a herb which after ingestion brings out some changes in the body.
3. **Hippocrates (460-375 BC):-** He is known as the father of medicine. According to him our body is composed of four elements blood, phelgmn, yellow bile(urine) and black bile.
4. **Theophratus(380-287 BC):**- He classified plants on the basis of their medicinal characters.
5. **Discorides:**- He was surgeon who had wrote materia medica. He described the medicinal value of 600 plants.
6. **Galen (201-131 BC):-** he described various processes of body.
7. **Von Hohenheim (1514-1544):**-
   - **i.** He studied opium.
   - **ii.** He prepared various tinctures.
   - **iii.** He is grandfather of pharmacology.
8. **Edward Jenner (1749-1823):-** He discovered small pox vaccine.
9. **William Harvey (1578-1657):-**He discovered blood circulation i.e. flow of blood in arteries and vein.
10. **Rudolf Buccheim (1820-1870):-**
    - i. He studied the effect of different drugs on human and animal body.
    - ii. He is father of pharmacology.
11. **Paul Enrlich (1913):-** He discovered chemotherapy.
12. **Pharmacy :-**compounding and dispensing of drugs .
13. **Pharmacology:**- Pharmacology is the complete knowledge of drugs and their effect on the body is called as pharmacology.
14. **Pharmacodynamics:**- It is the study of how can drugs work and affect the body.
15. **Pharmacokinetics:**- It is the study of absorption, distribution and excretion of drugs in the body.
16. **Chemotherapy:**- It is the study of those drugs which kill or step growth of pathogenic micro-organisms without any adverse effect on body.
17. **Pharmacotherapy:**- Administration of drug to the animal for treatment of various diseases is called as pharmacotherapy.

18. **Toxicology:**- Study of poisonous substances which affect the body symptoms is known as toxicology.
19. **Posology:**- Study of dose of drugs.
20. **Metrology or pharmacometrics:**- Study of weight and measures of drugs.
21. **Materiamedica(medical materials) :**- This is a book in which information about sources, physical properties, chemical properties, actions, doses, purity, uses &benefits of drugs.
22. **Therapeutics:**- It is a process of treating different diseases by using various methods.
23. **Chemicals:**- Any substance which has a fixed chemical formula is called chemicals.eg- NaCl, $MgSO_4$, H_2SO_4.
24. **Pharmacopoeia:**- This is a book which is prepared by government. This book contains list and description of drugs. This book also contains information about drug formulations in which each ingredients is added in standard quantity and concentration.

    The names of various pharmacopoeia:-

    i. Indian Pharmacopoeia (I.P.)
    ii. United State Pharmacopoeia (U.S.P.)
    iii. British Pharmacopoeia (B.P.)
    iv. British Veterinary Codex (B.Vet.C.)

 # Patents or Proprietary preparations:-These are the drugs manufactured by companies. These companies sell these drugs in the market by a “Trade name”. the trade name has to be registered with government.
Eg- Terramycin(pfizer) – oxytetracycline HCl

Note:- Father of Indian Pharmacology – Sir Col. Ram Nath Chopra

CHAPTER – 2
Therapeutics

1. **Empirical Therapeutics:-**It is the treatment of diseases with the help of experiences. In this, cause of diseases is not known. It is also not known how the drug is working or treating disease. The harmful effects of treatment is also not known eg- filling of air in the udder milk fever.
2. **Rational therapy or pharmacotherapeutics:**- In this the diseases is first diagnosed and cause of the diseases is known then specific drug to remove that cause is given Eg- in acidity, antacid is given.
3. **Chemotherapy or specific therapy:**- In this drugs are given to kill pathogenic micro-organisms or to stop their growth.eg- Sulfonamide, Tetracycline, Cefoperazone, Gentamycin, Amikacin
4. **Symptomatic therapy:-**Here diseases are treated on the basis of symptoms. Eg- pain is relieved with the help of analgesic(PCM). Symptomatic treatment should always accompany specific treatment.
5. **Expectant therapy:**- When it is expected that actual treatment of the patient will take time, some medicine is given to the patient which is not harmful. It is for physiological relief to the owner of patient. This way owner of the patient is satisfied and believes that the treatment is started eg- to give I/V glucose, give B-complex injection, Give mineral mixture.
6. **General therapy:-**This is method of treating a patient without drugs. It is of different types:-
   i. **Mechanical Therapy:-**Treatment of diseases with the help of massage or exercise.
   ii. **Physical Therapy:-**treatment of diseases with the help of heat, electricity, X-rays and radiations.
   iii. **Helio Therapy:-**Treatment of diseases with the help of sunlight.
   iv. **Hydro Therapy:-**treatment of diseases with the help of water in the form of liquid, solid or vapours.
   v. **Dietetic Therapy :-**Treatment of diseases with the help of control of feed or diet.
   vi. **Preventive Therapy:-**Diseases is prevented by use of vaccine, serum.

CHAPTER – 3
Pharmaceutical Processes & Sources of Drug

There are three sources of drug :-

1. Organic sources:- Most of drugs are obtained from organic substances.
   i. Plant source –Nuxvomica, aniseed, glycerrhiza, ginger.
   ii. Animal source – Bile salt, blood meal, bone meal eg- heparine, epi-nephrine, insulin.
2. In organic sources:- Mostly minerals ferrous sulphate, sodium bicarbonate, acetyl salicylic acid, ammonium chloride, red iodide of mercury.
3. Synthetic sources:- Synthetic medicines are modern and available in the market which are obtained from organic and in organic sources. These medicines are manufactured after long research by scientists before release in the market. This drugs are tested by pharmacologist and toxicologist in the animal and there dose standardize . If these drugs are found safe, they are visited in pharmacopoeia and then they are licensed for manufacturing in the industry.

 # Pharmaceutical processes:- drugs from natural sources can not be used as such because they may contain unwanted substances and also these drugs may cause irritation and bitter in taste. As such, these drugs need be used in very high doses. Therefore these natural drugs should be purified. Different types of method or processes are used to get active principle out of these drugs. These processes are called "Pharmaceutical Processes". These processes are as follows :-

1. **Distillation:-** this is process in which a liquid is first changed in to vapours and then these vapours are cooled to change into liquid. By this processes an impure liquid is changed into pure.eg- water containing impurities can be purified by this process and that purified water is called distilled water. This distilled water is used for dissolving drugs to prepare injections. The distilled water used for preparing injections is triple glass distilled water.
2. **Fractional distillation:-**Liquids have different boiling points. In this process impure drugs are distilled at different temperatures. In this process first of all a liquid with lowest boiling point is changed into vapours and then cooled to liquids. After that, temperature is increased and when boiling point of second liquid is reached than that second liquid also starts changing into vapours and then cooled to liquid. In this way liquids with different boiling point can be separated.

3. **Destructive distillation:-**In this process drugs are separated from their sources by heating the source in the absence of air. e.g:-Beach wood Tar,Creasote.
4. **Evaporation:**- In this process a drug is purified by heating it to a temperature below its boiling point. In this way impurity with low boiling point will changes into vapours and separated from the drugs. This process is used for preparing extract from tincture solution .
5. **Decantation:-**In this process insoluble solid is separated from liquid and insoluble solid which settle down at the bottom is called sediment and the clear liquid above the sediment is called supernatant.
6. **Filteration:-**In this process liquid is filtered with the help of filters. By this process all the insoluble material is separated.
7. **Colation or staining :-** In this process only large size particles are separated from liquid. In this process muslincloth is used.
8. **Communition :-**Process of making of drug into fine particles.

i. **Slicing or rasping or grating :-**Process of cutting drug substance into small pieces. Ex. Rhubrb root, belladona root, glycerrhiza rhizome etc.
ii. **Contusion or bruising :-** Process of making the drug fine by contusion with the help of pestle and mortar.
iii. **Grinding :-**Process of making fine particles of drug into finer particles by pestle and mortar by circular motion.
iv. **Disintegration :-**Process of making drug substance fine with the help of a machine with high speed.
v. **Levigation :-**Process of making drug substance fine by putting a liquid in which drug substance is not soluble.
vi. **Sifting/sieving :-** Process of sieving the drug with the help of sieve. Sieve is made of wire or silk. These sieves are given numbers according the pore size eq. 10, 20, 30. Larger the number finer the pore size of the sieve.
vii. **Elutriation :-**Process of sieving drug substances according to its fineness called elutriation.
viii. **Centrifugal separation :-**Process of separation heavy and light material with the help of machine. Blood=plasma+cell. If in a liquid heavy and light substances are mixed then they separated by this method.
ix. **Lixivation :-** The process of separating a soluble substance from a insoluble substance in a liquid.

x. **Maceration :-**Process of purifying impure drug by adding it into solvent (mainly alcohol) in which heating is not done and soluble material is settled down.. Insoluble material is called 'mare' soluble material is called 'lye'.

xi. **Digestion :-** When maceration is doing for long time and heat is used then this process is called digestion. Ex. Making tincture.

xii. **Per collation :-** Process of passing a solvent through a drug and dissolving part of drug is dissolved in the solvent and it is separated. The apparatus used in this process called percolator .

xiii. **Calcination/incineration :-**Process of heating a drug so that it become 'ASH'.

xiv. **Granulation :-** Process of making granules of the drug.

xv. **Sublimation :-** It is a process of purifying drug. In this process 1st drug is converted into liquid and heat liquid to form vapors. These vapors deposit on a plate in the form of flakes or flower. Eg. Flowers of sulphur.

xvi. **Refrigeration :**Process of keeping drug at the temperature of refrigerator that is 4° C – 5° C. eg. Vaccines and sreum are always kept in refrigerator. In freezer temperature is 0° C.

xvii. **Sterilization :-**Process of making the drug bacteria or pathogen free.If a drug is contaminated it should be sterilized. Methods of sterilization:-

i. Auto claving
ii. Flaming
iii. Boiling
iv. Antiseptics
v. Disinfectants
vi. Chemicals
vii. X- ray
viii. Uv ray
ix. Hot air oven

xviii. **Dialysis :-**Process of separate crystalline and colloid drug , in this process drug is passed through animal membrane by this crystals are separated.

xix. **Pharmaceutical assaying(standardization) :-** The process of making potency of drug uniform.

i. Chemical assay : chemical structure of drug is study.
ii. Biological assay : effect of drug on animal body is study.
iii. Physiochemical assay : colour, melting point, specific gravity is study.

xx. **Expression:-**When liquid is separated from a solid by applying a heavy pressure on it then it is called expression. Eg. Separation of oil from mustard seeds, cotton seed oil etc.

xxi. **Crystallization:-**When crystals of a drug is made then this process is called crystallization. Eg. Crystals of sugar and sulphur.

xxii. **Decoloration:-** The process of separation of color of a drug is called decoloration. For this charcoal powder is used.

CHAPTER - IV

TYPES OF PREPARATIONS OF DRUGS OR DRUG DOSAGE FORMS

Drugs are used in diff. forms so that we can make best use of drug and also administration of drug is easy. Depending on the condition different types of drug preparations are used. it also depend on the doctor which preparation is best to give. Drug dosage forms are of three types:

1. **Solid preparations (solid dosage forms)**
   - i. Powder
   - ii. Pills
   - iii. Tablets
   - iv. Capsules
   - v. Pellets
   - vi. Bolus
   - vii. Suppositoreis
2. **Semi solid preparations :**
   - i. Ointments
   - ii. Oculentum
   - iii. Paste
   - iv. Poultice
   - v. Plaster
   - vi. Electuries
3. **Liquid preparations**
   - i. Aromatic water
   - ii. Liquors
   - iii. Lotions
   - iv. Mixtures
   - v. Ear drops
   - vi. Eye drops
   - vii. Nasal drops
   - viii. Syrups
   - ix. Elixirs
   - x. Mucilage
   - xi. Emulsions
   - xii. Infusions
   - xiii. Decoction
   - xiv. Extracts
   - xv. Spirits
   - xvi. Tinctures
   - xvii. Liniments
   - xviii. Injections
   - xix. Collutoria

 # Solid preparations :

1. Powder (pulvis) :

Different dry drugs are first made fine , mixed & such a drug is prepared to be used internally known as powder. In the powder the quantity of active principle should be as prescribed. Quantity can be set by adding lactose powder. Eg.Pulv nux vomica (1-2 % strychinine), pulv glycerrhiza (16% senna), pulv opium, (10% morphine, Diuretic powder, Stomachic powder etc.

2. Pills (pillulae) :

If, powder drug is mixed with adhesive excipients & then given in round shape i.e known as pills .Smaller the pills better it will be. For small animal size of the pill is 3-6 mm & in large animal size of pill is 12 mm. now, a day instead of pills tablets are used.

3. Tablets (tabellae) :

They are different shape like circular, flat, disk type. Tablets are prepared from other drugs in powder form or granules by using different methods. For preparing a tablet starch is used because starch is soluble in water. Tablets have 2 type covering so that it is not bitter in taste. First covering is made up of gelatin& second covering is keratin. Covering of gelatin is dissolve in stomach because of acidic medium. Covering of keratin is dissolved in intestine because of alkaline medium. Tablets are taken through mouth.

4. capsules :

The preparations of drugs which are given in an appropriate envelop are called as capsules. They are rounded or cylindrical in shape. The coating is usually made up of gelatin and capsules are used to give irritant drugs. They are two types :

(a) Flexible capsules :

The covering of these capsules are made up of gelatin and glycerine which is flexible and soft. Liquid drug is filled in them. Gelatin is dissolved into stomach and drug comes out from capsule. In these capsules irritant and volatile drugs are filled. Ex. Carbon tetra chloride cap., cap. Cod liver oil, Chloramphenicol eye capsules etc.

(b) Hard capsules :

These are cylindrical in shape and corners are rounded. Covering is only made by gelatin. They are also made by methyl cellulose. These are also used in giving irritant drugs. If capsules are reacted with formaldehyde than they dissolve slowly in intestine due to this their effect is longer in time. Ex. Cap. Tetracycline, cap.Ampicillin, cap.Amoxicillin, cap.Chloramphenicol, etc.

5. Pellets :

Small tablets made up by compressions of some insoluble crystalline hormone which are used in sub-cut implantation are called pellets. Example: Testasterone pellets dissolve slowly by sub-cut implantation through drug.

6. Bolus :

Boluses are called to those cylindrical sphere which are made by one or more drug by mixing with vehicle drug. They are mostly used in horses and their weight is upto 60 g. In horses Bolus of aloe, Haematinic Bolus, Bolus of astrigents etc. are used.

7. Suppositories :

They are cylindrical or coned in shape which are given through per vaginal or per rectum. Their base is of glycogelatin & theobromo oil is present in them. On room temperature they are solid but when they are administered in to body then they are absorbed in liquid form. They are used in dogs and small animals to cure constipation. When they are used per vaginal then they are called pessaries. Ex. Pessaries of iodform, pessaries of acriflavin etc.

 # Semisolid preparations :

1. **Ointments (Unguentum) :**

   The drug which are made by mixing in fat, oil or vaseline which are use externally is called as ointment. Those substances which are used to prepare ointments are called as ointment base. Ex. zinc oxide ointment, sulphur ointment, iodine ointment, boric acid ointment etc. mostly ointments are used on skin.

2. **Oculentum (eye ointment) :**

   Ointment of drugs which are made in bacteria free environment, used in eyes are called as oculentum or eye ointment. Ex. Tetracycline eye ointment, chloramphenicol eye ointment, atropine sulphate eye ointment etc.

3. **Pastes (Pasta) :**

   These are the preparations of those drugs which are made by the mixing of powder drug with liquid paraffin and soft paraffin and they are also used externally. In this powder drug is used in large amount so that it become paste. Ex. BIPP :- B - bismuth subnitras, P- make a paste, I – iodoform, P – paraffin (liquid), ZIPP :- Z- zinc oxide, P- make a paste, I – iodoform, P – paraffin (liquid). BIPP & ZIPP are used in dressing of horn.

4. **Poultice (cataplasma) :**

   This is that preparation which is used to remove the pain of body. This preparation is like paste and also hot. By this preparation body part gets some heat and moisture. Ex. Cataplasmapoultice.

5. Plasters (emplastrum):

When drug is applied on body or cloth by mixing with any adhesive material than it is called plasters. Plaster is used to immobilization of bones. Ex. Plaster of belladonna, plaster of Paris etc.

Electuaries :

When any drug is mixed with food ingredient in adhesive form to give to animals known as electuaries. It rubbed on animal's tongue and on dental pad. Ex. Saline electuary.

 # Liquid preparations :

1. Aromatic water/aqua :

The preparations which are made by dissolving of volatile drug in water are called as aromatic water. In this distilled water is used. Ex. Aqua chloroformi, aqua comphorae.

2. Liquors (solutions):

Those preparations which are made by dissolving of non-volatile drugs in water are called as liquors. In this distilled water is used. ex. Liquor adrenaline.

3. Spirit or spiritus :

Those preparations which are formed by dissolving of volatile materials in alcohol.Ex. Spirit ammonia, spirit chloroformi, etc.

4. Tinctures (tincturae) :

When non-volatile drugs is dissolved in alcohol then it is called tinctures. When one drug is dissolved in alcohol it is called simple tinctures and when more than one drug is dissolved in alcohol then it is called compound tincture. Ex. Tincture of belladonna, tincture of iodine, tincture of benzoin etc.

5. Lotions (lotio) :

The water soluble drugs which are only prepared for external use then those preparation is known as lotion. For using it, it is not rubbed on skin. Ex. Boric acid lotion, calamine lotion, acriflavin lotion, lotio phenolis etc.

6. Mixture(Mixturae):

Any drug in liquid form which is dissolved in water or aromatic water and it is given through mouth.eg Diuretic mixture, White mixture

7. Eye lotion (Collyrium):

Is prepared as solution in water and prepared in bacteria-free environment and is used to wash eyes or applied in eyes eg Boric ACID, Collyrium, Zinc sulphate collyrium,Albucid,Locula etc

8. Ear drops(Auristilla):

Drug solution in water prepared in bacteria free environment and used in ears eg Hydrogen peroxide, Boric acid ear drops

9. Nasal drops{Collunaria):

Are prepared by dissolving drug in water in bacteria free environment and used in nose eg Efcorlin nasal drops,Nasavion nasal drops

10. Syrup(Syrupus):

Syrup is saturated solution of sucrose sugar in water in which flavouring agent and drug is added eg Corex syrup, Syrup glycodin

11. Elixir:

Is hydroalcoholic solution in which sugar, a flavouring agent and drug is added eg Paragoric elixir,Elixir negodine

12. Mucilage(Mucilaga):

Is prepared by dissolving gum –like substances in water. These are used to prepare suspension of drugs which are insoluble.These are used to prepare emulsion and therefore these are called emulsifier eg Mucilage acacia, Mucilage traga cantha

13. Emulsions:

Are watery preparations in which oil resin, insoluble powder or liquid drug is suspended with the help of mucilage.Eg Emulsion of Veterinary Cod Liver Oil,Emulsion of chloroform,Emulsion of Castor Oil.

14. Infusion (Maceration) or Infusum:

Are prepared by rubbing herbs in hot or cold water and then straining to get infusion.eg Infusion of chiratae recens, infusion quassieee recens etc.

15. Decoction (Digestion) or Decoctum:

Is prepared by adding herbs in boiling water and then separating by liquid decoction straining.Water is boiled for 15 minutes.EG Decoction of tobacco leaves,decoction of coffee leaves.

16. Extracts(Extractum):

When active principle of a drug is separated in pure form and in liquid form.eg Liquid extract of belladonna, Liquid extract of nux vomica.

17. Linimentum(Liniments):

Are prepared by dissolving drugs in oil or soap solution.These are used externally.eg Liniment of turpentine oil,Liniment of methyl salicylate,Liniment of soap

18. Injection:

Any sterile aqueous or oily preparation which is administered parenterally e.g. Inj. Novalgin,Inj. Terramycin,Inj. Atropine sulphate etc.

19. Colutoria:

Is solution of drug in waterwhich is used to wash mouth / throat or which is applied in mouth/throat eg Boroglycerine

CHAPTER – V
CHEMISTRY/CHEMICAL COMPOSITION OF DRUGS OR GROUPS OF DRUGS

1. **Alkaloids :**

These materials are active principle which are obtained from plants and animals tissues. In these C, H, N, are mainly present but in some Oxygen is also. They are toxic in taste. Pyridine is used in their synthesis. Their names end with 'ine'. They change red litmus into blue. They are of three types :
(a)Solid alkaloids : Atropine, Morphine, Caffine, Cocaine, Quinine, Strychnine.
(b) Liquid alkaloids : Arecoline, Pilocarpine and Nicotine.
(c)Synthetic Alkaloids : Apomorphine , Theophylline.
Alkaloids obtained from animals : Adrenaline
They make precipitates after reaction with heavy metal tannic acid therefore they are not used with them.

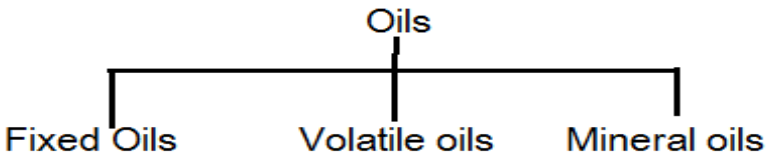
2. **Alcohol :**It is an liquid which is colorless like water. Alcohol are of many types but only two are used as drugs. Their names end with 'ol'. Eg. Methyl Alcohol(methanol), Ethyl Alcohol (ethanol). Methanol is toxic. They are mostly used in preparations of tinctures. Methanol is used very less. Alcohol is made by fermentation of sugar.
3. **Esters :**

They are usually liquids which are insoluble in water. They are made by organic, inorganic or alcohol reaction. Eg.Fats and fixed oil.

4. **Fats :**

They are fixed oil which are solid on room temperature. Eg.Butter, Lard, Lanolin.

5. **Oils :**



i. **Fixed oils :**

High molecular weight fatty acid such as oleic acid , palmitic acid, stearic acid etc. when combine with glycerine, they form esters and these esters are called fixed oils. Fats are also fixed oils. When amount ofpalmitic acid and stearic acid is more then fats are solid at room temperature. When oleic acid is more then fats are liquid at 25 C.

They are mainly obtained by expression. They are obtained

mainly from plants and tissues of the animals. These are insoluble in water but soluble in ether and chloroform and less soluble in alcohols. Bile juice emulsifies them. They provide energy to the body by oxidation and CO_2& H_2O are released. Fixed oil when mixed with alkalies they form soaps. Examples – from plants : Mustard oil, Almond oil, Sesame oil, Linseed oil, Castor oil, Coconut oil, Croton oil, Ground nut oil and Olive oil. Animal source : Cod liver oil.

ii. Volatile oils or essential oils or ethereal oils :

They are obtained mainly from flowering plants by distillation process. But lemon oil is obtained by expression. They are color less and have no oily base like a water. When they are mixed with alcohol they formed essence, which is used in perfumes. When mixed with water then they are called aromatic water or aqua. This aqua is used in many bitter taste medicines. When they are mixed with alkali then they do not form soap. Eg. T.T. oil, eucalyptus oil, are liquid while camphor and menthol are soild volatile oils.

iii. Mineral oils :

They are not obtained from organic materials. They are found under the soil and they have mainly Carbon and Hydrogen. They are also obtain by distillation process. They do not form soap when they mixed with alkalies. Eg.Kerosene oil, Petroleum, paraffin, Vaseline etc.

6. Glycosides :

They are those active principle which have two part. First part is made up of glucose or fructose i.e. of reducing sugar and second part is called aglycon which is made up of alcohols, aldehydes and phenol. When reducing sugar is glucose then glycosides is also called glucosides. And in this C,H& O are present but in some N is present. These glycosides are soluble in water and chloroform but insoluble in ether. Their names ends with 'in'. Ex. Digitalin, digitoxin, jalapin, salicin and glycorhizin etc.

7. Saponin :

They are glycosides, when dissolved in water they form foam. They destroy RBCs. They do emulsification of fats and oils. Saponin is present in bersime. Ex. Quillaria, bark, senega roots etc.

8. Gum :

Gums are the colloidal carbohydrates. When these colloidal carbohydrates is mixed with water they form excipient that is called mucilage. They are amorphous in nature. They are obtained from plants. Ex. Gum Arabic, gum tragacanth, vegetable jellies etc.

9. Resins :

They don't have carbohydrates but they have another chemical like alcohol, esters etc. they are insoluble in water but soluble in alcohol and ether. When they are mixed with alkalies they form resins soap. Resins are of three types

i. Oleo resins : when resins are mixed with volatile oil. Then they are called oleo resins. Eg. Crude turpentine

ii. Balsams : when oleoresins is mixed with cinnamic acid of benzoic acid then balsams is formed. Ex. Balsams of peru, belsams of tolu etc.

iii. Gum resins : when resins is mixed with gum then gum resins is formed. Ex. Asafoetida and myrrh.

10. Tannins :

These are the non nitrogenous phenol derivatives substances. They are obtained from leaves and stems of plants. They are soluble in water and chloroform and insoluble in ether. They precipitate metallic salt, alkaloids and proteins. Ex. Catechu, oak galls etc.

11. Waxes :

They are those esters which are formed by mixing of fatty acids and monohydric alcohols. They are high molecular weight substances. They are more solid than fats and melting point is also more than fats. They don't form soap when combine with alkalies and in soluble in water or less soluble. Ex. Bee wax.

12. Enzymes :

These are organic substances which increases the chemical reactions. Ex. Trypsin, ranin etc.

13. Hormones :

The substances which are secreted from the ductless glands, are called hormones.Ex. Oxytocin, Estrogen, Testesterone, Leutinizing hormones(L.H.),Follicle stimulating hormones(F.S.H.),Insulin, Adrenaline. They are also used as medicine.

14. Acids :

Those substances which release 'H' ion in solution , they are called acid. Ex. Sulphuric acid, hydrochloric acid, nitric acid, acetic acid etc.

15. Bases :

Those substances which when mixed with acid, form salts are called bases. Generally they released 'OH' ion in aqueous solution.

16. Salts:

When acids and bases are mixed they form salts.

Ex: Acid + base → salts + H_2O

$HCl + NaOH \rightarrow NaCl + H_2O$

$HNO_3 + KOH \rightarrow KNO_3 + H_2O$

CHAPTER-VI
ROUTES AND METHODS OF DRUG ADMINISTRATION

Administration of the drugs in the body known as routes. Routes are many types:-

1. **Per os route/Oral route :-**

(a) **Drenching :** appropriate amount of drug given by drinking through mouth known is as drenching. This is done by three ways :

i. By drenching bottle :- Almost in all animals for drenching, drenching bottle is used. drenching bottle is use in sheep, goat, horse. It is usually made by alluminium. Leather covering is done on the glass bottle because if glass bottle is broken down than no harm can occur to animal. In cattle drenching bamboo is used.
Following precautions should be taken during drenching :-
   I. Never hold the tongue of animal because due to this drug enters in trachea and drenching pneumonia may occur.
   II. If animal have already respiratory diseases than drenching should be avoided.

ii. By drenching gun:- It is used in sheep and goat. In this drug is given like drenching bottle but in this amount of drug is fixed. It is used in deworming camps.

iii. By stomach tube or by probang:- It is a tube of rubber which is used in horses. But it is also used in all the animals.Tube which is used in cattle and buffalo have iron rings attached in tube. It is called probing.
Size of stomach tube 9 feet long and 5/9 or ½ inch thick. It have two marks. One on 10-14 inches and second is on 4 feet. By controlling the horse put left hand on nostrils, deliver the stomach tube by right hand. It should be considered in mind that stomach tube must be clean and bacteria free. Push slowly the tube in the nostril. When tube reaches the pharynx there may be some difficulty in pushing of tube. To cross the pharynx and reaching the esophagus push the tube hardly. This is taken in mind that stomach tube do not enter in trachea. If the sound of respiration come through the tube than it goes in trachea and if no sound is hear from tube then it is in esophagus. When tube go in rumen then put the drug through the second end of tube by keeping funnel on it and by taking it up from the level of the animal. Following advantages of administration of drug through the stomach tube :-
   I. Irritant drugs given easily through it.
   II. Large amount of drug given easily through it.

III. Drug do not waste in this method.

(b) **Bolus or balls :** They are used in horses. For this first man control the horse and second man push the bolus behind the palate by holding its tongue and than take the mouth of horse in upward direction. After some time give the water to the horse.

(c) **Tablets and pills :** They are used in cats and dogs. Place the tablet behind the mouth and closed the mouth of animal. After sometime tablet go inside when the tongue is move inside the mouth. Give water to the animal. Tablet is also given in the piece of meat and chapati. By this method tablets are given in sheep and goat.

(d) **Capsules :** They used in dogs, cats, goats, sheep. Method of giving this is like bolus or ball in horses.

(e) **Electuries :** They used in those animal in which respiratory diseases or symptoms of cough are seen because in the case of pneumonia, drenching is prohibited.

2. **Nasal routes (Per nose) :**If for the treatment of abscess or tumor in nasal cavity drug is administered with the help of irrigator than this method is called nasal douche. By this pus comes out.
   i. **Inhalation:-**This is the method of drug administration in which vapours of drug directly affect the lungs with the help of breathing. For inhalation in large animals take water in a bucket and in them vapours of T.T. oil or eucalyptus oil or tincture benzoin or camphor or vicks drugs are taken into lungs with breath. In this it should be taken care that animal is fully controlled and his eyes are closed.
3. **Per rectum :** per rectum has two methods :-
   i. **Enema:-**Administration of drug solution into the rectum is called enema. For enema in large animals irrigator or enema pump is used. when constipation occur in animal than enema is done. By enema rectal mucosa becomes excited due to which movement of rectum is increased and constipation is removed. For doing enema luke warm water or cold water is used. in small animals or human beings for enema, enema syringe is used.
   ii. **Rectal suppositories :** Purpose of placement of these rectal suppositories in rectum is that they can remove constipation.
4. **Per vaginal, per uterus and per urethral :**

i. **Uterus or vaginal douches :**Douching of uterus is done by douching irrigator. First clean the back portion of the animal. By putting glove on hand one tip of irrigator is put into the uterus and with the help of irrigator drug is put into the uterus. Like this vagina is also cleaned with the help of irrigator. For the douching of uterus os of cervix must be open. For administration of drug, level of irrigator must be higher than the level of body.

ii. **Passaries :** For putting this in uterus os of cervix must be open. Putting gloves on hand, hand should be reached os of animal through the vulvar lips and passaries pushed into the uterus with the help of fingers. In this thumb is also used.

iii. **Cathetrisation :** This method is used in all the animals. First urine is voided from urinary bladder by putting the catheter in urethra and than any drug is administered. With catheter drug go directly in urinary bladder. Usually antiseptic drugs are also given by this therefore infection not occur in bladder.

5. **Intra mammary route :**Administration of drug into udder through the teats is called intra mammary route. This route is used for the treatment of teats and udder diseases. E.g. mastitis (inflammation of udder and teats). Before the administration of drug milking of those teat should be done. This is considered that all instruments must be sterilized.
6. **Per cutaneous route or topical application :**-
   i. **Poultice:-**First apply some oil on the spot where poultice is tied. Temperature of poultice should not be high. Poultice is of linseed meal, oat meal or bran. To make poultice boil one of from the above three in hot water until it becomes paste and than use after tied in a cloth.
   ii. **Fomentation :**- Foment of any part by warm water is called fomentation. When cloth or cotton applied on affected area after dipped in hot water is called moist fomentation. When foment is done by a bottle in which hot water is put than this is called dry fomentation. This is considered that temperature of water should be 110^{o} F.
   iii. **Inunctions :**Applying of liniments, oils and ointments by rubbing it on skin is called inunctions.
   iv. **Baths :**- For the treatment of hooves of horses and other animals, there hooves are washed with drug mixed water (2% $CuSO_4$) this is

called footbath. Cats and dogs are bathed with drug mixed water to remove parasitic diseases.

v. **Dip :-** To kill the ectoparasites of animal they are dipped in the solution of antiparasitic drugs mixed in water this called dipping. For this arsenic dip, sulphur dip, malathion dip, sevin dip, sumithion dip are used. They normally used in sheep and goats.

7. **Parentral administration :**With the help of injection administration of drug in different layers inside the skin and mucus membrane is called parentral route. It have following methods :-

i. **Intravenous :-** In cow, buffalo, sheep, goat and camel I/V is given in jugular vein. In dogs I/V is given in external saphenous and cephalic vein. In pigs in ear vein or direct in heart and in poultry in wing vein or direct in heart I/V is given.

Following precaution should be taken during given of I/V injection:-

(a)Drug is injected slowly. If it is given fastly than shock may occur.

(b) It should be ensured that there no bubble of air in the syringe because by this blocking may occur and blood flow is stoped, By which death of animal may occur.

(c)The area is sterilized where injection is given.

Disadvantages :-

a) Insoluble suspension are not given by I/V route.
b) There is a danger of shock if I/V is given fastly.

Advantages:-

a) Irritant drugs are given easily.
b) Large amount of drug is administered.
c) In this no absorption of drug is needed because drug directly goes into blood.

ii. **Intramuscular (I/M):-** Administration of drug into the muscles is known as I/M injection. In cow, buffalo, sheep, goat etc. injected in the center of neck. In poultry I/M injection is injected in the muscle of leg or breast muscle.

Advantages:-

a) Drug absorb fastly and insoluble suspensions are given by this method.

Disadvantages :-

a) Irritant drugs should not be given.

b) Large amount of drug can not be given.

iii. **Sub-cutaneous (S/C):-** Administration of drug between muscles and skin with injection is called S/C. In cow, buffalo, horse etc. S/C is injected into the upper part of neck. But in dogs it is given in thigh and chest muscle.

Advantages:-

a) Drug is absorbed easily and injection is easy.
b) Chances of shock is less.

Disadvantages :-

a) Irritant and large amount of drug can not be given.

iv. **Intradermal (I/D):-** Administration of drug under the layer of skin by a thin needle is called intradermal. This is used in performing many types of tests like TB test, single intradermal test, double intradermal test, Johnin test. By this very low amount of drug can be given.

v. **Intratracheal :-** Administration of drug into the wind pipe (trachea) is called intratracheal route. It is done when a great breathing problem is seen. Nowadays this route is less used.

vi. **Intra peritoneal route:-** Administration of drug in peritoneum is called intra peritoneal route. This is also less used. it is give in left flank. In this aseptic conditions are more considered. Because if no proper aseptic conditions are followedthen there may be chances of infection and peritonitis. By this method drug is absorb fastly and also large amount of drug can be given.

vii. **Intracardiac route:-**Administration of drug directly into the heart is called intra cardiac route. This is only used in emergency cases. This route also used in respiratory failure.

viii. **Epidural route :-** Space found outside the spinal cord is called epidural space. Administration of drug into the epidural space is called epidural route. In cow and buffalo epidural injection is given in between last sacral and first coccygeal vertebrae.

ix. **Intra ruminal route :-** Administration of drug into the rumen is called intra ruminal route. For this 5-6 inch long hypodermic needle is used. this needle is applied in left paralumber fossa on last rib near the left flank therefore drug directly enter into the rumen.

Note:- In elephant 13 Gauze needle is use.

CHAPTER – VII

POSOLOGY(DOSAGE OF VARIOUS DRUGS)

Dose is that quantity of drug which when administered to body once or more produces desired effect on the body.Dose has to be safe and non-toxic to animal as well as it should cure patient.

In pharmacopoeia, dose of each drug is fixed and maximum and minimum dose is also mentioned. Minimum dose is that dose which is needed to initiate action of drug in the body.Maximum dose is that dose which can be given without toxic effect.In every book, dose of every drug is given,but in if situation demands, dose can be increased or decreased.

Factors affecting dose of a drug:

To decide dose of a drug , following points should be considered:

1. **Age :**

   Small animals are given smaller dose because there is more risk of drug toxicity in small animals.

2. **Breed :**

   Adult body weight is different in different animals. Therefore dose should be decided according to body weight.The dose which is safe for heavy breeds can be toxic to light breeds. Sometimes dose difference can be 10 times.eg Body weight of Great Dane breed of dog is 10 times heavier than that of Perkingse breed dog.

3. **Body Weight :**

   Drug should always be given according to body weight in animals, animals of same age can differ in body weights.

4. **Sex :**

   In some animals, females have less body weight than male.Eg. Cow and Bull .Females also have load of Oestrous,Lactation andPregnancy.Therefore dose in females is less than in males.

5. **Management and Nutrition :**

   If management and nutrition is good then animal can tolerate higher dose.If these are bad then animal can not tolerate higher dose.

6. **Pre-Medication :**

   If animal has been given a drug for long time in past then again it should be given higher dose for complete pharmacological action.

7. **Disease :**

Dose depends upon illness.In the beginning ,illness can be cured with minimum dose.If the disease is chronic, then maximum dose is needed.Sometimes lower dose does not show any effect.

8. **Route of Drug Administration :**

Suppose a drug can be given by all routes. If the dose of drug is 1 g by oral route, then its dose will be half by I/M or S/C routes and its dose will be ¼ by I/V route. Dose by parenteral route is always less than oral route.In I/V route effect of drug is immediate and by oral route effect of drug takes some time.Sequence of drug effect in decreasing order is : I/V(Quickest) -> I/M -> Inhalation -> Intratracheal ->S/C -> Intraperitoneal ->Oral -> Rectal -> Intramammary is slowest.

9. **Species :**

Dose also depends on species of animal.If dose in cattle and buffalo is 1, it will be 1/5 in sheep and goat, 1/15 in dogs and 1/30 in cats.Dose of pulv nux vomica is more than strychnine hydrochloride.

10. **Type of action needed :**

Dose depends upon type of action needed. One salt can have many actions.eg. Magnesium sulphate at dose rate of 100-180 g acts as diuretic and at dose rate of 350-500 g ,it acts as purgative.

11. **Rate of elimination:**

If drug is eliminated through urine or faeces at once after administration ,then it has to be repeated soon. If the drug remains in the body for long, then it has to be repeated after longer time. e.g Inj. Terramycine L.A.(Long Acting) acts for 72 hours.

12. **Frequency of Drug Administration :**

Frequency means number of times drug is given in a day. Frequency depends upon rate of elimination of the drug. If a drug is eliminated after 6 hours , it has to be given 4 times a days. If a drug is eliminated after 12 hours, it has to be given 2 times a day. Some drugs act for long time e.g. Anthelmintics. These drugs kill parasites. Antibiotics are to be given as full course for prescribed period(5-7 days) regularly.

CHAPTER – VIII
INCOMPATIBILITY

INCOMPATIBILITY:

When two or more drugs are given together , then one drug may reduce the desired effect of another drug or completely eliminate the desired effect of another drug. Sometimes combination of two or more drugs may adversely affect the body. Such drugs should never be given together. When drugs given together react or adversely affect the body , then drugs are said to be INCOMPATIBLE.
Incompatibility is of 3 types:
1 Physical or Pharmaceutical
2 Chemical
3Pharmacological

1. **Physical**: When one drug can not be mixed with another drug properly or can not be dissolved with another drug. e.g. Mixture of oil and water, Mixture of water and Bismuth carbonate

If quantity of solute is less compared to solvent, it is also physical incompatibility.
Following examples of physical incompatibility should be taken care of:

i. Except a few nitrates, most of nitrates are soluble in water(or compatible with water).
ii. Except heavy metals (Lead, Mercury etc.) ,chlorides, bromides and iodides of metals are soluble in water.
iii. Except hydroxides, carbonates and phosphates of Sodium, Potassium, and Ammonium, all other hydroxides, carbonates and phosphates are insoluble in water.
iv. Alkaloids are usually soluble in strong mineral acid but insoluble in alkaline solution.

2. **Chemical:** Some drugs react with other drugs and form new compounds which are of no use as drugs and they can be harmful also. Sometimes chemical reactions are not visible. Sometimes precipitates are formed. Sometimes gas may be formed. Sometimes there is change in color.

Following chemical incompatibilities should be taken care of :

i. Acids and bases and their salts are incompatible with each other.
ii. Silver is incompatible with organic metals, sulphates and halogens.
iii. Oxidizing agents (KMnO4 etc.) are incompatible with some organic and inorganic metals as they oxides them.

iv. Iron salts are incompatible with tannic acid /phenols/salicylates/acetates and alkaline solutions.
v. Tannic acid is incompatible with alkaloids ,metallic salts and gelatin.
vi. Strong alkaline solutions are incompatible with chloral hydras as they produce chloroform.
vii. Tannic acid iodides, bromides, alkaline solution and mercury solution are not given with alkaloids.

3. **Pharmacological:** In this type of incompatibility,one drug acts against the other. In this both the drugs become ineffective. Sometimes one drug lowers the effect of other. Therefore these drugs should not be given together.eg CNS stimulants can not be given with CNS depressants.

i. Sulphonamides are not to be given with procaine and benzocaine (local anaeshesia)
ii. Strychninne should not be given with pentobarbitone etc.

CHPATER – IX

PRESCRIPTION WRITING AND ABBREVATIONS

Prescription :

It is written order from doctor to compounder or pharmacist in which complete direction about :-

i. Description of patient (animal).
ii. Inscription
iii. Superscription.
iv. Subscription.
v. Signa
vi. Signature of practitioner.

1. Description of patient (animal) :

In this age, sex, breedof cow and buffalo,owner's name and address are write down.

2. Superscription :

Before name of medicine Rx is written. This symbol represents god Jupiter of rome. It means prayer to god, for cure of animal. In latin language it means 'take tough' which means take the medicine written below.

3. Inscriptions :

This is the main part of prescription because name of drugs are written in this part. When several drugs are given it is called complex prescription. In this two or more drugs are written in English. The quantity of drugs written in metric system. Now a day simple prescription is written. Complex prescription has following parts :-

i. Basic drugs:- it is the main drug to cure illness.
ii. Adjuvant drugs:- it is added to increase effectiveness of main drug.
iii. Corrective drugs :- It is added to remove unwanted effect of basic and adjuvants drug.
iv. Vehicle drugs or excepients :- It makes administration of drug easy.

4. Subscription :

In this direction about method of preparation (compounding) and dispensing of drug which is given. This is written in both languages in English and Latin.

5. Signa :

In this compounder is directed about how to label the packing of drugs and method, time & frequency of drug given to patient. This information is told to the owner of patient/animal. This information can be written in English or local language of the owner of animal.

6. Signature of practitioner :

In last practitioner should do their signature.

OPD

OPD NO. : 10848 Date : 28/4/2016

Owner's name : Shrikant Owner's address : Budana, Hisar

Species : cow Breed : Shahiwal

Sex : Female Age : 6 years

History of patient : Off feed from 2 days

Diagnosis : Tympany

R_x

Mag. Sulphate	180 g
Pulv. Ginger	30 g
Vehicle	aqua q.s.

Subscriptions - Mft haust

Signa - To given immediately

Signature

CHAPTER – X
DRUGS ACTING ON DIGESTIVE SYSTEM

Drugs acting on digestive system :

1. Sialics/sialogogues/stomachic
2. Antisialics/antisialogogues
3. Carminatives
4. Antizymotics
5. Antifroathing
6. Emetics
7. Antiemetics
8. Local gastric sedatives (antacid)
9. Intestinal astrigents
10. Cholagogues
11. Purgatives
    i. Laxative
    ii. Simple purgative
    iii. Drastic purgatives.
12. Antidiarrhoics
13. Enema
14. Constipants
15. Antispasmodics
16. Demulcents
17. Intestinal adsorbants & protective

A. Sialics/sialogogues :

These are the drugs which increase the amount of saliva. These are of two types:-

i. Direct sialagogues': These are the drugs which directly stimulates nervous system which in turns stimulates salivary glands to produce more saliva. E.g. Arecotine, Pilocarpine, Physostigmine, Ephedrine, Adrenaline, Mercury iodide etc.

ii. Reflex or indirect: - These are the drugs which stimulates vagus nerve ending in the stomach and increase salivary secretions by reflex action. E.g. Tartar emetic. These drugs not given in animals to increase salivary secretions.

❖ Stomachic: These are the drugs which increase the secretion of saliva as well as secretion of gastric juice. These drugs are given to stimulate digestion. These drugs are given through mouth. These drugs should be given 15 minutes before feeding. e.g. Nux vomica, Gentian, Quassia, Chiretta, Columba.

Bitter stomachics:

1. **NUX VOMICA:** These are obtained from ripen seeds of plants.These seeds are very bitter in taste.The shape of seeds is flat.Active principle in this is

strychnine.Strychnine has sialicis action, means it increases secretion of saliva.If nux vomica is given in excess to animal, it can cause convulsion and death.

Preparation of NUXVOMICA:
FOUR TYPES OF NUXVOMICA IS USED ORALLY:

1. Pulv. nuxvomica
2. Liquid nux vomica
3. Dry extract of nux vomica
4. Tincture nuxvomica

Dose of nux vomica in case of largeanimal (cow and buffalo) is 4 gm small animals, ½ to 1 g. In dogs, 80 to 200 mg.

Strychnine: This is active principle of nux vomica.it is alkaloid in nature, odorless, colorless and transparent.It is very less soluble in water but soluble in alcohol.In the market, it is available as Liquor strychnine hydrochloride.This is given s/c. Its dose in large animal is 2 ml..

2. **Gentian:** This is obtained from root of plants.Its active principle is bitter glycoside.The name of active principle is **GENTIOPICRIN** and **GENTIN**.These are used as STOMACHIC. Two preparations of gentian are available in market:
   1. Pulv. Gentian
   2. Tincture Gentian

   Dose is as follows:
   Large animal: 15-60 g (30 g) orally
   Small animal: 5 g orally
   Dog 0.5 g orally.
3. **Quassia:** These are obtained from dry stem of plants.Active principle in this is quassin which is a glycoside.It is yellow coloured; it is available as Tincture and Infusion.
   Dose: Large animal 30-60 ml oral
   Small animal 2-4 ml oral.
4. **Chiretta:** This is obtained from flowers of plants.Active principle in this is **Chirettin**.In the market, it is available as Pulv. And Tincture.
   Dose: Large animal: 15-30 g
   Dog: ½- 1 g
5. **Columba:** This is obtained from roots of plants.Its active principle is **CALUMBIN**.In the market, it is available as Pulv. And Tincture.
   Dose: Large Animal: 15-30 g

Dogs: ½ - 1 g

INDICATIONS (USES) OF SIALAGOGUES AND STOMACHICS:

These drugs are used as stomachic.They are used in indigestion.The are also used in ruminal atony. They are also used as PLACEBO(To satisfy owner of animal).

Typical preparations' of stomachics: (Stomachic powder)

Soda-bi-carb 180 g
Sod.chloride 180 g
Pulv. Nux vomica 24 g
Pulv. Gentian 48 g
Mft. pulv. Div. into 6 parts and given o.d. orally

Proprietary preparations of stomachics:

Pulv nux vomica is available in market as 500 g pack. Dose 4 g oral.Liq. Strychnine is available in market in 450 ml pack. Dose 2 ml s/c

Sr. no.	Brand name	packing	Dose	Route
1.	Himalayan Batisa	100g,200g,1kg	50 g	Oral
2.	Digestovet	-do-	-do-	Oral
3.	Pachvardhak	-do-	-do-	Oral
4.	Pashurakshak	-do-	-do-	Oral
5.	Tab. Anorexon	Tin of 50 tab.	2 tab bid	Oral
6.	Tab. Rumenton	-do-	-do-	Oral
7.	Tab. Movirum	5 g bolus	-do-	Oral
8.	Tab. Bovirum	-do-	-do-	Oral
9.	Liv. 52 tab.	50-200 tab	10-20 tab bid	Oral
10.	liv.52 powder	100 g	10 g bid	Oral

B. Antisialics :

These are the drugs which decrease the secretion of saliva. These drugs act in two ways :-

i. By decreasing the irritation in the mouth, the secretion of saliva decrease. Eg. Kaolin, Alum, Tannic acid.

ii. Some drugs decrease the amount of saliva by depress parasympathetic nerve endings. Eg. Belladona, Atropine.

1. **Belladonna :**This is obtained from leaves and steams of plants. When plant starts flowering at that time plants are dried and these contains alkaloids which is called atropine. This is available in four forms :
   I. Pulv of belladonna
   II. Dry extract of belladonna
   III. Liq. Extract of belladonna.
   IV. Tincture of belladonna.

   Dose in large animal 5-15 g oral, in small animal 1-2 g oral, in dogs 150- 300 mg.

2 Atropine: This is alkaloid of belladona. This occurs as white crystals,It dissolves in water easily.It is used as Atropine Sulphate Injection.This is used in small animals like dogs and cats.

Dose: 1 ml (60-65 mg) S/C and I/M

Dog: 1 ml Cat: ½ ml Human beings: 1 ml

1 ml ampoule contains 65 mg Atropine salt.

Indications of antisialics.

1 After anaesthesia with ether and chloroform in animals, there is increased salivation.These drugs are used in dogs and cats to reduce secretion of saliva.

2.Antisialics are also used in poisonings caused by Lead,Mercury, Morphine, and Organophosphorus compounds in which salivation is increased.

3. In FMD, Actinibacillosis,Strangles in horses,Rinderpest and Stomatitis salivation is increased.Antisialics are used in emergency in these diseases.

4. Atropine is mostly used as pre-anaesthetic .Before surgery,Atropine Sulphate injection is given 15-20 minutes before giving anaesthesia so that increased salivation caused by anaesthesia is controlled.

C. Carminatives:.are the drugs which are given through mouth and which help in expelling gases from mouth and rectum.These drugs causes irritation of gastric mucus membrane and this increases the movement of stomach wall by reflex action.This will result in opening of cardiac sphincter and expulsion of gas accumulated there.These drugs also contain volatile oils. e.g.Ginger,Asafoetida, Aniseed etc.Alcohol also act as carminative.

1. Ginger: This is obtained from rhizome of plants. This is first dried and then given in Powder or Tincture form. Orally.

i. Pulv.Ginger
ii. Strong Tincture of Ginger
iii. Weak Tincture of Ginger

Dose as Pulv.:

Large Animal: 15-60 g
Small Animal: 2 g
Dogs: ½-1 g oral

2. Asafoetida: This is a gum resin .This has a special type of smell. This is obtained

from rhizome and roots of plants. This makes an emulsion on dissolving in water. This contains volatile oil. This is available as Pulv. Asafoetida and Tincture Asafoetida.

Dose as Pulv.:

Large Animal: 10-20 g

Small Animal : 1-2 g

Dogs:- 0.2-1/2 g Oral

Tincture is also used .Its dose is in ml.

3. Aniseed:These are obtained from ripened fruits of plants.Its taste is sweet and aromatic.This is available in powder form.

Dose: Large Animal: 30-50 g

Small Animal: 5-10 g

Dog: 1-2 g Oral

D. Antizymotics: These are the drugs which reduces fermentation caused by bacteria and protozoa in rumen. In this way, they reduce gas formation in rumen.eg.Turpentine oil, Formalin, Antibiotics.

1. Turpentine oil: This is obtained from PINUS tree. This is a OLEO-RESIN.In this, Resin and Volatile oil can be separated by Process of Distillation.When T.T.Oil is given to animal, its smell appear in milk and meat of animal for 4 days.T.T.Oil is insoluble in water but soluble in alcohol.
2. Formalin : it is made by dissolving formaldehyde in water. This is available in market as 37-40 % solution. This is colourless, pungent taste and smell. Eyes should be protected from this. This is soluble both in water and alcohol. Dose large animal 4-20 ml (10 ml average). Add1-2 liter water to 10 ml formalin and give orally. This can also be given when there is blood in milk.
3. Antibiotics : Some antibiotics like Terramycin, Sulphonamide, Pencillin, Streptomycin can also reduce fermentation by bacteria.

E. Antifroathing :

These are those drugs which expel gases by reducing the foam. These are used in bloat. E.g. Polymerized methyl silicon, Polyricinate etc.

1. Polymerized methyl silicon : This is dense, non-volatile, inert, translucent, tasteless, non toxic liquid.Dose 2 % solution of 100 ml.

   5 % solution of 50 ml
2. Polyricinate : Dose large animal 10-15 ml, small animal 2-4 ml, dog 1-2 ml. Its dose is less because its concentration is high.

 # Indications of antizymotics, antifroathing, carminatives :

To expel gases from stomach.

Typical prescriptions :

Tympany in cow and buffalo

Turpentine oil - 30 ml oral
Ammonium carbonate – 10 gm oral
Spirit ammonia aromaticus -30 ml oral
Linseed oil or mustard oil - 700 ml oral

 # Proprietary preparations of carminatives/antifroathing, antizymotics :

i. Tympol powder: large animal 50- 100 g oral, Small animal20-30g oral, Dogs - 5 g oral
ii. Bloatasil/afoenil: 100 ml in cattle oral or intra ruminal, 20 ml in sheep and goat
iii. Carminative mixture: 30 ml bid oral in Large animal, 5-15 ml small animal, 2-3 ml in dogs oral.
iv.

F. Emetics :

These are those drugs which are used to induce vomiting. Usually vomiting is not induced in animal. But in small animals sometimes it is necessary to induce vomiting. In small animal like calf etc. regurgitation may be occur. In horses vomiting is very rare. Vomiting may cause death in horses. Emetics are two types :

1. Reflex emetics : The drugs which cause irritation on stomach mucus membrane and induce vomiting by excitation of the vomiting center with reflex action. Eg. NaCl, copper sulphate, tartar emetic, zinc sulphate, mustard seed, apomorphine hydrochloride.
2. Central emetics : These are those drugs which cause vomiting by excitation of the CTZ (chemosensitive trigger zone) which is situated in medulla oblongata. Eg. Apomorphine hydrochloride.

Examples :

(a) **Sodium chloride :** This is obtained from sea water by evaporation. This is white crystal, odorless and salty in taste. This is soluble in water.

Preparations and dosage : In small animal 2-2 ½ g salt is placed in posterior part of tongue or by giving 2 spoons of salt mixed with water, vomiting will occur.

(b) **Copper sulphate :** This is a blue color powder soluble in water and insoluble in alcohol. 1-2% solution when given to dogs will cause vomiting .

(c) **Zinc sulphate :** This is colorless, transparent crystal. Its taste is metallic. If its 50 ml solution is given to animal , vomiting will take place.

(d) **Mustard seeds :** Vomition occurrs by giving mustard seeds after grinding. Vomiting is induced by giving 1 or ½ teaspoon full mixed with water.

(e) **Tartar :** This is present in white granules in powder form which is odorless and sweet in taste. 50-150 mg given to dogs.

(f) **Apomorphine hydrochloride :** This is soluble in water. If its color change into green then it should not be used. Once it is given to animal by mouth, first animal will salivate and then vomiting will start which will continue for 5-15 minutes. If vomiting does not start by giving once then do not give again, because by giving again, it will cause CNS depression, coma, death may be occur. This is available in the form of injection. By giving ,1.5-7 mg S/C ,vomiting will start.

Indications : By accident if animal consumes any poison and then after very short time after consumption of poison,emetics can be given to induce vomiting to expel poisons.

G. Antiemetics :

The drugs which stop vomiting. They effect by three ways :

1. Local gastric sedatives (Antacids) : Some drugs stop vomiting by decreasing the irritation of gastric mucus membrane which is caused by hyperacidity. These drugs are called antacids. Eg. Soda-bi-carb, calcium carbonate, aluminum hydroxide gel etc.
2. Demulscent : These are those drugs which make a protective layer on gastric mucus membrane by which irritation is decreased and vomiting is stopped.eg. Glycerine, Dextrose etc.
3. Vomition center depressants (central gastric sedatives) : These are those drugs which stop vomiting by depressing the vomition center. Eg. Chlorpromazine, Trifluprom̃azine, Promethazine (human beings) etc.

Examples :

(a) **Chlorpromazine :**This is crystalline chemical which is soluble in water. This is more used in dogs and avoided in cats. This is a Phenothiazine derivatives. Dose – dogs 1 ml I/M

(b) **Trifluprom̃azine :** This is also Phenothiazine derivatives like Chlorpromazine. Dose: large animal – 5 ml I/M, dogs – ½ ml I/M, sheep – 1-2 ml I/M.

Indications of antiemetics :

i. They are used as local gastric sedatives.
ii. Hyperacidity.
iii. Gastritis.
iv. Irritant poison etc.

Central gastric sedatives are used in poisoning of apomorphine, ergot and morphine and they are also given in motion sickness.

Proprietary preparations :

1. **Largectil (tablets and injections) :** dose : large animal – 10 ml I/M, small animal – 2-3 ml I/M, dogs – 1-2 ml I/M.
2. **Inj.Stematil :** dose : large animal – 8-10 ml I/M, small animal – 2 ml I/M, dogs – ½ - 1 ml I/M
3. **Tab.Stematil :**Mostly used in dogs. Dose : 5 mg 1 tab b.i.d.
4. **Inj.Phenergan :** dose : large animal – 5 ml I/M, small animal – 1-2 ml I/M, dogs – ½-1 ml I/M
5. **Inj. Siquil :**dose : large animal – 5 ml I/M, small animal – 1 ml I/m, dogs – ½ ml I/M.
6. **Tab. Avomine :**dose : 5 mg used in human beings.

H. Antacids :

These are those drugs which decrease the amount of HCl which is produced in stomach. Eg.Soda-bi-carb, calcium carbonate, magnesium trisilicate, aluminum hydroxide gel, bismuth carbonate etc. Soda-bi-carb, calcium carbonate produce carbon dioxide gas after reacting with HCl and this gas cause secretion of more HCl by reflex action. This method is called **Acid Reboundphenomenon.**

A good antacid does not cause systemic alkalosis and also does not produce carbon dioxide and their effect does not last for long time. Soda-bi- carb causes systemic alkalosis which has bad effect on kidneys. Aluminum hydroxide gel does not cause systemic alkalosis. $CaCO_3$ and aluminum hydroxide do not produce **acid rebound phenomenon**. Therefore these are good antacids.

Examples :

1. **Sodium-bi-carbonate :**This is a white powder which is odorless and salty in taste. Dose : large animal 50-60 g, small animal 5-10gm, dogs 2-3 g, oral.
2. **Magnesium hydroxide gel:** This is made by suspending in water. This is given in sheep, goats and dogs. Dose: Sheep, goats – 30-60 ml, dogs – 5-10 ml, oral
3. **Magnesium oxide:** This is a white powder which is odorless, salty in taste and insoluble in water. Dose : large animal 30-50g, small animal 5-10 g. dogs 2-3 g oral
4. **Magnesium trisilicate:** This powder is colorless, odorless, tasteless, and soluble in water. It is a good antacid because:-
   i. It does not produce carbon dioxide.
   ii. It does not cause systemic alkalosis.
   iii. It removes the toxins in body.
   iv. It also works as a laxative.

   Dose: 300 mg-1 g oral

5. **Calcium carbonate:** This is white, tasteless and insoluble in water. This is also called chalk. Dose: large animal 30-60 g, small animal 5-10 g, dogs 2-3 g oral.
6. **Aluminum hydroxide gel:** This is a white liquid. This hinders absorption of phosphorus in the intestine, Therefore by giving this continuously, phosphorus deficiency may occur. Dose: dogs 2-8 ml oral.

Indications:

1. Hyperacidity 2. Vomition 3.Gastritis 4. Enteritis 5. Peptic ulcer etc.

Typical prescriptions of antacids (in dogs) :

Magnesium carbonate - 333 mg
Soda-bi-carb - 333 mg Triple carb
Bismuth carbonate - 333 mg
Mft. pulv.
Signa – one such pulv every 4 hour oral.

I. **Intestinal astringents :**

These are those drugs which precipitate the protein to make a layer on intestinal mucus membrane for protection. If this type layer is made on skin than it is called **external astringent.** This process should be reversible. Intestinal astringent works as a wall by making a protective layer between tissue and irritant elements. This will protect intestinal mucus membrane from bad effect Intestinal astringents are obtained from plants and minerals. From plants, tannic acid, catechu is obtained and from minerals, copper sulphate, aluminum hydroxide, ferroussulphateetc are obtained.

Examples :

1. **Tannic acid: -** This is obtained from plants. This is light, amorphous powder. Its color is light yellow or brown and taste is pungent. It is soluble in water and alcohol. After entering in body, it soon changes into gallic acid and pyrogallic acid,which are not astringents. This cause precipitation of heavy metals and alkaloids.
   Dose: large animal- 2-8 g, small animal – 500 mg
   Dogs and cats – 100 mg oral.
2. **Catechu: This** is obtained from stem and leaves of plants. This is black, brown or yellow in color. Brown colored is mostly used. In this 25-50 % tannic acid is present. It is used more commonly than tannic acid. This is easily soluble in warm water. It is used in large animals.
   Dose: large animal – 5-15 g, small animal – 2-3 g, dog – ½-1 g orally

3. **Ferrous sulphate:** This is obtained by reaction of iron and weak sulphuric acid, its crystals are green and powder is light blue in color. Its taste is metallic.
   Dose: large animal – 5-10 g, small animal – ½-1 g,
   Dog – 200-500 mg.
   Indications of intestinal astringents:
   1. Diarrhoea 2. Heavy metallic poisoning 3. Alkaloids poisoning

J. Antidiarrhoics: Those drugs which without precipitating protein, make a protective layer on intestinal membrane and thus by decreasing irritation, stop diarrhoea.E.g. Bismuth carbonate, calcium carbonate, Kaolin (aluminum silicate) etc.

Examples:

1. **Bismuth carbonate:** This is white, odorless, tasteless and insoluble in water.
   Dose: large animal – 15-20 g, small animal – 2-4 g,
   Dogs – 200-500 mg oral.
2. **Kaolin: This** is in the form of mineral. It is given in the form of powder after purifying it. This is white in color, odorless, tasteless and insoluble in water.
   Dose: Large animal – 50-250 g, Small animal – 15-20 g
   Dogs – 6-10 g orally.

K. Constipants :

The drugs which decrease the movements of intestine. Therefore food stay for longer time in intestine and water is absorbed in large amount. Due to this, faeces become harder and constipation may be occur. Eg.Morphine, atrophine etc.

L. Antispasmodics:

Those drugs which decrease the abdominal pain which is caused by peristaltic movement of intestine are called antispasmodics. Eg.Belladona, Hyoscine etc.

Examples:

1. **Hyoscine: This** is obtained from leaves and flowers of plants. This is colorless and obtained in crystal form. This is soluble in water and alcohol. This is available in market in form of injection, pulv.and tincture.Inj. Hyosmus.
   Dose: Large animal – 10-15 g, small animal – 1-2 g pulv
   Dogs – 10-15 drops of tincture oral
   Injection: Large animal – 5-6 mg S/C, small animal 1-2 mg S/c
   Dogs – 0.3-0.5 mg S/C
   Indications of Constipants and antispasmodics:
   These are used in diarrhea, Dysentery (mucus +Blood +Feaces) and colic (Abdominal Pain)
   Proprietary preparations of antidiarrhoics:
   1. Neblon powder- 100g, 250g, 1kg

Dose: large animal – 30-50 g, small animal – 10-15 g

2. Pectilin syrup
   Dose: large animal – 30-50 ml, small animal – 10 ml (oral)
3. Diardon powder
   Dose: large animal – 50-60 g, small animal – 5-10 g (oral)
4. Pesulin bolus has 5 g
   Dose: large animal – 4-6 bolus, small animal – 1-2 bolus (oral)
5. Diorex tab.
   Dose: large animal – 16-20, small animal – 5-10 tablets t.i.d.
   Dogs – 4-5 tablets

M. Demulcents:

These are the drugs which are given internally and they have soothing, softening and protective effect. E.g. Glycerine, liquid paraffin, gelatin, mustard oil, bismuth subnitras, gum acacia. These drugs reduce inflammation of G.I.T.

1. **Glycerine: -**when fats and fixed oils are mixed and they are hydrolyzed then we get glycerine. It is colorless, odorlessand sweet in taste and available as thick liquid in market.
   Dose: large animal – 50-100 ml
   Small animal - 5-10 ml
   Dogs - 2-3 ml (oral)
   When it is given in excess, it absorbs water in the intestine and there is irritation in the intestine.
2. **Liquid paraffin: -** This is byproduct of petroleum. This is of 2 types, light liquid paraffin and heavy liquid paraffin. This is colorless, tasteless, transparent liquid. This is less dense than glycerol.
   Dose: large animal – 500-1000 ml
   Small animal - 100-150 ml
   Dogs - 10-15 ml (oral)
3. **Gelatin: -**This substance is obtained by boiling collagen tissues such as tendons, ligaments, bones, skin etc. This substance is soluble in boiled water and insoluble in cold water and alcohol. On cooling this substance become like jelly. This substance is used very less. This substance is used to make capsules.
4. **Mustard oil: -** This is obtained by expression of mustard seed. 27% oil is obtained by expression. It is yellow color liquid and it has specific smell.
   Dose: large animal – 200-750 ml
   Small animal – 30-50 ml (oral)
5. **Gum Acacia:** This is obtained from stem of acacia. This is soluble in water. This is light yellow, glistening and odorless. This is insoluble in alcohol. This

can not be used as such. This is used as vehicle. Drugs are given mixed in this.

Indications of demulcents:

i. They are used as a vehicle for irritant/pungent drugs.
ii. Glycerine is used for making many preparations. Eg. Boroglycerine (3%), Iodine ointment, Suppositories, Passaries.

N. Adsorbants (intestinal adsorbants):

When some drug does not react chemically with another substance but fixes with that substance physically, that drug is called Adsorbant.
If this reaction (physical) occurs outside the body. It is called external adsorbants.

 # Protective:

These are the drugs which form a layer on mucus membrane and protects it. E.g. Bismuth salt, Bentonite, Kaolin.

(a) **Bismuth salt**: - This makes a layer on intestinal mucus and thus reduces irritation.
(b) **Bentonite**: -This is a very fine, cream coloured powder. It is soluble in water and it tastes like soil. Its 2-7 %solution protects intestine.
(c) **Charcoal**:- it is of 3 types:-
   i. **Wood charcoal**: - This is obtained from wood. It is obtained by burning wood in absence of oxygen. It is also black in color. It is odorless and tasteless.
   ii. **Animal charcoal**:- This is obtained from bones of animals.
   iii. **Activated charcoal**:- when wood charcoal is activated by adding some substance. After feeding activated charcoal, purgatives should be given.
   Dose: large animal – 15-30 g
   Small animal - 4-5 g
   Dogs - 2-3 g (oral)
(d) Pectin:- This is substance obtained from Guava. This adsorbs bacterial toxin. This is available as a solution in market.

Dose: Large animal - 100-150 ml
Small animal - 50 ml (oral)

Indications of intestinal adsorbents:-

Kaolin, Charcoal and Pectin are used for the adsorption of bacterial toxin and these are also to be given in poising of phosphorus, opium, nuxvomica.

Always use purgatives after giving the adsorbents.

O. Enema:

To give or inject drug in rectum is called enema, according to mechanism of action it is of 4 types: -

1. Purgative enema: - When enema is given to cure constipation. E.g. Soap dissolved in water, liquid paraffinand castor oil.
2. Sedative enema: - When enema is given to cure pain and spasm of intestine. E.g. Luke warm water enema.
3. Antispasmodic enema: -To cure pain and spasm of stomach caused by flatulent colic and Tympany. E.g. T.T. oil with water, Tincture asafoetida in water.
4. Anaesthetic enema: - Giving charcoal hydras dissolved in water.E.g. 50-100g Charcoal hydras in ½ liter water.

P. Cholagogues:-

Drugs which stimulates liver and thus increase secretion of bile. These are of 2 types:-

1. Direct cholagogues: - These drugs increase secretion of bile by stimulating liver. E.g. Sodium benzoate, bile, bile salts.
2. Indirect cholagogues: - These drugs increase secretion of bile by contraction of gall bladder. E.g. Magnesium sulphate, Calomel.

Q. Purgatives:

These are the drugs which help evacuation of intestine by causing diarrhea.These are of three types:-

1. Laxative: - These are the drugs which cause normal defecation. Eg. Green fodder, liquid paraffin, agar agar.
2. Simple purgatives: - These are the drugs which will increase the frequency of defecation and no spasm. When simple purgatives are given in less amounts it act as laxative. E.g. Magnesium sulphate, Linseed oil, sodium sulphate, calomel.
3. Drastic purgatives:-
   i. Severe diarrhea (Loose motion).
   ii. Cramps/spasm
   iii. Pain

According to mechanism of action, purgatives are of 4 types:-

1. Irritant cathartics: - These are drugs which cause diarrhea by increasing internal motility by irritation action. E.g. Aloe (it is acidic), fixed oil and castor oil (bile react with oil to form soap and it is called saponification.
2. Bulk cathartics: - These drugs absorb water from food in the intestine and from wall of intestine. After absorbing water size of these drugs increases. Due to increase in size there is pressure on intestinal walls because of pressure there is reflex action and increase in intestinal movements. E.g. Agar agar, wheat bran.
   i. Simple bulk cathartics: -These drugs absorb water from lumen of intestine and food in intestine. Due to this there is increase in volume of intestinal contents which causes stimulation of intestinal walls.E.g. Agar agar, wheat bran.
   ii. Saline bulk cathartics: - These drugs stop absorption of water in intestine and also absorb water from lumen of intestine. These drugs used as hypertonic solution.

   E.g. Magnesium sulphate – It contains two types of ions Mg^{2+} and SO_4^{2-}. These ions absorb water from intestine. $MgSO_4$ is best purgative in veterinary practice. Sodium sulphate can also be given. These purgatives should not be used in animals suffering from dehydration. $MgSO_4$ is used in cattle and buffalos. Sodium sulphate is used in horses.
3. Mechanical purgatives: - these purgatives are oily in nature. Because of oily nature these purgatives form an oily layer on mucus membrane of intestine and food. It makes food soft and it is easily expelled from GIT.
   Disadvantages of these purgatives: - These purgatives interfere with absorption of drugs, proteins, fats and carbohydrates because of oily layer.
4. Neuromuscular cathartics: - These drugs increase intestinal movements by stimulation of nervous system. E.g. Carbachol, Acetylcholine, Physostigmine, Neostigmine.

 # Examples of purgatives:-

1. **Calomel: -** It is white in color, heavy, odorless, tasteless powder. It is insoluble in water.

   Dose: large animal – 5-10 g
   Small animal - ½ -1 g
   Dogs - 200 mg (oral)
   Note: - After giving this saline purgative should be given.

2. **Sulphur:-** It is of two types:-
   i. Sublimated – This is fine granule powder and gritty in nature.
   ii. Precipitated: - It is soft and non-gritty in nature. When sulphur is put into flame than blue color is formed.

   Dose: large animal – 40-50 g
   Small animal - 1-5 g
   Dogs - ½ -3 g (oral)
3. **Aloe: -** It is obtained from leaves of plants its color is dark brown. These are in the form of small transparent pieces. Its taste is bitter, It is less soluble in water but insoluble in alcohol.

   Dose: large animal – 15-60 g
   Small animal - 5-10 g
   Dogs - 1-2 g (oral)
4. **Linseed oil: -** It is obtained from seeds of plants. It is yellowish in color. It is insoluble in water but soluble in alcohol.

   Dose: large animal – 500-1000 ml
   Small animal - 40-50 ml
   Dogs - 10-15 ml (oral)
5. **Castor oil: -**It is a fixed oil. It is also obtained from seeds of plants. It is colorless or light yellow, tasteless, soluble in alcohol. The covering of its seeds has substance which is called **Ricin**. Ricin is poisonous.
6. **Croton oil: -**It is a fixed oil. It obtained from seeds of plants. It is brownish yellow and red in color. It is insoluble in water and soluble in alcohol.

   Dose: large animal – 10-20 drops in 400-1000 ml linseed oil
   Small animal - ½ - 1 drop in 40-50 ml linseed oil (oral).
7. **Jalap: -** This is also obtained from plants. It is also mainly used in monogastric animals (pigs and dogs). A resin called Jalapin is found in this drug.
8. **Agar agar: -**This is obtained from sea weeds. It is like a jelly. It is translucent. It is insoluble in cold water and soluble in hot boiling water. On cooling, it solidifies and forms a jelly.

   Dose in dogs 5-10 g dissolved in hot milk and given in liquid paraffin.
9. **Sodium sulphate: -**it is obtained from reaction of NaCl and sulphuric acid. It is salty and bitter in taste. It is soluble in water. It is less soluble in alcohol. It is mainly used in horses.

   Dose in horse is 250-400 g and in dogs is 1-2 g (oral)
   As laxative in horses – 50-60 g
10. **Liquid Paraffin: -**Done already under demulcents.

11. **Carbachol:** - It occurs as crystal or powder. It is soluble in water. It is available in market as injection. Before giving this injection, animal should be given mustard oil or liquid paraffin because carbachol injection causes excessive contraction of intestine. If mustard oil or liquid paraffin is not given, intestine is damaged and animal can die.

Dose: large animal – 2-5 ml S/C or I/M
Small animal - ½ ml S/C
Dogs - 0.25 ml S/C

12. **Physostigmine: -**It is an alkaloid. It is obtained from seeds of plants. It is white in color but when exposed to air & sunlight its color becomes yellow or red. It is less soluble in water but soluble in alcohol. Its injection is available in market it is used in cattle.

Dose in large animal 30-100 mg I/M or S/C
Injection Neostigmine: - dose in large animal 5-10 ml I/M and in dogs 1-2 ml I/M (prostigmine)

Indications of purgatives:-

i. Acute constipation.
ii. Impaction of rumen and intestine.
iii. Impactive colic in horses.
iv. Poisoning.
v. Tympany.
vi. Jaundice.

Contraindications of purgatives:-

i. Advanced pregnancy.
ii. Obstruction of intestine

CHAPTER – XI
DRUGS ACTING ON SKIN

1. **Emollients:-**These are the drugs which make skin soft and smooth. These drugs are mainly used as base or vehicle for drugs used on skin.

   They are of three types:-

   i. Oil emollients:-
      a) Sesame oil
      b) Olive oil
      c) Arachis oil
      d) Cotton seed oil
      e) Mustard oil
      f) Coconut oil
      g) Theo bromo oil
      h) Almond oil

   ii. Animal fats: -e.g. Lard, anhydrous lanolin, Lanolin (hydrous lanolin).

   iii. Hydrocarbons: -e.g. Hard paraffin (paraffin), soft paraffin (Vaseline), white soft paraffin (white Vaseline), liquid paraffin, yellow wax, and tween 80, polyethylene glycol.

Examples of oil emollients:-

I. **Sesame oil: -** It is obtained from seeds of plants. The color of seed may be black, white or brown. Color of oil is light yellow. It has a specific smell. This oil is used for making liniments.

II. **Olive oil:** - It is obtained from flowers. It is light yellow in color. It is also used for making liniments.

III. **Arachis oil:** - It is obtained from seeds of plants. Color of oil is light yellow. It has a specific smell. Physically and chemically it is like olive oil. It is used for making injection.

IV. **Cotton seed oil:** - It is obtained from seeds of plants. It has light yellow color. It has specific smell. It is used for making liniments.

V. **Mustard oil:** - It is obtained from seeds of plants. Color may be yellowish, golden yellow or black. It is used for making liniments. It has specific smell.

Composition of liniments:-
T.T. oil - 60 ml
Mustard oil - 250 ml

VI. **Coconut oil: -** it is obtained from kernel of coconut. It is colorless, at temperature below 20^0 C it becomes white solids. It is good vehicle for making ointments. It also used on skin.

VII. **Theobromo oil:** - It is a solid fat. It is obtained from seeds. Its melting point is 30^0-35^0 C. That is below body temperature. It used for suppositories or pessaries.

VIII. **Almond oil:** - It is obtained from seeds of plants and very costly. Color is slight yellow. It can not be used in animals because it is very costly.

 # Animal fats: - They are used for making iodine ointment, sulphur ointment, mercury ointment. E.g. Lard, lanolin.

Examples:-

I. **Lard: -** It is obtained from pig's fat. It is insoluble in water and soluble in ether & chloroform. It is used for making ointments.

II. **Anhydrous Lanolin:** - It is obtained by purifying wool of sheep. It is of yellowish color. It is very less soluble in water and used for making mercury ointment.

III. **Lanolin:** - When Water is mixed with anhydrous lanolin, it is called lanolin.
Composition:-
Anhydrous lanolin - 700 g
Distilled water - 300ml.

 # Hydrocarbons:-

I. **Hard paraffin: -**This is obtained by distillation of petroleum. It is solid at room temperature. It is insoluble in water & alcohol and soluble in ether & chloroform. It is tasteless, odorless and greasy in nature. It is used for making ointments.

II. **Yellow soft paraffin or Vaseline:** - It is also obtained by distillation of petroleum. It is available as yellowish color Vaseline. It is semi-solid. Its property are like hard paraffin. It is used for making ointments.

III. **Whit soft paraffin (white Vaseline or petroleum jelly):**- It is color less and obtained from petroleum. Other properties are like yellow soft paraffin.

IV. **Liquid paraffin (liquid petroleum):**- This is also obtained from distillation of petroleum. This is available in liquid form. This is of two types – heavy and light. This is colorless, transparent, oily, odor less, taste less liquid. It is used for lubrication and for making paste such as BIPP and ZIPP and liniments.

V. **Yellow wax (yellow bee wax):**- It is obtained from bee comb. This is yellow colored solid. This is used for making ointment which is used on hooves.

VI. **White wax (white bee wax):**- This is made by bleaching of yellow wax. Its properties are like yellow wax.

VII. **Polysorbate (twin 80):-** This is a complex hydrocarbon. This is soluble in water. This is used as emollients and as a vehicle.

VIII. **Polyethylene glycol:** - This is also a complex hydrocarbon. This is solid. This is soluble in water. This is used for making ointment.

Indications of emollients:-

These are used for making liniments, paste and ointment.

Composition of a simple ointment:-

1. Wool fat – 50 part
2. Hard paraffin – 100 part
3. Soft paraffin (Vaseline) – 850 parts

Melt together and stir until cooled. It is used as emollients.

2. **Irritants: -**These are the drugs which produce irritation and stimulation when applied on body and produce swelling. Depending on degree of irritation irritants are 4 types:-
   - I. **Rubefacients: -**These are the drugs which increase blood circulation and causes redness of that part of the body. E.g. Camphor liniments, T.T.liniments, iodine ointments etc.
   - II. **Vesicants:** - These are the drugs which produce vesicles on that part of the body. E.g. Strong tincture of iodine, red iodine of mercury.
     If rubefacients are applied for longer time it acts as vesicants.
   - III. **Pustulants: -** These drug produced pustules when applied on body. Eg. Red iodine of mercury, canthridine ointment etc.
   - IV. **Caustics:** - These drugs destroy tissues. Eg. Caustics soda, silver nitrate, copper sulphate, NaOH, firing etc.

Examples Of irritants:-

1. **Camphor: -** It is a solid volatile oil obtained from distillation of plants. It can be made synthetically. It has pungent smell and bitter taste. It is insoluble in water and soluble in alcohol & olive oil. It is used to prepare ammoniated liniment of camphor.

   Composition:-
   Camphor - 125 g
   Oil of lavender - 5 ml
   Strong solution of ammonia - 250 ml
   Alcohol - 1000 ml
2. **Ammonia: -** it is obtained by dissolving ammonia gas in water. Its concentration is 32.5%. This is colorless liquid with pungent smell. It is used for preparing ammoniated liniment of camphor.

3. **Iodine:** - It is blackish blue colored salt. It is in the form of prism and crystal. It is volatile. It is less soluble in water and soluble in alcohol. When it is mixed with potassium iodide it dissolves in water.

   Uses of iodine:-

   i. For preparing solution and ointment. Eg. Lugol's solution, weak and strong tincture of iodine, iodine ointment.

   - Composition of lugol's solution:-

   Used in infection of cervix.
   Iodine – 2 g
   Potassium iodide – 3 g
   Distilled water add 40 ml

   - Weak tincture of iodine:-

     Iodine – 2.5 gm
     Potassium iodide - 2.5 g (1.5-2.5 g)
     Distilled water - 2.5 ml
     Alcohol add 100 ml

   - Strong tincture of iodine:-

     Iodine – 10 g
     Potassium iodide – 10 g
     Distilled water – 10 ml
     Alcohol – 100 ml

   - Iodine ointment:-

     Iodine – 4 g
     Potassium iodide – 4 g
     Glycerine – 12 ml
     Vaseline – 80 g

4. **Red iodide of mercury: -**This is obtained by combining mercuric chloride and potassium iodide. It is red colored but it becomes yellow on heating. It is insoluble in water but soluble when mixed with potassium iodide. It is used for making red iodide of mercury ointment.

   Composition:-
   Red iodide of mercury – 1 part
   Vaseline – 8 part (winter)
   16 part (summer)

   Note: -This ointment is mainly used on horses. It is applied on the wound and also all around the wound. If there are ulcers after applying it should be washed with shop solution after 1-2 days.

5. **Cantharidine: -** It is obtained from plants. It is blue green color. It is used very less in veterinary. Solution of 0.7 % cantharidine and acetone in 1:1 used.

6. **Sodium hydroxide (caustic soda):-** It is a white salt. This is available in market in the form of rods and crystals. It is soluble in water and alcohol. It is hard, brittle and bitter in taste. Its rods are used as caustic. 5% rods are used as caustic. It is corrosive in nature.
7. **Potassium hydroxide (caustic potash):-** Same as sodium hydroxide.
8. **Copper sulphate:** - It is used 20 % solutionas caustic in case of fistula.
9. **Silver nitrate:-**It is colorless, smell less soluble in water. It is available in the market in the form of rod and crystals. It is used as caustic.
10. **Phenol (carbonic acid):-** It is colorless liquid but become solid after some time. It has needle like crystal. It kept for long time, its color become pink. It has a specific smell. It is soluble in water, alcohol and glycerine. Its 2% solution is used as antiseptic. In a concentration above 2% it is caustic.

Indications of irritants:-

i. These are used in pain, contusion, sprain, abscess, swelling of tendon and ligament.
ii. They are also used in cautry, poison bites, warts, tumors and granulated wound.
iii. These are used in granulated ulcers.
iv. Firing is used to change chronic inflammation into acute inflammation.
v. These are used to treat inflammation in internal organ.
vi. These are used in pneumonia and pharyngitis.

3. **Desicants:-** These are the drugs which help in healing of wound. E.g. Zinc oxide, boric acid, calamine, calcium carbonate, borax etc.

Examples:

i. **Zinc oxide:-** It is obtained as a reaction of zinc and air. Color is light yellow or white. This powder is insoluble in water, smell less and with no specific taste.

❖ **Uses:-**

a) Use for making dusting powder.
b) Use for making zinc oxide ointment.
c) Use for making ZIPP.
d) Use for making calamine lotion.

❖ **Composition:-**

I. Dusting powder:-

Zinc oxide powder – 2 part
Boric acid – 2 part
Iodoform – 1 part

II. Zinc oxide ointment:-
Zinc oxide powder – 15 g
Vaseline – 85 g

III. ZIPP:-
Z= Zinc oxide powder – 1 part
I= Iodoform – 1 part
P= Paraffin liquid – q.s.
P= Make a paste

IV. Calamine lotion:-
Calamine powder – 15 part
Zinc oxide – 15 part
Glycerin – 5 part
Distilled water add – 100 ml

ii. Boric acid:- This is available as salt. This is white, fine, bitter in taste, acidic in nature, soluble in water.

❖ **Uses:-**

a) For making dusting powder.
b) For making boroglycerine.
c) For making boric acid lotion.
d) For making boric acid ointment

❖ **Compositions:-**

I. Boroglycerine 3%:-
Boric acid - 3 part
Glycerine add – 100 part

II. Boric acid lotion 2%:-
Boric acid – 2 part
Distilled water add – 100 ml

III. Boric acid ointment 1%:-
Boric acid – 1 g
Vaseline – 99 g
Can be used (1-10%)

iii. Calamine:-It is pure form of zinc carbonate and ferric oxide. This is a mineral. This can be made synthetically also. This is used as lotion.

iv. Calcium carbonate:- It is a chalk.

v. Borax:- It available as white color powder. It is alkaline in taste. It is soluble in water and glycerine. It is used to make borax glycerine.

❖ **Composition:-**

Borax – 3 parts
Glycerine – 22 parts

Indications of Desicants:-
They are mainly used in-

I. Oozing wounds
II. Eczema
III. Burn wound

4. Refrigerants:- These Drugs produce cooling effect when applied on body.

Examples:-

I. Lead acetate:- This is available as a salt which is in the form of white transparent crystals. This can be easily identified because of acetate smell. It is soluble in water, glycerine and alcohol. It is used for preparing white lotion.

Composition of white lotion:-
Lead acetate – 1 part
Zinc sulphate – 3 part
Distilled water – 80 part.

II. Glacial acetic acid:- This is a liquid acid. This is colorless with pungent smell and soluble in water and oil. It is available in market as 99% acetic acid. Vinegar has 5% acetic acid. It is used as preservative.

Uses:-
- 5% solution of acetic acid is used externally on skin.
- It is used orally also.

III. Ammonium chloride: -This is a white salt. This is odorless, salty and cool in taste. This is used for making refrigerants lotion.

Composition:-
Ammonium chloride – 1 part
Potassium nitras – 1 part
Aqua – 16 part

2nd composition:-
Ammonium chloride – 1 part
Lead acetate – 1 part
Alum – 1 part
Vinegar – 1 part

IV. Potassium nitras:- This is white colored, crystalline, cool, salty and soluble in water. This is available in the form of crystals. This is also used in making refrigerants lotion.

Indication of refrigerants:-
1. These are used in sprains in tendon and ligament.

2. They are used in prolapse of uterus.

5. **Resolvants:-** These are the drugs which dissolve inflammatory tissue.

Examples:-

Potassium iodide:- This is white granular salt. This is odorless, salty, and soluble in water, glycerine and alcohol. This is given orally.

Dose:- Large animal – 5-10-15 g
Small animal – 2-3 g
Dog and cat – 200-500g

This is used for making ointment, tincture and Lugol's solution. This should not be given more than 5-7 days. If given more, it will cause toxicity. There will be discharge in nose and eyes.

Indications of resolvants:-

i. Oedema
ii. Rheumatism
iii. Arthritis
iv. Pneumonia
v. Pericarditis
vi. Contusion
vii. Lymphadenitis

6. **Keratolytics:-** These drugs destroy dead tissue from skin and make skin soft.

Examples:-

Salicylicacid:- This is light white colored powder. Its taste is sweet in the beginning but becomes pungent afterwards. This is soluble in water. It is used for making 2% ointment.

Indications of Keratolytics:-

This is used in:-

i. Warts
ii. Corns
iii. Ringworm

7. **Diaphorectic:-** These are the drugs which increase sweating. These produce their effect in different ways. "When amount of sweat increase so much that is flows like water" this condition is called as **SUDOROFICES.** E.g. opium, alcohol, chloral hydras, fear, anxiety.

8. **Antipruritis:-** These drugs are used to treat pruritis. These are 2 types:-
   i. Corticosteroid
   ii. Anti-histamine

9. **Deodrants:-** These are the drugs which remove bed odor from wounds.E.g. Potassium permanganate, charcoal etc.

Examples:-

Potassium permanganate:- There are violet colored crystals. This is odorless, sweet in taste and soluble in water. It is used in concentration of 1:1000. It is also called Candy's lotion.

Indications:-

i. For bad smelling wounds.
ii. For washing of wounds abscess
iii. Gangrene.

❖ **Detergents:-**These are the drugs which cleans skin of dust, dirt and oil. E.g. Liquid soap, cake soap, water, caustic soda.

CHAPTER – XII
DRUGS ACTING ON RESPIRATORY SYSTEM

1. **Expectorants:-** These are the drugs which makes secretion of respiratory system thin and increases its quantity so that it is expelled easily. These are of 2 types:-
   - **i. Local expectorants:-**These affect the respiratory tract directly. These are of 2 types:-
     - (a) Local inhalant:- These are the drugs which are given through inspiration and these drugs affect mucus membrane directly.
       Eg. Steam, T.T. oil inhalation, eucalyptus oil inhalation, tincture benzoin co inhalation, camphor inhalation.
     - (b) Non-inhalant:- These are the drugs which are taken through mouth and these also affect mucus membrane. Eg. Potassium iodide, potassium nitrate, sodium iodide.
   - **ii. Reflex expectorants:-**These are the drugs which stimulate nerve ending of mucus membrane of pharynx, mouth, esophagus and stomach.eg. Ammonium chloride, ammonium carbonate, potassium nitras.

Examples of expectorants:-

- **a. Benzoin:-**it is obtained from the stems of plants. Its properties :
  - I. This is brittle.
  - II. It melts after heating.
  - III. Its smell is pungent.
  - IV. It contains following compound :
    Benzoic acid, cinnamic acid and volatile resins.
    Dose as local expectorant for inhalation – 2-4 teaspoon full/liter of hot water.
- **b. Eucalyptus oil:-** It is obtained from distillation of the leaves of eucalyptus plant. Its properties :
  - I. Colorless to light yellow color.
  - II. Soluble in alcohol, insoluble in water.
  - III. It has camphor like smell.

  Dose : 10-15 ml/liter of hot water.
  T.T. oil : 10 ml/liter of hot water.
- **c. Camphor tablet:-**One tablet in hot water.
- **d. Ammonium chloride:-** It is white in color and salty in taste.
  Dose : large animal – 4-8 g

Small animal – 2-3 g
Dogs – 200-500 mg/in saline electuary /Mft. haust

e. **Potassium nitras:-**
Dose : large animal – 4-8 g
Small animal – 1-2 g in saline electuary, oral
Dogs – 200-500 mg

f. **Potassium chloride:-**It is obtained from electrolysis of potassium chloride. Properties :same as ammonium chloride. Route oral.
Dose : large animal – 8-16 g
Small animal – 2-3 g
Dogs – 200-500 mg

g. **Sodium iodide:-** It is white color crystalline salt. Salty and bitter in taste. It is soluble in water and alcohol.
Dose : large animal – 4-16 g
Small animal – 1-2 g in saline electuary Dogs – 200-500 mg

h. **Potassium iodide:-** It is resolvants.
Dose : Large animal – 8-16 g oral

i. **Balsam of tolu/peru:-**it is obtained from stems of tree which found in the forest area. Properties :
I. It is yellow in brown and solid.
II. They have specific smell.
III. It is soluble in ether, alcohol and chloroform.
IV. They are used in dogs.

Dose : 10-30 drops oral

j. **Ipecacuanha:-**It has the following alkaloids : Emeline, cephaline. If this medicine is give in small amount than it works as expectorants. But when give in large amount it works as emetics.
Dose : large animal – 2-4 ml
Small animal – 1-2 drops

k. **Glycerrhiza:-** it is obtained from rots of plants. Properties:-
I. Color is brown
II. Its smell is sweetish.
III. Taste is sweet.
IV. In this glycerrhizin glycoside is present.
V. This is used in dogs and human. Also used in saline electuary.
Dose : Liquid extract of glycerrhiza in dogs 15-30 drops oral.

Some preparations :

Saline electuary:-

Pulv. Belladonna – 4 g
Pot. Chlorate – 8 g
Pulv glycerrhiza – 16 g
Pot. Nitras – 2 g
Amm. Chloride – 8 g
Treacle – 8 g
Mft. elect.

Properietory preparations (trade name):-

	Name	Packing	Dose	Route
1.	Caflon powder	100 g, 1 kg	LA – 30-40 g SA – 5-10 g Dogs – 1 g t.s.f.t.i.d.	Oral
2.	Piriton cough syrup	450 ml	Dogs – 1 ml t.s.f.t.i.d.	Oral
3.	Vasaka syrup	100 ml	LA – 50 ml SA – 10 ml Sheep – 10 ml Dogs – 5 ml	Oral

Indications of expectorants:-

1. Pneumonia
2. Bronchitis
3. Tracheitis
4. Laryngitis
5. Pharyngitis
6. Bronchopneumonia

Anti-expectorants:- These are the drugs which decrease the bronchial secretions. They work by two ways:-

1. Decrease the amount of sputum by effect on the vagus nerve ending. Eg. Belladonna, Hyosyamus.
2. By effecting the brain decrease the sputum. Eg. Opium. These drugs are less use in vety. as anti-expecorants.

RESPIRATORY STIMULANTS OR ANALEPTICS :

The drug which stimulate respiratory system and due to this respiratory rate will

decrease and depth of respiratory will increases. Respiratory rate and depth of respiratory the both reactions are decreases in poisoning and anesthesia. Examples : Laptazol, Nikethamide, Picrotoxins, Bemogride, Caffine, Theobromide, Theophylline etc.

Examples:-

1. **Laptazol:-**This is a synthetic compound and is available in market as white crystals. It is soluble in water and used mainly in dogs.
   Dose : 3-5 mg/ pound b. wt. or 6-10 mg/kg b. wt. I/M or I/V.
2. **Nikethamide:-** It is also synthetic compound. It is a pyridine derivative. It is colorless or light black in color. Soluble in water, specific smell.
   Dose : 10-20 mg/lb. b. wt. I/M, I/V, S/C.
3. **Picrotoxins:**- This is obtained from seeds of plants. It is very strong analeptic. It is not safe but it can be used in emergency.
   Dose : Horse and cattle – 60 mg I/V
   Dog – 1-3 mg
4. **Bemegride:**- It is synthetic compound. It is used as antidote in barbiturate poisoning.
   Dose : 7-9 mg/lb. b. wt. I/V indogs and cats.
5. **Caffine:**- It is obtained from seeds of plants. It is CNS stimulant. In the market, it is available as APC tablet.
   Full form of APC : A= Aspirin, P= Phenacitin, C= Caffine
   Dose : 0.1 – 1 g in dogs oral
6. **Theophylline:**- This is obtained from tea leaves. This has effect on coronary blood vessels. It dilates coronary blood vessels. It also stimulates CNS and act as diuretic. This is mainly in broken wind mainly in horses.
   Dose : Tab. 500 mg (6Hourly) oral.
7. **Theobromine:**- This is obtained from beans of plants and soluble in water. It is CNS stimulants and act as diuretic.
   Dose : 2-3 g dry oral in human beings.

Proprietary preparations:-

I. Inj. Coramine :- LA – 6-10 ml direct in heart or I/V or I/M
II. Inj. Nikethamide:- LA –6-10 ml direct in heart or I/V or I/M (Available as Ampoule of 2 ml)

BRONCHO DILATERS & BRONCHIAL ANTISPASMODICS :

These are the drugs which dilate bronchi and reduce spasm.

Actions:-

i. By depressing the vagus nerve endings. Eg. Belladonna, hyocyamus.
ii. By stimulating symphathetic nerve system. Eg. Adrenaline, ephedrine.
iii. By relaxing smooth muscles. Eg. Pot. Nitras salt.

Examples:-

1. **Adrenaline:-**It is obtained from adrenal gland. It is less soluble in water but soluble in alcohol. Adrenaline hydrochloride is soluble in water and is available in market as injection adrenaline hydrochloride.
   Dose: LA – 5-15 ml S/C
   S&G – 5 ml (2-6 ml) slow I/V
   Dogs – 3-10 drop S/C
2. **Ephedrine:-**It is an alkaloid and obtained from plants. This is colorless odorless liquid. Its taste is not good. It is used in many expectorants, syrup.
   Dose : dog – 5-15 ml oral
3. **Theophylline**

Proprietary preparations:-

Deriphyllin : This is available as tablet and injection both. This is not much used.
Dose : LA – 5-15 ml
Dogs – ½-1ml deep I/M

Indications:-

i. This is not much used in veterinary.
ii. Pulmonary emphysema.
iii. Broken wind in horses.
iv. Bronchial asthma in human.

ANTITUSSIVE (Cough depressant) :

These are the drugs which reduce cough or eliminate cough. These drugs having following action:-

i. By depressing cough center in medulla oblongata. Eg. Morphine opium.
ii. By depressing vagus nerve ending.
iii. Local action as counter irritant chest.
iv. Inhalation.
v. By depressing para symphathetic nerve. Eg. Atrophine.

Examples:-

1. **Opium:-**This is obtained from plants. Its color is brown but become black afterwards. Taste is bitter and smell is specific. It contains alkaloids, resins and organic acids. Its powder contains 10 % morphine.
   Dose : LA – 4-12 g oral
   Dogs – 30-100 mg oral
   S&G – 1 g oral
   This is available in tincture also. In the market it is called tincture opic.

2. **Morphine hydrochloride:-** This is obtained from opium. It is colorless , brittle, needle like powder. Its taste is bitter. It is soluble in water and alcohol. It is available in market as injection.

   Dose : LA – 100-250 mg S/C
   Dogs – 5-10 mg S/C

Proprietary preparations of antitussive :

1. Glycodine syrup contains codeine phosphate
   Dog – 1 tsf b.i.d. oral
2. Tab. codeine phosphate 1 tablet b.i.d. oral

Indications:

Painful cough, dry cough due to pneumonia, bronchitis, pharyngitis, should not be used in productive cough.

RESPIRATORY DEPRESSANTS :

The drugs which decrease the respiration rate by depressing the respiration center. Eg.Anasthetics, narcotics etc.

CHAPTER – XIII
DRUGS EFFECTING BLOOD VASCULAR/CIRCULATORY SYSTE

COAGULANTS (HAEMOSTATICS) : The drugs which stop bleeding by coagulating the blood called coagulants. Coagulants are of two types:-

1. **Local coagulants:-**The drugs which are applied locally or topically and they stop bleeding by local coagulants or astringent action.

   STYPTICS : The drugs which stop bleeding by astringent action are called as styptics. Examples are thrombin, adrenalin hydrochloride, Tr. ferri chloride, Tr. ferri perchloride, Tr. steel, Tr. benzoin co. Tanin, alum etc.

   (a) Ferric chloride : These are yellow or orange colored crystals. It is soluble in water and odorless. This is used to make tincture eg. Tr. ferri chloride, Tr. ferri perchloride, Tr. steel. They are applied locally on skin.

   (b) Alum:- it is of two types – Potas alum and Ammonium alum it is colorless and in crystal form. Taste is sweet and astringents. It is soluble in water and glycerine and insoluble in in alcohol.

   Dose : as coagulant 10-30% of solution
   Generally its 2 % solution is used.

2. **Systemic coagulants:-**These are those coagulants which are given in body in the form of injection, tablets or capsules. If anywhere bleeding in the body they are used. eg. Vitamin K

   (a) Menadione : It is a synthetic salt which is available in yellow color powder or crystals. It is less soluble in water. It is give parenterally or orally.

   Dose : LA – 1-3 mg
   S & G – ½ mg
   Dogs – 0.2-0.5 mg

   (b) Chromostat : This is mostly used in vety. and human. It is available in reed colored 10 ml ampoules in market.

   Dose : LA – 20-40 ml I/V, I/M
   SA – 5-10 ml, I/V slow
   Dogs – 2-4 ml in drips or I/M

   (c) Chromogen : It is available as 2 ml ampoule. It is never use in pregnant animal because its action is ecbolics. Dose : Same as chromostat.

   (d) Inj.Adrenalin : it is give slow I/V and I/M.

   Dose : LA – 4-5 ml
   S & G – 2 ml
   Dogs – 1 ml

   (e) Styplon tablet :

   Dose : LA – 10-20 tablets
   SA – 2-4 tablets

Dogs – 1-2 tablet oral

(f) **Formaldehyde or formalin :** Dose only cow and buffalo – 10 ml in 1-2 liter of drinking water, mainly in blood in milk.

ANTICOAGULANTS : The drugs which stop clotting of blood. These are of two types :-

1. **In vivo systematic anticoagulants :**These are those drugs which prevent the clotting of blood inside the body. E.g. heparin, dextran sulphate, dicoumarols, warfarin sodium, snake venom.
   (a) **Heparin :** It is used as in vivo and in vitro anticoagulant and obtained from animals. It prevents formation of thrombin from prothrombin in body due to which blood does not coagulate. Dose : 400-600 IU for 100 ml blood.
   (b) **Dextran sulfate :**It is like heparin but it is more acidic.
   (c) **Dicoumarol :** it is also like heparin. Sometimes poisoning may be occur after giving this which is cure by giving vitamin K.
   (d) **Warfarin sodium :**this is like dicoumarol which is found in some amount in rat killing drugs in market.
   (e) **Snake venoms :** In poison of cobra snake anticoagulant property is present because in snake venom a enzyme is present which is called protease. This enzyme effect fibrinogen due to which blood does not coagulate.
2. **In vitroanticoagulants:** The drugs which prevent the clotting of blood outside the body.
   (a) **Sodium Citrate :** this is white, granular powder, odorless and soluble in water. Taste is salty and its 2.5% solution is used in water or NSS.
   Normal Saline Solution : Made by autoclaving 8.5 g NaCl in water then it is called NSS. Heat at 15 pound pressure for 15 minutes.
   (b) **Ammonium Oxalate and potassium oxalate :**
   Ammonium oxalate – 1.2 g
   Potassium oxalate – 0.8 g
   Dissolved in 100 ml distilled water.
   Its ½ ml (autoclaved) is sufficient for 5 ml of blood.
   (c) **EDTA (ethylene diamine tetra acetic acid) :**This is white, granule, easily soluble in water. Dose : 1 mg for 5 ml of blood & is used in lab.
   (d) **Hirudin :**This is obtained from leech. This is found in saliva of leech. This is antithrombin.
   Indications:-
   1. These are mainly used in laboratory.

2. These are also used as blood transfusion. Citrated blood is used for blood transfusion.

VASOCONSTRICTORS:-

The drugs which decrease the diameter of blood vessels by constrict them and increase blood pressure are called vasoconstrictors. They work by three types:-

1. Some drugs start vasoconstriction by stimulating the vasomotor center present in medulla oblongata. Eg. Strychnine, atropine, caffeine, laptazol etc.
2. Some drugs works as vasoconstrictor by stimulate the vasoconstrictor nerve endings. Eg. Adrenaline.
3. Some drugs act as vasoconstrictor by stimulating the wall of blood vessels. Eg. Vasopressin hormone, physostigmine.

Indications of vasoconstrictors:

These drugs are mainly used in human beings (1) Heart failure (2) Collapse (3) To check internal haemorrhage

VASODILATORS :

Those drugs which dilate the blood vessels and due to this decrease the blood pressure. This works by two ways:-

1. Some drugs works as vasodilators by depressing the vasomotor center which is present in medulla oblongata. Eg. Alcohol, chloroform, chloral hydras etc.
2. Nitras and opium are those drugs which decrease the blood pressure by dilate the muscles.

Indications :

1. Brain haemorrhage 2. Brain congestion 3. Fever

HAEMATINICS :

These are those drugs which increase amount of RBCs and Hb in blood. Mechanism of action is of types:-

1. Some drugs mature the RBC. Eg. Liver extract, folic acid, cyanocobalamin (B_{12}) etc.
2. Some drugs help in the formation of RBC. Eg. Iron, Copper, Cobalt etc.
3. Some drugs stimulate the bone-marrow and increase the number of RBC. Eg. Arsenic salt etc.

Iron preparations :

(a)Ferrous sulphate:-

LA – 4-16 g oral

SA – 1-2 g oral
Dogs – 50-200 mg oral

(b) Ferrous phosphate:-Available in the market as easton's syrup.

Composition :
Ferrous phosphate – 60 mg
Quinine sulphate – 48 mg
Strychnine hydrochloride – 1 ml
Aqua – 4 ml
Used in dogs : 5-30 drops oral

(c) Iron and ammonium citrate salt:-This is red colored, granular powder and easily soluble in water.

Dose:-Cattle – 4-8 g Oral
S & G – 1-2 g Oral
Dogs – 400-600 mg Oral

(d) Iron dextran:-It is used in veterinary practice. This is available in the market as parentrally injection which have brand name Imferon.

Proprietary preparations:-

1. Inj. Imferon 10 ml C & B deep I/M
2. Inj. Uniferon. Same as Imferon
3. Tab. Ferseolate
   LA – 10-15 tab. b.i.d. oral
   SA – 2-3 tab b.i.d. oral
   Dogs –1-2 tab.
4. Iron and folic acid tablet. Same as Tab. Ferseolate.

(e) Vitamins which are haematinics:-

1. Cyanocobalamin
2. Pyridoxine
3. Folic acid
4. Niacin

(f) Minerals which are haematinics:-

1. Copper
2. Cobalt chloride/sulphate :- When this salt is give in ruminants then after entering in the rumen it produce vitamin B-complex by mixing with microflora (which present in rumen bacteria).
   Prophylactic dose : LA – 10-25 mg, SA – 5 mg Oral
   Therapeutic dose : LA – 500 mg, SA – 100 mg Oral

Indications of Haematinics :

1. Anemia
2. For synthesis of R.B.C. and Hb.

3. Accidental haemorrhage
4. Leptospirosis
5. Post-parturient haemoglobinuria
6. Theileriasis
7. Babesiosis
8. Anaplasmosis
9. Copper deficiency
10. Haemonchus
11. Broken fern poisoning
12. Bacillary haemoglobinuria

Cardiac stimulants:-The drugs which increase the heart beat. They are 4 tgypes:-

1. Sympathomimetic drugs eg. Adrenalin
2. Parasympatholytic drugs eg. Atropine
3. Cardiac muscle stimulants eg. Digitalis
4. Reflex stimulant eg. Alcohol

Cardiac tonics:-The drugs which slowly increase the work efficiency of heart.
Eg. Tr. digitalis – Horse -10-15 ml
Digitoxin – horse – 8-15 mg, dogs – 2-10 drops

CHAPTER – XIV
DRUGS EFFECTICNG URINARY SYSTEM

DIURETICS : These are the drugs which increase the quantity of urine. They act in different ways therefore they divided into different groups:-

1. **Water and osmotic diuretics:-**When water is given in high amountto animal then more water is filtered from its kidney and reabsorption is reduced. Thus water is a physiological diuretics. In the same way, if such substances are given which have osmotic pressure and are not reabsorbed in tubules. After giving them they filtered from glomeruli of kidney and come in high amount in tubules and they do not absorb from tubules. By this the amount of urine is increases. Eg. Hypertonic solution of glucose and Manitol.
   (a)Glucose:- This is white, sweet in taste and cooling effect. It is soluble in water. Its 10%, 20% and 50% solution is called hypertonic which acts as diuretics.
   Dose:- LA – 1-2 liter I/V
   S & G – ¼ - ½ liter, I/V
   Dogs – 100-200 ml, I/V
   Note:- 5% glucose or dextrose are not hypertonic therefore they are not works as diuretics.
   (b) Mannitol:- This is also a carbohydrate& it is like glucose.
2. **Saline diuretics:-**These drugs increase amount of salt in glomerular and by this decrease the reabsorption of water from tubules. Eg. Soda bicarbonate, magnesium sulphate, ammonium chlorfide, potassium nitras.
   Formula of diuretics mixtures:-
   Aqua – q.s.
   Mag. Sulph. – 180 g
   Amm. Chloride – 16 g
   Pot. Nitras – 8 g
   Mft. drench
3. **Mercuric diuretics:-**When mercury salt is giventhen it lose ions of mercury and these mercury ions after combining with some enzymes in tubules reduced the act of reabsorption. In this way, they act as diuretics. In these days mercury salts are less used. Instead of thistheophylline or organic mercurial are used. eg. Calomel (mercurous chloride), mersalyl etc.
   High dose of calomel may be toxic and may damage nephrons.
   (a)Mersalyl:-This is white colored powder, smell less, bitter in taste, soluble in water and alcohol. It also contains 5% theophylline.
   Dose:- dog – 1-2 ml I/M
   Cat – ½-1 ml I/M

Note:- This should not be given S/C or I/V otherwise it may cause death.

4. **Carbonic anhydrase inhibitor diuretics :-**some drugs stop reabsorption in tubules by interfering the work of carbonic anhydrase enzyme and works as diuretics. Eg. Acetazolamide.
   (a) **Acetazolamide:**- This is white color powder, soluble in water. Available in market as tablets and injections. It is used in dogs and cats.
   Dose: 1-3 mg/kg body weight oral, I/M
5. **Thiazide diuretics :-**These drugs are chlorosulfonamide derivatives. These drug affect the proximal convoluted tubules (PCT). Due to this reabsorption of Na and H_2O is decreases. Therefore there is more excretion of water.
   Eg. Hydrothiazide, Chlorthiazide,
   Chlorthiazide is less potent than hydrothiazide. Examples are Chlorthiazide and Hydrochlorthiazide.
   Dose :
   Chlorthiazide : inj. 10 mg/kg body weight I/V
   Hydrochlorthiazide : 1 mg/kg body weight I/V
   Both are white powder and prepared synthetically.
6. **Xanthine and aminouracils:-**Earlier Xanthine were used much as diuretics like Theophylline and Caffeine, but now their nitrogenous derivatives prepared synthetically which are called as aminouracils diuretics. These diuretics not used in animals. Eg. Medicine like chlorazanil increase the amount of sodium and chloride in urine. Usually these medicines are not used in animals.
7. **Loop of Henle's diuretics:**- some drugs directly effect the loop of Henle and decrease reabsorption of water by this way increase the amount of urine.
   eg. Furosemide salt.

   (a) **Furosemide salt:-** It is white synthetically prepared salt
   Dose: LA – 1.5-3.0 mg/kg body weight oral or inj.
   Dogs and cats –5-10 mg/kg body weight 6 hourly
   inj. Furosemide (5%)

Proprietary preparations of diuretics :-

i. Inj. Manitol 10%, 20%, 30% in bottles. Dose : 2-4 bottle of 10% I/V
ii. Inj. Dextrose 10%, 20%, 50%. Dose : same as manitol.
iii. Inj. Lasix 2 ml of ampoules
   Dose : LA – 6-10 ml I/M
   SA – 2-4 ml
   Dogs – 1 ml
iv. Tab. Lasix 25 mg, 50 mg only in dogs 1 tab. b.i.d oral

v. Tab. chlorthiazide 500 mg, dose : 10 mg/kg body weight oral.
vi. Inj. Diural : (same as Lasix)

Composition Diuretic mixture (Febrifuge mixture):
Mag. Sulphate – 180 g
Amm. Chloride – 16 g
Pot. Nitras – 8 g
Aqua – q.s.
Mft. Haust
Indications:-
(1)Fever (2) Poisoning (3) Ascites (accumulation of water in internal organs) (4) congestive heart failure (5) Oedema (accumulation of water in body.

1. Water and osmotics diuretics are used in acute renal toxicity, renal failure, oedema due to heart failure, renal diseases etc.
2. Salts/saline diuretics used in prevention of urolithiasis, fever, cystitis, Oedema.
3. Mercurial diuretics : Oedema due to congestive heart failure.
4. Carbonic anhydrase inhibitor diuretics used in Glaucoma (accumulation of water in eye chamber, Udder Oedema.
5. Thiazide diuretics used in oedema due to hepatic disorder, congestive heart failure, renal diseases.
6. Xanthine and aminouracils : Oedema due to congestive heart failure.
7. Loop of Henle's diuretics used in oedema of any type mainly pulmonary oedema.

Note :diuretics are not preferred in lever diseases.

ANTIDIURETICS :
The drugs which decrease the amount of urine are called as antidiuretics. Some drugs decrease the amount of urine by decrease the flow of blood in kidneys. Eg.Adrenaline, digitalis.

Generally antidiuretics are not used in veterinary. But used in case of diabetes in human beings.

URINARY ACIDIFIERS :
These are the drugs which decrease pH of urine and make urine acidic. Eg.Sodium acid phosphate, ammonium chloride, sodium citrate, sodium salicylate etc.

(a) **Sodium acid phosphate :-** This is synthetically prepared white salt. It is odorless, salty in taste and soluble in water.

Dose : LA – 40-160 g b.i.d. oral (horse)
S & G – 10-20 g
Dog – ½-1 g

Note: Defficiency of phosphorus causes a disease which is known as

haemoglobinuria. In this disease color of urine becomes blackish or coffee color.

(b) **Sodium salicylate:-**this is white powder with a typical special smell, taste is sweet but not good, soluble in water and alcohol.

Dose: As acidifier	In Rheumatism
LA – 15-30 g	50-100 g
SA – 2-3 g	10 g
Dogs – 300-600 g	1-2g

Indications of acidifiers:

i. Cystitis ii. Urethritis iii. Alkaline urine of dogs and cats

Normally the urine of horse, cow and buffalo are alkaline in nature and urine of human, dog and cat is acidic in nature.

iv. When hexamine medicine is given it act as urinary antiseptic and this medicine acts only when urine is acidic.

URINARY ALKALIZERS :

The drugs which increase the pH value of urine, they are called urinary alkalizers. Eg.Soda-bi-carb.

These drugs are used mainly in human beings and not in animals.

Proprietary preparations:-

i. Alkasip - mainly used in dogs only.

ii. Alkacitron - 1 tea spoon full b.i.d./t.d.s. oral.

iii. Oricital

Indications:-Calculi formation due to uric acid. Uric acid is found in human beings.

URINARY ANTISEPTICS :

These are the drugs which stop thegrowth of microorganisms in the urinary tract. More acidic and more alkaline urine is always sterilized. Some drugs act in acidic medium eg. Hexamine. Some drugs act in alkaline medium eg. Acriflavin, methylene blue etc.

(a) **Hexamine:-**This is available as colorless or white colored powder. This is soluble in water and alcohol. It is first sweet then bitter in taste. Before giving this always give ammonium chloride before one hour therefore urine becomes acidic.

Dose :Dogs and cats - 300 mg – 1 gm oral

(b) **Acriflavin:-**This is dark orange or red colored powder. Its taste is alkaline and it is smelless, when it is dissolved in water then color of water becomes greenish yellow. This is soluble in water, alcohol, glycerine.

Dose : 5% solution, 20 ml I/V slow only cattle

Note : In these days acriflavin solution is not used because in these days very good urinary antiseptics are available.

Indications :(1) Cystitis (2) Urethritis (3) Nephritis (inflammation of kidney).

URINARY SEDATIVES :

These are the drugs which decrease the irritation of urinary tract. Eg.Soda-bi-carb, Belladona, Hyoscyamus, Hexamine.

Indications :

1. Pain and burning sensation in urinary tract in urethritis and nephritis etc.

URINARY LITHIORIPTICS :

These drugs prevent formation of calculi in kidney and urinary tract.e.g.Lithium carbonate,Lithium citrate.

a) **Lithium carbonate:**This is white colored,alkaline and less soluble in water.This is used in dogs. Dose: 200-600 mg oral
b) **Lithium citrate:** Its properties are also like lithium carbonate.But this is more soluble in water.This dissolves crystals of uric acid. It is mainly used in dogs and humans. Dose: 200-600 mg oral

Proprietory Preparations :

1. Cystone tab. Large Animals- 10 tab. t.i.d. oral, S & G -4 tab. t.i.d. oral, Dog: 1-2 tab. t.i.d. oral.
2. Cystone powder: Large animal: 2-4 g t.i.d. oral, S &G- ½ g Dog- 300-500 mg
3. Stonil powder: Large Animal- 50 g oral S & G: 5 g

CHAPTER-XV
DRUGS EFFECTING ON REPRODUCTIVE SYSTEM

APHRODISIACS:

These drugs increase sexual desire. These are of 2 types:

a) **Direct aphrodisiacs:** These drugs excite sex centres and thus increase sex desire.e.g.Nux vomica, Testosterone hormone,Alcohol,Yohimbine,Canthridine
b) **Indirect aphrodisiacs:** These are Good diet and haematinic drugs which increase sexual desire.

Indications of aphrodisiacs: Mainly used in impotency of bull and in such case give less ration to bull.

ANAPHRODISIACS:

These drugs decrease sexual desire. e.g.Pot. iodide,Sodium iodide,Sodium bromide,Pot. Bromide,Amm.Bromide,Belladona.

a) **Sodium iodide:** See Ch. XII -Resp.System Dose: Large animal: 4-8-16 g oral, Dog: 200-650 g
b) **Pot. Bromide:** It is colourless,odourless, salty,granular powder.It is soluble in water and alcohol. Dose: C & B -15-60 G ORAL, S&G- 2-4 g oral Dog- 500 mg -1 g oral
c) **Sodium bromide:** Same as Pot. Bromide but it is more soluble in alcohol.
d) **Amm. bromide:** This is available as colourless crystal. It is salty in taste. Dose same as Pot. Bromide.
e) **Belladona(See Antisialics,Ch 10 –Digestive System)**

Indications: Nymphomania (When animal comes in heat again and again before time)

ECBOLICS :

These drugs increase uterine contraction and thus expel foetus and placenta out of uterus.e.g.Posterior pituitary extract,oxytocin, ergot,ergometrine maleate etc.

a) Posterior pituitary extract: It is obtained from pituitary gland mainly in mammals. It is transparent liquid. It contains 2 things: Oxytocin and Vasopressin. It has to be sterilized before selling in market. 1ml ampoule of this contains 5 I.U. or 10 I.U. Dose: As Ecbolic: 60-100 I.U. I/M, Milk let down: 5- 10 I.U. I/M

b)Oxytocin: It is a hormone.It is available in market with this name. This is prepared from posterior pitutary extract. Dose as above.

c) Ergot: This is dark white to black colour substance which is of white or pink colour inside.This contains many alkaloids: e.g.Ergotamine,Ergotinine,Ergotoxine,Ergometrine etc.This is available in market as powder. Dose: H &C-15-30 g, S &G-2-3 g, Dog-1-2 g oral

d)Methyl ergometrine maleate: It white or yellow(light) powder,odourless,soluble in water and alcohol. Dose: As injection(0.2mg/ml), Cattle: 6-10 ml I/M

Proprietary Preparations of Ecbolics:

1. Inj. Oxytocin or Inj. Posterior Pituitary : 1 ml of 5 I.U. for milk let down, 12 ml of 60-100 I.U. as ecobolics I/M
2. Inj. Methtergin-Cattle-6-10 ml, Bitch – 1 ml I/M
3. Inj. Gynergen- 6-10 ml I/M
4. Inj. Imergan-6-10 ml I/M or Inj. Epidosin 6-10 ml I/M
5. Powder Replanta- 50-100 g oral in cattle , 5-10 g in S &G

Indications of Ecobolics: 1. Dystocia due to uterine inertia 2. Retention of placenta (ROP) 3.Induced abortion in bitches.

EMMENOGOGUES :

These drugs bring animal to heat. These are of different types:

a) Estrogen preparation or estrogen + progesterone combination
b) Pregnant mare serum gonadotropin(PMSG) OR Follicle stimulating hormone(FSH)
c) Leutinizing Hormone(LH)
d) Others … 1) Herbal preparations 2) Mineral mixtures 3) iodine etc.

(a) Estrogen preparation/compound : Estrogen hormone is secreted from follicle and carpus luteum of ovary and due to this animal comes in heat. Now-a-days synthetic hormones are available in market. Secretion of estrogen hormone depends on secretion of FSH and LH. Sometimes progesterone hormone is also given with estrogen to bring animal in heat. Hormones are measured in I.U.

Proprietary preparations : 1. Inj. Vetosterol 2. Inj. Stilbestrol 3. Inj. Ovocycline 4. E.P.Forte 5. Estradiol benzoate 6. Progenon depot 7. Sarcodyl. Dose: C & B -1-2 ml I/M

(b) Pregnant mare serum gonadotrophin (PMSG/FSH): This is also a hormone which is used to bring animal to heat.This hormone helps in growth of follicle due to which animal comes to heat.In the market,these injection are available as Inj. Foligon. One vial contains 1000 I.U. PMSG.This is also available as I/M and S/C Inj. Antex.This is specially used in mare.

(c)Luteinizing hormone: This hormone ruptures mature follicle and causes release of ova and due to this animal comes in heat.This changes follicle into carpus luteum.

Proprietory preparations: 1. Inj. Chorulon (1500 I.U. of LH) 2 Inj. Physex (1500 I.U. of LH) Dose-1000-2000 I.U. I/M or S/C

(d) Others :

(i) Herbal preparations: Two preparations are used: 1. Cap. Prajana 2)Cap. Heaton One bottle contains 6 capsules. Dose is 3 Caps. Daily for 2 days in cattle.

(ii) Mineral mixture: Calphos AD3 – 50 g x20 days oral, Inj. Prepalin forte- 6 ml I/M

(iii)Iodine: Used to prepare Lugol's iodine (Aqueous sol. Of iodine)

Composition: 1) Iodine: 2 parts 2) Pot. Iodide: 3 parts 3) D.W.: 40 parts This is painted on cervix.

Indications: Anaestrous(Animal not coming in heat)

Contraindications: 1. Lactating animal 2. Pregnant animal.

UTERINE SEDATIVES:

These drugs increase relaxation of uterus or decrease contraction of uterus.These drugs are given in threatened abortion.These act in following ways:

1. Some drugs act as hypnotics and decrease contraction of uterus by depressing centres in spinal cord e.g.Chloral hydras,Pot. Bromide.
2. Some drugs directly relax muscles of uterus. e.g. Atropine.
3. Progesterone hormone act by neutralizing function of estrogen hormone.

(a) Progesterone: This is available in market as Uniprogesterone and Progesterone. It is given 2-3 times in a month.This should be stopped 20-25 days before parturition.

INDICATIONS: 1) Threatened abortion 2) Prolapse of uterus and vagina.

UTERINE HAEMOSTATICS : These drugs stop bleeding in uterus.e.g.Oxytocin, other ecbolics such as ergot, methyl ergometrine etc.

GALACTOGOGUES : These drugs increase milk yield. These are of two types:

1) Direct galactogogues: These drugs increase increase milk yield by increasing blood circulation to udder.e.g. Thyroxine, Maasage of udder, Herbal drugs.
2) Indirect galactogogues:These drugs increase milk yield by increasing health of animal .e.g.Mineral mixture,Haematinics.

PROPRIETORY PREPARATIONS OF GALACTOGOGUES:

1) Galog powder : L. A.30 g x 15 days oral, S & G: 5-10 g x 15 days
2) Leptaden tabs. : L.A. 15 b.i.d. x 7 days oral ,then 10 b. i. d. x 10 days.

3) Desi khand : 250 g
   Lemon juice : 100 ml
   Curd : 200 g — oral
   Mustard oil : 400 ml
   Soda bi carb : 50-60 g

4) Mineral mixture: 50 G X 20 days Oral
   (Calphos AD3)

ANTIGALACTOGOGUES: These drugs reduce milk yield. These are normally not used.e.g. Alum, Potassium iodide, Purgatives.

CHAPTER –XVII
DRUG EFFECTING METABOLISM

Antipyretics (Febrifuge):

These drugs normalise increased temperature of animal body.But these drugs do not decrease normal temperature of animal body.

Mechanism of action of antipyretics: These drugs effect body in four ways:-

i) By depressing thermoregulatory centres present in hypothalamus.e.g.Aspirin, Soda salicylas, Phenacitin etc.
ii) By reducing general metabolism of the body.e.g. Quinine.
iii) Some drugs directly absorb heat from the body.e.g. Cold sponge, Cold bath, Refrigerant lotion etc.
iv) By diuretic action. e.g. Mag. Sulph., Amm. chloride, Pot. Nitras.etc.

a) **Aspirin:** (Acetyl salicylic acid) It is a white powder, acidic in taste,soluble in water and alcohol and smell-less. Dose: L.A. : 8-15 g oral SA : 2-3 g oral Dogs: 1-2 g oral
b) **Sodium salicylate (Soda salicylas):** It is a light white powder,smell-less,taste is sweet and sour.Dose : LA: 8-15 g SA : 2-3 g Dogs : 500 mg oral Inj. Soda salicylas, LA : 20 ml I/M as anti-rheumatic.
c) **Quinine:** It is available in 2 forms: 1) Quinine sulphate 2) Chloroquinine

Quinine sulphate: Its crystals are like small needle.It is bitter in taste, insoluble in water but soluble in alcohol and acidic water. Dose: LA: 20 ml. I/M S& G: 2-3 ml I/M Dogs: 0.5-1.0 ml I/M

d) **Paracetamol:** It is a white powder. It is aniline derivative . It is soluble in water.Dose: Inj. Paracetamol: LA: 15-20 ml. I/M, SA: 5 ML. Dogs: 1-2 ml I/M

e) **Analgin:** It is a white synthetic powder ,less soluble in water.Dose same as paracetamol.

f) **Phenylbutazone:** This is also synthetic white powder.

Horse : 4 g oral Dogs: 50-60 mg oral

PROPRIETORY PREPARATIONS OF ANTIPYRETICS:

1. Aspirin: LA: 10-12 tabs. , SA: 2-4 tabs. Dogs: 2-4 tabs oral.
2. APC tab.(Aspirin,Phenacetin and Caffeine): -do-
3. Inj. Sod. Salicylas : 20-30 ml. I/M in large animal
4. Paracetamol tab.: LA:10-15 tabs, SA: 2-3 tabs, Dogs: 1-2 tabs. Oral
5. Inj.Feva: LA: 15-30 ml. SA: 3-4 ML. Dogs: 1-2 ml. I/M
6. Inj. Novalgin: LA: 10-15 tabs. SA: 1-2 tabs. Dogs: ½ - 1 tab. oral
7. Tab. Analgin : -do-
8. Inj. Analgin/Novalgin/Cemizol/Ronalgin/Oxalgin/Oxyphenbutazone etc. LA: 15-30 ml. SA: 2-4 ml Dog: 1-2 ml I/M
9. Esgipyrin: LA: 15 ml I/M (This inj. Is not used in pregnancy)

INDICATION: In fever

ANTI INFLAMMATORY DRUGS :

These drugs reduce swelling in body organs.These are of 2 types:

1. Non-corticosteroid anti-inflammatory
2. Corticosteroid/Corticoid/Steroid

Non-corticosteroid e.g. Soda salicylas, Aspirin, Phenylbutazone etc.
Corticosteroid e.g. Betnesol (Betamethasone), Dexamethasone, Prednisolone etc.
ANTIALLERGIC DRUGS: These drugs correct allergic conditions. These are called antihistaminic drugs.e.g.Pheneramine maleate, Promethazine hydrochloride.
PROP. PREPARATIONS:
1. Inj. Avil LA : 10 ml SA: 2 ml. Dogs: 1 ml I/M
2. Tab. Avil (contains Pheniramine maleate) Dogs: (25 mg,50 mg)- 1-2 tabs.
3. Phenergan cream: local application
4. Inj. Phenergan for dogs : 2 ml I/M
5. Inj. Cadistin : Same as Inj.Avil
6. Inj. Anthisan: -do-

Indications : 1. Insect Bite 2. Any allergic condition 3.Urticaria 4. Oedema 5. Pruritis 6. Eczema 7.Photosensitization 8.Pulmonary emphysema 9.Tympany.
ANTIRHEUMATICS : These drugs reduce stiffness of muscles.e.g. Soda salicylas, Aspirin, Oxyphenebutazone, Rumalaya tab.,Rumalaya cream(Topical use)
Dose: LA: 8-12 tabs. Oral SA: 2-4 tabs. Oral Dogs: 1-2 tabs.
CORTICOIDS(CORTICOSTEROIDS) : These include steroids synthesized by adrenal cortex and synthetic ones.Two types of steroids are secreted by adrenal cortex: 1) Glucocorticoids
2) Mineralocorticoids
Glucocorticoids : Effect on the metabolism of proteins and fats. Adrenal cortex is a gland attached to kidney which is controlled by ACTH(Adrenocorticotrophic hormone)secreted by pituitary gland.
Mineralocorticoids : Effect the metabolism of water balance and electrolyte balance in the body.
Normally these steroids are secreted as per need ofanimal body.But in some conditions ,they are secreted more e.g. Pain, Trauma, Burn, Fear etc.ACTH controls amount of their secretion.Excess use of these drugs have following disadvantages:
1. These depress the immune system of the body and due to this production of antibodies is lowered.No vaccination should be given while giving this therapy.
2. They inhibit the growth of young animals.
3. They delay wound healing.
4. Continuous use of these drugs in large doses may lead to oedema and hypokalemia.
5. Repeated use of these steroids for several weeks may depress the secretion of pituitary glands.
6. They also lyse the CL(Carpus luteum) over the ovary and induce parturition.
7. The anti-inflammatory action of these steroids are temporary until the cause is removed.

8. These steroids are contraindicated in the following diseases: a)Corneal ulcer b) Renal insufficiency c)Muscle weakness d) Diabetes e) Hypertension f)J.D.(Johne's disease)

Continuous use of these drugs may increase the secretion of calcium , phosphorus,nitrogen in urine.Although it is very useful in case of ketosis, but the milk production is decreased.

INDICATIONS:

a) Bovine ketosis
b) Pregnancy toxaemia in sheep
c) Chronic arthritis
d) Rheumatism
e)Eczema
f) Pruritis, Burns, Conjuctivitis
g) Insect bite allergy ,Urticaria
h) Surgical shock etc.

EXAMPLES OF STEROIDS: a) Hydrocortisone b) Prednisolone c) Dexamethasone d)Betamethasone e)Flumethasone : May be given in Topical, I/M,Oral,I/V,Intramammary, Subconjuctival routes.

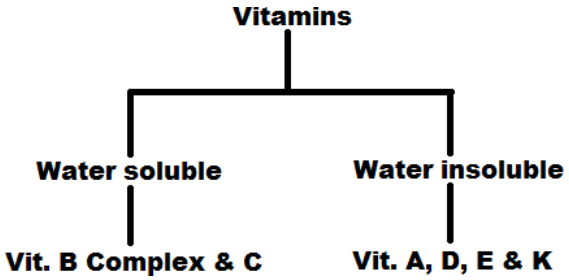
PROPRIETORY PREPARATIONS:

1.Inj. Hostacortin-H(10 ml) –LA: 5-10 ml SA: 2-4 ml Dogs: 1-2 ml I/M
2.Wycort(3ml)-1/2 dose of injection Hostacortin
3.Dexona(5ml)- LA: 2-5 ml SA: ½-1 ml Dogs: 0.25-0.5 ml
4.Betnesol(1 ml)- -do-
5.Vetalog(1ml, 5 ml)- -do-

FOR TOPICAL USE:

a)Betnovate-N Cream
b)Betnovate-C Cream
c) Flucort skin lotion
d)Betnovate skin lotion

CHAPTER – XVIII
VITAMINS AND MINERAL MIXTURES



VITAMIN-A :

Water insoluble, may be dissolved in fat and is used for treatment of night blindness in human beings, anestrus, corneal opacity, Xerophathalmia. Vit. A is mainly used in poultry and helps the animal to resist the bacterial infection. Defficiency of Vit. A in poultry leads to weakness, stagerry, drowsiness, cheasy discharge from eyes if not treated leads to blindness, emaciation, low egg production and low hatchability.

Proprietary preparations :

1. Inj. Prepalin forte : 1 ml ampoule, LA : 6ml, SA : 2-4 ml, Dogs : 1-2 ml I/M
   Note : In case of anestrus should be given prepalin 6 ml I/M, Lugol's paint on cervix and calphas AD3 50 g x 20 days and in heifer give 2 ml Inj. Ovocycline I/M.
2. Vitablend AD_3 (feed supplement) : 5 g (calf, pig) oral
3. Vitablend AB_2D_3 : It is used in poultry feed supplement. 1 kg/5 ton of feed.
4. Vimeral (liquid) : 5-10 ml/100 birds daily
5. Avivita : 100 g/ton poultry feed

VITAMIN-B COMPLEX :

These are synthesized in the rumen by microflora & generally there is no deficiency of B complex in ruminants, but in small animals deficiency may occur. When the animal suffers from indigestion for a very long period deficiency can be noticed. Deficiency symptoms are seen in poultry, pigs and in human beings.

(a) **B_1 (Thiamine) :** Deficiency of vitamin B_1causes star gazing syndrome due to paralysis of neck and poor growth in animals.

(b) **Vit. B_2 (Riboflavin) :** This is necessary for the growth and tissue repair. Deficiency of this vitamin results in curled toe paralysis in chick due to swelling of sciatic and bronchi nerves.

(c) **Niacin :** Deficiency leads to pellagra in pig that result in poor growth and poor hair coat.

(d) **Vitamin B_6 (pyridoxine) :**Deficiency results in convulsions in chick and anorexia, rough skin and goose stepping in pigs.

(e) **Pantothenic acid :** Severe dermatitis, odema poor or slow growth in chicks are associated with pantothenic acid deficiency.

(f) **Folic acid :** This is essential in formation of RBC. It is give to pregnant woman. Its deficiency results anaemia & perosis in chicks and anaemia in pigs.

(g) **B_{12} (Cyanacobalamin) :**Due to its deficiency poor growth, odema and reproductive failure may occur.

In market B complex injection are available in which B_1, B_6, B_{12} and liver extract are present. B_1, B_6, B_{12} are responsible for muscular weakness and paralysis.

Proprietary preparations :

1. Inj. Berin (B_1)
2. Inj. Neurobion
3. Inj. Polybion
4. Inj. Belamyl
5. Inj. Elneuron
6. Inj. Bekkom-L
7. Inj. Levogen
8. Inj. Stronic
9. Inj. Conciplex
10. Inj. Livet-B
11. Inj. Macrabin

Dose : LA : 5-10 ml I/M
SA : 2-4 ml I/M
Dogs : 1 ml I/M
Complex-B liquid for poultry :- 15-30 ml/100 birds dissolved in water.

VITAMIN D : This is essential for the assimilation of calcium and phosphorus in the body and due to the deficiency of this vitamin following diseases are seen in animals. (i) Rickets, (ii) Osteomalacia (iii) milk fever.

This vitamin D is also required for gestation, lactation, normal growth, egg shell formation, good hatchability and growth of bones.

Proprietary preparations :

1. Inj. Caldee – LA : 15-30 ml, SA : 3-5ml, Dogs : ½-1 ml
2. Vitablend (AD_3)
3. Avivita
4. Vimeral
5. Rovimix etc.

VITAMIN E : It is used in muscular dystrophy in young animals and oxidations of many other vitamins. It is also helpful in reproductive disorders. Its deficiency may results as diseases crazy chick syndrome. Poor hatchability, poor fertilization in chicks are also seen.

Proprietary preparations :

1. Avivita 100 g/ton poultry feed

2. Vimeral
3. Vit- E powder 10-12 g/Qtl. Poultry feed.

VITAMIN K AND ITS ANALOGUES : This is mainly used in –

1. Haemorrhage
2. PPH (post parturient haemoglobinuria)
3. Epistaxis
4. Blood in milk
5. Haematuria (blood in urine)

In poultry vitamin K is used in Coccidosis, internal haemorrhage.

Proprietary preparations :

1. Inj. Kaplin
2. Inj. Chromostat
3. Inj. Chromergin
4. Inj. Claudin

Dose :LA : 10-15 ml I/M or I/V
SA : 3-5 ml -do-
Dogs : 1-2 ml -do-

Give 40 ml chromostat per day when operation is performed.
K-cox powder 25 g/200 chicks, dissolved in H_2O.

CALCIUM, PHOSPHORUS AND OTHER MINERALS

1. CALCIUM AND PHOSPHORUS :

They are required for growth of bones and teeth and also for other metabolic activities of body. Deficiency of both leads to rickets in small animals and osteomalacia in large animals. Calcium is required in pregnancy, antidote of chlorinated hydrocarbons poisoning, ruminal atony, hypothermia (temp. below than normal). Milk fever diseases is seen due to calcium deficiency while the deficiency of phosphorus may lead to PPH (post parturient haemoglobinuria), allotrophagia (Pica), rheumatism, muscle stiffness.

2. MAGNESIUM :

Deficiency of this may lead to Hypomagnesium tetany (stiffness of neck muscles), Ketosis, this is also used to prevent cannabolism and feather pricking in poultry.

3. COOPER/COBALT/IRON :

These are required for synthesis of RBC. Deficiency of these may lead to anemia.

4. IODINE :

This is required for the activities of thyroid gland. This gland is responsible for control of many other activities. In human being due to its deficiency goiter may be seen.

5. MANGANESE :

Deficiency of this may lead to perosis and slipped tendons in chicks.

Dose of Calcium, Phosphorus and other minerals :

1. **Calcium preparations:-**
   LA : 200-450 ml half S/C and half slow I/V
   SA :25-75 ml
   Dogs : 5-10 gm

Mineral mixture:-
LA : 30-100 g
SA : 5 g
Poultry : 2-3 % of feed

Note :

1. I/V should be given slowly otherwise it can cause ventricular fibrillations or it may heart blockage.
2. The temperature of the preparations should be equal to the temperature of the body of animal.
3. This calcium should not be used in case of pyrexia (high temp.).

Proprietary preparations :

i. Cal. Borogluconate :- Composition :

Calcium gluconate – 60-75 g
Boric acid – 12 g
D.W. – 360 ml
Mft. boil, cooled and to be given as injection.

ii. Calboral
iii. Mifex
iv. Milk fever formula
v. Thiacal
vi. Calcium magnesium gluconate

Proprietary preparations of phosphorus :

1. **Sodium acid phosphate (mono basic, dibasic) :**In PPH – LA 80 g oral and 80 g I/V until the animal recover, SA – 10-20 g oral.
2. **Inj.Tonophosphen :** LA – 30 ml I/M, SA – 1-3 ml I/M, Dogs – ½ ml I/M

Liquid preparations :

1. Osteocalcium B_{12} syrup. Dog 1 t.s.f. b.d.
2. Calcium – D- rubra syrup.

Mineral mixtures : Milk-min, Supplimin, Minmix, Avlomin, Animin, Calphos AD_3, Mindif, Vetmin, Concimin etc.

Copper and cobalt :

1. Copper sulphate – LA 2-3 g oral

2. Vets Cu-Co tab. – La – 2-4 tab oral, SA – 1 tab.
3. Anorexon tab. – LA – 2 tab o.d., SA ½ tab o.d.

CHAPTER - XVIII

CHEMOTHERAPY

Chemotherapy: The treatment of diseases caused by bacteria, fungus,cancerous cells, virus etc.

Principles of chemotherapy : These drugs specifically kill microorganisms without harming animal host body.These drugs specifically affect metabolism of microorganisms.

Antibiotics : These are chemothearapeutic agents given to treat infectious diseases .These agents stop growth of or kill microorganisms.These are of several types:

1.Antibiotics produced by fungi.-Penicillin,Griseofulvin,Streptomycin,Tetracycline.
2.Antibiotics produced by bacteria:-Bacitracin, Polymyxin,Colistin etc.
3.Antibiotics produced by micromonospore:-Gentamycin.

Synthetic Chemotherapeutic agents : Sulphonamide, Isoniazide, Chloramphenicol.

Semi-synthetic: Amoxycillin,Ampicillin.

PROPERTIES OF IDEAL CHEMOTHERAPEUTIC AGENTS:

1. These should have selective and effective antimicrobial activity.
2. They should have broad range of antimicrobial activity.
3. Activity should be more of bactericidal than bacteriostatic.
4. These should not have bacterial resistance.
5. These should not have harmful effect on host body.
6. Substances like exudates, plasma proteins, enzymes etc. found in animal body should not effect their efficacy.
7. These should be easily soluble in water and they should not be destroyed easily at normal temperature.
8. Their absorption, distribution, fate and excretion should be such so that their concentration in body fluids and blood is maintained for maximum time.
9. These should be easily and economically available and should be compatible with other drugs.

CLASSIFICATION OF ANTIBIOTICS : They are mainly of 2 types:

1. Narrow and medium spectrum(These kill either Gram +ve or Gram –ve bacteria
2. Broad spectrum(These kill both Gram +ve and Gram –ve bacteria) e.g. Tetracycline,Chloramphenicol,Oxytetracyclline etc.

ANTIMICROBIAL SYNERGISM AND ANTAGONISM :

When antibiotics are given together,these act in 3 different ways:

1.Additive effect (1+1=2)
2.Synergistic effect(1+1>2)Best

3.Antagonistic effect(1+1<1 or =0)

NARROW OR MEDIUM SPECTRUM ANTIBIOTICS :

If drugs acting against G+VE and G-VE are given,their effect will be additive or synergistic.e.g. Penicillin and Streptomycin .Bactericidal and Bacteriostatic drugs should never be given together because their effect will be antagonistic.

NOTE:1.Sulphonamide can be given with Antibiotics.

2. Erythromycin and Chloramphenicol can be with inorganic substances e.g. with potassium iodide for treatment of Actinomyosis.

3. Mixed antibiotics can be given in the following conditions:

i) Mixed bacterial infection.

ii) To delay the rate of emergence of bacterial resistance.

iii) To enhance therapeutic efficacy.

iv) Therapy of severe infections where specific aetiology is not known.

v) To reduce toxicity.

RESISTANCE OF MICROBS TO ANTIMICROBIAL AGENT :

1. **Natural resistance:-**Some diseases are found in some animals and not found in some other animals. Like this in some bacteria the metabolic process is not occur where the drug can effect. These bacteria are resistance for those medicine.
2. **Acquired resistance:**- Once a drug work but not again. This is due to mutation, transduction, transformation and conjugation.
3. **Dependence resistance:**-Mycobacterium tuberculosis bacteria will more growth if it found streptomycin. Because these antibiotics are used for the growth of bacteria.

Bacteria sensitivity:- This is measured by two ways:-

1. By serial tube dilution test.
2. Agar cup or Agar plate or Filter paper disc method.

SULPHONAMIDES :

These are synthetic organic chemical compound. They mainly effects on G+ve and also effect on G-ve bacteria.

Mechanism of action : They interfere in the synthesis of cell wall of bacteria so bacteria multiplications is stopped.

Classification of sulphonamides :

1. **Gutacting sulphonamides :**These are those sulphonamides which stay for long time in intestine and effect on bacteria which is present there. E.g. sulphaguanidine, Succynyl sulphathiazole. These are less absorb by intestine.
2. **Systemic sulphonamides :** These are those sulhonamides which stay for short time in intestine and fastly absorb by intestine i.e. goes in blood. E.g. sulphanilamide, Sulphacetamide, Sulphamerazine, sulphafurazol, sulphamethazine, Sulphaquinoxaline etc.

3. **Long acting sulphonamides :**They absorb fastly by intestine and go into blood but their excretion is slow therefore their effect is longer in time. E.g. Sulphamethylphenazol, Sulphadimethoxine.

Physical and chemical properties of sulphonamides :

1. They are white colored powder or crystal but after sometime their color change into dark.
2. They are less soluble in water but sodium salts of sulphonamides are ,ore soluble in water.
3. Some sulphonamides cause renal toxicity. When more water is give then toxicity can be reduced.
4. These are smelless, bitter in taste and they sterilized by heat.
5. They are more soluble in alkaline solution as compared to acidic solution.

Action of sulphonamides :

They are bacteriostatics but when they are given in high doses they act as bacteriocidal. They act on the body by following ways :-

i. They increase the phagocytic activities of reticuloendothellial system in the body.
ii. They remove bacteria from body and help in defence mechanism.
iii. They are more effective in initial stage of diseases as compared to lastest stage of diseases.

Antagonists of sulphonamides : Following drugs act opposite to them :-

i. PABA (para-amino benzoic acid)
ii. Local or regional anasthetics like Procaine, Butacine, Benzocaine etc.
iii. Procaine penicillin
iv. Vit. B complex
v. Gelatin, Albumin, serum proteins etc.

Protagonists of sulphonamides :

i. High fever
ii. Urea

Absorption, Secretion and Excretion of sulphonamides :

Absorption : They are easily absorbed by intestine except gut acting sulphonamides. Following points are effect their absorption:-

i. Amount of sulphonamides:-When amount is large than absorption is more.
ii. Vascular activities of tissue:- if the blood circulation is high of this area than absorption is more.
iii. Area available for absorption of sulphonamides :-If area is large than absorption is more and if area is small than absorption is less.

T.E.C. (Therapeutic effect concentration) :

Therapeutic effect concentration (TEC) of sulphonamides in ruminants is 8-15

mg/100 ml blood. In case of dogs and simple stomach animals it is 5 mg/100 ml of blood.

Secretion:-Sulphonamides are secreted in milk when pH of milk is alkaline in nature.

Excretion:- Sulphonamides are excreted by urine, intestinal secretion, faeces, milk, sweat etc.

TOXICITY OF SULPHONAMIDES :

It is of two types:-

i. Acute toxicity ii. Chronic toxicity

1. **Acute toxicity:-**Acute toxicity may be occur if sulphonamides are give fast I/V. In acute toxicity symptoms seen in cattle:-
   i. Inability of focus eyes
   ii. Collapse
   iii. Muscular weakness
   iv. Death

In dogs :

i. Anorexia
ii. Vomition
iii. Running movement
iv. Convulsions
v. Muscular weakness
vi. Nausea
vii. Paralysis of muscles
viii. Renal troxicity

In renal toxicity following conditions are found:-

i. Renal haemorrhage
ii. Haematuria
iii. Albuminuria
iv. Anorexia
v. Depression
vi. Crystaluria
vii. Renal colic etc.

To avoid renal toxicity following points keep in mind :

i. Use those sulphonamides which are more soluble in water.
ii. Use those sulphonamides which have low excretion and give more of water to animal.
iii. Always use soda-bi-carb with sulphonamides.

2. **Chronic toxicity :**
   i. Loss of weight
   ii. Hypoprothrombenia
   iii. Systemic alkalosis
   iv. Uriticaria, odema etc.

In birds :

i. Muscular haemorrhage
ii. Thinner egg shell
iii. Less egg production
iv. Atrophy of male reproductive system

Dose : Initial dose : 200 mg/kg b. wt. slow I/V or S/C
Maintenance dose :100 mg/kg b. wt. slow I/V or S/C

Proprietary preparations of sulphonamides :

1. Sulphadimidine :-
   i. Inj. Vesadin and tab. vesadin
   ii. Inj. Diadin and tab. diadin
   iii. Sodium sulphadimidine inj.
   iv. Inj sulphadimidine and tab. sulphadimidine.
2. Sulphadimethyl pyrimidine :-
   i. Inj. Sulmet 25%, 30 ml/35 kg b. wt. I/V or S/C or I/P
3. Sulphapyridine and sulpha drugs :-
   i. Tab. 693
   ii. Tab. Elkosin
   iii. Tab. Orisul
   iv. Tab. Embet
   v. Tab. Cibazol 200 mg.body wt.
   vi. Tab. Thiazole
   vii. Septran – tab. ½ - 1 tab b.i.d. in dogs and cats
4. Sodium sulphacetamide eye drops :-
   i. Locula
   ii. Albucid
   iii. Minacid
5. Sulfaguinidine :- sulfaguinidine powder

Indications of sulphonamides:-

1. Mastitis
2. Strangles
3. Joint ill
4. H.S.
5. Arthritis
6. Wooden tongue
7. White scours
8. Eneritis
9. Respiratory infections
10. Pneumonia

In poultry :-

i. Fowl cholera ii. Pullorum iii. Bacillary white diarrhea.

Principles of sulphonamides therapy :-

1. They are more effective in acute than chronic stage.
2. In start give their initial dose and than give maintenance dose.
3. If there is no improvement in 3 days than stop giving them. They do not give more than 7-8 days because the destroy microflora of the rumen.
4. In this therapy give excess of water due to which toxicity do not occur. Because this is bacteriostatics so give 2 days after the improvement of animal.
5. If any abnormality seen in urine than stop them.
6. If two or more sulphonamides are given after mixing than reduce crystaluria toxicity.

NITROFURAN DERIVATIVERS :

These are antibacterial chemical substances which effect on G+ve and some G-ve fungi & protozoa. These are cheap from antibiotics and they effect on the work efficiency of body substances like blood, pus, plasma etc. After giving more toxicity may be occur in which following symptoms are seen:-

i. Vomiting
ii. Diarrhoea
iii. GIT bleeding
iv. Eosinophilia etc.

They are divided into five groups:-

1. **Furacin (Nitrofurazone):-** This is yellow colored powder, tasteless, odorless, less soluble in water and less absorbed in intestine. Because it is less absorbed in intestine so it give more effect on bacteria present in intestine. This is used in following condition:-
   i. Caecal and intestinal infections.
   ii. Local wound, ear infections, eye infections, skin infections etc.
   iii. Coccidiosis in poultry.
2. **Furadentin (Nitrofurantoin):-** This is also a yellow colored powder, little smell, bitter in taste, water soluble and fastly absorb in intestine. So this is not used in GIT diseases. It is used in systemic infections specially urinary tract. They work more in acidic medium. They are used in dogs and cats.
3. **Furadine (Furazolidone):-** it is yellow color powder and mainly effect Saimonella (G-ve) bacteria. It can be also used in mastitis.
4. **Furamazone (Nifuraldizone):**- It is less soluble in water and less absorbed in intestine. It is used calf scar diseases.
5. **Furasol (Furaltadone):**- It is less effective than other nitrofurans. It is used in mastitis and give oral in poultry diseases.

Proprietary preparations:-

1. Tab. Neftin 200 mg 1 tab. for > 40 kg b. wt. oral
2. Neftin – 50 powder 100 g/1 Quantity of poultry feed
   Ther – 800 g/1 quantity of feed
3. Neftin – 200 powder ¼ of above
4. Furasol powder for poultry ½-1 g/lit of water for 4-7 days
5. Bifuran tab. 1 tab./lit. of drinking water for 7 days for Coccidiosis
6. Furea bolus 4 bolus intra uterine
7. Furacin vet. Ointment topical use
8. Furacin powder topical use
9. NFT, furantoin 1 tab. > 40 kg b. wt. oral

PENICILLIN : This is a narrow spectrum antibiotics which work against the G+ve bacteria. It is obtained from a fungus of genus penicillium (P. notatum).

Types of penicillin :

1. **Natural :-**These are F, G, X & K (American system) and I, II, III & IV (British system).
2. **Semi-synthetic:**- These are prepared by many pharmaceutical companies.

Penicillin-G is very potent. It is more used because it is more effective. It have many preparations like Sodium Penicillin-G, Procaine Penicillin-G, Benzathene Penicillin-G.

Stability of penicillin : Its pure salts destroyed fastlly. But its sodium and potassium salts have stable for many month at the room temperature. These salts are used by dissolving in water and after dissolving in water they destroy in 4 days. So they used freshly. Preparations of Benzathene Penicillin-G is stable for 2 years.

Dose and route : Rate of drug administration, 5000 I.U. – 10,000 IU/kg body. Wt.I/M (1 mg = 1667 I.U. Approx.)

General rate for small animals : 2-4 lacs I.U., I/M

Large animals 20-50 Lacs I.U., I/M

1 lacs I.U. quarter, I/mammary

Mechanism of action of penicillin : Effect on cell wall of bacteria and hence there is no rigidity and toughness and so no growth of bacteria.

Factor affecting anti-microbial activity of Penicillin :

1. Penicillin is unstable in acidic pH.
2. No more effect of blood, pus, plasma etc. which found in body on Penicillin.
3. Types of bacteria and number of bacteria are also effect the activities of penicillin. If infection is G-ve than penicillin do not work. If number of bacteria is greater and dose is small than effect is less.
4. Its binding is occur with protein but work efficiency does not effected.

Physical properties of penicillin : Alcohol is its antagonist therefore when

penicillin is give in the injection from than there is no alcohol is present on needle.

Absorption of penicillin : Penicillin is absorb in 20 min after giving through I/M route and its effect for 6 hours. Organic salts are less soluble in water and after giving penicillin oral its 2/3 part is destroy by acidity and enzyme penicillinase.

Optimum blood level of penicillin :0.3-0.5 IU/ml of blood amount of penicillin work as bacteriostatics. If 0.5 IU/ml of blood give than it works as bacteriocidal.

Distribution of penicillin : After give I/M it distributes in whole body in 20 minutes. Largest amount is found in kidney and than in blood, liver, bile, semen. It does not cross placenta and blood brain barrier.

Excretion of penicillin : It 50-80% part is excrete in urine in 6 hours. It is also excrete through bile, saliva and milk. After excretion it occur allergy in humans.

Toxicity of penicillin : Its toxicity is depends on type of preparation and route of drug administration. Following symptoms are seen:-

i. Hypersensitivity (human beings)
ii. Skin rashes
iii. Contact dermatitis
iv. Glossitis
v. Stomatitis
vi. Loss of buccal mucosa
vii. Fever
viii. Eosinophilia
ix. Anaphylaxis
x. Angioderma (human beings)

In dogs :

i. Salivation
ii. Shivering
iii. Vomition
iv. Uriticaria

In cattle :

i. Dyspnoea (labored breathing)
ii. Salivation
iii. Cutaneoua odema

In horse :

i. Dermatitis

Disadvantage of giving of penicillin-G :

i. It is narrow spectrum and only work against G+ve.
ii. If it give oral than it is destroyed in stomach pH and enzyme penicillinase reduced its acitivites.
iii. Unstable in gastric Ph.

iv. Rapid renal excretion.
v. It can not cross or penetrate placenta and blood brain barrier.
vi. Hypersentivity.

Semi-synthetic penicillin :(1) Ampicillin (2) Oxacillin (3) Cloxacillin (4) Amoxycillin (5) Hetcillin (6) carbenicillin etc.

Dose of ampicillin and colaxacillin :-

1. Dogs and cats - 250-500 mg I/M b.i.d.
   (inj. 250 mg of synthocillin) (capsules are also available)
2. In cattle and buffalo - 2.0 g I/M

Proprietary preparations :

1. Sodium penicillin G inj. – 4 lac unit vial
2. Procaine pencillin G inj. – 20 lac unit vial
3. Pronapen V inj. Crys 4, crys 40 inj.
4. Benzathene penicillin
5. Benzyl penicillin

Proprietary preparations :-

1. Cap. Klox 250, 500 mg
2. Cap. Binoclox, Tilox, Floclox (lactating), Flaclox (dry) etc.

Doses: Dogs – 250-500 mg I/M
S & G – ½ g I/M
Large animals – 2-2 ½ gm daily for three days I/M

Indications :

i. Actinobacilosis
ii. Anthrax
iii. B.Q.
iv. Enterotoxemia
v. Enteritis
vi. Staphylococcus infection
vii. Steptococcus infection
viii. Leptospirosis
ix. Lumpy jaw
x. Nephritis
xi. Cystitis
xii. Pneumonia
xiii. Strangles mastitis etc.

STREPTOMYCIN : It is also a narrow spectrum antibiotics which work against the G-ve bacteria. Specially against the mycobacterium tuberculosis and it is also obtained from fungi. Genus of those fungus called Streptomyces.

Properties of streptomycin :

1. White powder
2. Soluble in organic solution
3. Dihydrostreptomycin is more stable than streptomycin.
4. Its activities are bacteriostatics, when given in high dose it acts as bacteriocidal.

Stability of streptomycin :

1. It is more stable at 6-8 pH and preserve for many months.
2. Its solution is used with in the 6 days which is kept in refrigerator.

Dose : 10 mg/kg b. wt. I/M
Minimum therapeutic blood level is 5 ug/ml of serum which is obtained in 60-90 minutes by I/M administration.

Mechanism of action of streptomycin : Streptomycin stop the synthesis of those protein which is essential for the growth of bacteria due to which multiplication is stop. (Binding of 30'S' ribosomal sub unit of bacteria).

Factors effecting antimicrobial activities of streptomycin :

1. Alkalizers should be given with streptomycin specially in urinary tract infection.
2. It absorb fastly when it is give I/M & I/M.
3. It is less absorbed in lungs.
4. Less absorbed by intestine so can be given with sulphonamides in enteritis.

Distribution of streptomycin :

1. It stay in plasma.
2. It do not cross blood brain barrier.
3. It go in foetal plasma and amniotic fluid.
4. It is less found in RBCs.

Excretion :

1. After give parentraly 50-60% part excrete through urine.
2. 10-30% metabolized in the body.
3. Some streptomycin excrete through bile.

Toxicity :

1. Local sensitization such as dermatitis/allergy etc.
2. Acute systemic effect in dogs and cats such as Nausea/vomition, collapse, loss of consciousness. Antihistaminc drugsshould be give.
3. Chronic effect :- if streptomycin is give for long time specially in dogs and cats than deafness may be occur.

PROPREITARY PREPARATIONS OF STREPTOMYCIN :

1. Inj. Streptomycin 0.5-1 g
2. Inj. Ambistrin-S -do-

Combination of streptomycin and penicillin

1. Inj. Dicrysticin-S
2. Inj. Bisterpen
3. Tab. Gastina
4. Inj. Munomycin
5. Inj. Combiotics-S
6. Inj. Strepto-Penicillin-S

(a) Small dose of streptomycin and penicillin : ½ g + 4 lac IU I/M
(b) Large dose of streptomycin and penicillin : 2 ½ g + 20 lac IU I/M

Intra-mammary infusion :

1. Pendistrin S.H.
2. Strypen tube
3. Pendistrin ointment
4. Mylipen tube

Indications of streptomycin :

1. T.B
2. Calf diphtheria
3. H.S.
4. Leptospirosis
5. Brucellosis
6. Calf scours
7. Swine fever
8. Infection due to G-ve bacteria

TETRACYCLINES :

This is a broad spectrum antibiotics which is obtained from fungus streptomyes risomus. This are also semi-synthetic available in the market.
It has following 8 categories :

1. Chlortetracycline
2. Oxytetracycline
3. Demeclocycline
4. Rolitetracycline
5. Methacycline
6. Doxycycline
7. Minocycline
8. Tetracycline

Doses : Route : 2-5 mg/lb b.wt. I/M/ I/V, 5-10mg/kg b. wt. I/M or 10-25 mg/lb oral

Mechanism of action of tetracycline :

These are also stop formation of the protein which help in the growth of bacteria.

Absorption :

Easily absorbed when give I/M and when give orally than absorbed from the upper part of the stomach. Its level reaches plasma in 2-4 hours after given orally. Aluminium hydroxide gel, soda-bi-carb, iron salts are contradicted.

Distribution :

Go in urine through blood after absorption from intestine. Some go in milk.

Excretion : Excrete from urine and feaces.

Toxicity of tetracyclines :

1. Hypersensitivity : vomition, fever, uriticaria collapse and death.
2. Blood dyscrasia, leukocytosis and a typical lymphocytosis.
3. Photosensitization
4. Hepatic dysfunction
5. When it give orally then with this vitamin B_{12} is also excrete out through urine.
6. After give orally clotting time of blood is increases.
7. Teeth of child should be brown.

Proprietary preparations of tetracycline :

(A) Oxytetracycline : cattle and horse – 30ml I/M

i. Terramycin (small animals) : 1 ml/10 kg b. wt. (50mg/1 ml vial)
Oxysteclin/wolicycline/microcycline
Dogs &cats : ½ - 2 ml I/M

ii. Terramycine animal formula : 20g/50 kg b. wt. oral in cattle.

iii. Terramycine egg formula : 5g/5 lt. of drinking water in poultry as prophylactic, 1 g/lt. of drinking water as therapeutic.

iv. Terramycin liquid/ointment/eye ointment :
a. Terramycin liquid 16% - 15-30 ml/day b.i.d.
b. Terramycin ointment – topical use
c. Terramycine eye ointment

v. Terramycin animal formula for mastitis :one tube in one affected quarter.

vi. Mastalone : 10 ml in one quarter.

(B) Tetracycline hydrochloride :
i. Inj. Steclin dose as terramycin
ii. Inj. Achromycin - do –
iii. Inj. Resteclin -do-
iv. Hostacycline powder – 5-10 g/50 kg b.wt. in cattle
1 g/lt. of water in poultry.
v. Steclin bolus – 4-6 bolus/day oral or 6-8 bolus intra uterine.
vi. Subacort eye ointment

(C) Chlortetracycline : Aureomycin soluble powder nutritional formula, tablets and mastitis tube : dose as above

(D) Doxycycline :

inj. Lenticillin – 5-10 mg/kg b.wt. I/M and cap. Lederamycin

(E) Rolitetracycline :

Inj. Reverin – 5-10mg/kg body wt.I/M

Indications of tetracycline :

1. B.Q.
2. Actinobacillosis
3. Bacillary Hb uria
4. H.S.
5. Bruicellosis
6. Foot rot
7. Calf diphtheria
8. Naval ill
9. Calf scours
10. Anthrax
11. Leptospirosis
12. To prevent secondary infections in some viral diseases.

In poultry :

1. Infectious coryza
2. Ranikhet diseases
3. Fowl cholera
4. Spirochaetosis
5. CRD – Chronic respiratory diseases
6. BWD – Bacillary white diarrohea
7. Fowl typhoid

CHLORMPHENICOL :

This is broad spectrum antibiotics. It is also ontained froma fungus genus sterptomyces. It usually works as bacteriostatic but sometime also works as bacteriocidal. It cross placenta and blood brain barrier.

Mechanism of action of chloramphenicol is like tetracycline :

Dose anfd route : 5-10 mg/lb b. wt. I/M, 10-20 mg/kg b. wt.I/M, 20 mg/lb b. wt. oral.

Absorption of chloramphenicol :

Chloramphenicol are absorbed from intestine when give orally. From here through blood they transfer in whole body.

They cross the blood brain barrier and become inactive after reaching liver.

Excretion : Excrete through urine.

Toxicity :

1. Hypersensitivity.
2. Inhibition of bone marrow activities.

3. Grey syndrome in babies (less than one month of age)
4. Aplastic anemia.

Proprietary preparations :

1. Inj. Chlormphen – 10 ml (100mg/ml)
2. Inj. Chlormycetin – 1.0 g (make 10 % solution)
3. Inj. Ranphenicol – 1 g (only I/V use)

Capsules/eye/ ear medication :

1. Cap. Chlormycetin –100 mg cap.
2. Chlormycetin ear drops
3. Enteromycetin ear drops
4. Udder infusion : Udoxin udder infusion intra mammary.

Indications :

1. Streptococcus infection.
2. Brucellosis/sheigella
3. Salmonella infection
4. Staphylococcus infections
5. Pasteurella infection
6. Escherichia coli infection

Some other antibiotics :

Inj. Polymyxin B-sulphate – 2000 unit/kg b. wt. I/M
Inj. Gentamycin, inj. Garramycin – 5-10 mg/kg b. wt. I/M
Inj. Lisarin – 2 ml –do-
Gentacin opth ointment – topical.

OTHER ANTIBACTERIAL AGENTS

A large number of antibacterial drugs in therapeutics do not fit properly into important categories of drugs discussed earlier or are not important enough to become a separate class.

Classification :

1. **Natural and semi – synthetic antibacterials**
   Polymixins, Bacitracin, Rifampicin, Novobiocin

2. **Synthetic antibacterials**
   Nitrofurazone, Metronidazole, Tinidazole

- **Bacitracin :-** Polymixin B and Polymixin E (Colistin) are bactericidal drugs mainly used topically to treat gram - negative infections of skin.

- **Bacitracin:** Bacitracin is a bactericidal drug that acts by inhibiting the cell wall synthesis. Bacitracin is mostly used topically for susceptible skin, ear and eye infections. Bacitracin is often used in combination with neomycin and/or Polymixin B to enhance the antibacterial spectrum.

- **Rifampicin:** Rifampicin inhibits DNA-dependent RNA polymerase in susceptible bacteria by forming a stable drug-enzyme complex. Rifampicin has high activity against gram-positive bacteria and mycobacteria. It is frequently used in combination with erythromycin for treatment of some pneumonic infections.

- **Novobiocin** : Novobiocin is a narrow spectrum antibiotic; active against gram- positive bacteria and is believed to act by inhibiting bacterial DNA synthesis.

- **Nitrofurazone :** Nitrofurazone is a topical and enteric nitrofuran antibacterialagents. The spectrum of activity includes both gram-positive and gram - negative bacteria and some protozoa. It is occasionally used topically as an antibacterial ointment, cream, solution or powder for application on wounds, burns and ulcers. It is also used for treatment of bovine mastitis, metritis, and ear and eye infections.

- **Metronidazole:** Metronidazole is a synthetic drug which has both antibacterial and antiprotozoal activities. It is bactericidal to most gram-negative and gram- positive anaerobic bacteria, but no activity against aerobic bacteria. It acts mainly by disrupting DNA synthesis in susceptible microorganisms. It is used for the treatment of infections of genital, GIT and respiratory tract.

ANTIVIRAL DRUGS

Antiviral drugs are the drugs which are used to limit growth and replication of viruses. Antiviral drugs are perhaps one of the least used drugs in veterinary practice. Depending upon the mode and site of action and chemical structure, antiviral drugs can be divided into following groups: -

A. Inhibitors of viral nucleic acid synthesis (transcription, replication)

1. Inhibitors of DNA virus nucleic acid synthesis: e.g. Aciclovir, Idoxuridine
2. Inhibitors of RNA virus nucleic acid synthesis: e.g. Ribavirin, Taribavirin
3. Inhibitors of Retrovirus nucleic acid synthesis: e.g. Zidovudine, Ritonavir

B. Inhibitors of viral assembly: e.g. Amantadine, Rimantidine

C. Inhibitors of viral release: e.g. Zamnivir, Oseltamivir

D. Immunomodulators: e.g. Interferons

1. **Aciclovir :** It is a synthetic guanosine nucleoside analogue, so it substitutes guanosine in DNA synthesis and inhibits viral replication. It has antiviral activity against a variety of DNA viruses; especially the herpes group of viruses. It is mostly available as sodium salt that has high solubility in water.Aciclovir should not be used with nephrotoxic drugs (e.g. aminoglycosides) because their combination may enhance potential for nephrotoxicity. It is useful in treatment of herpes infections in animals. It is available commercially as an ophthalmic ointment, a topical ointment or cream, an IV preparation and various oral formulations.
2. **Idoxuridine** : Idoxuridine is an analogue of thymidine. It is effective against various DNA viruses including herpes viruses and poxviruses. It is used topically. It is potentially carcinogenic and mutagenic and is not used systemically.
3. **Ribavirin :** It is a purine nucleoside analogue with a modified base and D-ribose sugar. It resembles structurally to guanosine and inosine. It has broad-spectrum antiviral activity against both RNA and DNA viruses. It has low margin of safety. The adverse effects are manifested as anorexia, weight loss, anaemia and bone marrow suppression. It is used clinically by topical and pulmonary routes (to treat respiratory infections caused by influenza virus).
4. **Zidovudine** : It is an analogue of thymidine. It is mainly used against retroviruses. It is effective against retroviruses only because of its action on viral reverse transcriptase enzymes. It is considered as the first line drug in the treatment of AIDS (caused by HIV virus) in human beings. In veterinary practice, it is used to treat cats with feline immunodeficiency virus (FIV) and feline leukaemia virus (FLV) infections.

5. **Zamnivir:** It is a neuraminidase inhibitor used in the treatment and prophylaxis of influenza caused by influenza A virus and influenza B virus. It acts by binding to the active site of the neuraminidase protein, rendering the influenza virus unable to escape its host cell and infect others. It is administered by pulmonary route.
6. **Interferons:** Interferons (IFNs) are a family of potent cytokines which possess antiviral, Immunomodulatory and antiproliferative actions. Interferons bind to their specific tyrosine kinase receptors on the cell membrane of both DNA and RNA viruses and affect viral replication at various steps (penetration, coating, transcription, translation, assembly or release). In veterinary medicine, interferon - a is used occasionally in cats to treat non - neoplastics feline leukaemia virus (FeLV) disease and ocular herpes infections.

ANTIFUNGAL DRUGS

Antifungal (Antimycotic) drugs are agents which are used to prevent growth and multiplication of fungi. Fungal infections, usually called **'Mycoses',** have been divided into two distinct classes: Systemic and superficial infections.

Classification of Antifungal Drugs: Depending upon the clinical use, the antifungal drugs are classified into two groups.

1. **Systemic Antifungals** : Amphotericin - B, Griseofulvin, Flucytosine, Ketoconazole, Fluconazole, Sodium iodide, Potassium iodide
2. **Topical Antifungals:** Econazole, Miconazole, Benzoic acid, Salicylic acid, Copper sulphate

- **Amphotericin-B:** Amphotericin B is a fungicidal; polyene antibiotic obtained from Streptomycesnodosus.It has high affinity for ergosterol, present in fungal cell membranes and results in formation of pores in the cell membranes with altered membrane permeability and leakage of cellular contents. It can cross blood-brain barrier. It is useful against several systemic fungi including Candida, Histoplasma, Cryptococcus, Blastomyces, Coccidiosis, Aspergillus etc. It is a toxic drug with side effects, especially nephrotoxicity & hepatotoxicity. It is an effective antifungal drug and is mainly used in dogs and some other species for the treatment of serious life-threatening systemic infections.

- **Griseofulvin:** It is a systemic antifungal antibiotic obtained from Penicilliumgriseofulvin. It exists as an odourless, bitter tasting, white to creamy-white powder. It is a fungistatic and acts by interfering with the polymerization of the microtubular protein with microtubules. It is a narrow-spectrum agent active only against dermatophytes i.e. Microsporum and Trichophytonetc

- **Ketoconazole:** It is a synthetic antifungal drug for systemic use. It has broad spectrum of antifungal activity, which include Candida, Cryptococcus, Blastomyces and Histoplasma spps. It is also effective against dermatophytes like Microsporum and Trichophyton. It is used to treat systemic mycoses in dogs, cats, horses, birds and some other spps. It is also used to treat superficial infections.

- **Fluconazole**: It is a synthetic antifungal drug commonly used in the treatment and prevention of superficial and systemic fungal infections. It occurs as a white crystalline powder that is slightly soluble in water. It inhibits the synthesis of fungal cytoplasmic membrane. It has fungistatic activity against a wide range of pathogenic fungi. It is effective against systemic as well astopical fungal infections. It is used in the

treatment of infections caused by dermatophytes, yeasts and a variety of systemic fungi.

- **Sodium Iodide:** Sodium iodide is occasionally used in the treatment of fungal infections. It is used clinically to treat cutaneous or lymphocutaneous forms of sporotrichosis in dogs and cats. It may also be used to treat some other mycotic infections including localised skin infections with variable results.

- **Potassium Iodide:** It possesses antifungal actions similar to those of sodium iodide. It is used as a 20% solution for oral or IV administration.

- **Miconazole:** It is an antifungal agent that is primarily used as a topical agent. It penetrates well into skin after topical administration and persists for about 4 days in the stratum corneum. It is effective against both Trichophyton and Microsporum species. It is available as a 2% cream and a 1% lotion for treatment of local Dermatophytosis in dogs and cats.

- **Benzoic acid& Salicylic acid**: Benzoic acid is a colourless crystalline solid, which have both bacteriostatic and fungistatic actions. For fungal infections, Benzoic acid (6%) is mostly combined with salicylic acid (3%) to make Whitfield ointment. Salicylic acid is used topically as keratolytic, antiseborrhoeic, antiseptic and fungistatic. Its keratolytic action helps in the dernial penetration of drugs. Whitfield ointment is used in ringworm infections caused by Trichophyton in cattle and dogs.

- **Copper sulphate:** Copper sulphate (CuSO4) applied topically is considered useful against ringworm infection. The fungicidal action is produced partly by virtue of its astringent and caustic nature and partly by antifungal action of copper ion. It is used as an ointment or paste in strengths of upto 5% or as aqueous solutions of 1 - 2 %.

ANTI-PROTOZOAL DRUGS

The common protozoal infections of veterinary importance are coccidiosis, giardiasis, amoebiasis, toxoplasmosis, trichomoniasis, babesiosis, theileriosis and trypanososmiasis.

PROTOZOA	ANTI-PROTOZOAL DRUGS
Coccidia	Amprolium, Monensin, Sulphadimidine, Furazolidone
Giardia, Amoeba	Metronidazole, Tinidazole, Albendazole, Fenbendazole
Babesia	Diminazine, Tetracycline
Theileria	Buparvaquone, Tetracycline
Trypanosoma	Diminazine, Quinapyramine, Isometamidium, Suramin
Anaplasma	Diminazine, Tetracycline

1. **Amprolium:** It is a structural analogue of thiamine (Vitamin B1). It occurs as a white crystalline, odourless powder that is soluble in water. It mimics the action of thiamine and competitively blocks the thiamine transporter; and prevents carbohydrate synthesis. In Poultry, amprolium has good activity against Eimeria tenella and Eimeria acervulina. In cattle, it is active against Eimeria bovis and Eimeria zurnii. Amprolium is a safe drug with safety margin of about 8 times the recommended dosage. Although, prolonged high dosages of amprolium can cause thiamine deficiency in the host. Amprolium toxicity can be treated by stopping the amprolium therapy and by administering thiamine (1 - 10 mg/kg, IM or IV). Amprolium is used for the prevention and treatment of coccidiosis in poultry and cattle.

2. **Diminazine:** Diminazine aceturate is a widely used antiprotozoal drug. Diminazine aceturate is a trypanocidal drug that is active also against bovine, equine, canine and feline babesiosis. It occurs as an odourless yellow powder that is relatively soluble in water. It acts mainly bybinding to the DNA containing organelles. Diminazine is generally well tolerated at recommended dosages; however local reactions may occur at the site of injection, which may be severe in equines. Diminazine is a veterinary drug and is used mainly for treatment. of trypanosomiasis and babesiosis in various animals viz. camels, cattle, cats, dogs, goats, horse, sheep and swine. The drug is not effective in late stages of trypanosomiasis. Diminazine is usually marketed in combination with phenazone, an antipyretic and analgesic to reduce pain at the site of injection. The drug is administered by either SC or IM injection.

Dose:
Cattle = 3.5 - 7 mg/kg IM or SC;
Dog = 7 mg/kg IM once, may be repeated in 2 - 4 weeks.

3. **Buparvaquone:** It is a synthetic drug for the therapy and prophylaxis of all forms of theileriosis in cattle. It acts primarily on the macroschizonts and intraerythrocytictheileria. It has long plasma half-life of atleast 7 days. It is commercially formulated as a solution for intramuscular injection.
   Dose: Cattle = 2.5 mg/kg, IM as a single dose

4. **Quinapyramine:** Quinapyramine is used as anti-trypanosomaldrug; mostly used as quinapyramine sulphate (curative effect) and quinapyramine chloride (prophylactic effect) salts in combination (3:2) and the product is commonly marketed as Antrycideprosalt. Quinapyramine is trypanostatic in action and therefore the host defence mechanism is very important in overcoming the infection. It causes kinetoplastic DNA condensation and the loss of ribosomes with possible aggregate of large number of lysosomes. It has significant activity against several species of Trypanosoma in animals. It is well tolerated at recommended dosages however; it may cause trembling, salivation and sweating in younger animals. It is widely used in veterinary practice for treatment and prevention of trypanosomiasis.
   Dose: Cattle/Horses/Other spps. = 4.4 mg/kg (max. = 2gm), SC as 10 % solution in dewlap or neck (in cattle) & as 5 % solution IM in horses.

5. **Isometamidium:** It occurs as red crystals and is soluble in cold water. It is active against Trypanosomacongolense and Trypanosomavivax in cattle and horses. It is also active against Trypanosomaevansi in cattle, buffaloes and camels. It inhibits DNA functions in trypanosomes by binding to kinetoplast DNA. It is very slowly absorbed from IM site, widely distributed in body and gets accumulated in liver. As a prophylactic drug, it provides protection against Trypanosoma spps. for 2 months or more. The drug is always administered by deep IM injection. Localised reactions may cause pain, swelling and necrosis of tissues at the injection site.
   Dose: Cattle/Horses = 0.5 mg/kg, deep IM as a single dose

6. **Suramin:** It occurs as slightly bitter tasting, white or slightly pink or cream coloured powder. It is freely soluble in water, but the solution deteriorates quickly in air.It has good activity against various species of Trypanosoma in animals. Suramin has a low safety margin. It causes a variety of unwanted effects which include nausea, vomiting, diarrhoea, hepatotoxicity and nephrotoxicity. Horses and donkeys are highly susceptible to the toxic effects

of Suramin. It has been used in veterinary practice for both curative and prophylactic control of trypanosomiasis.

Dose: Cattle/Horses/Camels = 8 - 12 mg/kg, Slow IV

ANTIPARASITIC DRUGS

Anthelmintics Drugs: These are drugs used to either kill (vermicide) or to expel (vermifuge) the parasitic worms which inhabit the GI tract, other tissues and organs of the body. Depending upon their primary action, anthelmintics are broadly divided into three groups - antinematodal, anticestodal and antitrematodal drugs.

A. **Antinematodal Drugs:** Antinematodal drugs are a type of anthelmintics, designed to act against roundworms.
B. **Anticestodal Drugs:** Anticestodal drugs are the drugs used to kill or expel tapeworms from the body.
C. **Antitrematodal Drugs:** Antitrematodal drugs are the drugs used to kill or to expel flukes from the body.

1. **Albendazole:** It is a broad-spectrum anthelmintic, widely used in veterinary medicine for treatment of nematode and trematode infections in large animals. Albendazole is administered on an empty stomach when used against intraluminal parasites. It has teratogenic activity in pregnant animals. It is available in market as suspension and as an intraruminal bolus for ruminants.

2. **Fenbendazole:** It is a broad-spectrum anthelmintic, widely used in veterinary medicine for treatment of nematode and trematode infections in large animals. It is administered on an empty stomach when used against intraluminal parasites. It has wide margin of safety as compared to albendazole. It is available in market as intraruminal bolus for ruminants.

3. **Oxfendazole:** Oxfendazole is broad-spectrum anthelmintic and is the sulphoxide metabolite of fenbendazole. It is active against many roundworms and their larvae and tapeworms. It is used in horses (mainly), cattle, sheep, goats and swine.

4. **Levamisole:** It is a synthetic anthelmintic which occurs as a white to pale cream coloured, odourless, crystalline powder. It is highly soluble in water so can be used as injection. It is also an immunomodulator. It is effective against

adult and larval gastro-intestinal roundworms and lungworms in cattle, sheep, goat, swine and poultry. It should not be used in weak, severely debilitated and lactating animals.

5. **Pyrantel:** Pyrantelpamoate occurs as yellow to tan solid and practically insoluble in water while stable in solid phase. It activates nicotine cholinergic receptors and produce slowly developing contracture and spastic paralysis of parasites. The paralysed worms are slowly expelled from the body. It has high efficacy against intraluminal adult GI nematodes and their larval stages.
6. **Morantel:** Morantel is the methyl ester analogue of pyrantel. It is available as Morantel tartrate that is soluble in water. Like pyrantel, it acts as a depolarising neuromuscular blocker in target parasites, thereby paralysing the susceptible organisms. It tends to be safer and several times more potent than pyrantel. It is marketed as oral bolus.
7. **Closantel:** It is a broad-spectrum anthelmintic available commercial in oral and injectable formulations in ruminants. It causes disruption of ATP production in parasites thus leads to energy depletion and kills the susceptible parasites. It is also active against some ectoparasites like mange mites, ticks and parasitic larvae of flies.
8. **Piperazine:** It is a narrow-spectrum anthelmintic which occurs as a white, crystalline powder that is soluble in water and alcohol. It causes muscle relaxation and flaccid paralysis in susceptible parasites. It is widely used for the treatment of ascariasis and nodular worms (Oesophagostomum) in all species.
9. **Praziquantel:** It is a broad-spectrum anticestodal and antitrematodal drug. It occurs as a white, hygroscopic, bitter tasting, crystalline powder that is very slightly soluble in water and soluble in alcohol. It increases cell membrane permeability of susceptible parasite; leading to high intracellular Ca++ concentration, which produces an instantaneous contraction and spastic paralysis of the parasites. The affected worms lose grip of intestinal mucosa and are expelled. It is indicated for the removal of all tapeworms in dogs, cats and farm animals.
10. **Niclosamide :** it was widely used for control of canine and feline cestodes, but now its use has been declined due to availability of much safer and broadspectrum anticestodal drugs.
11. **Triclabendazole :** it is a flukicide, very effective against all stages of Fasciola from 1 day old to adult . it is well tolerated at recommended dosages. It has no teratogenic,

embryotoxic or carcinogenic activity. It has a withdrawal period of 28 days and , therefore, should not be administered to lactating animals.

12. **Oxyclozanide :** it is an oral fasciolicide. It is mainly effective against adult flukes. Oxyclozanide mya be used alone or in combination with levamisole to provide broad – spectrum anthelmintic action. The drug has a withdrawal time of 14 days.

    Dose : Cattle and sheep : 10 – 15 mg / kg, PO

Ectoparasiticides: These are the drugs used to kill or eradicate animal parasites infesting the external surface of body. Ectoparasites of veterinary species mainly belong to the classes Insecta and Arachnida. The class Insecta includes flies, 'lice and fleas, whereas Arachnida contains ticks and mites.Ectoparasiticides are applied topically by various methods like dips, sprays, pour-on, spot-on, collars, and dusting. Some common examples of ectoparasiticides are cypermethrin, deltamethrin, flumethrin, amitraz and ivermectin.

1. **Cypermethrin**: It is a broad-spectrum 4th generation synthetic pyrethroids insecticide. As an ectoparasiticide, it is usually used as ear tags for control of flies and ticks on cattle. Sprays and pour-on preparations are also available for use in cattle, horses, sheep, goats and poultry against various external parasites. Treatment of young animals and treatment of animals during hot weather is not recommended. Topical application in the form of spray is recommended at concentration of 0.1% for horses and o.o5 % for poultry.
2. **Deltamethrin:** It is a broad-spectrum synthetic pyrethroids insecticide having contact and stomach actions.' It is extensively used as an ectoparasiticide in farm and companion animals against flies, lice, ticks, fleas, mites etc. It is available in the form of dips, sprays, wash, pour-on and spot-on formulations. It is also used as a premise insecticide. A 1% solution may be used as pour-on for control of external parasites.
3. **Amitraz**: It is widely used as insecticide and acaricide in veterinary practices. It is active against all forms of worms i.e. eggs, larvae and adults. It acts by increasing nervous activity in target parasites. It is widely used against lice, mites and ticks on cattle, lice and ticks on sheep, lice and mites on pigs and Demodex and Sarcoptes mange on dogs. It should not be used in horses due to increases incidence of toxicity. Its 0.025 - 0.05 % solution should be used.
4. **Ivermectin:** It is a semi-synthetic macrolides anthelmintic. It occurs as off- white to yellowish powder. It is less soluble in water but is soluble in propylene glycol, polyethylene glycol and vegetable oils. It is effective against a wide range of nematodes species and various ectoparasites like mange mites, lice, ticks and flies. It can be administered by oral and SC route. It has a high margin of safety; however, it should not be used in calves less than 3 months of age, puppies less than 6 weeks of age and collies breed of dogs. It is commonly used as endoectocide in veterinary medicine.

Dose: Cattle/buffalo/horse/sheep/goat/dog = 1 ml/50 kg b.wt.; SC

ANTISEPTICS AND DISINFECTANTS

Antiseptics and disinfectants are non-selective antimicrobial agents which are applied to inhibit or kill micro-organisms.

Antiseptics: These are the antimicrobial agents used topically on living tissues.
Disinfectants: These are the antimicrobial agents applied on inanimate objects.Collectively, both antiseptics and disinfectants may be termed as **Germicides.**

CLASSIFICATION OF GERMICIDAL AGENTS

Antiseptics and disinfectants are broadly classified into several groups depending on their chemical nature or mode of action. The distinction between antiseptics and disinfectants in not always clear because some agents in lower concentration act as antiseptics, but in higher concentration are disinfectants.

Physical Agents	Heat (Dry & moist), Light/Radiation (Ultraviolet light)	
Chemical Agents	Acids	Boric Acid, Benzoic acid, Salicylic acid
	Alkali	Sodium hydroxide, Calcium hydroxide
	Oxidising agents	Potassium permanganate, H202
	Reducing agents	Formaldehyde, Sulphur dioxide
	Alcohols	Ethyl alcohol, Isopropyl alcohol
	Phenols	Phenol, Cresol, Lysol
	Iodine compounds	Iodine oint., Povidone iodine, Weak sol. of iodine
	Chlorine compounds	Sodium hypochlorite, Calcium hypochlorite
	Surfactants	Soaps, Cetrimide
	Metallic compounds	Silver nitrate, Zinc sulphate, Zinc oxide
	Dyes	Acriflavine, Gentian violet, Scarlet red
	Antibiotics	Neomycin, Bacitracin, Sulphadiazine, Polymixin
	Miscellaneous	EDTA (Ethylene oxide and ethyleneDiamineTetra-acetic Acid)

1. **Heat:** Heat, in the form of dry heat (hot air oven) or moist heat (autoclaving), is widely used for sterilization and disinfection of glassware, surgical and laboratory equipments, dressings etc. Heat destroys all types of microorganisms including bacterial spores.
2. **Light/Radiations:** Ultra-violet (UV) radiations are often used for sterilisation of surgical rooms and naked surfaces such as tabletops. UV light is commonly used to reduce airborne contamination and sterilization of aseptic rooms.
3. **Boric Acid:** It is commercially available as colourless, odourless, transparent crystals or white granules or powder. It is a weak bacteriostatic agent. It is non-

irritating and is mainly used as an antiseptic in the forms of aqueous solution (4%), lotions and ointments. It is occasionally included in dusting powders, eye washes and eardrops.

4. **Potassium permanganate:** It exists as dark purple, odourless crystals. It acts as a powerful oxidising agent that liberates oxygen when comes in contact with organic matter and inactivates toxins and bacteria. Its solution in water is used as antiseptics, disinfectants and deodorants. In solid form, KMnO4 acts as an irritant and caustic. The KMnO4 in 0.1 - 0.01 % (1:1000 to 1:10000) solutions are used for douching, irrigating cavities and cleansing wounds. A 0.02 % solution is used as gastric lavage in the treatment of poisoning. Higher concentrations of 5 % KMnO4 solution is astringent, and used as footbaths.

5. **Hydrogen peroxide:** H202 as a solution in water is marketed in concentrations of 3 - 90 % by weight. As a 3 % solution, it is used as a wound- cleansing agent but has little value as antiseptic. It cleanses and deodorises infected tissue when comes in contact with wou:-Ad surfaces and mucous membranes. The antimicrobial action of hydrogen peroxide can be enhanced by surfactants and organic acids.

6. **Formaldehyde:It** is a flammable colourless gas having pungent suffocating odour. It is very soluble in water, alcohol and ether. Commercially available formaldehyde solution, called formalin, contains approximately 37 % formaldehyde gas in water. Externally, formalin is strongly irritant and antiseptic having strong germicidal activity against all types of microorganisms including spores. A 3 - 8 % aqueous solution of formaldehyde is commonly used as a disinfectant.

7. **Ethyl alcohol:** Ethanol is a volatile, flammable, colourless liquid used as an effective germicidal and antiseptic agent. It is most effective when diluted with water to a final concentration of 70 % by weight. It is frequently used for cleansing of skin prior to parenteral injections and on minor cuts. On open wounds,'it produces burning sensation and causes injury to surface.

8. **Phenol:Phenol** (Carbolic acid) is the oldest example of an antiseptic compound having a wide spectrum of activity against bacteria, viruses and fungi, but has minimal action against spores. It acts by penetrating and disrupting cell walls and denaturing bacterial proteins. At high concentrations, it causes skin burns and is a caustic. It is bacteriostatic at concentrations of 0.1 - 1 % and is bactericidal at 1 - 2 %. Presently, it is rarely used in veterinary practice because of its caustic nature and toxicity.

9. **Povidone** iodine:Iodine is one of the oldest antiseptic. Solutions containing elemental iodine produce excellent, prompt and effective microbicidayaction

with broad-spectrum of activity. A 1:20,000 solution kills most bacteria in 1 minute and spores in 15 minutes.

Povidone iodine has much greater stability is solution than that of tincture of iodine or Lugol's solution.Povidone iodine is widely used as a general antiseptic and wound-healing agent for various dermal & mucosal infections.

10. **Soaps:** Soaps are generally used to scrub hands and operation sites and are effective in acidic conditions. On application, they emulsify the lipoidal secretions of skin and remove it along with associated dirt, desquamated epithelium and bacteria. As most bacteria reside in lipoidal secretions of skin, soap produces mainly cleansing action. Because most soaps have alkaline pH, they may irritate sensitive skin and mucous membranes.
11. **Silver nitrate:** It has caustic, astringent and antibacterial effects. A 0.1 % aqueous solution is bactericidal and somewhat irritant to skin, whereas 0.01 % solution is bacteriostatic. As silver is effective against Pseudomonas, a 0.5 % solution of silver nitrate is sometime applied as a dressing on burns to reduce infections. As caustic, it is used to destroy horn buds in calves. It is also used as cauterizing agent to remove granulation tissue around a stoma.
12. **Zinc Compounds:** Zinc salts like zinc sulphate, zinc oxide and zinc chloride are astringents and mild antiseptics. The antiseptic action of zinc is probably due to the precipitation of proteins by zinc ions. The zinc salts are included in some ointments, lotions and eye/ear drops. Zinc oxide ointment (15%) is occasionally used in skin diseases like eczema and superficial wounds. Zinc sulphate solutions (0.1 to 1 %) are used as antiseptic eye/ear drops.
13. **Acriflavine**: Acriflavine exists as an orange-red crystalline powder that is soluble in water and alcohol. It is more active against gram-positive bacteria. Its activity increased in alkaline medium and it does not loss potency in presence of pus, serum and organic matter. Commercially, it is available either as neutral acriflavine (euflavin) or as acid acriflavine (acriflavine hydrochloride). The neutral acriflavine is often preferred for wound dressing because it is less- irritant than the hydrochlorides. It is mostly used in concentration of 0.1 % as emulsion, aqueous solution, lotion, cream or jelly. It is widely used in the treatment of burns, wound and other infections of skin and mucous membranes.
14. **EDTA:** It is active against certain gram - negative bacteria such as Pseudomonasaeruginosa, Proteusvulgaris and Escherichiacoli. It is used in combination with antibiotics in the treatment of otitis externa and bacterial rhinitis.

CHAPTER - 18 BIOMEDICAL WASTE MANAGEMENT

Bio-medical waste means any solid and/or liquid waste (including its container and any intermediate product) which is generated during the diagnosis, treatment or immunization of human beings or animals.

- Biomedical waste poses hazards due to two principal reasons - the first is infectivity and other toxicity.
- Bio Medical waste consists of -

1. Human anatomical waste like tissues, organs and body parts
2. Animal wastes generated from veterinary hospitals, research centersetc
3. Microbiology and biotechnology wastes
4. Waste sharps like hypodermic needles, syringes, scalpels and broken glass
5. Discarded medicines and cytotoxic drugs
6. Soiled waste such as dressing, bandages, discarded gloves, plaster casts, material contaminated with blood, tubes and catheters
7. Liquid waste like discarded blood and body fluids

SOURCES OF BIOl1E CAL WASTE

Major Sourc

- Govt. hospitals/private hospitals/ dispensaries.
- Veterinary colleges and animal research centers.
- Biotechnology institutions.

Minor Sources

- Animal houses/slaughter houses.
- Vaccination centers.

MANAGEMENT OF BIOMEDICAL WASTE

Biomedical waste must be properly managed and disposed of to protect the environment, general public and workers, especially healthcare and sanitation workers who are at risk of exposure to biomedical waste as an occup-atiolla' hazard.Steps in the management of biomedical waste include waste collection, segregation, transportation, storage, treatment and disposal.

1. WASTE COLLEdION

The collection of biomedical waste involves use of different types of container from various sources of biom - . cal wastes like Operation Theatre, laboratory, wards, kitchen, corridor etc. The containersbins should be placed in such a way that 100 % collection is achieved. Sharps must always be kept in puncture-proof containers to avoid injuries and infection to the workers handling them.

2. SEGREGATION

Segregation refers to the basic separation of different categories of waste generated at source and thereby reducing the risks as well as cost of handling and disposal. Segregation is the most crucial step in bio – medical waste management. Effective segregation alone can ensure

effective bio – medical waste management. Latest colour codings for segregation of biomedical waste :

1. **Red Bag –** synringes (without needles), soiled gloves, catheters, IV tubes etc should be all disposed of in a red colored bag, which will later be incinerated.
2. **Yellow Bag -** All dressings, bandages and cotton swabs with body fluids, blood bags, humane anatomical waste, body parts are to be discarded in yellow bags.
3. **Cardboard box with blue marking -** Glass vials, ampules and other glass ware is to be discarded in a cardboard box with a blue marking/sticker.
4. **White Puncture Proof Container (PPC) -** Needles, sharps, blades are disposed off in a white translucent puncture proof container.
5. **Black Bags -** These are to be used for non-bio-medical waste. In a hospital setup, this includes stationary, vegetable and fruit peels, leftovers, packaging including that from medicines, disposable caps, disposable masks, disposable shoe-covers, disposable tea cups, cartons, sweeping dust, kitchen waste etc

3. TRANSPORTATION

The waste should be transported for treatment either in trolleys or in covered wheelbarroW. Manual loading should be avoided as far as for as possible. The bags / Container containing BMWs should be tied/ lidded before transportation. Before transporting the bag containing BMWs, it should be accompanied with a sig.-We-a document by Doctor mentioning date, shift, quantity and destination.Special vehicles must be used so as to prevent access to, and direct contact with, the waste by the transportation operators, the scavengers The transport containers should be properly enclosed. The effects of traffic accidents should be considered in the design, and the driver must be trained in the procedures he must follow in case of an accidental spillage. It should also be possible to wash the interior of the containers thoroughly.

4. STORAGE

Once collection occurs then biomedical waste is stored in a proper place. Segregated wastes of different categories need 'to be collected in identifiable containers. The duration of storage should not exceed for 24 hours. Each container may be clearly labelled to show the ward or room where it is kept. The reason for this labellingis that it may be necessary to trace the waste back to its source. Besides this, storage area should be marked with a caution sign.

5. TREATMENT & DISPOSAL

CATEGORIES OF BIOMEDICAL WASTE SCHEDULE - I		
WASTE CATEGORY	TYPE OF WASTE	TREATMENT AND DISPOSAL OPTION

Category No. 1	Human Anatomical Waste (Human tissues, organs, body parts)	Incineration/ Deep burial
Category No. 2	Animal Waste (Animal tissues, organs, body parts, carcasses, bleeding parts, fluid, blood and experimental animals used in research, waste generated by veterinary hospitals and colleges, discharge from hospitals, animal houses)	Incineration/ Deep burial
Category No. 3	Microbiology & Biotechnology Waste (Wastes from laboratory cultures, stocks or specimen of live micro organisms or attenuated vaccines, human and animal cell cultures used in research and infectious agents from research and industrial laboratories, wastes from production of biologicals, toxins and devices used for transfer of cultures)	Local Autoclaving/ Microwaving / Incineration
Category No. 4	Waste Sharps (Needles, syringes, scalpels, blades, glass, etc. that may cause puncture and cuts. This includes both used and unused sharps)	Disinfecting (Chemical treatment / Autoclaving / Microwaving and Mutilation)
Category No. 5	Discarded Medicine and Cytotoxic drugs (Wastes comprising of outdated, contaminated and discarded medicines)	Incineration/ destruction and drugs disposal in secured landfills
Category No. 6	Soiled Waste (Items contaminated with body fluids including cotton, dressings, soiled plaster casts, lines, bedding and other materials contaminated with blood.)	Incineration/ Autoclaving/ Microwaving
Category No. 7	Solid Waste (Waste generated from disposable items other than the waste sharps such as tubing, catheters, intravenous sets, etc.)	Disinfecting by Chemical treatment / autoclaving / microwaving and mutilation)

Category No. 8	Liquid Waste (Waste generated from the laboratory and washing, cleaning, housekeeping and disinfecting activities)	Disinfecting by chemical treatment and discharge into drains
Category No. 9	Incineration Ash (Ash from incineration of any biomedical waste)	Disposal in municipal landfill
Category No. 10	Chemical Waste (Chemicals used in production of biologicals, chemicals used in disinfecting, as insecticides, etc.)	Chemical treatment and discharge into drains for liquids and secured landfill for solids.

EthnoveterinaryPractices

INDEX

1. Herbal masala bolus for all Digestive Problems:

This preparation is good for all digestive problems viz. anorexia, indigestion, off feed, absence of rumination, impaction etc.

Ingredients needed for 5 dairy animals / 10 sheep or goats are given below:

kalimirch (Black pepper) 10 gm,
jeera (cumin) 10gm,
dhaniya (coriander seeds) 20 gm, fenugreek (methi) 20 gm,
ajwain (Trachyspermum ammi) 10 gm,
adrak (ginger) 50 gm,
Haldi(turmeric)50gm(fresh), gheekumari (Aloe vera) 100 gm,
galo / batindu (Tinospora cordifolia) stem and leaves 100 gm,
Lahsun (garlic) 50 gm,
lallmirch (red pepper/chillies) 50 gm,
Paan (betel leaves) 10 number,
Kari patta (curry leaf) 100 gm,
Tulsi leaves 50 gm,
tarwar leaves and flowers (Cassia auriculata) 100gm,
Nariyal (coconut)100 gm,
gud(jaggery) 100gm,
rock salt 50 gm,
khaneka soda (sodium bicarbonate) 100 gm.




Galo/batindu **Gheekumari** **tarwar** **Karipatta**

First grind all dry items in a mixi viz. black pepper, jeera, coriander seeds, fenugreek, ajwain, red chillies).

Then grind all the fresh herbs viz. Aloe vera, curry leaf, garlic, tulsi, ginger, turmeric, coconut (grated), galo and tarwar.

After that mix together both the above items. Now add jaggery (after making into small pieces), and rock salt, (sodium bicarbonate) and mix it thoroughly.

Dosage :

At the end make a bolus of 100 gm each (lemon fruit size) and administer orally. For young animals (calf, sheep or goat) give half the quantity or reduce the quantity according to the body weight of animals. It can be given monthly oncepreferably in empty stomach. For problematic cases continue the treatment for 2-3 days.

Herbal masala bolus will also give some relief for Repeat breeding/reproductive problems, Internal parasites,
Preventive medicine for Foot and Mouth Disease, Blue Tongue, fever, Mastitis, Hemorrhagic septicemia.

2. Tympany:

Symptoms : Stomach bulged and difficulties in breathing

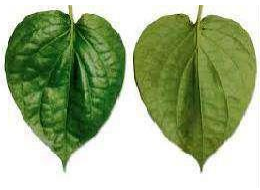
Causes : sudden change in feed materials, excess intake of legumes, dining waste

Treatment:

1. Administer 200 ml each of castor oil (Ricinus communis) and lukewarm water are shaken well and administered orally at an interval of 4-6 hrs for large animals.
2. Betel leaves(paan) 10 number, ginger (Adrak) 20 gm, pepper (kalimirch) 10 gm,

3. Garlic(Lahsun) 10 gm, rock salt 50 gm are pounded and mixed in lukewarm water and administer orally at 6 hours interval for large animals.

   Reduce the quantity to small animals according to the body weight of animals


Paan


Adrak


kalimirch

3. Diarrhea:

Symptoms : watery dung

Causes: Indigestion, intake of spoiled feed or eating toxic plants

Treatment: Grind one handful each of tender leaves of pomegranate(Anaar), tender leaves of neem, tender leaves of guava along with dried ginger 50 gm, jaggery 100 gm and make 3 bolus and administer one bolus at a time for 3 times until diarrhea gets cured.


Neem


Amrud,jamphal


Anaar

4. Constipation:

Symptoms : Lack of defecation or hard pelleted dung
Causes : Fever, heat stress and dehydration

Treatment:

1. Enema can be given (boil 10 litres of water after adding 100 gm neem leaves and cooled and administer through rectum of large animals). Avoid early stage pregnant animals.

2. Laxatives like castor oil, raw lin seed oil (500ml) can be given for 1-2 days according to species and body weight of animal. Given as drench for 2-3 days or as required.
3. A decoction of 100 gm of haldi (turmeric rhizome) in a litre of water may be given once daily for 1-3 days to large animals.

5. Endoparasites (Intestinal worms)

Symptoms: Animalsemaciated, thickbodyhairs, foulsmellingstoolswith worms

Causes: Round worms, tape worms, hook worms infestation

Treatment:
Ingredients:

Leaves of *nirgundi* (Vitex negundo), Leafpetalsof *khorpad* (Aloevera), Neem seeds,

Leaves *of sangkupi* (Clerodendrum inerme), Leaves of *akamadar* (Calotrophis gigantea)

Neem **Nirgundi,sindvar** **Gheekumari** **Madara, Aak** **Sangkupi**

They are to be taken at 1 kg each. All are to be ground well by sprinkling

little water and filtered and 4 litres of herbal mixture can be obtained. Then 30 ml of the extract is taken and administered for one adult sheep or goat. For younger sheep or goat less than 3 months old 10 ml has to be administered orally. For adult cattle 100 ml has to be administered. This can be stored for more than one month.

The dewomer arrest loose motion and result in solid dung and it is free from obnoxious odor. It increases grazing efficiency of animals and they look healthy.

6. Ectoparasites (Lice, ticks, mites)

Symptoms: Presenceof parasites visible all overthebody, animalemaciated, dull and death in severe cases.

Treatment:

1. Lahsun (Garlic), Tulsi, neem leaves, haldi(turmeric), seethapal seeds each 10-20 gm are ground together and boiled in 250 ml of neem oil and applied over the surface of the body of large animal.
2. Whole plant of Raimuniya (Lantana camara) is chopped and crushed and diluted with the urine of cattle for 3 days and apply externally.
3. Boil tobacco leaves and stalk 250 gm in 2 lit. of water and add 5 lit. of water and sprayed over the body of 10-20 animals.

Raimuniya

Seethapal

Tobacco

7. Respiratory tractInfections:

Symptoms: Heavy snoring, difficulty in breathing

Treatment:

1. Take leaves of *Thulsi* (Ocimum sanctum) 100 gm, leaves of *arusha* (Adhatoda vasica)100 gm, ginger 50 gm, pepper 10 gm, jaggery 100 gm

and boil in 1 lit. of water and administer 100 – 250 ml of the decoction 2-3 times daily.

2. Few fruits (6-8 number) of *kantakari / kateli* (Solanum surattense) are crushed and soaked in goat urine over night and filtered and few drops are squeezedinto the nostrils.


Arusha


kantakari /kateli

8. Foot and Mouth Disease:

Symptoms: Ulcers in mouthandcleft of hooves, droopingsalivaanddifficult to walk

Causes : Virus

Treatment:

Ingredients required :

Haldi(Turmeric) 200 gm (freshly harvested rhizome is preferred), coconut kernel extract (from 1 coconut), gheekumari (Aloe vera) – 200 gm, palm jaggery 200 gm, common salt 100 gm, garlic 100 gm, pepper 50 gm, cumin 50 gm, fenugreek 50 gm.

The above ingredients viz. turmeric, gheekumari (Aloe vera), garlic, grated coconut are ground well through grinder/ mixi by using sufficient water and collected in a vessel. Then make powder of pepper, cumin, fenugreek and all ingredients are mixed together thoroughly and add sufficient water to make it about 1 liter. Then filter it and administeredorally.

Dose:

100 ml at a time for adult animals or 50 ml for young ones or sheep or goats.

Before giving the treatment the animals are to be fed with banana (2

number) soaked in sesame oil(Til ka tel) 50 ml.

For treatment of wounds in the foot region:

A special wound healing *thaila* can be prepared by using following ingredients:

1. *Sesame oil*(Til ka tel) 1 lit, *haldi*(freshly harvested preferred or turmeric powder 50gm) 100gm, garlic - 50gm; neem leaves 10 gm, leaves of *mehanthi* (Lawsonia inermis) 10 gm, *kuppi* (Acalypa indica)10 gm. Ground the herbal items and mix with the oil and boil the oil well and filtered. The oil can be stored in a bottle. This *thaila* can be applied over the affected foot regionofanimalsfor 3 dayscontinuouslyortill thepointofcure. OR

2. Coconut oil 500 ml. and Datura leaf extract 500ml are taken together and boiled in a vessel till about one hour so as to get oily texture. Then put off the fire and add *tuutiya* (copper sulphate) 5 gm and stir it well. Now this *thaila* is stored in a bottle and used for all types of wounds including maggot wounds in animals.




Datura **kuppi** **Haldi** **Gheekumari**

Alsofeedtheanimalwithgruelpreparedbyboilingwithragi, wheatandbajra flour each 100 gm -200gm with sufficient water in a vessel.

9. Mastitis in Dairy animals:

Symptoms:swollen, hotudder; milkdiscolouredwithpusandthreadlike substance

Causes: Microbes

Treatment:

Ingredients required:

1. *Gheekumari*(Aloevera)- 2or3petals
2. *Haldi* (Turmeric) powder- 50gm
3. *Chunna* (Lime stone)- 10 gm

All the above ingredients are ground well and made in to a paste apply over the udder thrice a day for 3-7 days depending upon the disease incidence. Before applying, the udder and teats should be washed with boiled water for 3 times for 5 days. Administer orally 50 gm of khaneka soda (sodium bicarbonate) in the juice of lemon (4 fruits) dissolved in 200 ml of water.

Gheekumari

Haldi

10. **Infertility:**

For animals suffering repeat breeding, infertility or suboestrus or not coming to heat the following method has to be followed.

Administer orally Gheekumari (Aloe vera) 1-2 petals for 3 days in the empty stomach. Administer orally sprouted *chana dal* (bengal gram) or sprouted bajra or sprouted wheat 200 gm daily for 15 days. When signs of oestrus cycle is noticed administer orally neem oil 100-150ml before taking the animal for insemination or natural crossing (insemination shall be within 24 hours of noticing the symptom). After insemination feed the animals with curry leaves about 2 handfull daily for a week.

Chanadal Gheekumari

11. Retention ofPlacenta:

Symptoms: Non – shedding of placenta beyond 3-5 hours post-partum

Treatment:

1. Theleavesoftwosesameplants(Sesamumindicum) about 250 gmare pounded with 1000 ml ofwater anddrenched; placentawould beshed in 1to 2 hours. OR

2. Seedsofsesame 100 gm andjaggery 100 gm are taken andpound together and made into bolus and administered orally. OR

3. Take *Badagoksur* (Peadliummurex) plantabout 200 gm,poundand soakedin 1000 ml of water and stir well and drenched.

sesame plant **Bada goksur**

12. Prolapse of the Uterus:

Treatment: Clean the mass with sugar added water or any antiseptic lotion. Lift the massbyplacingbananaleafwithbothhands(specialcaremustbetaken to avoid lacerationortearwithnails, andhandmust be washed in theantisepticlotion). Mostly the urinary bladder will be filled. After lifting of the mass urine will easily go out and the mass will easily go inside.

Leaves of touch me not /*Chhui-Mui* (Mimosapudica) wholeplanttwohandfuls are groundwellandmixedwith 200 ml goat'smilktobeadministeredorally for three times (morning, evening and next day morning). Keep the animal in a slightly slanting position in such away that keeping the head portion inalower level at least for a week.

Chhui-Mui

13. Blue Tongue Disease in Sheep and Goats:

Duringrainyseason, sheepfarmersfaceeconomiclossduetosuddendeathof sheep by a new disease called as blue tongue disease.

Symptoms: ulcer in the mouth, oozing of fuzz like substance from the mouth and limping while walking and sometimes in the lying position. If the animal is lifted the hairs in the body will fall off. Animals will not take feed but drink little water. In the severity of the disease the animal will die on 15th day or so.

This disease is caused by a virus and mosquitoes or insects act as vectors.

Treatment:

Since the animal is not taking any feed the starvation may lead to death. So the animal has to administered orally the following recipe.

Bananafruitssmearedwithsesameoilandfedtoanimalsfor 2 to 3 times. Half a litre of oil with 20 bananas are sufficient to treat 20 sheep. By this animal will recover little. However this will not control the disease fully.

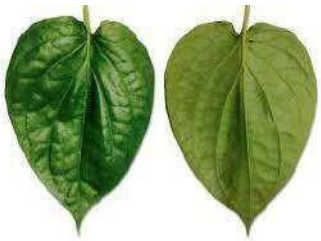
Next the leaf pulp of Aloe vera (100 gm) has to be administered daily. Administering of Aloe vera has to be continued for more days till the animal fullyrecoversfromthis disease.

Gheekumari

Administering Aloe vera also increases the body weight of animals as it acts as dewormer against intestinal parasites. This can also be administered aspreventive treatment on monthly interval especially during rainy season.

14. Poisonous bite or Food poisoning:

Leaves of betelvine, tulsi, pepper, dried *adrak*(sontha) each 10 gm. are pound together and mixed in warm water and administered orally. For poisonous bite few drops (2) of this extract are instilled to the eyes of the animal.



Paan

Tulsi

Sontha

15. Eye Injuries:

Leavesof *bimba* (Coccinia grandis) or castor (Ricinus communis) is crushed by mixing with a pinch of salt and the juice is applied for few drops(2) in the eyes.

bimba

castor

16. Wounds:

Prepare special *thaila* (oil) and apply over the wound : Coconut oil 250 ml. and Datura leaf extract 250ml are taken together and boiled in a vessel till about one hour so astogetoilytexture. Then put offthefireandadd *tuutiya* (coppersulphate)

2.5 gm and stir it well. Now this *thaila* can be stored in a bottle and used for all types of wounds including maggot wounds in animals.

Datura leaves

Tuutiya

17. Calf Scour

This caused by bacteria and it affects calf of cattle and buffaloes

Symptoms: Loose motion with foul smell and fever. dull inactive with sunkun eyes, temperature rises to 104^0 F.

Treatment: Sontha *(Zingiberofficinale) 50 gm,* guava *(Psidiumguajava) tender leaves 200 gm.* aregroundandmadeintoabolusandadministered orallyoneortwo times.

Sontha

Amrud, jamphal

18. *Panchagavya* for Animal Health:

This preparation overcome problems of infertility or repeat breeding. Mix5productsofcow(dung,urine,milk,curd,ghee) togetherbytaking

1 kg of cowdung,

1 lit cow urine,
1litofmilk,
1 litofcurd,
100 gm of ghee .

In addition add 2 banana, sugarcane juice 1litre or jaggery 500gm are added in a plastic barrel and allow them for 1 week for fermentation. Now administer 200 ml- 300 ml of *panchagavya* monthly once for general upkeep of cattle or 100 ml for sheep or goat on monthly basis . For dogs affected with skin disease (oozing of body fluid from the skin) can be given by administering 100 ml of *panchagavya* for 3 days continuously. For poultry birds mix about 50 ml of *panchagavya* along with feed for feeding a dozen birds. *Panchagavya* fed chicken lay eggs of bigger size and also the growth of the bird is quick and faster.

19. Milk fever or Calcium Deficiency :

The disease usually occurs in dairy animals caused by decrease in blood-calcium level, generally within 48 hours after calving.

Treatment:

Take 1 kilo of lime stone (Calcium hydroxide) and put in a mudpot . Add 20 litres of water and keep it overnight. Take 500 ml of supernatant water(top watery layer) and feed the animal daily by mixing in animal drinking water . While taking the upper layer of water add equal quantity of fresh water of

500 ml added daily. Every 20 days change the whole content with fresh limestone and water .

This practice can be followed regularly and it prevents diseases caused due to calcium deficiency.

20. Poultry Diseases:

i) For Ranikhet disease:

Symptoms: Diarrhoea, excreta is watery, green with foul odor; discharge from the nose; coughing and sneezing; swelling of the head; head and neck twisted to one side; drooping wings, dragging legs; sleepiness; full, distended drop; convulsions and paralysis; death.

Precaution : The disease affected chicken are to be removed and kept separately.

Treatment:

Leaves of *utarn* (Pergularia daemia) 20 gm, leaves of *kirayat* (Andrographis paniculata) 20 gm, fresh haldi (turmeric: Curcuma longa) 20 gm, garlic 20 gm and onion 20 gm are chopped together and fed with other poultry feed occasionally as preventive or curative treatment.

Utarn

kirayat

Haldi

ii) For Lice Infestation of Poultry :

Symptoms: Small, whitelicelayeggsonthefeathers; licemovingonskinand feathers ; reduced egg production; slower weight gain ; birds constantly peck at themselves or scratch themselves with their beak.

Treatment :

1. Spread crushed leaves of *sithapal* (Annona squamosa) or *Aak*

(Calotrpis) inside poultry nest and lice collected over the leaves can be disposed offhygienically.

Garlic, Tulsi, neem leaves, seethapal seeds, haldi (turmeric) each 10-20 gm are groundtogetherandboiled in 250 ml ofneem oil andappliedoverthe surfaceofthe body of 10-15birds.


Sithapal


Haldi


Lasun


Neem


Aak