# PRACTICAL MANUAL

# OF

# LIVESTOCK

# PRODUCTION MANAGEMENT

**Volume I (Unit I-IV)**

Ist Year B.V.Sc. & A.H.

(2020-21)


Prepared by:-

Dr. N. V. Jadhav
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**DEPARTMENT OF LIVESTOCK PRODUCTION MANAGEMENT**

**MJF COLLEGE OF VETERINARY& ANIMAL SCIENCES,**

**CHOMU, JAIPUR (RAJASTHAN)**


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# CERTIFICATE

This is to be certify that

Mr./Ms. …… …… …… ……..……

I.D. No…… …… … ……of First year B.V.Sc & A.H. has successfully completed all practical's in Livestock Production Management during first year of the academic year ……

Date :

Place : Chomu, Jaipur

**Signature of Head of Department** **Signature of Course Teacher**

# FOREWORD

I am very happy to go through the Practical Manual entitled "Livestock Production Management" prepared by Dr. N. V. Jadhav, Dr. Anil Kumar Patidar & Dr. Abhishek Saini, Department of Livestock Production Management, MJF College of Veterinary & Animal Sciences, Chomu, Jaipur (RAJ.) The Manual covers the practical syllabus of undergraduate course (Livestock Production Management, Volume I) Prescribed by veterinary Council of India (New VCl 2016) for B.V.Sc & A.H. programme.

The Manual Written by the authors is a good attempt which is based on their experience of teaching undergraduate courses. The language used in the manual is simple and lucid. The outline and description of practical exercises covering objectives, materials required, procedures and observations to be taken have been nicely presented which would be helpful in conduction practical more effectively.

I hope this manual will make its own place in the libraries' of Agricultural Universities, Veterinary and Animal Science College and various Livestock Institutions in near future.

I congratulate the authors for the efforts put in bringing out his practical manual.

**Dean**
MJF College of Veterinary &
Animal sciences, Chomu, Jaipur

# ACKNOWLEDGEMENT

Ever since the introduction of new course for professional B. V. Sc. & A.H. degree under Veterinary Council of India pattern in Veterinary Colleges/Universities in the country, there was a dire need to have a practical manual on Livestock Production management subject which covers the practical syllabus of undergraduate (Livestock Production Management ,volume I) These new course was not dependently developed in most of the Veterinary College/University before the introduction of Veterinary Council of India programme. The present manual covers the practical with objectives, material required, procedure, steps to follow precautions to be taken, observations to be recorded and exercise to be done buy the students. The main objective of this manual the need of students and teachers teaching these courses. we hope that users will find the manual immensely useful.

We look forward to receiving the valuable suggestions of readers for improvement of this manual.

Dr. N. V. Jadhav

(Professor & Head)

Dr. Anil Kumar Patidar

(Assistant Professor)

Dr. Abhishek Saini

(Assistant Professor)

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## UNIT - I

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# EXERCISE 1

# VISIT TO THE ANIMAL FARM

**Objectives:**

To familiarize the student with the work of animal farm.

**Procedure:**

1. To Acquaint the students with the various species of livestock maintained at the farm.
2. To acquaint them with layout of various buildings and equipments used for the management of livestock.
3. Visit each and every section of the farm.
4. Students will be required to record the following observations during the visit.

**Observation regarding animals:**

| Species | Breeds | Herd Strength | Characteristics |
|---|---|---|---|
| Cattle<br><br>Buffalo<br><br>Sheep<br><br>Goat<br><br>Poultry<br><br>Fish<br><br>Dog | | | |

**Strength of each class of herd:**

| **Class** | **Cows** | **Buffaloes** | **Others** |
|---|---|---|---|
| Milch animals | | | |
| Dairy animals | | | |

| **Class** | **Cows** | **Buffaloes** | **Others** |
|---|---|---|---|
| Down calvers/ | | | |
| Pregnant females | | | |

**Bulls:**

Bullocks

**Breedable/stock**

**Growing stock**

**Suckling claves**

(a) Males

(b) Females

**Management unit:**

| S. No. | Section | Activities |
|---|---|---|
| | | |

Note: List here species areas of operations like fodder production, milking, milk handling, Artificial Insemination facilities, Central feed and fodder store, Quarantine, Weighing bridge etc.

**Examine the following facilities and record their main function**

| Facilities | Function |
|---|---|
| Loose house | |
| Conventional bran | |
| Bull pens | |
| Calving pens | |
| Milking barn | |
| Growing animals shed | |
| Sick animals shed | |
| Drainage system | |

**Season wise common fodder supplied to animals**

| Season | Dry | Green | Hay/silage |
|---|---|---|---|
| Summer | | | |
| Rainy | | | |
| Autumn | | | |
| Winter | | | |
| Spring | | | |

**Precautions:**

(a) Do not make noise while you are visiting any farm.

(b) Do not chase animals

(c) Dip your feet in the foot bath if provided when entering animal standing

(d) Observe all the rules of approaching animals taught to you when examining them at the farm.

**Questions:**

1. Tick mark (_/ ) all correct answers:
   (a) The object of dairy farm may be breeding/supply of milk/production in milk.
   (b) The efficiency of dairy farm is based on productivity of the animal/good management /size of farm.
   (c) Commercial dairy farm produce only milk. Manure/ butter/ milk product.
   (d) Well organized dairy farms maintained a specific ratio of milch animals to total animals/pregnant /dry animals.
   (e) Cut and carry system of fodder feeding consumes more labour /less labour than grazing.
2. Name the different breeds of animals kept at the farm.
3. Relate/explain the management of bulls at the farm.
4. What are the feeding and watering arrangements at your college farm.
5. Describe the disposal of manure at the farm.
6. What is wallowing tank and why it is essential?

# EXERCISE –2

# IDENTIFICATION OF COMMON TOOLS USED ON ANIMAL FARM

**Objectives :**

To acquaint the students with common appliances used for the restraining different types of animals.

**Procedure :**

Application of various methods of restraining is essential to carry out certain procedures, that would otherwise be resented by animals. These methods may inflict a small amount of pain, but discomfort caused very often has a beneficial effect upon the animal, avoiding what otherwise may be a danger to operator's life. In other words restraining is a necessary civil in handling animals.

Appliances commonly used are :

1. **Halter** : It is a piece of rope specially made up of a particular shape to adjust on the head of the horse for its restraint. It can be made from cotton rope or hemp rope of about one inch diameter and ten feet length as follows :
    (1) Make a single loop about 2/3 the length of the horse's head on one end of the rope.
    (2) Place this loop over the horse's head with the top behind ears and knot under the jaw.
    (3) Pass the rope under the jaw to the off side and bring it forward across the cheek and nose.
    (4) Continue the rope back across the cheek on the near side and tie it to the loop so that the nose is lightly but not tightly encircled.
    (5) Lead the horse by the loose end of the rope.
    (6) A halter is a device prepared out of ropes on the face of the animal in order to restrain him easily.
2. **Muzzles** : These are made up of either leather, wire or cord (rope ) and are fitted round the muzzle of an animal. A leather muzzle should be preferred to wire muzzle on account of the later being uncomfortable although it is durable and cheap. Two big apertures provided in leather muzzle should come over the nostrils and it should be buckled on the near side. They should never be fitted tight . Muzzles are used -
    (i) To prevent animals from
        (a) Eating their bedding and dung
        (b) Fighting
        (c) Tearing of cloths
        (d) licking walls

(ii) For basting animals and also to prevent them eating green fodders or crops while working in such fields.

(iii) To prevent young calves from sucking their mothers.

(iv) To prevent dogs from biting while in transit in trains.

(v) To prevent young bulls from masturbation.

3.**Tape muzzle** : It is used to secure dogs from biting a person while handling. It can be made from ordinary bandage or cord in the following fashion :-

1. Make a loop in the centre or a four feet cord or bandage.
2. Slip the loop over the nose of the dog either from behind or front with loop under the jaw.
3. Draw the loop tight and bring the ends around the side of the neck.
4. tie the ends in a reef knot over the crest behind the ears of the dog.

4. **Bull nose rings** : These rings are of different sizes, ranging from 1.5" to 3" diameter generally made of such material which does not rust such as copper, aluminium or sone other alloys. In their manufacture, two semicircular pieces are generally hinged together, the free ends may either dovetail into one another or may just fit into each other as a point and socket, secured by a countersunk head screw. Theses rings are used in the restraint of bulls which are powerful and not easily manageable by halter. They are applied below the inferior extremity of the septum nasi about 5" back from the nostrils. These are used to hold or ties the bull when necessary. Too much force should not be applied to it as it may tear through the tissues and come away.

In bullocks a strong cotton rope is passed through a hole punched on the septum nasi. The ends of the rope are tied or spliced over the poll after passing each end or each side of the face. This loop of the rope should be loose to allow easy mastication etc.

**5. Pig rings** : These rings are exactly of the same pattern as bull nose rings. In pigs self piercing rings are preferred. They are applied either in the septum nasi or the side of middle lines one on each side of the snout. These are useful in preventing the pig from disturbing its bedding and destruction of grass on the turf.

6. **Bull nose puncher** : This is used to make a hole in the septum nasi for the bull ring. It may be either point and socket variety or just a puncher.

**7. Pig Snout punch** : It resembles bull puncher and is used for making hole in the pigs for ringing

**8. Bull holder (bull dog) bull nose tongs** : This appliance is used in the control of the head of cattle when the examination is likely to take long time and it is not possible to hold the animal's nostrils with

fingers and thumb. There are many patterns of this appliance. One of these patterns have swivel adjustment to avoid twisting the operator's wrist while the animal is turning or twisting its head . Bull tongs have a long rigid handle and an extra cord for fixing it to some other object and in this no assistant is required whereas and other person has to hold the bull holder all the time it is applied to the cattle. Its jaw end is applied in the nostrils and fixed by means of a spring.

**9. Bull leader or bull poles** : It is pole having chain or winch but there may be different makes for the catch. These are fixed in the bull ring for leading the bull.

**10. Milk sucking Preventer ( Anti sucking shield**) : it is an aluminium disk with arrangement of screws for adjustment on the septum nasi of the nostrils of animal. Its application does not interfere in the feeding of animals , whereas it prevents the cow from sucking its own teats and calves from sucking their mothers.

**11. Anti cow kicker & tail holder** : It consistes of two metal spring clips joined together with a chain for adjustments. One of the clips has a smaller clip fixed to it for securing the tail during milking. The legs of the cow can be drawn close together and the position secured by pulling the free end of the chain tighter and locking it in the groove in one of the clips. These clips can be fitted on the tendo achillis by a person sitting by the side of the cow while milking with chain hanging in front of the hocks. This is used to prevent kicking by the cow while milking . These clips seldom fit properly and hence are not very popular in this country.

A rope about three feet long & ½" diameter is used for immoblising the hind legs in the countryside to prevent kicking during milking of cows. This rope is tied to one leg above the hock and then passed round the other and back to the first leg again in a figure of eight fashion. In the village this rope is terned "niana".

**12 Twitch** : it is strong stout wooden stick about one yard long to one side of which is attached a rope loop through a hole. This loop is about 18 inches long and 3/8" thick. Instead\ of rope this loop can be made of horse's tail hairs. It is one of the oldest simplest and most commonly used appliance for the restaint of horses.

There are many types of twitches used. The principle underlying their application is the same i.e. pressure is applied to the sensory nerves of the area and the pain produced diverts the horse's attention while less painful work is being done elsewhere on his body. It is generally applied on the upper lip, but can be applied on the lower lip and ears. For cattle cord rope twitch is used on the upper lip.

**13. Dog Catcher**: It is an appliance used in securing vicious dogs from a little distance as a safeguard to the handler from its biting. An pole about for to six feet, long may be used in making dog catcher.

Get two holes made on one end at a distance of one inch from this end and the distance between the holes may range from three to four inches. A rope with a knot at one end is passed through the first hole and then slipped through the other end or rope held by operator.

**14. Pig catcher** : It is used for securing pigs. It consists of a hollow metal rod or a wooden pole about 2 feet long. Two holes are made on one end at a distance of one inch. A rope with a knot at one end is passed through the first hole then slipped through other.

**15. Probang gag (Wooden Gag**): This gag is made in two pieces of cast aluminium. One for the right jaw and the other for the left jaw of cattle. They are slightly curved longitudinally to correspond to the shape of an ox's jaw and are fitted with flanges above and below to accommodate the upper and lower cheek teeth. During use the right gag is held in the left hand and the left gag in the right. A piece of cord is attached to the front of each part to admit easy withdrawal. When sliding them into the mouth between the jaws, it is better to hold the beast's tongue.

**16. Drink water's gag for cattle :** this gag is made on two pieces of cast aluminum. One for the right jaw and the other for the left jaw of cattle. They are slightly curved longitudinally to correspond to the shape of an ox's jaw and are fitted with flanges above and below to accommodate the upper and lower cheek teeth. During use, the right gag is held in the left hand and the left gag in the right. A piece of cord is attached to the front of each part to each part to admit easy withdrawal. When sliding them into the mouth between the jaw, it is better to hold the beast's tongue.

**17. Spring gag:** The gag is used in dogs. The spring between the two arms keeps the jaws apart to the fullest extent. Pads of rubber are provided on the arms, one of which moves along a curved piece of metal and engages the points of upper and lower canines on one side.

**18. Linton's gag:** This gag is used for sheep. It is light and easily adjusted and has the advantage the the handles behind the poll give a good chance to steady the sheep's head. The bars should be covered with rubber to prevent damage to the gums.

All these gags are to be applied to different animals and the actual process of application should be demonstrated to the students in the practical class.

**Note:** An examination of mouth is possible without gags by holding the tongue, but it will necessarily be brief and unless the jaws are kept apart not much can be seen. Good strong light will assist in thorough examination.

***Questions:***

1. Practice the use of these gags on individual animal.

# EXERCISE-3

# FAMILIARIZATION WITH BODY POINTS OF ANIMALS

**Objective:**

1. Study of breed characteristics.
2. Judging of animals.
3. Locating the external abnormalities on body.
4. Preparation of Veterinary documents and certificates.
5. Essential for different husbandry practices.

**Procedure:**

1. Study the labelled body parts of the animals.
2. Observe the location of different parts on the body of the animal as explained by the instructor.
3. Study the differences in the external parts in cow, bull & buffaloes.

**External body Parts can be studied under the following headings-**

**a. Head**

**i. Poll –** the area between the base of horns.

**ii. Fore head -** The fore head is bounded dorsally by the poll; ventrally by an imaginary line drawn between two inner canthus of eyes and laterally by the imaginary line drawn from base of the ear to the outer canthus. The fore head shape will vary depending on the breeds (e.g.) in case of Jersey it is dished, in Holstein Friesian it is flat and there is a inverted triangular white patch, while in Murrah Buffalo it is convex with tough bristles.

**iii. Nasal Bridge-** It extends from the base of the forehead to that of a coloured area in the upper jaw i.e. Muzzle. The nasal bridge is dished in case of Jersey; in Holstein-Friesian it is flat; in Jamunapari Goat it is elevated "Roman Nose".

**iv. Muzzle-** It is a non-elastic black pigmented area devoid of hair. The muzzle will give an indication about the health of the animal. In the case of healthy cattle it is moist while in the sick animals it is dry and vice versa in case of horses.

**v. Nostrils -** The external opening of noses (or) openings of the respiratory tract are present on either side of muzzle. The nostrils are laterally placed in case of ruminants while in the pigs it is medially placed.

**vi. Horn**- has three parts i.e., Base, Body and Tip.

**vii. Eye:** Upper eyelid, lower eyelid, eye lashes, inner canthus, outer canthus & nictitating membrane (or) third eye lid.

**viii. Ear:** base, body, & tip.

**ix. Upper jaw**. (Maxilla).

**x. Lower jaw**. (Mandibles) Rami of the mandibles are present on the lateral aspect of the lower jaw. In between the rami of the mandible the forefingers can be inserted-that area is referred as "**Jowl**".

**xi. Cheek.**

**xii. Chin.**

**xiii. Buccal Cavity:** Upper lip, lower lip, buccal papillae, Tongue: base, body and tip, Taste buds.

**Xiv. Teeth:** Incisors, Inter dental space, pre molars, molars, dental pad.

### b. Neck

i. Dorsal border- Very close to the inner aspect of dorsal border there is "Ligamentum Nuchae". ii.Ventral border. iii. Base of the neck. iv. Top or cranial border. v. Sides. vi. Crest. vii. Jugular furrow: Jugular vein. In case of ailing ruminants fluid therapy is given in this vein while in pigs it is given in the ear vein. viii. Dew lap.

### c. Fore Quarter

i .Hump (or) withers. ii. Shoulder. iii. Shoulder joint. iv .Point of Shoulder. v. Arm. vi. Elbow joint. vii. Forearm. viii. Knee joint. ix. Fore cannon. x. Fetlock joint. xi. Pastern. xii. Coronet. xiii. Hoof: Inner digits, outer digit, inter digital space, Bulbs of the heel, Sole. xiv. Back of the fore arm. xv. Bend of the knee. xvi. Back of the fore cannon. xvii. Dew Claws (or) rudimentary digits.

Joints of Fore Quarter: 1.shoulder. 2. elbow. 3. knee. 4. fetlock.

### d. Body or Trunk

i. Dorsal Border: Back, Loin, Rump (or) Croup.

ii. Sides of the Body: Heart Girth (Circumference just posterior to the shoulder), Side of the chest, side of the abdomen, hollow of the flank, flap of the flank.

iii. Ventral Border: Brisket, Floor of the chest, floor of the abdomen, umbilicus.

In case of male: Prepuce, testicles, and rudimentary teats. In case of female: Udder (or)

Mammary Gland, Right & Left Quarters-Fore & Hind Quarter. Mammary Vein, Wells of the

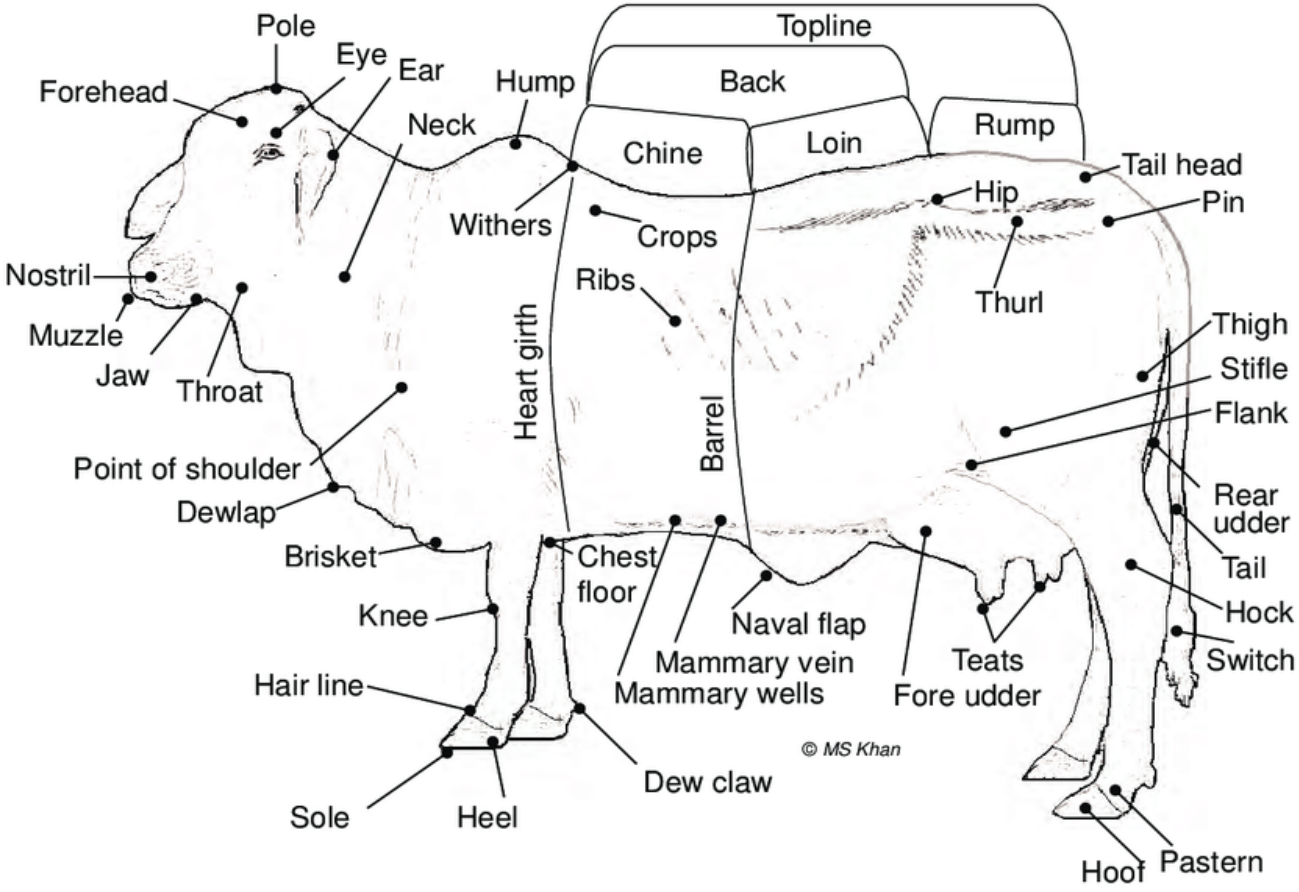
vein.

### e. Hind Quarters

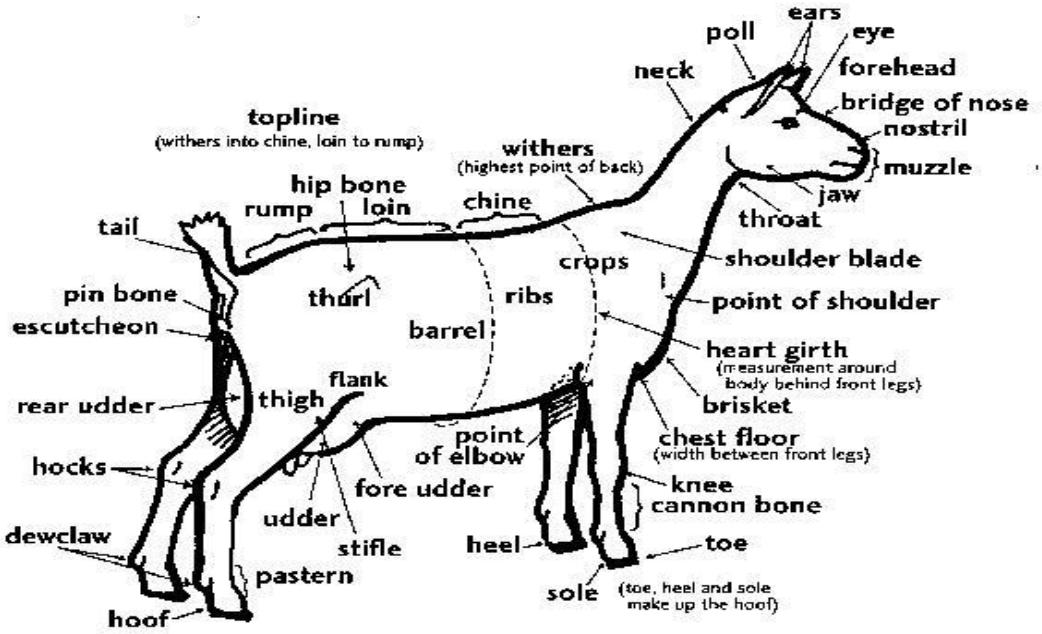
i. Hip joint. ii. Thurl. iii. Stifle joint. iv. Tendo Achilles (or) Ham string. v. Hock joint. vi. Hind cannon. vii. Fetlock joint. viii. Pastern. ix. Coronet. x. Hoof: Inner digit, Outer digit, and Inter digital space, Bulbs of the heel, Sole. x. Point of buttocks. xi. Point of Hock. xii. Back of the hind cannon. xiii. Dew claws. xiv. Tail: Base, body and switch. Below the base of the tail there is anus and in female vulva.

Joints of the Hind Quarter: Hip, Stifle, Hock and Fetlock.

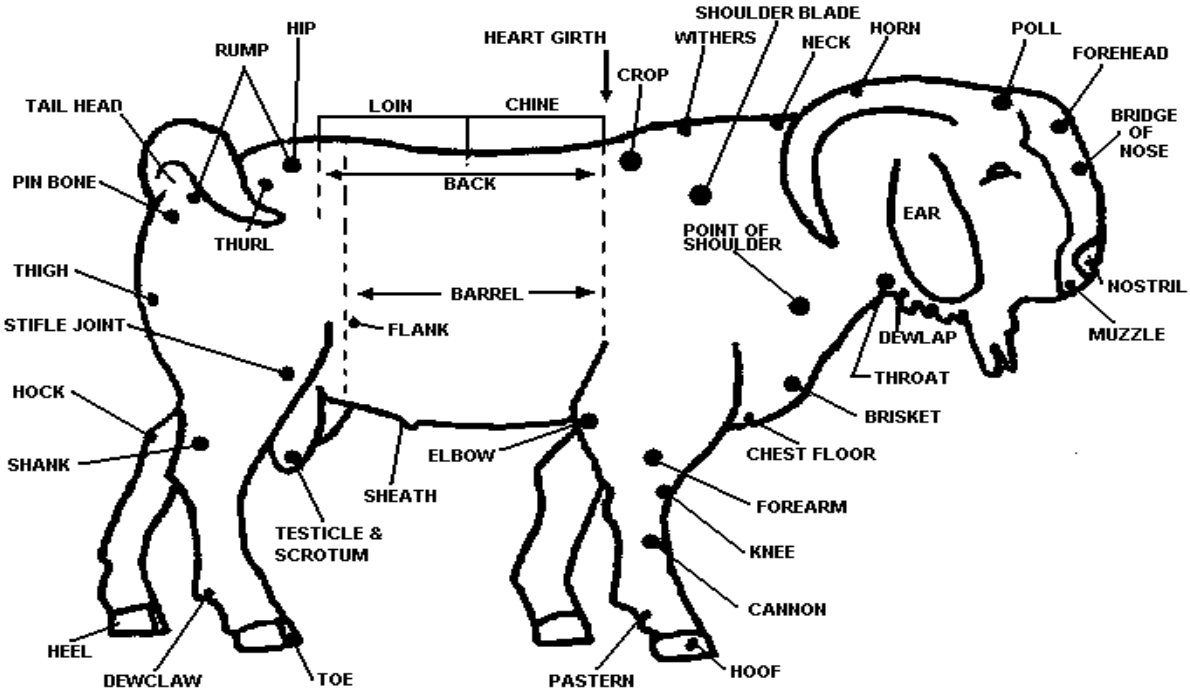
## BODY POINTS OF CATTLE



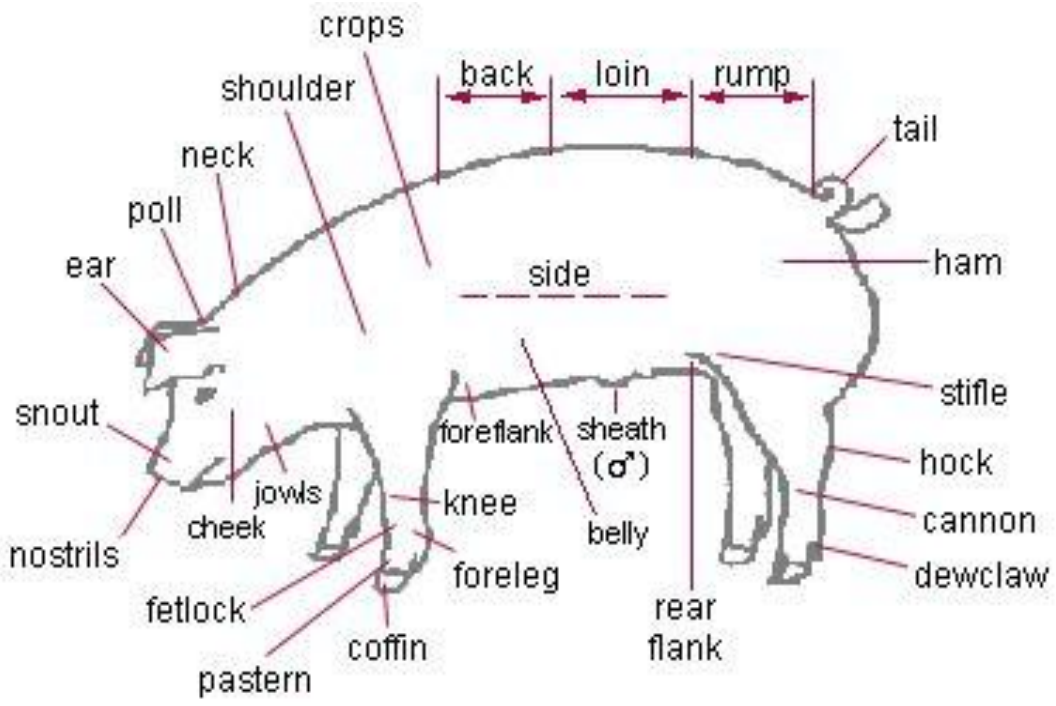

## BODY POINTS OF GOAT



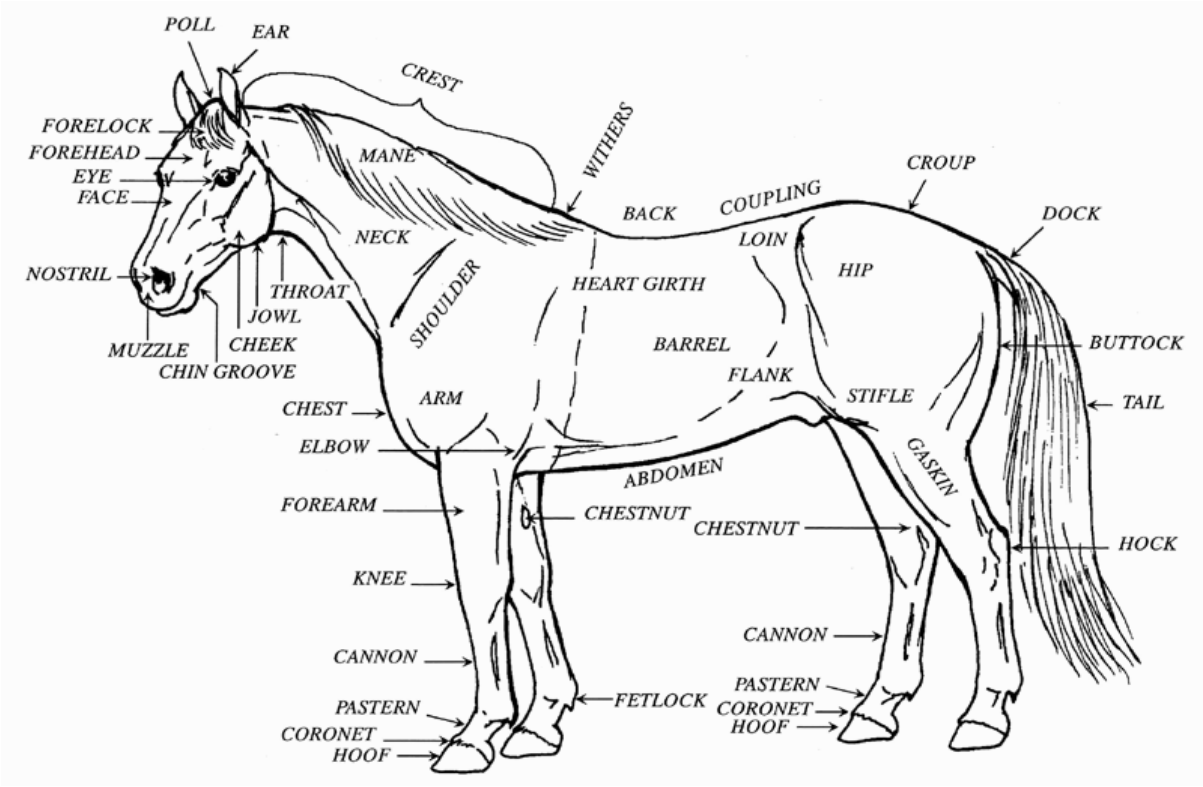
## BODY POINTS OF SHEEP



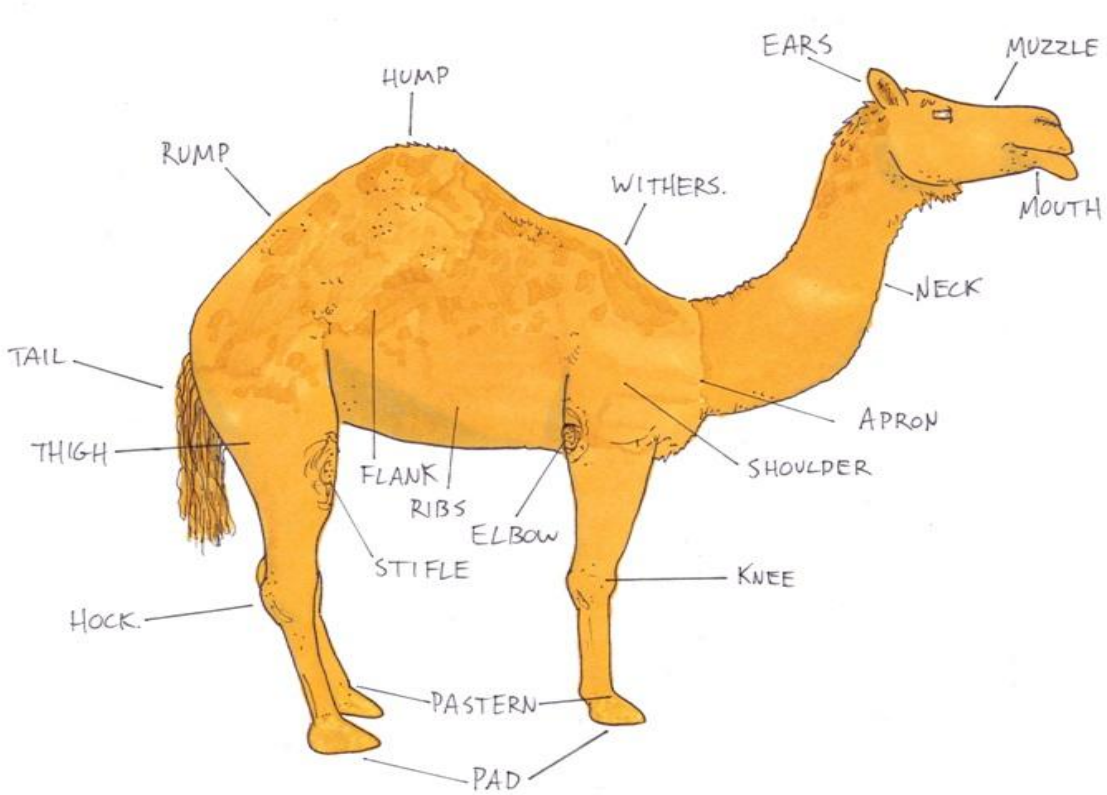

## BODY POINTS OF PIG



## BODY POINTS OF HORSE




## BODY POINTS OF CAMEL



***Questions :***

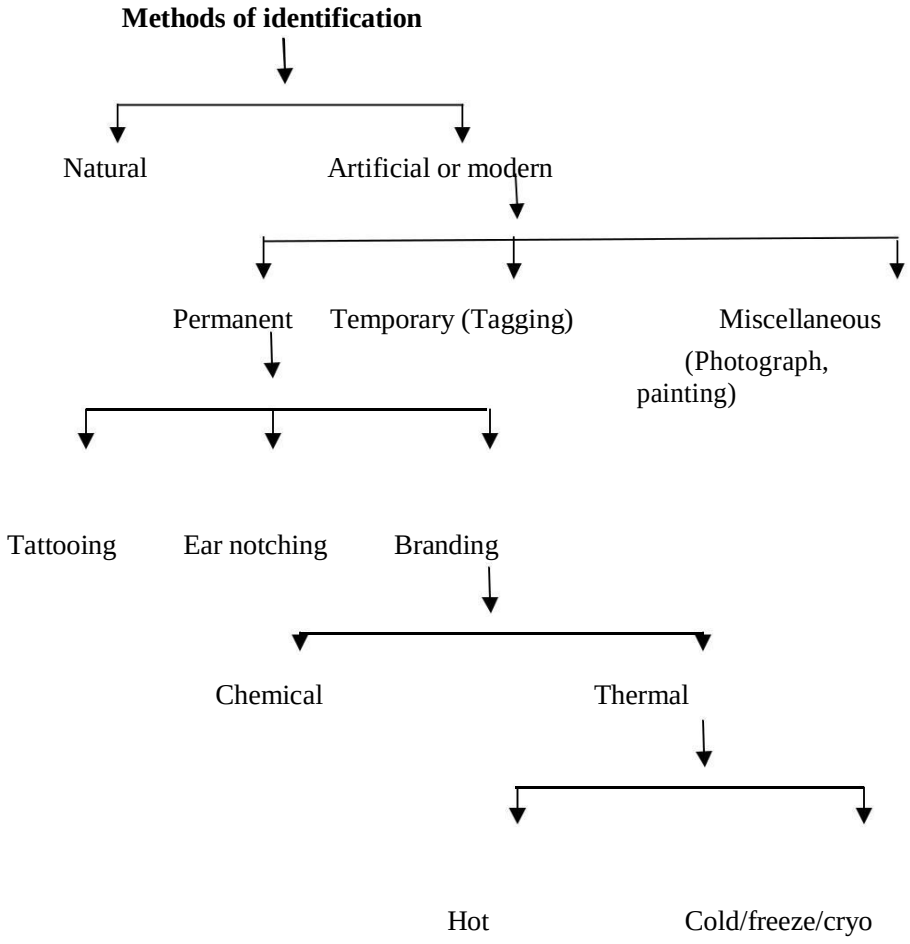
1. Locate various body parts of cattle provided in class.
2. what are the main differences in points of body of cattle and horse in the region of head, fore limb and neck .
3. Identify various body parts of Goat.

# EXERCISE –4

# IDENTIFICATION OF ANIMALS

**Objectives:**

1. Maintenance of proper records on the farm.
2. Proper feeding of animals.
3. Helps in better management practices.
4. Designation and identification of animals.
5. Requirement for registration of pure bred animals.
6. Helps in insurance of animals.



Some common temporary methods of identification used by farmers in field condition:

- Neck chain
- Tail tag
- Hair cutting of tail in different design.
- Colour spreading on body.
- Branding of horn.
- Photography.
- Natural mark or spot on body.
- Natural/ accidental physical injury/wound like burn, handicap.
- More or less number of organs i.e., 5 teats.

**Common methods of identifications are:**

### 1. Tattooing

- It is commonly used in young calves (1 week) and sheep and goats
- It involves piercing out lines of desired numbers on skin inside ear.
- In case of pigmented skin of buffaloes and cattle, tattooing can be done on under surface of the root of tail

**Material required:**

- Tattooing forceps
- Tattooing ink
- Series of letters and numbers

**Procedure:**

- The number should be determined to the allotted new born.
- The number should be checked after inserting it into forceps.
- Position of tattooing should be determined to avoid the bleeding.
- Ear must be cleaned using methylated spirit so that dirt and grease are cleaned.
- Tattooing ink must be pasted at proper place.
- Tattooing forceps pressed ink pasted place and later rubbed at punched place by using brush or finger so that ink enter into hole.
- Extra bait dried up after 2-3 days of application and number become clear and permanent.

**Precaution:**

- the number tattooed should be checked by piercing it on paper or leaves
- ear veins should be avoided while tattooing

- Equipments should be cleaned.

## 2. Branding

It is of three types: 1.Hot branding 2. Cryobranding/cold/freeze 3. Chemical

i. **Hot branding:** It is applied with objective that the skin of rump region is burnt which later on develop into scar tissue. The hair follicle of the branded site is damaged and the number becomes permanent and visible.

**Material required:**

- Iron /copper moulded numbers 0-9 and A – Z or any other design as required.
- A portable forge
- Zinc oxide and mustard oil

**Procedure:**

- The animal restrained in cattle crates
- The hair Clipped from rump region
- Brand iron ignited till it become red hot
- Applied on rump with a distance 2 to 3" between the m. The colour of brand site should be dark mahogany red.
- Antiseptic ointment applied regularly till healing of wound.
- Animals are kept with precautions, so that animal must protected from crows.

**Precaution:**

- Branding done when weather is good.
- Medium sized letter made up of cast iron/ copper should be used. If available copper is preferred.
- Cattle crates should be used for proper resting of animals.
- Winter season is best suited for proper healing of wound.

- Branding avoided at rainy season. Since the moisture in the hair may spread the heat as steam, which result in blotched brand, a bad or may even give no brand.
- Thickness of brand should be controlled

**ii. Chemical branding:**

Instead of using hot iron for branding, commercial branding inks are available for chemical branding which is equally effective as hot iron branding if carried out properly but it is less permanent and requires skill. Secure the animal properly by casting and tying their legs. The branding irons for chemical branding should have a shallow groove on the contact surface of the letter to hold sufficient branding ink. It consumes more time and chemicals.

**iii. Cold (cryo) branding:**

A hot brand is scar from a serious burn, while a properly performed cold brand merely causes the hair on brand site to grow in white. It is because freezing the skin for definite time will kill the colour producing cells of hair follicles (Melanocytes) without actually killing the hair producing cells. If skin is not frozen for enough periods, there will be no effect at all. Similarly the area is frozen for too long, the hair follicles will be destroyed and there will be no hair growth.

**Advantage:**

- It is permanent and easy to read even when animal have long hairs
- Brand is on hairs actually and not leave scar on the skin and brand cannot overgrown by hairs.
- No damage so may be placed anywhere on the skin.

**Disadvantage:**

- Time consuming
- Expert hand is needed.

**Material required:**

- Iron used for freeze branding should be made up of copper/brass, copper is preferred over brass.
- Hot branding irons are not suitable, as they do not have enough metal in them to give thermal mass so that the iron became cold during branding.
- The size of iron used is a matter of choice, while branding young animals, it is advisable that 25 mm size wire may be used as the brand will increase in size up to 6-8 times as animal grows.

- Refrigerant used are dry ice (dry ice -79$^{o}$C), Liquid nitrogen (-196$^{o}$C) with dry ice, a solution of 95 % $C_2H_5OH$ Isopropyl alcohol a acetone will have to be used.
- For branding 20 animals 5 lit of liquid nitrogen + 5 lit alcohol with 10 kg of dry ice. Required.
- Once branding procedure started, it should be finished as early as possible because the initial cooling of iron effect more and re-chilling require more refrigerant.

**Procedure:**

- The hair of the brand site should be clipped with clippers. Hair act as insulator and affects the efficiency. This is especially critical when using dry ice.
- The site washed and scrubbed with alcohol and acetone to remove scruff, dirt and looped hair
- Before starting iron should have been cooled in refrigerant up to the time when vigorous bubbling of refrigerant ceases and only a few bubbles seen rising to the top. The iron will be at ultra low temperature.
- Iron must pressed firmly, so that the numbers came in direct contact of the skin.
- When branding iron removed, a cloth soaked in water at body temperature should be applied at brand site up to the same length.

The brand will be visible immediately as a frozen indentation on the skin. As thawing occurs the area will become oedematous and brand will swell slightly. This will last up to 48 hrs. After that the branded area will become dry and scaly. A scab will form their and persist for 3 to 4 weeks. After which an area of hair less skin will remain.

### 3. Tagging

- Ear tags are commonly applied in sheep and goats, but rare in pigs and young calves. Tags or labels are made up of light metal or strong plastic with number stamped on them. There are two types of tags namely self piercing and non-piercing type

**Material required:**

- Tagging forceps, numbered metal and plastic tag
- Tag punch or pen knife
- Spirit and cotton

**Procedure:**

Self piercing tag can be applied directly to the ear with a forceps as they have sharp ends. For fixing non piercing tags a hole must be made in the upper edge of the ear as close to the head as possible with tag punch or pen knife. The numbered side of the tag should be on the top of the ear. Antiseptic should be applied to prevent infection.

### 4. Ear notching

Pigs are commonly identified by ear notching

**Material required:** Ear punch, sharp scissors or pincers or pocket knife, tincture iodine and cotton

**Procedure:**

Number given should be decided and cleared with position of notches by following standard method. V shaped notches made at specified place along the border of ears by means of sharp scissors or pincers. Tincture iodine applied on the notches.**Precautions:** Small or too large notch should be avoided

### 5. Banding

Banding carried out in birds. Bands are of two types viz., wing band (day old chick) and leg bands (grower or adult birds).

**Material required:** Aluminium band for wing and legs and banding plier

**Procedure:** Bird secured and left wing grabbed. The wing flap pierced with sharp edge of the desired band and then folded and pressed with fingers, Leg band applied to the shank of the bird with the help of pliers. Band is pressed if it is too large to avoid sleeping from the leg.

**Precautions:** Band should be soft and edges should not be rough and wing band should be applied too superficial or too deep.

### 6. Badging

Badges are made up of plastic and are numbered or lettered. These may be applied at the base of wing of the bird.

### 7. Photographing

Photographing commonly used in cattle and buffaloes. It can be done to get side view, rear view and hind view. All the three views appear when picture taken from $45^{o}$ angle. While taking photographs, the angle of vision of the camera should not exceed the angle of vision of normal eye.

Animal must stand squarely. The head of the animal should be held high at its natural sweep in such a way that the longitudinal axes of the head and neck as well as that of the body are in line.

### 8. Using Electronic chip

It is recent method of identification of animals & is carried out with the help of a syringe (specially designed to push the chips under skin of animals). The implanted chip bears a number, which is read by a scanner. This method is used in countries having very large farms where pasture raising of animal is practiced. An electronic chip is inserted subcutaneously in the animal's body and animal is traced with the help of a radio telemetric system. This method when used with other sensors like pedometers or intra vaginal Sensors also helps in detecting heat. Currently this method is used in wild animal like elephants and big cats. The advantage of this system lies in the fact that it helps in identification of animal from a distance.

***Questions:***

1. Why branding is preferred than tattooing in dairy cattle?
2. Which method of identification is most common is sheep and goat?

# EXERCISE-5

# DENTITION & AGEING OF ANIMALS

**Objectives:**

1. Selection and purchase of animal
2. Performance and economic returns from animal depend upon age.
3. Criteria for determining the price
4. Calculation of dose of medicine according to age and weight of animals
5. Help in record keeping in field condition.

**Methods of estimation of age:**

**1. General condition:**

| Young Animal | Old Animal |
|---|---|
| Eye Bright alert shining | Dull deep(sunken) |
| Small sized nipple, straight back and bright skin | Large size teats, curved back, dull coarse skin |
| Compact tight body, thin straight legs | Pendulous belly, loose body, thick curved legs |
| Healthy, ribs hooks and pin bones well covered with muscles | Emaciated, ribs hooks pin bones are Raised |

**Limitations:**

1. Actual age of animals can't be determined.
2. Clever preparation of animal adds to difficulty in determination of age by this method

**2. By Hooves:**

| Young Animal | Old Animal |
|---|---|
| Small sized hooves with less inter digital Space | Large sized hooves with more inter digital space |
| Smooth shining ,bright colour | Rough, dull colour |

**Limitations:**

1. Actual age of animals can't be determined.
2. Clever preparation of animal adds to difficulty in determination of age.

### 3. By Horns

| Young Animal | Old Animal |
|---|---|
| Thin, bright, shining and small size | Broad, long and coarse texture |
| Less number of horn ring<br>**(Age in year =no. of ring + 2)** | More number of horn ring |

**Limitation:**

Clever fitting and preparation of animal such as removal of rings on horn with a rasp and then oiling of the horn mask the original ages of animals.

Horn ring expresses the breeding efficiency of animal also, means a regular cyclic cow show ring in horn clearly, In case of irregular breeder more time taken to form ring. After each calving one ring formed.

### 4. Determination of Age by Teeth

Two set of teeth (milk teeth, permanent teeth) are considered for age determination. Incisors are commonly used for estimation of age and eruption time of teeth is different in different species of livestock.

**Differences between temporary and permanent teeth**

| Parameters | Milk teeth | Permanent teeth |
|---|---|---|
| **Size** | Small | Large |
| **Colour** | White or milky | Creamy or yellowish |
| **Shape** | Triangular with gum in between them but not always, means spacious | Rectangular, compact i.e. without Space between them. |
| **Gum** | Cover teeth more | Teeth remain uncovered and clear |
| **Neck** | Well developed | Less developed |
| **Root** | Well developed | Less developed |

## Types of Teeth

Among farm animals it is reasonably possible to estimate their age by examining their teeth, however, while such an estimate is reasonably reliable, it may not be always accurate. Presented below are the conventional formulae for temporary and permanent dentition of commonly used farm animals. In addition, the average periods of eruption of milk as well as permanent teeth have also been tabulated, while variations from them will certainly be met with, the majority of animals will be observed to cut their teeth at the periods stated or within a narrow margin of time before or after.

Three types of teeth: 1.Incisors 2. Canine 3. Cheek teeth (Pre molar and molar)

**Incisors:** Located in front. Broad and sharp used for cutting. Present only at lower jaw of cattle/sheep-goat/buffalo. Ruminants it is replaced by 'Dental **Pad**' (upper jaw)

**Canines:** Placed side of incisors. Sharp pointed used for gripping and ripping (tearing)

**Premolar and molar:** Covered by cheeks, found in side of jaw. Broad flat teeth with ridges. Largest and strongest of all teeth. Used for grinding purpose.

Cattle, Buffalo, Sheep and Goats

Temporary teeth: $\frac{0\ I\ 0\ C\ 3\ PM\ 0\ M}{4\ I\ 0\ C\ 3\ PM\ 0\ M} \times 2 = 20$

Permanant teeth: $\frac{0\ I\ 0\ C\ 3\ PM\ 3\ M}{4\ I\ 0\ C\ 3\ PM\ 3\ M} \times 2 = 32$

**Determination of category of animals, it belongs e.g. young, adult and old**

- Young animal have only one or two pair of permanent teeth.
- Adult animals are full mouth and teeth are well compacted.
- Space appears in between teeth as age increase.
- Root appears as age advance.

- The jaw of old animal becomes square shape and the teeth become loose or may broken down partially.

**Table: Eruption of teeth in buffalo and cattle**

| Time of eruption | Incisors | Molars |
|---|---|---|
| Birth to one month | All 8 temporaries | All twelve temporaries |
| Six months | - | 4th permanent |
| 1 year 3 months to 1 year 6 months | - | $5^{th}$ permanent |
| 1 year 9 months to 2 years | Ist pair permanent | - |
| 2 years | - | 6th permanent |
| 2 years 6 months | 2nd pair permanents | Ist and $2^{nd}$ permanents |
| 3 years | $3^{rd}$ pair permanents | $3^{rd}$ permanent |
| 3 years 6 months to 4 years | $4^{th}$ pair permanents | - |

**Table: Eruption of teeth in sheep and goat**

| Time of eruption | Incisors | Molars |
|---|---|---|
| Birth to one month | All 8 temporaries | All twelve temporaries |
| 3 months | - | 4th permanent |
| 9 months | - | $5^{th}$ permanent |
| 1 year to 1 year 3 months | Ist pair permanent | - |
| 1 year 6 months | - | 6th permanent |
| 1 year 9 months | 2nd pair permanents | Ist and $2^{nd}$ permanents |
| 2 years | - | $3^{rd}$ permanent |
| 2 year 3 months | $3^{rd}$ pair permanents | - |
| 2 year 9 months to 3 years | $4^{th}$ pair permanents | - |

## 5 Muzzle Pinctometer

Prints of muzzle of animals are taken on paper using ink. The size, number and pattern of beads are counted, which are useful in determination of age of animals

***Question:***

1. What is the difference between temporary and permanent teeth?
2. What will be the dental position of a horse at 3 and 5 years of age?
3. Give the dental formula of temporary and permanent teeth of horse, cattle, buffalo, sheep and goat.

# EXERCISE-6

# PREPARATION OF ANIMALS FOR SHOW AND JUDING

**Objectives:**

- To exhibit the best type of animal and win the contest in cattle shows or fair.
- Enables individual breeder to exchange ideas and experience in shows.
- Opportunity of making comparisons among superior type of animals both within and between breeds.
- Selecting cows based on type and body confirmation is very useful particularly when milk production records are not available.
- Builds a healthy competition and encouragement to other dairy farmer.
- Helps in uplift of dairy industry.
- Promotes the welfare of people by higher returns with high producing animals.
- The technique of beautification and presentation of animal at exhibition ground should be started two to three week before the day of show.

**Preparation of animals for show:**

1. Grooming, brushing and washing
2. Beautification of horn and hooves
3. Clipping of the hairs
4. Parasitic control
5. Application of mustard oil
6. Use of Halters
7. Use of necklace, ring and pansy
8. use of body cover and turban

1. **Grooming, brushing and washing:**

Grooming comprises of brushing the hair coat of animals. It is done by curry comb and brush which are fabricated with tin and bristle respectively.

**Objectives:**

- Maintain cleanliness, stimulates cutaneous blood circulation
- Removes waste i.e., scurf and loose hairs
- Prevents parasitic infestation
- Skin became loose and pliable by brushing, also brings natural oil in the hair
- Clean and hygienic milk production

**Procedure:**

- Accumulated filth from the hind quarters, belly and tail of the animal brushed with stiff hair and curry comb should not be applied for removing dried filth, these equipments can injure the skin which gives poor impression. Such filth is washed out by spraying water on this region smoothly.
- To remove the spot of filth ammonia solution to be used. (2 to 3 tea spoon full in 5 lit water)
- Switch of the tail is cleaned up with white alum.
- During winter, animal should wash either with hot water or at noon to avoid cold exposure.
- Soap should not be used every day as it damages the brightness and lusture of skin.

2. **Beautification of horn and hooves:**

To give normal shape to the overgrown hooves and horn is a standard management practices. Gait changed and the back becomes arched due to abnormal growth of hooves. Therefore, compact normal hooves are required to maintain good body conformation. Both horn and hooves, if clean and shining make the animal more attractive.

- The horn should be made attractive 1 to 2 months before the show.
- Long horn may cut and made fine by rubbing with file and finished with sand paper (removes coarseness).
- The over grown abnormal hooves are trimmed and finished properly with instruments.

- Horns are cleaned with cotton cloth.
- Horn and hoof polished by a mixture of mustard oil and black ink.

**3. Clipping of Hairs:**

Hair is very important structure of animal skin. Long hairs are distributed more around neck, belly, head, sheath and thigh regions. Garbage/filth is accumulated in between them which made a bad impression in the show and contaminates the milk, if not washed properly before milking. Therefore clipping long hairs is not only good for show but help in clean milk production. Hairs of milk vein and thigh regions should be clipped 1- 2 months before the show whereas the hair of leg, sheath and udder are clipped 2- 3 days before the show. Animal should not be allowed to go on open environment otherwise the hair become dry.

**4. Parasitic control:**

Parasitic infestation is very important for animal health and it is essential to examine before presenting the animal for show, leads to irritation and make the animal restless. Parasitic infestation should be cured using prescribed medicine (like butox, organophosphate, BHC etc). If parasitic diseases not treated properly it will leads to increase stress to the animals, which ultimately increase susceptibility to other diseases.

5. **Use of oils:** Usually mustard oil used on animal after washing them to make the skin bright. It is also used as polish on horns and hooves. It make the horn, hooves bright and control the attack of flies, mosquitoes too.

6. **Halters:** A halters from colored cotton rope/ leather is used to improve beauty and also restrains the animals in exhibition ground and during transportation.

7. **Necklace, ring and Pansy:**

Necklace, ring and Pansy are fabricated from brass/copper and are put on to the animal's neck and fore cannon above fetlock.

8. **Body mask and Turban:**

Made from coloured cloth and they are not only make the animal beautiful but also protect from extreme cold, harsh sun light.

**Position of Animal at Show**

- Animal must be trained before show to enable them to follow the signal of rope as per desire of stock man (husband man)
- Movement of animal should be at low speed too.
- The head of animal to be in upward direction and its face showing docility.
- The position of hind legs must be diagonal so that udder could be clearly demonstrated at the time of judging
- Animal should be free from alarm. Since a frightened animal will cause danger to all animals present in show.

**Cattle judging:**

Dairy score for cattle judging in fairs, shows, or exhibitions is based not only on apparent look of the animals but on **score points (score card)** given for qualifying traits with respect to

1. General appearance
2. Dairy character
3. Body capacity,
4. Mammary development

**Score Card:**

| **Animal no.** | **Position of Animals**<br>**(score earn per traits)** | **Reason** |
|---|---|---|
| | 1…….2…...3……4…….. | |
| | | |

## PREPARATION OF SWINE FOR SHOW AND JUDGING

Pig show provides an opportunity to the farmer to exhibit their best animals brings fame to the farmer and popularizes best breed as it act as an advertising media. It provides a platform where comparison among superior animals within and between breeds can be made. It further make possible to exchange experiences among the breeders, chance to learn about better breeding and management practices. It provides an opportunity to sell the limited number of animals. It helps in building a better competitive spirit among the participants.

The process of getting swine ready for the show is known as fitting. It enhances the features of the animals and includes selection of animals, feeding, exercising, training, grooming, washing and clipping.

1. **Selection of show pig:** while selecting the animal - age, pedigree, weight, sex, conformation and soundness of the animal should be considered. Hogs are generally selected at 2 to 3 month of age, weighing around 50-60 pounds (20-30 kg) so that they should attain a show weight (about 235-270 pounds/ 100-130 Kg) in approximately 100 days thereafter. If possible those lines are selected which has earlier history of winning the show in the past. Desirable physical characteristics are- long body with sound feet, well developed hams and joint should be well angled.
2. **Feeding:** Initially they are fed through self feeder and later on, to control weight gain they are hand fed.
3. **Exercising:** Regular walking exercise will help in maintaining the animal in good condition and make the animal more attractive in the show ring.
4. **Training:** Animal is trained to move in desired direction. They are trained to turn to the right by gently tapping on the left jowl and vice versa. Train them to move forward by tapping lightly in front of shoulder and to stop by holding the bat in front of his nose.
5. **Trimming of toes:** Three to four weeks prior to show, the toe of the pig is brought to proper shape with the help of hoof trimmer and hoof rasp is used to square-up the sole.
6. **Washing and rinsing:** This is the first step in the preparation of the pig for show and is also necessary to wash the animal before clipping. To accustom the animal to washing, it is generally started about three weeks prior to the show and frequency is increased to once a week before show and done again the way before the show. First the pig is wet

with water to remove of the large piece of dirt and debries then soap is applied and rubbed and washed. Head of pig is washed in the last. Rag is used to wash the snout and inner side of ear instead of brush.

7. **Clipping:** It should be done at home within a week prior to the show. Clipping make a youthful, fresher appearance and enhances muscle tone acuity. It is begin from the back against the grain of the hair then one side of the pig clipped at a time from the ham to the side to the shoulder up to the face.
8. **Oiling:** It makes skin soft, smooth and give shine to the hair coat. It is applied after the pig is bathed the first time and a further light application is just before the show.
9. **Show man ship:** Following guidelines should be followed during show
    - Exhibitor should be well dressed and groomed.
    - Keep the animal well groomed and watered prior to their class show begin.
    - Enter the ring without delay when class is called
    - The pig should be kept between the exhibitor and the judge.
    - Exhibitor should always look calm and confident, must keep one eye on the judge and another on pig.
    - The exhibitor should foresee movement of his/her pig and the judge and should take action accordingly.
    - The pig should be kept moving at a steady pace around the ring.
    - Never touch the show pig with the hands. Show stick should be used to tap on the point of the shoulder in the region of the jowl to encourage movement.
    - The exhibitor should place himself/ herself on the side of the pig away from the judge near the flank and ham/loin junction.
    - Be prepared to follow the instructions of judge as well as to answer the queries of judge.

**Judging Swine**

Judging is an art and expertise can be achieved by repeatedly practicing it with patient over period of time. For appropriate judging it is crucial to have meticulous understanding of ideal physical features of swine of different breeds, age group and reproductive characteristics

etc. The parameters of judging swine varies as per the purpose for which they are reared i.e. market hogs, breeding hogs.

**Procedure**

Usually numbers are marked on the body of animals to identify them for judging and are observed from a distance of about 15 feet when they move about the ring. From side view balance, length & depth of side, ham development. gait and physical characteristics are observed. From rear view depth of ham, depth of loin and body and position of hind legs while from front view meatiness, trimness of head and shoulder, spring of rib and position of forelegs can be observed.

These traits are observed and compared with the ideal hog and the other hogs in the class. During judging points are noted down with furnishing the reasons for particular points given. Traditionally only visual assessment of number of traits of the hogs were used to rank the animals. Now-a-days performance data (breed, sex, feeding, production environment, marketing plan etc) of hogs in combination with visual assessments are used to rank the animals.

For market barrows parameters like conformation (general appearance, hind quarters, fore quarters & middle), finish (ham, lump, back, loin, jowl and belly) and quality (bones) of tlie animal while for breeding swine general appearance, conformation (hind quarters, fore quarters & middle) and breeding qualities (underpinning, mammary system & breed characters) are evaluated on a 100 points scale for judging them.

## PREPARATION OF HORSE FOR SHOW

**Objectives:**

1. To exhibit best type of horse for wining prize.

2. To take part in competition and enjoyed of winning prize

3. To use the best media for business purpose.

4. To provide an opportunity for making comparison among superior type.

5. To provide opportunity to learn more of good feeding and management.

**Requirements:**

Horse, trainer and other accessories of horse for preparation for show.

**Procedure:**

**1. Selection of horse & trainer:**

Horse should be selected, which is true to its breed characteristics, proper growth and in good condition. Trainer to be selected should know all the rules and regulation of hose show as national level and international level.

**2. Training:**

Training a horse requires skill, patience, and careful handling. Training should be started at early age so that training will become easy. Foal should be handled each day for short period of time, which helps foals to overcome its fear.

**A) Haltering:** a foal may be halter when it is only a few weeks old. Crowd the foal into a corner of the pen and gently place the halter on its head. Let the foal become used to the feel of the halter by leaving it on for a short time. Parting the foal and giving it a small amount of grain will help to associate the halter with experience. Repeat the procedure for a week to two week.

**B) Leading:** to teach the foal to lead, put a loop of rope over the foal rump fasten a lead rope to the halter. Pull of the halter loop and the rump rope. This encourages the foal to move forward.

The foal may jump forward when the rump rope is pulled. Be alert to avoid being stepped by foal.

**C) Working with the feet:**

The foal should be tough to allow its feet to be picked up and handled. With the rope tied, pick up each foot and put it down. Be gentle with foal and pat it to keep calm. Work with foot first then hind foot.

**D) Lounging:**

Lounging is training the horse at the end of 25 to 30 foot line. The horse is worked in a circle. This training may be given when the horse is a yearling. One end of the line is fastened to the halter. The trainer attempt to make the horse move in a circle. Training begins with a small circle. As the horse learns to respond the command, the circle is enlarged.

**E) Saddling:**

The horse must be prepared for saddling several days before it is first saddled. When ready to saddle the horse, first let it see and small saddle, slide saddle blanket on and off the horse several times until it becomes used to it. Saddling procedure should be repeated for several days before attempting to ride the horse.

**F) Mounting & Riding:**

All the above preparation of the horses is prerequisite for the mounting and riding.

**3. Management:**

**a) Feeding:**

Horse hair coat can't bloom if any essential nutrients are deficient. The feeder must be sure that all nutrients are present in adequate quantity. A 12-15 % protein diet with double the requirement of Vit A, D & E and enough energy are required for weight gain and shiny hair coat. When preparing for an early spring show, start 10-12 weeks in advance with horse that are thin enough.

**b) Blooming show horses:**

A glossy hair coat with healthy look adds credit to sale horse as well as to a show horse. Feeding alone will not achieve a glossy hair coat, but it will help. Nature increases the length of daylight and the temperature and saturates the horse with an abundance of nutrient in blooming of hair coat during spring. Grooming can stimulate hair coat and keeps the horse attractive. Most horses are kept inside a stall, out of seen throughout the show season, so their hair coats do not see burn or dull. This also shows their owners to keep them under blanket and keeps their coat blooming.

**c) Clipping:**

Trimming horse must confirm to breed improvement. Two kinds of electric clippers are convenient for trimming a large type that trims fetlock, beside path and the body.

**d) Exercise:**

All horses need exercise but it is especially beneficially to show horse. It helps their attitude, improves their digestive processes and then gives the athletic look that can't simply be 'fed on' a horse many show horses in training get abundant exercise.

**4. Planning before show:**

Grooming starts weeks ahead of the show by proper nutrition, adequate exercise and endless brushing.

**a) Showing at halter or in hand:**

Each breed differs in equipment worn and emphasis on judging these classes. Western horses are shown in halters, many elaborately decorated; while gaited horses are most often are shown in bridles.

**b) Showing under saddles:**

All riding horses are presented with saddle on their back.

***Questions:***

1. Explain the utility of cattle fairs and shows.
2. Discuss the method of preparing a cow for show.
3. What points you will take into consideration while selecting Horse for the show?

# EXERCISE NO. 7

# SELECTION AND CULLING OF ANIMALS

## Objectives:-

1. Selection of superior animal.
2. Improving the efficiency of production of a farm,
3. Maintaining milk production at a desired level in farm
4. Preventing inferior animal from breeding.

**Selection of animal:**

Dairy animal are selected before starting of a dairy farm. Selection of animal is a continuous process on a dairy farm for maintenance of production efficiency. Following are the method of selection of dairy animals.

1. Score card.
2. Tandem selection.
3. Independent culling.
4. Index method.
5. Pedigree selection.
6. Progeny selection.

**When selection is required**

1. Selection is required at the time of purchase of animal.
2. Judging of animal at show.
3. Regular selection is required for keeping best animal in Farm and rejecting less productive animal.

1**. Scorecard method**: This method takes account of body condition of the dairy animal.

**Procedure**:

1. Secure the cows.
2. Make a picture of ideal cow in your mind.
3. Study the parameters of score card and marks against each of them.
4. Ask the attendants to untie the animals one behind the other for a walk of 5 minutes.
5. Watch the cows from a distance of 3-4 meter.

6. Bring the animals back and make a circle for close inspection.
7. Fill the score card and total the mark.
8. Rank the animals according to total score.

| Phenotypic Parameters | Perfect Score (100) | Students Score for allotted | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| **A. General Appearance** | **18 points** | | | | |
| **1. Size** | 3 | | | | |
| 2. **Form:** Stylish symmetrical | 2 | | | | |
| 3. **Dairy Character**: Lean and Angular | 5 | | | | |
| 4. **Quality:** Skin pliable and Soft, Free from excess fat, hair smooth, soft and fine | 4 | | | | |
| 5. **Temperament:** Active, vigorous and docile | 4 | | | | |
| **B. Head and Neck** | **9 points** | | | | |
| 1. **Muzzle:** Wide, Nostril-large | 2 | | | | |
| 2. **Face:** Clean cut, facial vein prominent | 1 | | | | |
| 3. **Fore Head**: Wide, fine at pole | 1 | | | | |
| 4. **Horns**: Fine, typical of Breed | 1 | | | | |
| 5. **Neck:** Slender, Medium length | 1 | | | | |
| 6. **Eyes:** Large, bright and prominent | 1 | | | | |
| 7. **Ears:** Well set, typical of breed | 1 | | | | |
| 8. **Dewlap:** Thin, graceful fold | 1 | | | | |
| **C. Fore Quarters** | **9 points** | | | | |
| 1. **Withers:** Clean refind free from fleshing | 3 | | | | |
| 2. **Shoulders:** Light, oblique, well attached free from fleshing | 2 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 3. **Legs:** Straight, well apart, Shank-fine and Smooth | 2 | | | | |
| **D. Body:** | **20 points** | | | | |
| 1. **Chest:** Wide, deep, fore flank-full<br>2. **Back:** Straight, well defind<br>3. **Loin:** Broad, strong, leveled, free from flesh<br>4. **Ribs:** Wide apart and well sprung<br>5. **Flanks:** Thin deep and full | 6<br>4<br>3<br>6<br>1 | | | | |
| **E. Hind Quarters** | **12 points** | | | | |
| 1. **Hip Bones**: Prominent, wide apart<br>2. **Rump:** Long wide leveled, free from flesh<br>3. **Pin Bones:** High wide apart<br>4. **Tail Setting:** Long, Fine tapering<br>5. **Thigh:** Thin, widely separated and curved inwards<br>6. **Hind Leg:** Straight, carried well apart and shank-fine | 2<br>3<br>2<br>1<br>2<br>2 | | | | |
| F. Mammary Development | **34 points** | | | | |
| **1. Udder Shape:**<br>a.) Fore quarters: Full attached forward<br>b.) Rear udder: Full attached high and wide<br>2. **Udder Symmetry**: Quarters evenly balanced, floorof udder leveled | 5<br>5<br>3<br>12 | | | | |

| | | | | | |
|---|---|---|---|---|---|
| 3. **Udder Capacity**: Large, texture pliable, free from fat and fibrous tissue<br>4. **Teats**: medium sized, squarely placed<br>5. **Milk vein**: Long tortuous, Zig-zag branching<br>6. **Milk wells**: Large and numerous | 4<br>3<br><br>2 | | | | |
| **Total** | **100** | | | | |

**Grading of animals on the basis of total score:**

| **Grade** | **Score points** |
|---|---|
| Excellent | 90 and above |
| Best | 90-85 |
| Better | 85-80 |
| Good | 80-70 |
| Fair | 70-60 |
| Poor | Below 60 |

- Discard the animal below 60 points.

**Culling of the animals:-**

Removal of uneconomic, unhealthy and unwanted animal from the herd is known as culling without culling the chances of herd improvement are very low. There are various reasons for culling.

**Reasons for culling:-**

A. Low production
B. Reproductive failure/poor breeding
C. Physical defects
D. Vices/bad habits.

**Low Production**:- Cow with low milk yield, short lactation length, long dry period and sharp decline in yield are to be culled.

**Reproductive failure**:- Cows with long anoestrous, long service period , repeat breeding . Cystic ovary, recurrent abortion, higher age at first calving are to be culled.

**Physical defects**:- Defects leads to low production and reproduction . e.g. loss of teat/teats. Mastitis, eversion of uterus/vagina, permanent lameness, loss of horns, old age, cryptorchid, pendulous udders, poorly balanced quarters, emaciation. Deviation from breed type etc. chronic diarrhea.

**Vices:-** Animals with fighting habits, kicking at the time of milking & treatment , suckling of own milk , biting with horns,, not allow the service , pica, soiling of feed material etc.

**Questions:-**

1. Enslist common defects in animals observed at LRS for culling of animals.
2. What is the criteria for purchase of animals at LRS from field.

# EXERCISE-8

# PREPARATION OF PROJECT PROPOSAL

**Objectives:**

1. To generate full time employment.
2. To increase/supplement the income of a farmer.
3. To use agriculture by-products.
4. To give idea of income from different sources.
5. To determine fixed and variable expenses of herd for budgeting.
6. TO determine the cost of per kg milk produced on the farm.

**Economic Aspects of Dairying:**

For increasing the productivity and profitability in dairying , certain aspects must be kept in view, irrespective of the fact whether the dairy unit is set up as a source of supplementary income with two to three animals or commercial unit with a herd of six to ten animals or more. The following are some more important aspects that need close consideration.

1. **High milk yielders**: A dairy animal producing 200 litres of milk during one lactation should be selected.
2. **Regular breeder with short inter calving period:** The dairy animal should conceive within 60-90 days after calving and have an inter-caving period of 350-390 days for economic milk production.
3. **Economic in feeding** : Feed both concentrate and dry fodder should be purchase and store during the harvesting season. The home grown green fodder would be much cheaper.. the green fodder, during peak production period can be converted into hay/silage for meeting lean period requirements. Legume fodder, a rich source of protein, should whenever possible, be included in the ration. While computing concentrate in feed, the cost factor must be kept in view and ingredients selected as per their availability of cost.

4. **Disease control**: For proper health conditions, the schedule of vaccination and deworming should be followed. The animals should be regularly subjected to laboratory tests for diagnosing subclinical diseases like mastitis, brucellosis and tuberclosis.
5. **Milking:** Proper method of milking should be followed. For efficient milking good milkers should be used. Excitement, ear, beating and slow milking retards milk yield.
6. **Vigilance**: The dairy farmer/manager should be vigilant about daily performance of the animal. Any abrupt change in feed consumption of milk production, needs immediate investigation for corrective measures.
7. **Age at first calving**: 40-44 months in case of buffaloes and 24-28 months for cross breds, 36-40 months for indigenous cattle.
8. **Lactation period**: 280-305 days.
9. **Dry period:** 60-90 days.
10. **Service period**: 60-90 days after calving.
11. **Milk yield per lactation**: 2000-2500 litres.
12. **Green fodder availability**: Preferably *ad lib*, or at least 25-30 kg per animal per day.
13. **Dry fodder:** Depending on the availability of green fodder, the quantity of green fodder range from 2-6 kg per animal per day.
14. **Concentrates:** If green fodder is available ad lib, then the concentrate feeding can be avoided upto milk production of 6-7 kg per day, over and above thus, for every 2 kg of buffaloes and 3 kg of cow milk, 1 kg concentrate is required.
15. **Housing:** Non-slippery floor and expensive shed, preferably bricks flooring with slop for easy cleaning, well ventilated shed with simple roofing and with manger and adequate drainage.
16. **Milking:** Two or three times a day at fixed time and in one sitting, within eight minutes.
17. **Milk for calf:** Leave some milk, if calf is not weaned at birth.

**Procedure:**

For increasing productivity and profitability in dairy farming, attention needs to be paid to the following.

1. **Capital investment**: It varies with the quality of animals purchased, type of construction, etc.
2. **Location:** Nearness of the farm to the market and approach through pacca road.
3. **Managerial skill**: Farmer/his family members.
4. **Veterinary aid and breeding facilities:** Adequate and timely availability of these facilities.
5. **Choice of dairy animals:** Is crucial both in terms of milk production, reproductive efficiency, especially the calving interval. It should have high daily milk production. Should dry period and optimal lactation length.
6. **Replacement of livestock:** Is more economical by raising heifers on the farm than purchasing adult animal in milk.
7. **A.I. Facilities**: in the neighbourhood to ensure breeding, in their absence, the arrangement of superior bull for natural services.
8. **Feeding :** Feeding of balance ration.
9. **Cultivation:** Cultivation of green fodder on own farm.
10. **Mode of marketing** : Will influence the net profit and so proper arrangements need to be made in advance.

Assumptions in calculating economics of dairy farming:

**1. Capital expenditure/fixed cost:**

(a) Floor space of cattle shed: About 2 sq. meters per animal with 4-5 sq meters as loafing area.

(b) Shed construction cost: For small units located in rural arrears 1000 per animals and for and for urban Rs. 1500 per animal.

(c) Land requirement: One hectare of cultivatable land for fodder requirement of 8-10 animals.

(d) Price of milch animals: Rs. 40000 to 50000 high yielders may cost more, upto 85000. Preferred dairy animal in buffaloes or cross bred cow.

(e) The milch animal: IN second lactation and in the first month of lactation, having a female calf at its heel.

(f) Replacement of milch animals: After 6-7 lactations.

(g) Mortality: 2-3 per cent for adult animals, calf mortality 10-15 per cent.

(h) Cost of equipments: Equipments such as:

| | | | |
|---|---|---|---|
| (i) | Chaff cutter | : | Rs. 7000, simple and big @ Rs. 40000 both electrically operated |
| (ii) | Milk cows | : | Rs. 50000 each. |
| (iii) | Wheal barrow | : | Rs. 3000 each for disposal of dung and trolley for milk cans. |
| (iv) | Tie chains for cows | : | Rs. 200 each. |
| (v) | Shovel/spades | ; | Rs. 200 each |
| (vi) | Miscellaneous | : | Rs. 20000/- |

**2. Variable costs: This includes**

(a) Cost of green fodder: Rs. 200 per quintal (home grown may be cheaper).

(b) Cost of dry fodder (Bhusa): From Rs. 400-500 quintal.

(c) Cost of concentrate: Rs. 1300 per quintal.

(d) Cost of veterinary aid: Rs. 500 Per animal per year.

(e) Milk yield per day: 8 to 10 kg.

(f) Labour rate: Rs. 250 per labour.

(g) Depreciation of shed: 5 per cent of the cost of construction. It is not taken into account during the loan period, serving towards loan repayment installments.

(h) Insurance charges: 4.5 for CBC, 4 per cent for buffaloes on the purchase price of animals.

(i) Interest rate: Keep on changing but for the purpose this statement an average interest rate has been taken at 15 per cent.

**3. Income:**

(a) Sale of milk: About Rs 20-25 per kg depending on fat percentage and season in rural areas. In urban areas, between Rs 25-30.

(b) Value of manure /sale of manure: Rs 100 per qtl..

(c) Sale of empty gunny bags of concentrates: Rs. 10 per bag.

(d) Sale of calves: Rs. 400 for female calf and Rs. 200 for male calf.

4. **Profit/Net income** = Total income - Total expenditure

$$\text{Cost per kg milk produced} = \frac{\text{Total expenditure}}{\text{Total milk produced}}$$

***Questions:***

1. Calculate the economics of a dairy farm maintaining 50 adult animals.

# UNIT-II

## INDEX

**NAME : ……** **BATCH: ……**

| S.NO. | NAME OF EXERCISE | PAGE NO. | DATE | SIGNATURE |
|---|---|---|---|---|
| 1 | A visit to fodder farm and Feed stuffs classification | | | |
| 2 | Familiarization with Fodder Crops, Seeds and Collection | | | |
| 3 | Familiarization with cropping systems | | | |
| 4 | Familiarization with different Fodder Crops Rotations | | | |
| 5 | To Study the Cropping Scheme for Maximum Forage Production | | | |
| 6 | Preservation Techniques of Animal Fodder | | | |
| 7 | Storage of Feed at the Animal Farm | | | |
| 8 | Recycling of Animal Wastes in Fodder Production | | | |
| 9 | To Calculate Cost of Fodder Production | | | |
| 10 | Familiarization and Collection of Fertilizers | | | |
| | Glossary | | | |

# EXERCISE NO.1

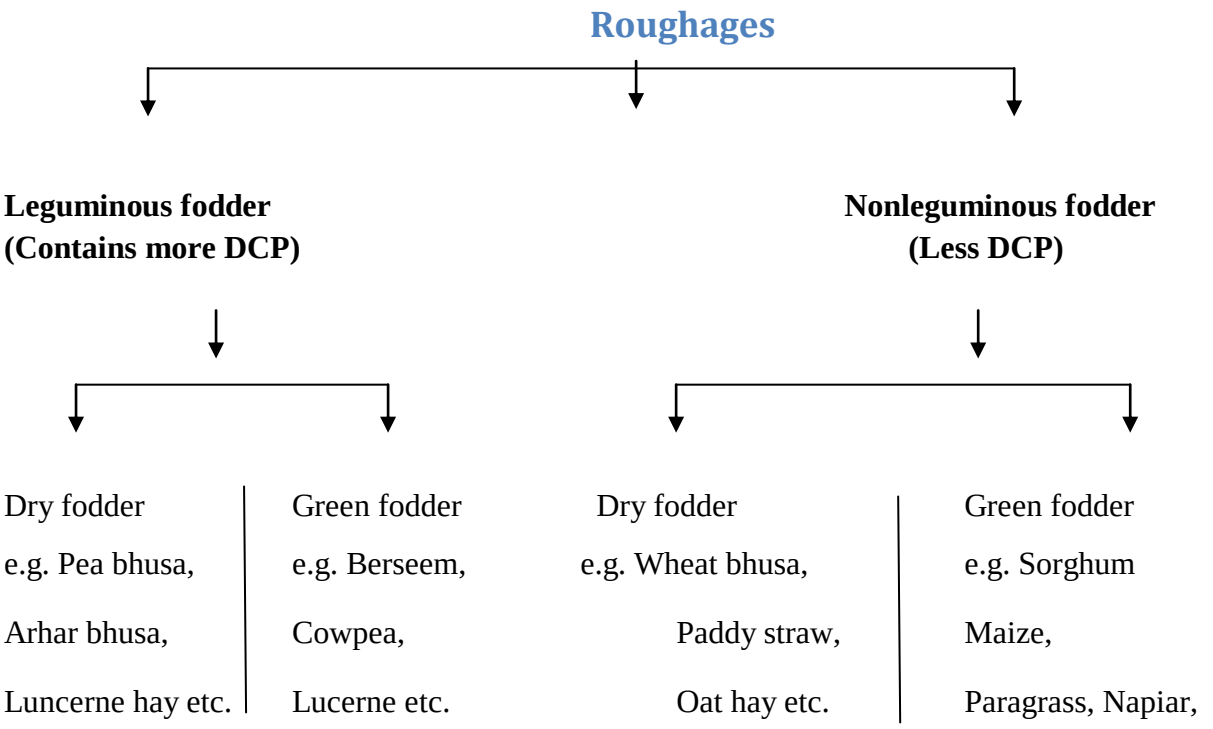
## VISIT TO FODDER FARM AND FEED STUFFS CLASSIFICATION

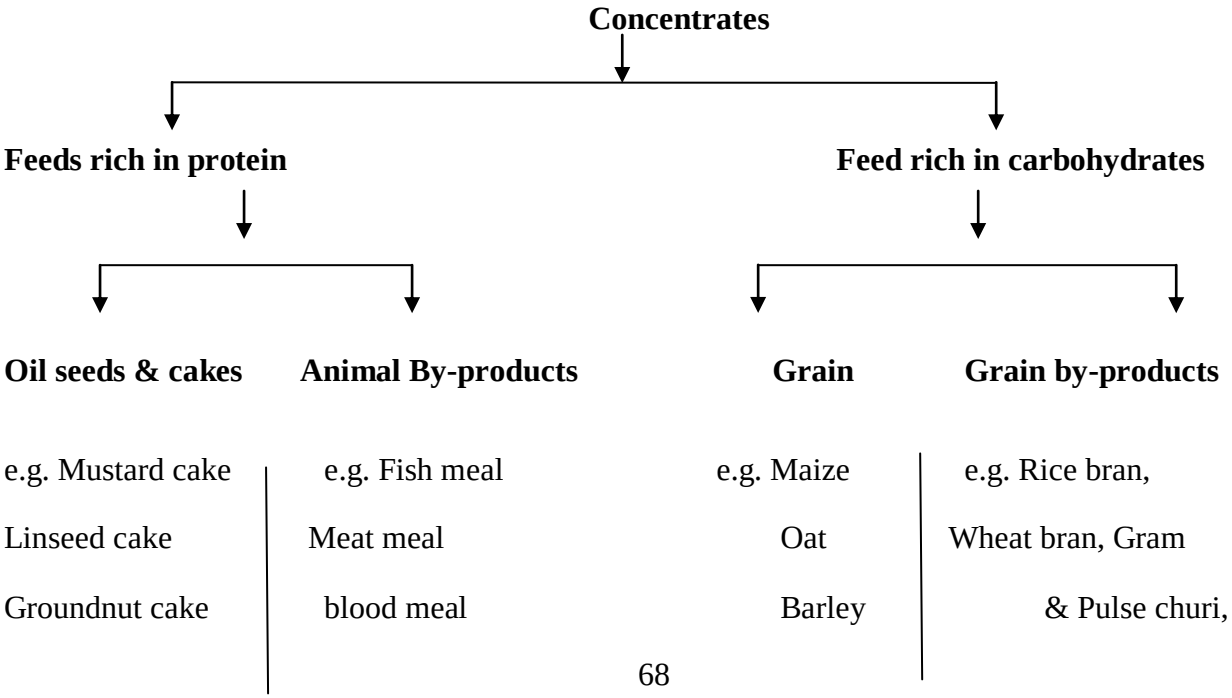
**Objectives:-**

1. To acquaint the students with various types of feedstuffs used for animals
2. For preparations of balanced ration for animals.
3. To differentiate different types of fodder.

**Feed can be classified into**

I. Roughage (contains more Crude fibre and less TDN)
II. Concentrate (contains less Crude fibre and more TDN)
III. Feed additives.



Cotton seed cake Bone meal etc Rice polish etc.

III. Feed Additives & Feed supplements

e.g. Vitamins

Urea

Mineral and Sublimate

Antibiotics and Probiotics

Hormones

Colouring material

Flavouring medicants

***Questions:-***

1. Write name of roughages and concentrates which are available in area.
2. Name the feeds rich in protein.

# EXERCISE NO.2

# FAMILIARIZATION WITH FODDER CROPS, SEEDS AND COLLECTION

**Objectives:**

1. To get acquaint with various types of fodder crops and seeds of fodder crops.
2. To use this knowledge in evaluation and selection of feeds for developing a balanced and economic ration.

**Feed:** refers to food but more commonly is used to designate animal food.

**Fodder:** The entire above-ground part, mature and in the fresh or cured form.

**Forage:** Crops used in whole plant form (except roots) at pasture, hay, silage, or green chop for feeding purposes.

| **A. KHARIF FODDERS** | | | |
|---|---|---|---|
| **Non- Leguminous** | | | |
| **S. No** | **English Name** | **Common Name** | **Scientific Name** |
| 1 | Pearl millet | Bajra | *Pennisetum americanum* |
| 2 | Maize | Makki | *Zea mays* |
| 3 | Sorghum | Jowar | *Sorghum bicolor* |
| | Sorghum | Chari | *Andropogon sorghum* |
| 4 | Teosinte | Mak chari | *Euchlaena Maxicaena* |
| **Leguminous** | | | |
| 1 | Cowpea | Lobia | *Vigna sinesis* |
| 2 | Cluster bean | Guar | *Cymposis tetragonoloba* |
| **B. RABI FODDERS** | | | |
| **Non- Leguminous** | | | |
| 1 | Oat | Javi | *Avena sativa* |
| 2 | Mustard | Sarson | *Brassica campestris* |
| 3 | Mustard (Indian) | Raya | *Brassica juncea* |
| 4 | Turnip | Salgam | *Brassica rapa* |
| 5 | Carrot | Gajar | *Doucus carota* |
| **Leguminous** | | | |
| 1 | Egyptian clover | Berseem | *Trifolium alexandrium* |
| 2 | Indian clover | Senji | *Melilotus parviflora* |
| 3 | Fenugreek | Metha | *Trigonclla foenumgraceum* |
| **PERENNIAL FODDER** | | | |
| 1 | Lucerne | Rizka | *Medicago sativa* |
| 2 | Pusa gaint napier grass/ Napier bajra hybrid | Elephant grass | *Pennisetum purpureum* |
| **GRASSES** | | | |
| 1 | Napier grass | Elephant grass | *Pennisenum purpurium* |
| 2 | Guinea grass | | *Panicum maximum* |
| 3 | Para grass | Buffalo grass/ water grass | *Brachiaria mutica* |

| | | | |
|---|---|---|---|
| 4 | Sudan grass | | *Sorghum Sudanese vulgare* |
| 5 | Dina grass | Kyasuwa | *Pennisenum pedicellatum* |
| 6 | Anjan grass | Dhaman | *Canchrus ciliaris* |
| 7 | Doob grass | Hariali | *Cynodon dactylon* |
| 8 | Setaria grass | Golden timothy | *Setaria sphacelata* |
| 9 | Rhodes grass | | *Chloris gayana* |
| **TREE** | | | |
| 1 | Khejri | Jaanti | *Prosopis cinereria* |
| 2 | Subabool | | *Loucaena leucocephala* |
| 3 | Phog | | *Calligonum polygonoides* |
| 4 | Jhar beri | | *Zizyphus rotundijolia* |
| 5 | Pala ber | | *Zizyphus numularia* |
| 7 | Ber | | *Zizyphus jujaba* |
| 8 | Sinia | | *Crotolaria baria* |
| 9 | Cont kantalo | | *Solanum indicum* |
| 10 | Kheemp | | *Leptidenia Spartium* |
| 11 | Pardesi kikar | | *Prosopis juliflara* |
| 12 | Babool | | *Acacia arabica* |
| 13 | Khait | | *Acacia catechu* |
| 14 | Israeli Babool | | *Acacia tartalis* |
| 15 | Kankeda | | *Mamordica doica* |
| 16 | Gokhru | | *Tribulus terrestrial* |
| 17 | Ardu | | *Ailanthus excels* |
| 18 | Sares | | *Albizzia lebbek* |

**Procedure**

1. Collect different seeds & place in containers.
2. Arrange all the containers with the samples in a row.
3. Study the characteristics and identify different fodder seeds and fodders.

**Questions:**

1. Identify various green fodders and seeds.
2. Difference between:
   (i) Straw & hay
   (ii) Legumes & non- legumes.

# EXERCISE NO.3

# FAMILIARIZATION WITH CROPPING SYSTEMS

**Objectives**

1. To obtain better yield
2. To maintain fertility of soil

**Commonly practiced cropping systems are :**

- Crop rotation practices
- Intercropping systems
- Mixed cropping systems

**Crop rotation**

Crop rotation is a time-honored process of planting annual crops. The strategy involves changing the type of crops that are planted in a given section of field each growing season. There are several benefits connected with this approach that help to increase the chances for successful crops each season.

**An ideal cropping system should:**

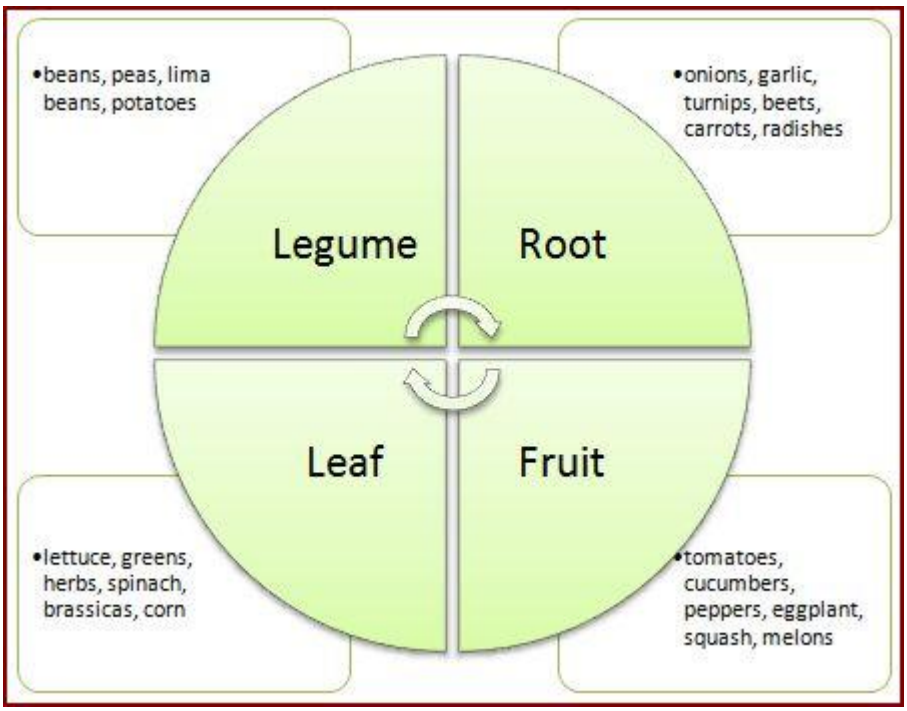
- use natural resources efficiently
- provide stable and high returns
- do not damage the environment.

**Useful tips in planning crop rotation**

1. Know the family where your crops belong to make sure that you plant on the next cropping a crop that belongs to a different family than the previous one.
2. Grow legumes before grains or cereals.

**Advantages of crop rotation**

1. Prevents soil depletion
2. Maintains soil fertility
3. Reduces soil erosion
4. Controls insect/mite pests.
5. Reduces reliance on synthetic chemicals
6. Reduces the pests' build-up
7. Prevents diseases
8. Helps control weeds
9. Spread the workload on family labor, use of bullocks and farm equipment, hired labor etc.
10. Increase net profits.




CROP ROTATION

**Intercropping**

Intercropping is the cultivation of two or more crops simultaneously on the same field. It also means the growing of two or more crops on the same field with the planting of the second crop after the first one has completed its development. The rationale behind intercropping is that the different crops planted are unlikely to share the same insect pests and disease-causing pathogens and to conserve the soil.

**Types of intercropping practices**

**Mixed or multiple cropping** is the cultivation of two or more crops simultaneously on the same field without a row arrangement.

**Relay cropping** is the growing of two or more crops on the same field with the planting of the second crop after the first one has completed its development.

**Row intercropping** is the cultivation of two or more crops simultaneously on the same field with a row arrangement.

**Strip cropping** is the cultivation of different crops in alternate strips of uniform width and on the same field. It has two types; contour strip cropping and field strip cropping. Contour strip cropping follows a layout of a definite rotational sequence and the tillage is held closely to the exact contour of the field. Field strip cropping has strips with uniform width that follows across the general slope of the land.

Question:-

1. Define crop rotation, give examples.
2. What is intercropping, give examples

# EXERCISE NO.4

# FAMILIARIZATION WITH DIFFERENT FODDER CROPS ROTATIONS

**Objectives:**

1. To get acquaint with different crop rotations in different regions.
2. To obtain green throughout the year.
3. To help in reducing the cost of livestock production.

**Crop rotations**

A. Arid and semi-arid (sub-tropics)
   (i) Berseem – hybrid Napier
   (ii) Berseem + Japan rape – Bajra + Cowpea – Maize + Cowpea
   (iii) Berseem + Mustard – Maize + Cowpea – Maize + Cowpea + Teosinte
   (iv) Berseem + Mustard – Maize + Cowpea – Jower + Guar
   (v) Luceme – Jower + Guar
B. Central region
   (i) Oats – Bajra + Cowpea – Teosinte + Cowpea
   (ii) Oats + Lucene – Teosinte + Cowpea
   (iii) Berseem + Mustard + Oats – Maize + Cowpea
C. Western region
   (i) Berseem – Maize + Rice bean + Teosinte + Rice bean
   (ii) Berseem – Rice bean interplannted between hybrid napier
   (iii) Berseem – Maize + Cowpea – Deenanth grass
D. Hilly region
   (i) Oat + Mustard – Maize + Cowpea – Jowar + Cowpea
   (ii) Oat – Maize – Maize + Cowpea
   (iii) Berseem + Mustard – Cheena – Maize + Cowpea

Effective measures to produce maximum forage per unit area

1. Selection of intensive cropping system
   (i) Under irrigation conditions
      (a) Napier bajra hybrid + cowpea (Summer)
      (b) Cowpea + Chinese cabbage (Winter)
      (c) Hybrid Napier + Lucerne (both perennial)
      (d) Sudan grass or multicut sorghum – berseem

(ii) When irrigation is limited

(a) Bajra + Cowpea (Summer)

(b) Sorghum + Cowpea (Kharif)

(c) Oats (Rabi)

2. To sow a cash crop in between the existing cropping pattern of the region.
3. To adapt mixed cropping or intercropping for improving the quality of the forage.
4. To adapt proper cutting schedule for prolong availability of green fodder.
5. To adapt recommended package of practices.
6. Sow dual purpose crops, i.e. both for fodder and seed production.

**Questions:**

1. Draw a diagram of different crop rotations by which green fodder can be made available throughout the year.

# EXERCISE NO.5

# TO STUDY THE CROPPING SCHEME FOR MAXIMUM FORAGE PRODUCTION

**Objectives**

1. To obtain good quality fodder.
2. Good cropping scheme provide employment throughout the year.
3. All the domestic needs are fulfilled from the farm.
4. Maximum profit is assured in advance.
5. Inputs like fertilizer, irrigation, seeds etc., can be arranged in advance.

**Cropping scheme**

1. It should be according to the size of the farm and irrigation facilities available.
2. It should be according to the availability of labor.
3. It should be according to the source of capital available which include building, machine or bullock or tractor power.
4. It should provide employment throughout the year.
5. No such crop should be included for which the cultivation practices are not known.
6. It should be according to be domestic needs and resources of disposal and near to the market.
7. It should not be for a period more than 3-4 years.

**Preparation of cropping scheme**

A. Assumption
   (i) Area under layout
   (ii) Fertility status of the soil
   (iii) Availability of inputs
B. Selection of crops
   (i) Suitability of a crop in a particular area.
   (ii) Availability of resources on the farm.
   (iii) The demand of crop and marketing facilities.
   (iv) Varieties suitable in that area.

C. Farming the rotation

(i) The principles of crop rotations for a particular area should be followed.

(ii) Daily requirement of green fodder.

D. Calculation of the area under different crops.

(i) Fallow or green manuring should not be included in the cropping scheme.

(ii) Only half area of each crop is to be included in calculating the mixed cropping.

$$\text{Cropping intensity \%} = \frac{\text{Total cropped area}}{\text{Net cultivated area}} \times 100$$

**Questions:**

1. A farmer having cultivable land of 5 hectare and he cropped paddy in 5 hectare, wheat in 4 hectare and moong bean in 1.5 hectare in a year. calculate the cropping intensity.

# EXERCISE NO.6

# PRESERVATION TECHNIQUES OF ANIMAL FODDER

**Objectives**

1. To acquaint with different methods of fodder preservation.
2. To make availability of fodder during scarcity period.
3. To avoid wastage of excess fodder produced in peak season.
4. To help in reducing the cost of feeding.

**Methods of preservation:**

1. Hay making
2. Silage making

**1. HAY MAKING:**

Hay is a dry fodder green in colour containing moisture not more than 20 per cent. Thin stemmed crops like lucerne, oat, berseem, cowpea & grasses are more suitable for hay making than thick stemmed crops like maize & bajra in respect of nutritive value & time taking in its curing.

Types of hay:

(i) Legume hay: It is made from legume crops (berseem, lucerne etc) & is generally rich in protein, vitamins & minerals as compared to non leguminous ones.

(ii) Non leguminous hay: It contains less protein, vitamins & minerals (barley, oats, grasses etc).

(iii) Mixed hay: Prepared from mixture of both mentioned above.

Methods of hay making:

(i) Field drying

(ii) Barn drying

**(i) Field drying**

(a) **Spreading forage crops in the field**: After the dews dried up in the morning the hay crops at bloom stage is harvested and spread in layers of about 10 inches on leveled ground. The hay crop layers are turned upside down periodically for effective drying until the desired moisture content remains to an extent of not more than 18-20 percent.

(b) **Windrows method**: Hay crops are kept for sun drying on the field for one day then collected in small heaps. These are turned periodically to achieve desirable moisture level.

(c) **Tripod method**: The method is suitable in high rainfall areas. Hay crops are spread on tripods for sun drying. Crop plants in this method do not come in contact with soil.

**(ii) Barn drying**

Crops are first partly dried in open field until moisture content remains not more than 30 percent. Then spread on the floor of barn in small furrows through which hot air is passed artificially for drying till the moisture comes below 20 percent.

## 2. SILAGE MAKING

An important method of preserving forages is through ensiling. The process of making silage in soils (pit, trench, and tower) is known as ensiling. Silage is the product obtained from controlled fermentation of forage crops of high moisture content.

**Method of Silage Making:**

(a) Prepare a silo pit.

(b) Make the pit air tight: Lining of polyethylene sheet at the bottom, sides and top of the silo should be fixed or laid down.

(c) Fill the pit with chaffed fodder as quickly as possible and compressed properly to eliminate air (by pressing 20-30 cm layer each time).

(d) Give attention on the sides while compacting, when it is done, the upper surface to each layer maintains a convex or dome like shape.

(e) The material at the centre of the dome should be 1.5 meters high from the ground level, at final layer.

(f) Cover the dome with polyethylene sheet and then put 8 cm thick layer of moistened straw and finally with a layer of soil (1.5 cm thick) and plastered with mud.

(g) After few days again plastering is done fill the cracks.

(h) Silage is ready in 6 weeks and can be stored for one year.

Difference between hay & silage:

| S.No | HAY | SILAGE |
|---|---|---|
| 1 | Dry roughage | Succulent roughage |
| 2 | 18-20% moisture | 60-70% moisture |
| 3 | Made by hollow stem crops. | Made by CHO rich crops. |
| 4 | e.g.: Lucerne, berseem, cowpea,soyabean,oat etc | e.g.: jwar, maize,oat,bajra etc |
| 5 | Dried product | Fermented product |

**Questions:**

1. Name the fodders used for hay and silage making.
2. Give the stage of harvesting fodder for making hay and silage.
3. Name the different types of silo pits used for silage making and determine their capacity.
4. To prepare of hay and silage.

# EXERCISE NO.7

# STORAGE OF FEED AT THE ANIMAL FARM

**Objectives**

1. Timely availability of feed.
2. Desired, safe processing of the feed at one place is possible.
3. To avoid wastage of time and feed in transportation.

**Storage conditions**

(a) Storage capacity and type of storage should be decided on the basis of size of the animal farm and frequency of inflow and outflow of raw material and finished products.
(b) Storage of the raw material and finished products should be made separately.
(c) Storage place should be located within the premises of animal farm.
(d) It must have wide gate with shutter to receive materials directly.
(e) The storage platform/plinth should be sufficiently high so that storage is free from moisture/seepage.
(f) Protection form entry of birds, rodents and insects is must for store.
(g) Pesticide treatment should be done in the foundation of the godown/store during civil construction work.

**Stores**

1. Godown 2. Silos

**1. Godown**

Two types:

(i) For hazardous material (H.M.)
(ii) For non-hazardous material (NHM)

I. Godown for hazardous material: - It should be fully ventilated from all the sides and protected by expended metal wires. Materials which catch fire or those which catch fire due to auto-oxidation should be kept away.

II. Godown for non-hazardous material: - It should have well covered roofs and brick walls with proper cross ventilation. Fire extinguisher should be placed at all the strategic points.

**2. Silo storage**

This storage is preferred where plinth area is less. Ingredients like grains and de-oiled cakes are stored in silos for long term storage. For this system conveyor and elevators are being provided. Separate storage tanks for liquid materials like molasses or furnace oil are required.

**Storage of raw materials**

All the inflammable raw material bran, husk, etc. and materials with higher moisture content should be stacked in the HM while NHM like grains should be storage in well aerated godowns.

The storage of materials depends on:

1. Moisture content
2. Temperature
3. Relative humidity
4. Strength of the floor
5. Height available for stacking

**Storage of finished products**

Godown for finished product should be separate, well aerated and located nearest to farm. Bulk storage of compounded feed during hot dry weather should be avoided to minimize drainage loss. Pellets having moisture 12-13% bags should be stacked in low piles and on the wooden pellet to facilitate aeration from beneath also.

**Storage losses**

1. **Handing:** - Due to loading, unloading and transportation from godown to farm or processing unit.
2. **Storage loss:** - Due to moisture evaporation, insect infestation, rodents and birds, putrefaction and mould formation due to bad storage conditions.
3. **Production loss:** - Due to various processes such as conveying, cleaning, mixing and grinding. In grinding, loss occurs due to removal of moisture and as dust with air. From chimney of pneumatic blower, de-oiled cake and light material rice bran, etc., suffer max loss due to grinding.

**Measures to Control Insect Infestation and Rodent**

All measures should be taken to keep the godown free insects and rodent infestation. Stakes should be carefully examined for evidence of infestation. If proper control is not exercised, loss is heavy. Pests not only consume feed but also make the feed unhygienic due to their excreta, dead body etc.

**Insect Infestation and Its Control**

1. Complete wiping out of the existing insects
2. Safe guarding re-infestation.

**Common Insects Found In The Animal Feed Are:**

(i) Rice weevil (Sitophilers spp)
(ii) Khapra beeter (Teogogama sp.)
(iii)Flour beetles (Trobolium sp.)
(iv)Flat grain bewltes (Crytolestes sp.)
(v) Grain moth (Corcysa sp.)

These insects can multiply very fast under favorable conditions e.g. a small population of flour beetle can multiply to 76 million within a period of six months at $28^0$ C temperature and 65-80% RH. If the infestation is heavy, the crawling insects can be detected on the bags, in bag stacks, on floors and walls of godown. To access the extent of infestation about 3 kg samples should be collected from different stacks, sieved and examined.

**Questions:**

1. Categories the feed on basis of infestation.
2. Name the feed used in small and backyard units.
3. Explain the method used to control insect infestation and rodents.

# EXERCISE NO.8

# RECYCLING OF ANIMAL WASTES IN FODDER PRODUCTION

**Objectives**

1. To control environmental pollution by utilizing animal wastes as an organic manure.
2. To maintain the moisture and soil productivity.
3. To improve biological, chemical and physical properties of the soil.
4. To minimize the cost of fodder production.

**Animal waste**:

1. Fresh excreta including both solid and liquid portion.
2. It also includes the bedding material, animal washings, feed waste, and straw-litter to absorb the liquid component.
3. The material after liquid run-off, evaporation of water and other volatile components and leaching of soluble nutrients.
4. Material obtained following aerobic or anaerobic storage of livestock manure.

The wastes from ruminants (cattle, buffalo, sheep and goat) have different composition than the wastes obtained from pigs and poultry, which are highly digestible. The faeces of livestock consist of indigested food which has escaped bacterial and digestive enzyme action. Undigested protein is excreted in the faeces and excess nitrogen, the digested protein in the urine as uric acid on urea.

**Bovine manure**

The dung consists of about 75-85% moisture, 15-25% organic matter and 2-5% mineral matter, the organic matter of dung mainly comprised of 78-90% of total CHO (CF+NFE), 9-18% of CP and 2-5% E.E.

**Goat and Sheep excreta**

The chemical composition the dung had a dry matter content of 42-48%. The organic fraction of the dung comprised 5.2-9.3% CP, 1.4-1.9% EE, 27.8-36.4% CF, 40-47% NFE and 0.35-0.77% ash. The dung comprised 30-50% total nitrogen excretion, all phosphoric and 90-91% of potassium. The total output of urine ranged

from 1700-2000 ml/day/head which comprise mainly 68% urea – N and 11% ammonia – N. the average composition of N, $P_2O_5$ and $K_2O$ in goat and sheep dung comprise 0.65, 0.5, 0.03% and that in urine 1.70, 0.02 and 0.25 respectively.

**Poultry excreta**

This is rich organic manure, since liquid and solid excreta are excreted together the dry matter content of the fresh poultry excreta ranged from 20-30% and it comprise 20.2% ash. The organic fraction- 21.5% CP, 1.9% EE, 13.4% CF and 42.9% NFE. The fresh poultry excreta comprise 80% moisture, 0.76% N, 0.63% $P_2O_5$ and 0.22% $K_2O$ whereas dried and dried had only 30 and 10% moisture, respectively and have 4-5 times more of the above nutrients. The deep liter with sawdust and straw comprise 1.8% N, 2.3% $P_2O_5$ and 1.45 $K_2O$.

**Effect of direct incorporation of organic materials in the soil**

Organic materials can be added to the soil (0-20 cm layer) about 3-4 weeks prior to sowing of cops with optimum moisture level. The prior decomposition of organic materials is important to ensure benefit to the crop. The rate of decomposition will depend on the nature of organic used. Mineralization of humified FYM or compost is slow and steady process and acts as a slow release fertilizer then the leguminous residues and non-edible cakes. The application of FYM or compost is the best source for maintenance of soil organic matter in Indian soils.

**Effect of organic matter on soil micro-organisms**

With different types of organic materials the living phase of soil is greatly stimulated which will be of consequence not only in biodegradation but also in nitrogen fixation, phosphorous solubilization and increasing the availability of plant nutrients to crops? The regulated applications of organics as a practice will energies the living micro-organisms of the soil involved in biochemical activity is of great importance to soil fertility and plant nutrition. Addition of FYM increase total $N_2$ varying from 10-70% depending upon the plant material and soil type used. FYM also is the availability of $P_2O_5$.

**Organic Mulch**

This is an unique and simple method particularly recycling of dry and nitrogen poor organic material decomposition of mulch is slow process, its biomass and C:N: ratio during the course of one crop season is appreciably reduced and this facilities its incorporation in next season at a low cost. Straw mulch besides controlling the weeds and conserving moisture and thereby saving irrigation, also increase crop yield and population of beneficial soil micro-flora. By mulching the population of $N_2$ fixers and $P_2O_5$ , solubilisers increases by several folds.

Organic mulch acts in several ways on soil and crops:

1. Enhance population of soil micro-flora.
2. Increases plant nutrient availability.
3. Conserves soil moisture.
4. Controls weed growth.
5. Regulates soil temperature.
6. Auguments crop yields.

**Biogas from livestock waste**

The raw biomass (dung, urine, crop residues and kitchen wastes, etc.) is converted into methane gas (fuel) by the action of methanogens like mathamobacterium.

***Objectives:***

1. To utilize the animal waste.
2. To prevent the problem of faeces and urine borne diseases.
3. For proper disposal of manure.
4. To control flies and parasites.
5. To keep hygienic condition of farm.

While keeping the domestic animal there may be problem of faeces and urine borne disease among human being and animal due to improper disposal of manure. So to control such diseases and to promote the health of men and animal these in an acute need for the

proper disposal of their manure. The disposal of manure by using biogas plant helps in controlling the diseases of faeces origin and also prevent the fly breeding.

Khadi Gram Udhyog Biogas plant is very common in use. It has four parts:

1. Inlet tank
2. Digestor
3. Gas holder
4. Outlet

**1. Inlet tank:**

This is the place from where the mixture of dung and urine (4 part dung and 5 part of urine) is introduced into the digestor. It is situated on the ground level and it connect with the digestor with the help of a pipe.

**2. Digestor:**

It is a small well, prepared under the ground. Bricks or stone are used to layer with cement so that there may not be any seepage of water. It's depth can be 3.5 to 6 meters and the width can be 1.2 to 6 meters. A brick wall is constructed in the center of the well which divides the well in two equal parts. It is constructed in the ground so that the well can with stand the fluctuation of environmental temperature. In each part of well one cement pipe is placed. One pipe is used for feeding the semisolid manure in the well. The lower part of this should face upward and thus help the liquid manure to mix well. The other pipe is used for taking and the digested slurry from the bottom to out side of the well. The outlet pipe is kept at some what lower level in comparison to feeding pipe this help in easy escape of the slurry.

**3. Gas-Holder:**

This is a circular iron drum which helps in collection of the gas. The drum rest over a stone slab which contain water and the used mobile oil. This helps in preventing damage of drum as in absence of the slab the drum comes out directly in contact with slurry and is damaged by rusting. In center of slab a hole is created and through this a tube is passed to join the well on the drum. The tank is placed above ground level.

**4. Outlet:**

It is used for escaping the slurry and it is slightly lower than that and the inlet or below the ground.

**Procedure:**

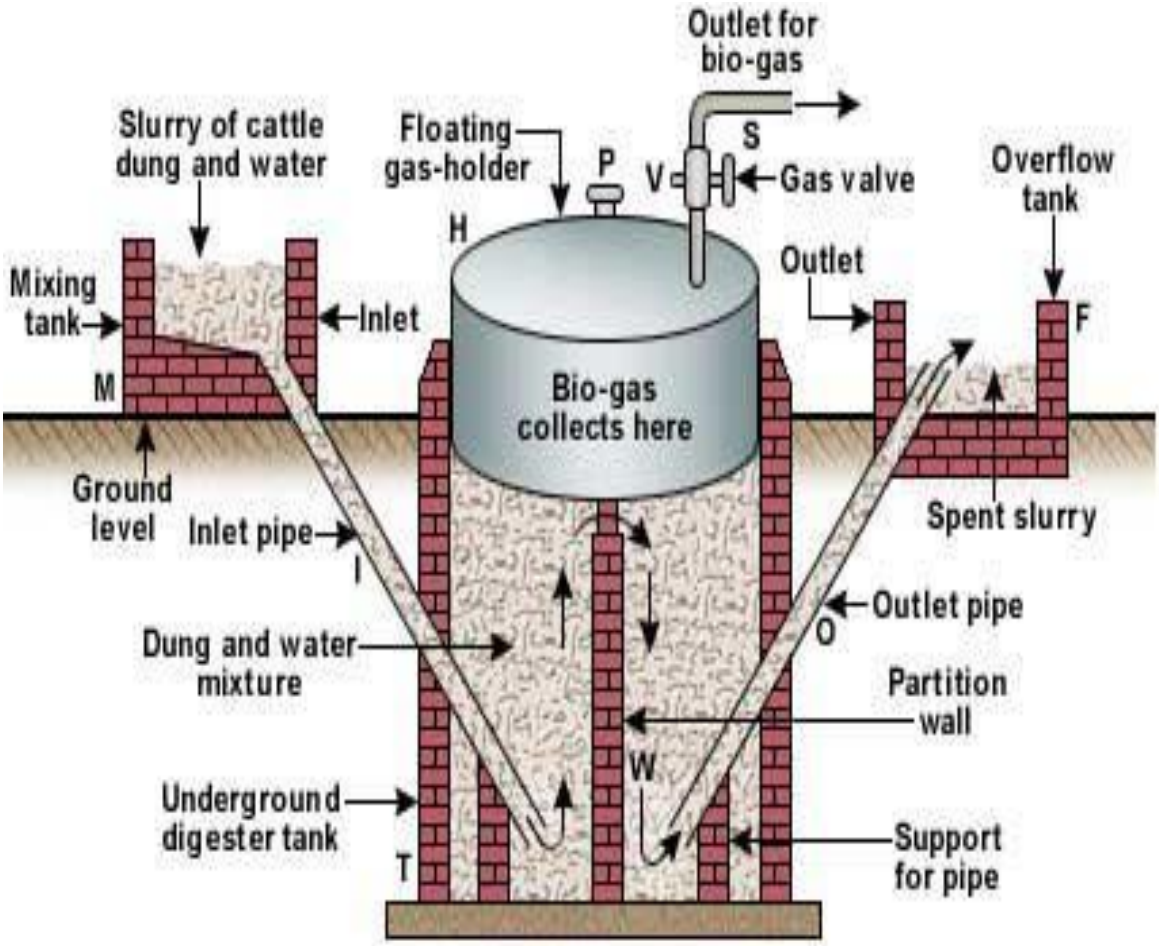
For better gas production animal or human faeces is allowed to decompose in a closed place for at least ten days. Faeces and water are mixed in the ratio of 4 : 5 (4 part dung and 5

part water ) and poured into biogas plant. If water is more then 5 part will not be produced gars. For better gas generation the temp of slurry should be between 30º C to 40ºC. Gas generation practically ceases below 10ºC. this condition generally occur during the winter climate. Curing cold days the warm slurry should be added for the better working of the biogas plant. In the beginning it takes at least 20-30 day for generation of gas , if slurry is not used with dung. After many days the thick slurry react to other part of the well. The slurry is taken out by the other pipe. This can be taken directly for the use at farm or it can be stored in pits till further use. The slurry can also be dried and used after wards as a fertilizers or for burning purpose.

The gas collected in the inverted drum is taken to kitchen or to the machine. The mixture of gas and air is released and further pure gas can be collected in drum.

For better efficiency of gas store:

1. The water collected in gar tube should be removed once in 4 to 5 days.
2. Paint the drum once in a year.
3. Move the gas holder twice in a day.
4. Sand should be avoided in gobar gas plant.




Floating gas-holder type bio-gas plant.

**Questions:**

1. How much dung an animal produce in a day
2. Explain the process of recycling of organic materials

# EXERCISE NO.9

# TO CALCULATE COST OF FODDER PRODUCTION

**Objectives:-**

1. To estimate the economics of non-leguminous and leguminous fodder production.

## (A) COST CALCULATION OF FODDER PRODUCTION:

Following Parameters are considered in calculation cost of production.

1. Preparatory tillage
2. Pre-sowing irrigation
3. Sowing
4. Ridging
5. Seed
6. Seed treatment
7. Farm yard manure (FYM)
8. Fertilizer
9. Fertilizer application
10. Irrigation
11. Hoeing and weeding (only in seed production)
12. Harvesting
13. Interest or cost of production for 6 months
14. Management charges (8-10 of cost of production)
15. Risk factor (8-10% cost of prod.)
16. Transportation charges (8-10 % of cost prod.)
17. Rental value of the land (40-45% of cost prod.) Total cost of production (1 to 8) = …….

Total fodder production (quintal) = …….

Total income = …….

Net profit (Total income – Total cost of production) = ……..

## (B) MARKETING OF FODDER IN ARID AND SEMI ARID REGION

The main fodder for livestock in desert region from rangeland is sewan grass. Which grows abundantly during rainy season. The grass can survive in draught or famine became the root system is about 4cm deep. It is harvested twice when the heavy rainfall taken place. Grass production about 6-8 quintal per bigha.

1 Bigha = 127.5 x 12.5 feet

1 Hectare = 100 m x 100m

Grass after harvesting is chaffed and marketed directly in months of November.

Av. Price is between Rs. 250-325/quintal dependly on demand and supply.

| Price of some fodder | Average price (Rs/q) |
|---|---|
| Bhurat (*Cenchurus biflorus*) | 150-250 |
| Pala (*Zizyphus numularia*) | 600 |
| Wheat straw | 175 |
| Pavari (dry leaves of Khejri) | 350-400 |

Some cultivated fodder

| | |
|---|---|
| Jowar/Bajra fodder | 100 |
| Moongphali Chara | 250-350 |
| Moongphali Guna | 150-250 |
| Moth Chara | 250-350 |
| Moth Guna | 150-250 |
| Guar by products | 100-250 |

The above given prices are not fixed they may varies with demand and supply of fodder or other factors also, like quality, famine etc.

Bhurat and Pala are marketed mainly during summer season. Pala is harvested in Nov.-Dec. The price is mainly meant for milch animals and it is mixed with sewan grass or wheat straw.

The guar by products such as branches (guna) and covering of seeds (falgati) are fed to camel and the price depends upon demand and supply.

***Questions:-***

1. Collect the current data of market prices of various fodder crops in arid region.

# EXERCISE NO.10

# FAMILIARIZATION AND COLLECTION OF FERTILIZERS

**Objectives:**

1. To acquaint with different fertilizers and their composition.
2. Calculating the quantity of fertilizers required for a particular crop.

**Fertilizer**

Fertilizer is a soil conditioner that promotes plant growth by providing the deficient nutrients. Due to continuous cultivation and other factors the nutrients in soils get diminished which leads to retarded growth of crops. To compensate the diminished nutrients in the soil fertilizers are added externally thereby they enhance the fertility of soil and helps in improved growth and productivity of crops.

Fertilizer is composed of largely macronutrients (primary macronutrients nitrogen, phosphorous, and potassium and secondary macronutrients magnesium, calcium, and sulfur) and other micronutrients (iron, chlorine, copper, boron, molybdenum, manganese, zinc, and selenium) in smaller quantity. They are either directly applied to soil or sprayed on leaves. Fertilizers are available in varying proportions of macro- and micronutrients. eg. potash is composed of 1:1 potassium to carbonate.

Fertilizers are classified as organic fertilizer (natural fertilizer), are composed of organic matter from plants or animals and inorganic fertilizers (synthetic fertilizer), that are composed on chemically synthesized nutrients. Application of synthetic fertilizers leads to depletion of trace minerals in soil and over-fertilization results in damage to crops and soil pollution.

**Types of fertilizers**

**1. Straight fertilizers**

Any material or fertilizer that contains one essential plant nutrient. There are three types of straight fertilizers.

(i) Nitrogenous fertilizer
(ii) Phosphate fertilizer
(iii) Potash fertilizer

**2. Complex fertilizers**

Any fertilizer which contains two or more plant nutrients, e.g,

Di-ammonium phosphate DAP (18%N): (48% $P_2O_5$)

Ammonium phosphate sulphate (20%N): (20% $P_2O_5$)

**3. Mixed fertilizers: -** A mixture of two or more straight fertilizers is known as mixed fertilizers, e.g. Urea ammonium sulphate (N20%, $P_2O_5$ 20%)

# Manure

Manure is organic matter that is used as organic fertilizer in agriculture. Manures enrich the fertility of the soil by providing organic matter and macronutrients and micronutrients. Manure has been used for centuries as a fertilizer in agriculture, as it is rich in nitrogen and other nutrients that facilitate the growth of plants.

Manures are broadly classified into animal manures, compost, and plant manure. Animal manure is generally feces of farm animals such as cattle, horses, sheep, pigs, chicken, turkey, rabbit, and birds. Compost is the decomposed remnants of animal dung or organic materials from plants. Plant manures includes plants such as clover.

Manures improve soil structure and are generally with unpleasant odor. Organic fertilizers like manures increase the soil organism numbers and have long-term impact in increasing crop yield. Usage of organic fertilizers also reduces soil pollution.

The major difference between manure and fertilizer is manure is a organic fertilizer where as a fertilizer can be organic or synthetic.

**Organic manures:**

**Two types**

(1) **Bulky organic manures (BOM):** They are bulky in nature but supply plant nutrients in small quantities are termed as BOM e.g. FYM, Compost, Green manure, etc.

(2) **Concentrated organic manure (COM):** Those which contain higher percentage of major plant nutrient are known as concentrated OM e.g. oilcake, blood meal, meat meal, wastes, fish meal and poultry manure.

   **(i) Farm Yard manure (FYM):** It refers to decomposed mixture of dung and urine of farm animals along with the litter and left over material from roughage for fodder fed to the animals (N 0.5%, $P_2O_5$; 0.25% $K_2O$ 0.5%).

   **(ii) Compost:** A mass of rotted organic matter made from waste, the whole material may be from fields, like sugarcane thresh, paddy, wheat straw, etc., cities like street sweeping, night soil, debris, etc.

**Concentration (%)**

| | N | P | K |
|---|---|---|---|
| Farm litter compost | 0.5% | 0.15% | 0.5% |
| Cities or town compost 1. | 5% | 1.0% | 1.4% |

**Exercise**

1. The student will identify different fertilizers and collect them.

# GLOSSARY AND ABBREVIATIONS

1. **Agriculture:** An activity of man, from primarily aimed at the production of food, fiber, fuel etc. by optimum use of terrestrial resources.
2. **Agronomy:** The word has been derived from Greek word `agros' means field and `nomos' means management. It is a specialized branch of agriculture dealing with crop production and soil management or this is an application of scientific principles to the art of crop production.
3. **Agronomical Practices:** Agronomical Practices are steps framers incorporate into their farm management systems to improve soil quality, enhance water use, manage crop residue and improve the environment through better fertilize management.
4. **Farm:** An area of land used for agriculture either to raise a crop or pasture or maintain livestock.
5. **Agrostology:** A branch of science which deal with the study of grasses, their classification and utilization.
6. **Grass:** Botanically any plant of family Gramineae is called grass. The term grass in the contest of feeding. Livestock and grassland agriculture is not limited to narrow botanical sense alone but also include cereal when grown for grains.
7. **Grassland:** The land on which gramineae species represents the dominant, if not exclusive vegetation grassland is intermediate in status between forest and desert.
8. **Grass land farming:** farming system that emphasizes the importance of grasses and legumes in livestock and land management in which the legumes are the keystones and grasses from the backbone of the grassland farming.
9. **Herbage:** Leave, stem and other succulent part of forage plant upon which the animal feed.
10. **Grazing:** is a method of feeding in which a herbivores feeds on plants such as grasses or other multi cellular organisms such as algae. In agriculture, grazing is one method used whereby domestic livestock are used to convert grass and other forage in to meat, milk and other products.
11. **Pasture:** The term pasture is applied for a grazed plant community usually composed of several species often of diverse botanical type.
12. **Pastureland:** An area of land covered with grass and other herbaceous forage plant for grazing animals.
13. **Range:** Any extensive area of natural pasture land. If unfenced, it is an open range.

14. **Roughage:** Plant material that has relatively high yield crude fiber and low digestive nutrients such as Straw & Stover.
15. **Crop:** Refers to plant sown and harvested by men for economical purpose.
16. **Crop Residue:** The portion of plant or crop left in the field after harvest of that part of the crop that is not used domestically or sold commercially.
17. **Cultivation:** It include any labour and care taken in the raising of plants such as stirring soil fertilizing etc, or to loosen the soil around the plant for the primary purpose weed control.
18. **Fodder:** Maize, lower or other coarse grasses harvested with seed and leaves and cured for animal feeding
19. **Fodders Crop:** The cultivated plant species that are utilized as livestock feed in the form of silage and hay.
20. **Forage Crop:** crops grown primarily for livestock feed to be either harvested fro hay, silage or green feed or harvested by grazing animals.
21. **Kharif Season:** Crop gown during the main monsoon season (April to Sept ) such as Kharif. Maize, cotton, rice, pearl millet, sorghum etc.
22. **Rabi Season:** Season during which winter crops like wheat, barley, mustard, gram etc. are cultivated and usually it extends from Sept. to April.
23. **Zayad Season:** crop grown during the main summer season (March to June).
    Such as : Maize, Bajra, Sorghum, Cow Pea, Guar, Napier grass, Sudan grass.
24. **Farming System:** Farming system represent an appropriate combination of farm enterprises vitamin cropping system livestock, fisheries, forestry, poultry and the mean available to the farmer to raise them for profitability.
25. **Cropping scheme: -** The plan according to which the crops are raised on individual plots in the fixed period on object of getting maximum returns from each crop, without impairing the fertility of soil, is known as cropping scheme.
26. **Crop Rotation: -** Growing of crops on a piece of land for a fixed period of time in a pre-planned succession is called as crop rotation.
27. **Mixed Farming:** Farming system which involves the raising of crops and rearing of animals and poultry. Mixed farming is based upon the principle that land support animal and animal should support land. Mixed farming is type of farming under which crop production is combined with livestock raising.

28. **Mixed cropping:-** Growing of two or move crops simultaneously on the same piece of land, without any definite row arrangement is called as mixed cropping.
    Ex. Jowar + cow pea, Maize + cow pea, Barseem + mustard
29. **Inter cropping:-** Growing of two or more crops simultaneously on the same field, crop intensification is in both temporal and spatial dimension.
    Ex. Jowar + Cow pea, Maize + Cow pea, Bajra + Cow pea, Maize + pea, Jowar + Moong.
30. **Mono cropping**:- Growing of only one crop the land may be occupied by during one season is called as mono cropping.
    Ex. Bajra, Jowar, Barseem, Lucorne, Sudan grass.
31. **Double cropping:-** Growing of two crop consecutively on the same field in same year is called as double cropping.
    Ex. Jowar-Guar, Maize-cow pea, Jowar-oat.
32. **Triple cropping**:- Growing of three or more crops consecutively on the same field in same year is called triple cropping.
    Ex. Majze-Jowar-Barseem, Maize-Cowpea-Oat.
33. **Relay cropping:**- Growing of two or more crops on the same field with the planting of the second crop after the first one has completed its development.
    Ex. Paddy-Barseem.
34. **Strip cropping:** is the cultivation of different crops in alternate strips of uniform width and on the same field. It has two types: Contour strip cropping and field strip cropping. Contour strip cropping follows a layout of a definite rotational sequence and the tillage is held closely to the exact contour of the field. Field strip cropping has strips with uniform width that follows across the general slope of the land.
35. **Straw:** Straw means the dried reminent of a crop from which the seed has been threshed. The term is most commonly used to wheat, Oats, Barley, rice tec.
36. **Feed:** feed is food given to domestic animals in the course of animal husbandry. There are two basic types fodder and forage.
37. **Hay:** Hay is feed produced by dehydration of green forage to a mixture contain moisture about 15 % or less, so that the biological processes do not proceed rapidly enough to build up heat.
38. **Stubble:** The basal portion of the stem of plant left standing after cutting or harvesting the crop.

39. **Silage:** Animal feed resulting, from storage and fermentation of green or wet crops under anaerobic conditions.
40. **Silage Crop:** Those crop which are preserved in a succulent condition by partial fermentation in a tight silo pits.
41. **Silage Preservative** Material added to forage at time of ensiling to enhance the favorable fermentation process.
42. **Silo:** A semi air tight structure designed for use in production and storage of silage.
43. **Crude Protein (CP):** is a term for the total protein content of a food source as determined by its nitrogen content. The term is most often used in scientific testing and on the labels of animal feeds.
44. **Total Digestive Nutrition (TDN):** the sum of the digestive fibre, protein, lipid and carbohydrate components of a feed stuff or diet. TDN is directly related to digestible energy and is often calculated based on ADF.
45. **Annual Crops:** Crop grown during time only one season. Such as – Sorghum, Bajra, Maize, Cow pea, Guar, Dot, Barley, Berseem, Mustered etc.
46. **Biannual Crops:** Crops grown during the time two or more year. Such as – Sudan grass.
47. **Perennial crops:** Crop grown during time two or more year. Such as – Napier grass, Para grass, Lucerne, Anjan grass, Dhaman grass etc.
48. **Leguminous fodder crop:** The plant belong to family leguminous and having nitrogen fining nodules on their foots. The leguminous fodder has special significance because of high herbage protein and partial independence from soil for their nitrogen needs. Such as- Cow pea, Guar, Berseem, Lucerne, pea etc.
49. **Non Leguminous fodder crops:** Cereals & grasses belonging to family non leguminous. Non leguminous fodder crops are characteristically determinate in growth habit and their herbage. Such as – Sorghum, Maize, Bajra, Oat. Napier grass etc.
50. **Back Yard Cultivation / Farming:** It is highly suitable for landless poor farmers. On small family farms rabbits and poultry can be strongly integrated in to traditional family practise. This entails the recycling of garden or food refuse to rabbits or poultry and their manure into compost for exhausting soil fertility. This integrated approach is an effective system and is a boon to resource poor farmers, weeds, tropical forages, vegetable tops and table scraps can be used as feed for rabbits and poultry.

**Abbreviation:**

1. I.C.A.R Indian Council of Agricultural Research (Bhartiya Krishi Anusandhan Parishad, New Delhi)
2. 1.A.R.I: Indian Agricultural Research Institute, Pusa.
3. D.A.R.E: Department of Agriculture Research Education, New Delhi.
4. I.V.R. I : Indian Veterinary Research institute, Izzatnagar, Uttar Pradesh
5. C.I.R.G Central Institute of Research on Goat. Makhdoom, Near Mathura (U.P)
6. I.G.F.R.I: India Grassland and Fodder Research Institute, Jhansi, Uttar Pradesh.
7. I.L.R.I: Indian Livestock Research Institute, P.O. Numkum, Ranchi
8. N.D.R.I: National Dairy Research Institute, Karnal, Haryana.
9. N.B.A.G.R: National Bureau of Animal Genetic Resources, Karnal, Haryana.
10. C.I.R.B: Central Institute of Research on Buffalo, Hisar, Haryana
11. N.R.C.E: National Research Centre on Equine, Hisar, Haryana.
12. N.R.C.C: National Research Centre on Camel, Jorbeer, Bikaner, Rajasthan.
13. C.S.W.R.I: Central Sheep and Wool Research Institute, Avikanagar,Tonk Raj.
14. C.A.Z.R.I: Central Arid Zone Research Institute, Jodhpur, Rajasthan.
15. N.D.D.B; National Dairy Development Board, Anand Gujarat.
16. F.A.O: Food and Agriculture Organization, Rome, Italy.
17. AMUL: Anand Milk Union Limited.
18. RCDF: Rajasthan Co-operative Dairy Federation.
19. VCI: Veterinary Council of India, New Delhi

# UNIT-III

## INDEX

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| 4 | Routine farm operations at livestock farms clipping shearing, dipping, spraying and spotting sick animal | | | |
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| 11 | Economics of dairy | | | |

# EXERCISE NO. 1

# LAYOUT PLANS FOR DIFFERENT LIVESTOCK HOUSES

**Objectives:**

- To design building at proper location and spacing.
- To accustom the students with essential and subsidiary farm buildings

The fore most things to be considered before planning to build a dairy farm are the size of the farm and economic return from the farm. A dairy farm preferably started with small herd. The farm buildings can be constructed with cheap, semi permanent materials. After getting good return and learning about dairy farming, one should increase his herd strength, Farmer may consider any lay out depending on their herd strength.

The lay out are intended to show the sizes, number and location of different sheds. The popular pattern of arrangement of individual buildings within the site or in the farm of E, U, L, C and F.

**Design of different buildings for dairy farm:**

Basically mainly two types of buildings required for dairy animals.

A. Essential buildings

B. Ancillary buildings

## A. Essential buildings:

i. **Milking barn:** It is fully covered barn in which the milch animals are milked. It is located at central place with all other buildings around it. The milking animals can be secured by stanchions or neck chains either in tail to tail or head to head to head arrangement. The length and width of the standing place depends on size of animals and may varying from 1.5 to 1.7 meter length and 1.05 to 1.20 meter width with a slope of 1 in 40 towards drain or gutter. Two continuous feed manger on either side of shed with 0.75 meter wide feeding alley beyond each manger. The width of central passage shall be 1.5 to 1.8 meter with gentle slope towards drain. The roof of the shed should be gabled. The eaves of the roof shall project at least 50 cm away from side walls. In heavy rain fall areas and cooler areas the side walls are completely up to the roof with windows and ventilators at suitable places.

**ii. Milch/Dry animal shed:** These sheds are for housing milch cows and dry cows separately. On small farms a partition can be made on one side for housing dry cow separately. These are simple sheds comprising a closed area and an adjoining open paddock. The covered area should be preferably of cement, concrete on the floor. For open paddock brick on edge is better one.

iii. **Maternity pens:** Pregnant animals are transferred to maternity pens/ calving boxes two to three weeks prior to expected date of calving. The number of maternity pens required is about 5 % of the total breeds able stock on the farm. The dimensions are 3 X 4 $m^2$ covered area and another 3 X 4 $m^2$ for open paddock. The covered area shall have 1.25 m high wall, 1.2 m wide gate for opening into paddock. The maternity pens are constructed either in rows or groups of 2/4 nearer to the living quarter of the farmer so that the down calvers can be constantly observed.

**iv. Calf Shed:** The calf shed should be nearer to the milking barn so that the calves can be brought to the dams at milking time, if weaning is not practiced. Hand/ pail feeding of calves can be done if weaning is practiced. If large number of the calves present then the calves of different age groups should be housed separately for better feeding and watering.

**v. Young stock shed:** Calves from 6 months -1 year of age should be housed separately from suckling calve. Generally all male calves above 6 months of age are disposed off. The dimensions of the shed are same as calves shed except differences in manger and waterer.

**vi. Bull shed:** It is located towards one end of the farm with one bull for each shed. The bull shed can have a covered area of 12 $m^2$ with a open paddock of 120 $m^2$. In case of natural services one bull is required for every 50 breedable females in the farm.

**vii. Sick animal/ isolation shed:** Isolation shed located well away from other shed so that they are inaccessible to other shed. Sheds more or less similar to maternity pen in structure.

## B. Ancaillary building:

**i. Feed stores:** it is required for storing the concentrates. The size of concentrate storage space required is on the presumption that 0-0.2 meter storage space is required for per adult unit. There should be one main concentrate cum feed mixing room at distant place and a small ration room near the milking barn separately for storing concentrate mixture for 2-3 day temporarily. The feed room should be damp free and rodent proof.

**ii. Silos:** Silage is important feed item for dairy animal. It is prepared by ensiling chaffed green fodder in silos. Tower, pit and trench silos are commonly used. Under Indian condition trench silo will be more practicable and convenient. It is made by simple excavation of hard ground, floor and sides are lined with cement concrete/bricks/stone slabs, which are long lasting and seepage proof.

**iii. Hay/straw shed:** Sheds with walls on three sides are better for storing straw/hay. Some time a simple frame shed with gabbled roof is sufficient. The hay shed should be away from animal shed because of fire hazards, storing hay in open space results in excessive wastage.

**Floor space requirement per animals ($m^2$)**

| Type of animals | Covered area | Open paddock | Maximum no. of animals per shed | Height of shed (cm) at eaves) |
|---|---|---|---|---|
| **Cattle & Buffaloes** | | | | |
| Bulls | 12 | 120 | 1 | 175 in medium and heavy rain fall areas and 220 in arid & semi arid areas |
| Cows | 3.5 | 7.0 | 50 | |
| Buffaloes | 4 | 8 | 50 | |
| Down calvers | 12 | 12 | 1 | |
| Young calves | 1 | 2 | 30 | |
| Older calves | 2 | 4 | 30 | |

| Sheep and Goat | | | | |
|---|---|---|---|---|
| Ewes/ nanny | 1 | - | 60 | 300 in dry areas and 220 in heavy rain fall area |
| Lamb/kid | 0.4 | - | 75 | |
| Ram/buck | 3.4 | - | - | |
| Milch doe | 1.4 x 1.2 | - | One stall for each doe | |

**Feeding/watering space requirement for different categories of Livestock**

| Type of animal | Space per animal (cm) | Total Manger length in a pen per 100 animals (cm) | Water trough length in a pen for 100 animals (cm) | Width of manger/water trough (cm) | Depth of manger/water trough (cm) | Height of inner wall of manger/water trough (cm) |
|---|---|---|---|---|---|---|
| Adult cattle & Buffaloes | 60-75 | 6000-7500 | 600-750 | 60 | 40 | 50 |
| Calves | 40-50 | 4000-5000 | 400-500 | 40 | 15 | 20 |
| Adult sheep & goat | 40-50 | 4000-5000 | 400-500 | 50 | 30 | 35 |
| Lambs & kids | 30-35 | 3000-3500 | 300-500 | 50 | 20 | 25 |

**Floor space requirements for Sheep & Goat**

Floor space: Minimum floor space requirement per animal (sheep or goat)

| Type of animal | Minimum floor space per sheep/goat ($m^2$) |
|---|---|
| Ram or buck in groups | 1.8 |
| Ram or buck individual | 3.2 |
| Lamb or kids in groups | 0.4 |
| Weaner in groups | 0.8 |
| Weaner individual | 0.9 |
| Yeraling/goatling, individual | 0.9 |
| Yearly goatling in groups | 0.9 |
| Ewe or doe in groups | 1.0 |
| Ewe or doe, individual | 1.2 |
| Ewe with lamb | 1.5 |

Housing for sheep is kept for wool and meat, and goats kept for meat productions:

Units:

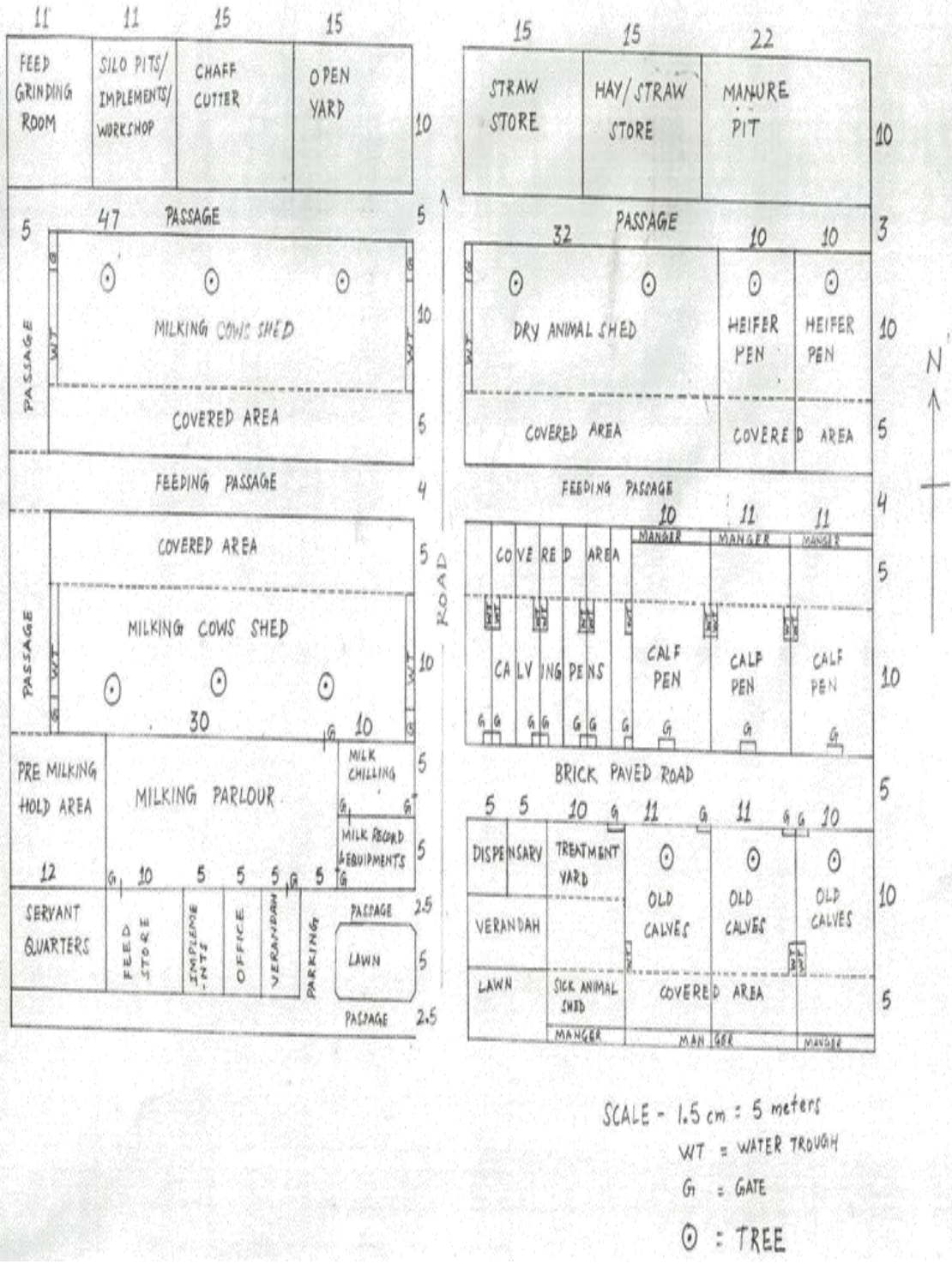
(a) Sheds
(b) Shearing shed and store room
(c) Shepherd's groups

Type of sheds:

Coral at the rate of $2m^2$ per animal and 1.2 m above the ground be provided for each shed. Shed must be fenced.

| Sr. No. | Type of shed | Size (m) | Height (m) | Maximum animals | Remarks |
|---|---|---|---|---|---|
| 1. | Ewe or doe shed | 15 x 4 | 3 | 60 | Partitioned Breadth wise |
| 2. | Ram or buck shed | 4 x 2.5 | 3 | 3 | |
| 3. | Lambing/kidding shed | 1.5 x 1.2 | 3 | 3 | |
| 4. | Lamb or kid shed | 7.5 x 4 | 3 | 75 | |
| 5. | Weaner shed | 7.5 x 4 | 3 | 75 | |
| 6. | Yearling or goatling shed | 10 x 5 | 3 | 50 | |
| 7. | Sick animal shed | 3 x 2 | 3 | 1 | |
| 8. | Shearing shed and store room | 6 x 2.5 | 3 | | |
| 9. | Shepherd's room | 6 x 4 | 3 | | |

# LAYOUT OF BUILDING FOR HOUSING 200 DAIRY ANIMALS

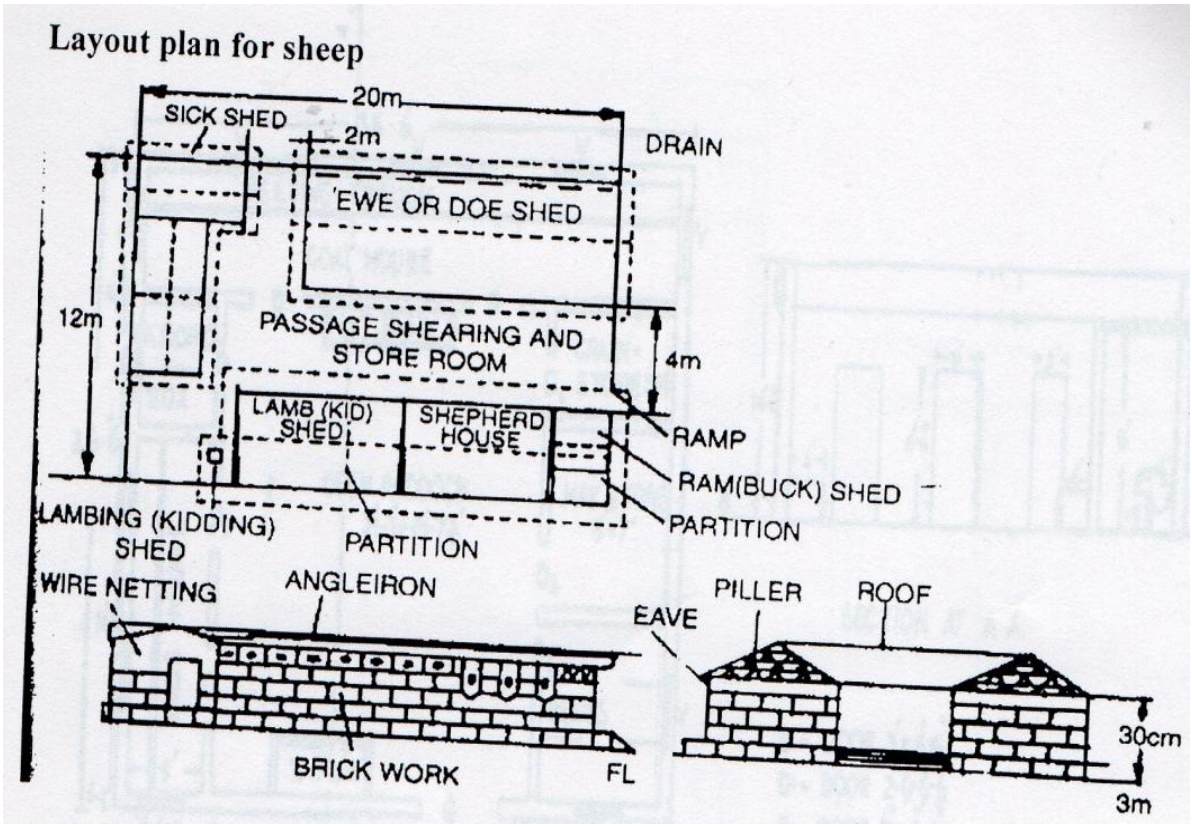


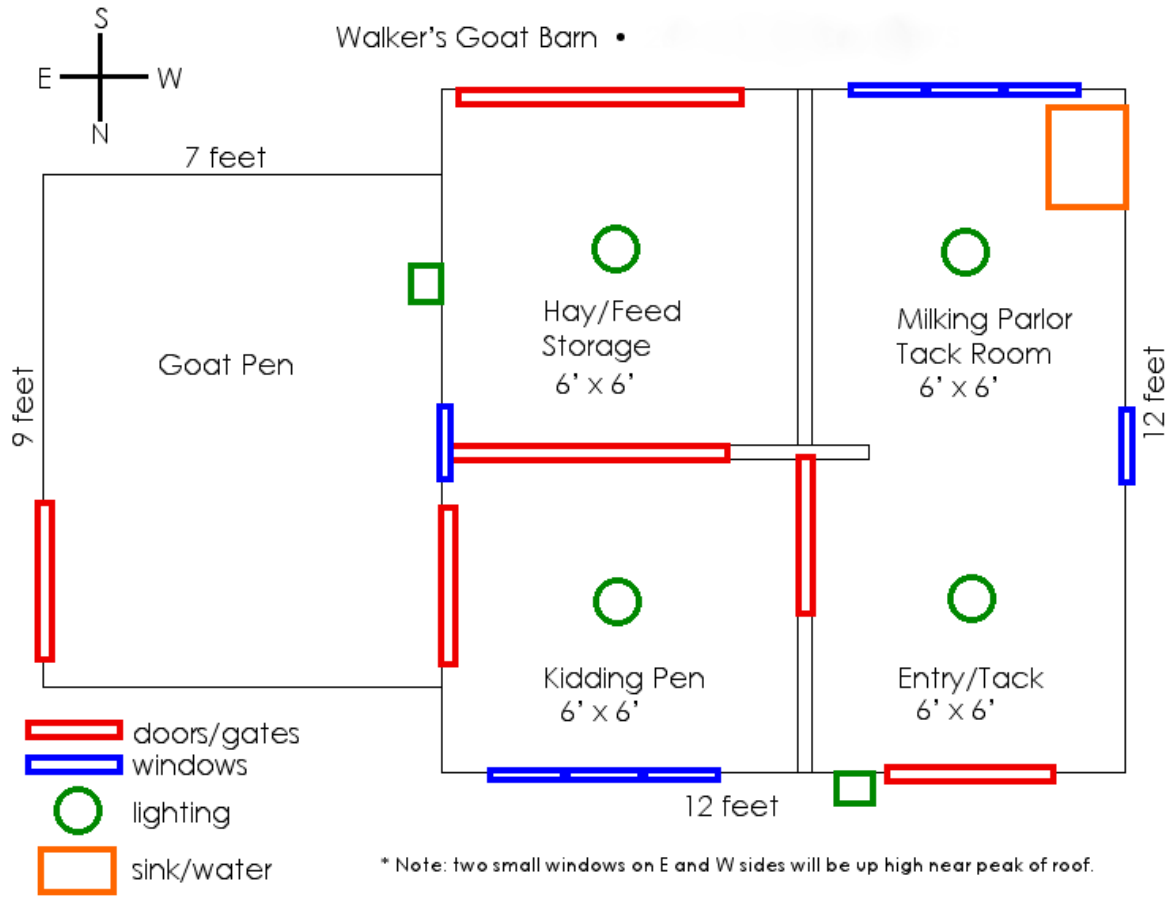

SCALE - 1.5 cm = 5 meters

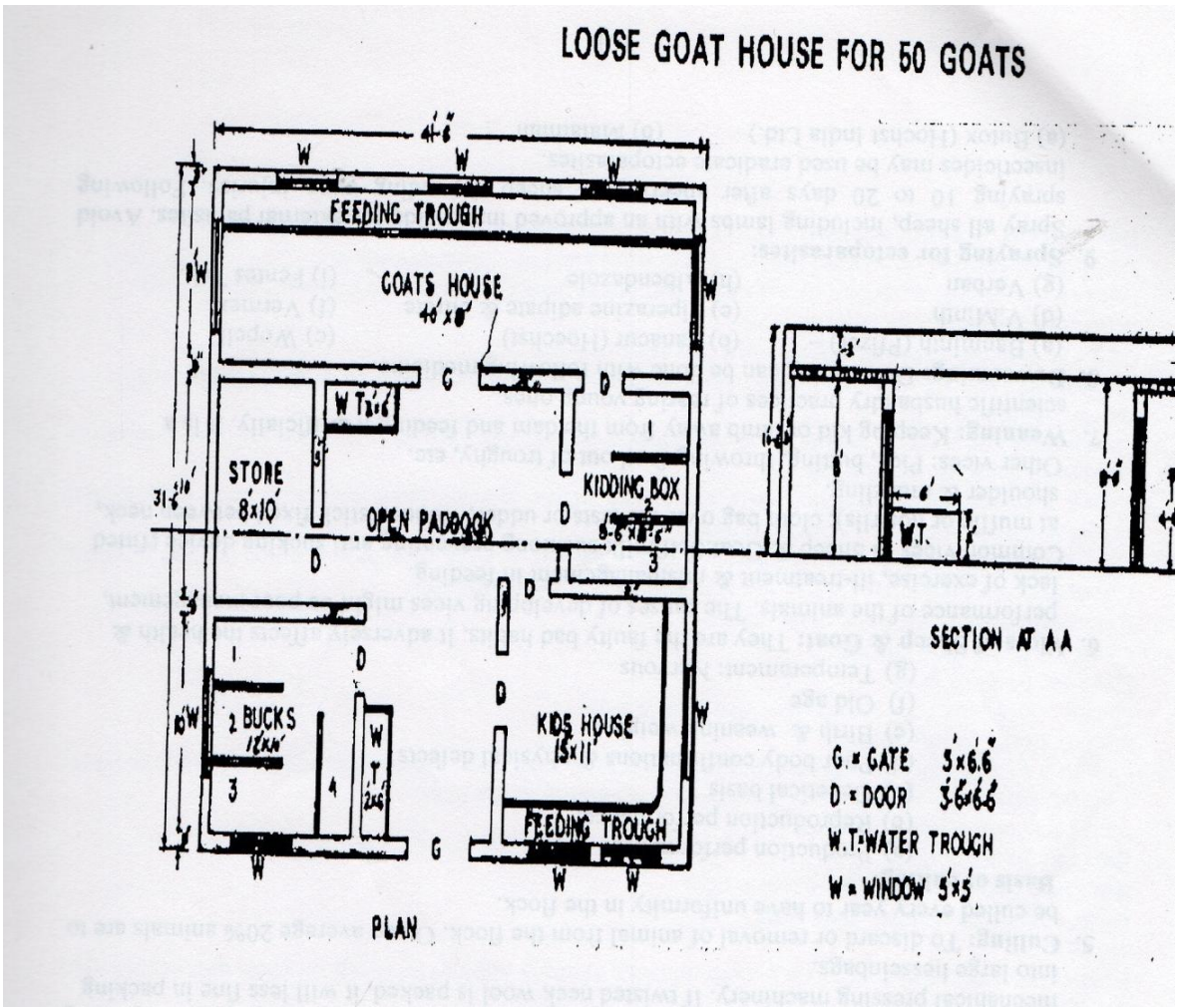
WT = WATER TROUGH

G = GATE

⊙ = TREE


Layout plan for sheep
20m
SICK SHED
2m
DRAIN
EWE OR DOE SHED
12m
PASSAGE SHEARING AND STORE ROOM
4m
LAMB (KID) SHED
SHEPHERD HOUSE
RAMP
RAM(BUCK) SHED
PARTITION
LAMBING (KIDDING) SHED
PARTITION
WIRE NETTING
ANGLEIRON
EAVE
PILLER
ROOF
BRICK WORK
FL
30cm
3m


Walker's Goat Barn •
S
E
W
N
7 feet
9 feet
Goat Pen
Hay/Feed Storage
6' x 6'
Milking Parlor
Tack Room
6' x 6'
12 feet
Kidding Pen
6' x 6'
Entry/Tack
6' x 6'
12 feet
doors/gates
windows
lighting
sink/water
* Note: two small windows on E and W sides will be up high near peak of roof.




**Questions:**

1. Give in detail about floor space requirement per animals ($m^2$) ?

# EXERCISE NO. 2

## IDENTIFICATION OF DIFFERENT BREEDS OF ANIMALS

**Definition and introduction:**

A breed is a group of animal's related similar characters like general appearance size, features and configuration etc. A group of individual which have certain common characteristics that distinguish them from other groups of individuals is known as "Species".

**CLASSIFICATION OF CATTLE BREEDS**:

Indian cattle breeds of cattle classified in to three types

a) Milch breeds / Milk breeds

b) Dual Purpose breeds

c) Draught breeds

1. **Milch Breeds / Milk Breeds:**

The cows of these breeds are high milk yields and the male animals are slow or poor work animals. The examples of Indian milch breeds are Sahiwal, Red Sindhi, Gir and Deoni. The milk production of milk breeds is on the average more than 1600 kg. per lactation.

**2. Dual Purpose Breeds:**

The cows in these breeds are average milk yielder and male animals are very useful for work. Their milk production per lactation is 500 kg to 1500 kg. The example of this group is Ongole, Hariana, Kankrej, Tharparker, Krishna valley, Rathi Goalo and Mewathi.

**3. Draught breeds**

The male animals are good for work and Cows are poor milk yielders are their milk yield as an average is less than 500 kg per lactation. They are usually white in colour. A pair of bullocks can haul 1000 kg.Net with an iron tyre cart on a good road at walking speed of 5 to 7 km per hour and cover a distance of 30 to 40 km per day. Twice as much weight can be pulled on pneumatic rubber tube carts.

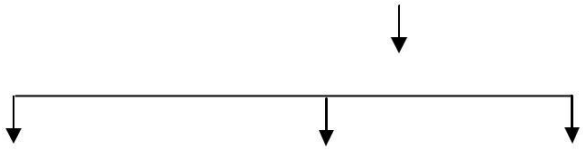
**Classification of cattle Breeds:**

**BREEDS OF CATTLE**

**Indigenous breeds**

(In India cattle are mostly reared for milk & draught purpose)

**Exotic breeds**



| **Beef breed** | **Dairy breeds** | **Dual breeds** |
|---|---|---|
| Hereford, | Holstein Friesian, | Red poll, |
| Angus, | Jersey, | Brown Swiss |

**Based on utility**

**Milch breed**
(Cows are high yielder 1500-2500 lit/lact.)

**Dual purpose breed**
(Intermediate between milch & draught, lactation yield between 1200-1500 litre)

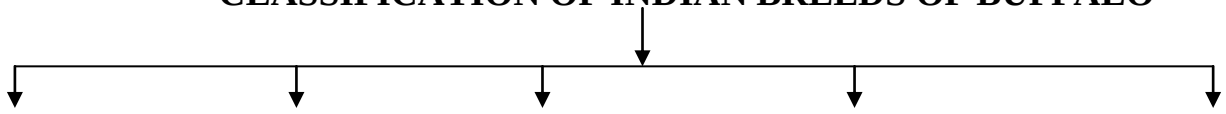
**Draught Breed**
(Bullocks are excellent draft animals, cows are poor milker)

| Breed | Origin & Distribution | Distinguishing characters | Body colour |
|---|---|---|---|
| | **(A) Milch breeds** | | |
| 1. Sahiwal | Montgomery (Pak.)<br>Punjab, Haryana, U.P., M.P., Bihar. | Loose skin (Lola) deep body, short legs, stumpy horns, broad forehead, massive hump, voluminous dewlap & Pendulous sheath, tail is long & whip like reaching to ground. | Reddish dun with various shades of pale Red to dark brown. |
| 2. Red Sindhi | Sindh & Karachi (Pakistan) | Medium size & compact body having well Proportioned body. Extremely docile, intelligent facial expression, horns thick & Blunt, drooping ears. | Deep dark red colour varying from dun yellow in almost dark brown. Males are darker red than the Cow. |
| 3. Gir | South Kathiawar to (Gujarat), Gir forest & migrated Surrounding area. | Bulging forehead, ear are long, pendulous resembling a tiny curled Leaf. Docile temperament. | Colour is seldom entire varying from almost red to almost Black. |
| 4. Tharparkar | Tharparkar dist. Of Hyderabad, extends up to Kutch deserts in West India. | Medium size, deep built, short, straight & strong limbs, slightly convex Forehead. | White or light grey line along the spine in Young animal. |
| | **(B) Dual Purpose Breed** | | |
| 1. Hariana | Originated in East Punjab & are now extensively found in Hissar, Karnal, Gurgaon & Delhi | Compact graceful appearance stumpy horns, bony prominence in the centre of the poll, Navel flap absent. | Popular colour is white or light grey. |

| | | | |
|---|---|---|---|
| | Provinces. | | |
| 2.Kankrej | Gujarat, Rann of Kutch, Sindh, Barmer, Jalore (Raj.) | One of **heaviest Indian breed** animals are energetic & vigorous with powerful body. Strong curved horns. Peculiar gait called " Sawai chal" | Silver grey, Iron grey or Black. |
| 3. Rathi | Bikaner, Sriganganager, Hanuman garh | Shows medium sized powerfull cattle. Basically similar to Hariana breed well built & short tail with black switch. | White or light grey. |
| 4. Mewati | Alwar,Bharatpur of east Rajasthan & Mathura dist. of UP. | Long deep & Powerful Frames. The breed shows admixture of Gir, Rath & Nagori. | White with dark head, neck & shoulder |
| | **(C) Draught Purpose Breeds** | | |
| 1. Amritmahal | The home is in Karnataka State | Narrow face, Prominent forehead with deep furrow in middle, long sweeping horns. Small red eyes and ears. | White or grey with darker head, week humps & quarters. |
| 2. Nagori | Jodhpur & Nagore Distt. of Rajasthan | Active & docile, long deep, compact & powerfull body, cotton shaped narrow face, modretely developed horns, bullocks are powerfull trotters & well suited for deep sandy soils. | Generally white or grey. |

| | | | |
|---|---|---|---|
| 3. Khillari | Originates from Sholapur & Satara Distt. of Maharastra. | Long & narrow forehead with gradual backward convex bulging towards horns, distinct groove runs in center of forehead from nasal bridge to middle of | Grayish white. |
| 4. Kangayam | Kangayam division of Coimbatore district in Tamilnadu | Mysore type horns, body moderately long, straight back, short & strong neck | Bull- Grey with dark grey to black<br>Cow- white with black markings just in front of the fetlock. |
| 5.Krishna Valley | Home tract of this breed is the river Krishna & areas of Ghatprabha & Malprabha in Karnataka. | An admixture of Gir, Ongole, & local Mysore type breed. Long & massive body. Head is small with bulging forehead. | Generally grey in colour. |

## CLASSIFICATION OF INDIAN BREEDS OF BUFFALO



| Murrah Group | Gujrat Group | Uttar Pradesh Group | Central India Group | South India Group |
|---|---|---|---|---|
| Murrha | Surti | Bhadwari | Nagpuri | Toda |
| Nili-Ravi | Jaffrabadi | Tarai | Pandharpuri | South Kanara |
| Kundi | Mehsana | | Jerangi | |
| Godavari | | | Kalahandi | |
| | | | Manda | |

| Breed | Origin & Distribution | Distinguishing characters | Body colour |
|---|---|---|---|
| | **(A) Murrah group** | | |
| 1. Murrah | Home of this breed is mainly in Haryana, Punjab and Delhi but animals are bred pure in U.P., Rajasthan & other places. | Massive body, tightly curved horns, short & broad back. Scanty dropping quarters, broad hips, tail reaching upto fetlocks, well developed udder. | Popular colour is jet black with white markings on the tail, face & extremities. |
| 2. Nilli Ravi | Found in the valley of Montgomery & Ferozepur. The best animals are found in the reverine tract along the Sutlej river. | Medium sized, deep frame with an elongated, coarse & heavy head, bulging at the top, depressed between the eyes & ending in a fine muzzle. Horns are small with a high coil, neck is long, thin & fine. | Colour is black but brown is not uncommon. Pink markings are sometimes seen on the udder & brisket white markings are sometimes seen on udder & brisket. |
| **(B) Gujarat group** | | | |
| 1. Surti | Anand, Baroda & Surat (Gujarat) | Medium sized, broad & rounded head between horns. White & treat of hairs over the eyebrows, sickle shaped horns. | Black to Brown. |
| 2.Jaffarabadi | Gir forest of Kathiawar, Jaffarabad, Junagarh, Jamnagar & Kutch (Gujarat) | Large & Massive body, massive head & neck, prominent head, heavy inclined dropping horns on each side of neck turning upward, well developed udder, bulging forehead. | Grey or black. |
| | **(C) Uttar Pradesh group** | | |
| 1. Bhadawari | Bhadawari estate of Agra district & adjoining areas of Gwalior & Etawah. | Medium size & wedge shaped, comparatively small head bulging towards horns legs are short but stout. | Colour is copper with scanty of hair. |

## A. MILCH BREEDS/ MILK BREEDS

### 1. Sahiwal

**Home tract**: Sahiwal (Montgomery) district of Pakistan

**Type:** Milch breed

**Colour:** Reddish brown

**Body:** Symmetrical body and loose skin

**Dewlap:** Large and heavy

**Udder:** Heavy

**Lactation yield:** 1,400 to 2,500 Kg.

### 2. Red Sindhi

**Home tract:** Karachi, Hyderabad district of Pakistan

**Type:** Milch breed

**Colour:** Dark red to fawn yellow

**Body:** Medium sized compact and well proportioned

**Horn:** Short, thick at base

**Dewlap and sheath**: Pendulo

**Lactation yield:** 1,250 to 1,800 Kg.

### 4 GIR

**Home tract:** Gir hills of Gujrat

**Head :** Broad convex forehead

**Eyes:** Partially closed appearance

**Horns:** Curved horns turning back at the tip

**Ears:** Long, pendulous, folded like a leaf, notch at the tip

**Body sheath:** Long and pendulous

**Lactation yield :** 1,200 to 1,800 Kg.

### 4.Tharparkar

**Common name**: Thari , White Sindhi

**Home tract**: Thar desert of Rajasthan

**Type:** Dual purpose

**Colour:** White grey

**Ears:** Long pendulous

**Horns:** Small and stumpy

**Lactation yield:** 1,800 to 2,600 Kg.

## B. DUAL PURPOSE BREEDS

### 1. Ongole

**Synoname :** Nellore
**Home tract:** Ongole taluk in Guntur district in Andhra Pradesh
**Body sheath:** Glossy coat
**Horns:** horns are Short and stumpy, growing outward and backward
**Hump:** Well developed, Dewlap fan Shaped
**Lactation yield :** 1,000 to 1,200 Kg.


### 2. HARIANA

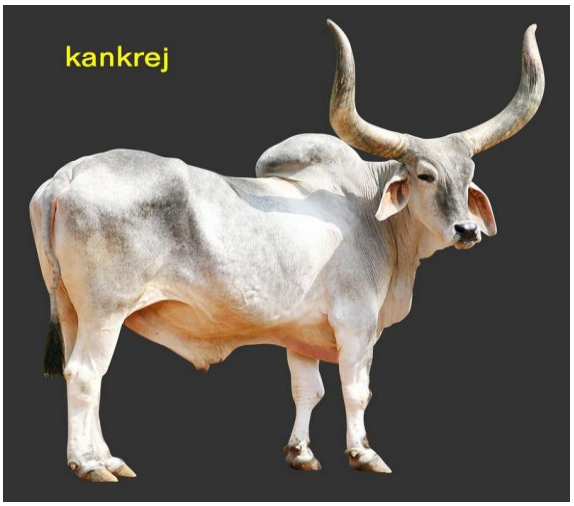
**Home tract:** Rohtak, Hisar, Jind and Gurgaon district of Haryana

**Color:** White or Light grey, In bulls color between fore and hind quarter is relatively dark or dark grey

**Head :** Flat fore head and well marked body prominence at center of poll, face long and narrow

**Horns:** small **Lactation yield :** 600 to 800 Kg

### 3.**KANKREJ**




Heaviest breed of cattle in India

**Home tract**: Gujrat

**Type:** Dual purpose

**Colour:** Silver-grey to iron-grey

**Gait:** "Sawai Chal"

**Horns:** Strong and curved outward and upward in a lyre shaped fashion

**Lactation yield :** Avg. 1,400 Kg.

### 4.DEONI

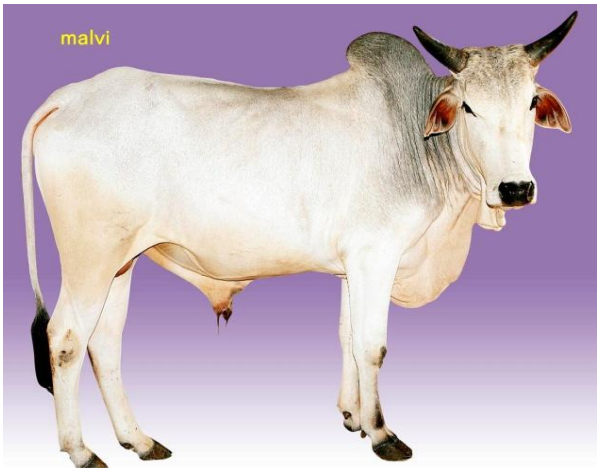

**Home tract:** Gir hills of Gujrat
**Head :** Broad convex forehead
**Eyes:** Partially closed appearance
**Horns:** Curved horns turning back at the tip
**Ears:** Long, pendulous, folded like a leaf, notch at the tip
**Body sheath:** Long and pendulous
**Lactation yield :** 1,200 to 1,800 Kg

### 3. Rathi

**Home tract**: Western part of Rajasthan
**Type:** Dual purpose
**Eyelids:** Brown or black
**Horn:** Short and
**Ears:** Moderate, dewlap is voluminous
**Tail:** Long, switch is black
**Lactation yield:** 1,325 to 2,093 Kg

## C. DRAUGHT BREEDS

### 1. Malvi




**Home tract**: Malwa tract in Madhya Pradesh and Rajasthan

**Colour:** White to light grey, with black markings on neck, shoulders, hump and quarters

**Horn:** massively built. Black, upright and pointed at tips.

**Head:** Small and Dished Face

**Tail:** Small, touching the fetlocks

### 2. Nagori

**Home tract**: Nagur districts of Rajasthan.

**Color:** White, light Grey.

**Horn:** Black, emerging from outer angles.

**Eyes:** White eyelids, heavy and over hanging

**Ears:** Medium size, inside is pinkish.

**Tail:** Small, touching the fetlocks

### 3. Halikar


**Home tract**: Mysore, Mandya, Bangalore, Hassan District of Karnataka

**Colour:** Grey to dark grey with deep shading on fore and hind quarters.

**Horn:** Closely at base from the top of poll, backward long forward bend, tip is black and pointed
**Ears:** Small, Tapering to a point.

**Tail:** Small, Switch is Black

### 4. Amritmahal


**Home tract**: Hassan and Chikmagalur District of Karnataka

**Color:** Grey, white and black

H**ead:** Long and Tapering, Forehead is narrow and Furrow in Middle

**Horn:** Long, emerge from the top of poll, close together backward and upward direction

**Ears:** Small, Horizontal ,

**Tail:** Small, Switch is Black

## EXOTIC DAIRY BREEDS

The European breeds of dairy cattle belong to the species of *Bos Taurus.* They are humpless generally large spread with a fine coat, short ears, without a pendulous, dewlap: They are less heat tolerant and less disease resistant when compared to Indian cattle, but are superior in milk production.Exotic breeds of cattle have been used in India on a fairly extensive scale with a view to improve the milk yielding capacity of the indigenous cows. The important European breeds of dairy cattle are Holstein Friesian and Jersey.

### 1. Holstien Friesian

Largest dairy breed, highest milk yield and lowest fat

**Home tract**: Netherland

**Colour:** Typical marking of black and white

**Udder:** Very large and pendulous

**Lactation yield:** 6,000 to 7,000 Kg.

### 2. JERSEY

Small dairy breed, Compact and angular body

**Origin:** Island of jersey

**Colour:** Reddish fawn

**Udder:** Large and pendulous

**Lactation yield:** 3,000 to 4,000 Kg.

## INDIAN BUFFALO BREEDS:

### 1. Murrah

**Common name**: Black Gold

**Home tract**: Rhotak, Hissar and Jind districts of Haryana State, Punjab and Delhi. Animals are distributed throughout India.

**Colour:** Jet Black colour

**Horns:** Tightly Curved

**Tail:** Long reaching the fetlock, with switch

**Lactation yield:** 1364 kg to 1820 Kg.

### 2. Nili-Ravi

**Common name**: Panch- Kalyani
**Home tract**: Sutleg valley in Ferojpur district of Punjab and Sahiwal district of pakistan
**Colour:** Jet Black colour
**Typical characteristic:** Usually the colour is black with white markings on forehead, face, muzzle, leg and tail. Wall eyes.
**Horns:** Small, tightly curved and circular in cross section
**Lactation yield:** 1500 kg to 1850 Kg.

### 3. Bhadawari


**Origin**: Agra and Etawah District of U.P.
**Typical characteristic:** Medium and Wedge Shaped Body, Hind Quarters are uniform and higher than the forequarter.

**Body colour**: Copper coloured

**Horns:** black, curling Slightly Outward, downward before running backward parallel and close to neck and finally turning upward

**Lactation yield:** 800 to 1000 Kg.

**Fat Percentage:** 6-14 %

This Breed is an efficient converter of coarse feed into butter fat and is known for its high butter fat content

## 4. Jaffarabadi

Heaviest breed of Buffalo

**Origin**: Kutch and Jamnagar District of Gujrat

**Typical characteristic:** Head and Neck are massive

**Body colour:** Black

**Horns:** Heavy, inclined to droop at each side of neck and then turning up at point, but less tightly curved then Murrah

**Lactation yield:** 1000 to 1200 Kg.

## 5. Mehsana

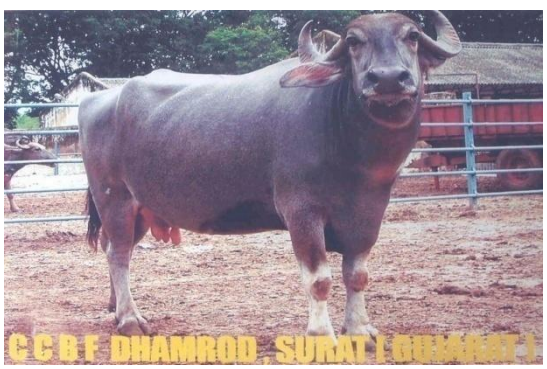
This breed is supposed to evolve out of crossbreeding between Surti and Murrah

**Home Tract**: Mehsana town in Gujrat and adjoining Maharashtra State

**Typical characteristic:** Body is mostly black or black-brown. Head is Longer and Heavier

**Horns:** Usually less curved at end compared to Murrah but are longer and could be irregular shaped

**Lactation yield:** 1200 to 1500 Kg




## 6. Surti

**Origin**: Kaira and Baroda district of Gujrat

**Typical characteristic:** Body is well shaped, Medium sized. The barrel is wedge shaped. Head is Long with

prominent eyes Peculiarity is Two white collors, one round the Jaw and other on Brisket

**Horns:** Sickle Shaped

**Lactation yield:** 900 to 1300 Kg.

**Fat Percentage:** 8-12%

## Sheep Breeds

**Important Indian Sheep Breeds:-**

| Region/Breeds | Place of Origin | Body size/ Type | Remarks |
|---|---|---|---|
| **Temperate Himalayan Region** | | | |
| Gurez | Gurez tehsil of Kashmir | Longest breed of J&K with small ears | ***Longest sheep breed of J&K*** |
| Karnah | Kel tehsil of Kashmir | Large, long face & roman nose | |
| Bhakarwal | Lower hills of Himalayas; reared by Bhakarwal shepherds | Large, ears large-broad drooping | |
| Gaddi (Bhadarwah) | Kister and Bhadarwah tehsil of Jammu; Kangra, Chamba and Mandi in HP, Punjab | Medium, sturdy climbers | ***Used for Kullu shawls and Blankets*** |
| Rampur Bushair | Mahasu and Kinnaur of HP | Medium, Blocky | Used for superior cloth |
| Biangi | HP | | |
| Ladakhi | J&K | | |
| Kashmir Merino | J&K | | |
| **North Western Region** | | | |
| Lohi | Lyallpur and Montgomery of West Pakistan, also in Punjab | Blocky | Better quality mutton |
| Chokla | Jodhpur and Jaipur (Rajasthan) | Medium, compact body | ***Best carpet wool breed of India/Rajasthan merino*** |
| Magra | -do- | Sturdy. Long legs | |
| Nali | Jodhpur and Jaipur (Rajasthan), Haryana & UP | | |
| Marwari/ Bikaner/ Bagri | Marwar of Rajasthan and Haryana | Medium, sturdy. Long legs, blocky | |
| Malpura | Tonk dist (Malpura teshil) | | |

| | | | |
|---|---|---|---|
| | of Rajasthan and adjoining areas | | |
| Sonadi | | | |
| Kutchi | Kutch (Gujarat) | Medium, dual | |
| Katiawari | Kathiawar (Gujarat) | Medium, sturdy. Long legs, blocky | |
| Muzaffarnagri | Muzaffarnagar dist of UP and adjoining areas | | ***Heaviest breed of India with longest tail*** |
| Patanwadi | Gujarat | | |
| Charotri | Gujarat | | |
| Joria | Gujarat | | Superior carpet wool |
| Munjal | Haryana & Punjab | | |
| Pugal | Rajasthan | | |
| Jaisalmeri | Jaisalmer and adjoining areas in Rajasthan | | |
| **Southern Region** | | | |
| Deccani | Southern Maharashtra and neighboring AP | Small, Hardy, Meat type | |
| Nellore | Nellore of AP | Tallest breed of India, good meat | ***Tallest breed of India*** |
| Bellary | Bellary of Karnataka, Karnool of AP | Large, compact, skin of good quality | |
| Mandya | Karnataka | Large, meat type | ***Shortest breed of India*** |
| Bandur | Bandur vill. of Mandya district of Karnataka | Short to medium, compact body | |
| **Eastern Region** | | | |
| Shahabadi | West Bengal, Bihar | | |
| Chhota Nagpuri | -do- | | |

**<u>Important Crossbred Sheep</u>:-**

| Region/Breeds | Place of Origin | Wool Quality |
|---|---|---|
| Hissardale (Merino male x Bikaneri female) | Hisar (Haryana) | Medium fine |
| Bharat Merino (3/4 Russian Merino/Rambouillet x ¼ Chokla/Nali/Malpura/Jaisalmerri) | CSWRI Avikanagar | Fine wool |
| Avivastra (1/2 Russian Merino/Rambouillet x ½ Chokla/Nali/Malpura/Jaisalmeri) | -do- | Fine wool |
| Avikalin (1/2 Rambouillet x ½ | -do- | Carpet wool |

| | | |
|---|---|---|
| Malpura) | | |
| Avimaans ( ½ Dorset/Suffolk x ½ Malpura/Sonadi) | -do- | Mutton Synthetic |
| Indian Karakul | CSWRI, Bikaner | |
| Nilgiri Merino | TN | |
| Kashmir Merino | J&K | |
| Gaddi Synthetic (3/4 Russain Merino/Rambouillet x ¼ Gaddi) | | Fine wool |

**Important Exotic Sheep breeds:-**

| **Quality of wool** | **Region/Breeds** | **Place of Origin** |
|---|---|---|
| Fine wool | Rambouillet | France |
| | Merino | Spain |
| Medium wool | Suffolk | England |
| | Hampshire | England |
| | Shropshire | England |
| | South Down | England |
| | Dorset | England |
| | Cheviot | England |
| | Oxford | England |
| Long wool | Romney marsh | England |
| | Lincoln | England |
| | Leicester | England |
| | Cotswold | England |
| Carpet wool | Scottish Black face | Scotland |
| Fur type | Karakul | Asia & USSR (Erstwhile) |
| Crossbreds | Corriedale | New Zealand |
| | Columbia | USA |
| | Panama | USA |
| | Targhee | USA |

**Imp points related to sheep breeds:-**

(1) Tallest breed of Sheep in India – Nellore

(2) Smallest breed of Sheep in India – Mandya

(3) Breed having skin of highest quality – Mecheri

(4) Best meaty confirmation breed – Mandya

(5) Good quality carper wool – Chokla

(6) Best skin quality breed from Africa – Red Sokoto

**Sheep breeds of Rajasthan:-**

Chokla, Nali, Marwari, Mewati, Magra, Badmei, Medatapatti, Sonadi, Jachi, Bakali, Jaisalmer, Pugal, Malpura

## GOAT BREEDS

### CLASSIFICATION OF INDIAN BREEDS OF GOATS A/C TO REGION

| Temperate region Himalayan rigions breeds | Dry northern region breeds | Central retion breeds | Southern breeds | Eastern breeds |
|---|---|---|---|---|
| 1 Kashmiri | 1. Jamunapari | 1. Marwari | 1. Surti | 1. Ganjam |
| 2 Changthangi | 2. Barbari | 2. Sirohi | 2. Osmanabadi | 2. Assam hill |
| 3 Gaddi | 3. Beetal | 3. Mehsana | 3. Osmanabadi | 3. Black |
| 4 Chegu | | 4. Zalawadi | (Tellichery) | Bengal |
| 5 Pashmina | | 5. Belari | 4. Kannaiodu | |
| | | 6. Kathiwari | 5. Sangamneri | |
| | | 7. Kutchi | | |
| | | 8. Jhakarna | | |

### CLASSIFICATION OF INDIAN BREEDS OF GOATS A/C TO UTILITY

| Production type | Breeds |
|---|---|
| Meat/ Skin | Bengal, Ganjam Kutchi, Malabari, Sirohi, Osmanabadi, Sanganneri, Zalawadi, Gohilwadi, Mehsana & Kannai |
| Milk / Meat | Beetal, Barbari, Jhakrana, Jamunapari & Surti |
| Fiber/ Meat | Gaddi, Marwari, Changthangi, and Chegu |

### BREEDS OF HIMALAYAN REGION: (JAMMU & KASHMIR, H.P., HILLY AREAS OF U.P.)

| **Breed** | **Habitat** | **Characteristics** | **Utility** |
|---|---|---|---|
| **1 Kashmiri or pashmina** | H.P. Kashmir (Lahaul valley) Laddakh | Large sized, height at withers-65-80 cm. male 60 kg female 50 kg, grey or white brown, white silky hair 4 to 5" long beneath fur coat is pashmina | Pashmina yield/goat 25-56 gm/combing max.200 gm/year used for shawl and rugs; small quantity of milk, bred for meat and draft purposes |
| **2 Changthangi** | Laddakh Lahaul Valley | Small, white coloured/brown and grey also, back-levelled, ears-long, pendulous, coarse hair on face | Produce softest fibre (pashmina) 25-50 g/goat /year. |

| | | | |
|---|---|---|---|
| **3 Chegu** | Kashmir Lahaul Sitpi, Yaksar | Medium sized, colour-white greyish red mixture, Horns-upward and backward. Adult weight of male 40 kg and female 26 kg. Kids once a year; one kid per kidding. White gery/red in colour | Pashmina yield 110 g; Good meat and little amount of milk/day |
| **4 Gaddi** | Kangra, Kullu valley; Simla, Sirmur, Chamba in H.P. | Horns pointed at apex, tough skin, long and coarse hair 8 to 10 inches long, firm footed, used for transport, mature weight of male 30 kg and female 20 kg. long lope ears | Used for transport, hair, meat; yield of fleece per clip ½ to 1 kg, milk yield 500 g. per day. |

**BREEDS OF DRY NORTHERN REGION (PUNJAB, HARYANA AND WEST U.P.)**

| Breed | Home | Characters | Utility |
|---|---|---|---|
| **1 Jamunpari** | Between Jamuna & Chambal rivers Chakarnagar (Etawah) | Dual purpose, No standard colour, white with tan markings, 20 to 25 cm long pendulous ears, roman nose, short flat horn, large udder and big teats, long hair on hocks, mature wt. 50 to 60 kg | Dual purpose (Milk & meat) milk 2.5-3 kg/day, fat in milk 4 to 5 percent |
| **2 Barbari** | Agra, Etawah, Mathura, Aligarh etc. | Small sized, wedge shape straight facial line, short erect ears, pendulous udder, white with tan sports; short legs. Full mature weight 35-40 kg. age at 1$^{st}$ kidding 10 months | Milk 0.8 to 1.3 kg/day. Twins per kidding common, economical, suited to stall feeding. |
| **3 Beetal** | Sialkot, Jhelum Gurdaspur, Amritsar (Punjab) | Resembles Jamunpari but small in size, long ears, roman nose, horns horizontally backward spirally twisted, male beared, red or black tan spotted with white. Mature body weight 50 kg in females and 70 kg in males | Milk 1.5 to 2 kg per day, dual purpose (meat and milk), milk yield is 200 kg in 220 days. |

**BREEDS OF CENTRAL INDIA REGION: (RAJASTHAN, M.P., GUJARAT AND NORTH MAHARASHTRA)**

| Breed | Home | Characters | Utility |
|---|---|---|---|
| **1 Marwari** | Marwar area of Rajasthan | Jet black colour, white speckled ears, hairs lustrous-long (10-12 cm), male beared, small ears, long cork crew-horns | ***Triple purpose (meat, milk and hair)***, milk yield 0.9 kg/day, Average height 55 to 60 cm. & mature wt. 25-30 kg. |
| **2 Sirohi** | Gujarat, Rajasthan | Colour-white and brown, body covered with dense coarse short hair | Milk yield 0.9 kg/day. Raised mainly for meat. Mature-wt. 40 to 50 kg |
| **3 Mehasana** | Meshana (Gujarat) | Colour grayish black, white ears with black spots, small beared, medium sized, roman nose, long hair on body | Udder well developed, good milk yield 1.5 to 2 kg/day. |
| **4 Zalawari** | Zalwad of Dathiwar district west Mehsana | Colour pinkish-blue, black; lustrous hair of 15 cm length, large sized straight screw shaped horns. | Good milk yield 1 kg/day, one kidding/year. |
| **5 Berairi** | Nagpur Wardha, Nimar (M.P.) | Dark colour tall breeds. | Poor milk yielder ( 0.6 kg/day) |
| **6 Kutchi** | Kath, Rajasthan | Black colour, medium sized, reddish mark on neck, long hair, screw borns. | Milk yield 1.3 kg/day, raised for meat, milk, hair. |

**BREEDS OF SOUTHERN REGION: (MAHARASHTRA, GUJARAT, A.P., TAMILNADU, KARNATAKA)**

| Breed | Home | Characters | Utility |
|---|---|---|---|
| **1 Surti** | Surat, Nasik (Maharashtra) | Short stature, unable to walk long distance, reared in town-stall fed | 1.2 kg milk yield/day |
| **2 Osmanabadi** | Osmanabad (Maharashtra) | Tall stature, mostly black in colour, with brown or white spots, ears-medium, males are horned, and 50 percent females have horns | Poor milk yielder-mostly raised for meat. |
| **3 Malawari** | Calicut, Cannanore Mallapuram dist. (Kerala) | Medium sized, colour-white to complete black, males are beared, small twisted horns-outward & upward, medium sized, down-ward ears. | Milk yield 0.45 kg per day. Adult wt. 15 to17 kg. |

**BREEDS OF EASTERN REGION (WEST BENGAL, BIHAR, ASSAM & ORISSA)**

| Breed | Home | Characters | Utility |
|---|---|---|---|
| **1 Black Bengal** | West Bengal | Excellent meat, twins, multiples, chest wide, ears upright, short and soft hair, black in colour, Ist kidding at 15 months age, both sex have horns, kids twice a year | Meat of good quality, milk yield 0.4 kg/day. |
| **2 Ganjam** | Puri (Orissa) Coastal A.P., South M.P. | Black/white/grey, males beared, horns parallel curved, backward and downward; compact body small sized, kids twice a year, litter size of 1.8 kids, Matures late at 25 months. | Poor milker 0.4 kg/day, raised for meat, frolific breeder. Adult wt. of male and female is 35 & 28 kg, respectively |
| **3 Assam Hill** | Khasi Nagar, Lushai hills | White grey, short legged, longer body, mature wt. 25-30 kg. poor milker. | Kids twice a year, twins common, poor milker. Useful for meat only |

**EXOTIC BREEDS OF GOAT AND THEIR PERFORMANCE IN TROPICS**

| Breed | Home | Characters | Utility |
|---|---|---|---|
| **Alpine** | France | White to black with white spots, short pointed ears, adult weigh 60-65 kg | 0.9 to 1.3 kg milk/day |
| **Nubian** | Sudan | Black dark brown with white spots, body coloured with short silky hair, developed udder | 0.8 to 1.3 kg milk/day known as ***Jersey of goat*** |
| **Saanen** | Switzerland | Dull white, male horned but female hornless, mature wt. 65-70 kg. straight nose, upright erect ears, large udder | 2-3 kg milk yield per day, known as ***Milk Queen*** |
| **Toggenberg** | Switzerland | Brown with white colour on legs, polled, mature wt. 55 kg | Milk yield 1 kg/day |
| **Angora** | Turkey | Smaller in size and legs are much shorter, it appears like sheep | ***Produce Mohair*** |

**Imp points related to goat breeds:-**

(1) Tallest breed of Goat – Jamunapari

(2) Smallest breed of Goat – Black Bengal

(3) Most prolific breed of Goat – Black Bengal

(4) Best chevon production breed – Black Bengal

(5) Milk purpose breed – Jamunapuri, Barbari, Beetal, Mehsana, Zalawadi, Surti, Malabari

(6) Meat producing breed – Black Bengal, Assam Hill, Ganjam,

(7) Stall fed breed of Goat – Barbari, Sirohi, Surti

(8) Pasmina producing breed – Kashmiri (30-70 gram up to 200gram)
Changthangi (25-50 gram)
Chegu (110 grm)

(9) Mohair producing breed – Angora

(10) Graceful appearance breed – Jamunapari

**Goat breeds of Rajasthan:-**

Sirohi, Marwari, Jhakrana, Barbati, Kutchi & Sanganeri

**Some facts about sheep and goat production:-**

| **Particulars** | **Sheep** | **Goat** |
|---|---|---|
| Time to start with | April-May (Spring season) | February-March |
| Numbers to start with | 40-50 | 40-50 |
| Age at maturity | 7-8 m | 6-7 m |
| Age to breed female | 1-1.5 years | 10-12 months |
| Age to use male | 1-1.5 years | 1years |
| Heat period | 1-3 days | 1-2 days |
| Repetition of estrous cycle | 14-19 days (17 days) | 18-21 days (19 days) |
| Gestation period | 145±5 days | 150±5 days |
| Breeding season | Mar-May (Spring) & Oct-Nov (Autumn) | Mar-May (Spring) & Oct-Nov (Autumn) |
| Productive life of female | 7-8 years | 7-8 years |
| Age at weaning | 2-3 months | 2-3 months |

Question:

Q1. Write classification of cattle breeds.

Q.2. Write classification of buffalo breeds.

# EXERCISE NO. 3

# APPROACHING, HANDLING AND RESTRAINING OF ANIMALS

**Objectives**:

1. To attend the animals in sickness.
2. To making animals docile.
3. To ensure safety both for animal as well as operator.
4. To make use of animals for agricultural operations like ploughing, leveling etc.
5. To estimate the age of an animal.
6. To prepare the animal for judging, show and competition.
7. To perform management practices like dehorning, casting, branding etc.

**Precautions to be taken while approaching the animal:**

1. Be careful while approaching the unknown animal and approach with caution.
2. Avoid exciting of animals.
3. Approach the animal on the left side which is usually referred as "NEAR SIDE" and right side is referred as "OFF SIDE".
4. Approach the animal on the sides especially around the neck region.
5. Do not forget to pat the sides of the animal in order to win its confidence.
6. Do not excite the animal.
7. Try to convince the animal by provision of certain eatables viz.: green grass etc.,
8. Try to get information from the owner about the vices of his/her animal.
9. It is always beneficial to have the owner by the side of his/her animal.
10. It is preferable to restrain the animal before examination with a rope (or) Trevis.

**Cattle and buffaloes:**

- Always approach the cow from left side on which it is generally milked.
- It is always better to speak the animal and pat its back while approaching it.
- Both horns should be secured, then nostril hold with left hand, for examination of head with right hand.
- Always remember that cow can kick from both sides and both ways.
- Avoid any type of crowding.
- Various devices or instruments can be used while handling e.g. Bull holder, Nose ring and bull leader.

## RESTRAINTING

A restraint is to keep the animal under control. Animals are very frequently restrained for various purposes like physical examination, medication, identification, castration etc. Handling of the animals without restraint may be harmful to both the operator and the animals.

**Methods of restraint in cattle**

**A. General restraints:**

**Trevis:** For restraining of animal in a confined space. Trevis is symbol of veterinary hospital.

**Single bamboo method:** In the absence of Trevis the animal can be confined by placing against a wall by means of a long stout bamboo pressing the animal to one side

**Double bamboo method:** When there is no wall, animal may be confined by placing two bamboos on either side of the animal

**B. Head Restraints:**

**Pressing the nasal septum and raising the head:** Use to prevent butting by the animals. One horn clutched in one hand and nasal septum pressed with the first, second and thumb finger of the other hand and then raise the head.

**Bull holder or bull tong:** It is metallic instrument with a locking device to press the nasal septum

**Bull nose ring:** It consist of two semicircular pieces of copper or aluminium hinged together with a locking device and applied to the nasal septum. It has a full control over the animal.

**Bull nose string:** If nose ring is not available a moderate thickness of rope is passed through nasal septum and tied around the neck by the help of the needle. A hole made in nasal septum with the help of nose punch and the string passed through hole and tied behind the horn. If the animal gives trouble we can control it by pulling the nose string.

**Bull leader or bull pole:** It carries a break link which can be opened by pulling a rope on a wooden rod of 3 ft length and 1.5 inches diameter. Apply the instrument to the bull nose ring to lead the bull. It is used to take a bull for exercise. It is made of long pole one end of which is a blunt end at the other end is metallic catch with a clip. A write connects this and runs on the upper side of the pole. The bull can be led properly by putting the hook of the bull leader into the nose ring.

**Bull mask:** This is made of iron sheet or leather and when applied to the animals, it prevents the animals from viewing the object in front of the animal. But at same time it permits a grazing view.

**Muzzle:** It is made of cotton rope, wire or leather. It is used to prevent the animal from eating unwanted things like bedding. They are applied to mouth and fixed behind the horn by means of strap/string

**Mouth Gag:** Mouth Gag are meant for keeping the jaw apart for examination of the mouth, tongue etc or passing stomach tube in cattle.

**C. Neck restraints:**

**Cradle or beads:** It is made up of 10 to 12 long wooden pieces with pointed and round ends of string on two pieces of cord. It is applied to the neck, with pointed end touching the base of the neck. The straps are buckled to retain the cradle in position. It is used to prevent bending the head or neck.

**Side rod/side stick or sword stick:** A wooden rod with holes at both end are strapped to the chest of the animal on one side and other to the head collar.

**Fixing a log or wood to the neck:** A 3 ft log of wood is fixed to the neck by means of a rope. The log is left to trail in between the two forelimbs. This prevents the animal from running.

**Hobbling neck to fore limb:** One end of short rope is fixed around the cannon of one of the fore limbs and the other end of the rope is fixed around the neck of animal. This restraint permits the animal to walk easily and at the same time prevents the animals from running.

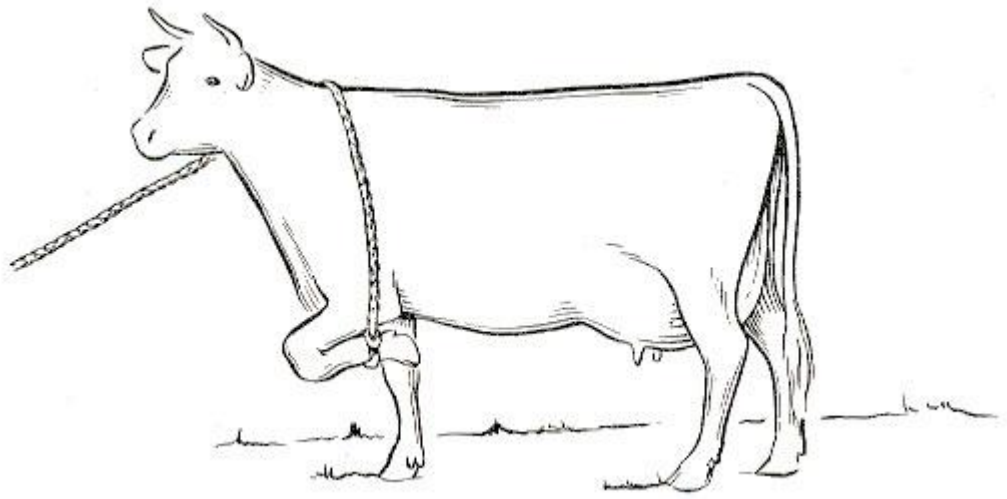
**D. limb restraints:**

**Forelimb restraints:**

**Lifting with hand:** The limb lifted by holding the cannon region with the hand along with the shoulder support.

**Lifting with rope:** Method is used for prolonged examination of the limb. One of the fore limb lifted by fixing a rope at cannon and rope over the back of the animal and pulled it from other side.

**Hind limb restraints:**



**Lifting hind limb with a pole:** 6 ft long pole is passed in front of the hind limb to be lifted and behind the other limb. The pole raised with the help of another man by placing it at the bend of the hock.

**Lifting the hind limb with tail:** Pass the tail over the external part of hock, and raise the limb by lifting the tail

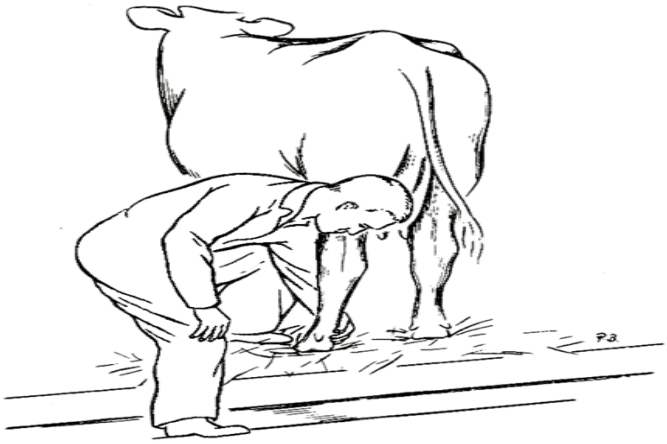
**Milk man's rope:** A rope of 3 ft long and ¼ inch in diameter with a knot at one end is used to apply above the hock covering around the gaskins. The unknotted end is fixed over knotted end and twisted firmly to secure both legs. The tail is also involved in the knot to avoid wagging while milking. It is useful to restrain the animal while milking.

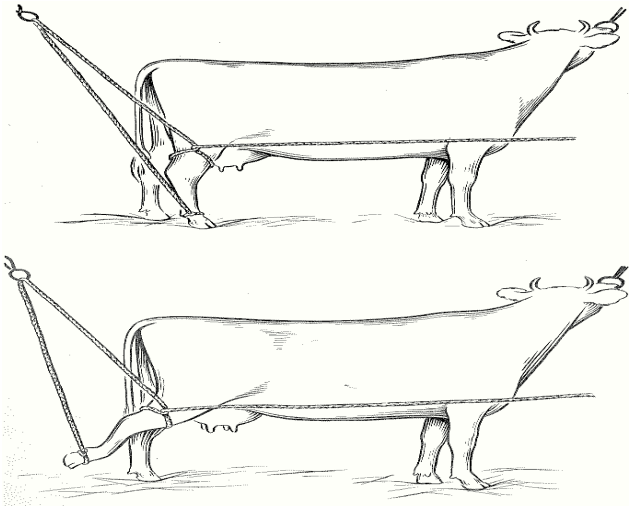
**Cow anti-kicking device:** It is made of two metal planks joined with chain intended to cover tendoachilles to hold the two legs firmly.

**Big rope method:** It is applied to mature bulls for examining the hind quarters and scrotum. Rope over the loins region and cross the two end of the rope under abdomen and draw the two ends backward to enclose the hind limb and tail. The two end of rope are tightly twisted to immobilize the limbs.

**Udder kinch:** Double ended rope secured at back of the animal while passing, it through well up behind the udder and a slip knot made on back of the animal. Pulling the rope to side makes cow to crouch which pushes udder forward.

**Lifting the tail:** Lifting the tail vertically restrains the animals for examining both the hind limbs for short duration.



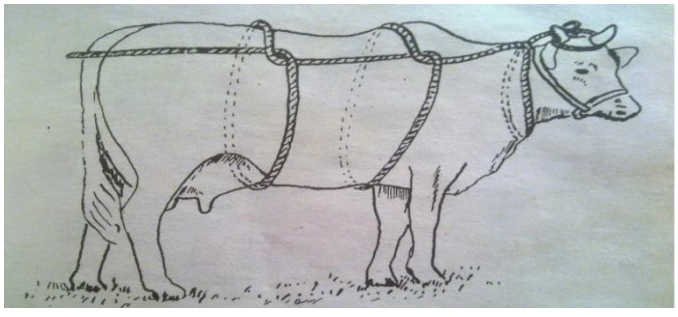


**Casting:** Process of lying down animal on ground. Casting means throwing the animal down on the floor for the purpose of shoeing, castration, branding etc.,

- Reuffs method
- Indian method

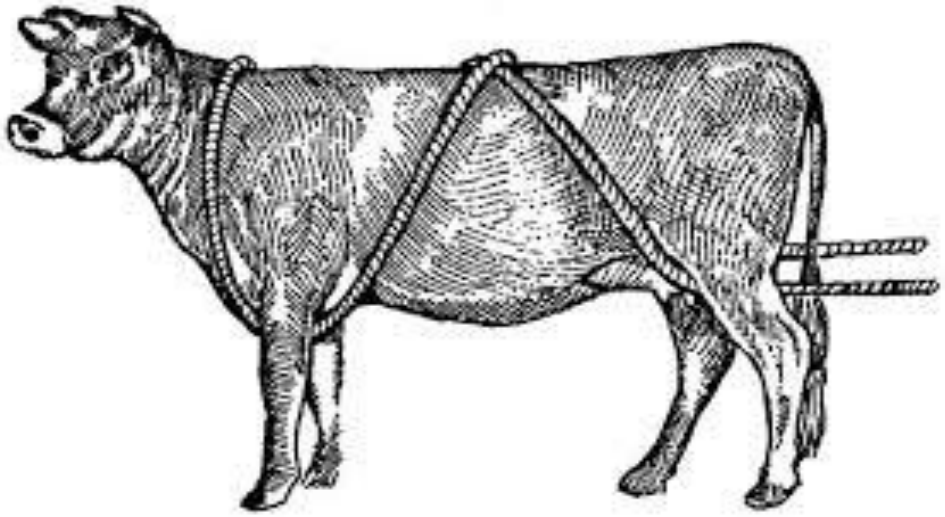
**Reuffs method:**

- A running nose is made at the end of at 30' rope and passed round the base of the horses.
- A half hitch is next made round the neck a second round the chest immediately behind the elbows and a third round the abdomen in front of the udder or scrotum.
- The rope is pulled by two persons.



**Indian or Alternative method:**

- A long rope about 30’ in length is taken and a loop is made.
- Middle of the rope is placed over the neck and the ends passed between the front legs.
- They cross under the brisket, are passed upward and crossed over the back and then downwards past the flanks and between the hind legs.
- Traction on the free ends will then cause the animal to collapse. The ropes must cross under the brisket (Not on the throat), or the animal will not go down.
- One great advantage of the latter method is that, because there are no knots involved, it is easier to remove the rope when you are finished with the animal. With Reuff's method, the rope tends to stay in a better position. This is an advantage when casting wild or excited cattle because the rope can be put on in the crush. The animal is then let out of the crush and the process of casting can begin.



- ❖ Casting is not recommended for pregnant animals because of the possibility of abortion. It can also result in bloat, pneumonia, or displacement of the abomasum.

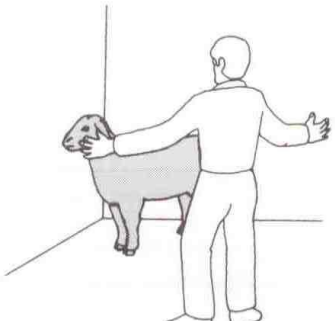
**Sheep and Goat:**

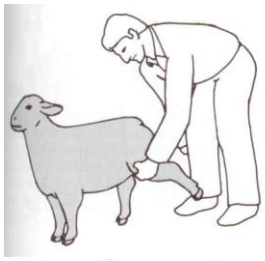
- Sheep and goat are generally not aggressive.
- Excitement and disturbances must be avoided especially in case of sheep.
- When a particular sheep or goat in flock is to be examined, the flock or a part of it should be rounded up to a corner of a pen
- Aanimal should be identified and isolated from flock and seized above hock with right hand and the left hand placed below (underneath) the jaw and around neck.
- Horned animals can held by horn.

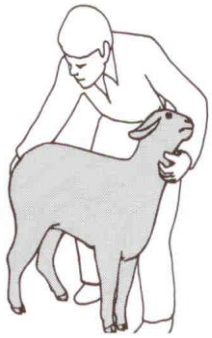
- Sheep are turned by lifting fore legs first and then sheep is suspended off the ground before being lowered. After lowering on the ground rest the sheep against shepherds' knees. Horned sheep are turned by holding the horn instead of fore legs.

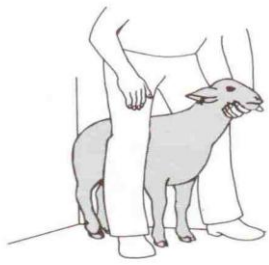
**Approaching and Handling of Sheep and Goat**

- Sheep are held above the hock or placing the left hand underneath the jaw and around the back. Horned sheep can be held by the horns.
- When holding a sheep, stand on its left side and place the left hand under its jaw, the right hand should reach well under the belly.
- To turn up a sheep, the attendant should stand against it left side placing his left hand under its neck.
- Pass your right hand over the right flank as far under the belly as possible and take hold of the wool.
- Raise the sheep's fore legs off the ground with the right hand lift the animal into a sitting position in front of the shepherd legs and supported.
- In horned breeds to avoid injury and to have better control, the horns are held instead of the fore limb









**Questions:**

1. Define Casting ?
2. Enlist various method of Casting ?
3. Describe Reuff's method of casting ?

# EXERCISE NO. 4

## ROUTINE FARM OPERATIONS AT LIVESTOCK FARMS

### (Grooming, dipping, washing, exercise, spraying, clipping and shearing)

**Objectives:**

- Makes hair coat clean, glossy and pliable
- Close inspection for observation of abnormalities on the body
- Stimulate blood circulation in body
- To check parasitic infestation
- To make animal active and physically fit
- To improve breeding efficiency

## GROOMING

Grooming comprises of brushing the hair coat of animals. It is performed for cleanliness and it stimulates the cutaneous blood circulation and removes waste products like skin secretions, loose hair, lice and other skin parasites from hair. Grooming also helps in keeping the skin loose and pliable and brings out the natural oil in hair.

❖ **Procedure:**

- Brush made up of stiff fibers, whisks made of paddy straw or hay or any brush with stiff bristles can be used for grooming the animals
- The brush is kept in left hand for grooming left side of the animals similarly right hand for right side of animals.
- Grooming should start at the neck behind the ears and brushing is carried out in the same direction as the flow of hair. Occasionally, brushing has to be carried out against the flow of hair to remove the dirt sticking to the hair.
- One has to lean hand against the brush standing away from the animals.
- Grooming brushes should not be used on the face of the animals instead, the face can be wiped with a clean cloth

- Cows are regularly groomed before milking to avoid falling of dust in milk. Before milking the brushing of rump, sides of the thigh and buttock should be done. Sheep and goats are not groomed except when taken out for show purposes.

## DIPPING

Dipping is commonly practiced in sheep and occasionally in cattle to eradicate ecto-parasites (Tick, mites and lice). By doing this the animal general health condition will be improved. Dipping in sheep is done at least once in a year. Depending upon the incidence of ectoparasites, the frequency of dipping can be practiced in animals.

**Time for dipping:**

(i.) Before post winter shearing or before post autumn shearing.

(ii.)At the time when incidence of ectoparasites is more or high.

Common chemicals used in dipping

| Chemical | Concentration in dip | Remarks |
|---|---|---|
| Linden dip | 0.031% gamma isomer concentrate | For young stock |
| | 0.05% | For adult stock |
| | 0.5% DDT | To get this concentration mix |
| DDT dips | | 20 kg or 25% DDT wettable |
| | 0.2% total arsenic | powder or 10 kg of 50% DDT wettable powder in 1000 liters. |
| Pyrethrin | | Including 0.13% soluble |
| (Arsenic-sulhide | | arsenic. |
| powder dips) | 0.76% total tar oil | |
| Coal-tar creosote or | | Including 0.36% tar acids. |
| phenol dip Nicotine | 0.1% Nicotine | Or soak 15 kg of tobacco leaves |
| & tobacco dips | | in 500 ml. or water. |

**Methods of dipping:**

(1.) Hand bath methods: Tank size is 1.2 x 1.0 x 0.5 (meters) $^3$ and is for small number of sheep.

(2.) Swim bath method: Tank size measuring 3.0 x 1.5 x 2.0 (meters) $^3$ and is used for large flock.

**Precautions:**

- Down calvers should not be dipped
- Dipping avoided in rainy days
- Animal should not be thirsty to avoid drinking of dip water
- Dipping avoided in sick animals, animals with open wound and young ones

- Breeding male should not be dipped during breeding season
- Manufacturer's instruction must be thoroughly read, while using dipping chemicals.
- Day should neither be too hot, nor too cold.
- Complete the process of preparation of dip solution a night before.
- Make sure to complete dipping before 4 P.M. to give enough time to dry off.
- Remove soiled and dung stained wool on the crutch by hand sheets before dipping.

## Washing of Animals

Except for buffaloes, farm animals are not washed daily. Cattle are washed when they become too dirty. Buffaloes have to be washed daily, more so during summer. The whole hair coat of the animal should be thoroughly wetted first by rubbing with hands or brush against the hair, simultaneously pouring water. For show animals some soft soap should be applied thoroughly rinsed off first with warm water and then with cool water. The coat is dried thoroughly with a towel. Carbolic acid soap should not be used on animals as it causes irritation.

## Exercising of animals

Exercising is to make muscle active and animal physically fit. Minimum exercise is necessary for all animals. It helps in normal body metabolic process and good health. Outdoor exercise exposes animals to sunlight and help in gaining vitamin D. Breeding bull has to be provided loafing area of about 120 sq meters to get sufficient exercise. In larger farms or semen banks the bulls are regularly kept on bull exerciser to avoid obesity. Exercise in pregnant animals facilitates easy parturition. Grazing in sheep and goat provides sufficient exercise.

## Spraying

In this method properly diluted method insecticide are spray on the animal body and animal shed with help of spray pump. Spray care should be taken to spray the on dewlap, medial aspect of the leg, ventral part of abdomen and below the tail. It is useful for large animals because it help the clean dung and dust of animal body. It is also suitable for spraying animal shed and does not spray the sheep goat because not reach up to base due to thick wool and hair coat.

## Clipping

Clipping is done to remove the hair coat of animals. Pigs are generally never clipped except for specific purposes. Cows are rarely clipped except for livestock show purposes, or market or medical reasons. Hair clipping in dairy animals from hind quarters is done to prevent falling of loose hair in milks. In breeding bulls prepucial hair should be clipped (ringing) periodically to improve the semen quality and to avoid infection.

## Shearing

Shearing is removing wool from sheep. Shearing should be done during warm climatic conditions, when sufficient grazing is available. Shearing should not be carried out at a time when the climate is either very hot or cold. Shearing is done with shearing machine. In India traditional sheep farmers use hand shears, a simple pair of scissors and hand clippers.

**Purposes**:

1. To obtain complete wool easily and quickly without any injury to any part of sheep.
2. To minimize discomfort to shearer and sheep as well.

**Methods of shearing**: There are three methods of shearing

1) Hand Shearing
2) Machine Shearing
3) Chemical Shearing

**Time of Shearing** Twice in year

(i) March to April

(ii) Sept to October

1) Hand shearing (Manual method of shearing) - This is also Known as Rooing. It is performed when the size of flock is small i.e. 25 to 30. Shearing is carried out by keeping the sheep 1.5 feet high by clipping stool made of wooden floor. This method is painful hence not used now.
2) Hand shearing (By Clipper): it is carried out by skilled person, it is faster method and wool is sheared out from the base of the body. Fleece is cut more evenly in a smooth easy and economical way.

**Precaution before shearing:**

1) Body surface or wool should be completely dry.
2) Lumps of manure, dirt, vegetable materials on body surface or wool should be cleared.
3) Shearing place should be clean and dry. In large farms special shearing sheds are built.
4) Avoid second cuts in shearing.
5) Always turn the sheep from left to right, so that the shearing is done from right to left.

**Method:**

1) Place the sheep on its rump.
2) Hold the sheep head back with left arm while keeping forelegs in left hand.
3) Take the shaft of wool shears in right hand and open up the fleece first on belly and then on brisket.
4) Shear down the wool of right arm pit and down to right flank .Shear down the wool from udder or scrotum.
5) Keep the left hand on left stifle and shear the wool of left leg.
6) Keeping the hand on left stifle turn the sheep right side and remove the wool on outside of left rear leg from foot, towards thigh.
7) Turn the sheep to lie on right side in such position that back of sheep remains towards shaft of machine and open the fleece on the back along the back bone.
8) Now raise its head with left hand and shear the wool of head and neck.
9) After this remove the wool from right side by standing on left side of the sheep, then by standing in convenient position remove the wool from right foot and towards the tail to obtain complete fleece of sheep collect the entire fleece and tie it with cotton rope.
10) Weigh the fleece and record.

3. **Machine Shearing**: - Electrically operated machine is used to remove the wool.
4. **Chemical shearing**:-

   - Chemicals are used to remove wool chemically are 24 mg of Cyclohosphamide (CPA) per Kg live weight. Molting take place after 12 days.
   - 10 -14 mg of Thallium -- Molting take place after 11-16 days.
   - Painting of sodium sulphide and time on the under-Neath surface of skin.

## IDENTIFICATION OF SICK ANIMALS

To make the sheep and goat more profitable, It is better to have prevention against the ailments and disease than treating them. Hence, Animals must be vaccinated and dewormed from time to time. It is also essential that shepherd / owner must be aware about signs of good health.

**Sign of Healthy and sick Animal**

| Parameters for observation | Healthy Animal | Sick Animal |
|---|---|---|
| **Physical appearance** | | |
| o Look | Active and Alert | Dull, Inactive |
| o Head | Raised | Downward |
| o Eyes | Wide open, Bright | Dull, White Deposition in corners |
| o Nose | No discharge | Slimy Discharge |
| o Movement | Active | Sluggish |
| o Response | Quick | Slow |
| o Consistency of Dung | Normal | Abnormal (Hard/ Loose, mucus, blood etc. |
| o Udder | Normal | May be Swelled |
| **Physiological appearance** | | |
| 1. Pulse/min. | Normal | Not Normal |
| 2. Body Temperature | Regular | Irregular |
| 3. Respiration/min. | Normal | Reduced |
| **Feeding Behavior** | | |
| 1. Grazing | Normal | Not Normal |
| 2. Rumination | Regular | Irregular |
| **3.** Feed and Water Intake | Normal | Reduced |

**Questions:**

1. Write down about the Shearing ?
2. Precaution taken during Dipping ?

# EXERCISE NO. 5

# METHODS OF DETERMINATION OF BODY WEIGHT

**Objectives:** The weight of the animal is essential for the following purposes

- To find out whether the animal maintains normal health or not.
- To study the weight gain during experiments.
- For computing rations.
- For calculating the correct dosage of medicine

Weight can be measured by Two methods:

1. Direct Method
2. Indirect Method

1. **Direct Method:** Usually adult animal are weighed once in a month.

   A. Weighing bridge: The animal is made to stand on the platform of the weighing bridge and it records the weight in pounds (lb) or kilogram (kg).
   B. Spring balance: Sheep and goat may be weighed by using the spring balance.
   C. Platform balance: Small ruminants and pigs can be weighed by using the platform balance.
   D. Table balance: It can be made use of to record the weight of poultry and the rabbits.

2. **Indirect Method:**

    a. By using formula
    b. By Weight band

**A. By using formula:**

**Shaffer's formula**

- This is the most common formula used for cattle and buffaloes. This formula tends to under-estimate weight of very young and very heavy animals.

$$W = \frac{LG^2}{300}$$

- In this formula the weight of the animal is expressed in pounds.

Where, L is Length of the animal from point of shoulder to point of buttocks in inches.

G is the chest girth of the animal in inches.

**Minnesota formula**

$$W = \frac{LG^2}{600}$$

- In this formula the weight of animal is expressed in kilograms.

Where,

- L is the length of the animal from point of shoulder to point of buttocks in inches.
- G is the chest girth of the animal in inches.

**Agarwal's modified shaffer's formula**

- Formula for Indian cattle is as follows

$$\text{Live weight in seers} = \frac{(\text{Girth}) \times (\text{Length})}{Y}$$

Where,

- Y is equal to 9.0 if girth is less than 65 inches
- Y is equal to 8.5 if girth is between 65 – 80 inches
- Y is equal to 8.0 if girth is over 80 inches.
- (One seer is equal to 0.93 kg)

**Mullick's formula for Buffaloes**

- X = 25.156 (Y) - 360.232
- X = Estimate of body weight in pounds
- Y – Heart girth in inches

**Formula of Bandari and team**

- For dry and non-pregnant buffaloes
    - Body weight in lbs = -2123.73 + 26.356 (Girth in inches) + 21.50 (Length in inches)
- For dry pregnant buffaloes
    - Body weight in lbs = -1934.48 + 20.52 (Girth in inches) + 25.90
    - (Length in inches)
- For Lactating buffaloes
    - Body weight in lbs = -2387.60 + 27.12 (Girth in inches) + 24.55
    - (Length in inches)

**Formula for Hariana cattle**

- Body weight in kgs = (Girth in cm) 3.3 + (Posterior girth inch)
- + 0.7 (Length in cm) – 490

B. By Weight Band:

- ❖ This is meant for cattle and pig. It is a printed tape having weights in pounds along its border.
- ❖ It is put around the chest and the weight is read directly from the tape.
- ❖ There are 3 different weights that could be recorded by this band

For lean animal

a. For normal animal and
b. For Very fat anima

**Questions:**

1. Calculate Cattle body weight having chest girth 63 inch and body length 57 inch using Agarwal's modified shaffer's formula ?

# EXERCISE NO. 6

# ROUTINE FARM OPERATIONS

**Objectives:**

1. Increasing the efficiency of managemental process on farm
2. Advance planning of activities
3. Increasing the overall production status of farm and returns from the farm
4. For efficient utilization of human and other resources of farm.

**Procedure:**

Routine farm operations include daily schedule on farm as well as other general activities that are performed time to time.

1. Identification of animals
2. Exercising animals
3. Grooming of animals
4. Washing of animals
5. Disbudding of animals
6. Castration’
7. Weighing
8. Removal of extra teats
9. Milking
10. Feeding
11. Routine health examination
12. Deworming at timely intervals
13. Vaccination
14. Record keeping
15. Routine monthly examination of sub clinical mastitis.

- **ROUTINE DAIRY FARM OPERATION**

| TIME (hours) | SI.NO | ROUTINE CATTLE AND BUFFALO FARM OPERATION |
|---|---|---|
| 03.00 - 03.30 | 1. | Cleaning/brushing of milch animals |
| 03.30 - 05.00 | 1. | Feeding half of the daily concentrate ration just before milking |
| | 2. | Milking cows |
| 05.00 - 05.30 | 1. | Delivery of raw milk (in cans) to milk pick up van of dairy plants and receiving previous day's empty cans |
| | 2. | Washing and disinfection of milking barns |
| 05.30 - 08.00 | 1. | Cleaning of milk cow sheds |
| | 2. | Feeding of dry/green fodder to milch stock |
| | 3. | Cleaning of farm premises |
| | 4. | Isolation of sick animals |
| | 5. | Isolation of "in-heat" cows for artificial insemination |
| | | Note: use milk man at the rate of one for every 12-14 cows, for all the above operations. Milk man go off duty by 8 am and farm labour come on duty |
| 08.00 - 12.00 | 1. | Cleaning calf, maternity, dry stock, bullock and bull sheds |
| | 2. | Feeding half of the daily concentrate ration to calves, pregnant cows and bulls |
| | 3. | Exercising and grooming of bulls |
| | 4. | Treating sick animals. |
| | 5. | Breeding cows that are " in-heat" |
| | 6. | Harvesting, chaffing and feeding of green fodder to all the stock. Manger in all sheds should be filled with green fodder |
| | | Note: animals should be taken for grazing (if practiced) between 9 a.m and 2 p.m. in winter and between 6 a.m and 10 a.m. and again between 5 p.m. and 7 p.m. in summer |

| | | |
|---|---|---|
| 12.00 - 13.00 | 1. | Lunch cum rest period for labourers |
| 13.00 - 15.00 | 1. | Miscellaneous jobs of dairy farm like stock identification, periodical vaccination, preparation of concentrate mixture, repair of farm fences, fitting and repair of equipments, rope and halter making, weekly scrubbing and white washing of drinking water tank, manure disposal/conservation, hay and silage making, periodical spraying of animal houses with suitable pesticides, periodical deworming of stock, clipping of hair from sides and hind quarters of cows; grooming, toe trimming, dehorning of calves, attending to sale and purchase of livestock and their transportation, fitting and training of cows for show |
| | | Note: the dairy manager should planed the jobs well in advance in such a way that they are evenly distributed over the week. Some jobs may require longer time and the labour have to work extra time on such occasions**.** |
| | | Milkers come duty by 14.30 hours and remain up to 1730 hours whereas general farm labour go off duty by 1700 hours**.** |
| 14.30 - 15.00 | 1. | Washing/brushing of milch cows by milkers |
| 15.00 - 16.30 | 1. | Feeding the other half of daily concentrate ration to milch cows just before milking |
| | 2. | Milking |
| | 3. | Cleaning calf, maternity, dry stock and bull sheds and feeding the other half of concentrate ration to calves, pregnant cows and bulls |
| 16.30 - 17.00 | 1. | Delivery of milk (in cans) to milk pick-up vans of milk plants and collection of morning's empty cans |
| | 2. | Washing and disinfection of milking barns |
| | 3. | Feeding dry and green fodder to calves, dry stock and bulls |
| 17.00 - | 1. | Cleaning of milk cow shed |

| | | |
|---|---|---|
| 18.30 | 2. | Feeding green / dry fodder to milch stock |
| | 3. | Cleaning of farm premises |
| 18.30 - 03.30 am | | Night watchman on duty |

**DAILY ROUTINE**

| Approximate time(hours) | Routine sheep and goat Farm operations |
|---|---|
| 7.00 AM | 1. Counting the animals, check the sick animals for treatment if any.<br>2. Send the animals for grazing.<br>3. During breeding season the rams should be allowed along with the ewes for grazing.<br>4. Nursing mothers should be retained inside the pen with lambs. |
| 8.00 AM | 1. Feeding half of the daily concentrate ration to nursing ewes, fattening or market lambs.<br>2. Arrangement should be made for watering sheep on grazing lands. |
| 8.30AM | 1. Feed chopped green or dry fodder to penned sheep.<br>2. Cleaning of all the sheds and disposal/conservation of manure. |
| 9AM to 3PM | Special jobs namely shearing, vaccination, dehorning, identification of lambs, daily recording of data, buying and selling of animals. Initial grading and baling of wool, marketing wool, training of sheep for show. |

| | |
|---|---|
| **Note:** The farm manager should plan various jobs in advance and as per the season and the market demand. Extra labour should be employed during dipping and shearing days. | |
| 4PM | 1. Returning the sheep from grazing, counting and penning.<br>2. Check the animals for the grazing efficiency on to the flank region and alertness.<br>3. Many decisions have to be taken for the animals which are not showing the signs of active grazing.<br>4. Feeding the remaining half of the concentrate ration to nursing ewes and market lambs.<br>5. Feeding dry fodder and chopped green fodder to all animals. |
| **Note:** In goat farms the milch goats should be milked once in the morning and once in the evening at convenient times. | |

**Questions:**

1. What are the procedure adopted in routine farm operation ?

# EXERCISE NO. 7

# MILKING METHODS

**Objectives:**

1. Hygienic milk production.
2. Obtaining high quality milk and its product.
3. Optimization of milk production.
4. Prevention of milk born diseases.
5. Maintenance of udder health status of farm.
6. Minimizing economic losses due to mastitis.

**Material required**:

1. Healthy animal.
2. Cleansing and sanitizing agents.
3. Clean water supply.
4. Grooming equipments.
5. Clean milking pails and utensils.
6. Strip cup.
7. Milk strainer and muslin clothes.
8. Ropes for restraining legs.

**Milking:**

Process of removal of milk from the udder is known as milking. Removal of milk is achieved when external forces such as suckling or milking, open the teat duct at the teat end. Even so, at least 10% of secreted milk will be retained in the udder as residual milk.

**SYSTEMS OF MILKING**

**A. Hand milking.**

**B. Machine milking**

## A. Hand milking

**1. Full hand:** milking is performed using the palm and the all the fingers encircling the teats. Pressure is applied at the teat end (teat meatus) and milk is drained. Process is repeated by applying alternate pressure and relaxation. Hand milking is dependent on increased Pressure within the teat to overcome the resistance of the tent sphincter. This is NOT the way milk is removed by nursing calves or milking machines. Full hand method is safe and does not cause any injury to the teats.

**2. Stripping:** This method is applied when the teats are small. Milk is drained out stretching teats on its entire length using the fore finger and thumb. This method is bit painful and milking and slower than full hand method. Stripping is generally followed after full hand milking, milk animal completely.

## B. Machine Milking

1. **Bucket machine milking:**

Bucket milking machines were the first major development in the mechanization of milking systems and were designed particularly for herds kept in cowsheds. Each portable unit, consisting of a 15-litre capacity lidded bucket, Pulsator and teat-cup assembly or cluster, requires manual attachment to a vacuum supply when it is moved from cow to cow during milking. This requires more time than direct to can or pipe line system of milking and consumes more labor.

**2. Direct-to-can milking**:

Milk is drawn direct from the udders to the milk cans via a specially designed lid, which connects the milk can to the vacuum supply. Manual lifting, carrying and tipping of milk is eliminated with a consequent improvement in milking efficiency and performance. Therefore, each operator is able to manage a 4 unit, 8 stalls or a 5 unit, 10 stalls abreast milking parlour effectively. When full, the milk can is replaced with an empty one and milk. Cooling may begin: Cooling milk produced with the direct-to-can system is (lone simply by inserting an in-can cooler into the cans of milk and connecting it either to a clean, cold water supply or to a chilled water unit.

**3. Pipeline milking**:- It is a high investment, low labor cost system, originally installed in cowsheds and milking barns but particularly suited to large and medium sized herds milked in parlors with bulk milk collection. Milk is transported direct from udder to refrigerated bulk milk tank for cooling and storage.

**Questions:**

1. Enlist method of milking and describe Hand milking in detail ?

# EXERCISE NO. 8

# TRAINING OF BREEDING MALES

**Objectives:**

- Easy to handle at the time of breeding
- For proving a sire
- For maximum use of germplasm from proven sire

Bulls develop desire to mount over other animals is natural. If a bull calf is reared in complete confinement then it is necessary to frequently bring in teaser / dummy / female in close proximity with the bull. So that it learns the art of mounting

**Training for semen collection for A.I.:** During semen collection natural instinct of bulls has to be harvested for ejaculation into artificial vagina.

**Procedure:**

- Bulls must wear nose ring 2-3 month before giving training to bull
- The place of training should be free from insect and flies at the time of training therefore training recommended in morning hours 6-7 A.M in summer and 7-8 A.M. in winter
- Dummy should be familiar with the site of semen collection, it must brought regularly to the site of semen collection
- Change in dummy may result in more reaction time and possibly less semen ejaculation.
- For proper training of bulls, it is advised that breeding chute be used for dummy
- Developing sex desire in young bulls. For this, two methods are used:

  (a)Some kind of sound familiar to bull may be used by the attendant to instigate/activate the sex desire.

  (b)If the reaction time is more, bull may be temporarily withdrawn and brought back in 10 minutes for mounting. Attendant should handle the bull gently. He should be familiar to young bulls, who had been handling regularly. He must be active but stand a little far, near the hind quarters of bull at collection

**Precautions:**

- ✓ Bull should not be frightened by any means.
- ✓ Artificial vagina (A.V.) should be fitted properly, kept clean and sterile.
- ✓ Temperature should not be more than $41^{o}$C inside A.V. and for this hot water of $42\text{-}45^{o}$C may be used for filling jacket. There should be optimum pressure( pressure match with natural vagina 45-55 mm of Hg) for effective stimulation and subsequent ejaculation.

- ✓ Position of A.V. at collection time should be at $45^{o}$ angle.

✓ Mounting on single animal should be practiced and other should be tied nearby.

**Questions:**

1. What kind of precaution taken by you during collection of semen ?

# EXERCISE NO. 9

# HEAT DETECTION

**Service period:**

From calving to successful conception. This period is expected to last between 45 and 90days. During this period, the cow is expected to come and heat and be bred. The main management practices are therefore heat detection and successful mating (natural or artificial).

**Heat detection:**

This is an extremely important exercise as a missed heat translates into a wasted 21 days while efficient heat detection makes it possible to serve the animal at the right time. The average heat interval is 21 days with a range of 18 to 24 days. Duration of heat is 24 to 36 hours in exotic and crossbred cows.

Numerous studies indicate poor oestrus (heat) detection is the most common cause of prolonged inter-calving intervals in dairy cattle so herd managers must insure that animal attendants responsible for this, are competent. An oestrus detection efficiency of 75 % would represent outstanding performance, a standard achieved in very few herds. Even 60 % efficiency would be somewhat above average with perhaps a 45 % detection rate representing about the average for commercial dairy farms.

Several methods are used to detect heat. The most commonly used by farmers are behavioural signs and physical changes.

1. **Visual observation and Behavioral sign:**

a) Increased nervousness/restlessness
b) Mounting other cows
c) Swollen vulva
d) Licking other cows
e) Sniffing other cows and being sniffed
f) Reduced feed intake
g) Standing to be mounted
h) Clear mucus discharge
i) Sharp decline in milk production
j) Tail bent away from the vulva
k) The animal may stop eating
l) Dried mucus on the tail

m) Roughened tail head
n) The animal refuses to be mounted
o) Streaks of saliva or signs of leaking on her flanks

**2. Aids to oestrus detection:**

**I. Vasectomised or teaser bulls -** These are surgically prepared bulls which are intact but will not impregnate the cow (teaser bulls have their penis deviated such that they will mount but cannot deposit semen in the cow). Animal with nutritional deficiencies (eg Calcium and Phosphorous mainly during the dry season) may exhibit silent heat (no behavioural signs), which can be detected by vasectomised bulls.

**II. Records** – can be used to predict date of expected heat.

**III. Pressure sensitive** (commercially available) mount detectors. They are glued to the rump (back) of the cow suspected to be on heat and are activated by pressure of mounting of the cow by others.

**IV. Detection of ovarian changes:** Use commercial kits to detect fall in progesterone levels in milk.

**V. Other Methods:** It include Rectal palpation, Level of hormone in urine, milk and blood, use of sniffer dogs, pedometer, chin ball marker, C.C.T.V. and Video recording and Microscopic examination of cervical discharge.

**Questions:**

1. Enumerate the various sign (Visual Observation) of Heat detection ?

# EXERCISE NO. 10

# CARE AND MANAGEMENT OF DAIRY ANIMAL

## CARE AND MANAGEMENT OF CALF

The feeding and care of the calf begins before its birth the dam should be dried 6-8 weeks before expected calving and should be fed well. Underfed animals will give weak and small calves.

### A. Early Management:

1. Immediately after birth remove any mucous or phlegm from those nose and mouth.
2. Normally the cow licks the calf immediately the birth. This helps' dry off the calf and helps in stimulating breathing and circulation. When the cows do not lick or in cold climate, rub and dry the calf with a dry cloth or gunny bag. Provide artificial respiration by compression and relaxing the chest with hands
3. The Naval should be tied about 2-5 cm away from the body and cut 1cm below the ligature and apply Tr. Iodine or boric acid or any antibiotic.
4. Remove the wet bedding from the pen and keep the stall very clean and dry in condition.
5. The weight of the calf should be recorded.
6. Wash the cow's udder and teats preferably with chlorine solution and dry. Allow the calf to suckle the first milk of the mother i.e. Colostrum.
7. The calf will be standing and attempts to nurse within one hour. Otherwise help too weak calves.

### B. Feeding of Calves :

1. Feed colostrum i.e. the first milk of the cow for the first 3 days. The colostrum is thick and viscous. It contains higher proportions of Vit A and proteins. The proteins are immune globulin which gives protection against many diseases. Colostrums contain antitrypsin which avoid digestion of immunoglobulins in the stomach and is absorbed as it is.
2. Whole milk should be given after 3 days it is better to teach to, drink the milk from the pail or bucket. Feed twice a day which should be warmed to body temperature. For weak calves feed thrice a day.
3. The limit of liquid milk feeding is 10 % of its body weight with a maximum of 5-6 liters per day and continues liquid milk feeding for 6-10 weeks. Over feeding causes 'Calf Scours'.
4. The milk replaces can be given to replace whole milk.
5. Give calf starter after one month of age.
6. Provide good quality green fodder and hay from $4^{th}$ month afterwards.

7. Feeding of antibiotics to calves improves appetite, increases growth rate and prevents calf scours. E.g. auromycin, Terramycin etc.

## OTHER MANAGEMENT PRACTICES.

1. Identity the calf by tattooing in the ear at birth, and branding after one year.
2. Dehorn the calf within 7-10 days after birth with red hot Iron or caustic potash stick or electrical method.
3. Deworm the calf regularly to remove worms using deworming drugs. Deworm at 30 days interval.
4. Fresh water should be given from 2-4 week onwards.
5. House the calves in individual calf pens for 3 months afterwards in groups.After six months males and females calves should be housed separately.
6. Weigh the calves at weekly interval upto 6 months arid at monthly interval afterwards to know the growth rate.54Dairy Animal Management
7. Mortality in calves is more in first month due to pneumonia. Diarrhea (calf scours) and worms. House them under warm condition, clean condition to avoid above condition.
8. Extra teats beyond 4 should be removed at 1-2 months of age.
9. 8-9 weeks of age, males should be castrated.
10. Keep the body clean and dry to avoid fungal infection.
11. Mineral-blocks should be provided, so that the calves lick and no changes for mineral deficiency.
12. Wean the calf from the mother and feed through pail feeding system.

## CARE AND MANAGEMENT OF HEIFER

Better Care and Management of heifer will give high quality replacement stock to the dairy farm. The following care and Management practices are recommended for a heifer.

1. Feed the heifer sufficiently to produce normal growth. During the early stage relatively more protein than energy is needed. Most heifers grow well if excellent hay is given as much they can eat. The amount of growth depends upon the quality of forage fed.
2. The heifers should be provided with a dry shelter free from drafts. A loose housing system with a shelter open to one side is sufficient.
3. The size rather than the age of a dairy heifer at breeding time is important. Breeding under sized animals is never profitable. They may be stunted or slow to reach maximum size. Small heifers are more likely to have difficulty in calving. Though the heifer that is bred to calve at an older age yields higher milk yield in the first lactation, the total milk produced by such a cow will be less when compared to the heifers that freshens at an early age. Usually the heifer is bred to freshen at 24-30 months of age.

4. The heifer should be growing and in good flesh at calving time. This is necessary so that she can produce milk at the most profitable level.
5. Place the heifer in a separate shed about 6-8 weeks before she is due to calve.
6. Feed 2 - 3 kgs of concentrate daily and all the forage she eats.
7. Before calving let the heifer becomes accustomed to handling and to the procedures used in the milking herd. Always handle her gently and with kindness.
8. Maintenance of health among heifers is very important for proper growth. The health among the heifers is maintained by hygienic housing, water balanced feeding and taking necessary preventive steps against common diseases.
9. Periodically the heifers in the herd should be checked for their proper growth and other progress. Animals lagging behind below the required standards should be removed from the herd.
10. For the heifer the calving is first time and it may have difficulty in calving. So take extra care during calving.

## CARE AND MANAGEMENT OF MILCH ANIMAL

To get high milk during any lactation, the milch animal should be properly fed and necessary care and managemental practices should be followed.

1. Provide green succulent forage together with leguminous hay or straw to the extent of animal can consume, so that all its maintenance requirements are met with through forage only. Extra concentrate at the rate of 1 kg for every 2 to 2.5 liters of milk should be provided. Salt and mineral supplements should be given to maintain the lactation.
2. Never frighten or excite the animals. Always treat them gently and with kindness.
3. With proper feeding and care, a cow will come to heat within 16 days of calving. Do not with hold service unnecessarily after the signs of heat are noticed in a cow. The shorter the interval between calving, the more efficient the animal is as a milk producer. By maintaining proper records of breeding and calving of the animals will ensure a study flow of milk throughout the year.
4. Individual attention to feed each animal according to its production is a must. For this purpose maintain individual production records.
5. Keep up regularity of feeding. Concentrate mix is fed before or during milking, when as roughages after milking. This practice will avoid dust in the shed.
6. Water should be provided to drink at will or at frequent intervals. It is more beneficial, if the animal is maintained on paddy straw as sole rough age.
7. Regularity in milking is essential. Increase of milk in the udder will reduce further secretion of milk. Milking thrice is better than twice since 10 - 15 % more milk can be produced.
8. Rapid, continuous, dry hand milking should be practiced without undue jerking of teats. Milking should be done with whole hand, but not with thumb and index finger.

9. Cows should be trained to let down milk without calf suckling. This will hold to wean the calves early.
10. Loose housing with shelter during hot part of the day should be provided. The animals will get maximum exercise in loose housing system.
11. Grooming of the cows and washing of the buffaloes before milking help in clean milk production. Daily brushing will remove loose hair an dirt from the coat. Grooming will also keep the animal hide pliable.
12. Wallowing of buffaloes or water spraying on their bodies will keeI6 the buffaloes comfortable especially in summer.
13. Common ailments should be properly detected and treated.
14. Common vices should be properly detected and care should be taken. eg. Kicking, licking, suckling etc.
15. Provide at least 60 - 90 days dry period between calving. If the dry period is not sufficient, the milk yield is subsequent lactation will be reduced.
16. Vaccinate the cows- against important diseases and also guard against insects and pests.
17. Every animal should be numbered and particulars pertaining to milk, fat %, feed taken, breeding, drying and calving dates should be recorded.
18. Check for mastitis regularly.

## CARE AND MANAGEMENT OF DRY AND PREGNANT ANIMAL

The good care and managemental practices given to pregnant animal will give good calf and also high milk yield during the successive lactation.

1. Extra concentrate mix of 1.25 to 1.75 kgs should be provided for pregnant animal as pregnancy allowance. Feed good quality of leguminous fodder. The animal should not be not - lean - not fat' condition.
2. Provide clean drinking water and protection from thermal stress.
3. Do not allow them to mix with other animals that have aborted or that are suffering from or carriers of diseases like brucellosis.
4. Allow moderate exercise, which helps in calving normally. Do not tire them by making long distances especially on uneven surfaces.
5. Do not allow them to fight with other animals and take care that they are not chased by dogs and other animals.
6. Avoid slippery conditions, which causes the animal to fall receiving fractures, dislocation etc.
7. If accurate breeding records are available, calculate the expected date of calving. Separate it one or 2 weeks before and shifted to individual parturition pens. These pens are thoroughly cleaned and fresh bedding may be provided.

8. Feed one kg extra concentrates during last 8 weeks of gestation. Feed laxative about 3 - 5 days before and after calving (Wheat bran 3 kg + 0.5 kg of Groundnut cake + 100 gm of mineral mixture of salt).
9. Symptoms of delivery may be observed i.e. swelling of external genitalia, swelling of udder; usually majority of animals will deliver without any help. If there is any difficulty, provide veterinary help.
10. After parturition external genitalia, flank should be cleaned arid protect the animal from chill and give warm wafer.
11. Placenta will normally leave the cow within 2 - 4 hours after calving. If not, take the help of a veterinarian.
12. Take care of the animal before calving from milk fever. Give calcium supplement.
13. Sometimes the udder will be swollen just before calving. Remove the milk partially.
14. Take care, of the animal, if at all any abortion.
15. Provide always free access to drinking water.

## CARE AND MANAGENT OF BULL

The maintenance of breeding bulls in good condition and suitable for breeding is highly essential requirement for the success of breeding programmes. A rising condition is better for reproduction than a falling one. Fat males may produce semen of inferior quality or they may be slow or fail at service. Breeding bull should receive plenty of exercise; will usually produce large ejaculation containing more sperms of higher activity.

A breeding bull should house separately known as “Bull Shed” with sufficient area of floor and proper covering. It is sound practice to provide cool conditions and adequate drinking water. Balanced rations should be fed containing adequate energy, proteins, minerals, and vitamins. Green fodder must be available both before and during breeding season. Most of the bulls are ferocious and so control them properly using nose rings etc. It is of great importance that males should be, fed regularly and not too much at one time, and too little at another. For bulls two mating a day has been found to be openings.

Moderate exercise should be provided to keep the breeding bull in active and non fatty conditions. Regular grooming of the breeding bull is practiced. In buffalo bulls regular shaving may be practiced.

## CARE AND MANAGEMENT OF BULLOCK

Bullocks are normally used for agricultural operations and or transport purpose. Some bullocks are ferocidus and so control them properly with nose rope or nose rings. The hooves of the bullocks should be provided with metal shoes to protect the hooves from wear and tear.

The working hours for bullocks are recommended as follows:

A. Normal Work - 6 hours of carting or 4 hours of ploughing.
B. Heavy Work - 8 hours of carting or 6 hours of ploughing.

Sufficient roughages and 1-2 kg of concentrates may be provided for feeding of bullocks during break period in works, the animal may be left for free grazing.

The bullocks are housed in separate sheds with sufficient space and protection from hot and cool conditions. Free access to drinking water is essential. Regular grooming of animals should be practiced.

**Questions:**

1. Care and Management of dry and Pregnant animal describe in detail ?
2. What do you understand about care and management of heifer ?

# EXCERCISE NO. 11

# ECONOMICS OF DAIRY, SHEEP OR GOAT FARM

Balanced sheet is prepared to find out the accurate financial position of business at the end of the year. Balanced sheet is made up from assets and liability. The term asset means the entire possession and property of every description which the business owned at any particular date. They are debit (Dr) balances of personnel and real account balances of certain nominal account such as payment is made in advanced or outstanding debtor for acquired income are also included among the assets.

Liabilities are the total debts owned to other at any particular date. They are the credit balances of real and personnel account and capital account. The amount such as wages remain unpaid and income received in advance are also included among the liabilities.

All assets and liabilities are set out in the balance sheet in classified form. The assets are shown on right hand side (R.H.S.) and liabilities on left hand side (L.H.S.). As a balanced sheet is statement and not an account the word "To" and "By" or "Dr" and "Cr" not used in it.

**Arrangement of assets and liabilities in balance sheet:**

The assets in balance sheet are arranged in the order of their commonsense of with cash. The liabilities are grouped in order I which they would discharge first.

If the total assets liabilities of balance sheet are equal, it means that the assets are just enough to discharge of liabilities and there is no capital or surplus. If the assets exceed the liabilities, the amount is excess in surplus capital.

**Specimen balance sheet:**

Balance sheet of ……. As on …….

| **Liabilities** | **Assets** |
|---|---|
| Bill payable rupees | Cash on hand |
| Loan | Cash at bank |
| Mortanding expenses | Investment |
| Outstanding expenses | Bill receivable |
| Income received in advanced | Stocks in hand |
| Reserve fund (if any) | Purchased good |
| Capital | Crop at hand |
| Capital less drawing | Crops growing |
| (PVT account) | Implement less depreciation |
| | Livestock, Furniture. |

**Uses of balance sheet:**

1. It gives information about the nature and value of all assets held.
2. It gives information about nature and extent of liabilities and their value.
3. Whether the business is solvent or can pay all liabilities from assets.

**Questions:**

1. Difference between Liabilities and Assets ?

# UNIT- IV

## INDEX

**NAME : ……** **BATCH: ……**

| S. NO. | NAME OF EXERCISE NO. | PAGE NO. | DATE | SIGNATURE |
|---|---|---|---|---|
| 1 | Visit of a Zoo/National Park | | | |
| 2 | Housing of Captive animal | | | |
| 3 | Feeds and feeding of captive animals | | | |
| 4 | Hygienic preparation, preservation and storage of feeds of captive animals | | | |
| 5 | Restraining, handling and physical examination of captive animals | | | |

# EXERCISE NO.-1

## Visit of a Zoo / National Park

**Objectives**

1. To acquaint the students with the layout and design of enclosures of wild animals of the Zoo / National Park.
2. To acquaint with the various management practices adopted in the captive conditions.
3. Identification of the important species of wild animals.

**Procedure**

The students will be taken around the various sections of Zoo/National Park. The Zoo Veterinarian will explain to the students the various activities and practices adopted there. The students will record the following information on the manual.

1. History of Zoo / National Zoological Park
2. Area of the Zoo (ha)
3. No. of species exhibited
4. Total number of wild animals exhibited
5. No. of endangered species
6. Disease prevention measures adopted
7. Vaccination / Deworming schedule
8. Feeding practices adopted for various species
9. Daily routine activities at Zoo
10. methods of restraining of captive animals

**Questions:**

1**.** Mention the important endangered species kept in the zoo**.**

2. Describe the vaccination schedule of wild animals in the zoo.

# EXERCISE NO.: 2

# HOUSING OF CAPTIVE ANIMALS

**Housing to wild animals and birds is done**

1. To protect from adverse environmental conditions.
2. To facilitate breeding, feeding, watering and treatments in captivity.
3. To protect from stress due to visitors and also to protect the visitors as well.

**Principles of housing**

1. The floor space and height of the roof must be adequate and as per the norms depending on species, size and behavior of the animals.
2. There should be economy in construction but should provide maximum comfort to the captive animals. Overcrowding within the enclosure must be avoided.
3. There should be adequate provision of ventilation and exposure to maximum sunlight
4. Safety of animals, care takers and visitors must be given due consideration while designing the animal house.
5. For the animals, which are having the burrowing habits, e.g. rabbits, mongoose, etc. the floor must be cement and concrete.
6. Separate enclosures should be provided for advance pregnant animals and also to the recently
7. There should be separate ward for the sick animals, in proirimity with veterinary dispensary within premises of the zoo.
8. All the animal houses and enclosures should be equipped with resting" platforms, bedding materials, feeding and watering troughs, nesting boxes, open to sky raised platforms, etc. as per the need of the individual species.

- Designing an enclosure depends on the animal's physical activities like climbing, burrowing, jumping, wallowing. Climate and biological requisites of the social group in wild have to be considered. Floor must be designed for easy cleaning and must have proper drainage.
- Provision to have a safe buffer zone between the visitor and the animal is important for human safety, safeguard against visitor disturbances and to prevent zoonoses.
- Adequate living space depends upon the spaces to be exhibited, providing free movement and exercise as well as protecting from extreme temperature.

- The quality and type of enclosure are of great importance depending upon the different type of species. Enclosure should have provision for easy viewing by the visitors.
- Enclosures should have resting and retreating places ( sleeping shelves, perches, platforms, trees , caves or sand banks), hiding places (dens, burrows, holes, bushes, stone heaps), place to give birth or brood (nesting boxes, nesting materials and hollow trees), grooming (for skin and claw pawing logs, stones, pools, wallowing pools, mudbath, dustbath etc), camouflage (tree and branches, various types of vegetation) and mental stimulation (swings, balls, poles) that can be 'changed periodically to avoid boredom. Play Objects are important and this will stimulate their play with littermates.
- Enclosure should be free from health hazards like broken glasses, nails, toxic fruits, sharp comers or any similar objects or poisons that could be hazardous to animals.
- Fence barriers like chain link fence may not give a visual barrier for the timid animals and may injure themselves. Lack of binocular vision in ungulates adds to this by poor depth or distance assessment.
- A hard floor is required for hoofed stock to prevent the overgrowth of the hooves. Soft-footed animals should have soft ground if not, it will lead to sore paws.
- Similarly pawing of soft wood will prevent in-growing nails. Elephant and rhino rub their body on tree trunk and this has beneficial effect for skin in addition to the pleasure they derive out of it.
- A hiding place from the crowds and pestering visitors will often help the animal to avoid stress. At least one area of the enclosure should not have access 'to visitors. This will help the animal to retreat to that area when disturbed by the visitors.
- Nocturnal animals require poorly lit area and hence in many Zoos special nocturnal houses are designed to avoid stress and strain.
- Exothermic animals like reptiles ares heat sensitive and hence serpentarium should have provision to keep the temperature in moderation.
- Provision for cleaning the left· over food, excreta and even flushing if necessary should be available.

**Enclosure barriers**

Enclosure barriers are the special features for the wild animals housing in zoo for extra protection.

***Types* of *enclosure barrier***

1. Wet and dry moat
2. Wire mesh fencing
3. Vertical walls
4. Glass and plastic panels
5. High tensile vertical wires
6. Electrically charged wires

Anyone or combination of enclosure barriers can be constructed depending on biological capabilities (like jumping, climbing, swimming) of the animals.

**Do's and Don'ts for Efficient Housing and Management of Wild Animals in captivity**

**Do's**

1. Study the psychology, shelter seeking, behavior, feeding habits, sexual behavior and mothering ability of the animals in captivity and provide conditions accordingly.
2. Animal should be grouped and placed according to age, size and sex. Male and female should be housed separately.
3. Calculate the feeding requirements in terms of proximate principles and the quantum as per species, age, sex and lactation and provide feed accordingly.
4. Provide extra care to young ones, advanced pregnant and sick animals. Very advanced pregnant animals and sick animals should be housed separately and due care must be guaranteed.
5. Young ones must be provided with optimum amount of colostrums and milk as per their need.
6. Weaning must be practiced at appropriate age.
7. Provide housing conditions in captivity as natural as possible.
8. All the hygienic measures must be adopted within the enclosure and in premises of the zoo.
9. Dead-animals must be disposed off quickly.

10. Zoo attendants, veterinarians and other personnel should develop friendship with the animals in captivity.

**Don'ts**

1. Do not house male and female together.
2. Do not allow the feedstuffs from outside the zoo or feeding by the visitor must not be allowed. This may carry infection.
3. Do not feed stale and unfit meat and other feedstuff to the animals in captivity.
4. Do not allow the visitor to tease the animal especially monkeys and elephant.
5. Do not allow the entry of pet dogs, cats and birds along with visitors in the zoo.
6. The zoo premises must be smoking free zones.
7. The visitors must not be allowed with weapons (even toy guns) within the zoo and safari parks
8. The exit and entry points in the zoo must not be left unguarded.
9. Fire crackers within and nearby zoo must not be allowed.

**Annexure I: Minimum prescribed size for feeding/ retiring cubicle for important mammalian species of captive animals**

| Name of the Species | Size of the feeding cubicle/ night shelter for each animal (meters) | | | Name of the species | Size of the feeding cubicle/ night shelter for each animal (meters) | | |
|---|---|---|---|---|---|---|---|
| | Length | Breadth | Height | | Length | Breadth | Height |
| Tiger, Asiatic lion | 2.75 | 1.80 | 3.00 | | | | |
| Common leopard, Clouded leopard & Snow leopard | 2.00 | 1.80 | 2.5 | Musk deer, Nilgiri tahr, Chinkara, Four horned antelope, Bharal, Goral, Wild sheep and Markhor | 2.5 | 1.5 | 2.5 |
| Sloth bear, Himalayan black bear, Brown bear and Malayan sun bear | 2.5 | 1.8 | 2.5 | | | | |
| Monkeys and Langurs | 2.0 | 1.5 | 2.5 | | | | |
| Small cats, Civets, Binturong, Otters, Retel, Hogbadger, | 2.0 | 1.5 | 2.5 | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Martens, Red panda, Wolf, Jackal and Wild dog | | | | | | | |
| Elephant | 8.0 | 6.0 | 5.5 | Slow loris and Slender loris | 1.0 | 1.0 | 1.5 |
| One-horned Indian Rhinoceros | 5.0 | 3.0 | 2.5 | | | | |
| Wild buffalo, Yak, Indian gaur and Wild ass | 3.0 | 2.0 | 2.5 | | | | |
| Brow antlered deer, Hangul & Swamp deer | 3.0 | 2.0 | 2.5 | | | | |

## Annexure II: Minimum prescribed sizes species in captivity for outdoor open enclosures for important mammalian

| Animals/ Species | Minimum size of outdoor enclosure (per pair) (Square meters) |
|---|---|
| Tiger and Lion | 1000 |
| Panther, Clouded leopard and Snow leopard | 500 |
| One-horned Indian Rhinoceros | 2000 |
| Brow antlered deer, Hangul, Swamp deer | 1500 |
| Wild buffalo, Indian bison and Wild ass | 1500 |
| Bharal, Goral, Wild sheep and Serow | 500 |
| Sloth bear, Himalayan black bear, Brown bear and Malayan sun bear | 1000 |
| Red panda, Jackal, Wolf and Wild dog | 400 |
| Monkeys and Langurs | 500 |

**Annexure III: Minimum prescribed sizes for outdoor enclosures for important birds in captivity**

| Animals/ Species | Minimum size of Aviary (Square meters) | Minimum height of the aviary (meters) | Minimum size of the water body within the aviary (Square meters) |
|---|---|---|---|
| Birds of prey | 300 | 8 | 10 |
| Pheasant * | 80 | 3 | 3 |
| Water birds (mixed species enclosure) | 300 | 8 | 60 (with a depth of 1.5m) |
| Flying birds (mixed species enclosure) | 300 | 8 | 20 |
| Flying birds (single species) | 80 | 6 | 2 |

**Annexure III: Minimum prescribed sizes for outdoor open enclosures for important reptiles and amphibians in captivity**

| Animals/ Species | Minimum size of the enclosure (Square meters) | Minimum size of the water body within the enclosure (Square meters) |
|---|---|---|
| Crocodile/ Gharial | 400 | 150 (with a depth of 2 meters) |
| Python | 80 | 6 |
| Cobra, Rat snake, Vipers | 40 | 4 |
| Sand boas | 40 | 4 |
| Monitor lizards * | 80 | 6 |
| Chameleons and Small lizards | 40 | 4 |
| Tortoises | 40 | 4 |
| Turtles | 80 | 40 (with a depth of 2 meters) |
| Amphibians | 10 | 4 (with a depth of 0.5 meter) |

**Questions:-**

1. What are efficient housing management points of wild zoo animals ?

# EXERCISE NO. 3

# FEEDS AND FEEDING OF CAPTIVE ANIMALS

**Objectives**

1. To study on the general components of nutrients
2. To study on the feeding strategies used by various wild animals like felids
3. To understand about the components of feeds routinely offered to wild animals belonging to multiple species
4. To study on the different types of feeding habitats existing among the wild animals and sick diets.

**SIGNIFICANCE OF FEEDING**

1. Feeding in wild animals is different under captive conditions and in free ranging conditions.
2. Feeding is a controlled activity in case of captive wild animal species unlike in case of free ranging wild animal species in which cases, the animal by itself attempt to have some control measures.
3. Differing feed habits are there in case of captive wild animal places that are rich in multiple species of wild animals.
4. Hence, one should have a preliminary knowledge of the feeding related activities in the concerned wild animal species and a basic knowledge of nutrition, proper diets etc. is an essential one.
5. Scientific mode of feeding strategies forms the basis for the scientific management of wild animal places.

**Significance of balanced nutrition**

1. Longer life span of the animal
2. Maximal reproduction
3. Maximal infant survival rate
4. Appreciable health status
5. Acquiring of good immune mechanisms.

## CLASSIFICATION OF WILD ANIMALS BASED ON FEEDING BEHAVIOR

**Herbivores**

1. They constitute the wide spectrum of different species of wild animals with anatomical adaptations comprising of symbiotic microbial population of bacteria, protozoa etc.
2. The feed resources to these animals have in general low nutritional values but are bulky in nature.
3. Among herbivores, the ones with complex stomach (ruminants) are the most efficient ones and the roughages and forages are most efficiently utilized by the species.
4. Microbial fermentation is the mode of digestion in these species.
5. Example: Gaur, deer, giraffe, antelopes like blackbuck, buffalo etc. Pregastric fermenters are also available as wild fauna like kangaroo, wild pig, hippopotamus etc. Similarly, hind gut fermenters like rabbits, guinea pigs, capybara (cecal fermentation) and zebra and wild asses (colon fermentation) also exist under captive conditions.
6. Cecotrophs are the ones that are produced in the morning and are the soft materials that are often consumed directly from the anal region. Animals like rabbit and hares produce these soft fecal pellets that have high protein, fiber and water contents with increased amounts of vitamin B complex.
7. It is noteworthy to note that the bulk eaters like elephants or rhinos have poor digestive efficiency but meet their nutritional requirements by consumption of high levels of feed intake and fast rate of food transit without digesting fiber.(as the case with giant panda)

**Omnivores**

1. Large group of wild animals belong to this in general. Most of the rodents, flying fox, sloth, bears, nonhuman primates, pigs many species of birds etc. belong to this group.
2. Carbohydrates become the major nutrient received from the plants, while moderate amount of protein and fat are received from meat sources.

**Carnivores**

1. Carnivores are the meat eating animals and require highly digestible and high quality food resources with nearly all the types of nutrients.
2. The various species of this group require most of the times unique type of nutrition. For example, felids need a dietary requirement for amino acid '**taurine**' and preformed vitamin A and essential fatty acid 'arachidonic acid'.

## GENERAL NUTRIENTS AND FEED STUFF

**Carbohydrates**

1. This is the chief source of energy in case of wild animals.
2. Ruminants like deer or giraffe or antelope make use of the complex carbohydrates subsequent to the bacterial actions in the rumen and the rumen microflora help the proper digestion of nutrients.
3. Cereals, grains, roots, tubers and fruits have high carbohydrates.
4. Fruits are rich in pentoses and hexoses, whereas the tubers and seeds are rich in glucose.

**Proteins**

1. More significance needs to be provided towards the provision of adequate amounts of protein to wild animals especially the carnivores.
2. The proteins comprise the ingredients of internal frame work of cells esp. the interstitial cells like dentine, osteoid tissue, connective tissue etc.
3. Essential amino acids like arginine, methionine, threonine, leucine, lysine etc. are to be given importance during the provision of protein rich diets.
4. It is to be noted that protein deficiency may result in retardation of the growth rate, cessation of lactation in case of nursing animals, impairment of reproduction, decreased body resistance level etc.

**Fats**

1. Fats are the important nutrients in case of wild fauna like the domestic animals. They provide the fat soluble vitamins like A, D, E and K.
2. In addition, the fat materials provide some satiety value to the concerned wild animal species in addition to the provisions of the palatability to the feed.

3. Provision of optimal amounts of fat is a must for the wild animal species. Fat provides the most concentrated forms of stored energy and fat reserves in fact help a lot for the provision of energy during the adverse climatic extremes.
4. For example phocids like elephant seal may spend a considerable time in land without any access to food while suckling the pups. In such occasions, fat is the major nutrient factor that helps the survival of the concerned species.
5. Similarly, in case of hibernating animals like bears in cool regions it is the fat that gets accumulated often and is useful as an energy resource in winter months.

**Mineral mixtures**

1. Mineral supplements need to be added along with the routine food materials to be offered to the dietary items of captive wild animals. It to be borne in mind that minerals also are supplied by a balanced diets.
2. However, these can be supplied as mixtures including lime stone, dicalcium sulphate, salt, trace mineral mixtures etc.
3. Among minerals, it is the zinc that has effect on the hair growth and calcium with phosphorous are also to be given maximum significance in case of wild animals.
4. Deficiency of minerals like calcium and phosphorus may lead to development of bone disorders like rickets, osteodystrophy etc. Nursing animals need an additional allowance of calcium in their dietary items.

**Vitamin supplements**

1. Vitamins like fat soluble ones and water soluble ones are of much helpful in various metabolic functions occurring in the body.
2. Care has to be paid in the provision of adequate amounts of vitamins to the diet of captive wild animals.
3. The vitamins can be supplied along with the main diet as a special mixture to rectify feather loss like conditions.
4. Species like red vented bulbul, frugivours bats, guinea pigs, nonhuman primates etc. are in need of direct supply of vitamin C because they lack the enzyme L-gluconolactone oxidase required for the synthesis of vitamin C.

**Water**

1. Watering in case of wild animals has to be given more significance. Generally wild animals prefer water content and even in the wild, wild animals move to the water holes frequently in every day.
2. However, it is to be understood that certain species may not take water much like blackbucks. The water requirement may be met by water content of food itself or through the oxidation of organic constituents that produces metabolic water.
3. High moisture diets are generally preferred by the wild animals like nonhuman primates. It is also equally true that high moisture food items are often subjected to the fungal as well as the microbial proliferation.
4. Wild ruminants mostly drink water either in the late evening or early morning. Camels have capacity to take more water at a time. Wild animals like felids require the provision of water *ad libitum*.

**Roughages**

1. Tree and shrub leaves, grass and legume silages, straw, fodder, hulls, shells, maize, hay etc. form the roughages.
2. They are bulky in nature but are poor in energy content and are rich in fiber.

**Concentrates**

1. These are low in fibre but are rich in protein or energy content.
2. Cereal grains, noncereal seeds like amaranthus green, grain milling byproducts like wheat and rice bran, beet pulp, citrus pulp, molasses etc. fall under this category.
3. Fish meal, dried milk products like skin milk powder, sunflower meal, cotton seed meal etc. provide more than twenty per cent crude protein.

**Feeding habits**

- The feeding habit varies from species to species.
- Chewing bones is a preferred activity among lions, tigers and jaguars and the activity is less in panthers.

- These carnivores prefer larger pieces of meat to alleviate hunger more readily than the smaller meat pieces. Lions and tigers carry the beef pieces to one side of the cage before it sits for feeding.
- In lion, tiger and jaguar the posture of consumption was of extending the fore legs and holding the meat while the hind legs are tucked up within the body, where as in panthers all the four legs tucked up within the body.
- Wild dogs eat while they were in standing position in a hurried gulping manner.
- Among the large felines like tiger, lion, panther and jaguar the time taken to consume the meat was from 16.5 minutes to 39 minutes in a very slow manner.
- Tigers soon after feeding they lick the cage wall few times and then drink water, where as in lions they drink water soon after feeding.
- After the weekly starvation in lions and tigers a characteristic restlessness was evinced by the sound and arrival of the food delivery vehicle.
- During the act of drinking the large cats curl tongue backward and then flick it forward, rolling it up slightly into a spoon shape, as they do so and they swallow after every 4 or 5 laps.
- Tigers, Jaguars and Panthers show a preference for chicken meat when offered than beef.
- Almost all species of the carnivores like panther, lion, wild dog and tiger eat quickly in winter than in summer.
- In panther, lion and tiger, smelling and licking of the meat were noticed. Tigers and lions show a greater degree of smelling the licking than the other species.
- Elephants use trunk as prehensile organ and may even pick up grass by using strikes with legs on ground and later, the grass materials may be striked on its own legs to wither away the dirt or sand and then by using the trunk, they may place the feed materials into the mouth. The trunk will not be protruded during eating activities of the elephant.
- Bears have the habit of climbing the trees or rocks in order to remove the bee hives and by using forelimbs, the hives are destroyed and use to suck honey in addition to lapping using tongue.
- Crocodile have the habit of gulping the feed materials.

**Sick diets**

Most seriously ill-wild animals refuse to eat or just pick at the food. Force feeding often may not be practicable especially in carnivores or herbivores.

- Soft diet like chicken preferably in cooked form may be attempted as one of the significant diets in wild animal species.
- Intra-venous fluids like dextrose saline, Ringers lactate etc, may be chosen in wild animals that have totally ceased eating activities.
- Attempts may be done to provide the most palatable food for the targeted wild animal species.
- In wild animals especially carnivores with severe gastritis whatever food is offered or ingested, it may be vomited often. In such cases, blend diet may be offered. Egg white may be offered to carnivores with severe vomiting, in addition to administration of 5% dextrose saline solution, in these gastritis affected wild animals.
- Provide drinking water ad libitum to all the sick wild animals in general.
- Provision of bland diet in small quantities spaced in several daily doses may help to minimize the incidences of vomiting or rejection by the concerned wild animal species.

**Geriatric animal feeding**

- Avoid feeding with less digestible feeds.
- Avoid full-stomach feeding.
- Provide adequate quantities of vitamins and minerals.
- Provide water adlibitum.

## FEEDING OF WILD ANIMALS

Based on the physiology of digestion and food habits, the wild animals can be classified into:

1. Herbivores - ingest plant origin. It may be sub divided in to 2 types.

    1) Simple stomached or non-ruminant. Eg. elephant, zebra, wild horse, rhino, hippo, monkeys etc.

    2) Complex stomached or ruminants. Eg. bison and giraffe etc.

    (Pseudo ruminants. Eg. Camel- has 3 compartments. Omasum absent)

2. Carnivores - ingest animal origin. Eg. cheetah, leopard, tiger, lion, fox, bear, wild cats etc.

3. Omnivores -ingest both animal and plant origin, Eg. wild pigs, rodents, bear, and monkeys etc.

**According to activity it may be**

1) Nocturnal - hunt their prey during night time.

2) Diurnal - hunt their preyduring day time.

3) Crepuscular - Active at dawn or dusk

**Based on behaviour;**

a) Solitary - feed alone. Eg. Tiger

b)Gregarious - feed in groups. Eg. deer, lion, etc.

It may be a) continuous feeders ie, feeding continuously. Eg. Peafuwl

b) Occasional feeders. Eg. Snakes. ‘

**Depending upon the nature of feeding;**

1. Euryphagous - Prefer a variety of food.

2. Stenophagous - feeds on specialized foods.

3. Monophagous - eating one kind of food. Eg. Gharials - live fish, King cobra - live Snakes

**Factors to be considered while feeding**

1. Food should be qualitatively and quantitatively sufficient maintain proper health as well as for reproduction Factors like age, sex, size, physical status like pregnancy and lactation should be considered. lt should also be palatable and free from toxic elements.

2. Feed selected should be as far as possible similar to the natural feeds of the animals. Time of feeding should be strictly adhered to.

3. Necessary changes both in quality and quantity should be made based on the physiological needs of the animal. Eg. pregnancy, lactation, disease and convalescence.

4. Predators like tigers, panther, lion, and cheetah hunt their prey in their natural habitat. Hence to satisfy the hunting instincts, these species should be provided with live birds and live rabbits in their cages at some periodical intervals.

5. Carnivores should be fed alone since they can't tolerate the presence of other animal in proximity. They are generally fed for 6 days, a week and fasted for one day.

6. For herbiv6res, plenty of green grasses, hay silage, along with concentrate mixture, mineral and vitamin supplements are very essential. Herbivores fare fed daily.

7. Snakes must be fed individually a!1d simultaneously to avoid 2 snakes seize the opposite sides of the same prey.

8. The group feeder like deer should have enough feeding space and points to avoid competition.

9. Nocturnal animals can be fed during late evening to avoid wastage of feed.

10. Animals live in social groups tend to feed less when isolated or separated from the group, when compared to solitary animals, which prefer to take feed alone. Similarly animals caught from wild will feed less initially due to .stress. .

11. Nature of food like hard or soft should also be considered. Rodents need hard food as they have continuously growing incisors and the seed eating birds like parrots need a feed to crack. Wild cats and bears have the natural habit of eating the hidden food. To satisfy this instinct, the feed can be hidden in the treetop of the enclosure.

12. As far as possible one person should feea one set of animals on a regular basis. The left over should be removed promptly.

13. Mineral supplements like salt lick and vitamins can be provided to avoid mineral and vitamin Deficiency.

14. Food items should be inspected daily at supply point, store and in the enclosure. Foreign bodies in the enclosure must be avoided.

**Feeds and feeding of wild mammals**

Feed must be supplied in a balanced manner so that it contains the proper levels of protein, carbohydrates, and fats and includes vitamins and minerals. There is diversity of feed taking place amongst animals to a considerable level. The carnivores mainly depend upon meat, as these animals are able to make energy from protein sources. The meat requirement is roughly based on one-tenth of their body weight for an adult animal.

Fish is a preferable food item for fishing cats and the otter. Fish, along with meat, is provided to jungle cats. Boiled eggs along with meat are provided to the small Indian civet and binturong, Meat along with bread, biscuits, molasses and some fruits, even milk is supplied to bears.

The feeding habits of primates in captivity are likely to change. Readymade bread or a small amount of boiled rice is supplied as the prime carbohydrate resource. Vegetables like pumpkin, cucumber, ladies ringer and beans and different fresh leaves along with fruits, which are rich in vitamin C, are supplied to these animals for their maintenance. Most animals or

primate groups are vegetarians, but some animals like the slow Loris and a few varieties of both langurs and monkeys require animal protein. Small live birds are supplied to Loris Chimpanzee, gorillas are supplied with honey, condensed milk, dates, grapes, etc. Supply of one boiled egg a week also substitutes for animal protein in some animals of the primate group. The other important food items are soaked gram, plantains, sweet potatoes, papaya etc.

Deer and antelope are browzers and some are both browzers and grazers. Grazers can thrive well on grasses, but animals in captivity are supplied with soaked gram, paddy straw, bran mixture of cereals, namely, gram, wheat, com and carrots, etc. Sambar deer being the largest among all deer require bulk amount of food for their existence. ‘

Large animals, namely, the Indian rhinoceros, the Indian elephant and the wild ox, namely gaur, mithun, wild water buffalo, etc. require bulk amount of feed consisting of different crushed grains like gram, oat, corn along with paddy straw, bran hay and a measurable amount of salt. Extra supply of fodder, namely, jackfruit leaves, figs or banyan leaves are required to be supplied in maximum amount to the Indian rhinoceros and the Indian elephant. Supply of at least 10 kg boiled rice and pulses should be offered along with bulk supply of green leaves, etc. for Indian elephants. Main stem of plantains and bamboo leaves are also preferable food for an Indian elephant. Salt, either mixed with grain or in small lumps, for licking and grass bran should be supplied.

The large Indian squirrel is supplied with fruits, nuts, corn, along with other grains and vegetables and even with biscuits. Porcupines should be maintained on carrots, sweet potato and some grains etc.

## FEEDING OF WILD ANIMALS

**Bonnet macaque**

- Rice 50 g
- Banana 3 nos
- Orange/Mango ¼ no.(100150gm
- size)
- Guava ¾ no
- Groundnut (WOS) 15 g
- Bengal gram 15 g

**Jungle cat**

- Chopped beef 250 g
- Bread slice 2 no

- Milk 100 ml

**Jackal**

- Beef without bone 500 g
- Liver 100 g
- Chicken 250 g weekly once.

**Hyena**

- Beef 3 kg/day
- Liver 100 g
- Chicken 500 g weekly once.

**Sloth bear**

- Ragi (cooked) 250 g
- Rice gruel + black gram 150 + 50g
- Orange / Mango 2 nos
- Guava 4 nos
- Tapioca 100 g
- Jaggery 200 g
- Groundnut (WOS) 100 g
- Honey biweekly
- Milk ½ litre
- Radish 100 g
- Bread slices 2 nos
- Carrot 200 g

**Otter**

- Fish 1.5 kg
- Crab (weekly twice) 300 g
- Sardine 1.5 kg

**Indian Elephant**

- Ragi 7 kg
- Horse gram 2 kg
- Salt 200 g
- Jaggery 250 g
- Grass 200 kgs
- Sugarcane 4 nos
- Green tree leaves –
- Bamboo / stylo 250 kg
- Coconut 500 g (1 no)

**Porcupine**

- Rice 100 g
- Carrot 100 g
- Cabbage 100 g
- Tapioca or sweet potato 100 g
- Soya bean 20 g
- Groundnut (WOS) 150 g

**Lion and Tiger**

- Beef (with bone) 10 kg

- Liver 500 g
- Chicken 1 kg (weekly once)

**Zebra (adult)**

- Wheat bran 2 kgs
- White Bengal gram 100 g
- Grass and leaves 30 kgs
- Mineral mixture 10 days in a month at regular intervals.
- Lucerne 5 kgs

**Panther**

- Beef (with bone) 3 kg
- Liver 250 g
- Chicken 1 kg (weekly once)

**Indian bison (Gaur)**

- Wheat bran 3 kg
- Bengal gram 0.5 kg
- Green leaves/ grass L.S

**Barking deer/ Spotted deer/Sāmbhar deer**

- Wheat bran 1 kg
- White Bengal gram 25 gm
- Grass 7 kg
- Green leaves 3 kg
- Salt 10 gm
- Stylo/Lucerne 2 kg

**Peach faced love bird, Fisher's love bird, Sky blue mask love bird, Love bird**

- (Split)
- Apple (to all) 1 no
- Banana (to all) 1 no
- Thinai 10 gm
- Paddy 5 gm
- Mixed grain 10 gm
- White Bengal gram 5 gm
- Onion 10 gm
- Greens 10 gm
- Shell grit Q.S

**Parakeet**

- Bread slice 1 no
- Apple (L.S) 3 no
- Sathukudi/Mango/Orange ¼ no
- Guava 1 no
- Groundnut (WOS) 20 gm
- Chilly fruit 10 gm
- Garlic 2 gm
- Paddy 10 gm
- Mixed grains 20 gm

- Bengal gram 10 gm
- Sunflower seed 10 gm
- Green gram 10 gm

**Indian Peafowl**

- Cabbage 25 gm
- Mixed grains 25 gm
- Paddy 25 gm
- White Bengal gram 50 gm
- Greens 100gm
- Garlic 10 gm
- Groundnut (WOS) 50 gm
- Shell grit 25 gm
- Green gram 25 gm

**Owl**

- Chopped beef or rat 150 gm/2no/day
- (each 100150
- gm size)
- Chicks 10 gm (once in a week)

**Budgerigar**

- Thinai 10 gm
- Greens 10 gm
- Shell grit 20 gm
- Bengal gram 5 gm
- Green gram 5 gm

**Emu**

- Green gram 250 gm
- Wheat 250 gm (soaked)
- Broiler finisher grumble diet 250 gm
- Rice 250 gm (cooked)
- Milk 100 ml (boiled)
- Tomato 100 gm
- Green banana 2 no

**Marsh crocodile (adult)**

- Fish (twice a week) 250 gm
- Bone (vertebral column) 100 gm
- Beef 250 gm

**Gharials (adult)**

- Fish (twice a week) 1 kg
- Bone (vertebral) 100 gm

**Python**

- Chicken 1 kg (twice a month)
- Rat 8 no (twice a month) each 150 gm size.

**Viper**

- Chicken 3 no
- Rat 4 no (weekly once) 100150

- gm size.

**Cobra**

- Chicken 3 no
- Rat 4 no (weekly once) 100150
- gm size.

**Iguana**

- Carrot 50 gm (daily)
- Cabbage 50 gm (daily)
- Tomato 50 gm (daily)
- Greens 100 gm (daily)

**Star tortoise**

- Carrot 30 gm (daily)
- Cabbage 30 gm (daily)
- Tomato 30 gm (daily)
- Greens (L.S) 500 gm (daily)

**Questions:**

1. Mention the feeding schedule of any three endangered species in the captivity.
2. Mention the feed of choice for important three endangered species.
3. Mention the feeding schedule of two Herbivorous and Carnivorous zoo animals.
4. Describe the diet plan for a sick animal and precautions to be taken care.

# EXERCISE NO.: 4

# HYGIENIC PREPARATION, PRESERVATION AND STORAGE OF FEEDS OF CAPTIVE ANIMALS

## FEEDING BY VISITORS

Some zoos allow visitors to feed some of their animals. This should be done on a selective basis and the zoo should control which animals are fed, and the type and quantity of food given. This is usually achieved by selling small bags of grain or other suitable foods at an appropriate point. The animals that may be fed are often domestic animals such as goats and sheep kept in a petting zoo or similarly separated from the main collection. The Wildfowl and Wetlands Trust sells bags of food suitable for the species in its wildfowl collection via vending machines. Where feeding by the public is allowed it is essential to provide hand-washing facilities with anti-bacterial soaps.

## FOOD PREPARATION AND STORAGE

Food should always be prepared under hygienic conditions. In many zoos, food preparation areas are located within individual animal facilities themselves, thereby reducing the risk of contamination when it is transported to the enclosures. Sometimes these areas are on show to visitors. Staff must observe strict personal hygiene standards while preparing food and minimize the risk of cross-contamination between utensils, equipment and work surfaces.

Zoos must make adequate arrangement such that animal foods should be available as at the feeding hours. The food items could be contracted out by giving orders to animal food contractors at quoted prizes and such supplies may be received on weekly basis.

In some zoos, farmland are acquired for planting of various food items such as fruits, yams and rearing of goats for carnivores feeding. The problem usually associated with the feeding of animals in captivity is that of wastage generally. Food ordered and supplied need be kept in the central food store. Inappropriate storage of food may lead to deterioration in its quality Food should be protected from dampness and contamination by fungi. It should also be protected from contact with and contamination by insects, birds, rodents and other pests. Perishable food and drink should be refrigerated unless they are supplied fresh each day Containers used to store food

should not be used for anything else. Some zoos have sufficient space to store large quantities of food on the own premises.

The experience at times is that much waste may be recorded than the actual quantity served the animals. The reasons being (1) faulty storage system (2) perishable items such as vegetables and fruits remaining in store for many days. Not many zoos can afford effective cooling and preservation system. Electricity power failure is a major threat where standby generators are lacking. Another general problem of feeding could be finance. This is possible where and when financial decisions are left in the hand of people of low knowledge of zoo management and wildlife conservation. They see no strong reason why much money should be committed to feeding animals. At times the contractors bills are not paid and hence stoppage of supplies. Also, general bureaucratic bottlenecks – in cases of Zoos run under Civil Service setting.

**SANITATION**

- ✓ The excreta and the leftover food must be properly discarded.
- ✓ Hard floors should be cleaned with pressure washer and kept from cracks.
- ✓ Drainage should be sufficient to keep the animal home clean.
- ✓ Sanitation has to be carefully looked into picnic spots, toilets, food kiosk and cafeteria.
- ✓ A good and effective disinfectant has to be selected.
- ✓ Moats wet or dry are to be cleaned regularly and refilled if necessary with clean water.
- ✓ Feeding utensils, water trough and food storage containers are to be checked periodically and prompt cleaning measures to be taken.
- ✓ Stray dog and cats, crows, rodents, snails and insects transmit various diseases both passively and actively. Hence strict control on their breeding and elimination of them are to be carried out regularly.
- ✓ Lime treatment of the soil and burning of the ground when found necessary must be done.
- ✓ A hand held kerosene run blowpipe can be used to sterilize cracks and crevices in animal houses and iron cages.
- ✓ Cleaning of the post - mortem room and disposal of carcasses after autopsy is very important.
- ✓ Sufficient precaution has to be taken so that dogs, foxes and jackals do not dig out the carcass.

- ✓ Installation of incineration facilities has to be encouraged.

**Points to be considered for Zoo Hygiene**

1. Usage of suitable disinfectant (natural/ synthetic).
2. Proper disposal of carcasses (burning/incineration)
3. Speedy and proper disposal of feed wastes.
4. Supply of hygienic water.
5. Animal keepers and handlers hygiene.
6. Bush clearance (vector - control).
7. Disposal of left - over feed items and polythene bags by visitors.
8. White washing of water container tanks in a periodical manner.
9. Adaptation of suitable fly control measures (fly catcher lights) especially in main feed receiving spots.
10. Cleaning of sheds immediately after the calving/cubbling/pawing ie., placenta, discharge etc.
11. Speedy clearance of sheds / cages after the occurrence of diarrhoeic stools/ after conducting of operations.
12. Strengthening of rodent or pest proof barriers or cages or fences especially in aviaries or birds exhibit places to avoid diseases.
13. Usage of aseptic infra structures like sterilized needles, syringes, sample-collectors etc.
14. Change of contaminated soil.

**Questions:**

1. Describe the points of Sanitation methods in zoo ?

# EXERCISE NO.: 5

# RESTRAINING, HANDLING AND PHYSICAL EXAMINATION OF CAPTIVE ANIMALS

## Handling and Restraining Wild Animals

**Objectives**

1. To provide veterinary care to wild and captive animals.
2. To translocate, reintroduce, hormonal implant and sterilize wild and captive animals.
3. To conduct research studies eff. radio collaring
4. To capture the problematic animals.

**Important practical points to be considered while handling and restraining:**

1. It is important to adopt proper method of restraining to avoid any stress or ill affect on the behavior, activities and life processes.
2. Ensure the Safety of wild animals and persons.
3. The persons engaged in restraint operations should be skilled, confident and experienced with the restraint techniques and equipments.
4. Avoid any sound / noise in proximity of the animals.
5. The person must have knowledge of the threshold of tolerance, flight distance, strike reach and response of the species to be restrained.

6 Always use suitable device / equipments for easy handling of animal.

7 squeeze cages are good for restraining.

8 The size and design of cage should be in conformity with the animal.

9 Use tough leather gloves, L-shaped sticks, cloth bags, thick towels etc. for small mammals, birds and reptiles.

10. During physical or manual restraining of animals, use ropes, snares, nets, bamboos, poles etc.
11. For close approach to an animal e.g. primates, carnivores, rodents and small animals, always use physical barriers such as plywood board, transparent or opaque plastic shields which have very useful application in restraining of wild animals.
12. Always grasp the animal from proper site.
13. While restraining carnivores extra precaution should be taken.

14. Selection of chemical drugs or combination of drugs should be made to minimize stress and trauma.

15. Avoid chemical restraining near water pond, pit, pool etc.

16. Sedated animal should be blind folded to prevent damage to the eyes/ retina from direct sun rays and should be manipulated in the brisket region to prevent regurgitation and chocking of trachea.

17. Always use proper equipment / device for projecting a syringe.

18. Use equipments operated by air pressure for Zoo animals e.g. blow pipe and blow gun.

19. Arrangement for administering oxygen, antidote, circulatory stimulant etc. should be readily available for emergency measures.

20. Post operative care should be taken in sedated wild animals.

**Darting site**

| S.No. | Species | Darting site |
|---|---|---|
| 1. | Elephant | Hind quarter, Shoulder |
| 2. | Wild herbivores | Hind quarter, Shoulder |
| 3. | Rhinoceros | Neck, Upper portion of shoulder, rump |
| 4. | Wild buffalo, Gaur | Shoulder, rump |
| 5. | Samber | Rump, Shoulder and neck, |
| 6. | Swamp deer, Bara Singha | Rump, shoulder and neck |
| 7. | Nilgai | Hind quarter, shoulder |
| 8. | Black buck | Shoulder, hind quarter |
| 9. | Chital | Shoulder, hind quarter |
| 10. | Tiger | Rump, shoulder |
| 11. | Musk deer | Rump, shoulder |
| 12. | Snow leopard | Rump |

**Estimation of Drug Dosage**

$$\text{Dosage required (ml)} = \frac{\text{Recommended dosage mg/kg x Body Wt (kg)}}{\text{Concentration of active principle (mg/ml)}}$$

# Post Capture Care and Treatment

**Objectives**

1. To provide medical care during complications induced due to imbalances in physiological conditions.
2. To maintain desired position of recumbancy.
3. To provide emergency measures to save the animal's life.
4. To administer specific antidote for speedy recovery.

**Materials required**

1. Stethoscope
2. Clinical thermometer
3. Cotton wool
4. Antibiotics
5. Specific antidotes
6. A hollow needle (16 gauges)
7. Respiratory apparatus
8. Oxygen
9. Life saving drugs e. g. doxapram, adrenaline, dexamethazone or dexonayet or dexa fort etc.
10. Antiseptic solution/antibiotics powder
11. Sample collecting vials

**Post capture Monitoring**

The post capture period is very critical stage in chemical immobilization or darting. The immobilizing agent such as the CNS depressants causes physiological changes in wild animals. If the animal is in faulty recumbancy, there may be a bloat problem. The narcotic drug such as Acepromazine produces hyperthermia at higher ambient temperatures and hypothermia at low ambient temperatures due to anti-adrenaline action. The CNS depressants cause a drop in respiration rate which may result in respiratory failure. As a result of shock or acute acidosis due to the disturbances in acid base balance there may be circulatory failures. During post capture period hypotension or lowering of blood pressure is the most common problem. Majority of the deaths from circulatory failure occur due to oxygen deficiency. Such

situations can be overcome by carefully performing the chemical restraining operations in the field and providing emergency treatment of the darted animal.

**To overcome the problems in the field conditions the following precautions/measures should adopted:**

1. Immediately after the capture, note down the animal's vital signs-respiration, pulse, rectal temperature, body reflexes and response to stimuli. Monitor these vital signs at an interval of 10 minutes to know the progress of recovery.
2. Check for respiration rate by placing your back of palm near the animal's nostrils to feel its exhaled hot air. lf the respiration is shallow and irregular, there is cause for concern and in such cases early recovery is must. The respiratory rate below 4 per minute in elephants and 18 per minute in spotted deer and bara singha, warrants immediate medical assistance. Provide artificial respiration with the help of respiratory apparatus or resuscitator.
3. If oxygen is not available and the darted animal does not respond to the injected antidote. Give a restorative drug such as doxapram which is very effective in field conditions. It may be given by i/v at the rate of 0.5-1.0 mg/ml per kg body Weight. Repeat at 5 minutes interval. The maximum does over a short period is 2 mg/kg body weight.
4. Record the pulse rate at every 10 minutes. The pulse of darted animal is monitored with a stethoscope held over the heart or at femoral artery. Most of deaths occurs due to circulatory failure. Oxygen therapy is very effective in hypotension cases which are indicated by prostration, rapid pulse rate, rapid respiration and shivering symptoms.
5. To overcome the circulatory failure give adrenaline at a rate of 1 ml of 1:1000 solution per 100 kg body Wt. It is commonly used in field conditions to stimulate the heart. An intramuscular injection of a corticosteroid preparation such as Dexona-Vet or Dexa fort (Dexamethasone) which is long acting and most effective treatment in case of circulatory failure. This drug is contra-indicated for pregnant animals.
6. In case of apparent over dosage. The animal should be treated with an intravenous injection of the specific antidote to restore normal respiration.
7. The animal should be positioned for maximum ease of respiration. The nostrils should be freed from obstruction and head off the ground.

8. The mouth should be examined for any obstructions. The tongue should be pulled forward and cleaned, induce artificial respiration.
9. The captured animal should be positioned in correct recumbancy to avoid bloat lf the abdomen is disturbed then release the accumulated gas by probing. In extreme cases, remove the gas by puncturing the rumen from outside from flank with the help of a 16 gauge needle.
10. Do not use narcotic drugs during very hot or very cold ambient temperatures. The animals should be darted only during early morning (in summer) or afternoon (in winter) hours.

**Observations**

The students should note down the following observations in the manual:

1. Species darted
2. Drug and dosage
3. Method of darting
4. Vital signs
    - (i) Respiration rate
    - (ii) Pulse rate
    - (iii) Rectal temperature
5. Antidote used
6. Problems encountered due to
    - (i) Respiratory failure
    - (ii) Circulatory failure
    - (iii) Bloat
7. Treatment given
8. Measures used to restore normal respiration
9. Treatment in case of circulatory failure
10. Remarks

**Questions:**

1. Mention the precautions to be taken while approaching carnivores.
2. Mention the precautions to be taken during handling the wild animals in captivity.