

PRACTICAL MANUAL
IN
LIVESTOCK
PRODUCTION MANAGEMENT

Volume -II (Units V-VIII)



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

(2023-24)

DEPARTMENT OF LIVESTOCK PRODUCTION MANAGEMENT
MJF COLLEGE OF VETERINARY & ANIMAL SCIENCES,
CHOMU, JAIPUR (RAJ.)

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CERTIFICATE

This is to be certify that Mr./Ms. _____

Roll 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

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EXERCISE-1

Introduction with different poultry breeds and their classification

Objective

- (1) To familiarize the students with ten most common breeds of chicken.
- (2) To judge the best breeds of chicken for different purposes.

India has made considerable progress in broiler production in the last two decades. High quality chicks, equipments, vaccines and medicines are available. With an annual output of 41.06 billion eggs and 1000 million broilers, India ranks fourth largest producer of eggs and fifth largest producer of poultry broiler in the world. The broiler production has also sky rocketed at an annual growth rate of about 15 percent at present. Broiler farming has been given considerable importance in the national policy and has a good scope for further development in the years to come.

I. American breeds

The American breeders have developed a number of breeds and varieties for dual purpose. All breeds in this class have yellow skin; clean shanks free from feathers, red ear lobes except Lamona, lay brown-shelled eggs.

Plymouth Rock : This is the oldest and until recently, a very popular breed in America, because of the size of its egg and excellent fleshing properties. Barred Plymouth Rock and White Plymouth Rock are two most popular varieties of this breed. White Plymouth Rock especially popular for broiler production. The birds of this breed have a rather long body with good depth and fairly broad and prominent breast. The breed has a single comb. The cock, hen, cockerel and pullet weigh 4.3, 3.4, 3.6, and 2.7 kg, respectively. The plumage of Barred Plymouth Rock is grayish white. Each feather is crossed by black bars, in width, straight and extends down to the skin. The barring in the hackle and saddle of the male is narrower than in the other sections of the body. Solid black or partly black feathers may occur in some birds of practically all strains of this breed. Black spots on the shanks are also common particularly in females. Due to the black and white bars of about equal width the males look lighter in color than the females. In the females the black bars are about 1 ½ times as wide as the white bars. This feature is used for sexing the birds.

Wyandotte : The body of birds of this breed is comparatively round. The general shape and character of feathering gives it an appearance of having a rather short back and a low-set body. Like the Plymouth Rock, it is a good general-purpose breed, well adapted for flesh production and a good layer when bred for eggs. All Wyandotte have rose combs. The cock, hen, cockerel and pullet weigh 3.8, 2.9, 3.4 and 2.5 kg, respectively. Silver Laced, White Buff, Golden Laced, Partridge, and Silver Pencilled, Columbian and Black are some of the important varieties.

Rhode Island Red : This breed is a cross between Malay games and Shanghais of reddish color, followed by the introduction of germplasm from many other breeds such as the Brown Leghorn, Cornish and Wyandotte. Farmers of Rhode Island in America developed the breed.

Originally developed for utility purpose, it later on became a fancy fowl as well. Some of its strains are well known for egg production. Some of the Rhode Island Reds have a single comb and others have rose comb. In type, some resemble the Wyandotte and others the Rock. The most common colors red, but buff; white and brown varieties are also found. Birds of this breed have a long body and broad and deep breast carried well forward. The back is flat. Legs and feet are deep yellow but may show some brown color. The male is rich dark red, with black tail. The wing, when open, shows black in both primaries and secondaries. Females have a rich even shade of deep red throughout, with wing and tail markings as in the male. Neck hackle usually shows a little black marking at base. Single and rose combs are allowed, but the single combs are more popular. Ear lobes and eyes are red. The cock, hen, cockerel and pullet weigh 3.8, 2.9, 2.9 and 2.5 kg, respectively.

New Hampshire: The poultry farmers of New Hampshire developed this breed through selection from the Rhode Island Red for early maturity, early feathering, large egg size and good meat type. The plumage color was apparently ignored with the result it became chestnut red. The comb is single. The body is rectangular than that of the Rhode Island. The cock, hen, cockerel and pullet weigh 3.8, 2.9, and 2.5 kg, respectively. This breed is used for broiler production in some farms in India.

II. Asiatic breeds

Brahma: This breed originated in the Brahmaputra region, where fowl their ancestral type known as ‘Grey Chittagongs’ are still found. It was first imported into America in September 1846 and into England in 1853. Brahas are massive, well-feathered and well-proportioned birds. The characteristic of this breed is its pea comb. The cock, hen, cockerel and pullet weigh 5.4, 4.3, 4.5 and 3.6 kg, respectively. The standard weights of The Dark Brahma cock, hen, cockerel and pullet on an average weigh 4.9, 3.6, 4.0 and 3.1 kg, respectively.

The Buff Brahma has the same color pattern as the Columbian Plymouth Rock, except that golden buff or buff is replaced by White. In the Buff Brahma, the shank feathers are buff and the feathers on the outer toe of each foot are buff, the black being laced with buff.

Cochin: This breed originated In Shanghai (China) and is also known as ‘Shanghai fowl’. It was imported into England In 1845 and a little later into America. The outstanding characters of the Cochin are its massive appearance and thickly feathered shanks. The breast is low in the female. At the base of the tail there is a very prominent development of the cushion. The feathering is extremely long and profuse. As a result the Cochin appears much larger than it really is. All Cochins have Single combs. The cock, hen, cockerel and pullet weigh 4.9, 3.8, 3.6 and 3.1 kg, respectively. The Buff Cochin has the same even shade of golden buffs as the Buff Plymouth Rock and Wyandotte. The colors of the Black Cochin and Black Wyandotte are identical.

Langshan : The Langshan breed originated in the Langshan region north of the Yangtze Kiang river, in China. Langshans were first imported into England in 1872 and later into America. The principal characteristics of the Langshan are: shorter but deeper body than that of Brahma and Cochin, larger tail feathers, tail carried higher and long legs. The Langshan stands up well and is well proportioned, which make it a graceful bird. The comb is single. The cock, hen, cockerel and pullet weigh 3.8, 3.4, 3.6 and 2.9 kg, respectively. The Black Langshan has the same color as the Black Wyandotte, except that the beak is dark brown, the shanks and toes are bluish black and the bottoms of the feet are pinkish white. The White

Langshan is of the same color as the White Plymouth Rock, except that the beak is light slaty-blue to pinkish-white, and the shanks and toes are slaty-blue, with pink between the scales.

III. English breeds

The breeds of English origin are mostly utility breeds noted for their excellent fleshing properties. With the exception of Cornish, all the breeds have white skin and red earlobes and, except the Dorking and Red Cap lay brown shelled eggs. All are classed as broody but breeding is eliminating this defect.

Orpington : Its long, deep and well-rounded body with a full breast and a broad back characterizes this breed. The birds are rather low set and heavy in bone. They are more loosely feathered than the breeds of American class. The Orpingtons make good table-birds. Good laying strains have also been developed. The comb is single. The cock, hen, cockerel and pullet weigh 4.5, 3.6, 3.8 and 3.1 kg, respectively. Some of the varieties of Orpington are described below: Black Orpington, Buff Orpington, Blue Orpington and White Orpington.

Cornish : The Cornish, originally known as the Cornish Indian Game, appears to have been developed in England about the middle of the last century from crossings involving the Aseel, the Malay and English game breeds. It was imported in 1887 into America, where it gained popularity because of its excellent fleshing properties and yellow skin. It is noted for its close and compact feathering and heavy flesh with distinctive shape. The breast of the Cornish is very deep and broad, giving the shoulders great width. All Cornish birds have pea comb. The cock, hen, cockerel and pullet weigh 4.5, 3.4, 3.6 and 2.7 kg, respectively.

Sussex : The Sussex was developed in England about 200 years ago, primarily as a table-bird. It was developed from birds with four toes. It has a long body, broad at the shoulder and with good depth from front to rear. The breast is well developed. The bird has excellent fleshing qualities. Fowls of this breed have single combs and horn colored beaks, shanks and toes. The cock, hen, cockerel and pullet weigh 3.6, 3.1, 3.4 and 2.7 kg, respectively. The varieties are: Speckled Sussex, Red Sussex and Light Sussex.

Dorking : This breed, like the Sussex, was developed in England about 200 years ago primarily as table birds from the birds of the same origin as that of Sussex, but with five toes. Like the Sussex they are characterized by long, broad, deep and low-set bodies. The White Dorking has a rose comb, the other two varieties, viz. Silvery-grey Dorking and Colored Dorking, have single combs. All Dorkings have five toes. The cock, hen, cockerel and pullet weight, 3.4, 2.7, 2.9 and 2.2 kg, respectively.

Red Cap : The Red Cap is supposed to have been developed from old English Games and Golden Spangled Hamburgs. The name 'Red Cap' has been given on account of its large rose comb. The bird is of medium size with a fairly long body and a rather prominent breast. The cock, hen, cockerel and pullet weight 3.4, 2.9, 2.7 and 2.2 kg, respectively.

Australorp: This breed originated from Black Orpington and as the name suggests, was developed in Australia. It is more upright and less massive in appearance than the Black Orpington and has been developed as a layer bird. The back is rather long, with a gradual sweep to the tail. The comb is single, the beak is black and the shanks and toes are black or lead-black. The bottom of the feet and toes are pinkish white. The plumage is lustrous

greenish black in all sections and the under-color is dull black. The cock, hen, cockerel and pullet weight 3.8, 2.9, 3.4 and 2.5 kg, respectively.

IV. Mediterranean breeds

Leghorn : The Leghorn was first imported into the USA in 1835 from Italy, the United Kingdom Imported it later. The breed is famous for the compactness of the various sections of the body, uniform blending and pretty carriage. The Leg horn breed includes varieties of various colors, the best known of animal which are The White, Brown and Black. Of these, the White Leghorn, on account of its excellent laying qualities, has become by far the most popular all over the world. White Leghorn cockerel and pullets weigh 2.2 and 1.8 kg, respectively. Single-Comb White Leghorn is the most prevalent variety. The indigenous Non-descript fowls in the villages were graded up With the White Leghorns. These day purebred strains of White Leghorn are raised for egg production in large numbers.

Minorca: The Minorca are also known as Red-faced Spanish because of the close resemblance in shape and appearance to the Black Spanish. It is probable that these two races were originally one. Five varieties of this breed are Black (Single and Rose Comb), White (Single and Rose Comb) and Buff (Single Comb), are known in USA.

Ancona: The Ancona breed originated in the vicinity of Ancona in Italy. It was imported into England about the middle of the last century and from there Into Ancona. It is of the same general type as the Leghorn breed. The cock, hen, cockerel and pullet on an average weigh 2.5, 2.0, 2.2 and 4.0 kg, respectively. The Ancona is not a common breed .The Single Comb and Rose Comb Ancona are the two varieties of this breed.

White-faced Black Spanish : The White-faced Black Spanish has an extensive white face, quite smooth and free from wrinkles. The skin is white. The comb is single and rather large, although not so large as In the Single-comb Minorca. It has five regular deeply serrated points, the blade extends nearly straight back from the head, having little, if any, tendency to follow the neck The comb of the female is erect in front and droops to one Side. The cock, hen, cockerel and pullet on an average weight 3,6, 2.9, 2.9 and 2.5 kg, respectively. The plumage is entirely black with a beautiful glossy sheen. The beak is black and the shanks and toes are dark lead blue or black.

Blue Andalusian: (Spanish origin) Interesting heterozygous color, which is Identical With that of the Blue Plymouth Rock, except that the skin is lute, the beak horn-colored and the shanks and toes lead-blue. The comb of the male is Single and somewhat larger than that of the Leghorn; the blade has a slight tendency to follow the neck. The comb of the female is practically identical with that of the Leghorn female. The cock, hen, cockerel and pullet on an average weight 3.2, 2.5, 2.7 and 2.0 kg, respectively.

V. Indian breeds

The ancestral home of the modern breeds of chickens is south and central India, The Himalayan Terai, Assam, Burma, Sri Lanka and all the countries southwards. The Indian birds are mostly Non-descript and are of very little value as layers. They have several local breed names, such as Tennis, Naked Neck, Punjab Brown, Ghagus, Lolab, Karaknath, Kashmir Faberella, Tilri, Busra, Tellicherry, Danki and Kalahasti. There are only three pure breeds of fowls Indigenous to India. They are the Chittagong, Assel and Busra. The last occur

in western India, A large number of fowls of different size, shapes and colors and for the most part resembling the Jungle fowl, are found all over India. They vary in appearance according to the locality in which they have been bred

Aseel: Aseel is perhaps a pure game. It is an excellent table-bird, its flesh being plentiful and well flavored. They are good layers, but are superior as sitters and possess good parental qualities. They do not thrive in confinement and have to be allowed to move about somewhat freely. They are intensely pugnacious and on this account, are hard to keep. The chickens are rather delicate and need great care, plenty of animal feed and liberty of movement. They are not suitable for being kept in the company of chickens of other breeds. Indiscriminating Inbreeding has badly affected the size, vigor, constitution and laying performance of this breed. There is a good market in USA and certain other countries for genuine strains of the Aseel, but birds of really superior quality are hard to obtain in India. A few graceful specimens, however, are now found in Andhra Pradesh and Karnataka, where Aseel of very large size are bred for sport. The cock should weigh 4.0 to 4.3 kg and hen 3.1 to 3.6 kg.

The Aseel has a small pea-shaped comb, long and somewhat slender face, heavy eyebrows, thick and long neck, hard and close-feathered body, broad breast, very upright carriage and small and drooping tail. The bird is somewhat round and compact in appearance. The color may be black, white duck-wing, black and red, and mottled. The pure whites are beautiful but are difficult to breed. Aseel is excellent for putting stamina into deteriorated breeds.

Question

1. Paste photo of different poultry breeds including duck, turkey, quails.

EXERCISE- 2

FAMILIARIZATION WITH DIFFERENT BODY SYSTEMS: DIGESTIVE, RESPIRATORY AND REPRODUCTIVE

Objectives

- (1) To know the different parts of poultry body systems in detail.
- (2) To study the location, functional morphology of various parts of these systems.

The digestive system of chicken is a hollow tube running from mouth to cloaca. Modifying along its length into characteristic organs. Length of the digestive tract is 5 to 6 times of bird's external length. Starting from mouth these organs are: Oesophagus, Crop, Proventriculus, Gizzard, Small intestine, (Duodenum, Jejunum, Ileum), Pancreas, Liver, Large intestine (Caeca) and Cloaca.

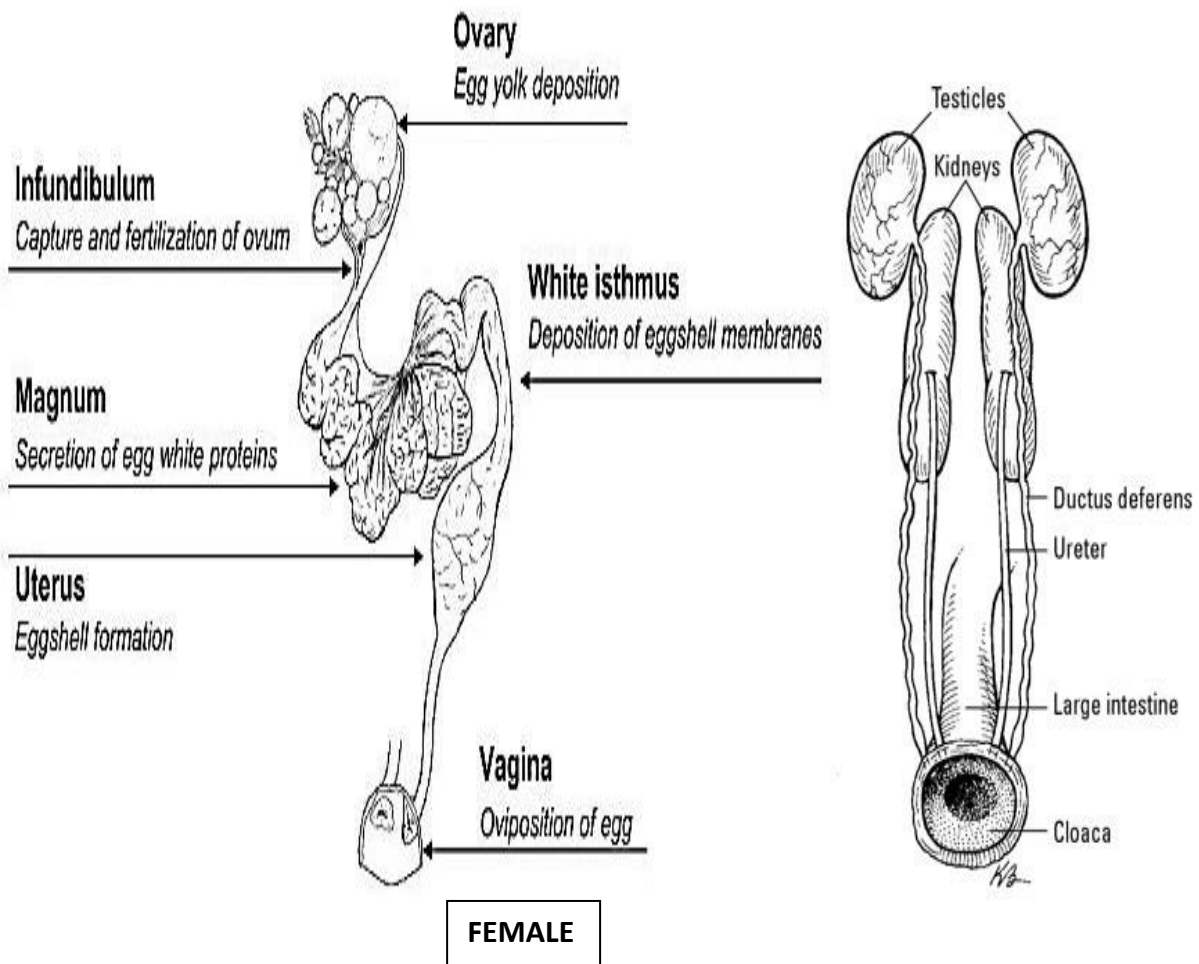
- (a) **Mouth**:- In chicken teeth and lips are absent which are replaced by a horny mandible on each side-forming beak, which is the main organ of prehension. Tongue of chicken is shaped like a barbed head of an arrow with the point directed forward. Tongue helps in positioning the food and moving the food towards throat for swallowing. In buccal cavity salivary glands are present, which secrete saliva and which acts as lubricant and buffer.
- (b) **Oesophagus**:- It is dilatable tube and helps in passing of food from mouth to stomach.
- (c) **Crop**:- It is dilation of oesophagus at the thoracic inlet, which acts as storage organ. It passes the food to the stomach as required.
- (d) **Proventriculus**:- It is glandular stomach, which is relatively smaller but richly supplied with glands and lymphoid tissue. These gastric glands secrete hydrochloric acid and enzyme pepsin, which helps in protein digestion.
- (e) **Gizzard**:- The gizzard is oval, reddish in colour and located just after the proventriculus. Gizzard is also called as muscular stomach because it is supplied with two pairs of longitudinal muscles with the help of these muscles grinding takes place.
- (f) **Small intestine**:- Small intestine forms the digestive tracts from duodenum to caeca. It is 2.5 feet in length in adult bird and it is structurally adapted for absorption. Its lumen is lined with small finger like projections called 'villi'. Besides digestive function the small intestine acts as an organ of absorption of nutrients.
- (g) **Duodenum, Jejunum and Ileum**:- Immediately after the gizzard the intestine is folded in a loop like structure called as duodenum. The sides of the duodenum are parallel which enclose the pancreas. Duodenum helps in pancreatic and gastric digestion. Immediately after duodenum Jejunum starts which usually up to the meckel's diverticulum, just after that ileum starts and ends at the ileo-cecal junction. Maximum absorption of nutrients takes place in the Jejunum portion.

(h) **Pancreas**:- Pancreas is located in the fold of duodenum and secretes a fluid called as pancreatic juice that contains proteolytic, amylolytic and lypolytic enzymes, which hydrolyze proteases, peptones, starch and fat.

(i) **Liver**:- It is the largest gland in the body. Two ducts from liver to the terminal part of the duodenum convey the bile produced in the liver. The one dark green colour duct from right lobe of the liver is enlarged to form ‘gall bladder’ in which bile is temporarily stored.

(j) **Large intestine**:- Large intestine is short and comparatively straight than small intestine. It starts from ileo-caecal junction consisting of short caeca, leading to the cloaca. It serves as a storage organ for faecal material and little fiber digestion takes places in caeca by the action of microorganisms. Absorption of water takes place in caeca as well as synthesis of vitamin B complex and vitamin K occurs in caeca.

(k) **Vent/Cloaca**:- Cloaca is a common chamber for openings of digestive system , urinary system and reproductive system. The end products of digestive and urinary system are mixed and excreted through vent.



Female Reproductive System

The reproductive system of the female chicken consists of one ovary and one oviduct (Fig A). At the time of hatching, the female cluck has two ovaries and two oviducts. The right ovary and the right oviduct, however degenerate later on and only the left ovary and the left oviduct

develop and function in the adult female. The ovary can be seen as a cluster of grey yolks of varying sizes situated at the anterior end of the left kidney. The yolk of the egg is formed in ovary whereas the albumin and the egg shell are formed in the oviduct. The ovary also secretes sex hormones.

The oviduct is in the form of a long glandular tube extending from the ovary to the cloaca. It has five membranes and the shell. The vagina opens into the cloaca. Except the yolk, all other parts of the egg, viz. albumen, shell and shell membranes are formed in the oviduct. Its walls have glands, which secrete the material for the formation of the egg.

Male Reproductive System

The male reproductive system of birds is extremely simple, consisting of two testes, each having an epididymis and vas deferens that lead to the copulatory organ. The male bird is unique among domestic animals in that the testes are located along the backbone within the abdominal cavity and in front of the top lobe of the kidneys. During non-breeding season the testes are difficult to locate due to their small size, but during breeding season they may grow as much as several hundred times their non-breeding size. The testes also secrete the male sex hormones.

Normally, semen is stored in the vas deferens where it is diluted with lymph fluid; both are ejaculated as a mixture during copulation. The penis of the male chicken is quite small, lymph enters the penis to form a mild erection, but it does not penetrate the cloaca. Rather during mating, the cloaca of the female opens to expose the end of the oviduct where semen is deposited.

No.	Part of the oviduct	Functions	Duration of developing egg stays	Length (cm)
1	Infundibulum	Picking and engulfing the yolk	15 minutes	9
2	Magnum	Secretion of thin and thick albumen	3 hours	33
3	Isthmus	Formation of shell membranes	1 hours & 15 minutes	10
4	Uterus	Formation of shell	18 to 21 hours (average 20 hours)	10
5	Vagina	Oviposition	2 to 5 minutes	6
TOTAL			24 Hours : 35 minutes	68

DIFFERENT KINDS OF COMB

Comb is a fleshy protuberance on top of the fowl's head, generally red in colour and of various types and shapes. The type of comb is usually a breed or variety characteristic. Some of the types of combs are,



Single Comb



Rose Comb



Pea Comb



Cushion Comb



Buttercup Comb



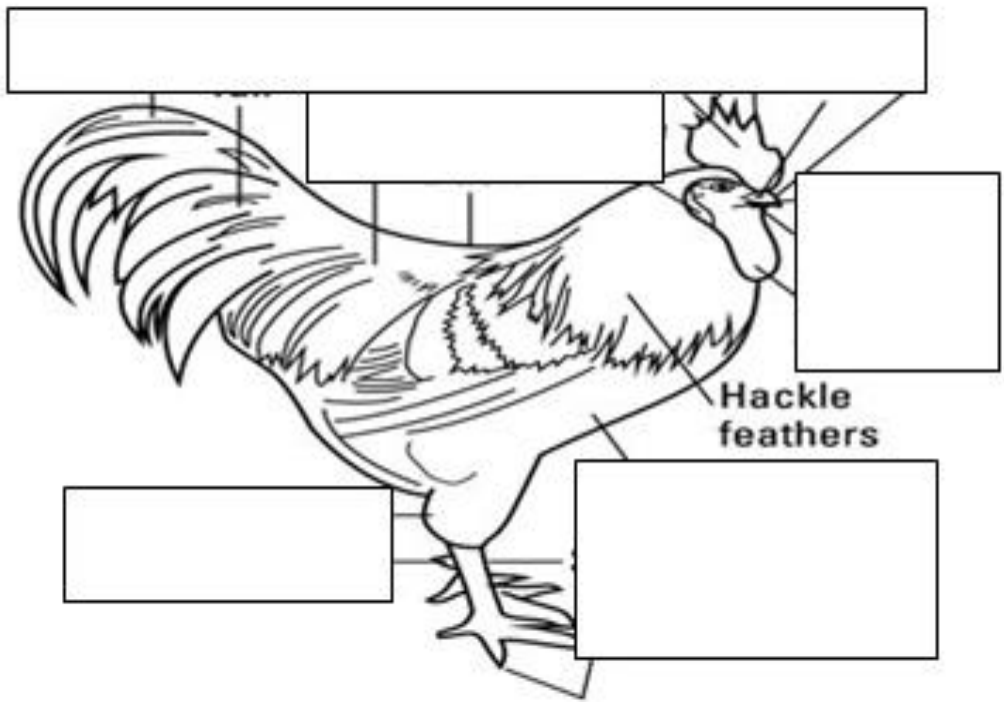
Strawberry Comb



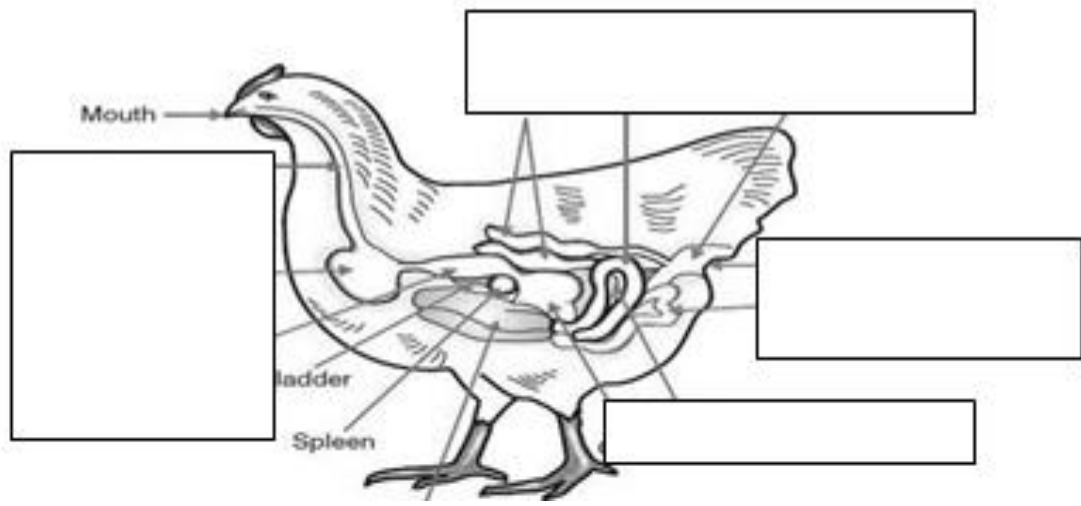
V-Shaped Comb

Question

1. Label the following diagrams.



1

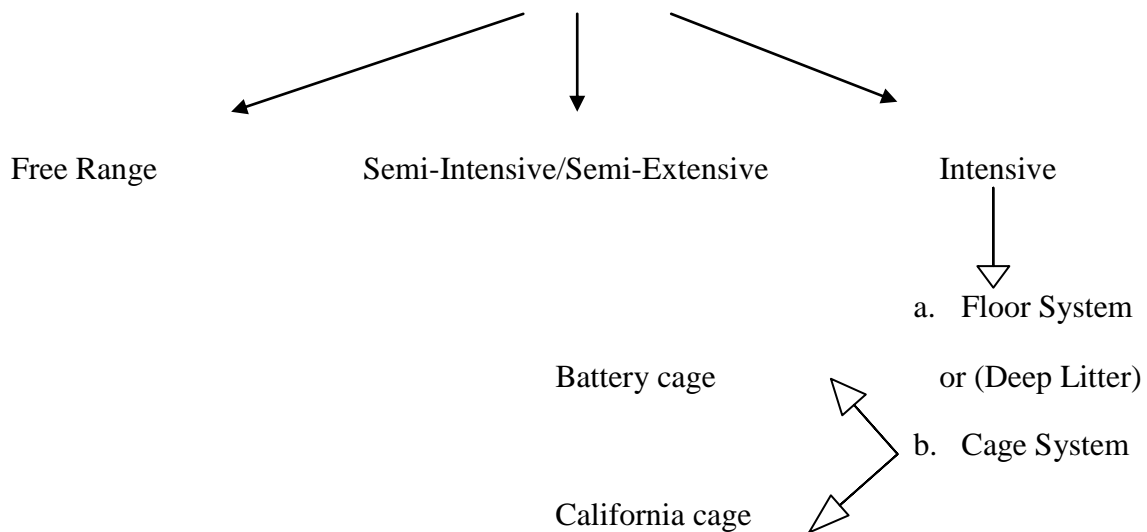


EXERCISE- 3

POULTRY HOUSING, FARM DESIGN AND COMMON FARM EQUIPMENTS

Objectives: To study different housing systems (advantages and disadvantages)

Poultry Housing



1. **Free-range system:** It is the oldest of all the systems. Birds are left loose on open fields to harvest their feed on their own fields, which is adequate enough. Birds use herbage, seeds, insects etc, as their feed. They are usually provided with shelter at night for protection from predators. This system is being used in village level for back-yard/court-yard poultry keeping (small-scale rearing) of 20-30 hens. On an average 200-500 birds can be reared on per hectare of land.

2. **Semi-Intestine system:-** This system is primarily used for laying and breeding flocks and given housing with 20-30 sq. Yard per bird free space for outside run. The runs-space are used on rotation basis. It was once popular, largely for breeding on the assumption that it imparts physical stamina to the birds. On an average 500-750 birds can be reared on per hectare of land.

3. **Intensive system:-** The birds are confined to houses entirely with bedding material on floor or wire netting in cages. It is mostly preferred for modern and commercial poultry farms.

I. **Deep litter system:-** Rearing the birds on floor, with spreading litter material like; paddy husk, saw dust, groundnut hulls, Sugarcane bagasse etc. Where they defecate and live on.

It is mostly adopted to rear broilers and breeders. This system mainly depends on two factors for its absolute success:

- i. Dryness of floor
- ii. Bacterial action of the litter:- There is considerable synthesis of animal protein factor (APF) and Vitamin B12 due to bacterial fermentation of litter material.

II. **Cage system:-** mostly used for commercial egg production . it was originally introduced for single laying hen to allow recording of individual egg production and culling of poor layers. Later several birds 3-6 were held in each cage and called colony cage. For any stock feed is supplied in a trough placed in front of the cage and water in automatic system such as nipple, cup or through line in the cage. The eggs are collected in front of the cage whereas droppings are collected below the cage on floor.

A). **Battery cage system:** The compartment of cages are arranged one above the other in 3-4 tiers on stands and dropping tray is kept underneath of each tier for collection of faeces. It provides space for about thrice the number than litter system and one and half than California cage.

B). **California cage or Reverse cage:-** The compartments of cages are arranged stepwise on both sides of cage row in 2-3 tiers, on stands in platform house. Because of special design, the droppings from all compartments fall on ground or pit under cages. This system provides space for twice the number of birds than deep litter system. The faecal material should be removed once in an interval of 12 months, along with disposal of birds'

Advantages of cage system: Less space required per bird. Elimination of the use of bedding i.e. litter material. Reduction of jobs like litter removal and thus labour cost. Eggs obtained are clean, this reducing chances of breakage. Day to day management operations like feeding, watering and egg collection are easy to conduct. Feed consumption is less by 5-10 gm/bird/day. Culling is easy. Monitoring of individual is possible. Less chances of diseases transmission. Space requirement is less. There is no cannibalism in cage system. Early diagnosis of diseases possible.

Disadvantages: Higher initial cost than conventional solid floor. i.e. infrastructure is costly. Less flexibilities in the use of building. There may be problems of flies. More labour required. Problem of cage layer fatigue.

Advantages of Floor rearing: Lower initial cost i.e. infrastructure is cheaper. Number of labour requirement is less. Lesser chance of fatigue.

Disadvantages: Chance of disease producing is more due to the close contact. Space requirement is more. Monitoring of individual is not possible. Cannibalism is more pronounced. No early diagnosis of diseases. Production of soiled eggs.

Housing units of an Ideal poultry farm: In poultry farm such units become well set up for maximum production and these units lead the farm in profit.

1. Brooder house.
2. Grower house.
3. Layer house.
4. Broiler house.
5. Feed mill.
6. Egg storage house.
7. Feed store room.
8. Office.
9. Incinerator room.
10. Pump house.
11. Hatchery.
12. Generator room.
13. Incubator room.
14. Sexing room.
15. Poultry meat processing room.
16. Packing and dispatch room.

Questions:

1. Write the advantages and disadvantages of cage system?

EXERCISE- 4

POULTRY FEED INGREDIENTS AND ASSESSMENT AND PREPARATION OF POULTRY FEED

Objectives:

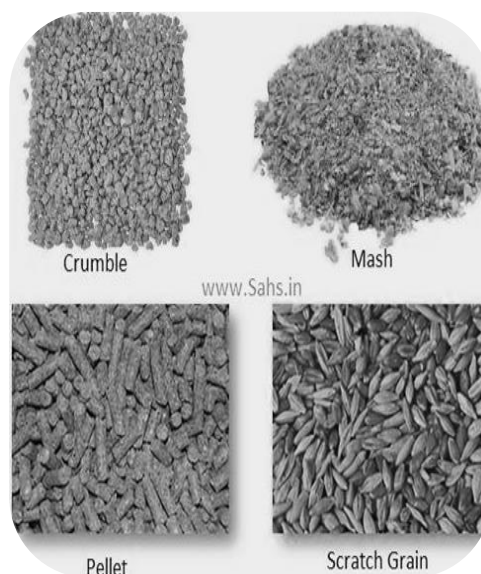
- To study different systems of feeding.
- To study the different feed ingredients and the methods of feed formulation.
- To study the standard nutrient requirements for broiler and layer.

Principles of feeding poultry:

1. Feeds accounts 65-70% expenditure in production so care must be taken for correct feeding.
2. Birds are more sensitive for environmental changes so careful nutritional adjustment is required.
3. The feed should be balanced and devoid of all anti-nutritional factors.

BIS standards, poultry feed requirements

Characteristic	Broiler starter feed	Broiler finisher feed	Chick feed	Growing chicken feed	Laying chicken feed	Breeder layer feed
Moisture (maximum %)	11	11	11	11	11	11
Crude protein (N x 6.25) (maximum %)	23	20	20	16	18	18
Crude fibre (maximum %)	6	6	7	8	8	8
Acid-insoluble ash (maximum %)	3.0	3.0	4.0	4.0	4.0	4.0
Salt (as NaCl) (maximum %)	0.6	0.6	0.6	0.6	0.6	0.6



Classification of feedstuffs:

- a) **Energy sources:** Cereals and their by-products are major sources of energy. Maize, Wheat, Sorghum, Broken rice, Rice kani, Fat & Oils are high energy supplements. Pearl millet, Finger millet, Rice bran, Rice polish, DORB, Molasses, Tapioca meal etc. are low energy supplements. Maize is commonly used energy ingredients for poultry in India.
- b) **Protein sources** (Plant protein and animal protein feed stuffs): Groundnut cakes, Sunflower meal, Soybean meal, Coconut oil cake, Cottonseed meal, Safflower meal,

rapeseed meal etc. are plant protein in feedstuffs. Animal protein sources include Fishmeal, Meat meal, Meat cum bone meal, Poultry by product meal, Blood meal etc. soybean –meal is commonly used protein ingredient for poultry in India.

- c) **Mineral supplements:** Minerals are supplemented either through a readymade mineral mixture or through specific mineral supplements. Two types of mineral mixtures are available in market 1) with salt (2) without salt. Calcium carbonate/marble chips are used as calcium and dicalcium phosphate as source of calcium and available phosphorus. Trace minerals are added as premix (market preparation) or prepared at mill.
- d) **Vitamin supplements:** Vitamins are supplemented either through premixes or through individual vitamins. Two types of vitamins are available in market. One premix supplies vitamin A, D3 and Riboflavin (B2) and in some products vitamin D and K are also present. The other premixes supply water-soluble vitamins including group of B-complex and vitamin C.
- e) **Feed additives:** These are not dietary essential. Common feed additives are Antioxidants, Coccidiostats and other like arsenicals, flavouring agents, enzyme preparations, yeast, probiotics, prebiotics etc.

Feed formulation: Feed formulation is mathematical calculations to prepare a balanced diet.

- ✓ Ingredients selected for preparation of feed must be palatable.
- ✓ Nutritional value, merits, demerits, anti-nutritional factors of each ingredient must be evaluated before feed formulation.
- ✓ Micronutrients and feed additives should be carefully mixed for effective results.
- ✓ Optimum inclusion level, cost, keeping quality, availability, compatibility with other feed ingredients must be considered before utilizing any feed ingredients.
- ✓ Include locally available feed ingredients to prepare least cost feed formulation.

Different methods of diet formulation:

- **Pearson square method:** This is simple technique of feed formulation that helps in achieving one desired nutrient by mixing two ingredients. No consideration is given to vitamin, mineral and other nutrient requirements.
- **Hit and trial method:** Feed ingredients are inter-changed by trial-and error until the right combinations is found.
- **Algebraic method:** In this method, two or more ingredients could be mixed to obtain the desired quantity of one nutrient through solving simultaneous equations.
- **Computer method:** Computers are being commonly used for feed formulation in larger establishments. Though it is the most sophisticated way for formulating ration, however there are certain factors like (1) feed palatability (2) variation in the feed ingredient

quality (3) goals of feeding program (4) environment, health, stress on birds (5) processing of feed etc., which could not be taken into consideration during computer feed formulation. However, the computer offers fastest way of checking all possible combinations with the feed ingredients in short time.

Physical forms of feeds: Whole grains/ Mash feed / Pelleted feed / Crumbles/ Wet mash.

1. **Pellet method:** It eliminates selective feeding, reduces feed wastage render feed more utilizable. The size of pellet depends on age of birds, which are of 2, 4 and 6-8 mm size. The disadvantage is that pelleting involves more expenditure.
2. **Controlled or restricted feeding:** The feed restriction programs are followed for pullets from 6 to 20 weeks age and also for breeders: *Restriction on feeding time.*Restriction on feed consumption.*Skip-a-day feeding program.*Restriction of particular nutrient (e.g. protein or energy). *Alternate day feeding program.

The assessment of physical form of feed is made on the basis of following observations by examination of representative samples:

- Soundness of the grains and seeds
- Dampness or sensible moisture content in the feed.
- Colour of the ingredient
- Odour of the ingredient
- Texture of the ingredient
- Presence of cake formation and extent of caking
- Presence of extraneous materials in the food
- Infestation (insect and/or fungi)

Questions:

1. What are the physical forms of feed.

EXERCISE- 5

ECONOMIC TRAITS OF BROILERS, EGG TYPE CHICKEN AND A.I. IN POULTRY

OBJECTIVES

- (i) To evaluate the production performances of birds.
- (ii) To assess the financial condition of the enterprise.
- (iii) To suggest the correcting measures for improvement of the economic efficiency of the business.
- (iv) To formulate guidelines for future improvement, planning and expansion.

Problems associated with poultry production:

- Disproportionate and uncertain market price of Chicken produce, the poor marketing system.
- Shrinking feed resources and lack of quality feed ingredients.
- Inaccurate budgeting.
- Lack of proper government policies.
- Unawareness of the farmers and follow of conventional system.
- Small farm holding and secondary priority of the farmers and subsistence production of poultry.
- Danger of various known and unknown disease and poor bio-security measures.
- Poultry diseases are the major cause for undeveloped poultry farming.
- Development of urban centralized farms.
- Lack of manpower.

Important economic traits:

1. Egg production: The number of eggs a hen will lay during a laying cycle depends upon

- ✓ Age when it sexually matures,
- ✓ The length of laying cycle (persistency),
- ✓ The rate of egg production(intensity of lay),
- ✓ Number of pauses during which no egg is laid,
- ✓ Number and duration of broody periods.

2. Egg weight: Egg weight or egg size being a highly heritable trait can be improved by selection. The first egg laid is usually smallest and is about 75% of the maximum weight that can be reached. Final egg weight is influenced by age at puberty, body weight and rate of lay. Birds which mature earlier and those with high production potential tend to lay smaller eggs.

Egg weight is high for heavy breeds than light breeds. Other factors affecting egg size are nutrition, season and disease conditions. Birds housed in cages may lay larger eggs than those housed on floor.

3. **Egg quality:** External quality of the egg is judged from its color, shape, texture and breaking strength (or shell thickness). The internal quality is assessed from the quality of albumen, yolk and the presence or absence of blood and meat spots.

4. **Body size and conformation:** Body size is usually measured by weighing the birds. Optimum body size is very essential in laying chickens to obtain eggs of satisfactory size. Conformation refers to body proportions and is more important if broilers are not sold as whole birds. Conformation is determined both by bone structure and fleshing.

5. **Growth:** Rapid juvenile growth reduces the cost of production by saving labour, time and feed. Growth rate is fairly high up to approximately 12 weeks of age in broilers, 5 weeks of age in quails and 16 weeks of age in turkeys after which it slows down.

6. **Feed efficiency:** Better understanding about the nutritional requirements and formulation of high energy rations have also contributed significantly for improving feed efficiency. Feed efficiency in layers is measured either as amount of feed consumed in kg/dozen eggs or as amount of feed consumed in kg/kg egg mass. Small bodied birds are most efficient for egg production as they consume less feed.

7. **Fertility and hatchability:** Breeds, strains, family as well as individuals within a family differ with respect to fertility and hatchability. Inbreeding depresses those while outbreeding increases. Age of birds, season, nutritional status of flock, diseases and management conditions affect both fertility and hatchability.

8. **Heritability% of certain quantitative traits:** Egg weight55, Actual body weight55, 8 week broiler weight45, Egg shape40, Breast fleshing30, Egg production25, Age at sexual maturity25, Body depth25, Shell thickness25, Albumin quality25, Keel length40, Hatchability of fertile eggs15, Blood spots15, Adult liveability10, Chick liveability05, Fertility05.

ARTIFICIAL INSEMINATION IN POULTRY

Artificial insemination (AI) is an important tool to improve the reproductive performance of birds especially broiler breeders and turkey where fertility is low due to heavy body weight.

- The techniques available at present permits to collect semen and use it for insemination immediately with or without dilution using semen diluents at 1:2 ratio, semen collected from one cock is sufficient for inseminating 5 to 10 hens depending upon the semen volume and sperm concentration
- At farms, where AI is practiced the males are kept separately in individual cages where sufficient space is available for movement of the birds.

- There should be a particular team of workers to associate collection and insemination of semen.
- Frequent changes of personnel in the team may affect the normal behaviour of birds.
- Rough handling should be avoided, if not it may develop fear reaction, which affects the semen volume during ejaculation.

CHARACTERISTICS OF POULTRY SEMEN

- Usually cock start producing semen from the age of 16 weeks but fertilizing capacity of the semen is low. So the cocks from 22 to 24 weeks of age are used for semen collection. The natural colour of poultry semen is white or pearly white.
- Heavy breed male can produce 0.75 to 1 ml semen and light breed male can produce 0.4 to 0.6 ml of semen. A male can be used thrice in a week for semen collection with a gap of one day. Although every day semen collection will not change the fertilizing capacity but the volume of semen will be low.
- Semen consists of spermatozoa and seminal plasma. Fowl semen is generally highly concentrated (3 to 8 billion spermatozoa per ml for broiler fowl). This is due to the presence of limited amount of seminal plasma since the accessory reproductive organs are absent in avian species. The seminal plasma is derived from the testes and excurrent ducts.
- At the time of ejaculation a lymph – like fluid (also known as transparent fluid) of cloacal origin may be added to the semen in varying amounts. The addition of transparent fluid to semen at the time of ejaculation act as an activating medium for the previously non- motile spermatozoa, thus ensuring their transport from the site of deposition to the sites of sperm storage tubes in the utero-vaginal junction of the hen’s oviduct.

EQUIPMENT NEEDED FOR A.I.: Small glass funnel with stem plugged with wax, Inseminating syringe, wide mouthed glass vial, Small pyrex semen cup, large flask to hold water at 18°C to 20°C range for short time holding of semen.

STEPS IN A.I.

- AI in poultry is a three – step procedure involving semen collection, semen dilution and insemination. The second step may be omitted if ‘neat’ semen (undiluted) is to be used for inseminations within 30 minutes after collection.

SEMEN COLLECTION

- The first step in AI program is manual collection (milking) of the semen. For semen collection, a team of two members are generally involved, one for restraining the male and the other for collecting semen. The bird is held in a horizontal position by a person at a height convenient to the operator who is attempting to collect the semen.

- To collect semen the operator should place the thumb and index finger of the left hand on either side of the cloaca and massage gently. By his right hand the operator should hold a collecting funnel and with the thumb and index finger massage the soft part of abdomen below the pelvic bones.
- Massage should be rapid and continuous until the cock protrudes the papilla from the cloaca. Once the papilla is fully protruded, the previously positioned thumb and index finger of the left. Avoid contamination of semen with faeces and feather.



INSEMINATION

- All equipment used for insemination should be thoroughly cleaned and dry before use. Insemination must be carried out when majority of the birds completed laying since a hard shelled egg in the lower end of the oviduct obstructs insemination and lowers fertility.
- In practice, inseminating in chicken after 3 pm obtained better results. In turkey flocks much better results are obtained if insemination is done after 5 pm. It is difficult to inseminate Non-laying hens. Hens are inseminated twice during first week and then at weekly interval.



PROCEDURE: Bird is held by the legs with the left hand down and tail tucked back and against the operator chest. The thumb of the right hand is placed against the upper lip of the vent then with a rounding motion press the abdomen muscle. Do not squeeze with fingers but apply pressure evenly with the palm of the hand. When the oviduct is averted, the second operator inserts the syringe into oviduct as far as it is going inside without exerting pressure.

The insemination apparatus is introduced into the vagina about 1 inch and semen is deposited at the junction of vagina and uterus.

DOSE AND FREQUENCY OF INSEMINATION

- **Chicken** : 0.05 ml, once in a week.
 - **Turkey** : 0.025 ml once in every 2 weeks.
 - **Ducks** : 0.03 ml once in every 5 days.
 - **Goose** : 0.05 ml for every 7 days.
- It has been observed that the males produce more semen of good quality during morning and female produce more fertile eggs when inseminated around 9 p.m.

SEMEN VOLUME AND SPERM CONCENTRATION IN DIFFERENT SPECIES OF POULTRY

Species	Volume (ml)	Sperm concentration (million per ml)	Need of sperm concentration per insemination (million)
Broiler type chicken	0.7	3500	150 to 200
Layer type chicken	0.5	4000	150 to 200
Tom	0.25	9000	300
Gander	0.6	2500	250
Drake	0.3	4000	300

Questions:

1. What are the main traits in broiler and layer traits?

EXERCISE-6

CALCULATION OF DIFFERENT ECONOMIC INDICES OF BROILER AND LAYER FARM

OBJECTIVES

- (i) To evaluate the production performances of birds.
- (ii) To assess the financial condition of the enterprise.
- (iii) To suggest the correcting measures for improvement of the economic efficiency of the business.
- (iv) To formulate guidelines for future improvement, planning and expansion.

PRODUCTION INDICES FOR BROILER BIRDS

A. Average body weight at market age (6 weeks of age): It is calculated by dividing the total body weight of a flock by the number of birds at the time of marketing. Ideal value becomes 1.82 kg.

B. Feed conversion ratio (FCR): It is obtained by dividing the total amount of feed consumed by the amount of live broiler weight produced.

i.e., $FCR = \text{Total amount of feed consumed} / \text{Total body weight gain}$

A value of less than 2.00 at 6 weeks of age is preferable.

C. Feed cost per kg of broiler produced: It is calculated by the multiplication of FCR with cost per kg of feed.

D. Performance efficiency factor (PEF): The PEF is derived by dividing the live body weight of the flock by FCR and number of chicks purchased, multiplied with 100.

Total live body weight of the flock i.e. $PEF = \text{Live wt.} / FCR \times \text{no. of chicks purchased} \times 100$

The higher the PEF better will be the performance of the flock. A value of 100 or higher is desirable.

E. Gross margin per unit floor space: It is calculated by subtracting the total cost of raising (cost of chicks, feed, medication, etc.) from gross income and then dividing the result by the total area of floor space.

Gross income - Total raising cost i.e., $\text{Gross margin per unit floor space} = \text{Total floor area (in sq. ft. /sq. m.)}$

F. Production number (PN): It is calculated as follows

$PN = \text{Daily growth} \times \text{Survivability (\%)} \times FCR \times 10$

Average final weight/bird where, Daily growth = Average fattening period

Survivability % = 100 - Percent mortality.

G. Broiler performance efficiency score:

It is calculated based on the body weight, feed efficiency and livability at six weeks of age; giving appropriate score for each of these three traits; based on their relative economic importance.

Score card to judge the broiler performance efficiency

Trait Optimum Range

(i) Average live weight at 6 weeks of >1.6-1.3 to 1.8 age (kg)

(ii) FCR <2.0-1.8 to 2.1

(iii) Percent livability >95.0-92.0 to 98.0

A broiler farm should try to attain minimum score of 70.

PRODUCTION INDICES FOR LAYER BIRDS

1) Egg production

The egg industry has two principal methods of measuring daily, weekly, and total egg production i.e. the hen-day and hen-housed systems.

(i) Hen-Day Egg Production (HDEP)

$$\text{HDEP} = \frac{\text{Total number of eggs produced on a day}}{\text{Total number of hens present on that day}} \times 100$$

HDEP is usually expressed in percentage. It is mostly used for the scientific studies and truly reflects the production capacity of the available birds in the house. A farm average of 85% or more per year is desirable.

(ii) Hen-Housed Egg Production (HHEP)

$$\text{HHEP} = \frac{\text{Total number of eggs laid on a day}}{\text{Total number of hens housed at the beginning of laying}} \times 100$$

period

It is usually expressed in numbers. HHEP values of 80% or 295 or higher are desirable. Although HDEP is an excellent indicator of how well the live birds are laying, it does not consider egg size and egg quality. Since these factors help in determining the income from eggs, HDEP is often misleading from a profit standpoint. It also fails to account for past mortality. However, it is the best egg production index available and is universally used by the industry.

From a cost of egg production standpoint, HHEP is good as it measures the effects of both egg production and mortality. If there is no mortality during a period, the HDEP and HHEP are equal.

2) Egg Mass

The use of egg mass rather than egg numbers will lead to better comparisons of flocks or strains of birds. To calculate egg mass it is first necessary to determine the average weight of eggs by weighing representative samples of the eggs produced.

$$\begin{array}{l} \text{Average egg mass} \\ \text{(Per hen per day in grams)} \end{array} = \text{Per cent HDEP} \times \text{Average egg weight in grams}$$

3) Feed efficiency (Feed conversion ratio – FCR)

(i) Feed efficiency per kg egg mass

This takes into consideration of the feed intake, egg weight and egg production. It is the ratio between the feed consumed and the egg mass.

$$\begin{array}{l} \text{FCR (per kg egg} \\ \text{mass)} \end{array} = \frac{\text{Kg of feed consumed}}{\text{Kg of egg produced}}$$

A value of 2.2 or less is advantageous to the farm.

(ii) Feed efficiency per dozen eggs

This takes into consideration of the feed intake and egg production. It is the ratio between the feed consumed and the number of eggs produced.

$$\begin{array}{l} \text{FCR (per dozen} \\ \text{eggs)} \end{array} = \frac{\text{Kg of feed consumed} \times 12}{\text{Total eggs produced}}$$

A value of 1.5 or less is advantageous to the farm.

4) Net Feed Efficiency Index (NFEI)

This is based on egg production, egg weight, feed intake and body weight gain.

$$\text{NFEI} = \frac{(\text{EM} + \text{BW}) \times 100}{\text{FC}}$$

Where,

EM = Mean egg mass in g during a specific period

BW = Mean body weight gain or loss in g during a particular period

FC = Mean Feed consumption/hen in g during a particular period

NFEI value of 45 and above is desirable.

5) Egg Feed Price Ratio (EFPR)

It is used to find out the ratio between the receipts from egg and expenditure on feed.

$$\text{EFPR} = \frac{\text{Total value of egg produced}}{\text{Total value of feed consumed}}$$

An EFPR ratio of 1.4 and above is desirable.

EXERCISE-7

POST MORTEM EXAMINATION AND SAMPLING, COLLECTION, DISPATCH OF SAMPLES

Necropsy or post-mortem examination is the study of gross pathological lesions which is done with an aim to ascertain the cause of death by systemic exposure and through examination of cadaver (dead animal).

Selection of the bird

Selection of specimen is of vital importance, especially if the flock is not seen. A few each of recently dead, sick and sometimes apparently healthy birds should be submitted to the laboratory for blood sampling, necropsy and diagnostic examination in order to get a true picture of the situation. This is also important owing to the fact that the magnitude and pattern of lesions vary with the individual birds even for a single disease.

Euthanasia of the birds for necropsy

It is most important that the investigator be able to sacrifice birds quickly and completely so that it does not suffer in the process. The methods must be a humane scarification in accordance with the prevailing ethical guidelines leading to the least discomfort to the bird. The following methods may be employed.

Cervical dislocation/Breaking the neck

This is the quickest way to kill small bird and also considered to be humane method of killing. The small or medium birds may be suitably killed. The method is inadequate if histological investigation of brain is required as the process results in congestion of cerebral vessels.

Method- Hold the legs, or alternatively the base of the wing together over the back in left hand. Grasp the head with the palm of right hand against the back of the birds head, resting in the hollow formed by joining the forefinger and thumb. The head is bent vertically upwards by the thumb under the beak, whilst at the time the head is pulled firmly and steadily forward, stretching the neck, dislocating the skull from the neck and breaking the cord. Stretching must stop as separation is felt, otherwise the head will be pulled off the body. The base of the wing should be held firmly as there will be violent reflex movements of the limbs. In case of chicks, the neck may be suitably broken by pressure with the thumb against a sharp edge, alternatively by placing the neck between the two shafts of handle end of a large pair of scissors, which are then fully closed together.

Use of Anaesthetic drug for Anaesthesia

1. Injectable Anaesthesia

Pentobarbitone solution or some other suitable anaesthetic agents may be injected intravenously or by the intracardiac route.

2. Inhalation Anaesthesia

Avian species are very susceptible to chloroform which may conveniently be placed on the thick cotton wool pad at the bottom of a narrow jar, bird's head is then placed in the mouth of the jar. Care should be taken to allow air to enter the jar to avoid suffocation. This method may be suitable when histological examination of brain tissue is to be carried out e.g. New Castle Disease, Avian encephalomyelitis and avian influenza.

Acceptable Euthanasia methods for birds

Agent	Classification	Ease of use/Safety	Rapidity	Comments
Barbiturates	Hypoxia due to depression of vital centers	Animal must be restrained; Personnel must be trained in use; DEA controlled substance	Rapid onset of anaesthesia	Highly effective
CO ₂	Hypoxia due to depression of vital centers	Use in closed container; minimal hazard	Moderately rapid	Effective but time required may be prolonged

Conditionally Acceptable Methods

Agent	Classification	Ease of use/Safety	Rapidity	Comments
Cervical Dislocation	Hypoxia due to depression of vital centres	Requires training and skills; safe	Moderately rapid	Irreversible; violent muscle contraction may occur
Decapitation	Hypoxia due to depression of vital centers	Requires training and skills; safe	Rapid	Irreversible; violent muscle contraction may occur
Nitrogen; Argon	Hypoxia	Use in closed chamber with rapid filling	Rapid	An effective agent but other methods are preferable.

Material required for the post-mortem examination of birds

1. Disinfectant or detergent solution-to dip the entire bird or to wet the body to control dust and feathers
2. Disposable hand gloves, face masks, head cap and aprons
3. Post-mortem tray, Surgical-Scissors, forceps and scalpel of various sizes
4. Weighing balance, Table with sufficient light, History sheet to record the result
5. Syringe and needles, Spirit or alcohol, Sterilized cotton swabs
6. Clean glass slides and permanent marker
7. Sampling bottles with tissue fixative like 10% neutral buffered formalin, 10% Formal saline, 50% Phosphate buffered glycerine, PBS (pH 7.3-7.4) and Hank's balanced salt solution.

Necropsy procedure of Poultry

The method for necropsy of birds is as follows

1. Dampen the plumage with a disinfectant solution to limit the dispersion of infected dust and feathers. The bird must be placed on its back with feet towards the operator.
2. Dislocate the coxo-femoral joint and the skin over the abdomen should be cut and removed. The anterior of joint of the limbs may then be examined and the muscle groups parted to reveal the sciatic nerve.
3. The superficial breast muscles should be examined to determine whether decreased muscle mass, paleness (anaemia), haemorrhage, congestion or bruising are present.
4. The abdominal muscles, ribs and coracoid bone may be cut with robust scissors (poultry shears) and removed from the chest to expose the internal organs and the chest cavity, the liver, lungs, heart and the air sacs can now be examined.
5. Angle of jaw is cut. With the blunt point of scissors inside the oesophagus the cut is continued down the neck thus exposing the pharynx, oesophageal lining and trachea for examination.
6. A longitudinal section of the larynx, trachea and larynx will facilitate accurate examination of the mucosa and the collection of samples by swabbing.
7. The lungs must be gently removed from the ribcage with the trachea.
8. Incise pericardial sac and take out the heart by cutting the larger blood vessel arising from it.

9. The gastrointestinal canal may be excised between the oesophagus and proventriculus and in the vicinity of the rectum near the cloaca.
10. The proventriculus, gizzard and intestine can then be removed with the pancreas, liver and spleen. The spleen is a small, red, round organ located at the junction of the proventriculus and gizzard.
11. The proventriculus and gizzard are to be cut open to detect the presence of feed (indicating that the bird has/had not suffered from anorexia) and for the presence of submucosal haemorrhage.
12. Examine the kidneys (elongated and lobulated organs embedded) in the vault of the pelvis and observe ovaries and oviduct or paired testes, which are positioned on the top of the kidneys.
13. The Bursa of Fabricius should be carefully observed to note any changes.
14. The sciatic plexus beneath the kidneys should be examined by the removal of the kidney tissues by the blunt dissection. The brachial plexus should also be examined on the either side near the thoracic inlet.
15. Softness and hardness of bones should be noted during sectioning and the degree of bend and sharp in the long bone should be assessed for evidence of rachitic changes.
16. To collect the brain, disarticulate and detach the head from the atlanto-occipital joint and raise the skin to expose the skull. Holding the skin with a hand, pull towards the beak and incise the skull from the occipital foramen forward in two tangential cuts to both orbits, joining the incisions frontally. The cranial vault may be removed exposing both the cerebral hemispheres, optic lobes of surgical forceps under the anterior region of the brain case and leverage gently upwards.

The necropsy is concluded with an examination and sampling of the mucosal surface of the oesophagus, crop and intestine. Particular attention should be paid to lymphatic tissue, such as peyer's patches and caecal tonsils, which may appear enlarged and haemorrhagic. It is worthy to point out if the carcass is putrified and there is no other second thought to diagnose the septicemic disease, it would be appropriate to collect bone marrow aseptically for microbial isolation. All organs and tissues reflecting gross abnormalities should be collected using suitable preservative and then sent to the diagnostic laboratory at an earliest through a special messenger.

COLLECTION OF MATERIALS FOR LABORATORY EXAMINATION

The materials which should be collected for diagnosing various avian diseases are as follows

S. NO.	DISEASE	MATERIAL TO BE COLLECTED
1.	New Castle Disease	Brain, Bone marrow, Lung, Liver, spleen and serum samples.
2.	Infectious bursal disease	Bursa of Fabricius, Spleen, Kidney and Liver.
3.	Mark's disease	Brain, Nerve, Ovary, Testis, Liver, Spleen and Feather follicle (for virology).
4.	Lymphoid leucosis	Liver, Spleen, Kidney and Gonads.
5.	Infectious bronchitis	Trachea, Lungs, Air sac, Kidney (for virology).
6.	Infectious laryngotracheitis	Tracheal exudates for serology and virology. Trachea for histopathology.
7.	Avian Encephalomyelitis	Brain for virology, serum samples, Brain, Pancreas, Gizzard and Proventriculus for histopathology.
8.	Avian influenza	Tracheal plug, Brain and Pancreas for virology, Brain, Pancreas, Liver, Spleen and lungs for histopathology.
9.	Inclusion body Hepatitis	Liver for virology and histopathology.
10.	Egg drop Syndrome	Affected eggs for virology and serum samples.
11.	Fowl Pox	Piece from skin and other tissue lesions, serum samples.
12.	Leechi disease	Liver for virology and histopathology.
13.	Chicken infectious anaemia	Liver impression smears, Thymus, Bone marrow, and Liver for virology.
14.	Colibacillosis	Heart, Liver and Lungs for bacteriology.
15.	Infectious coryza	Swabs from infra orbital sinus.
16.	Fowl Cholera	Impression smear from liver and lungs, heart blood smear, Liver, Bone marrow, Heart blood for bacteriology.
17.	Fowl Typhoid	Liver, Spleen and Caeca for bacteriology, whole blood and serum for serology.

18.	Pullorum disease	Liver, Spleen and Caeca for bacteriology, whole blood and serum for serology.
19.	Necrotic Enteritis	Intestinal contents, Scraping of intestinal wall, haemorrhagic lymphoid nodules for bacteriology.
20.	Gangrenous Dermatitis	Exudates of skin and subcutaneous tissue or underlying muscle for bacteriology.
21.	Tuberculosis	Crushed lesion from Liver, Spleen and Bone marrow for bacteriology, Whole blood for serology.
22.	Spirochaetosis	Blood smears or staining, wet blood film for dark field microscopy, Serum samples.
23.	Chronic Respiratory Disease	Swabs from nasal cavity, Air sacs, Trachea and Lungs, exudates aspirated from infraorbital sinus and joints for bacteriology.
24.	Aspergillosis	Smears from lesions and lesions for culture.
25.	Mycotoxicosis	500 gm of suspected feed and mouldy clumps.
26.	Chlamydiosis	Impression smear from surface of liver or spleen and cloacal, tracheal or conjunctival swabs for culture. Serum samples for serology.
27.	Coccidiosis	Sick birds and faeces for examination, Piece of intestine and caeca for histopathology.

Questions

1. Mention the importance of P.M examination in Veterinary Science.

EXERCISE-8

SUMMER, WINTER AND RAINY SEASON MANAGEMENT AND FARM AUTOMIZATION

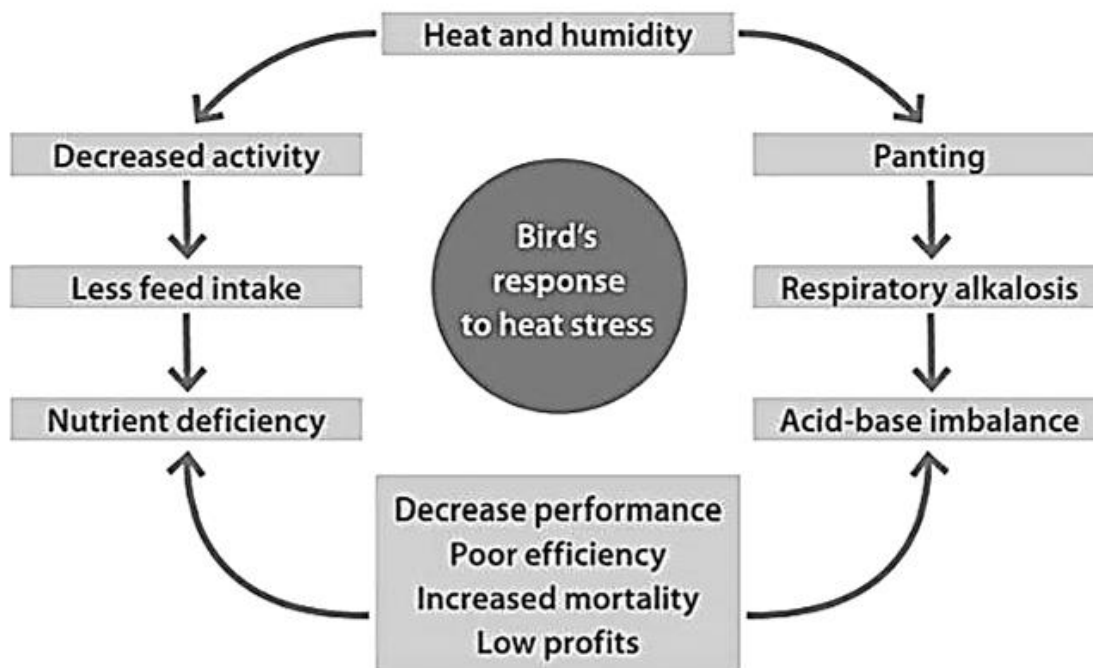
Objectives:

1. To identifying heat stressed or winter stressed birds during bad weather.
2. Managemental practices required to maintain farm production.

SUMMER MANAGEMENT:

The following clinical signs will be observed in heat stressed birds:

- Panting/rapid respiration, More intake of water
- Reduced appetite, Reduction of egg production, Poor egg shell quality
- Less body weight gain in broilers, Reduced feed efficiency
- Increase in body temperature, Death



SUMMER MANAGEMENT PRACTICES:

- Make sure roof or sidewall ventilation openings are clean and unobstructed.
- Inspect emergency generators, automatic curtain (or sidewall) drops and alarm systems to ensure they are functioning properly. Failure of this equipment to function properly will most likely result in catastrophic losses.

- Water is critical during hot weather. Inspect the watering system frequently to ensure water flow is consistent and unrestricted.
- Water in a closed watering system will quickly approach the temperature of the air around the pipe. Water consumption will decrease when the temperature of the water rises above 85 degrees. Flush the closed watering system two to three times each day during the hottest part of the day to remove warm water from the system. However, the birds will generally demand enough water to keep fresh water in the pipes.
- Orient the long axis of poultry house in an east-west direction to minimize solar heating and direct access to sunlight.
- Poultry houses in tropics should have good roof insulation (if possible with false roof to reduce the conduction of heat) with support of foggers and cooler systems.
- Thatching of roof with paddy straw or sugar cane leaves will reduce temperature inside the shed. The roof should be painted white to reflect light.
- Shades from tall trees and plantation around the sheds can reduce the radiant heat. The plantation of trees should be such that trees will be leafy during summer and bald during winter.
- Supply of plenty of clean and cool water (60-70°F) must be ensured during summer months.
- In water use aquacure to control infections through water. Increase number of waterers by 25%. Increase frequency of watering. Provide electrical energy (1-2 gm/liter) in water during hot hours.
- Addition of 0.25% of salt to drinking water increases water consumption. Adjust the amounts of medications and volumes of water used for water vaccination to reflect the increase water consumption of the flock during hot weather.
- In water use aquacure to control infections through water. Cover water tanks with wet gunny bags to avoid direct exposure to sun heat.
- Do not offer feed during day time in broilers. Increase the calcium level from 3-3.5% in layer diet.
- Increase nutrient density of feed to compensate for depressed feed intake. Energy of feed should be reduced. Crude protein content should not be increased because energy generated by one gram of fat is 16.5% or one gram of fat is 22.5%.
- Similarly 20-30% extra vitamins and trace minerals should be added to feed. Available phosphorus content of feed should be increased. Vitamin C is necessary to maintain integrity of blood vessels. Supplementation of vitamin C @ 200-500 gm/ton feed will be beneficial.

- Grow E-Sel @ 50 gm/ton feed will also be beneficial. Pelleted feeding is beneficial where low energy fiber diets are used. Add soda-bicarbonate @ 0.1% for improvement of shell quality.
- Inclusion of **Growvit-A** and **Grow E-Sel** 250 mg/kg diet for better performance and combat heat stress.
- Litter preferably fresh litter of 2 inches thickness with racking or stirring of litter 2-3 times a day during cool hours recommended.
- 10% extra floor space should be provided in summer. Overcrowding of birds should be avoided. Shifting, transportation, Debeaking and vaccination should be done during night or cool hours of the day.
- Birds severely heat stressed may be dipped in cold water for 2-3 minutes keeping their neck and head above water level. Use of paint, white lime etc practically reduces the shed temperature up to 2°C. Use side curtain in shed which should be sprinkled with water.
- Provide three exhaust fans on one side and pad cooling on other side (200ft) which completely seals the shed sides and brings down temperature below 8°C.
- High altitude of roof is ordinarily 2.6 to 3.3 m from foundation to the roof line to provide maximum ventilation. Provide one meter overhang to cut the direct sun and rain into the house.

WINTER MANAGEMENT PRACTICES:

- **ORIENTATION OF HOUSE:** Poultry house should be designed in such a way to provide all the comfort required by birds during winter. Orientation of a building with respect to wind and sun consequently influence temperature, and light on different external surfaces. In winter the arc of the sun's visible path is shortened, an east west alignment of a rectangular house provides a maximum gain of solar energy in winter. House should be designed in a way that maximum sun light enters the shed during day time. Birds should be protected from chilled winds, for this gunny bags should be hanged at the places from where the cold air enters. These gunny bags should be hanged down as soon as sunlight goes in the evening till the arrival of sunlight next morning.
- **VENTILATION:** During winter season it is necessary to keep the hose draft free but with plenty of ventilation. Birds release a lot of moisture in their breath and droppings which adversely affects their health, if there is restricted ventilation it causes ammonia build up in the air which causes respiratory problems. So, they need plenty of fresh air circulating around the house. For the purpose sliding windows are useful as they can be opened during day and closed during night. There should also be arrangement of exhaust fans to remove impure air.

■ **LITTER MANAGEMENT:** Prior to chick being placed in house, the surface of floor should be covered with a bedding material called litter. It gives comfort to the birds. A good quality litter serves as an insulator in maintaining uniform temperature, also absorbs moisture and promotes drying. It dilutes fecal material thus reducing contact between birds and manure. It also insulates the chicks from the cooling effects of the ground and provides protection cushion between bird and floor. Around 6 inches of litter is needed in houses during winter. The litter gives warmth to the birds during winter. If litter management is proper, it will be felt quite warm when taken in hand.

■ **FEED MANAGEMENT:** Poultry uses food for two main purposes i.e., as an energy source to maintain body temperature and to carry on normal physiological activities and as building material for development of bones, flesh, feather, egg etc.

- The variation in feed consumption is smaller for each degree Fahrenheit change in temperature when the weather is cold than when it is hot. Low temperature causes more feed intake and higher oxygen demand. Therefore, when the weather gets colder, it is essential to give the chicken plenty of food as they require extra energy for maintaining body temperature.

- Consumption of calories of ME/bird/day varies as the ambient temperature changes. Normally these differences are as follows:

- When bird eat more feed, along with energy, other nutrients are also consumed more which are actually not needed and they become a waste. To avoid this wastage during winter energy rich sources like oil/fat should be added to the diet or level of other nutrients may be reduced keeping the energy at same level

- In winter number of feeders should be increased as compared to summer.

- Feed should be available to the bird whole of the day. It has been experimentally proved that for proper growth of broiler during summer, diet containing 23% protein and 3100 Kcal ME/kg diet is needed. While in winter 3400 Kcal/kg ME and 23% protein is needed.

■ During winter season birds take less water so far maintenance of water in the body, it is necessary to give continuous supply of fresh water which can be taken by the bird.

■ Water must be fresh and clean. If water is cold enough, then it should be given to chicken after adding hot water to it, so that the water comes to normal temperature. In ice falling areas, blockage of pipe is a big problem due to freezing of water during winter season. When temperature goes below 0°C routine inspection of pipe line should be done to avoid blockage of water.

■ Many of vaccines/medicine/anti-stress vitamins are given to poultry through water. As water consumption of bird is reduced during winter season. Therefore, care should be taken that waterers are removed few hours prior to water medication and medicine/vaccine is given

in less amount of water so that birds can consume total water and each bird get benefit of medicine/vaccine or other supplements.

■ Start and adjust the brooder stoves 24 hours before the arrival of chicks. Ensure that they are working correctly. Adjust the temperature to 95°F (35°C) at the edge of the brooder 2 inches (5cm) above the litter. Lower the temperature by 5°F (2.8°C) each week until it reaches 70°F.

■ **Brooder Guard:**

1. Make the guards from material, which can be properly sterilized.
2. Height of Guard should be approximately 16 inches to 18 inches.
3. Guards will ensure chicks stay near the source of heat.
4. Helps in preventing chilling and piling.

■ Use of LPG operated Gas Brooders gives much more uniform heat as compared to conventional types of brooding practices like Electric Lamps, Coal or Wood. The radiant Gas Brooder creates microclimate for the chicks so that they can choose their most comfortable place and warmth at any time. This results in proper growth and weight gain, which is more uniform. LPG Gas Brooding can be done either by central Control System or by Individually Controlled Infra-Red radiant gas brooders. The number and types of Gas Brooders can be decided as per the specifications of the Gas Brooder. It is very important to note that the Gas Brooder, which you select, spells out the specifications in terms of BTU/KW rating, operating pressures etc. The temperature can be sensed by a sensor connected to the Individually Gas Brooders or the Central Control System.

Question

1. What kinds of summer and winter management are followed in our country?

UNIT – VI

INDEX

NAME :

BATCH:

S. NO.	NAME OF EXERCISE	PAGE NO.	DATE	SIGNATURE
1	To study hatchery layout and farm design.			
2	Project report for establishing a broiler farm, layer farm and breeder farm.			
3	Visit to commercial poultry farm, hatchery and feed mill.			

EXERCISE-1

TO STUDY HATCHERY LAYOUT AND FARM DESIGN

Objectives:

1. To study the important points in constructing a hatchery.
2. To understand the placement of different machines in the hatchery.
3. To understand the hatchery equipments installed with the aim of improving hatchability and chick quality, increase capacity and reduce labour and energy costs.

SIZE OF THE HATCHERY

- The size of the hatchery is based on the egg capacity of the setters and hatches, number of eggs that can be set each week and number of chicks hatched each week.
- Necessary space to be allotted for further expansion.

HATCHERY DESIGN AND CONSTRUCTION

Hatchery design

- Hatchery should be constructed in such a manner that the hatching eggs may be taken in one end and the chicks removed at the other.
- In other words, eggs and chicks should flow through the hatchery from one room to the one next needed in the hatching process.
- There should not be no backtracking. Such a flow affords better isolated of the rooms and there is less human traffic throughout the building.

HATCHERY CONSTRUCTION

- Hatchery buildings should be intricately designed, properly constructed, and adequately ventilated. Brief general points to be considered are,
 - **Width of the hatchery:** The width of the setter and hatcher rooms is to be determined by the type of the incubator used. Find the depth of the incubators; then allow space for the working aisles, behind the machines and the walls.
 - **Height of the ceiling:** The height of the ceiling should be at least 10 feet.
 - **Walls:** Fireproofs material should be used in constructing the walls of the hatchery building as far as possible because the interior of the hatchery building is continually being washed and disinfected, the inside walls should be covered with a glazed hard non-absorbent finish. This finish also prevents the growth of molds common to walls that are porous and absorbent.

- **Ceiling material:** Most hatchery rooms have a high humidity, and during cold weather condensation of moisture on the ceilings is common. Hence, the ceiling material is to be waterproof.
- **Doors:** The hatchery doors are wide enough for easy movement of trolleys, chick boxes etc. The door openings should be 8 ft high and at least 4 ft wide and double-swinging.
- **Floor:** All floors must be of concrete, preferably with imbedded steel to prevent cracking. The concrete must be given a glazed finish. Slope of the floor should never be greater than 0.5 inch in 10 feet.
- **Sewers:** Since very large amount of water is utilized for hatchery operations and the possibilities for settling of broken eggshells in the sewer lines, it is necessary to have larger sewers in hatchery than those used in most industrial buildings.
- **Water lines:** Large amounts of water will be used in the hatchery for washing hatching trays and cleaning as well as in the incubators. Hence the incoming water lines are adequate in size.
- **Docks:** Unloading eggs from trucks and loading chicks into trucks will be implemented so dock constructed at truck height is used. The top of the dock should be level with the floor of the hatchery, constructed of concrete, with a drain in the middle.
- **Electric lines:** Electric points are to be kept at the convenient height of equipment to be used.

HATCHERY ROOMS / STRUCTURES

- Hatchery rooms must be adequate in size. Usually, hatcheries of medium size will hatch chicks twice a week, but large hatcheries will hatch more than two hatches per week.
- Consequently, hatching schedules will affect the size of some rooms in the hatchery.
- The following are the rooms/structures available in the hatchery for efficient functioning:
 - I. Shower room
 - II. Getting hatching eggs into the hatchery
 - III. Fumigation room
 - IV. Egg holding (egg-cooler) room
 - V. Pre-incubation warming room
 - VI. Setter room
 - VII. Egg candling (dark) room
 - VIII. Hatcher room

- IX. Chick-holding room
- X. Wash room
- XI. Clean room
- XII. Other hatchery rooms

Depending on the type of the hatchery, other rooms are often found, including

Small office

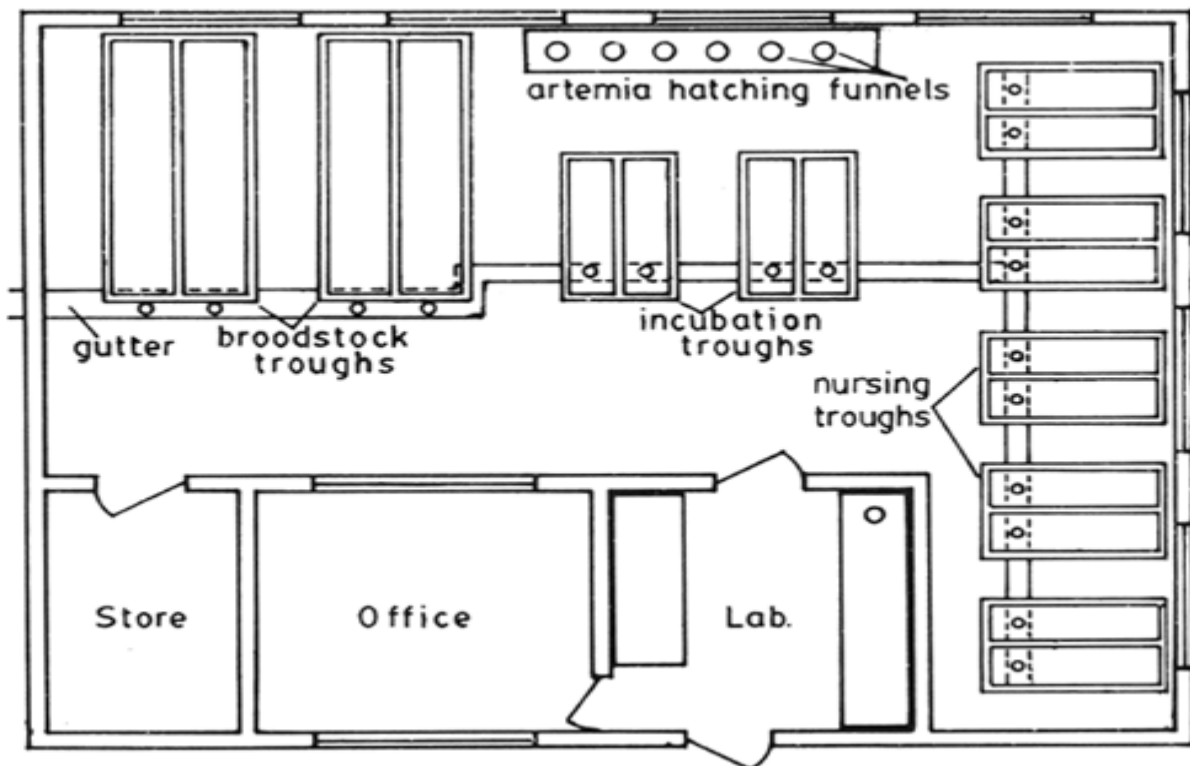
Lounge and lunch room

Rest room

Tool room generator room

Box storage room

Electrical control room



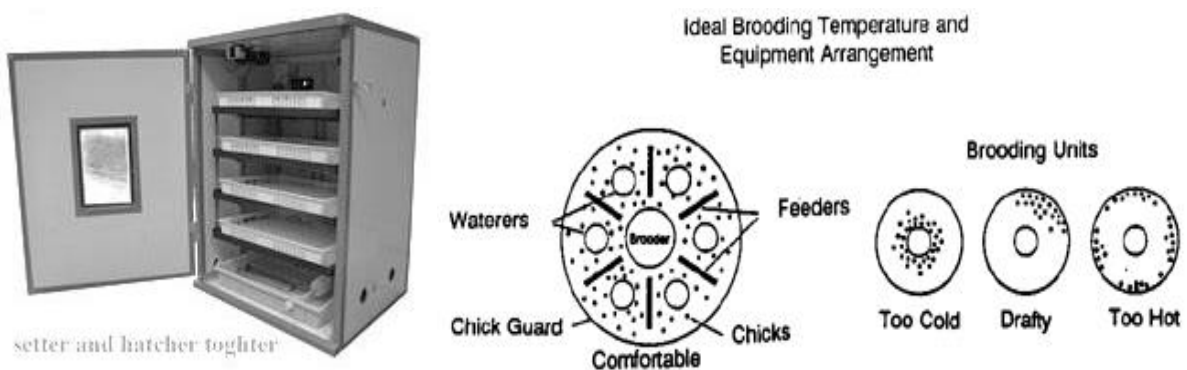
LAYOUT DESIGN FOR AN HATCHARY

HATCHERY EQUIPMENT

- The hatchery equipments are installed with the aim of improving hatchability and chick quality, increase capacity and reduce labour and energy costs.
- Some of the equipments are common to all hatcheries while the others are required for certain types of hatcheries.

INCUBATION EQUIPMENT

- **Setter**
 - It is a machine in which proper temperature, humidity and turning are provided for the first 19 days of incubating chicken egg



- **Hatcher**
 - It is similar to that of setter but turning mechanism is not available and the trays are designed to hold the newly hatched chicks.
 - Here, the eggs are placed for the last three days of incubation.
 - Various styles of Setter and Hatcher found around the world include,
 - Walk-in or Corridor incubators
 - Tunnel type incubators
 - Vertical fan incubators

EGG HANDLING EQUIPMENT

- Hatching egg trays
 - Generally hatching eggs are set in the flats or bug-eye type trays.
 - The capacity of each tray is either 90 or 180 chicken eggs.
- Hatching egg transfer machines
 - This is used to transfer the eggs from the breeder farm trays to hatcher trays.

- Vacuum egg lifts are usually employed in the hatcheries handling large volume of eggs

WATER EQUIPMENT

Water softeners and filters

- Water with high total dissolved solids will cause deposits on the humidity controls, spray nozzles, jets and valve seats.
- Therefore filter systems and water softeners are necessary to reduce the TDS content of the water used for hatchery operations.

Water heaters

- Hot water will be necessary for operating most hatchery tray washers and for general clean up.
- A large capacity boiler is generally used to provide hot water.

Compressed air

- Some incubators require compressed air to actuate the turning mechanism for the racks of eggs.
- A large central compressed air system is needed for blowing down dust and other dry cleaning in the hatchery.

EMERGENCY STANDBY ELECTRIC PLANTS

- When there is a failure in the local electrical supply, the incubators must have a secondary source of electricity.
- Therefore, a standby electrical generator located on site, generally within, or next to the hatchery building is imperative.
- The standby electrical generator should have the capacity to support the all essential services of the hatchery.

EGG CANDLER

- It is a lighting device, used to find out the internal structure of eggs.
- Two types of egg candler are available, individual and mass candler.

HATCHERY AUTOMATION EQUIPMENT

- Hatchery tray washers
- Waste removal systems

- Egg transfer machines
- *In ovo* vaccination equipment
- Chick box washers
- Rack washers
- Vaccinating / sexing / Grading systems
- High pressure pumps

Question:

1. Write briefly about hatchery operations.

EXERCISE-2

PROJECT REPORT FOR ESTABLISHING A BROILER FARM, LAYER FARM AND BREEDER FARM

Objectives

- To start a broiler hatchery for producing 50,000 broiler chicks per week.

TECHNICAL DETAILS

- Eggs set per batch – 30,000
- No. of batches per week – 2
- Cost of one hatching egg – Rs. 11
- Capacity of one setter – 30,000 eggs
- Capacity of one hatcher – 10,000 eggs
- Average hatchability – 85%
- Investment details: 25% by the investor and 75% by the bank

I. Cost of building			
Construction of R.C.C. roofed hatchery building			
@ 8,800 sq.ft (110' x 80' size)			
@ Rs. 800 per sq.ft.		: Rs.	70,40,000
Total expenditure on building		: Rs.	70,40,000
II. Cost of equipment			
Cost of incubators			
	@ 6 double setters with 30,000 eggs capacity each		
	@ 3 hatchers with 10,000 eggs capacity each		
	@ Rs.4.0 lakh per setter and Rs. 1.50 lakh per hatcher	: Rs.	28,50,000
	Cost of one 50 KVA and one 25 KVA generators	: Rs.	6,00,000
	Cost of 4 Tonnes capacity truck for chick delivery	: Rs.	7,00,000
	Miscellaneous equipment	: Rs.	2,00,000
	Total expenditure on equipment	: Rs.	43,50,000
III. Working capital			
Purchase of hatching eggs			
	@ 30,000 eggs per batch; 6 batches		
	@ Rs. 11 per egg	: Rs.	19,80,000
	Total working capital	: Rs.	21,60,000
IV. Expenditure and income per batch			
A. Expenditure			
Purchase of hatching eggs			
	@ 30,000 eggs per batch		
	@ Rs. 11 per egg	: Rs.	3,30,000

	Fuel, electricity, labour etc. @ Re.1 per egg; 30,000 eggs	: Rs.	30,000	
	Total expenditure per batch	: Rs.	3,60,000	
B. Income				
	By sale of day old chicks			
	@ 85% hatchability			
	@ Rs. 25 per chick	: Rs.	6,37,500	
	Total income per batch	: Rs.	6,37,500	
1	Gross profit per batch (Rs. 6,37,500 – Rs. 3,60,000)	: Rs.	2,77,500	
2	Gross profit per annum (52 x 2 = 104 batches)	: Rs.	2,88,60,000	
V. Total project cost and bank finance needed (Rs. In lakhs)				
S. No.	Details of expenditure	Total cost	Share of the promoter	Bank finance needed
1	Cost of buildings	70.40	17.60	52.80
2	Cost of equipment	43.50	10.88	32.62
3	Working capital	21.60	05.40	16.20
Total		135.50	33.88	101.62

- The bank loan will be repaid in 5 years period along with interest.
- The first year period is the holiday period. However, the interest amount will be paid in the first year.

I – Year	Nil	+	Interest only
II – Year	11.62	+	Interest
III – Year	30.00	+	Interest
IV – Year	30.00	+	Interest
V- Year	30.00	+	Interest

EXERCISE-3

VISIT TO COMMERCIAL POULTRY FARM, HATCHERY AND FEED MILL

Important things to be noted

- Students are expected to visit commercial broiler and layer farms and commercial feed mills.
- **In broiler and layer farms:**
 - Construction of the farm
 - System of rearing
 - Feeding, watering and other managerial practices followed
 - Type of feed offered
 - Records maintained
 - Marketing of produces
 - Difficulties encountered



In feed mills:

- Construction of feed mill
- Mill capacity
- Type of machinery used
- Safety methods followed
- Records maintained



Various poultry farm equipments:



PLASTIC MANUAL FEEDERS



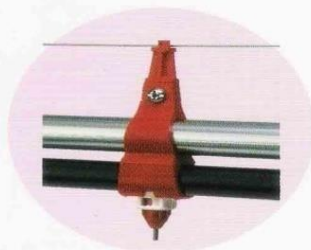
AUTOMATIC PAN FEEDERS



AUTOMATIC BELL DRINKERS



BROILER BREEDER FEEDERS



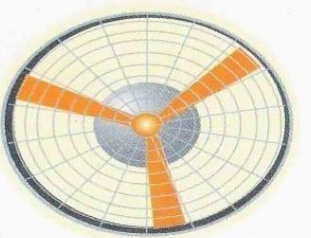
NIPPLE DRINKERS WITHOUT CUPS



CHICKS HANGING FEEDERS



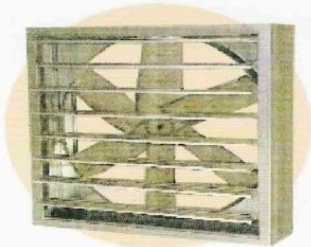
CHICKS FEEDING TRAY



36" FAN



CHICKS DRINKERS



FANS WITH AUTOMATIC LOUVERS



COOLING PADS

Question

1. Name the following poultry farm equipments shown below.



UNIT – VII

INDEX

NAME:

BATCH:

S. NO.	NAME OF EXERCISE	PAGE NO.	DATE	SIGNATURE
1	Identification of body parts, weighting, sexing, weaning of lab animals.			
2	Computation of balanced ration for lab animals.			
3	Maintenance of breeding records of lab animals.			
4	To study common diseases of lab animals, hygienic care and parasites control.			
5	To study feeding, housing, searing of rabbit and common instruments used.			
6	Preparation of project report for establishing rabbit farm.			
7	Handling and restraining techniques and instruments used for pet dog, cat, and birds.			
8	To study routine care of dogs, cats, pups, kitten and weaning.			

EXERCISE-1

IDENTIFICATION OF BODY PARTS, WEIGHTING, SEXING, WEANING OF LAB ANIMALS

Objectives

1. To identify basic body parts of different lab animals.
2. To study basic weighting, sexing and weaning procedures of lab animals.

Introduction

Lab animals are defined as animals, which are used for experimental diagnosis purpose and may resemble in results with human being. They are small, tame easy to control and less expensive. Amongst the lab animals, the mouse is by far the most commonly used laboratory mammal. It owes this unique position to its small size and high fecundity and because like its larger relative the rat it resembles man in being largely unspecialized (apart from its highly specialized rodent teeth). It has adopted itself readily to domestication and cage life. It is in consequence the cheapest and the most readily available of laboratory mammals.

The laboratory rat (Rattus norvegicus) has been developed over last 100 years. There are three main groupings, The Wistar albino, The Sprague-Dawley albino and The long-Evans rat. It is found all over the world, particularly in association with human habitation. The rabbit (Oryctolagus Cuniculus) was domesticated by the first century B.C. and adopted wide variety of conditions. Its habits vary according to the environment so that sandy land rabbits live in burrows, whereas on moorland or under wet conditions they resort to runs or galleries or utilize hedgerows or hollow trees for cover.

Uses of Lab Animals in the Laboratory

Laboratory mice account for 60-80 per cent of all mammals used as laboratory animals, Their main uses in the laboratory are in bio-assay and toxicity tests, screening of new compounds, microbiology, virology, radiobiology, cancer and behavior research. The rats accounts 10-15 percent of the total. They are used mainly for toxicity studies, including long-tests; for nutritional, behavioral and cancer research. A small number are used in physiological, and rather more in pharmacological, investigations and for teaching. Rabbits are used for cardiac surgery and studies of hypertension, infectious diseases, virology, embryology, etc. the species is used routinely in serological work and latterly for screening embryo toxic agents and teratogens. It is especially suitable for research on reproduction since ovulation is Non-spontaneous. There is no seasonal anoestrus, estrus is short and semen easily collected.

Management

It is a complex phenomenon, which includes nutrition, feeding, housing & breeding of animals making it a viable unit. The following factors are significant in the management.

1. **Environment:** Environment can be classified into: Microenvironment & Macroenvironment.

There are various factors, which affect the animal growth; survivability & health. These are namely heat, ventilation, moisture, odour, dust, light, noise, hygiene etc.

2. **Record Keeping:** It helps to manage the animal successfully. It is important to record pregnancies, abortion, injury, diseases, treatment etc.

3. **Housing and handling:** In housing one should take care that the animals should have appropriate ventilation. Their cage should be dry and free from any infectious organism. The selection of site, direction, building material of housing should be considered carefully.

4. **Cage:** Size, shape and types of cages should be selected as per requirements. Different types of cages are there, like shoebox type & wire mesh cages. For rats, wooden cages or metabolism cages can be used. Wooden cages are cheap, good insulators and can be sterilized by all methods except autoclaving. Aluminum and its alloys are not used because they are poor insulators, noisy and may be subjected to corrosion. Galvanized steel can also be used which is less expensive.

a. **Breeding:** Breeding stock should be carefully selected from sexually mature and healthy individuals. The breeding programmes of a colony of lab animals must be strictly controlled if the animals are to be suited to the needs of the laboratory. Correct breeding methods should be practiced to make the animal better fitted for the purpose.

b. **Bedding materials** depend on the type of laboratory animals. The bedding material may be sawdust, wood shaving, paper cutting and prepared from hay or wool. It must be changed at least twice a week.

c. **Feeding:** Feed must be balanced & include carbohydrate, protein, inorganic elements and salts. Special care should be taken in all aspects during pregnancy and lactation. Animals should have proper access to clean, fresh water at all times. Care should be taken while storing the feed.

d. **Cleaning & Disinfecting:** Regular and frequent washing of all cages is essential to the health of the animal. Sterilization is required only if there is evidence of any disease in the colony. Tools like yard, brush, wheelbarrow, soft brush etc. are used in cleaning. These equipments should be disinfected properly. Also, the persons entering the animal house must be regarded as potential vector of infection. In general, daily observation of the animals is very important to detect any infection and to prevent its spread. General external appearance and condition of animal, as obesity, Neurological signs like

tremors, spasms, rigidity, convulsions, inactivity, excitability, rolling, curling etc. should be noted.

Commonly used Mouse strains and stocks			Commonly used Rat strains and stocks		
Name	Colony Type	Description	Name	Colony Type	Description
ICR	Outbred	Albino	Sprague-Dawley	Outbred	Albino
Swiss-Webster	Outbred	Albino	Wistar	Outbred	Albino
Balb/c	Inbred	Albino	Fisher 344	Inbred	Albino
FVB	Inbred	Albino	Lewis	Inbred	Albino
C57BL/6	Inbred	Black coat color	Long Evans	Inbred	Hooded, black and white
C ₃ H	Inbred	Brown coat color			

IDENTIFICATION

It is the method by which each individual animal can be distinguished. On a domestic scale it is easy. However, it may be time consuming when quick identification is needed. Various methods have been developed to aid this task.

Identification of mouse: At weaning age, the mice should be individually marked and recorded in the ledger. Several systems of individual marking have been used-

1. Touching the picric acid or some other acid colour solution to various parts of mouse. It applies only to albinos or light coloured mice. There is another disadvantage that distinguishing spots are lost at each moult of hair and must be periodically renewed.
2. Amputation of one or more toe: Permanent toe amputation may be practiced but this is restricted to the fact that some mothers may be cannibalistic and may eat tail, toes and feet of their: young ones during nursing period.
3. Use of punched holes & notches in the ear: This system is so far the best devised system. It recognizes 3 positions in the ear - the front, the middle and type back. Punching holes through the ear in these 3 positions produces numbers 1, 2 and 3. Punching notches in one of the same 3 positions produce numbers 4, 5, 6, 7, 8 and 9.

9 are made with a peculiar combination of notches (7 - by making 2 notches in front; 8 - by 2 notches in middle, 9 - by 2 notches in the back of the ear. Tens are punched on left and amounts on the right ear. Thus numbering from 1 to 99 can be done.

Identification of Rat: Method of permanently marking the young rat must be simple, quickly applied, easily deepened and harmless to the animal. For short-term experimental work, the animal may be marked with a soluble stain. Consideration must be given to the chemical composition, effect (if any) on the coat and skin of animal and whether or not it is comparable with the experiment. For permanent marking, different methods are there-

1. Punching holes right through the ear on a series of notches around the edges.
2. Tattooing - A convenient method is to tattoo a series of numbers on to their ears. A punch is used for tattooing individual number in the rat's ear by means of Indian ink.
3. Painting various parts of the rats with a basic Carbol fuchsin stain - It is necessary to mark the animal about once every 6 weeks.
4. Perforating the ear with a needle or a punch in a combination of one or more dots and then paint the ear promptly with Carbol fuchsin or Indian ink.

Identification of Guinea Pig:

1. Ear making: This is not recommended especially if the animals are maintained in groups where fighting may take place and ears in which punching is done may get tamed.
2. Ear Clips: There are several types of ear clips available and all can be supplied with either number or letter.
3. Staining: The following stains (which are soluble in alcohol at a temperature of 26°C) are generally used.

Color	Stain
Yellow	Saturated picric acid & crystal iodine.
Red	Fuchsin, ether alcohol or acid/ base.
Violet	Methyl alcohol
Green	Brilliant methyl or malachite

WEANING IN LAB ANIMALS:

MOUSE: It is the process of gradually introducing a mammalian infant to an adult diet (solid food) and withdrawing the supply of its mother milk. Gestation for mice and rats is approximately 21 days. The young are weaned at 21-28 days of age. Both mice and rats can breed as early as 8 weeks of age, thus it is imperative that the pups are separated by gender at an early age. In *Rattus norvegicus*, a species important in laboratory studies of ingestive behavior, the young begin to reliably ingest solid food on about Day 18. Time spent suckling begins to decline around, while time spent ingesting solid food increases. By about, the young no longer suckle and weaning is essentially complete. The average weaning age is 3 weeks for laboratory rats.

GUINEA PIG: Young ones can be removed from the mother at birth and reared by hand. A female which is fed dilute cold, boiled milk by a dropper at 2-3 hrs interval for first weeks has a number of young ones weaned at 10 - 20 days of age and reared individually lacks In normal reproductive behavior as in adults. Therefore, they should be weaned at 30 days of age and reared in - group.

RAT & MICE: Young rats are normally weaned by age and not by weight. Weight at weaning varies depending on litter size. It is a practice In some labs either to reduce the litter size or foster the young rats so that each female rears a given number per litter, thus producing a more uniform weaning. An increase in weight of young ones at weaning may be achieved by adjustments of litter by culling and fostering to a member of 8. Weaning takes place at 3 weeks post-partum.

HAMSTERS: Usually are weaned between 21 and 30 days of age. If males are not weaned, they may breed with doe or with siblings after 43 days of age.

MONKEYS: Weaning is gradual process which is completed In about 6 months.

HANDLING AND RESTRAINING:

1. Scruffing: Mice are most often restrained using the scruffing technique, but young rats can also be restrained with this method. Adult rats are more difficult to restrain with this technique due to a more muscular neck, a reduced amount of loose skin, and an aversion to this method.

2. Gloves: There are a variety of gloves available for handlers to wear for protection from rat bites. They are generally unsuitable for work with mice due to the loss of dexterity. Often, the disadvantages of many glove types outweigh the advantages.

3. Body Restraint

4. Restraint devices.

WEIGHING: Balance are used for weighing, There are different types of balances ranging. From monopan electric balance, double pan balance, spring balance and platform balance. Animals weighing up to 5 kg are weighed double balance where sensibility is 1 g. those above 5 kg are weighed in a platform balance.



1: One-handed and two-handed restraint method for mice



Figure 2: T-rex grip and forelimb crisscross method for restraint



Figure 3: Broom-style restraining device



Flexible restrainer

QUESTION:

1. Write about handing methods and instruments of lab animals.

EXERCISE-2

COMPUTATION OF BALANCED RATION FOR LAB ANIMALS

GENERAL PRINCIPLE FOR BALANCING RATION

The diet must include a minimum level of dry matter, otherwise the digestive tract of the animal will not function properly, but there is an upper limit on the amount of DM that can be involved in animal diet. This varies with the age, species and size of the animal being fed. DM should not be more than 3%. Diets are balanced to meet protein, energy, calcium, phosphorus and vita requirement of animal.

- A) Protein - Depend upon CP and DCP content of feed stuff. In non ruminants EAA is to be considered.
- B) Energy - DE, TDN, ME & NE are usually used. Energy should not be greater than 5%.
- C) Minerals - Ca and P ratio is important; Ca: P is 1:1 or 2:1
- D) Vitamins - 4 + varies from species to species
- E) Cost of nutrients- Cost/kg should be considered.
- F) Moisture basis

STEPS IN BALANCING RATION

Step I -Identify kind, age, weight and function of animal for which the ration is formulated.

Step II - Consist of a table of nutrient requirement of determine the needs of the animal.

Step III - choose the feed to be used in the ration and consult a feed composition table to determine the nutrient requirement.

Step IV - Calculate the amount of cash - feed to use in one turn.

Step V - Check the ration formulated against the need of animal. Adjust or alternate components of the compounded feed stuff to make it mere commercially available. It is necessary to feed salts & mineral on free choice basis.

Table : ISI specification of compounded feed for rat, mice, monkey, guinea pig and rabbit.

	Mice	Rat	Monkey	Guinea pig	Rabbit
Crude protein(%min)	20.0	20.0	20.0	24.0	20.0
Ether extract(%min)	4.0	4.0	6.0	3.5	3.5
Crude fiber (%max)	4.0	4.0	4.0	12.0	12.0
Ash (%maximum)	8.0	8.0	8.0	8.0	8.0
Calcium (%minimum)	1.0	1.0	1.0	1.2	1.2
Phosphorus (%min)	0.6	0.6	0.6	0.6	0.6
Nitrogen free extract (%)	55.0	53.0	53.0	43.0	47.0
Metabolisable energy (K cal/Kg)	3600	3600	4000	3000	3000

Diet composition for Rodents: Rat, Mice, Hamster AS PER UFAW

1. *Wheat flour* : 22%
2. *Roaster Bengal gram flour* : 60%
3. *Ground nut flour* : 10%
4. *Skim milk powder* : 5%
5. *Casein* : 4%
6. *Refined oil* : 4%
7. *Salt mixture with starch* : 4.8%
8. *Vitamins & choline mixture with starch* : 0.2%

Scientifically the feeding schedule includes the following aspects:

- a) Mode of feeding b) Form of feeding c) Frequency of feeding d) Feeding behavior
- e) Calculation of long term feed f) Feeding for various functions.

SPECIES	MODE	FORM	FREQUENCY	FEEDING BEHAVIOR	FUNCTIONS
RAT	Controlled feeding (most common) & Rarely ad libitum	Pelleted or crude form, sometimes mash form	Usually twice a day	Predominantly nocturnal	Breeding animals, animals in gestation, lactation etc. are given ad libitum feeding or otherwise an increment in the usual quantity of feed.
MICE	Controlled feeding, sometimes ad libitum	Pelleted & Mash form	Usually twice a day		Supplement mixture of wheat, oat sunflower seeds, calf meal pellets is given at least once a week, usually a small handful. Breeding mice are fed with piece of enriched bread in milk.
HAM-STER	Controlled or ad libitum	Whole grain, ground or pelleted	Usually once or twice a day	Usually nocturnal, prefer variation in feed and they relish earthworms and insects	Feed should be supplemented with vit B12 and choline. Each hamster should receive 5 gm of carrots, 1/6th of one apple/day.
G. PIG	controlled feeding is preferred, mostly ad libitum	Mash&Pellets	Twice a day.	Never fed very much at one time.	2 parts crushed oats +1 parts oat bran or bran+ sugar. beet pulp in 2:1 ratio. Provide a supplement of vit A, B2, D3, +C.

Diet composition for monkeys, Rabbits & Guinea pigs

1	<i>Wheat flour</i>	:	61%
2	<i>Roaster Bengal gram flour</i>	:	28%
3	<i>Casein</i>	:	1%
4	<i>Refined oil</i>	:	5%
5	<i>Salt mixture with starch</i>	:	4.8%
6	<i>Vitamin & choline mixture with starch</i>	:	0.2%
7	<i>Vitamin C</i>	:	50 mg/100 g diet

Question

1. Write composition of ideal ration for a hamster.

EXERCISE-3

MAINTENANCE OF BREEDING RECORDS OF LAB ANIMALS

Breeding parameters of various lab animals:

	Rat	Mouse	Guinea pig	Rabbit	Monkey
Age at puberty (months)	1 – 2	1	2	6 – 9	30 – 36
Minimum breeding age (months)	3	1	3 – 4	9 – 12	50 – 56
Oestrus duration (hours)	10 – 20	10 – 20	6 – 12	Induced	24 – 36
Oestrus intervals (days)	5	5	14 – 16	None	30
Gestation period (days)	21 – 22	19 – 21	60 – 80	30 – 32	168
Recurrence oestrus (months)	Post partum	Post partum	Post partum	End of lactation	-
Breeding life of females (years)	1	1	2 – 3	2 – 3	6 – 8
Breeding life of males (years)	1.5	1.5	3	1 – 3	8 – 10
Breeding ratio (M/F)	1:2	1:2	1:5	1:1	1:1
Litter size (Nos.)	5 – 10	7 – 12	2 – 6	4 – 6	1
Birth weight (grams)	5 – 6	1 – 1.5	50 – 80	80 – 100	300 – 500
Weaning weight (grams)	35 – 40	10 – 12	250	600 – 800	800 – 1000
Weaning days (Nos.)	21	19 – 21	21 – 30	45	90 – 150

QUESTION

1. Write Taxonomical classification of Lab animals

S.No.	Particulars	Rat	Mice	Rabbit	Hamster	G. Pig
	TAXONOMY					
	CLASS					
	ORDER					
	FAMILY					
	GENUS					
	SPECIES					
	COMMON BREEDS					

EXERCISE-4

TO STUDY COMMON DISEASES OF LAB ANIMALS, HYGIENIC CARE AND PARASITES CONTROL

Normal body parameters and requirements:

	Rat	Mouse	Guinea Pig	Rabbit	Monkey
Daily feed intake (gm)	10 - 15	5 - 10	30 - 50	100 - 200	100 - 300
Daily water intake (ml/100gm) body weight	15	5 - 10	15	20	30 - 40
Urinary output (ml/100gm) Body weight	5 - 8	3 - 4	4 - 9	7 - 8	5 - 6
Daily fecal output (gm)	9 - 13	6 - 9	15 - 18	20 - 30	100 - 150
Pulse rate (no's/min)	300	600	150	155	90 - 100
Respiratory rate (no's/min)	85 - 113	163	82 - 90	38 - 60	39 - 60
Rectal temperature (F)	99 - 100	96 - 100	100 - 102	102 - 103	100 - 102
Room temperature (F)	65 - 75	68 - 74	65 - 75	62 - 68	68 - 72
Relative humidity of room (%)	45 - 55	45 - 55	45 - 55	45 - 55	45 - 55

One of the greatest problems in the husbandry of lab animals is the control of diseases. When animals act as sources of outbreak of diseases. On the other hand colonies with closed system are almost if from diseases, but the proper care and prevention are always necessary. Though the colony is healthy it carries a variety of bacteria and virus, ready to produce disease if allowed to grow by some alteration in envired

Essential things in the control of disease are -

1. Establish the cause of loss where facilities exist.
2. Post mortem examination should be done on ail died animals.
3. Routine bacteriological and parasitological examination is necessary.
4. Adequate records of death and cause of death should be kept.
5. Any rise in normal death rate should be carefully investigated.

I. GUINEA PIG

(a) Dietetic: Due to sudden change in diet due to Vit-C deficiency.

(b) Bacterial:

(i) Salmonellosis: It is lethal infection, occurs by ingestion. Affected stock must be killed and bedding should be disposed of. Cages should be disposed of or should be thoroughly cleaned.

(ii) Pseudo brucellosis: Caused by pseudo tuberculosis infection by oral route. vaccination is effective in controlling the disease since diseases is confined to abdominal glands. The diseases is less transmitted and also elimination of animal with enlarged abdominal gland is possible thus making the disease under control.

(iii) Streptococcus: Cause labour pneumonia.

(c) Viral disease: Paralysis and viral pneumonia.

(d) Protozoan: Coccidiosis.

(e) Parasitic diseases: Ectoparasite, Pin-worm, Mite infestation can be controlled by dipping in monosulfiran or benzyl benzoate solution.

II. Rat & Mouse

These should be examined every day. Most common diseases of lab and mouse are infantile diarrhea, Tyzzer's disease, Salmonellosis and Coccidiosis.

Infantile diarrhea: Unweaned rat 14 days old mostly suffer. Its control is difficult however culling the litter can be a successful measure.

Tyzzer's: controlled by culling.

Middle ear disease: Affected rats, when picked up by tail will twist and circle.

III. MONKEY: Tuberculosis, pneumonia, basillary dysentery are most common. It is vitally important to ensure that the newly introduced monkey should be free from disease.

IV. RABBIT:

1. Mucoïd enteritis - Controlled by disinfection and isolation.

2. Snuffles - Bacterial disease strict eradication of infected and contact rabbit is one way

3. Pseudotuberculosis - Common in domestic stock. Incidence is reduced by prevention of contamination of food stuff.

4. Rabbit Cystitis - Common visceral disease of rabbit.

V. HAMSTER: Regular schedule of excreta removal and removal of food stuff daily checking essential to maintain healthy animals.

Disease preventive measures:

1. **Cleaning and Sanitation:** Cleanliness, including personal cleanliness on the part of the staff, cannot be overemphasized in an animal care specialty. Employees should follow the proper cleaning and disinfecting procedures and their importance in disease prevention. All cages, pens, racks etc. must be thoroughly cleaned and disinfected before reuse. As a general rule, the animal house should be cleaned every day or alternative day. Animal cages are most efficiently cleaned and sanitized with mechanical washing equipment operating at 83°C (180°F) or higher, for a minimum of ten minutes. Cages should be carefully rinsed to remove all traces of washing and disinfecting agents, Bedding in animals cages or pens should be changed as often as necessary to keep the animals clean, dry, and relatively odor free. Smaller laboratory animal require one to three changes per week, depending on population of the laboratory animals.

2. **Waste Disposal:** Dead animals, animal tissue excreta, bedding, unused diet etc. should be collected with care an in leak proof metal or plastic containers and incinerated. Waste which cannot be rapidly disposed of should be stored in storage area provided for that purpose. Such areas must be vermin free, easily cleaned and disinfected as well as been physically separated from other storage facilities. Dead animals should be properly identified, placed in disposable plastic bags and immediately incinerated upon discovery, installing an incineration facility for the disposal of pathological and animal wastes should be planned for animal house well in advance during civil and electrical construction.

3. **Storage area:** A properly construction building should be vermin proof, but may not be free from vermin. Vermin enter on feed, bedding, man and laboratory animals. Insects and arthropods thus introduce may act as the intermediate hosts of certain parasites and may also mechanically transmit certain other infections. Wild rodents may transmit a wide variety of bacteria, viruses, and parasites to the housed species. New facilities should be checked critically for vermin before any animals are moved in. training of personnel, good waste disposal, sealing or eliminating breeding sites, extermination through pesticides or trapping, and the recovery of all animals. It is important that pesticides should be applied only under supervision.

QUESTION

1. What are hygienic techniques can be used in lab animals?

EXERCISE-5

TO STUDY FEEDING, HOUSING, SHEARING OF RABBIT AND COMMON INSTRUMENTS USED

RABBIT: Rabbits are social, burrowing herbivores that are natural prey for a large number of carnivores. Rabbits are mild weather animal, their natural habitation is hilly slopes, high altitudes, cool and bushy forest. They also thrive well in the plains, if proper care and housing is available. Rabbits are fast in producing the young ones, and are ready for table purpose in about 3-4 months of age. Rabbit has been identified as an important micro livestock that can meet the increasing demand of meat in the NE region.

BODY PARAMETERS OF RABBIT

Rectal temperature:- 38.7 C-39.1 C

Normal respiratory rate:- 55 per minute

Pulse rate:- 135 per min

Gestation period:- 28-31 days

Weaning age:- 6-8 weeks

Mating age:- 6-9 months

Litters:- 4 yearly ; average 4 litter

Room temp:- 15.5-18.5

Humidity:- 40 -45 percent

Weight – adult:- 0.9-6.75 kg

COMMON TERM FOR RABBIT

- Doe - female rabbit
- Buck - male rabbit
- Kit (kitten) - baby rabbit
- Kindling - giving birth
- Fryer - market rabbit that is 8 to 10 weeks old and weighs 4-5 lbs.
- Cuniculture - raising of rabbits.
- Hole – production unit

BREEDING PARMETERS OF RABBIT:

Length of pregnancy	31 -32 days
Mean litter size	6.3
Birth weight	30 gm in small breed 70 gm in large breeds
Rectal temperature	38.5 to 40C
Respiration rate	38-65 per minute (average 50)
Volume of air taken per breath	20 ml.
Lifespan	6-7 years

Reproductive life span	4-5 years (maximum)
Gestation period	30 days
Estrus cycle	Continuous

RABBIT BREEDS

Breeds	Size	Use	Mature Weight (lbs)
Angora	medium	wool; meat	9-12
American Chinchilla	medium	Fur	9-12
Californian	medium	Meat	8-11
Dutch	small	Lab	3-6
English Spot	medium	meat; lab	9-13
Flemish Giants	large	Meat	13+
Himalayan	small	Lab	2-6
New Zealand	medium	Meat	9-12

Rabbit feeding

- Handmade and own processed feeds can use for rabbit feeding. Rabbit diet consists of silage and fresh hay. Feed needs to be processed before feeding such as by granulating, chopping, cleaning, steaming and boiling. To avoid feed spoilage, remaining feed has to be removed frequently from feeders and these must be kept clean. In summer, vetch, alfalfa and other leguminous plants can be used for feed.
- Green plants are highly nutritious, and cheap to use for rabbit feed. If there is lack of green plants, roots and leaves may be used. Green plants can be used without processing.
- A suitable ration may be composed by adding the above mentioned ingredients with at least 16% digestible crude protein and 70% total digestible nutrients for rabbits.

Composition of an ideal concentrate mixture for rabbit feeding is:

Maize	(40%),
Wheat bran	(15%),

Deoiled rice bran	(15%),
Soyabean meal	(10%),
Ground nut cake	(7%),
Rice husk	(5%),
Fish meal	(5%),
Mineral Mixture	(2%),
Common salt	(1%)

- **In the winter season**, forage is use for feed, such as hay, straws and foliage of trees. If there is deficiency of forage, rabbits may start to nibble at fence posts.
- Doe and young female rabbit's diet is composed of 65% silage, 35% green plants, 15% green plants and 20% forage.
- During breeding period, a doe's daily diet is composed of rye 60 gram, barley 40 gram, hay 450 gram, and salt 1.8 gram. During the gestation period, diet consist of rye 50 gram, barley 40 gram, peas 20 gram, hay 340 gram and salt 1,2 gram.
- For a doe with 8 kits, the daily feed is composed of rye 80 gram, barley 90 gram, pea 160 gram, oil plant essence 110 gram, hay 560 gram and salt 6 gram.
- **In the summer season**, rabbits can be fed on pasture plants and fodder instead of hay. A young female rabbit consumes 220 gram water, dry rabbit 170 gram water, suckling rabbit 200 gram water, and gestating rabbit 300 gram water per 100 gram of dry ingredients in the feed respectively.
- Weaned young rabbit diet should include highly nutritious and easily digested ingredients such as young green plants, peas, vitamin rich hay, rye, boiled potatoes, carrots and a small amount of wheat and barley.
- Animal derived ingredients would be fish meal, yeast and other things that have a rich energy.
- During the restocking period, the feed is composed of silage 60-65%, clovers 15-20% and forage 15-20 %. In the summer season, green plants needed to weigh 40% of total ingredients. At least 1% of mixed fodder should be vitamins and minerals.

Housing Management techniques

Housing: Rabbits can be maintained in three housing systems viz.

a) Cage system b) Hutch system and c) Floor system.

a) **Cage system:** Rabbits are raised in wooden or galvanized wire mesh cages under a shed. The general size of the cage is 2 ½' x 2 ½ 'x 2 ½ '. Rabbits can gnaw, and caging should be constructed of durable materials. Cages should be easily sanitized and allow easy cleaning. All-wire cages with a minimum of 12-gauge wire (16-gauge recommended for cage floor to support the weight of the rabbit) are preferred. Aquariums are not appropriate housing for rabbits (or other small mammals) because of inadequate air circulation. The size of the cage depends on the size of the rabbit. Giant breeds (>12 lb) require a minimum of 30 × 36 in. to 36 × 48 in. Medium breeds (7–12 lb) require 24 × 30 in. to 30 × 36 in. Smaller breeds can be

accommodated by 18 × 24 in. The cage should be tall enough to allow the rabbit to stand on its hind limbs.

b) **Hutch system:** It is a self-contained cage with a roof on top which can be moved from one place to another as and when required. The dimension of hutch may be 3 ½ ' x 3 ' x 3 ½ '.

c) **Floor system:** Rabbits are kept on the floor like deep litter system of poultry. Floor should be made of cement concrete as the rabbits are burrowing in nature. The rabbit house may be partitioned for keeping different group of animals like male, female, grower etc. Floor space requirement for each rabbit is 4 sq ft. This system is recommended for high land and heavy rainfall areas.



Breeding

Rabbits attain maturity at 6-7 months of age or when they weigh about 2 kg body weight. Male matures a little later than the female rabbit. Keep the male and female in separate cages. Mating is done in the morning or evening. Female is introduced into the male cage. If the doe (female) is ready for breeding, she will allow the buck to mount and mating will take place within minutes. After successful mating, male will fall down on one side making a characteristic sound and thereafter the female should be put back in her own cage. Through proper planning 4-5 cropping can be obtained from each female per year. Around 20-25 days after mating, provide nest box with nesting materials such as chopped paddy straw or clean jute bags to help the doe in preparing nest for the new born babies. When the doe is with the newborn kits, dogs and children should not be allowed to go near the rabbit house and cause disturbance. When the doe gets disturb, she gets frightened and injure the babies, and sometime the doe eats her babies due to noisy environment or due to poor feeding.

Care of the new born

New born kits are helpless as they are born blind and devoid of hair. The hair starts to grow on the 4th day and open their eyes after 10th day. It is advised not to disturb the young ones except to replace wet bedding or remove the dead kits, if there is any. Kits begin to come out

of their nest around 21-23 days and starts nibbling. At around 1 month they start to take feed properly.

Diseases of rabbits

Diseases of rabbit are less, if we maintain proper feeding and hygienic condition of the cages and house of rabbit. Rabbits usually suffer from diseases such as coccidiosis, hock sore, ear canker, mucoid enteritis and aflatoxicosis. Some of the commonly encountered diseases and parasitic infestations are coccidiosis caused by Eimeria group of protozoa. Symptoms includes loose motion, loss appetite, rough hair coat, weakness and animal will lie quietly with sleepy eyes. Treatment with 'sulmet' @ 1.5 ml/ kg body weight for 2 days followed by 0.7 ml/ kg body weight for another 4 days is recommended.

Aflatoxicosis occurs due to feed contaminated with Aspergillus fungus. The fungal toxin called aflatoxin may cause mortality up to 30 percent. Symptoms include distended abdomen, abortion in pregnant animals, loss of appetite and mortality. Ear cancer caused by ectoparasite called Psoroptes mite. Symptoms are constant itching and irritation of the ear. In severe cases cause 'wry neck'. Necrotic lesion also may be seen inside the ear. Snuffles caused by Pasteruella bacteria. In this disease mucopurulent discharge from nose is common. While breathing, sneezing or snuffling sound will be produced. Rabbit will rub its nose between feet.

Marketing

Rabbits can be marketed at 90-120 days during which they will weigh around 1.9 kg. However, a mature rabbit will weigh between 2.5 to 4.0 kg. The dressing percentage of rabbit is around 65%.

Shearing of wool/marketing:

Shearing of wool should preferably be done when the wool is 5 to 6 cm long. Young ones should be sheared a week after weaning and subsequently at every 10-11 weeks interval. Shearing should not be done on extreme cold days of December and January. While shearing care should be taken to cut the wool as close to the skin in a single cut. After shearing animal should be given protection against adverse climate for 15 days. The wool should be sorted out into various grades for better marketing. Ensure the constant and study demand for wool and pelts. Avoid shearing of pregnant females 15 days before due date of kindling. Wool should be delivered in a clean manner to fetch premium price. Plan shearing of breeding stock 7-10 days before start of breeding in your flock to avoid poor reproductive efficiency.



Angora rabbit farming

Angora rabbits are mainly raised for their wool, which is known for its quality. Angora rabbits are of many types. The differences are mainly in the amount of wool produced and the percentage of guard hair in the wool. Among the various types, German Angora is the best and annually yields 1000 to 1200gm of wool under ideal management practices. Rabbits can be adopted to any set of circumstances right from a kitchen garden to a large intensive commercial enterprise. The wool produced by rabbits are preferred for manufacturing of high value woolens which have got very good export potential.

Question:

1. Write in detail about the advantages of rabbit farming.

EXERCISE-6

PREPARATION OF PROJECT REPORT FOR ESTABLISHING RABBIT FARM

A	Breeds available For Meat	New Zealand White, Soviet Chinchilla, Grey Giant, White Giant
B	Breeding age of animals	6-8 months
C	No of animals per unit	100+20
D	Breeding and rearing cycle	
	1. Ratio of males to females	1:5
	2. Pregnancy period	About 30 days
	3. Kindling percentage	80% i.e for every 100 does, 80 will be pregnant
	4. Average No. of young rabbits born per kindle	6
	5. No of kindlings in a year	4
	6. Female rabbit (doe) bred again	7 days after weaning
	7. No bunnies obtained	80 females x 6 bunnies x 4 kindlings- 1900
	8. Mortality in bunnies (30%)	560
	9. Young bunnies available	1900 – 560 = 1340
	10. Mortality in adults	5-10%
	11. Average adult body weight	3.0-3.5kg
	12. Average live weight of bunnies at 3 months	1 Kg
	13. Cage size	360 sq.inch (adult)
	14. Concentrate required	Buck 120 g/d Doe (dry + preg) 120g/d Weaner (6-12 w) 50 g/d
	15. Hay requirement	Buck 40 g/d Doe (lact) 40 g/d Weaner (6-12 w) 30 g/d
	16. Meat yield	Young rabbit (12-24 w) 1.kg Above 24 w 1.5 kg
	17. Cost of meat	Rs 120/kg
	18. Manure income	Rs 2/- per animal

Capital expenditure

A) Shed and cages

1. Cost of construction one shed kacha 12'X30'
(120 cagesXRs.100)
2. Cost of construction one shed kacha 12'X30'
3. All wire cages (180)X Rs 55
11/2 X11/2' for growers

B) Daily use article

Buckets ,wire brushes,blow lamps,feeders
Waterers/nestboxes etc.

Total A+ B

C) Cost of broiler rabbits

(100 F+ 20 M adults)@ Rs 300 each

Total A+ B+ C

1,19,000.00

Recurring expenditure

(12 months for initial stock and 2 months for young)

- a) Feed cost for adults
 $120 \times 0.12 \times 365$ (52.56 q x 750)
- b) Feed cost for young
 $1340 \times 0.05 \times 60$ days (40.20 x 750)
- c) Hay cost lump sum
- d) Miscellaneous expenditure

Total

Income for the first year

Sale of meat 1340 kg from 1340 young of 12 weeks old @ 120/kg

Sale of 1340 rabbit skins @ Rs 80 each

Sale of manure 12 kg/per adult /yr Rs 02/- kg

Sale of manure 1340x Rs 1/-

Total

2,72,222.00

Cost of production

Recurring expenditure for I year 99570.00

Depreciation @ 10% on fixed amount 8300.00

Total

1,07,870.00

Income	2,72,222.00
Expenditure	1,07,870.00
Profit per animal	Rs. 80.5
Net income	1,64,352.00
Non-Recurring expenditure	1,19,000.00
Bank loan 75%	89250-00

	Ist year	II Year	III year	IV year	V year
Principle	89250	71400	53550	35700	17850
Interest @ 14%	12495	9996	7497	4998	2499
Loan portion	17850	17850	17850	17850	17850
Total	30345	27846	25347	22848	20349
Total income per year	1,64,352.00	1,64,352.00	1,64,352.00	1,64,352.00	1,64,352.00
Net profit	1,34,007	1,36,506	1,39,005	1,41,504	1,44,003

QUESTION

1. Complete the project report and missing data using first table data.

EXERCISE-7

HANDLING AND RESTRAINING TECHNIQUES AND INSTRUMENTS USED FOR PET DOG, CAT, AND BIRDS

Physical Restraining:

Different restraining tools for cat and dog

1. **Noose Leashes:** A noose leash is a single piece of nylon or rope with a ring on one end and a handle at the other. The noose leash can be used to remove a dog from a cage or run. Make the loop on the noose leash big enough to fit around the head
2. **Rabies pole:** The rabies pole is used to capture a dog or cat when you cannot put your hands on it. This could be used to remove a dog or cat from a cage or to capture an animal that got loose in the hospital this may be the restraint necessary to give a sedative to allow for a physical examination or treatment to the animal. Once the noose is around the neck, quickly tighten it. Anyone using this pole should familiarize themselves with the tightening mechanism of the noose before using it.
3. **Muzzle:** Place commercial muzzle of appropriate size on dog otherwise cut strips of cloth or gauze etc.
4. **Strip of cloth & loop:** Before approaching the animal, make loop of strip of cloth. Diameter of loop must be double than the dogs snout. Slip loop over dog's nose and mouth with the half square knot on dorsal surface of dog snout and pull strip from both ends to tight the muzzle. Cross free ends of muzzle under dog's lower jaw. Bring ends of muzzle up behind dog's ears and tie in a bow. Muzzle should be removed immediately when animal has difficult breathing or starts to vomit. To remove muzzle quickly untie bow and pull on one end of muzzle. Double thickness strip of cloth/gauze is used in giant breeds of dog.
5. **Use of Elizabethan collar:** It should be made of tough flexible structure like plastic. Place it on neck of fractious dog or cat to prevent animal from biting or licking itself. In this, animal can paint easily may be applied for days without any drawback Collars are reusable
6. **In Sitting Position:** Place one arm under the dog's neck to secure dog head firmly place the other arm around the hindquarters to prevent the dog from standing or lying down. Pulling the dog close to the chest allows more control if the animal attempts to move.
7. **In Standing position:** Place one arm under the dog's neck in such a position that it is impossible for the dog to bite. Place the other arm under the abdomen to prevent the dog from sitting or lying down. Pull the dog close to your body allows more control if the animal attempts to move.
8. **In lateral recumbency:** Take hold of the fore leg and hind leg closest to you. Gradually lift the dog's legs off the table and allow her body to slide slowly against

your body until she is lying on her side with feet pointing away from the handler. Use your forearm to exert pressure on the side of the dog's head, thus immobilizing the head. Used for saphenous venipuncture

Restraint of Cats

Restraining a cat is difficult than restraining of dog because cat can move very quickly. Use claws as well as teeth to defend themselves. Cat is a small animal, can be injured by indiscriminate use of force.

- 1) **Restraint of cats by scruffing** : Grasp the loose skin of cat's neck between the ears tightly(called **scruffing**) . This grasping/scruffing unable cat to turn her head and bite. Wrap the fingers of the other hand around and through the cat's hind legs. Gently stretch the cat out • Brace the cat's back and neck firmly against your forearm.
- 2) **Cat Muzzle:** Approach the animal from behind. Put muzzle on the face. Tightened the muzzle with a kont.
- 3) **Towels:** A towel or blanket is a very useful tool for cats and small dogs. A towel can be used to decrease an animal's arousal by covering the head and body and can help protect from sharp claws.
- 4) **Cat Bag:** A cat bag is useful for restraint because it prevents the cat from scratching. The Head is still exposed, however. These bags are typically made of nylon.

The cat bag is used to:

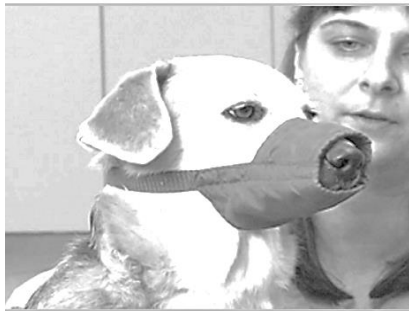
- Restrain a cat so that personnel do not get scratched.
- Provide access to specific areas of the body through various zippered openings allowing for injections or venipuncture.
- To provide restraint while anesthetizing a cat with an anesthetic mask.

Obtain the **cat bag** you will be using and unzip the top all the way open. Scruff the cat and lift it into the bag. This should be done in one swift motion.

- 5) **Restraint for femoral venipuncture** : The hand holding the hind legs can then be used to hold the top leg and tail out of the way • While the person performing the venipuncture pulls out on the leg closer to the table. • Pressure placed vertically on the inner thigh will occlude and raise the femoral vein.
- 6) **Restraint of the Cat for Cephalic Venipuncture:** Place the cat in sternal recumbency on an examination table. Scruff the cat with your right hand and extend the left front limb forward by grasping the elbow in the palm of your hand with your thumb on top of the elbow joint. The procedure for occlusion of the vein is the same as in the dog
- 7) **Restraint of the Cat for Jugular Venipuncture:** Place the cat in sternal recumbency with its chest close to the edge of the table. Hold the head up, away from the chest. This can be achieved by cupping your hand underneath the jaw and pushing the head up toward the ceiling.

QUESTION

1. Name the given handling methods and instruments used.



EXERCISE-8

TO STUDY ROUTINE CARE OF DOGS, CATS, PUPS, KITTEN AND WEANING

Routine care of dogs and cats should include the following:

- 1) Grooming,
- 2) Preventive health care,
- 3) Parasite control,
- 4) Nutrition,
- 5) Household hazards
- 6) Housing requirements and environmental factors.
- 7) Signs of Illness
- 8) Dental Care

Grooming

Dog's hair coat should be brushed regularly to remove shed hair and prevent hair mats. Grooming is especially important for dogs with thick or shaggy hair coats that mat or tangle easily. Mats can irritate the skin, and the moist, stuffy conditions underneath them leaves the skin more susceptible to bacterial or parasite infections. Mats should be removed with electric clippers (not scissors) to avoid cutting the skin underneath. Periodic bathing with a pet shampoo is also important for maintaining healthy skin and fur. However, excessive bathing can irritate and dry the skin and hair. On average, most dogs do not need to be bathed more than once a month, depending on time of year and weather conditions.

Preventive health care

Preventive health care in small animals primarily involves vaccination and parasite prevention. Vaccines are available for a variety of infectious diseases in dogs, including distemper, parvovirus, hepatitis, leptospirosis, tracheobronchitis, rabies, Lyme disease, and coronavirus. Vaccines available against infectious diseases in cats include those for panleukopenia, rhinotracheitis, calicivirus, rabies, feline infectious peritonitis (FIP), and feline leukemia virus (FeLV).

Dog vaccination

S.No	Puppy's Age	Recommended Vaccinations	Revaccination / Booster
1.	4weeks	Parvo Gastroenteritis	After 2 weeks
2.	6 weeks	Canine distemper & Parvo Gastroenteritis	After 2 weeks
3.	8 weeks	DHPPiL (vaccines for distemper, adenovirus [hepatitis], parvo, parainfluenza, and leptospirosis) and corona vaccine	After 4 weeks
4.	12 weeks	Rabies, DHPPiL (vaccines for distemper, adenovirus [hepatitis], parvo, parainfluenza, and leptospirosis) and corona vaccine	Followed at one year of age

Cat vaccination

Vaccine	Age	Booster	Repeat
1.Feline panleucopenia	8-9 weeks	12 weeks	Annual
2.Feline rhinotrachities	8-9weeks	12-16 week	Annual
3.Rabies	12 weeks		Annual

Other preventive health care measures may include castration or ovariohysterectomy, and annual veterinary examinations. The current trend in preventive health care is to emphasize an annual examination separate from visits for vaccination. The preventive health visits allow the veterinarian to see the animal frequently and detect disease at an earlier stage.

Parasite Control

The primary intestinal parasites of dogs include roundworms, hookworms, whipworms, and tapeworms. These worms damage the digestive tract or interfere with absorption of essential nutrients, or both. Intestinal parasite infections are diagnosed by finding worm eggs (or sometimes actual worms or worm segments) in fecal samples. Fecal samples should be tested periodically (yearly or on the schedule recommended by your veterinarian) in all dogs and more frequently in puppies, which are especially prone to parasite infection. Heartworm is an especially serious parasite that is transmitted by mosquito bites. Blood tests to check for heartworm disease should be done yearly. Common external parasites include fleas, ticks, and mange mites. Monthly preventive treatments are available to control fleas and ticks, and are administered as body sprays or “spot-on” preparations that are placed on the skin between the shoulder blades. Mange mites can be detected by scraping the skin of infected areas for signs of mites or their eggs. Signs of mange include red, scaly areas or bald patches on the skin, or both.

Nutrition

It is an important and often overlooked aspect of pet ownership. Most pet foods on the market have been formulated based on significant research and development. Specialty diets are available (both over-the-counter and from veterinarians, including prescription diets) for young, growing, and geriatric pets, as well as for specific disease processes. Overfeeding and over supplementation may lead to numerous problems, and feeding of table scraps should be kept to a minimum. Water quality should not be overlooked, especially in rural areas and in kennels and catteries. Fresh water should be available ad lib.

Household Hazards

Dog and cat must be protected from household hazards, including chemicals, pesticides, cleaning supplies, antifreeze, electrical cords, drugs, alcohol, and poisonous plants. Curious puppies that tend to investigate and chew everything are at greatest risk; however, these products must be kept out of reach of all dogs. Dangerous items (especially electrical cords) can be frequently coated with a foul-tasting spray to discourage chewing.

Housing requirements and environmental factors are an important consideration for pets. For companion animals sharing an owner’s home, concerns are generally limited. However, outdoor housing must provide cover from direct sunlight, shelter from excessive wind and extreme temperatures, adequate ventilation, and an adequate supply of fresh water. These factors are critical in kennels and catteries. Drainage must be appropriate for proper

sanitation, and surfaces must be suitable for cleaning and disinfection. Hazardous environmental conditions can result in hyperthermia, sunburn, dehydration, hypothermia, or frostbite.

Traveling with pets is another important consideration. If crossing state lines, a health certificate should be issued. When international travel is planned, owners should be advised to become familiar with the appropriate health, quarantine, agriculture, and customs requirements. Transport of animals by airlines is under the jurisdiction of the specific airline company, but a veterinarian should be consulted and a health certificate issued. Animals should not be allowed to ride unrestrained in motor vehicles and should never be allowed to ride in the back of open vehicles such as pick-up trucks. Motion sickness and anxiety are common problems in dogs and cats when traveling. The phenothiazine tranquilizer acepromazine may be beneficial in this situation, and antihistamine therapy such as diphenhydramine may be useful. Maropitant citrate is also approved for treatment of motion sickness.

Signs of Illness

General signs of illness include a lack of appetite or decreased activity. Other more specific signs include vomiting and diarrhea, urinating more (or less) frequently, coughing and sneezing, or a discharge from the eyes, ears, or nose. Illness can also show up as a loss of hair or itchy areas on the skin or around the ears. Problems with the musculoskeletal system are often seen as stiffness or lameness, such as not putting weight on a leg. If your dog shows any of these signs for more than a day or two, a visit with your veterinarian is a good idea.

Dental Care

Dogs need dental attention throughout their lives. Keep dog's teeth and gums in good condition by feeding dry food, providing certain toys (for example, "flossie"-style bones), brushing dog's teeth regularly, and following a program of professional dental cleanings and oral care performed by veterinarian. Good dental care reduces the development of plaque which, if untreated, can progress to gingivitis and periodontal disease. In severe cases of dental disease, extraction is common.

QUESTION

1. Name diseases against which vaccination is necessary in dog and cat.
2. What are Zoonotic diseases?

UNIT – VIII

INDEX

NAME:

BATCH:

S. NO.	NAME OF EXERCISE	PAGE NO.	DATE	SIGNATURE
1	Methods and Techniques used in handling & restraining of Pig, Horse and Camel.			
2	Pregnant animal identification, care, isolation in farrowing sows and care of piglets.			
3	Preparation of Swine and Equine for show and their judging.			
4	Economics of pig farming.			
5	Routine inspection, tooth care and vaccination schedule of equine.			
6	To study different Horse riding methods and techniques.			
7	Layout plans for a sty and stable.			

EXERCISE-1

METHODS AND TECHNIQUES USED IN HANDLING & RESTRAINING OF PIG, HORSE AND CAMEL

Objective:

1. To attend the animals for various farm operations, to examine and provide veterinary aid to suffering animals.
2. To make animals docile keeping in view safety of farm workers.
3. To prepare the animals for show.

Principal of handling:

- ✓ The animals should be approached /handled with confidence without fear.
- ✓ The animals should be handled with care, politely, quietly and firmly.
- ✓ The sufficient human assistance is needed to control animals.
- ✓ Avoid noise and overcrowding.
- ✓ Adequate restraining materials and appropriate methods of restraining.
- ✓ Animal handled at suitable site.
- ✓ Knowledge about animal's behaviour and physiology is required.
- ✓ Assess the temperaments of the animals and opinion of attendant should be taken into consideration. (Temperament scoring)

HANDLING OF PIGS

Materials required: Ropes of different sizes. Different devices like: Mask, mouth gag, Pig catcher, pig tether, pig-ring, forceps and crates.

1. The pigs are very temperamental, should be handled with care.
2. Never handle the pigs by their tail as it can easily be pulled out.
3. Equipment's must be used for catching and handling of pigs.
4. Piglets can be caught by their hind legs seized above the hock.
5. A pig catcher should be used for adult pigs.
6. Unnecessary handling should be avoided for too long times.

7. Adult pigs are secured by using running noose (loop/lasso) or a strong pig net or a pig catcher.
8. For castration, young pigs are held upside down by holding the hind legs at hock and head is secured between the knees of the attendant with the pig back facing mothers.

Handling and Moving Equine

When handling equids, most injuries occur because of a lack of understanding of equine behaviour. Chasing the animals will result in agitated, stressed animals. Use slow, deliberate movements. Use the flight zone to direct movement. Avoid: Abuse, loud noises, yelling, isolating animals and distractions.

Methods of Restraint

Restraint may be needed for diagnostic sampling (e.g., blood collection) or vaccination or treatment. There are many ways to restrain equine depending on their familiarity with human contact. The method of restraint will depend on available resources, the number of handlers present, and the behaviour or agitation level of the animal.

- **Halter and Lead Rope** – This is a common form of restraint, but is dependent upon having something to which the animal can be secured.
- **Halter with Chain Lead Shank** – This is commonly used when handling stallions.
- **Stocks/Chute with Head Restraint** – A good restraint method if minimal movement is required.
- **Hobbles** – Put on equid legs can keep them from moving, while still allowing them to eat grass.
- **Twitch** – A nose twitch made of soft rope can be wrapped around the end of the animal's nose to keep it still.
- **Tranquilization/Sedation** – May be needed for situations requiring maximal restraint.
- **Stalls or Corrals** – can be used to contain equine but allow full movement of the animal or herd.

Special Considerations • Avoid moving equine under hot conditions • Move them in early morning or late evening • Provide water and breaks often • Use caution when moving in cold conditions • Monitor for slick or icy surfaces • Use gritty, non-slip, non-toxic material to improve traction • Responder safety: Be aware of potential injuries from equine • Bites, kicks, foreleg strikes, rearing, crushing • Animals may run over you when desperate • always have an escape route in view.

HANDLING OF CAMEL

Camel is a docile animal. If handled properly it is very easy to manage this animal. In rutting season male became excited at that time it is very difficult to handle it. It is advisable

to keep the males away from the female during rutting. The experience and long association with the animal make easy to handle the animal firmly and boldly.

Control of camel

For the restraining control of camel following are the equipment's such as

- 1) Nose rope/leading rope
- 2) Nose peg

1. Nose rope (leading rope)

Most commonly used. It is 13 feet long either attached to nose string which is tied to nose peg or head collar. A nose rope with a string should be provided even if the animal has head collar. While controlling with nose rope handle it gently to avoid injury and discomfort to the animal.

2. Nose peg

It is made up of wood and resembles a large collar shape. 2.5 log, 1.5 in diameter at base.

Disadvantages

- i. It may cause infection during blow –fly season.
- ii. Metal rings may cause trouble in summer.
- iii. String used to nose peg should be thin otherwise it may cause tearing of nostrils (in case of stumbling , sleeping, thin string-breaks, metal ring tears nostrils.)

Best material for string is:

- (1) **Munja** – Made up of sarkanda grass.
- (2) Mixture of goat and camel hair.

Restraining of camel

Well-handled camels are always friendly and docile and they may be even affectionate to those whom they known well. However, there are occasions when they need to be restrained and immobilized. This can be best done quietly but with determination and without any physical abuse. Many camels can be controlled with minimal effort, using a simple rope halter or just the manual lip twitch or a stick twitch. The lip twitch is used manually to apply moderate pressure. The lips being very sensitive help in controlling the head. One person can hold the upper and lower lips separately in both hands and keep them stretched. The stick twitch is preferably used on one lip. A quick and efficient way to restrain calves and immature which are not too heavy, for purposes of brief inspection/examination, drenching or injections, is to grasp them by the tail and the lower neck, virtually hugging

them to ones chest. Slightly larger animals can effectively be held for a few minutes by grasping the tail and one hind leg just above the hock. Brief physical examinations and application of drugs can be done this way. Adult animals can be controlled and guided with a rope halter in most situations. Should it be necessary to keep an animal from moving fast, it is a common practice to tie one leg to itself (fetlock to forearm or fetlock is flexed and tied). The animal can still move around over considerable distance and feed. For longer or painful treatments such as branding or castration, it is necessary to immobilize a camel in recumbent position. It can be done by limiting the neck movement and the animal is kept sitting by a tight rope leading around the flexed forelegs and over the neck or the animal is secured and tied in sternal recumbences. It might still be required to restrain the head, which can be done by the manual lip twitch or by a rope twitch, which can be fixed securely behind the lower canines.

To keep a rutting bull from fighting other males and from wandering off in search of females in other herds, his forelegs are tied together with a short rope just above the fetlocks, efficiently restricting him to very short strides. Sometimes the ankle ropes are secured to the ground to further restrict the movements of the animal. In another method used by African tribesmen, a tight rope collar slightly constricts blood flow in jugular vein and creates a slight discomfort. If the bull tries to engage in any strenuous activity, blood flow and breathing become rapidly impaired due to the tourniquet placed around the bull's neck and the animal is forced to calm down immediately. Grazing and other activities are not hindered at all by this device.

Questions:

1. Write about various instruments used for the control of camel.
2. Write down the any two restraining and handling instruments for equine.

EXERCISE-2

PREGNANT ANIMAL IDENTIFICATION, CARE, ISOLATION IN FARROWING SOWS, CAMEL AND CARE OF PIGLETS

Objectives:

1. To provide additional care to pregnant animals to avoid injury or abortion.
2. To provide prompt care, assistance and help at farrowing.
3. To ligate and disinfect naval cord and assist in artificial breathing, if required.
4. To ensure availability of colostrums to piglets within recommended standard time (half to two hours of farrowing). To dispose off foetal membranes (after birth) immediately after farrowing.

Materials required:

- ❖ Tincture iodine, Piece clean cloth, Luke warm water, Clean and sterilized towel, Sterilized scissors, Sterilized cotton wools, Clean, disinfected and well bedded farrowing pen.

Procedure:

1. **Farrowing:** It is critical time in pig production. Even in well managed farm 25-30% of the pigs born, never reach the market.
2. **Good housing:** sow may be farrowed in pens equipped with guard rail and crip space is adequate. Pen must be dry, sanitary and well ventilated and that they provide protection against heat, cold and winds.
3. **The guard rail:** it is effective means of preventing sows from crushing their piglets. The rail should be raised 8-10 inches from floor and should be 8-12 inches from wall.
4. **Temperature management:** temperature should be maintained at 24-28° until the piglets are 3-4 days old and 18-22°C until pigs are approximately six weeks old. Temperature maintained with the help of heating lamp (lamp hung 45cm from the floor),
5. **Pig brooder management:** supply of heat to piglets through stove, heater, and fire wood should be avoided. Electric pig brooder is much safer heating unit; the principles are same as chick brooder, except for chick guard.
6. **Cleaning of pregnant sow:** the sow should be thoroughly cleaned before shifting to farrowing pens. This should be done about 3-4 days prior to expected date of farrowing.

7. **Disinfection of farrowing pens:** to reduce infection, pen should be thoroughly cleaned and disinfected.
8. **Bedding of the farrowing pens:** when the pens are thoroughly dry, they should be bedded with good absorbent that is dry and be close to the floor. Straw or dry grasses are suitable for the purpose.
9. Presentation and expulsion pattern of foetus should be observed. Farrowing sow should be assisted, if required. Help the weak piglets in artificial respiration, if required. Piglets should be cleaned and naval cord should be disinfected.
10. Piglets must be helped for suckling colostrum. Newly born piglets should be kept in creep area.
11. **Piglet Anaemia:** sow' milk being deficient in iron and copper , the piglets suffer from a serious deficiency piglet anaemia, and are more prone to such a deficiency since the amount of the minerals stored in their liver much lower. The udder of the sow may be swabbed daily with saturated solution of ferrous sulphate to avoid piglet anemia.
12. **Controlling piglet anaemia:** Providing clean sod or clean soil in the shed itself. By allowing they access to clean area of soil. By giving iron and copper pills. The udder of the sow may be brushed with a solution of ferrous sulphate and copper sulphate. By injecting 2 ml of iron dextran's or iron dextrans at three days' and three weeks' age.
13. **Weaning of piglets:** India it is done on 56 days .the weaning time should not be less than three weeks. Weaning is very important in sows, because sow will come in heat after removal of piglets from suckling.
14. **Creep feeding:** Creep feed is called "**pig starter**". It is concentrate mixture having 25 to 30% proteins.
15. **Castration:** Boar pig to be fattened for market must be castrated when young. Age of castration is 4-6 weeks. Both the testicles are removed through **incision** method.
16. **Marking/identification of pigs:** Commonly used methods of identification are ear notching, ear tattooing, body tattooing, metal ear clips etc.
17. **Sanitation:** Scours should be avoided by keeping the pen dry and clean and equipment's and utensils under sanitary conditions.
18. **Hypoglycaemia:** Occur in new born piglets during the first few days, i.e. they do not receive sufficient milk from the cow. Glucose in warm water may be given to such piglets to restore them to health.

19. Protection from cold: Baby pig may die of chill particularly during first 2-3 days, so they should be protected from the chill. A pig brooder in a corner of the pen warmed with an electric heater protects young pig from cold.

PREGNANCY IN CAMEL

In camel 99% pregnancy occurs in left horn .the incidence of twin ovulation is 14 %. Embryos develop initially in both horns but, unfortunately one in right horn dies when it reaches a size of 2-3 cm.

Pregnancy diagnosis: There are various methods of pregnancy diagnosis in camel like:

- Physical changes, which are most common: Cocking of tail, increase in body weight, dark yellow coloured urine, pH of urine becomes 3.10, specific gravity- 1.038 to 1.086. Vaginal folds become prominent, rectal palpation by 60 days.
- Chemical test:
 - ✓ Cuboni test.
 - ✓ Barium chloride test.
- Biologic test:
 - ✓ Detection of gonadotropins
 - ✓ Vaginal cytology

Care during pregnancy

Once pregnancy is confirmed the care has to be taken to avoid abortion. Pregnant camel should not be allowed to run extensively. Balanced nutrition with plenty of water is required. Feed quantity should be increased by 25% for growing foetus. Fighting in camels leads to rupture of uterus. Kicking and biting on the abdomen should be avoided as far as possible. Plenty of green and dry fodder is necessary. The diet generally prescribed during pregnancy is as follows:

- | | |
|-------------------|-----------|
| ➤ Concentrate mix | 5 kgs |
| ➤ Tree fodder | 20-25 kgs |
| ➤ Crushed barley | 2 kgs |
| ➤ Crushed gram | 2 kgs |
| ➤ Bhoosa | 7-10 kgs |
| ➤ Salt | 30 g |

Excitement and over exertion may lead to abortion and hence in the last trimester of pregnancy the females must be given maximum rest. In few camels, heat during pregnancy is expressed and in such cases mating must be avoided.

Parturition in camel

The duration of the labour is more pronounced. Navel cord generally breaks by itself when the camel licks her young and the placenta is expelled soon after parturition. Securing of animal as soon as the symptoms are seen is advisable. The labour pains continue for 5 to 10 hours. She camel remains in recumbent position for few minutes after parturition. Camel calf stands on its own within 6-8 hrs after birth. The female generally produces one calf at a time.

Exercise:

1. Write down the precautions to be taken during and after farrowing?
2. Write the various methods of pregnancy diagnosis in camel.

EXERCISE-3

PREPARATION OF SWINE AND EQUINE FOR SHOW AND THEIR JUDGING

Objective:

1. To exhibit best type of animals and win the contest.
2. To exchange the Ideas between participants breeders of the show.
3. Healthy competition and encouragement to other breeders.
4. Help in uplifting the equine industry.

Judging horses, like all livestock judging, is an art that must be developed through patient study and long practice.

A horse judge must:

- ❖ Know the parts of a horse and their location
- ❖ Know which parts are most important and the most desirable form of each part.
- ❖ Visualize the ideal horse, perfect in all respects.
- ❖ Make keen observations of horses and compare them to his ideal.
- ❖ Weigh the good and bad points of each horse.
- ❖ Develop a system of examining horses so he won't overlook important points.

CONFORMATION

Conformation includes type, muscling, balance, and structural smoothness. It also includes the form and proportion of the various parts of the body.

Type:

Depends upon the function a horse is to perform, our study of horse judging will focus on saddle horse type, since saddle horses, or light horses, comprise most of the 4-H projects and judging contests. Desirable type in a saddle horse requires a horse of medium size and weight, generally ranging in height from 14 ½ to 17 hands and weighing from 900 to 1300 pounds, depending on the breed. This horse has a long, sloping shoulder, a long croup, a fairly short back, and a short, strong coupling. The bottom-line is much longer than the top-line, allowing a long stride. Both fore and rear quarters show an adequate amount of muscling for the breed. The chest is deep and the ribs well sprung. Legs are clean, flat-boned, and medium to short in length. Horses that do not fit this general description are called **off-type**.

They may be too small (pony – type) or too large and heavy (draft-type). The several breeds of saddle horses have distinguishing type characteristics (breed type). Usually all horses in judging class of same breed. They should be compared as to how well they exhibit breed type.

Muscling:

Both the quantity and the quality of muscle are important. Muscles should bulge and be distinctly visible on the surface under the skin. The muscles in the arm, forearm, V-muscle, stifle, and gaskin should be smooth, long and well attached. Long, tapering forearm and gaskin muscles that tie well into the knee and hock both inside and outside are preferred to short, “bunchy” muscles.

Balance:

A balanced appearance comes from the forequarter and hindquarter appearing to be of nearly equal size and development. They “fit” together well. A heavy-fronted horse that is narrow and shallow in the rear quarter is not balanced; neither is a heavy quartered horse that is narrow, flat, and shallow in front.

Smoothness:

When all the parts of a horse blend together well and the muscling is long and tapering, then the horse has smoothness. The head and the neck should be in proportion, and the neck should blend smoothly into the shoulder. The shoulder and fore rib should fit smoothly together, and the coupling should be short and strong so that the top line is strong and the hips tie in smoothly. A horse with a thin neck and a sharp break at wide, prominent shoulders is not smooth. One with a weak coupling and jutting hips is not smooth nor is a horse that is extremely “bunchy” in his muscling.

Head:

Each of the light horse breeds requires slightly different characteristics about the head. These should be considered when breed classes are judged. In general, the head should be well proportioned to the rest of the body, refined and clean cut, with a chiselled appearance. A broad forehead, with great width between the eyes is desired. The face should be straight as compared to convex (Roman nose) or concave (dished). The eyes set wide-apart, should be large and clear. The ears should be medium to small in size, set wide, and active. The muzzle should be small, the mouth shallow and the nostrils large and sensitive. The upper and lower teeth should meet when biting. A contrast is the parrot mouth where the lower jaw is too short.

Neck:

The head should join the neck at about a 45 degree angle with a distinct space between the jawbone and the neck. This is the throat latch. It should be clean-cut. Depending

on the breed, the neck should be medium in length to fairly long, the head carried either high or at a moderate level. The neck should be slightly arched, lean and muscular, and blend smoothly with the shoulder. A high-arched or heavy-crested neck is undesirable.

Shoulders:

The shoulder is long and set at an angle of about 45 degrees from the withers down to the point of the shoulder. Shoulder should be smooth yet well-muscled. The wither should be well defined, extend well back beyond the top of the shoulder, and be as high as the hips. Low, flat withers do not hold a saddle well.

Chest and forelegs:

The chest is deep and fairly thick, with this depth and thickness extending back into the fore rib and barrel. A deep heart girth and well-sprung fore ribs give room for good respiratory and digestive capacity. The forelegs are wide-set and blend smoothly into the shoulder. The forearm muscle is large and tapers into the knee when viewed from the back or front. The knee joint should be clean and the pastern medium in length. The pastern and the hoofs are set at about a 45 degree angle to the ground.

Back, loin and croup:

The top-line should include a short, strong back and loin a long, nicely-turned and heavily muscled croup, and a high well-set tail. The loin (coupling) must be short and very strongly muscled because it supports the weight of the saddle and rider and lifts the forequarters when the horse is in motion (see figure 3 for undesirable characteristics).

Rear Quarters:

The rear quarters should be thick, deep, and well-muscled then viewed from the side or rear. This muscling shows in thickness through the thigh, stifle and gaskin. The hind legs are muscled both inside and out with the gaskin tied in low in the hock joint. The hocks are wide, deep, and clean.

Bone, Legs:

The bones of the legs should be flat, clean, and free from fleshiness and puffiness. The bone should be of adequate strength and substance to support the horse during strenuous performance. The hock should be large, clean-cut, wide from front to back, and deep. Gaskin muscles should tie-in very strongly and low on the hock. The knee should be wide when viewed from the front, deep, and clean-cut. When viewed from the front or rear the knees and hocks should be bisected by an imaginary vertical line down the centre of the legs. Tendons below the knees and hocks appear sharply separated from the canons, giving the leg a flat appearance. All four legs are set squarely under the body. From the front view, the forelegs are parallel with the feet pointing straight ahead. From the side view, a line drawn perpendicular to the ground should bisect the foreleg all the way from the shoulder to the rear of the hoof. From the rear view, the hocks should point straight back or turn in very slightly.

The hind legs should set well under the horse and the feet point straight ahead. The hock should be set at the correct angle. Too much angle at the hock with the feet set too far under the body is called “sickle-hocked”. Too little angle is called “post-legged”.

Feet and pasterns:

The hoof should be well shaped, roomy and balanced in size with the horse. The heel should be deep, wide, and open. The hoof should appear tough and durable. The pasterns should be medium in length and set at approximately 45 degrees to the ground. The hoof should have the same angle as the pastern. If the pastern is too straight, it does not cushion the shock of the foot striking the ground and can lead to serious damage as well as a rough ride.

Quality:

Quality is indicated by cleanness of the bone and head, general body smoothness, and stylishness. The bone should be clean and hard. The joints, free from fleshiness. The tendons in the legs stand back from the cannon bones and give the legs a flat appearance. The head looks clean-cut and chisels. The body is smooth and the hair coat glossy. However, a slick fat horse might appear smooth and glossy and still be of low quality.

Sex and breed character:

By sex character, we mean masculinity in the stallion and femininity in the mare. The stallion should have a bolder, stronger, head, a more massive jaw, and thicker heavier neck and shoulders than the gelding or mare. The stallion has heavier bone and is larger and more rugged than the mare. Geldings do not show excessive masculinity. Mares should be feminine about the head and neck and more refined than stallions. Each breed has slightly different characteristics about the head as well as in body conformation. These are the points which make us recognize one breed of light horses from the others.

Although the degree of action will vary somewhat with the different breeds of light horses depending on their use (saddle, racing, stock horse, show, etc), the usefulness of all horses depends on their ability to move well. In all breeds the motion should be straight and true, with a long, well-coordinated, elastic stride. Excess lateral movement of the feet reduces efficiency and detracts from coordination. Action is affected by the set of the feet and legs. A horse that stands crooked usually moves crooked. A horse that toes in (pigeon-toed) on the front feet will usually paddle or wing out. Some horses place the front feet too close together, sometimes interfering as they move. A horse that toes out (splay-footed) in front will usually dish or wing in. Fairly close hock action, with the hind legs moving straight forward is desirable. Lateral movement of the hocks is undesirable. The horse should move with snap and determination, as if he knows where he is going and is sure to get there. A halting, sluggish movement is undesirable. Some common defects are:

Cross firing. A “scuffing” on the inside of the diagonal forefeet and hind feet: generally confined to pacers.

Dwelling: A noticeable pause in the flight of the foot, as though the stride were completed before the foot reaches the ground: most noticeable in trick-trained horses.

Forging: striking fore foot with toe of hind foot.

Interfering: striking fetlock or cannon with the opposite foot; most often done by bse-narrow, toe wide, or splay-footed horses.

Lameness: A defect detected when the animal favours the affected foot when standing. The load on the ailing foot in action is eased and a characteristic bobbing of the head occurs as the affected foot strike the ground.

Speedy cutting: The inside of diagonal fore and hind pastern make contact: sometimes seen in fast trotting horses.

Stringhalt: Excessive flexing of hind legs: most easily detected when a horse is backed.

Trappy: A short, quick, choppy stride: a tendency of horses with short, straight pasterns and straight shoulders.

Winding or rope-walking: A twisting of the striding leg around in front of supporting leg, which results in contact like that of a rope-walking artist: often occurs in horses with very wide fronts.

Winging: An exaggerated paddling particularly noticeable in high-going horses.

Paddling: Throwing the front feet outward as they are picked up: mot common in toe-narrow or pigeon-toed horses.

Pointing: Perceptible extension of the stride with little flexion: likely to occur in the long-strided thoroughbred and standard bred breeds – animals bred and trained for great speed.

Pounding: Heavy contact with ground instead of desired light, springy movement.

Rolling: Excessive lateral shoulder motion: characteristic of horses with protruding shoulders.

Scalping: The hairline at top if hind foot hits toe of forefoot as it breaks over.

Unsoundness and blemishes:

A major point in judging horses or examining one prior to purchase is the recognition of unsoundness and blemishes and calculating the importance of each. A blemish is an abnormality which may detract from the appearance of a horse, but does not affect his serviceability. An unsoundness is an abnormality that interferes with the useful ess of the horse. Certain unsoundness has a tendency to be inherited, and these are more serious than those which are acquired by accident. Inherited unsoundness make a horse undesirable for breeding, showing or performance.

❖ **Judge's score card (detailed score card)**

<p>A. Appearance of the horse</p>	<p>40 points</p>
<p>1. Condition</p>	<p>15 points</p>
<p>a. Smooth glossy coat with hard rippling muscle.</p> <p>b. Alert and vigorous.</p> <p>c. Skin loose and pliable; clean, with healthy, fine, short hair.</p> <p>d. Evidence of a balanced program of nutrition, health care and exercise.</p> <p>e. Neither excessively fat nor thin and unthrifty.</p>	
<p>2. Grooming</p>	
<p>a. Clean, well-brushed hair coat. Dust, dandruff and stains objectionable. Judges should discriminate heavily against artificial whiteness or colourings.</p> <p style="padding-left: 40px;">i. No change in the major colour pattern of an animal by painting or dyeing will be allowed.</p> <p style="padding-left: 40px;">ii. No grooming material that allows colour to come off from an animal will be allowed at the show.</p> <p style="padding-left: 40px;">iii. The use of artificial tail fans, artificial polls, false tails, or the addition of any hair or hair-like substance to any part of the animal's body is discouraged.</p> <p>b. Clean around the eyes, ears, nose, muzzle and tail.</p> <p>c. Mane and tail rimmed to breed standards.</p> <p>d. Head trimmed neatly to breed standards.</p> <p>Trim long hair under jaws and around throatlatch. Nose and muzzle hair should be trimmed. Long hair in ears should be trimmed flush with edges of ear. Ears may be "peeled", but not required. Legs should be booted from knees and hocks down to the hoof. Hooves must be clean and properly trimmed. If horse is shod, shoes must fit properly and not show excessive wear. Hoof dressing is permissible, but not required. Hooves cleaned and polished in natural condition will receive equal merit to those with hoof dressing.</p>	<p>25 points</p>

B. Showing the horse	50 points
1. Ring deportment	10 points
<ul style="list-style-type: none"> a) Be on time. b) Enter the ring at a brisk walk in a counter-clockwise direction. c) Be alert for instruction from either the ring steward or the judge. d) Show form from the time you enter the ring until you leave the ring. e) Do not crowd or otherwise interfere with other horses or other showmen. 	
2. Actions	
<ul style="list-style-type: none"> a) Showmen and horse should work as a team. b) Give cues calmly and quietly. c) Showing procedure should direct attention to the horse. Attention should not be attracted to the showman. d) Manners and actions in showing the horse should reflect patience and training. 	10 points
3. Leading	15 points
<ul style="list-style-type: none"> a) Lead from the near (left) side of the horse. Hold the lead shank at a length that allows instant control of the horse. For safety reasons, an exhibitor should never hold the chain portion of the lead. Length of the lead should not be so short as to interfere with free, natural movement of the animal or so long as to surrender control or permit a sloppy lead. b) For safety reasons, fold excess lead into a figure '8'. A two-handed lead is recommended for juniors and permissible for all as a more professional show performance. c) Lead from the near side of the horse midway between the head and shoulder. d) All turns shall be to the right with the exhibitor walking to the right around the horse with the exception of initial line up and when excused by the judge. e) You will show in hand at the walk and trot. Watch the ring steward or judge for instruction. 	

<p>f) When asked to move your horse from one position to another in the line, lead your horse forward, clear the line, turn, lead back through the area you vacated, then proceed to your new position and enter from there.</p>	<p>15 points</p>
<p>4. Posing</p> <p>a) Western-type horses should stand squarely with the weight distributed equally on all four feet. Other breeds may be shown stretched.</p> <p>b) The horse should set up squarely and quickly, stand quietly, and move forward or back freely.</p> <p>c) Horses should take cues off the lead strap and by quiet verbal command.</p> <p>d) The quartering system should be used. (see description and diagram below.) when the judge is working the line, the exhibitor should use the quartering system when the judge is three horses away from him/her.</p>	
<p>5. The exhibitor</p> <p>a) The exhibitor should be clean, neat, and in appropriate attire.</p> <p>b) Be business-like and friendly.</p> <p>c) Be cooperative.</p> <p>d) Be courteous.</p> <p>e) Concentrate on showing the horse.</p> <p>f) Be a sportsman.</p>	<p>10 points</p>
<p>Total</p>	<p>100 points</p>

❖ **Draft showmanship judge’s score card**

Appearance of horse	40 points
1. Condition	15
2. Grooming	25
Showing the horse	50 points
1. Ring deportment	10
2. Actions	10
3. Leading	15
4. Posing	15
The exhibitor	10 points
1. Appearance	5
2. Attitude	5
Total	100 points

Preparing the show horse

The following point should be considered, while preparing a horse for show:

- ✓ Formulation of Ideal ration. Rapid rehydration after exercise, travelling or competition. Horse kept cool and easy to handle.
- ✓ Special care taken, in case of gastric ulcer. Preparation of hooves and coat for showing. Producing shiny coat.
- ✓ Supplementation with omega-3/omega-6 fats. Cleaning of hair coat. Improving condition and top-line.

➤ **Formulation of Ideal ration:**

Many people have tendency to be overfed, resulting in “fizzy” behaviour and overweight condition, which can have detrimental effect on joints and the general health. On the other hand poor feeding results in underweight condition, with show horses having no top-line and ‘sluggish’ movement due to inadequate energy. So, balanced ration recommended for horse.

- 1-2 energy source like cereal grains, rice bran and 1 good quality protein like soybean meal.

- A good quality fibre source and supplement with bone minerals, trace minerals and vitamins.
- Salt like NaCl, important electrolyte required for nerve function and fluid balance in the body, supplementation with Kohnke's own cell-salts provided.

➤ **Rapid rehydration after exercise, travelling or completion:**

It is important to provide water and salts to replenish fluid and electrolytes after exercise or long distance travel to a show or competition. By conditioning horse with the warm saline after exercise, it will look for it as rehydration drink following travelling or competition. It helps to rapidly re-hydrate the blood and body fluids within 5-10 minutes if a horse is hot and thirsty. A daily supplements of **Kohnke's Own Cell-salts** should be added to the feed each day provide a range of salt to correct low or inadequate level in feeds.

➤ **Horse kept cool and easy to handle:**

When competing in the show ring, it is important that your horse or pony be relaxed and attentive. An excited, 'hot' or nervous horse or pony can result in misbehaviour and an unenjoyably experience, besides being marked down for distraction during competition. There are a number of consideration which should be taken into account as the possible cause or contribution to this unwanted behaviour, including **organisation and routine, overfeeding, feeding 'hot' feedstuffs, magnesium deficiencies and gastric ulcers**. Eliminating these problems is likely to produce both a happier horse and rider, as well as reducing the chance of injury.

Horse and ponies which have an inadequate intake of magnesium in their diets can develop a **nervous, temperamental and anxious** attitude. They often have difficulties in adjusting or coping with unfamiliar surroundings. Some of the symptoms include anxious and unsettled behaviour during handling, travelling or competition, especially when they are removed from their home environment. Magnesium is often relatively poorly absorbed from feeds as it competes for uptake with calcium. As well, when excess phosphorus (for iron) is provided in the ration, there will also be a reduction in magnesium uptake from the small intestine. For horses and ponies with low intake of magnesium, consider supplementing the ration with magnesium and Vitamin E.

➤ **Special care taken, in case of gastric ulcer:**

Many stressful and anxious horses and ponies often have a poor appetite and are picky eaters particularly after exercise and travelling. Other horses can develop a restless/worried/nervous temperament when travelling or waiting to compete. These horses are likely to be suffering from **Equine Gastric Ulcer Syndrome (EGUS)**. **Symptoms also include unwillingness, bad behaviour when travelling and pawing the ground when waiting to compete due to gastric discomfort.**

For a 500 kg horse, try feeding 4 litres of dampened lucerne chaff, or ¼ biscuit of dampened lucerne hay with 3-4 scoops of **Kohnke's Own Gastro-Coat** 30 minutes prior to

exercise, travelling and on arrival before competition to help salivation and normal gastric function. Lucerne contains natural mucilages, saponins and buffering compounds which are often found to be low in processed and heat treated feeds. The mucilages in lucerne and Gastro-coat encourage chewing and saliva buffering which helps to maintain optimum gastric conditions and digestive function.

➤ **Preparation of hooves and coat for showing:**

Regular hoof care and trimming is essential to prevent injury and reduce uneven and unwanted pressure on joints which can lead to early breakdown. Proper hoof balance helps to facilitate optimum gait and a smooth stride. Regular hoof trimming is particularly important in growing horses as it helps to ‘set the bones’ in place and correct any limb deviations. It is important to trim to realign the limbs during the first 3-12 months while the horse is growing. Corrective trimming in young growing horses to ensure straight limbs should be carried out every 4 weeks rather than the standard 6-8 weeks in mature horses.

Adequate nutrition is essential for proper hoof growth and strength. The diet for a fully grown horse should contain a good source of protein such as 200-300 gm full fat soya bean meal, or 400gms cracked lupins or 500gms copra meal as well as a high quality vitamin and mineral supplement which includes calcium, zinc, vitamin A and biotin (Vitamin H). Where a horse has poor quality “shelly” hooves, an additional 15 mg of biotin daily may be worthwhile.

➤ **Producing shiny coat:**

Skin and coat condition is largely a reflection of a well-balanced ration, a good **worming** program and regular grooming, cleaning and appropriate rugging. The ration must include a good source of vitamins and minerals, in particular copper, zinc, iron and vitamin A, as well as polyunsaturated oils. An additional iron supplement can be useful to assist with producing a deep, lustrous colour coat.

➤ **Supplementation with Omega-3/omega-6 fats:**

Polyunsaturated vegetable oils, fed in conjunction with a supplement containing zinc, copper, iron and vitamin A, will help to maintain optimum coat and skin condition. **Kohnke’s own Energy Gold** is a blend of vegetable oils containing omega-3, omega-6 and omega-9 fatty acids, as well as added vitamin which is important to prevent destructive oxidation in muscle tissues during exercise and garlic oil flavouring for high palatability. It can be included in the daily ration at 15ml per 100kg of body weight as a coat conditioner and has a reputation for improving coat condition in just 2-3 weeks.

➤ **Cleaning of hair coat:**

It is important to keep the coat clean and free from stains and scurf. Avoid shampooing excessively and avoid shampoos which are soap/detergent based, as these will often strip the natural oils from the coat and dry out the skin. During the week prior to competitions, start the finishing touches by trimming the tail and clipping out the ears, trimming feathers and

whiskers on the muzzle and around the eyes, only if breed regulations permit. Pull the mane and tail to remove bleached hairs and create a good line for plaiting. Keep the horse rugged to avoid any sun bleaching and to reduce the chance of dirty stains and insect bites.

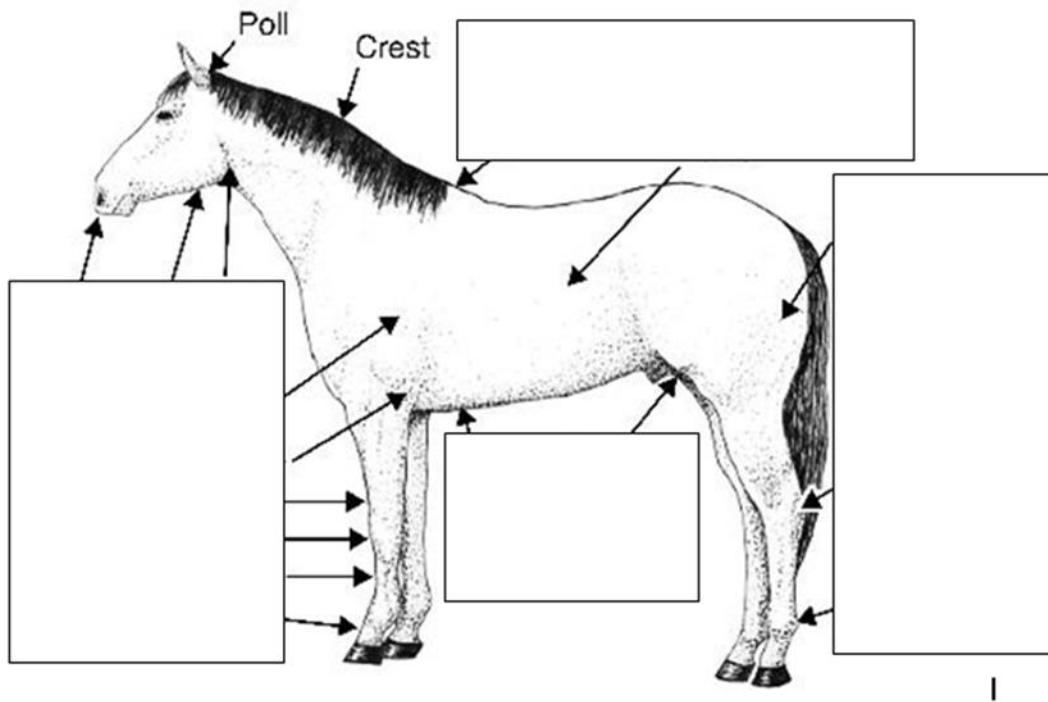
➤ **Improving condition and top-line:**

Improving condition on a horse and building top-line are two quite different objectives in a show preparation, which are sometimes confused and regarded as the same by some. Putting condition on a horse or pony is usually a result of the diet being **high in carbohydrate and fat**, while **top-line** is developed by limited amounts of good quality **protein and muscle loading exercise**.

Questions

1. What is difference between condition and top –line?

2. Label the diagram of horse with body parts.



EXERCISE-4

ECONOMICS OF PIG FARMING

Tentative farm plan for setting up a piggery unit (10+1 sow, boar) size

A. Non – recurring expenditure (fixed capital)

A. Non – recurring expenditure (fixed capital)

(a) Cost of construction of buildings:	Rs.
i. Covered area 150 sq meter @ Rs. 270 per square meter	_____ .00
ii. Open area 225 square meter @ Rs.125 per square meter	_____ .00
(b) Expenditure on equipments:	
i. Cost of equipments	_____ .00
ii. Installation of hand pump (electric pump) for water	_____ .00
(c) Cost of animals	
i. Cost of one breeding boar and 10 sows	_____ .00
ii. Transportation charges	_____ .00
Total= _____ .00	
Total fixed capital required (a+b+c) _____ .00	

Note:

- The farmer initially needs Rs. _____/- as a fixed capital
- Annual loan instalments of Rs. _____/- for ten years.
- Interest on fixed capital is given annually.

(B) Recurring expenditure:

i. Feeding cost of adult breeding stock 90 quintal concentrate mixture per year @ Rs.500 per quintal	_____
ii. Feeding charges of 160 piglets/fatency pigs 100 q concentrate mixture @Rs.550 per quintal	_____
iv. Cost of cultivation of foliages/tuber/vegetables etc for feeding animals	_____
v. Labour charges (one)	_____
vi. Veterinary charges	_____
vii. Miscellaneous charges	_____
Total working capital Rs.	_____ .00
viii. Depreciation on buildings @ 5%	_____
ix. Depreciation on equipment's @Rs.20%	_____
x. Interest on fixed capital in first year (loan) @ Rs.14%	_____

xi. Interest on working capital @ Rs. 14% for the first year _____

Total expenditure:

(C) Expected return from the unit:

- i. Sale of 144 market pigs(10% mortality) weighing 70 kg body weight @Rs.70 per kg live weight _____.
- ii. Sale of manure _____.
- iii. Sale of gunny bags: _____.
- Total=** _____.

(D) Annual return

- i. Expected income _____
- ii. Expected expenditure _____
- iii. Gross return _____
- iv. Repayment of annual loan instalments _____
- v. Net return _____

Exercise:

1. Prepare a housing layout plan for piggery unit (10+1)?

EXERCISE=5

ROUTINE INSPECTION, TOOTH CARE AND VACCINATION SCHEDULE OF EQUINE AND SWINE

Vaccination schedule for pigs

Name of disease	Type of vaccine	Time of vaccination	Duration of immunity period	Remarks
Anthrax	Spore vaccine	Once in a year, pre-monsoon vaccination	One season	
Hog cholera	Crystal violet vaccine	After weaning	One year	
Foot and mouth disease	Polyvalent tissue culture vaccine	At about six months of age with booster done after 4 months	One season	After vaccine repeat vaccination every year in October/November
Swine Erysipelas	Alum treated vaccine	After weaning with a booster dose after 3-4 weeks	About one year	
Tuberculosis	B.C.G. vaccine	At about six months of age	One to two years	To be repeated every 2 or 3 years

- ❖ Piglets are born with 8 needle teeth; 4 are incisors and 4 are canine teeth. These are considered baby teeth and they will eventually fall out, however in some piglets or litters it may be necessary to clip them. These teeth can be blunted or shortened during the first week of life by grinding the tip, clipping the tip, or clipping the tooth at the gum line.
- ❖ **BENEFITS:** Litters of piglets with intact needle teeth suffer more facial lacerations, and their sows may have more lacerations on their udder and may shield their teats by spending more time lying on their bellies. Piglets whose teeth have not been clipped may sometimes suffer higher rates of mortality due to increased overlying and crushing by the sow; it has been suggested this might be due to sows being injured and becoming more restless.
- ❖ However increased udder injury is not always found when piglets are left intact, and it has also been suggested that piglets whose teeth have not been clipped are less competitive and so lie closer to the sow thus increasing their risk of being crushed.⁸
- ❖ Recently, a study found that unclipped teeth and undocked tails did not have significant negative effects on average daily gain (ADG), gain to feed ratio (G:F), serum

immunoglobulin G (IgG) concentrations, mortality rates, wound severity/incidence, post-weaning behavior of piglets or carcass composition.⁹These studies could suggest that there is little to no significant advantage to the clipping of teeth.

Clipping has been shown to increase behaviors suggestive of discomfort such as “chomping.” Piglets whose teeth have been clipped may experience more gum and tongue injuries and potentially painful inflammation or abscesses of the teeth. These injuries may lead to infections and increased time spent sleeping⁴ (seen as an indicator for infection).

EQUINE VACCINATION SCHEDULE:

Disease / Vaccines	Age and booster doses	Remarks
Tetanus toxoid	1 st dose: 3-4 months; 2 nd dose: 4-5 months; Annual	Administer during surgery and wound treatment @5ml IM; Tetanus anti toxin may be given @1500-3000 IU
Influenza	Inactivated injectable: 1 st dose: 6 months; 2 nd dose: 7 months; 3 rd dose: 8 months; Annual Intranasal modified live virus: First dose: 11 months; Semi-annual	There are restrictions for pregnant mares, but not open mares
Rhinopneumonitis (EHV-1 & EHV-4)	1 st dose: 4-6 months; 2 nd dose: 5-7 months; 3 rd dose: 6-8 months ; Annual	
West Nile	1 st dose: 3-4 months; 2 nd dose: 1 month later (plus 3rd dose at 6 months in areas at risk); Annual	Usually given in the spring or prior to mosquito season &/or bird migration risk in your area
Equine Encephalomyelitis, Sleeping sickness	1 st dose: 3-4 months; 2 nd dose: 4-5 months; 3 rd dose: 5-6 months; Annual	Usually given in the spring before insect & mosquito season
Strangles	<i>Injectable</i> : 1 st dose: 4-6 months; 2 nd dose: 5-7 months; 3 rd dose: 7-8 months (depending on product used); 4 th dose: 12 months; Semi-annual <i>Intranasal</i> : 1 st dose: 6-9 months; 2 nd dose: 3 weeks later	
Potomac Horse Fever	1 st dose: 5-6 months; 2 nd dose: 6-7 months	
Equine Viral Arteritis	Intact colts intended to be breeding stallions: 1 st dose at 6-12 months; Annual	
Botulism(inactivated type B toxoid)	3-dose series of toxoid at 30-day intervals, starting at 2-3 months of age.	
Rabies	1 st dose at 6 month age; Annual	Only in endemic area

Questions

1. Write in detail about teeth clipping methods and precautions in piglets.

2. Define the following terms.

i) Farrowing Index:

ii) Drove:

iii) Farrowing:

iv) Back fatter:

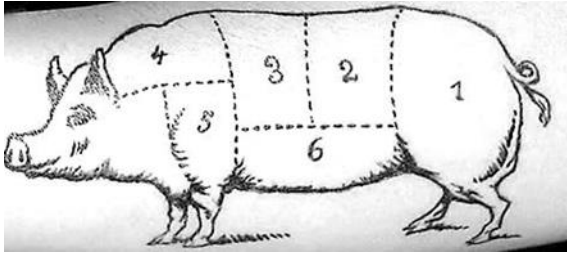
v) Feeder pig:

vi) Brawn (dish):

vii) Bristles:

viii) Creep feed:

3. Label the following diagram:



EXERCISE-6

TO STUDY DIFFERENT HORSE RIDING METHODS AND TECHNIQUES

Objectives

1. To know about common riding instruments.
2. To acquaints students with riding styles and techniques.

Equipments used in stud farm:

1. Head collar (Nukta)
2. Rope (bag dor)
3. Bit and reign (legaam)
4. Body brush and comb (kharkhara and brush)
5. Saddle.
6. Jhools (horse blankets)
7. Rope halters.8.Measuring stick.

Bridling

Always untie your horse before removing the halter. Stand in close just behind and to one side (preferably on the left side) of the horse's head. Handle the horse's ears carefully.

Keep control of the horse when bridling by re-fastening the halter around the neck. Be careful not to bang the horse's teeth when bridling or unbridling. Ask your horse to open his mouth by putting one or two fingers in the corner of his mouth.

Be sure the bridle is properly adjusted to fit the horse before you ride:

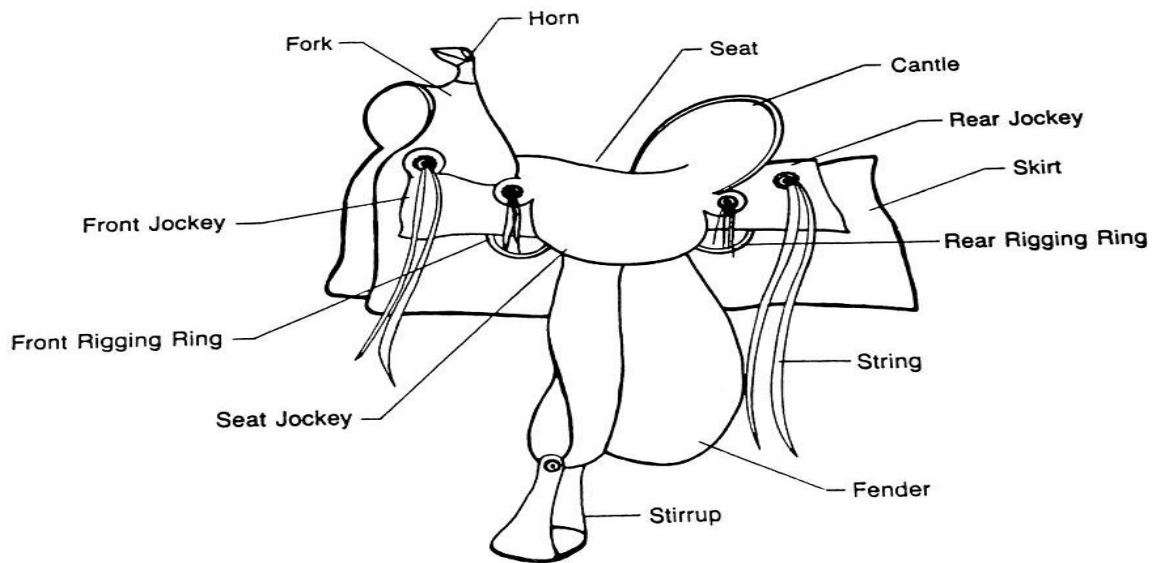
- Check the bit-there should be one or two wrinkles at the corners of the mouth.
- The throatlatch should be adjusted so that you can insert three fingers between it and the horse's jaw.
- The cavesson (if used) should be relatively tight. You should be able to insert only one finger between the cavesson and the nose.
- The curb chain (if used) should be flat and not twisted. You should be able to insert two fingers between the chain and the horse's chin groove.

Never let your horse eat when wearing a bridle. He may step on the reins or get his feet tangled in them. Also hay or grass may get caught in the bit and injure his mouth.

Mounting and Dismounting

Never mount or dismount a horse in a barn or near fences, trees, or overhanging projections. Sidestepping and rearing mounts have injured riders who failed to take these precautions.

A horse should stand quietly for mounting and dismounting. To be sure the horse stands, you must have light control of its head through the reins



WESTERN SADDLE PARTS

English riders should “run up” the stirrups on English saddles immediately upon dismounting. The dangling stirrup may startle or annoy the horse. After running up the stirrups, English riders should immediately bring the reins over the horse’s head. In this position, the reins can be used for leading. Western riders should also bring the reins forward for leading immediately after dismounting.

Headgear

Medical studies show that the most common riding-related injuries are to the head. Many of these could be prevented or made less severe by the wearing of protective headgear.

Protective headgear is a hat that stays on during a fall (not one that hits the ground before the rider). Protective hats cannot be pierced by a sharp object and have extra padding inside to protect riders from concussion.

Riding

When riding, wear boots with proper heels to prevent your feet from slipping through the stirrups. Always wear protective headgear, properly fitted and fastened. Keep your horse under control and maintain a secure seat at all times. Horses are easily frightened by unusual objects and noises.

Until you know your horse, confine your riding to an arena or other enclosed area. Ride in open spaces or unconfined areas only after you are familiar with your horse. When your horse becomes frightened, remain calm, speak to it quietly, steady it, and give it time to overcome its fear.

Hold your mount to a walk when going up or down a steep hill. Allow a horse to pick his way at a walk when riding on tough ground or in sand, mud, ice, or snow where there is danger of your horse slipping or falling. Don't fool around. Horseplay is dangerous to you and to your friends, as well as to others who may be nearby.

Never ride your horse with just a halter. Halters don't give you enough control. Use a bridle. Try to avoid paved or other hard-surfaced roads. Walk the horse when crossing paved roads.

If you must ride along the road, ride on the shoulder and follow the rules of the road. Get a Driver's Manual from your Department of Motor Vehicles. These rules vary from state to state. Never rush past riders who are proceeding at a slower gait, as it startles both horses and riders and frequently causes accidents. Instead, approach slowly, indicate a desire to pass, and proceed cautiously on the left side.

Ride abreast or stay a full horse's length from the horse in front to avoid the possibility of being kicked. You can tell if the distance is safe **by looking through your horse's ears**. You should be able to see the hind heels of the horse in front of you. Don't let a horse run to and from the stable. Walk the last distance home.

If you use spurs, be sure your legs are steady enough that you don't touch the horse with the spurs by mistake. If you're not sure, don't wear them. When your horse is frightened and tries to run, turn him in a circle and tighten the circle until he stops. A **red ribbon** tied into the tail indicates a kicker, so stay back.

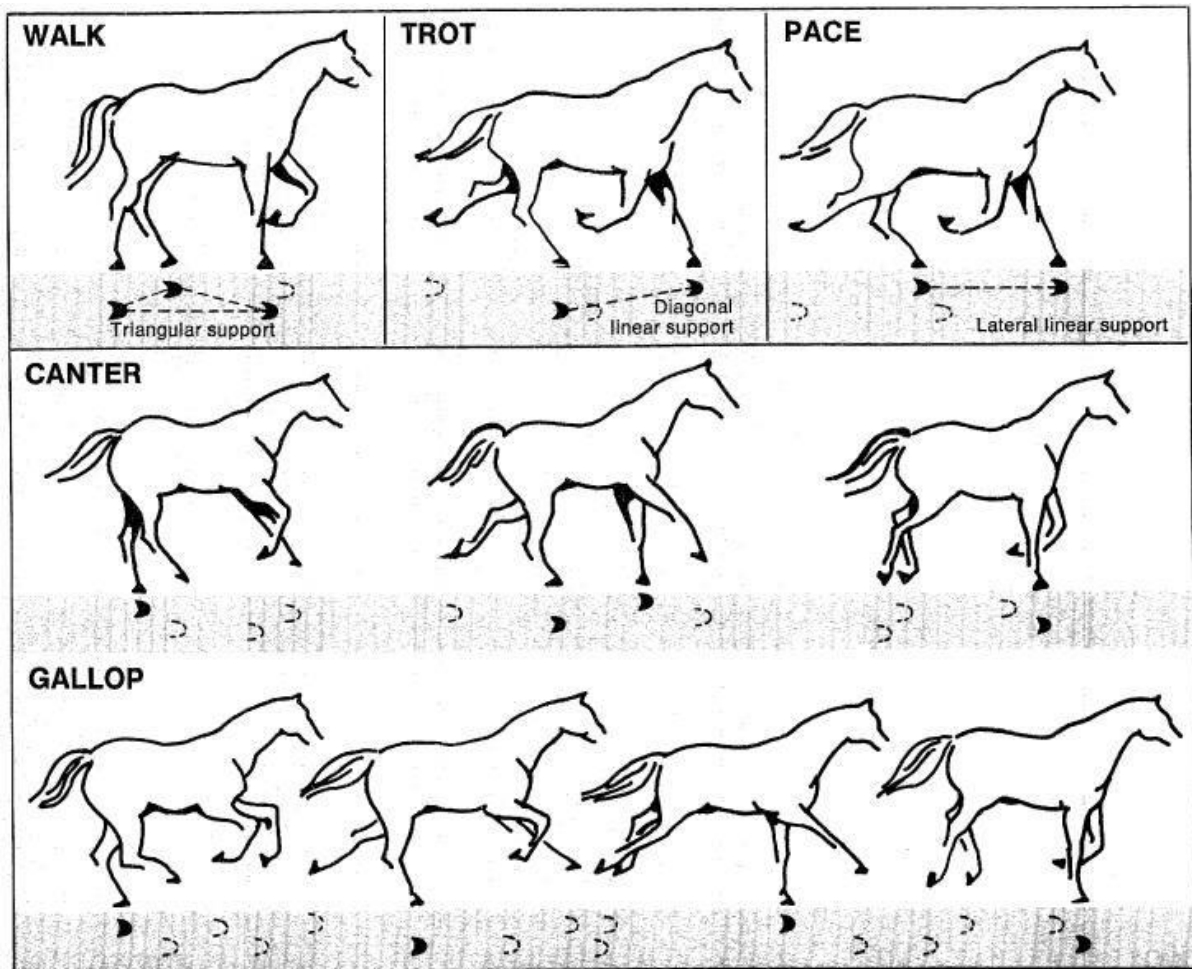
Horse riding and different gaits of horses

Different types of gait:

1. **Walk:** is taking short, simple and slow steps by horse while riding.
2. **Trot:** Trotting is taking short quick steps by horse while riding. To move forward at a speed that is faster than a walk and slower than a canter. A two-beat gait involving diagonal pairs of legs. The two legs with white stockings are off the ground.
3. **Canter:** a movement of a horse at a speed that is fairly fast but not very fast. The left hind and right fore will land at the same moment, creating three beats in the stride. In fig below horses is on the right lead, as the right rear and left fore are moving together, with the right hind leading the left hind. As the left forefeet lands, it will be in front of the right fore. The speed of the canter varies between 16-27 km/h (10-17 mph), depending on the length of the stride of the horse. The "lead" of a canter refers to the order in which the legs are placed, and is determined by which leg is the last to ground before the suspension phase. If the left hind leg is placed first (beat one), which would then be followed by the right hind and left foreleg (beat two), before the right foreleg (beat three), the horse is said to be on the "right lead." If the right hind leg is beat one, then the left foreleg will be the last leg to ground, and the horse will be said to be on the "left lead." Therefore, a person on the ground can tell which lead the horse is on by watching the front and rear legs and

determining which is the last one to touch the ground, but may also simply watch to see on which side the legs are literally “leading”, landing in front of the opposing side.

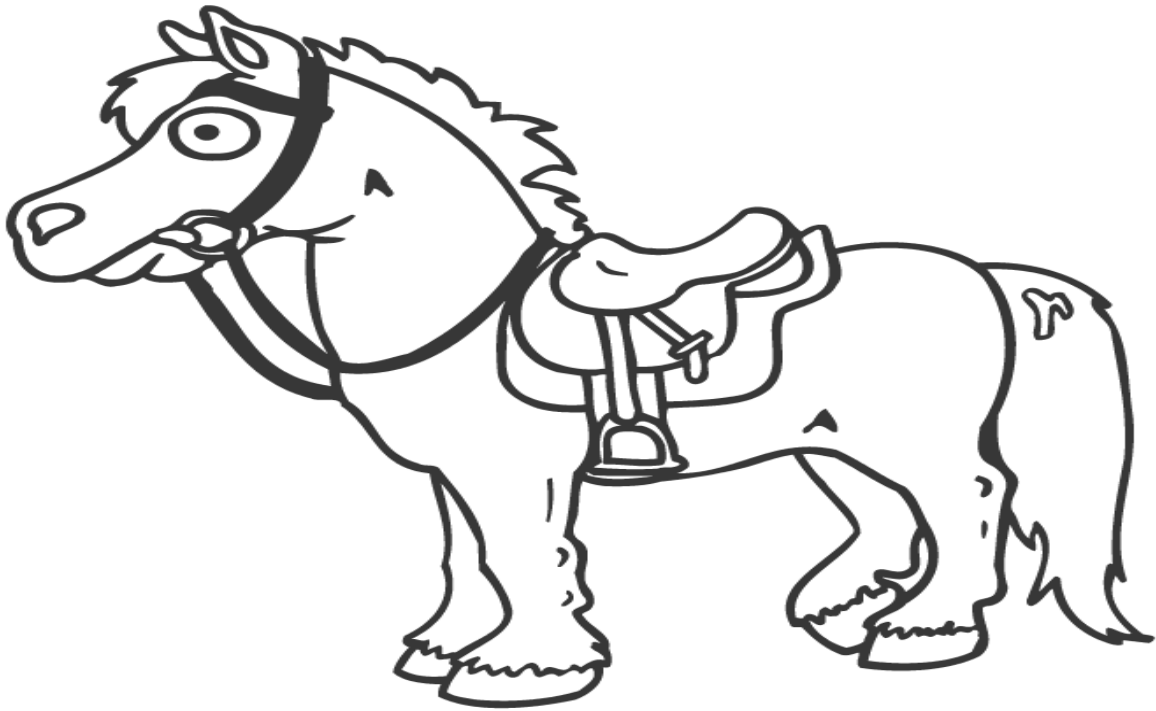
4. **Gallop:** The fastest speed at which a horse can run, with a stage in which all four feet are off the ground together. The canter and gallop are related gaits, as the rider simply asks the horse to gallop from the canter by allowing it to lengthen its stride until it is four-beat, rather than three beat. The horse is able to easily move in and out of the gallop using the canter.



Although the **walk, trot, and canter** can be collected to very short, engaged strides, the gallop, should it be collected as far as possible, will turn into a canter stride. In the same sense, if the canter stride is lengthened to the extreme, it will invariably turn into the gallop. This doesn't mean that the rider cannot achieve an extended canter, but care must be taken to maintain the purity of the gaits.

Questions

1. What are the four gaits of horse while riding?
2. Label the following diagram (parts of horse and saddle).



Exercise- 7

LAY OUT OF A STUD FARM AND STY

Objectives:

1. To study the standard requirement for Horse farm.
2. To familiarize the student with Pig farm.

REQUIREMENT FOR HORSE FARM

The following three points should be born in mind while preparing a project on horse farm:

- A. Selection of site.
- B. Arrangement of farm shed buildings.
- C. Design of building/animal shelter.

A. Selection of site for stud farm:

- Stud farm should be away from railway line, highway, factories, aerodrome and city (as horse is very sensitive to noise). It should near to market.
- Road connected site should be slightly at higher level (avoid water logging).
- Water should neither be hard nor brackish (excess salt), sweet water will be good for cultivation of lucerne and oats. It should not leave any deposit of salts on the ground surface.
- Soil of paddock should not contain stones and it should not be hard.
- Sandy soil chances of damaging the hoof are less, hoof remains dry and healthy. Paddocks are provided with grass and are kept green round the year. Soil should be fertile.
- Entire farm must be fenced, so that no stray dogs, wild animals, rat snake and skunks enter the farm. Good drainage system required to avoid water logging. Needs uninterrupted electric supply and communication.
- Orientation of building either east-west or north-south.

B. Farm buildings: (for 20 brood mares)

1. Stable
2. Paddock
3. Other buildings.

1. Stables: Stables can be constructed in block as follows:

- ❖ *For pregnant mares, block of 20.
- ❖ *For empty mares, block of 16 (along with yearlings fillies).
- ❖ *For yearlings colts, block of 10.
- ❖ *For weanling, fillies, colts, block of 16.
- ❖ *For stallion and teasers 2.
- ❖ *Sick or isolation ward 4.
- ❖ * Foaling boxes 2.

2. Paddock: It is attached to respective stables.

- ❖ Pregnant mares,
- ❖ Empty mares.
- ❖ Colts,
- ❖ Fillies,
- ❖ Weanlings.

3. Other buildings:

- ❖ Exercise ring.
- ❖ Covering yard.
- ❖ Dispensary and treatment hall (Fly and dust proof).
- ❖ Feed store.
- ❖ Dry fodder yard.
- ❖ Residences: vet doctors, manager, compounder, Ferrier and couple of individual loose boxes for visiting mares.

Note: Care should be taken that distance that distance between stables and a paddock is least.

There should be plenty of green fodder (grass, lucerne and oat). The farm should be able to produce the requirement locally. During winter season carrot can be grown and fed to equines of all ages.

C. Design of building/animal shelter:

1. Stables:

On economic grounds double row of stables with a common passage in between will be suitable under Indian conditions where, summer is great problem to keep the animals cool. The height of the stable is kept about 12' and door height 7, and a manger for water and fodder, flooring may be rough cemented with slope, sandy, brick line with straw bedding. The size of stable should be 14 x 16' or 12' x 18'. Height of the ceiling should be good enough to have free flow of air i.e. 12'-14' high. In Indian condition the main problem of housing is how to keep the livestock cool and comfortable. All angles and corners of the stable should be rounded off. It is recommended that the stable should be concrete floored so

that good hygienic condition can be maintained and hoof disease are thus avoided. Adequate ventilation should be provided in all the stables.

- ❖ **Foaling box:** The foaling boxes are constructed not very far away from main stables and also quite close to medical supplies. These should be completely concrete floored which will facilitate dis-infection and cleaning after every foaling.

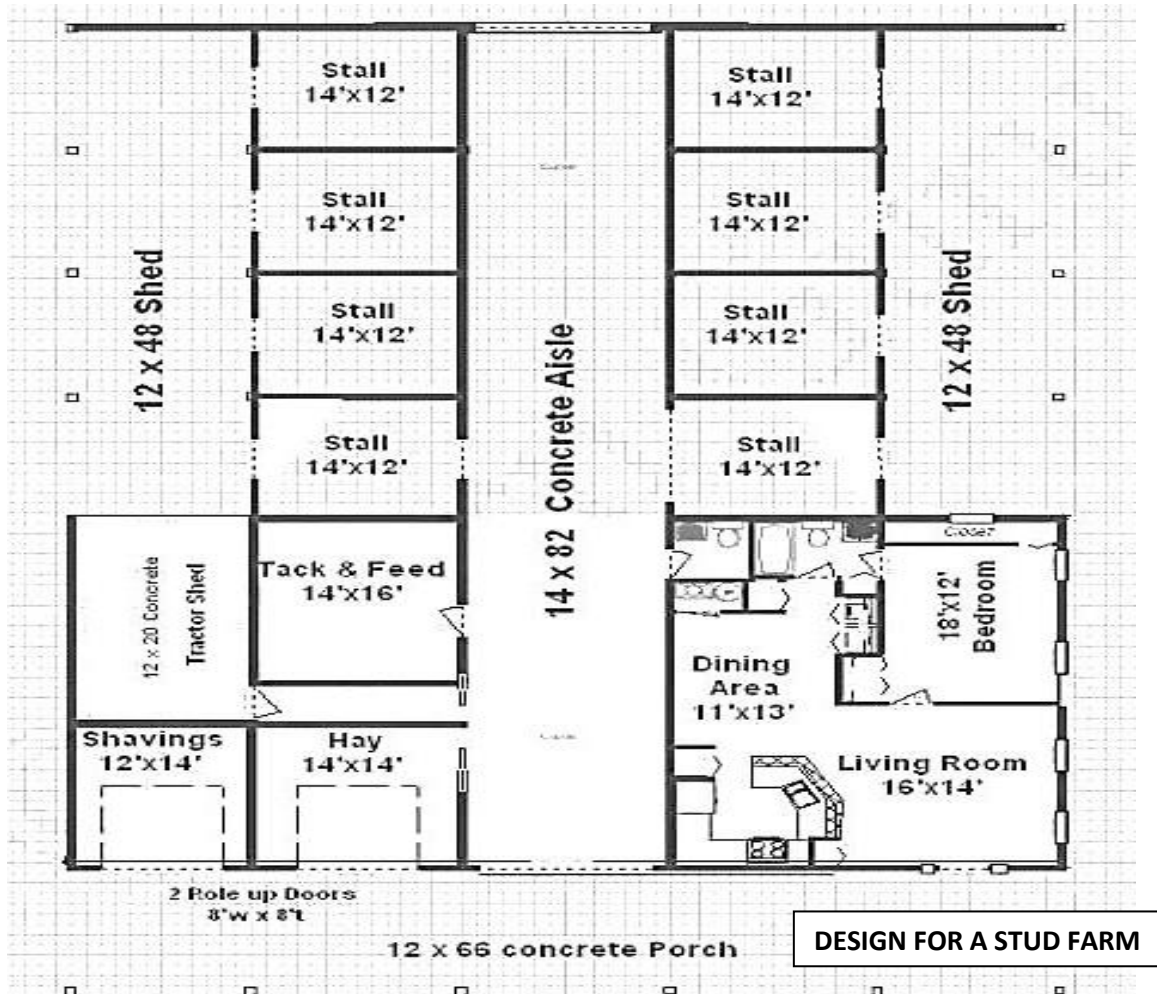
2. Paddock:

If land is available the paddock may be constructed as big as possible. These paddocks should be properly fenced by brick wall, iron pillars and wooden fencing is good but it does not last long due to termites invasions. Within paddock a water trough with clean and wholesome water should be provided. In case of paddock where mare are to be kept for 24 hrs a big shade can be provided in the Centerior in one of the corners of the paddocks. This shade is sometimes dangerous in paddocks where weanlings and yearlings are to be kept. Since they often run fast and blindly are likely to get hurt. If possible all around the paddock tree be planted so that they provide shade in early morning and in afternoon. Paddock should be levelled and made sure that there are no rat holes and stones. It is advisable to have green grass in the paddocks so that animals keep grazing. Regular watering of these paddocks and alternate grazing will assure in keeping the grass lush green and prevent blowing of the dust.

3. Other buildings:

- ❖ **Exercise ring:** A circle of 100'-180' diameter will be ideal for this purpose. However it can be reduced in size, if the space is limited. Provide soft sandy track and enclosed with brick lining wall at least 7'- 8' high with a gate 8'-10' wide.
- ❖ **Covering yard:** It should be covered on all four sides by brick walls. If it is to be open from the top then a lawn grass may be planted and maintained, so that during covering in dust arises from the ground and stallion will have firm footing. In case it is covered from top the flooring can be provided with wooden material or any other ant slippery material. During April to June it is extremely hot, the covering yard can be air cooled to obtain better results.
- ❖ **Dispensary and treatment hall:** A two room pharmacy would be highly desirable where necessary medicines and instruments can be stored as well as used. Connected to this or close to it a dust and fly proof hall having one trevis will be ideal. In this way all types of treatment as well as rectal palpation can be carried out under hygienic conditions.
- ❖ **Feed store:** Normal feeds for equines are oats, barley, soybeans, maize and wheat bran. The store room should be rat proof so that the concentrate is not spoiled and eaten away. A ratio of various feed stuff be evolved and mixed and stored for further use. Oats and barley should be crushed and broken. If not, then barley is boiled and fed. Facilities for oat crushing by the roller mill can be provided at the farm.

- ❖ **Dry fodder yard:** Dry fodder, oat hay or dry lucerne is preferably stored under cover in order to protect it from rains. Even the bedding material, rice straw etc. should be kept under shade to avoid mould formation.



REQUIREMENT FOR PIG FARM

Factors taken in consideration for selection of site and layout of piggery farm:

- Kind, type and condition of soil.
- The size of enterprise.
- Type of pig to be produced.
- Availability of land.
- Climatic conditions.

- Location of farm for easy disposal of products.
- Availability of raw materials.

System of housing in pigs:

1. Open air system.
2. Indoor system.
3. Combination of above two.

Location:

Farm should be:

- Located near the city.
- Not situated in municipal area.
- Having good drainage.
- Properly sanitized.
- Exposed properly with sun light.

Enclosure:

Permanent enclosure are necessary for permanent buildings and portable enclosure are necessary for rotational system where usually portable type system are used. Permanent enclosure are usually provided by fences.

Construction details:

Floor: It is warm, dry bed free from draught. The floor should be hard, impervious to liquid and easy to clean. Brick absorbs liquid but well made concrete provide the most satisfactory floor. A concrete floor should be laid on a hard foundation with a rough surface.

Roof: It should be water proof and should not be bad conductor of heat. R.C. roof or tiles are excellent for this purpose. But R.C roof is costly, asbestos cement will make a satisfactory light roof which is also cheap. Corrugated G.I (Galvanized Iron) sheet is also suitable but it is good conductor of heat so when used it should preferably be insulated. Thatched roof or tiled roof may also be provided in pig housing.

Walls: Wall should be 4' to 5' high from the floor. Brick and concrete are the best material for construction of walls for a height of about 3' from the floor while the remaining one to two feet may be of wood or 1" G.I pipes. Wall must be strong and smooth. Partition between pen 4' high.

Windows: In enclosed building good windows and roof lights is required. The windows would promote cleanliness and allow the entry of sunrays necessary for the pigs. Many pig houses in colder countries have double glazed windows to reduce the escape of heat.

Doors: Door should be such that when closed it may cut off the entry of air and rain water in the building. The width of door should be 2'6" to 3'.

Troughs: A trough space of about 12 inches should be provided to each pig to facilitate proper feeding without scrambling and fighting. All pig troughs should be strong, easy to clean and fitted in such a way that pig cannot tilt them. Portable galvanized heavy iron troughs are suitable in piggeries with deep litter system. The height of the trough from the floor next to pigs should be about 6" and the trough may be divided at an interval of 12 inches by placing iron and wooden bars across trough to prevent the pigs from wallowing in it. The trough should be about 15" wide.

Water supply:

Water is required for cleaning and drinking purposes. Fresh drinking water should always be available to the pigs all the year round. Automatic drinking bowls are best way for providing water to pigs but are very costly. In some piggeries no separate water trough is provided and the feed trough is filled with water after each feeding.

Drainage facility:

In deep litter system no elaborate drainage is necessary as all the urine is expected to be absorbed in the litters. But in other piggeries drainage is necessary. All floor should be laid to a fall (1 to 72) towards the drain for rapid removal of liquid.

Floor space requirements:

Fattening pigs- **10 to 16 sqft per pig**

Fattening pig in yard- **30 to 40 sqft per pig**

Farrowing pigs- **60 to 80 sqft per sow and litter**

Boar pens - **40 to 50 sqft per pig**

Description of permanent building:

➤ Boar pens:

Boar placed in individual boar pens away from the dry sow unit. A boar house should be built with a large open air paddock enclosed up to the height of not less than 4 ½ feet.

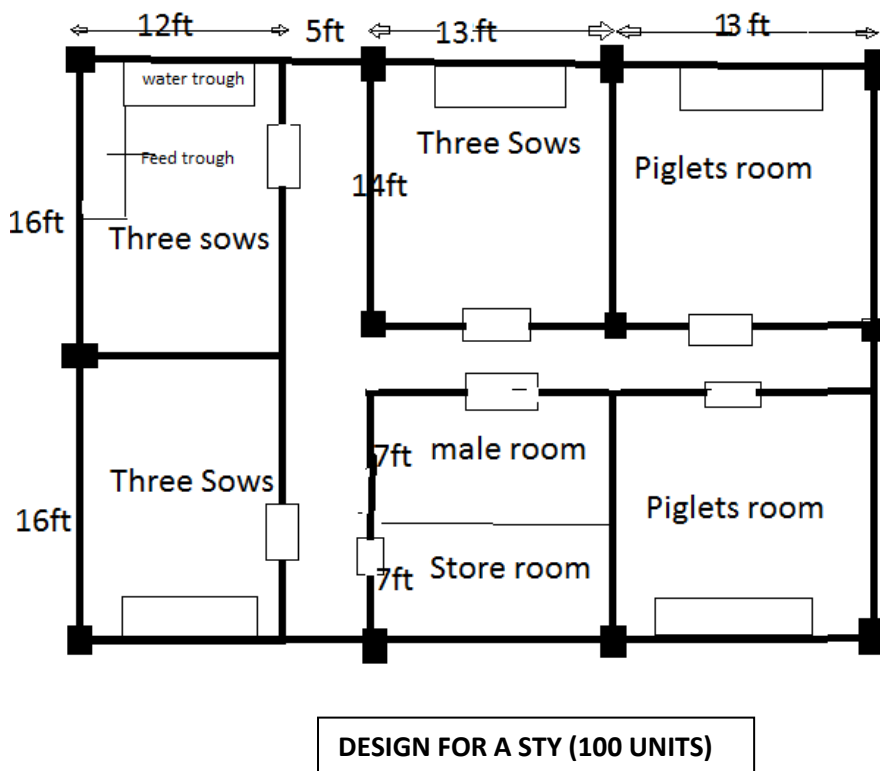
➤ Farrowing pens:

The sow should have separate accommodation where she can find her piglets all to herself. A farrowing should have an area of 60 to 80 sq. Ft. and should be fitted with automatic drinking bowl or in its absence a water trough. Attached to each farrowing pen

there should be a small exercise paddock with a wallow of about 8” in depth especially on hot regions of our country. The pen should be dry and warm. Trampling/crushing/walk over is common cause of death of piglets so guard rail (G.I pipes of 2” diameter or bamboo pole) is placed to avoid crushing to piglets. The rails are usually fitted 8 to 10 inches from and off the wall and the floor.

A creep is a device in a farrowing g pen which allow the entry of piglets only as protected area from the sow. A floor space of 15 to 20 sq ft for a creep is recommended. The floor of a farrowing pen may be kept warm and dry by spraying saw dust or similar materials.

- **Dry sows and gifts:**
- **Weaners and fatteners:**
- **Segregation shed**
- **Other buildings**



Question:

Q. 1 Describe housing structures in an equine farm/ stud farm.

Terms related to Equine husbandry:

Horse is general term related to particularize all the members of the horse species. The horse meant for general purpose. But during writing a description, it is applied to un-castrated males and is synonymous with 'stallion' or "Entire". There are many types of horse classified according to the nature of work for which they are used. Such as draft horse, racers, hunters, polo-ponies and hackneys.

Aged horse: A horse of eight year and above.

Brood mare: A mare kept for breeding.

Colt: A young immature male horse.

Cob: A short legged, stocky and small horse, 13 ½- 14 ½ hand (1 hand =4")

Covering: Act of mating in horse.

Double rig: Is a horse of twelve month or over whose both testicles have been retained in the abdomen. Double rig are usually sterile.

Donkey: Synonymous with ass. Jenny is female donkey.

Entire: Is an adult un-castrated horse which is not used for breeding purposes.

Filly: A young immature female horse usually over one year of age.

Filly foal: A female foal under one year of age.

Foal: A young one up to one year of age.

Gelding: Also written as geld, means a castrated male horse of any ages.

Hinny/Jennet: A hybrid whose sire is a stallion and dam is a female donkey.

Jack: Male of donkey.

Mare: An adult female horse.

Mule: A hybrid whose sire is a donkey and dam is mare.

Pony: A horse of smaller size measuring less than 13 hand (1 hand=4")

Rig, Rigling or Cryptorchid: A male horse of twelve month or over, whose one testicle has been retained in the abdomen. Rigs are often more intractable than the stallions.

Stallion: An un-castrated male used for breeding.

Thorough bred: Is a breed of English race horses that originated from the mixture of eastern blood. Thorough bred horses are famous for their stamina, courage and seed.

Waler/ whaler: Is an Australian saddle horse imported into India and other eastern countries.

Yearling: A horse of over one year and under two years of age, i.e. a yearling colt and yearling filly.

