



Practical Manual On Livestock Production Management (Unit-5,6,7, and 8)



Compiled By

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Name : _____

Roll No : _____

Regn. No : _____

Batch : _____

Department of Livestock Production Management
College of Veterinary Science & Animal Husbandry
Anand Agricultural University
Anand – 388 001 (Gujarat)



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PREFACE

With the implementation of new course curriculum of B.V.Sc. & A.H. by Veterinary Council of India to be followed in Veterinary Colleges / Universities there was a dire need to have a practical manual on Livestock Production Management subject which covers the practical syllabus of undergraduate courses. The main objective of this manual is to meet the need of students and teachers teaching this course. It is hoped that users will find the manual immensely useful.

The authors are highly thankful to Dr. A. M. Thaker, Principal and Dean, Veterinary College, AAU, Anand for his kind guidance and constructive comments. We also thank to Indian Council of Agricultural Research for providing funds required for publishing the practical manual.

Suggestions for improvement are welcome from scientists, teachers and students.

With Regards!

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Certificate

This is to certify that the practical exercises duly signed were performed in the subject of Livestock Production Management by Mr/Ms..... Roll No-....., Regn. No.....of 1st Year B. V. Sc. & A. H. class during academic year.....

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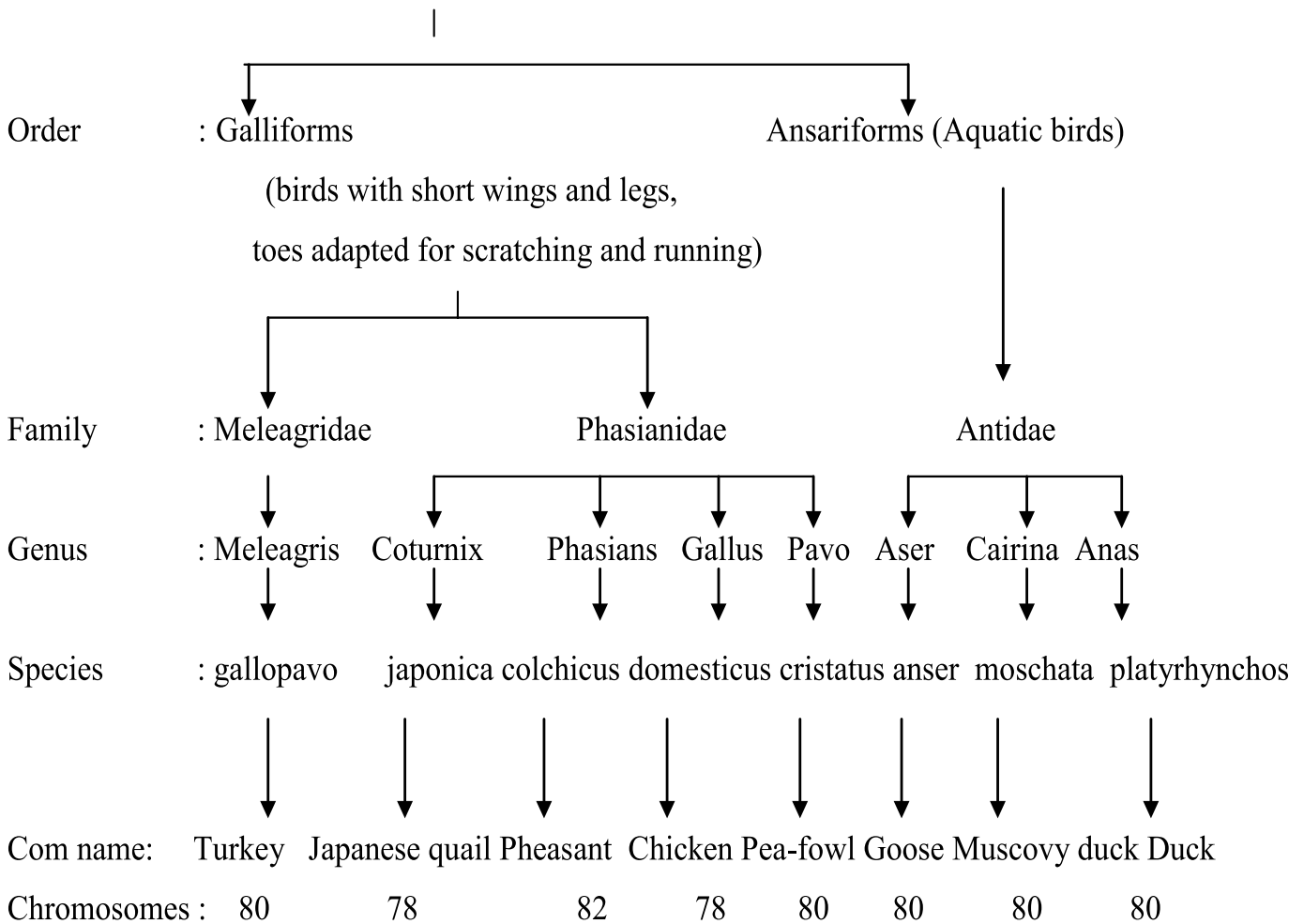
POULTRY ZOOLOGICAL CLASSIFICATION AND NOMENCLATURE

Objective:

1. To obtain the knowledge & characteristics of various species of poultry.
2. To get familiar with common terminologies used for various species of poultry.

Zoological classification:

Kingdom : Animalia
 Phylum : Chordata (with bone)
 Sub-Phylum : Vertebra (Animal having spinal column)
 Class : Aves (Feathered, warm blooded vertebrates with 4-chambered heart)
 Sub-class : Neorniths (without teeth)



Nomenclature of fowl

Species	Young			Adult (Over 44 weeks)	
	0-8 weeks	9-18 weeks		Male	Female
		Male	Female		
Chicken	Chick	Cockerel	Pullet	Cock	Hen
Duck	Duckling Drakelling	Drakelet	Ducklet	Drake	Duck
Turkey	Poult			Tom turkey/stag	Hen turkey
Quail	Q. Chick	Q. Grower		Cock quail	Hen quail
Goose	Goosling			Gander	Goose

Common terminologies:

1. Poultry:

The term poultry applies to a rather wide variety of birds of several species, and it refers to them whether they are alive or dressed (slaughtered and prepared for market). The term applies to chickens, turkeys, ducks, geese, swans, guinea fowl, pigeons, peafowl, ostriches, pheasants, quail and other game birds.

2. Ornithology:

The study of birds, which are not classed. as poultry is known as ornithology.

3. Poultry Science:

It is the study of principles and practices involved in the production and marketing of poultry and poultry products.

4. Chicken/Fowl:

The chicken is a warm-blooded vertebrate (homeotherms) covered with feathers, skin and scales and lay eggs.

5. Chicks:

Young ones of either sex of domestic fowl, up to 8 weeks of age.

6. Growers:

They are young growing chickens from 9 to 20 weeks of age.

7. Pullet:

The female chicken usually about 9 to 18 weeks of age, ready for laying eggs.

8. Cockerel:

A male fowl less than one year of age.

9. Hen:

A mature female fowl/chicken which is laying eggs generally about 1 year of age.

10. Cock:

An adult male chicken/fowl usually about 1 year of age used for breeding. The cocks are with coarse skin, toughened and darkened meat and hardened breast bone tip.

11. Spent Hen:

A hen which has completed/finished her laying life and sold for slaughter is known as spent up/culled hen, some may also refer as Boiler hen.

12. Broiler:

A broiler or fryer is a young chicken of either sex usually 6-8 weeks of age, that is tender meat with soft pliable, smooth textured skin and flexible breastbone cartilage for either broiling or frying.

13. Layer:

Mature female fowl, which has been kept for egg-laying purpose especially those, are in current production.

14. Capon:

Capon is a castrated male usually under 10 months of age that is having tender meat with soft, pliable, smooth textured skin and is good for table purpose.

15. Brooder:

A metallic or wooden equipment used for artificial rearing of baby chicks initially.

16. Clutch:

The eggs laid by a hen on consecutive days are referred as a clutch.

17. Cull:

An unproductive hen or pullet as an egg producer or any weak individual whatever the age, a profit eating bird.

18. Culling:

The elimination of unproductive or undesirable birds.

19. Filler flat:

They are plastic or card board (pulp) trays used for collection, transportation and storage of eggs. Thirty eggs can be kept in one filler flat.

20. Commercial layer farm:

The farm where commercial poultry farmers keep only the female birds and produce infertile eggs, which are used for human consumption. These eggs are popularly known as 'veg-eggs'.

21. Auto-sexing:

Differentiation of sex in the chickens by some visual characteristic such as colour of down (feather/plumage), early feathering, barring etc. is called auto-sexing.

COMMON BREEDS OF POULTRY, DIFFERENT CLASSES, INDIAN CHICKENS AND OTHER AVIAN SPECIES

Objectives:

1. To obtain the knowledge of various species, breeds and varieties of poultry.
2. To have mental picture of species, breeds and varieties of poultry in the mind.
3. To get acquainted with obvious and non-visible characteristics of various species, breeds and varieties of poultry.

Principle:

Poultry birds are classified into various species, breeds and varieties depending on their obvious and non-visible characteristics. One who wants to study and identify species, breeds and varieties of poultry has to carefully observe obvious characters like type of comb, colour of plumage; colour of earlobe, skin and shank; body size and shape, etc. and make the permanent mental picture about these characteristics in mind. The non-visible characteristics like hardiness, growth rate, feed consumption, egg yield, etc. also contribute the confirmation of species, breeds and varieties of poultry.

Relevant information

1. Breed

A group of individuals, all members of which are descendants of common ancestry and similar in shape, size, comb type, plumage colour and confirmation, etc. which are true to the type. They have more or less same genetic make-up having common morphological, physiological and functional set-up. The common breeds of chicken are leghorn, Rhode Island Red, Australorp, Aseel, etc.

2. Variety

It is sub-division of breed characterized largely by distinctive colour of plumage and type of comb. For example- White Leghorn, brown Leghorn, white and barred Plymouth rock, black Minorca, etc.

3. Strain

It means groups of birds with special characters within a variety. It may be regarded more or less family of poultry birds possessing renowned qualities like early maturity, high production, sizable eggs, faster weight gain, high livability, etc. Usually it is named after the research station or person, where and whom has developed the bird. For example, CARL Bro-91, ILI-SO, HH-260, BV-300, Lohmann, Anak, Ranishaver, H and N, etc.

4. Lines

They are sub classification of strains, which are used for producing commercial hybrids.

5. Class

It refers to the official or standard classification, which distinguishes various groups of birds largely on the basis of geographical regions, where they were originally developed. For example, American, English, Mediterranean and Asiatic.

Breeds of chicken

1. Leghorn

This breed has been developed at Leghorn village in Italy. Among all the varieties, white leghorn is most popular and can be called as egg laying champion of chicken world, producing white eggs of large size. The light brown variety is also fair egg producer. White leghorn is widely reared by egg producers due to its lower feed consumption and higher egg production because of its smaller body size. It has medium size, red coloured single comb of which all five points stand erect in males while in female first point is generally erect and other points drop on either sides. White leghorn has reached to 290-310 eggs hen-housed production per bird per year. The bird has got wide popularity in private hatchery operators and commercial egg producers.

2. Rhode-Island Red

This is the breed of American class and propagated on large scale by state government farms to improve country hens by upgrading. It has red coloured single or rose comb and plumage is rich brownish-red. It is sturdy breed with very good disease resistance power, hence thrives well for back yard poultry keeping in village in harsh conditions. It produces about 240-260 hen-housed eggs per year but feather development is slow. The meat is tender and tasty, hence liked by most of rural non-vegetarians all over the country.

3. Aseel

It is popularly known as “Indian fighter” or “game bird” among the chicken used for fighting game in north India. It is a tall bird having strong built-up body. The comb is small and pea shaped. Neck is long and thick, face long, bones are heavy and body is hard with closely feathered and broad breast. The different varieties vary in colours from black, white, black and white with spotting, black and red, brown to golden red. They produce well flavored ample flesh but are poor layers.

4. Kadaknath

This breed is otherwise known as “Kalamasi” which means “fowl with black flesh” and is native of Madhya Pradesh. The colour of the day old chicks is bluish to black with irregular dark stripes over the back. The adult plumage varies from silver to gold spangled to blue black without any spangling. The skin, beak, shank, toes and soles of feet of males and females are dark gray colour. Even the comb, wattles and tongue also show a purplish hue. The shining blue tinge of the earlobes adds to its unique features. The peculiarity of this breed is that most of the internal organs show the characteristic black pigmentation which is more pronounced in trachea, thoracic and abdominal air sacs, gonads, elastic arteries, at the base of the heart and mesentery. Varying degree of blackish colouration is also found in the skeletal muscles, tendons, nerves, meninges, brain and bone marrow. The black colour of muscles and tissues is due to the deposition of melanin pigment, a genetic condition called “Fibromelanosis”.

Breeds of Ducks:

Broadly they can be typed as table ducks and egg layers.

Table Ducks

1. **Aylesbury:** It has white plumage, bones are light and the flesh is creamy white. The adult drakes (males) weigh about 4.5 kg and ducks (female) weigh 4.1 kg.
2. **White pekin:** It is very popular table duck The drakes weigh about 4.1 kg and ducks weigh about 3.6 kg. Pekin is more fertile, better layer and a economical grower.

Egg Layers

1. **Khaki-campbell:** The origin is in England and was developed from cross of Rouen and white Indian runner. It has khaki colour and lays about 300-310 kg eggs per year. The egg size is larger than that of runner.
2. **Indian runner:** Adult drakes weigh about 1.8 to 2.4 kg and ducks 1.4 to 2.1 kg. Body is broader in front and slightly tapering at back. Body is well carried up in front and inclined at back. It lays about 310 eggs per year. It is good forager and hardy, hence can perform well in harsh conditions.

Breeds of Turkey:

The different varieties of turkeys have been developed from single breed namely North American turkey. The varieties of turkey differs in plumage colour, size and fleshing, characteristics having the same shape in general. The broad breasted bronze, broad breasted large white and beltsville small white are important in all varieties.

Breeds of Quail:

Japanese Quail: It is the most popular breed of quail used in England. On an average female weighs about 240 gms, while the male weighs lesser than female. The average egg weight is 10 gms and quail lay about 210 eggs per year. The quail broilers are ready for table purpose at 6 weeks of age weighing about 220 gms. Plumage is admixture of grey and black colour.

Bobwhite Quail: Bird is without tail having white colour as dominant.

Species

<i>Type of bird</i>	<i>Species</i>
1. Chicken	<i>Gallus gallus</i> or <i>Gallus domesticus</i>
2. Duck	<i>Anas platyrhynchos</i>
3. Turkey	<i>Melleagris gallopavo</i>
4. Japanese quail	<i>Coturnix coturnix japonica</i>
5. Bobwhite quail	<i>Colinus virginianus</i>

Distinguishing characteristics of important breeds of chicken

Breed	Type of comb	Colour of comb	Colour of skin	Colour of shank	Colour of egg	Standard wt (kg)		Commercial importance
<i>Mediterranean Class</i>						<i>hen</i>	<i>cock</i>	
Leghorn	Single	White	Yellow	CI. Yellow	White	1.8	2.7	Egg type
Minorca	Single	White	White	CI. Darkslate	White	3.5	4.2	Egg type
Ancona	Single rose	White	Yellow	CI. Yellow	White	1.9	2.9	Egg type
<i>English class</i>								
Cornish	Pea	Red	Yellow	CI-Yellow	Brown	3.5	4.6	Meat type
Sussex	Single	Red	White	CI. White	Brown	3.1	4.0	Meat type
Australorp	Single	Red	White	CI-Darkslate	Brown	3.1	4.0	Dual type (egg crosses)
Orpington	Single	Red	White	CI-White	Brown	4.0	5.0	Meat type
<i>American class</i>								
Rhode Island Red	Single	Red	Yellow	CI- Yellow	Brown	2.9	4.0	Dual type
	Rose							(egg purpose)
Plymouth rock	Single	Red	Yellow	CI- Yellow	Brown	3.3	4.2	Dual type (meat purpose)
New Hampshire	Single	Red	Yellow	CI- Yellow	Brown	3.1	3.9	Dual type (meat purpose)
<i>Asian class</i>								
Aseel	Pea	Red	Yellow	Fea-Yellow	Brown	4.0	5.0	Game bird (fighting-meat)
Brahma	Pea	Red	Yellow	Fea-Yellow	Brown	4.2	5.5	Fancy bird (meat purpose)
Cochin	Single	Red	Yellow	Fea-Yellow	Brown	3.9	5.1	Fancy bird (meat purpose)

CATCHING AND HANDLING OF BIRDS

Objectives:

1. To examine birds for diagnosis of disease
2. To examine birds for selection, culling and judging
3. To handle birds at the time of vaccination, testing, putting identification marks, debeaking, dubbing, AI and sometimes for individual treatment
4. To study the external body parts
5. To catch birds at the time of marketing

Principle:

Poultry birds are handled for above mentioned operations at different ages during their life. As the improved breeds of poultry have higher productive capacity, they are under heavy stress, which makes them much more delicate. Hence poultry birds should be handled very carefully and gently causing least possible stress to avoid losses in the form of mortality or lowered production.

Further, it is advisable to handle poultry birds in the cool hours of morning or evening or in the night to minimize the stress to reduce the losses. Birds should be handled only for most essential operations to avoid frequent disturbances and stress due to handling.

(A) Catching of birds:

(i) Deep-litter system: While catching bird on deep-litter, it is to be caught either by putting catching hooks to the leg or simply by grabbing the legs with fingers. Birds should never be caught by neck or feathers, which can put birds under severe stress or discomfort.

For catching a bird, drive all or a group into a corner of the deep litter pen with forward bending and keeping the hands low, and then catch the bird quickly. Catching crate may be used for catching 25-30 birds at a time. For holding bird for some time before starting of actual operation, it can be hold by wings or its movement can be restricted or stopped by entangling their wings to each other at the base.

(ii) Cage system: While taking out bird from cage, head with neck should be taken out first by holding body of birds in both the hands with closure of wings to facilitate easy removal of bird form cage, without causing any injury to bird. The same procedure is followed while putting bird in cage i.e. head is entered first; followed by body.

(B) Handling of birds:

Grasp the birds from its wings and gently pass the other hand under the body to place the index finger between two legs and then catch one thigh by the thumb and another thigh with the rest of the fingers. The bird is allowed to rest on the palm quietly and comfortably. If the birds are struggling, grasp the thighs firmly and place the other hand on the back of the bird.

Suggestions while catching the birds:

1. Stand at the entrance of the pen and knock the door before entering.
2. Carry large objects like feeders, waterers, sticks, gunny bags etc. as low as possible, so that birds can recognize them.

-
3. During catching operation, the portable equipments like feeders, waterers may be kept on one side near the wall or preferably they may be removed from the pen.
 4. Prefer catching and handling of bird during late evening or night hours, as they are less active at that time.
 5. Be careful that birds do not get pile up in the corner and die due to suffocation.

Precautions to be observed while handling the birds:

1. As far as possible catch and handle the birds at late evening or night time because they are less active at that time.
2. Use dim light during catching and handling of birds.
3. Do not throw or kick the birds.
4. Never chase the bird as if you are hunting them.
5. Carry 2-3 birds only in each hand, so as to avoid injury to them.
6. Birds must be given anti-stressors such as Vitamin B Complex, mineral supplements etc. in drinking water on the same day or preferably on previous day of handling.

STUDY OF EXTERNAL BODY PARTS OF FOWL

Objectives:

1. Identification and judging of birds such as male-female, layer- non-layers birds, sex, young and old birds etc.
2. Knowing /classification of breed of the birds.
3. To differentiate between types of combs found in chickens.

For the convenience, portions of the birds can be grouped into eight parts / regions viz: head, neck, back/ wings, saddle, legs, webs, breast and vent

(A) Head:

The head of chicken is represented by the following parts

1. Comb: There are several types of combs. But only the first three of the following list are common. The comb types : single, rose, pea, cushion, strawberry, walnut, "V", buttercup
2. Eyes: chickens have color vision and show a preference for violet and orange.
3. Eye rings: Inner margin of eyelids.
4. Eyelashes: Bristle feathers composed of a straight shaft.
5. Ears: Hearing is equal to that of mammals.
6. Earlobes: Either red or white.
7. Wattles: Fleshy, appendages hanging on either sides of the lower beak.
8. Beak: It is a horny mouth portion and an organ of prehension of food and self protection.
9. Nostrils: Two external opening of respiratory tract near the base of the upper beak.

(B) Neck:

1. Neck Hackles: The narrow pointed feathers on and around the neck.
2. Cape: A group of neck hackles going towards the head from the base of the neck.

(C) Back/Wings:

It is a part from where wings/feathers originate. During the evolutionary process of the chicken most of the reptilian scales changed to feathers.

1. Primary feathers: These are used for flying, hence also known as "flight feathers".
2. Secondary feathers: They are the quill feathers of wings, which are visible from outside when the wings are closed.
3. Axial feathers: This is a short feather in the middle of the wing, which can only be seen by separating primary and secondary feathers.

(D) Saddle: It is the posterior portion of back leading to tail.

1. Sickle feathers: These are long curved feathers of tail of the male only, usually going up and then down ward.

2. Pin feathers: These are not fully developed but are just emerging from the skin follicles.

(E) Legs / Quarters:

1. Thigh: The portion above the hock joint.
2. Hock: The angular joint present between the thigh and the shanks.
3. Shank: The part below the hock joint, where leg bend is applied. Shank is covered with scales of various colors viz, yellow, black, greenish and white
4. Spur: It is a horny protuberance on the back side of the lower shank which is prominent in male and rudimentary in female birds.
5. Toes: Most chicken have four toes on each *foot*, but there are a *few* breeds with five.
6. Fluffs: These are soft downy feathers around thigh.

(F) Webs (toe-webs and wing webs):

The flat, thin, skin-like structures found between the toes and also between the wings and the body. The wing band is applied in the wing web of bird at day old age. Similarly, toe punching is done in toe web as group identification.

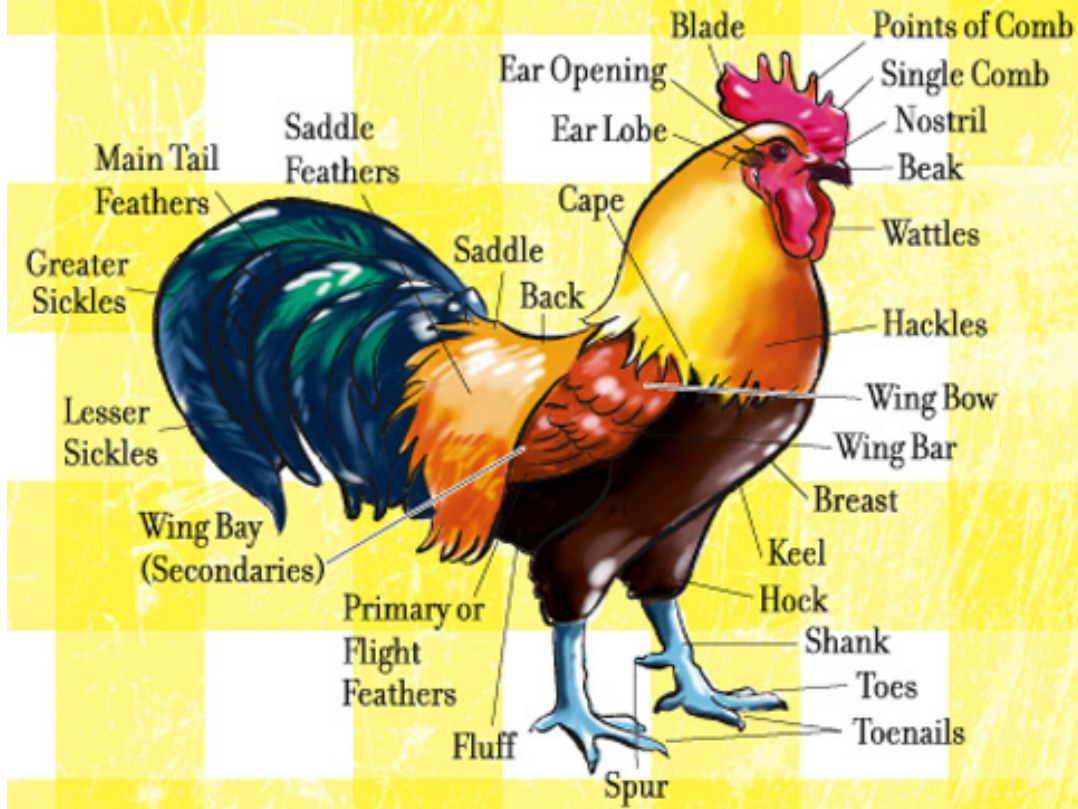
(G) Breast:

The prominent lower front portion of the bird's body usually at the keel bone or breast bone.

(H) Vent/Cloaca:

It is the common external opening of digestive, reproductive and urinary systems. It is a large, oval, moist and dilated in good layer and small, round, dry and constricted in poor/non layer birds.

Rooster Anatomy



Hen Anatomy



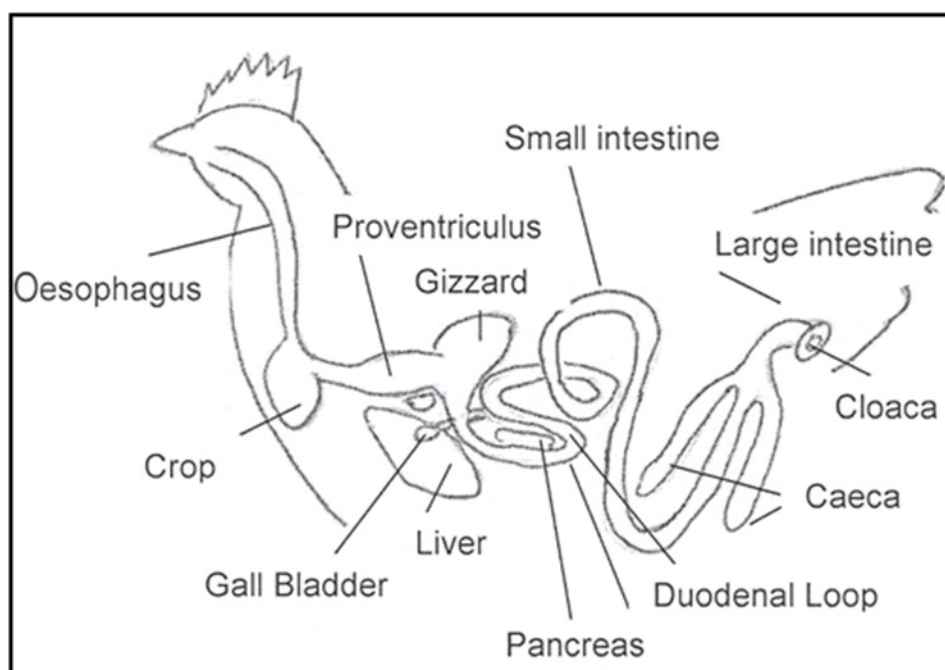
DIGESTIVE AND RESPIRATORY SYSTEM OF CHICKEN

Objectives:

1. To know the different parts of digestive and respiratory system of chicken.
2. To study the location, structure and morphology of various parts of the system
3. To study the functions of various parts of the digestive and respiratory system of chicken

Principles: The most important purpose of poultry keeping is to get maximum egg and meat production, with minimum inputs by maintaining mortality to normal levels. To achieve these goals of productive performance, one must have knowledge of the body systems and their functions, which forms the base of production. The digestive system is to be studied with this principle only.

Digestive system of chicken:



Mouth: The chicken has no lips, soft palate, cheeks or teeth but there are an upper and lower horny mandible referred to as beak, to enclose the mouth. Long slit-like opening in the hard palate and absence of soft palate makes it possible for the bird to drink. The dagger-like tongue has a very rough surface at the back which helps to force the food into the esophagus. A chicken has fewer taste buds than mammals but its ability to taste feed is relatively high.

Esophagus: The esophagus or the gullet is the tube through which the food passes on its route from the back of the mouth (pharynx) to the proventriculus.

Crop: Just before the gullet enters the body cavity, it extends on one side into the pouch known as the crop, which acts as a storage place for food. Little or no digestion takes place here.

Proventriculus: An enlargement of the gullet just prior to the connection with the gizzard is known as proventriculus, sometimes called the glandular or true stomach. The gastric juice is produced here. Because the food passes quickly through the proventriculus, there is little digestion of food material

here, but secretions pass into the gizzard where the enzymatic actions take place.

Gizzard: The gizzard, sometimes called the muscular stomach, lies between the proventriculus and the upper limit of the small intestine. It has two pairs of very powerful muscles, the surface of which is constantly being eroded and sloughed off. Since the gizzard usually contains some abrasive material such as grit, rock, gravel, etc. the food particles are soon grounded or reduced to small particles capable of being taken into the intestinal tract.

Small intestine: The small intestine is about 62 inches (1.5 mt.) long in the adult chicken. The first part forms a loop known as the duodenal loop. Pancreas is embedded in the loop that secretes the pancreatic juice.

Caeca: Between the small and large intestine, two blind pouches are situated which are known as the caeca. Each caecum is about 6 inches (15 cms.) long in the normal healthy adult bird, and soft feed material passes in and out. The exact function of the caeca is not known.

Large intestine: The large intestine is a relatively short rectum in the chicken being only 4 inches (10 cm.) long in the adult bird and about twice the diameter of the small intestine. The large intestine is a place for water reabsorption to increase the water content of the body cells and maintain the water balance in the bird.

Cloaca: The bulbous area at the end of the alimentary tract is known as the cloaca. Cloaca means “Common sewer” and into the cloaca, digestive, urinary and reproductive canals are opening.

Vent: The vent (anus) is the external opening of the cloaca. Its size varies greatly in the female, depending on whether or not, she is producing eggs.

Supplementary digestive organs: Certain organs are closely associated with digestion because their secretions empty into the intestinal tract and helps in the processing of food material.

Pancreas: The pancreas lies within the duodenal loop of the small intestine. It's a gland that secretes pancreatic juice that is then passed into the duodenum by the way of the pancreatic duct, where its five powerful enzymes aid in the digestion of starches, fats and proteins. The pancreatic juice neutralizes the acid condition of the proventriculus.

Liver: The liver is composed of two large lobes. Its main function is the secretion of the bile, which helps in digestion, particularly of the fats.

Gall bladder: The chicken has a gall bladder but some birds do not. Two bile ducts transfer the bile from the liver to the intestines. The right duct is enlarged to form the gall bladder, through which most of the bile passes and is temporarily stored there in the Gall bladder. The left duct does not enlarge.

Respiratory system of chicken:

Respiratory diseases are the most common cause of death in a poultry flock. Knowledge of the avian respiratory system is essential for developing a health monitoring plan for a poultry flock, recognizing problems that may occur, and taking action to correct them.

The avian respiratory system is involved in the following functions:

- absorption of oxygen (O₂)
- release of carbon dioxide (CO₂)
- release of heat (temperature regulation)
- detoxification of certain chemicals

- rapid adjustments of acid/base balance
- vocalization

An understanding of the functions of the respiratory system begins with an understanding of the parts of the respiratory system.

Parts of the Chicken Respiratory System

The chicken respiratory system (shown in Figure 1) begins at the head region. Parts of the respiratory system in this region include the nasal openings and nasal cavities and the pharyngeal region of the mouth. The cranial larynx (sometimes referred to as the superior larynx or glottis), located in this pharyngeal region, is the opening to the trachea (windpipe). The pharyngeal region also has the openings of the esophagus. The cranial larynx is normally open to allow air passage, but it closes when feed is passing down the throat so that the feed goes down the esophagus and does not enter the trachea.

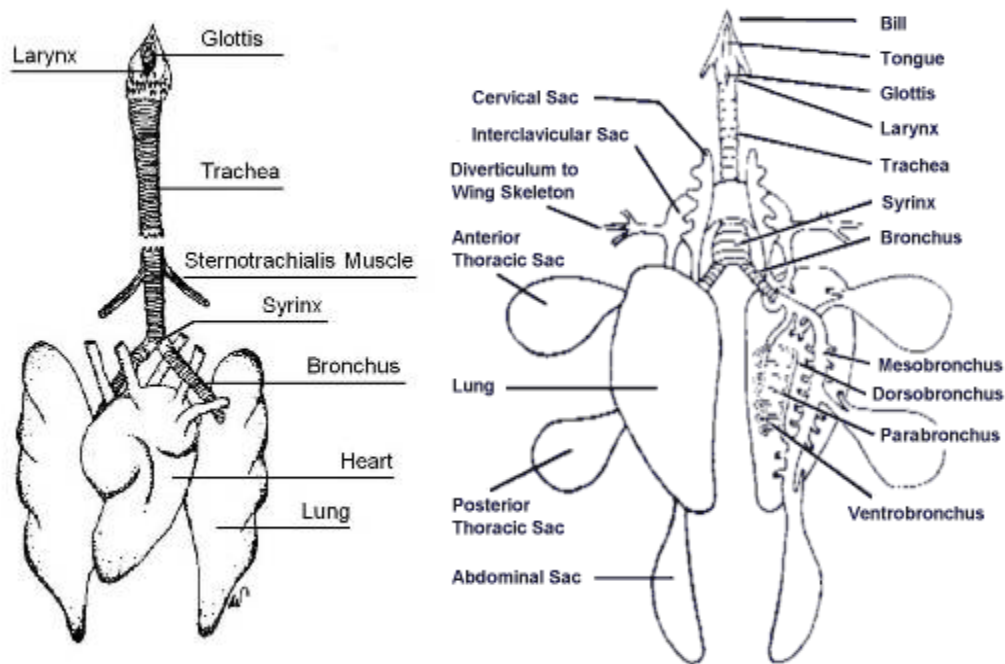


Figure: Chicken respiratory system

After air passes through the cranial larynx, it continues through the trachea. The trachea is made up of cartilaginous rings that keep it from collapsing due to the negative pressure present when a chicken breathes in air.

The syrinx (or caudal larynx), located near the end of the trachea, is the chicken's voice box. A chicken does not have vocal cords to produce sound. Instead, a chicken's "voice" is produced by air pressure on a valve and modified by muscle tension. It is not possible to remove the syrinx to prevent chickens from crowing.

After the syrinx, the trachea divides into two much narrower tubes called bronchi. In some respiratory diseases, tracheal plugs form and physically block the respiratory tract at the junction of the bronchi, thus suffocating the chicken.

Each bronchus (singular of bronchi) enters a lung. Chicken lungs are relatively small, are firmly attached to the ribs, and do not expand. Birds have an incomplete diaphragm and chest muscles and a sternum (keel) that do not lend themselves to expansion in the way that a mammal's chest muscles and sternum do. Consequently, a bird's lungs operate differently from those of a mammal. Mammalian lungs contain many bronchi that lead to small sacs called alveoli. Because an alveolus (singular of alveoli) has only one opening, air flows into and out

of the alveolus but not through it to the outside of the lung. In comparison, air passes through a bird's lungs in one direction. (In fact, the mammalian respiratory system is described as tidal because air goes in and out like the tide, whereas the avian respiratory system is described as nontidal.)

A bird's lungs contain parabronchi, which are continuous tubes that allow air to pass through the lung in one direction, and air sacs. The parabronchi are laced with blood capillaries, and it is here that gas exchange occurs. The air sacs, which fill a large proportion of the chest and abdominal cavity of a bird, are balloon-like structures at the ends of the airway system. The key to the avian respiratory system is that air moves in and out through distention and compression of the air sacs, not the lungs. The air sacs act as bellows to suck air in and blow it out and to hold part of the total air volume. At any given moment, air may be flowing into and out of the lung and being "parked" in the air sacs.

Air sacs are somewhat unique to avian species, found elsewhere only in certain reptiles. In the chicken, there are nine such sacs: an unpaired one in the cervical area, two interclavicular air sacs, two abdominal air sacs, two anterior thoracic air sacs, and two posterior thoracic air sacs.

Another important feature of the avian respiratory system is also part of the avian skeletal system. Some of a bird's bones are hollow. The air sacs in a bird's lungs connect to the air spaces in these bones, and the bones then act as part of the avian respiratory system. They are called pneumatic bones and include the skull, humerus, clavicle, keel, pelvic girdle, and lumbar and sacral vertebrae. A broken pneumatic bone can cause a bird to have difficulty breathing.

MALE AND FEMALE REPRODUCTIVE SYSTEM OF FOWL

Objectives:

1. To know the different parts of reproductive and digestive system of chicken.
2. To study the location, structure and morphology of various parts of the system.
3. To study the functions of various parts of the reproductive and digestive system of chicken.

Principle:

The most important purpose of poultry keeping is to get maximum egg and meat production, with minimum inputs by maintaining mortality to normal levels. To achieve these goals of productive performance one must have knowledge of the body systems and their functions, which forms the base of production. The reproductive and digestive systems are to be studied with this principle only.

Reproductive system: Male

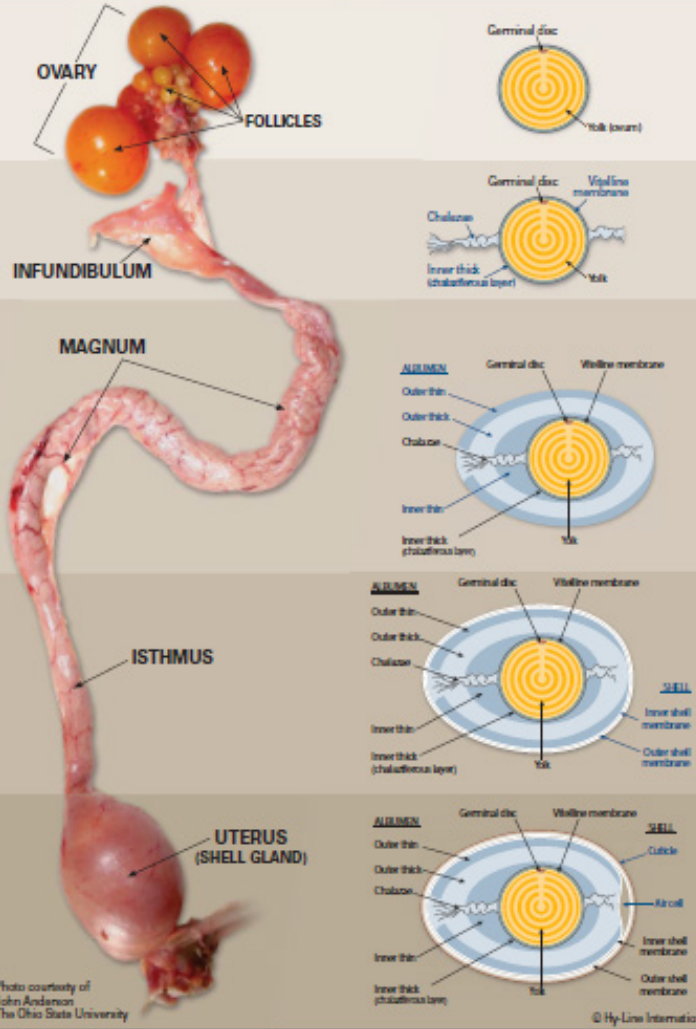
It consists of two testicles, which are bean shaped and yellowish white in colour. The left testis is generally larger than the right, located in the dorsal area of the body cavity, just in front of the kidneys. The many ducts of the testes lead to the vas deferentia and vas deference, which carry the semen from the testicles to the papillae on the dorsal area of the cloaca, which is the rudimentary copulatory organ in birds. Papilla is conical. erectile duct end within the vent itself. Normally, semen is stored in the vas deferens. Here it is diluted with lymph fluid and both are ejaculated as mixture during copulation. The pH of semen is between 7.0 and 7.4. The volume of the semen ejaculated during one mating may be as high as 1.0 cm³.

Reproductive system: Female

Out of two ovaries and oviducts only the left ovary and oviduct is functional, the right being dormant. The left ovary is situated on the dorsal part of the abdominal cavity at fore end of the kidneys. The oviduct is a long zig-zag tube consisting of glandular and muscular parts through which the yolk passes and where the remaining portion of the egg are formed. The segments of added the oviduct and their purpose are summarized below and are illustrated in the figure.

REPRODUCTIVE TRACT

EGGSHELL FORMATION



ECONOMIC TRAITS OF LAYERS AND BROILERS

Objectives:

1. To know the different traits related to economics of layers and broilers.
2. To know the importance of the different economic traits in genetic selection of layers and broilers.
3. To know the relation between different economic traits in genetic selection of layers and broilers.

Economic Traits of Layers

1. Age at sexual maturity (days)/Age at start of lay
2. Body weight at maturity
3. Egg production/Egg number
4. Egg weight
5. Feed efficiency
6. Livability

Age at sexual maturity

Age at sexual maturity (days)/Age at start of lay

- For a flock of layer pullets, age in days at which 5 % egg production level is reached is considered as the age at maturity. It usually falls within 21st week of age. Sometimes the level may be reached even at 19th or 20th week which is not desirable. It happens when additional night lighting is given to growers indiscriminately even after six weeks of age
- If laying starts early, the eggs laid are smaller in size which continue to be so for long time, thus affecting the egg price and in turn, the profitability
- Adopt lighting schedule for growers as advised
- Strain of the bird and quality of feed are two other factors influencing age at start of lay of eggs

Body weight at maturity

- This character decides feed efficiency, egg number and egg weight
- The body weight of layers at start of lay has to be optimal; it should neither be low nor high
- Low body weight indicates poor growth of egg forming female reproductive tract, which in turn will result in poor egg production and egg weight
- Higher body weight at maturity will lead to higher feed consumption and reduced persistency
- If higher body weight is due to high abdominal fat, the same will obstruct infundibulum and affect egg production
- Strain and feed quality also influence this character

Egg number

- Commercial hybrid layers produce around 300-310 eggs in one year from 21-72 weeks of age.

Factors such as

- Strain of the bird
- Age and body weight at start of lay
- Lighting schedule during growing and laying
- Feed quality (protein, energy, vitamins, mineral and trace mineral content and toxin free feed)
- Culling procedure
- Climate
- Managerial factors like space allowances
- System of feeding
- Water quality
- Vaccination and other disease control measures influence egg number

Egg Weight

- It varies from 52-56 g on an average
- Egg weight is mainly dependent on body weight of the birds
- Birds at later stage of production are comparatively older, heavier and lay larger sized eggs
- First egg in a clutch (series of eggs laid daily without a break) is always heavier than other eggs in the series
- If total number of eggs laid in a laying cycle of one year is comparatively less, individual egg size by such strain of birds is normally larger and if the egg number is more egg size will be comparatively less. To overcome this and to decide as to which strain is preferable, another character known as “egg mass” is considered
- It is the total weight of eggs laid by a bird in a laying cycle
- It depends both on egg number and average weight of an egg
- All other factors such as quality of feed, managerial factor, age, strain etc., which influence body weight also have an influence on egg weight

Feed Efficiency

- It denotes the efficiency of conversion of feed into egg.
- *Feed efficiency of layers is calculated in terms of conversion into number of eggs (per dozen eggs) or weight of eggs (per kg egg mass)*

$$\text{Feed Efficiency (per dozen eggs)} = \frac{\text{Average quantity of feed consumed (kg) by a bird in a laying cycle}}{\text{Average number of eggs in dozens, produced by a bird}}$$

$$\text{Feed Efficiency (per kg egg mass)} = \frac{\text{Quantity of feed consumed (kg)}}{\text{Total weight of eggs (kg) produced}}$$

- Feed efficiency of a layer depends on the
- strain of the bird
- average egg number
- egg weight (in the latter case)
- Quality of feed (energy, protein and contents of other vital nutrients, presence of toxins, if any, inclusion of performance promoters etc.), managerial care (space allowances, system of feeding, feed wastage, proper debeaking, deworming, insect and rodent control), climate, disease control measures etc.

Livability

- Per cent livability is worked out separately for each of the three stages of layer management viz. in Brooder (0-8 weeks), Grower (9-20 weeks) and Layer (21-72 weeks) stages
- Permissible levels of mortality during these stages are 4%, 2-3% and 6-8% respectively
- Accordingly, livability levels of 96%, 96-97% and 92-94% are prescribed as optimal for these stages independently of each other
- Strain, feed quality, litter management, vaccination schedule and other disease control measures, disease outbreaks, layout and design of poultry houses, climate, biosecurity measures adopted, dead bird and manure disposal, parent breeder management and hatchery sanitation etc. all influence livability levels in layers

Economic traits of broilers enterprise

- Growth traits - Body weight and Growth rate
- Feed efficiency
- Livability/Survivability at market age
- Carcass traits - Dressing percentage

Body weight at market age

- It is the average live weight of a broiler when sold to market. It is obtained by dividing the total weight of birds sold by the number of broilers. Since the broilers fetch price based on their body weight, it is advantageous to get heavy birds at an early market age (fast growing).
- The body weight at market age depends on so many factors, the knowledge of which will help the farmer to make their birds grow faster viz. Strain, disinfection, downtime, system of rearing, water sanitation, feeding, night lighting, watering, floor

Feed Efficiency

- The term indicates the quantity of feed required to put up a unit live body weight. Since feed involves 70 % of the cost of production, feed efficiency or efficiency of feed conversion by the broilers determines profit margin also. It is calculated as:

$$\text{Feed Efficiency} = \frac{\text{Quantity of Feed consumed by a batch (kg)}}{\text{Total live weight of broilers marketed(kg)}}$$

- For broilers, a feed efficiency of 1.8-2.0 kg feed to put one kg live body weight is considered as optimal. Lower the feed efficiency value, the better for the farmer.

-
- The factors influencing feed efficiency are strain, quality and energy level of feed, feeding, growth promoters, climate, floor space, role of microbes, mortality etc.
 - Space, growth promoters, housing design etc.

Livability/survivability at market age

$$\text{Livability} = \frac{\text{Number of birds alive at market age}}{\text{Number of chicks purchased}} \times 100$$

- Under standard rearing conditions, 94 to 96 % livability is anticipated at market age since the death rate (mortality) should not exceed 4 to 6 %.
- The factors influencing livability are strain, housing design, disinfection and other disease control measures, medication, vaccination, standard of management like brooding, extremes of climate, downtime between batches, system of rearing, Quality of feed, litter material etc.

Carcass Traits

- It is the proportion of edible meat to total live weight which varies from 72 to 76 %.
- Strain of the bird, energy content of the diet, feeding and watering before slaughter, length and time of transport etc. are some of the factors that influence dressing yield.

ARTIFICIAL INSEMINATION IN POULTRY

Objectives:

1. To acquire the knowledge regarding methods of mating in poultry.
2. To know the importance of the different methods of mating in poultry.
3. To know the importance of artificial insemination method in poultry.

There are two main methods of mating the birds:

(I) Natural mating method:

In the natural mating, male & female are allowed to come for direct contact with each other and mate. There are three methods under natural method.

1. Flock mating/mass mating method:

In this method, a number of males are allowed to mate with entire flock of hens. The number of hens per male will vary with the size & age of the birds. With light breed like Leghorn, one male can be used for 15-20 hens. In medium breed, this ratio is one male with 10-15 hens. Whereas, in heavy breed, one male is used for 8-12 hens only. Under this method better fertility is obtained than from pen mating, but pedigree recording is not possible under this method.

2. Pen mating method:

In pen mating method, a number of hens are mated with one male in a single pen. About same number of hens are mated with one male in pen mating as in flock mating. However, fertility is generally not so good in pen mating as in flock mating because:

- (a) There is no opportunity for birds especially hens to mate with the ones they choose and
- (b) There is no competition between males.

We can record the paternal pedigree but if we want to record the full pedigree under this system, hens should be leg banded and trap-nest should be kept in each pen.

3. Stud mating:

In this method the females are mated individually with a male that is kept in a coop or pen. Stud mating involves more labour than the other two systems because birds should be mated at least once each week in order to maintain good fertility. Sometimes stud mating is used when a very valuable male is being used as a breeder and it is desired to use that male maximum.

(II) Artificial Insemination: Artificial Insemination (AI) means the deposition of semen into reproductive tract of female by some means other than natural mating.

In various poultry breeding projects the artificial insemination has gained considerable attention. The advantages of the artificial insemination in poultry are:

1. Efficient use of breeding males
2. Multilocational testing of outstanding sires
3. Avoidance of preferential mating and physical incompatibility
4. Production of fertile eggs from layers in cages

-
5. Accurate recording of pedigree is possible
 6. Requirement of males is lesser in A.I. compared to natural mating which will not only reduce the rearing cost of male but also increases the intensity of selection.
 7. Fertility is 5-10% higher in A.I. as compared to natural mating
 8. Interspecies hybridization is possible
 9. Use of large males, small female and vice versa is possible

The process of artificial insemination includes preparation of males, preparation of equipments, collection, evaluation and dilution of semen and deposition of semen in vagina of female.

1. Preparation of males:

Males used for artificial insemination should be healthy, vigorous and free from any physical abnormality or disability. They should be placed on balanced breeder ration a month before actual collection is to be practiced.

The clipping of feathers around the cloacal region of the males prior to use for A.I. is preferred. Each and every male should be tested for production and evaluation of semen before used for A.I.

2. Preparation of equipment:

The equipment required for the artificial insemination are:

1. Semen collection cups/funnels: Glass or plastic funnel of 3 cm diameter with stem blocked with paraffin.
2. Glass/tuberculin syringe
3. Test tube stand/rack for holding of funnel/cup

3. Collection/Milking of semen from males: Semen is collected by gentle massaging of dorso-lateral lumbo-sacral region and sometimes the abdomen of the cock. This causes erection of papillae in the cloaca. As soon as the erection occurs, thumb and index finger are placed in position on either side of the protruding papillae and semen is squeezed out gently into the collection cup/funnel.

4. Evaluation of semen: The fertilizing ability of semen depends on its quality. Semen can be evaluated on the basis of volume, colour, pH, motility of the spermatozoa, sperm concentration, percentage of live, dead and abnormal spermatozoa etc.

Good quality chicken semen is pearly white and opaque. The semen volume is about 0.5-0.75 ml/ ejaculate with sperm concentration of 4 billion per milliliter.

5. Dilution of semen: The spermatozoa begin to lose their integrity after collection, which results in reduced fertility.

The concentrated semen can be diluted by using extenders to inseminate more number of females. However, the A.I. should be done as early as possible after dilution because fertilizing capacity of avian species is quickly degenerated on storage. The diluent should be added at a ratio of 1:2 to 1:4.

The some of the diluents used for dilution of chicken semen are:

- i. Glucose citrate solution
- ii. Tris-yolk extender buffer

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- iii. Ringer's solution
 - iv. Simple saline diluents
 - v. Sodium citrate buffers
 - vi. Lake's diluent
 - vii. Mac Pherson's extender
 - viii. Belts ville poultry semen extender

6. Deposition or Insemination of semen: The recommended dose for undiluted, good quality semen is 0.03 ml per week but for diluted semen dose varies from 0.03 – 0.05 ml per every 3-4 days to maintain good fertility. To obtain optimum fertility, 80-100 million sperm per ml is recommended. The required quantity of semen is to be taken in syringe for insemination.

The process includes: (i) Eversion of vagina (ii) Deposition of semen

The process of insemination requires two men. One man with his left hand holds firmly the lower thighs of the hen and with the right hand applies pressure on the abdomen below the cloaca to evert the vagina. As the vagina is everted, the second man gently inserts the inseminating syringe to a depth of 3 cm into the oviduct. The semen is deposited / released from the syringe; simultaneously the pressure on the abdomen is released to allow the oviduct to resume its normal position.

For better fertility, insemination should be done twice a week. Soon after insemination, optimum number of spermatozoa enters the primary storage glands (sperm storage gland) at utero-vaginal junction and a small number of spermatozoa are stored in the infundibulum where fertilization of egg takes place. Thus, after a single mating or insemination, eggs received upto 3-4 weeks will be fertile but the fertility will be reduced with time advances.

HOUSING AND DESIGN OF POULTRY FARM

Objectives:

1. To protect birds from extreme weathers, parasites, predators, rodents and thieves.
2. To provide physical environment which is required for optimum egg and/or meat production.
3. To avoid development and spread of infectious and contagious diseases.
4. To enable poultry attendant to work efficiently.
5. To provide the manager full control of the farm with least efforts.

Location of the farm: - While selecting the land and constructing the poultry house, following points are to be considered.

1. The site should be on height to avoid water logging.
2. Optimum temperature, humidity, light and ventilation should be there inside the poultry house.
3. Poultry house should be with east-west orientation to prevent entry of direct sunlight.
4. Transportation facility should be there up to the farm in all seasons.
5. Constant electricity and potable water supply as well as efficient drainage system should be there.
6. Proximity to road and the marketing zone.
7. Keep maximum distance from a neighboring farm and also between two poultry sheds within a farm.
8. Location of poultry farm should be such so that all essential things required for profitable poultry farming are readily available.
9. The area should have enough space for future expansion.
10. It may be noted that an official permission from local authority may be needed to start a poultry farm particularly in urban areas.

Factors influencing design of poultry houses:**1. Temperature and Humidity: -**

The optimum temperature for layer is 55-70°F and for broiler 75°F. Humidity influences are tied closely to the temperature effects. For a layer and broiler house the humidity should be within the range of 40-60%

2. Ventilation: -

Ventilation refers to the changing of respired air with fresh air. Poultry house should be well ventilated avoiding direct wind-drafts and coldness. Proper ventilation is required for-

- a) To provide sufficient oxygen to birds.
- b) To remove undesirable gases (NH₃, CO₂, Methane etc.) from the poultry shed.
- c) To reduce the temperature inside the poultry shed during summer.

3. Floor, feeder and waterer space requirement: -

It varies according to age, size, type(layer or broiler), sex, species and number of birds to be maintained.

4. **Light:** -

It is very essential for normal production performance of poultry. Light enters into the eye of the bird and stimulates the pituitary gland, which in-turn releases certain hormones responsible for ovulation and oviposition. Because of this phenomenon, both, natural and artificial light is more important for poultry house.

5. **Orientation of house:** -

Under tropical conditions, the width of poultry house should be from north to south and length from east to west. Such orientation avoids direct sunlight radiation and minimizes splashing of rain water into poultry house.

6. **Foundation:** -

It should have enough hold on the ground to support the building. Most permanent poultry houses have concrete foundations.

7. **Floor:** -

It should be elevated by at least 30 cm from outside ground level to prevent seepage and rain water entering into poultry house. It may be either of cement concrete or covered with granite or cement slabs, for efficient cleaning and disinfection. "Kachha" floor made of dirt, sand and gravels is difficult to disinfect.

8. **Length of house:** -

Length of poultry house may be of any convenient length. Generally, it should not be more than 100-120 feet.

9. **Width of house:** -

Width of open sided poultry house should be about 30 feet (9-8 m) and not more than 40 feet (12.2 m) wide. Houses wider than this will not be able to provide ample ventilation during hot weather and will also demand additional interior supports, which may interfere with equipment or manure removal.

10. **Height of ceiling:** -

In no case, it should be less than 3 meter. A ceiling at 3.5 meter is more desirable where summer is severe.

11. **Walls:** -

In open sided tropical houses, the long side wall should not be more than 30-45 cm height except at the pillars. In case of cage house, there should not be any long axis sidewall above the floor level, for allowing optimal cross ventilation and quick drying of cage manure. The space between top of sidewall and roof at eaves would be covered with suitable wire mesh.

12. **Roof:** -

Poultry house roofing may be covered with straw, coconut leaves, light roof, plastic, aluminum or asbestos sheet depending upon planning and budget of the farmer. Local availability, environmental condition and cost factor must be considered.

Types of roof are (i) Gable (ii) Shed (iii) Combination (iv) Half monitor (single ridge) and (v) Full monitor (double ridge)

13. **Partition:** -

Each poultry house may be partitioned into pens of different length depending upon the number of birds per batch. This will be more applicable to broiler house where birds are sold in batches.

Housing Systems:

Based on type:

1. Naturally ventilated -
 - (a) Open sided house
 - (b) Enclosed sided house
2. Artificially ventilated- Environmentally Controlled (EC) house

Based on purpose:

1. Brooder / Chick house
2. Grower / Replacement pullet house
3. Brood-Cum-Grow house
4. Layer / Breeder house
5. Brood-Cum-Grow-Cum-Lay house
6. Broiler house

Based on system: **Free range**

Semi- intensive

Intensive

1. Solid floor - Deep litter house
2. Slatted floor -
 - (a) All slatted floor house
 - (b) Slat and floor house
3. Caged floor house -
 - (a) Battery cages
 - (b) California cages

Layout of a Broiler Farm:

Construction of different farm buildings at proper position in the site is highly essential for disease prevention. The site should be fenced from all sides. There should be only one entrance with a proper and large enough gate. The selling booth, storehouse and office should be situated near the entrance to minimize movement of people around poultry sheds. The storehouse (feed godown) should be constructed near the entrance so that vehicles carrying the feed need not go inside for unloading. The residential quarters for the laborers should be constructed after the office and storeroom. Poultry sheds should be constructed after the residential quarters maintaining a minimum distance of about 300 feet. The poultry sheds should face east - west direction length-wise and minimum distance between two sheds should be 35- 40 feet. The disposal pit and sick room should be constructed only at the extreme end of the site.

Layout of a Layer Farm:

Basic things will remain same as discussed in layout of a broiler farm. Here, the egg store room cum office and egg shop should be situated near entrance to prevent entry of the vehicles inside. A feed mixing unit is very important for profitable layer operation. The residential quarters must be situated in such a way that all buildings should be clearly visible from residential quarters, which is very vital to have complete control over the entire poultry operation. The sheds should be so located that fresh air first passes through the brooder cum grower shed and then the layer sheds. This prevents spread of diseases from layer houses to brooder house. It is always advisable to install cages in the sick room. If sick birds (layer type birds only) are kept in cages, treatment will be very easy.

POULTRY FARM EQUIPMENTS

Objectives:

1. To aware with various equipment used for poultry farm.
2. To classify various equipments use on poultry farm based on operation/requirement

Equipment's can be classified as follows:

- ✓ Brooding equipment
- ✓ Feeding equipment (Feeder)
- ✓ Watering equipment (Waterer)
- ✓ Hatchery equipment
- ✓ Egg quality measurement equipment
- ✓ Vaccination / Medication equipment
- ✓ Miscellaneous equipments

1. Brooding equipment: -

- a) Electrical brooder
- b) Gas brooder
- c) Coal/charcoal brooder
- d) Kerosene stove brooder
- e) Centralized heating system
- f) Bukhari
- g) Chick guard

2. Feeding equipment (Feeder):

- (1) Line/Linear feeder: Linear chick feeder
Liner grower feeder
Linear layer feeder
Linear cage feeder
- (2) Hanging/Tube feeder (Hopper)
- (3) Plastic chick tray/Tray type chick feeder

3. Watering equipment (Waterer):

1. Fountain chick waterer
2. Automatic drinker
3. Nipple drinker

-
4. Water channel
 5. Water trough/Plastic tub

4. Hatchery equipment:

1. Incubator /setter
2. Hatcher
3. Setter tray
4. Hatcher tray
5. Pedigree box
6. Electric egg Candler-
 - (a) Individual egg Candler
 - (b) Mass egg Candler
7. Chick boxes
8. Filler flat-
 - (a) Pulp tray
 - (b) Plastic tray
9. Trolleys

5. Egg quality measurement equipment:

1. Micrometer Screw Gauge
2. Vernier Callipers
3. Spherometer
4. Yolk Color Fan
5. Automatic Egg quality measuring machine

6. Vaccination / Medication equipment:

1. Automatic vaccinator/Auto-vaccinator
2. Fowl pox vaccinator
3. Vaccine container
4. Needle with syringe
5. Sterilize

7. Miscellaneous equipment's:

1. Chick guard
2. Electric Debeaker
3. Weighing balance
4. Sprayer
5. Egg filler flat

-
6. Incinerator
 7. Flame gun/Blow-lamp
 8. Vacuum dust cleaner
 9. Measuring jar/cylinder
 10. Catching crate/hook
 11. Rake
 12. Shovel
 13. Bucket
 14. Nest - individual, community, trap nest
 15. Wing Band
 16. Leg Band
 17. Cage/Plate number
 18. Toe-cutter
 19. Litter material
 20. Roosts/Perches
 21. Curved Scissor
 22. Foggers/Sprinklers
 23. Recent equipments:
 - i. Egg washer
 - ii. Automatic Egg Grader
 - iii. Egg Packer
 - iv. Cold Storage Cabin
 - v. Proctoscope (Chick Sexing Machine)

BROODING MANAGEMENT

Objectives:

1. To know the importance of brooding in poultry rearing
2. To know the different methods of brooding

Purpose of Brooding

- Egg type female chicks are received as Day old Chicks (DoC) at the farm and they require additional warmth during early age for atleast two to three weeks
- The thermoregulatory mechanism of a newly hatched chick is not well developed and takes about two weeks for this mechanism to develop fully and maintain homeostasis
- Therefore chicks cannot maintain the body temperature properly for the first few weeks of life; and may be subjected to chilling, if not properly taken care off
- Under these circumstances, artificial brooding is mainly aimed at, providing extra heat or warmth during the first two to three weeks of the chicks life
- This is done to prevent cold shock since the environmental temperature may be lower than the hatcher temperature
- A brooder simulates the care and attention of a mother hen

Brooding arrangements

- Required number of feeders and waterers are arranged alternate to each other on the newspaper area.
- The chick linear feeders and chick waterers should be placed alternatively in a radiating way, to give a “*cart wheel*” appearance
- Care should be taken to avoid placing them crowded at the centre under the source of heat
- Keep feeders open for five hours and also spread some feed on the newspaper
- Two linear feeders of 60 cm size and two chick waterers may be used for every 100 chicks
- Automatic feeders and waterers may also be used as per manufacturer’s specifications
- Allow free moving space on the sides of waterers and feeders.

Behaviour of chicks

- As the chicks arrive, check whether the chicks are healthy, of uniform weight
- Count the chicks, and moist the beak of the chick by dipping it in the water containing vitamins, electrolytes and/or antibiotic and place it gently into the brooder arrangement
- Check that the chicks move actively scratching and taking feed and water. Return weak, inactive, unhealthy chicks with matted feathers at the back and the dead chicks and ask for replacement

Chick comfort

- It is necessary to verify whether the warmth given is sufficient to the chicks. A thermometer kept at the bird level will indicate the temperature

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- More practical way of assessing the adequacy of warmth provided is by watching the distribution of the chicks within the brooder guard management
 - If they crowd under or near the source of heat, then the warmth given is not sufficient. Then, a bulb may be added to the hover or the height of the hover may be brought down. If chicks have moved to the periphery and are reluctant to come to the centre under heat source, then temperature in the environment is higher than required. The hover may be pushed up or a bulb removed. If the chicks feel comfortable at the given temperature, they walk actively throughout the area unmindful of the heat provided and some take rest setting their head down on the side, the posture being given the name as "*Chick comfort*".
 - Heat source should be placed at the right height at the centre and the temperature has to be checked by observing the *chick comfort zone*

FEEDING MANAGEMENT IN POULTRY

Objective:

1. To know the different types of feeds used for feeding of various categories of layers and broilers depending on the age.
2. To get acquainted about quality and quantity required for feeding of broilers and layers.
3. To study various methods of feeding broilers and layers.
4. To know the utility of different systems of feeding in poultry.

Principle: About 80 percent productive performance is governed by genetic component and 20 percent is by environment. The quality and quantity of feed with methods of feeding has got major contribution in the environment component, controlling the productive performance. Similarly as feed accounts for 65-70 percent expenditure in production of poultry, the due care must be taken for correct feeding. The feed should be balanced, free from micro-bacterial contamination and devoid of toxic principles and anti-nutritional factors. The major such ailments are Salmonella, *E. coli*, Mycoplasma, aflatoxin, ochratoxin, trypsin inhibitors, urea, gossypol, gum, etc. In the same way, bird should be fed adequate quantity of feed per day. Both over and under feeding, which leads to excessive fat deposition or depletion of body reserves respectively, is harmful in the form of drop in egg production or stunted growth, which can hamper expression of full genetic potential of bird.

Salient Features of Feeding Poultry

1. Younger birds should be fed frequently, while adults at least twice in a day, to maintain cleanliness, freshness and desired consumption of feed.
2. Feeders should not be filled more than half to one-third level to control feed wastage.
3. Feed in the poultry shed should not be stocked more than a day's requirement to avoid spoilage by rats.
4. The finished feed should not be stocked more than one to one and half month as it may develop rancidity or fungal growth and loss of vitamins and minerals.
5. Feed in feeders should be stirred at least 4 to 5 times in a day to avoid formation of cakes and fungal growth.
6. Feeding of wet mash in summer helps in maintaining the feed consumption.

Table: Various feed for layer and broilers and their scientific requirement (B.I.S., 2007)

Age (weeks)	Category	Type of feed	ME KCal / kg feed	Protein (min) (%)	Crude fiber (%)	Acid insoluble ash (max)%	Ca (%)	Available P (%)	Salt (%)
0-8	Chicks	Chick	2800	20	7	4	1.0	0.45	0.5
9-20	Grower	Grower	2500	16	9	4	1.0	0.40	0.5
21-45	Layers	Layer Phase I	2600	18	9	4	3	0.40	0.5

46-72	Layers	Layer Phase II	2400	16	10	4.5	3.5	0.40	0.5
21 & above	Breeders	Breeder mash	2800	16	9	4	3.5	0.40	0.5
0-7 Days	Broilers	Broiler Pre-starter	3000	23	5	2.5	1.0	0.45	0.5
8-21 days		Broiler starter	3100	22	5	2.5	1.0	0.45	0.5
22 days to finish		Broiler finisher	3200	20	5	2.5	1.0	0.45	0.5

Note: 1. All feeds should not contain more than 11 percent moisture.

2. They should contain optimum quantity of vitamins and minerals.

Systems of Feeding Poultry

The system of feeding poultry is as important as quality of feed because, feeding balanced diet by improper system of feeding may not result in efficient productive performance. The common systems of feeding poultry are as follows:

All Mash System: This is most popular system used for feeding of all categories and species of poultry. All the ingredients are usually ground to 710 milli-micron size and mixed to a single mixture. There is less choice for selective feeding because of homogenous mixing. The finished feed should not be stocked for more than one to one-half month to avoid loss of vital nutrients like vitamins and minerals. In summer, wet mash feeding is advisable to avoid wastage by dust and to increase feed consumption.

Grain and Mash Feeding: In this system, grains or grain mash is fed. General practice is to get concentrate, enriched with nutrients like vitamins, minerals and protein from outside source and grains are added to it on the farm. The protein level can be increased or decreased to desired quantity. But this method can lead to poor performance in absence of skill. Similarly, selective feeding will lead to refuse of unpalatable ingredients and vitamins as well as minerals may not be available to birds because of setting at the bottom of feeder.

Pellet Feeding: Mash is pressed into small, cylindrical shaped pellets, under high pressure of steam. The size of pellets depends on age of birds which are of size 2-4 and 6-8 mm. The main advantage is that selective feeding is totally eliminated. The chances of setting powder at bottom of feeder will not be there. Hence, birds correctly receive all the vital nutrients like minerals and vitamins, which are added in very small quantity. The rejection of unpalatable ingredients is also avoided.

Feeding Crumbles: Large sized pellets are passed through blur mills, granulators or rolling mills to break them in varying sizes of crumbles. They are quite palatable and useful, when pellets are more hard and over size for younger birds, especially chicks.

Scratch Method (Grain Feeding): This is also called as cafeteria, free choice or whole grain feeding system. Various types of grains are fed in separate hoppers, which is useful for backyard poultry keeping. The skimmed or butter milk (12 lit/100 birds/day) is fed to balance deficiency of protein. Birds are given access to good succulent grass or to other crops. The system has got no commercial importance.

Feeding of Broilers

As the growth rate is very fast in broilers, they are fed ad-libitum with special attention. The feeds are with high energy and high protein. Broilers are fed broiler starter up to 3 or 4 weeks and then shifted to broiler finisher from fifth week onwards.

Feeding of layers

Layers are rather maintained on controlled feeding to avoid fat deposition, which can hamper further laying. For the matter of understanding, feeding is divided in two phases. The first phase is from 18/20 weeks to 42 weeks and second phase is from 43 weeks to disposal. The Ca percent is increased from 3 to 3.50 in second phase. Similarly energy content is also increased by 50-100 Kcal/kg of feed in second phase.

Average daily feed consumption of layer (light breeds) depending on age and laying percentage:

Age (weeks)	Laying percentage	Daily feed cons./day (g)
18	4	70
19	9	74
20	15	77
21	22	80
22	45	85
23	70	85
24	85	95
25	92	100
26	93	105
27-28	94	110
29-30	95	120
31-32	94	120
33-35	93	118
36-38	92	115
39-41	91	115
42-45	90	114
50-58	88-83	112
59-63	82-79	112
64-72	78-75	110

Growth performance and feed efficiency of broilers

Age(weeks)	Mean body weight (g)	Feed intake/ 1000 birds/ day (kg)	Cumulative feed intake per bird (g)	Feed efficiency	Water intake 1000 birds/ day (litre)
0	42	--	--	--	--
1	170	19	146	0.86	46
2	380	37	426	1.12	89
3	720	68	945	1.31	165
4	1170	102	1730	1.48	245
5	1680	134	2720	1.62	320
6	2220	168	3996	1.80	405

ECONOMIC INDICES OF LAYERS AND BROILERS

Objectives:

- 1. To calculate various production parameter on poultry farm

Layer

- Hen-housed egg production

$$HH \% = \frac{\text{Total number of eggs laid}}{\text{Number of birds at start}} \times 100$$

- Hen-day egg production

$$HD \% = \frac{\text{Total number of eggs laid during the period}}{\text{Number of birds during the period}} \times 100$$

Broiler

- Feed Conversion Ratio (FCR)

$$FCR = \frac{\text{Total feed consumed(kg)}}{\text{Total live body weight (kg)}}$$

Calculate the example of Hen-Housed and Hen-Day egg production.

Age (Wks)	Date	No. of Birds	Total eggs produced	Egg Prod. (%)		Remarks
				HH (%)	HD (%)	

HH (%):

HD (%):

POULTRY POST-MORTEM EXAMINATION AND SAMPLE COLLECTION

Objectives:

1. To carry out post mortem examination of dead bird on farm.
2. To know the cause of mortality on poultry farm.
3. To differentiate the various postmortem changes occur in different diseases of poultry.

Post-Mortem Examination Procedure: Steps

1. Obtain flock history
2. Examine the bird externally
3. Open the body; observe organs in situ
4. Remove the organs for detailed examination and sampling
5. Examine and sample the organs
6. Consider observations for d/diagnosis and write the report

General examination procedure

- General body examination: Plumage; body symmetry; palpate for crepitation, ascites; abdominal tumors.
- General body condition- weight: normal, low or high
- Skin, legs, feet etc. - Indicate effect of management and environment; fracture and trauma (self or externally inflicted)
- Inflammation of feet may indicate: poor litter, wet bedding, chronic *Pasteurella multocida* infection of the head, fowl pox, ectoparasites
- Cloaca examination may give a clue to: enteritis, salpingitis, uraemia, criminal abuse
- Examine for ectoparasites: around the head, on the body; under the wings and thighs
- Examine mucous membranes: conjunctiva, oral cavity and cloaca (DD: anaemia; inflammation, hemorrhages, purulent discharges, Avitaminosis A)

Dissection procedure

- Carcass is placed on its right side with head pointed towards the examiner and dampened with disinfectant
Infra-orbital sinus is opened and examined for inflammation
- The beak is opened and the oral cavity is opened (the blunts part of the scissors within the cavity)
- Incision is extended down the neck to open the oesophagus and the crop,
- Thymus is inspected and incised (well developed in young birds (broilers) atrophied in old birds (laying flocks))
- The carcass is placed on its back with the legs towards the examiner
- The skin is incised transversely behind the xyphoid process and the incision is extended towards both knees. The skin is removed over the pectoral muscles by pulling in a cranial direction
- Parasternal bursa is inspected for: inflammation associated with recumbency (immobile birds)
- Pectoral muscles are incised and examined for lesions legs and hips are bent outwards until each femoral head is dislocated from the acetabulum

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- Transverse incision is made behind the xyphoid process to open into the thoracic cavity
 - Incisions are made on both sides of the thorax up to the brachial region or shoulders to open the thoracic inlet
 - Sternum is slightly lifted to examine the abdominal and thoracic cavities insitu for evidence of mycoplasmal, bacteriological or virological infections
 - Sternum with pectoral muscles is cut and rotated upwards and cranially to expose the abdominal and thoracic cavities
 - Examine all air sacs in situ for evidence of inflammation
 - Remove the heart with pericardial sac and incise and examine it for lesions
 - The liver and gall bladder are removed and examined
 - The spleen is removed and examined
 - Make transverse incision cranial to the proventriculus and remove the whole intestinal tract in a caudal direction. Make a transverse incision 1-2 cm cranial to the cloaca and remove the entire intestines
 - Examine the serosal surface of the intestines and then open the intestines in a caudal direction starting from the proventriculus. Simultaneously examine the pancreas.
 - In females: cut the reproductive tract free of its ligaments in a caudal direction and subsequently open the infundibulum, magnum, isthmus, uterus and vagina (these are inspected both from the serosal and mucosal surfaces)
 - In young birds the Bursa of Fabricius is opened through its cloacal opening and examined for swelling, oedema, haemorrhages
 - Examine the kidneys for lesions such as atrophy, nephropathies, inflammation, tumours
 - Examine the thoracic air sacs for cloudiness, thickening
 - Remove the lungs and examine for size, colour, consistency, oedema tumors
 - Examine the heart sac for adhesions, lesions, fluid contents
 - Examine the heart for lesions (hemorrhages, myocardial dystrophy, neoplasms)
 - Examine the brachial plexus for Marek's disease
 - Examine the sciatic nerve bilaterally for Marek's disease by exposing it through a blunt dissection to separate the gracilis muscle
 - Palpate all the joints and open them in case of swellings and asymmetry
 - Open the knee and hock joints and inspect the tendons and tendon sheaths for haemorrhage, ulcers, exudates

Samples Collection

- Swabs: oropharyngeal / tracheal, cloacal, ocular
- Organs: Trachea, lungs, duodenum, caecal tonsil, brain, liver, spleen and any organ with lesions from fresh carcasses
- Blood for serum: sick and recovered birds
 - For each sample, n = at least 20 per affected flock
- At least 5 whole fresh carcasses should be submitted for autopsy wrapped in double layer polythene bags and accompanied by full case history as seen by the referring clinician

COLLECTION AND HANDLING OF DIAGNOSTIC SAMPLES

Objectives:

1. To collect blood sample for serological examination.
2. To know the importance of routine sero-monitoring on poultry farm.

Diagnostic samples are used to determine health status or identify specific pathogens in pullet, layer and breeder flocks. Routine samples include whole blood, serum, formalin-fixed tissue and swabs: tracheal, choanal, oropharyngeal, cloacal, organs and joints. For specific investigations, Fast Technology for Analysis of nucleic acids (FTA) cards can be used to collect feather pulp, whole blood or isolates from any type of swab.

Sample submission

When submitting samples to a diagnostic laboratory, it is important to provide thorough and relevant flock information on the laboratory submission form. Critical information that should accompany all diagnostic sample submissions includes:

- Flock identification and location
- Age of flock
- Date of sample collection
- Vaccination program
- Flock history, including pertinent health or production problems

This information is vital to the flock veterinarian and diagnostician to make a meaningful interpretation of serological or diagnostic results and provide recommendations to improve flock health and/or production.

Ages for blood collection in flocks:

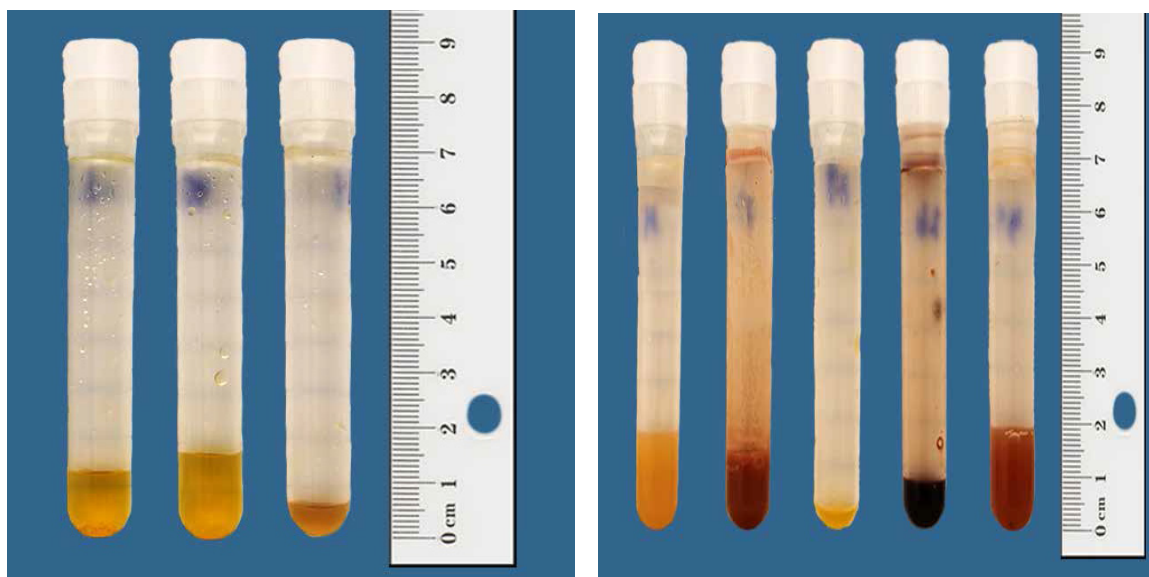
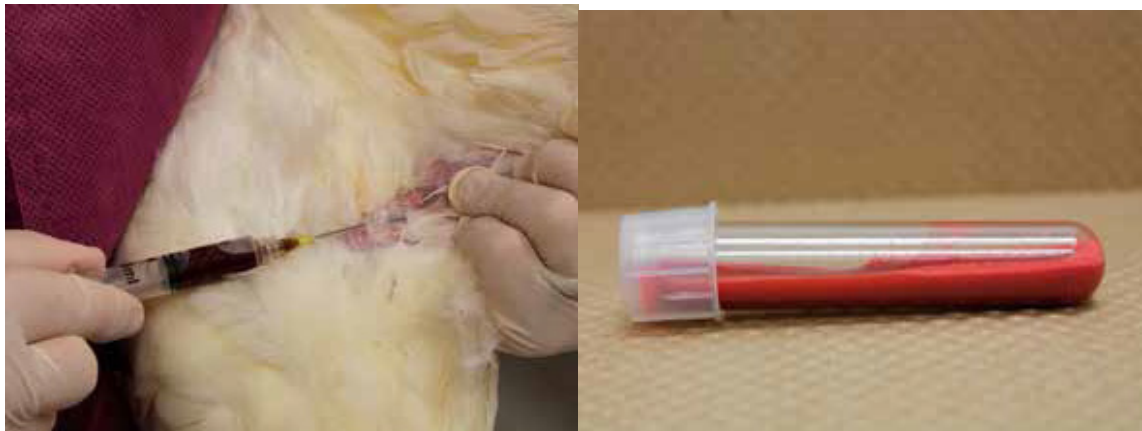
1. 10 to 12 weeks
2. At time of transfer (grow to lay farm)
3. Every 10 to 12 weeks during egg production

Summary of Guidelines for Proper Serum Collection

- Select normal representative birds (10 to 20 sera samples), unless working up a diagnosis.
- Collect 2.0 to 3.0 mL of blood from each bird.
- Samples collected with a needle are cleaner than with a scalpel.
- Do not damage samples by forcing the blood sample back through the needle into the clot tube.
- Ensure blood runs down the side of the clot tube and position the tubes nearly flat until the clot is formed.
- Leave blood in the clot tube for 10 to 12 hours at about 80°F (27°C).
- Do not shake, roughly handle or freeze the blood while the clot is forming or hemolysis will occur.
- Remove clot gently, or pour off serum.
- Do not mail samples without first removing the clot.
- Keep the serum samples cool and send immediately to the laboratory on wet ice or cold pack.

Serology

Serology is the study of serum antibody levels, also known as titers. The immune system develops antibodies that circulate in the blood after a bird is exposed to an antigen, whether by vaccination or exposure to a wild strain pathogen. Antibodies are found in the serum portion of blood (the liquid portion after the clot develops). Serum is free of all blood cells and clotting factors.



Examples of good serum samples. Note the transparent, golden color and adequate volume (>0.25 mL).

Examples of poor quality serum samples.
A: cloudy, turbid sample; B: lipemic sample;
C: too little volume (<0.25 mL); D: clot and no serum; E: hemolyzed sample.

SEASONAL MANAGEMENT ON THE POULTRY FARM

Objectives:

1. To study the effect of excessive heat and cold on health and production of poultry birds.
2. To get acquainted with measures to be taken to combat stress of extreme weather on poultry.
3. To know the managerial practices to be adopted for keeping stress at minimum possible level and getting optimum production during summer winter and monsoon.

As the normal body temperature of poultry birds is 40 to 41°C, which is very high than the other class of livestock, they are very sensitive to extremes of climate. The comfortable temperature zone in which poultry can express its maximum genetic potential is 18 to 21°C. The temperatures above 28°C and below 12°C, lower down their productive performance considerably. The temperature above 38°C and below 10°C causes drastic detrimental effects on poultry in the form of reduced feed intake, loss of production and mortality. Therefore, they must be efficiently managed during these extremes of weather to keep losses at minimum.

Summer Management:

House Management:

- Orient the long axis of poultry house in an east-west direction to minimize solar heating and direct access to sunlight.
- In open sided houses, width of house will be a limiting factor so keep the optimum width (24-32 ft) based on, temperature, humidity, wind velocity, type of house and nature of bird for effective cross ventilation.
- For proper air movement the poultry houses should be away from other buildings. The distance between houses should be 75-100 ft.
- The height of the house should be 8.5- 11 ft from the floor of the house and roof overhangs should be 3-5 ft to avoid direct sunlight & rainwater.
- The roof should be well insulated by using straw/thatch on the roof and sprinklers on the roof can be used to reduce temperature. Use roofs made of reflective material such as shiny and smooth surface or white wash.
- Increased air movement over the birds by cooler air circulation fans and exhaust fans to produce a *wind chill* effect, which will cool birds even without drop in the house temperature. For broilers air coolers can be provided during intense summer.
- Grow tall shaded trees and grasses with sprinklers around the house to cool incoming air and reduce the reflection of heat into open houses. Bare ground can reflect a large amount of heat into the house.
- Remove manure from the house often during the summer.
- The bird density per unit area may be reduced to provide more air space between the birds and also reduces the amount of heat added into poultry house.
- Hang gunny bag curtains 3 feet away from the wire netting and wetting them with water will reduce the temperature of the house.

Feed & water management:

- Birds prefer cool water between 45-80°F. Except day old chicks, all type of chicken should be provided water at lower temperature than the room temperature. During summer increase the number of waterers. Water becomes warm during afternoon hours in metal vessels and birds may not drink it so replace the water frequently.
- Cooling the drinking water by flushing waterlines with fresh cool water and should be painted with white colour to reflect the solar radiation or buried well below the ground level to avoid direct sunlight will be helpful to increase feed consumption and egg production in heat-stressed birds.
- Feeding of bird should be during cooler parts of the day. Feed withdrawal from 9.00 a.m. to 4.30 p.m. is very effective in reducing heat stress mortality. Birds compensate this feed intake in the night time and it should be seen that lights do not go off in night.
- Wet mash during summer days will result in better growth and feed efficiency but the wet feed should not be left overnight otherwise fungal growth may occur. Never store wet mash in bags.
- Birds under stress need a high nutrient density feed enriched with vitamins, essential amino acids and minerals to compensate for reduced intake.
- Carbohydrate calories may be replaced by fat calories to minimize the extra heat generation in the body and there should be a proportional decrease in metabolizable energy.
- Fiber content of the diet should be kept down, do not feed high levels of byproducts especially to broilers and birds in production.
- Both electrolytes and Vitamin-C are effective in alleviating the summer stress. Vitamin-C is more effective than electrolytes. Chicken can synthesize Vitamin-C in kidneys but this quantity is not sufficient during stress, hence dietary supplementation is essential. Vitamin-C must be supplemented at 100–200g/l prior to onset of stress.
- Vitamin-E is having a greater role in alleviating stress and immuno-modulation. Vitamin-E is a biological antioxidant for respiratory enzymes involved in nucleic acid metabolism, improves humoral immunity.
- Sodium bicarbonate, Potassium chloride, Sodium salicylate is found effective to reduced the mortality due to heat stress.
- Electrolyte and mineral supplementation may be done to alleviate stress. Calcium supplementation is helpful for maintaining egg production and shell quality in layers. During intense summer low energy but high protein, vitamins and mineral rich layer mash be used in caged layers.

Litter Management:

- Frequent removal of old litter is beneficial. Old litter generates more heat.
- Reduce depth of litter. Two inch thickness is optimum in summer.
- In extreme dry conditions litter sometimes become too dusty so water can be sprinkled on it. The temperature of the litter is always lower than the surrounding air.

Other managerial practices:

- Productivity rate declines as population size increases and space allowance per bird decreases so maintain a desired flock size and provide optimum space for birds.
- Do not disturb the birds during the hottest time of the day (afternoon and early evening).
- Adjust work schedules and lighting programs, so that routine work is done early in the morning or at night.

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- Postpone routine management practices which require bird handling, such as debeaking, eye/nasal drop or wing web vaccinations and carry out operations during the cooler parts of the day (early morning or late evening) or at night.
 - Transport birds at night with low stocking density of birds in cages to increase the ventilation around the birds.
 - Do not spray-vaccinate flocks during the time of high environmental temperatures.
 - Adjust the amounts of medications and volumes of water used for water vaccinations to reflect the increased water consumption of the flock during hot weather.
 - Do not withhold drinking water from the flock when vaccine is provided through drinking water. Postpone these vaccinations whenever possible as heat stressed birds have decreased immune function and may not respond well to vaccination.

Winter Management:

It is comparatively easy to counteract effects of cold weather in winter than heat stress in summer. The adverse effects become more prominent when temperature drops below 10°C.

Following are some steps, which can help to minimize winter stress:

1. Try to increase temperature in shed by covering open sides with curtains to avoid draughts of cold wind without obstructing ventilation.
2. If possible, insulate roof to conserve heat in house or simple thatch can also help.
3. Try to warm the house by using electric or coal heaters or bukharies.
4. Increase the energy content of feed by about 100 to 150 Kcal/kg to generate more heat in body of birds due to increased calories.
5. Increase depth of litter to about 15 cm, which will help in warming house because of more heat production in litter.
6. Increase strength of birds (stocking density) by 10 per cent in the house, which will help to warm the house by increased heat production from body of birds (deep-litter).
7. Provide warm water to the birds.

Monsoon Management:

Following are some steps, which can help to minimize monsoon stress:

1. Keep the drainage system proper functioning.
2. Overhang of poultry shed will prevent the rain water to enter inside.
3. Required quantity of feed should be stored before monsoon.
4. Feed bags should be kept at height and also away from the side walls.
5. Water should be given to the birds only after purification.
6. Prevent water leakage and keep the litter dry by frequent stirring.
7. Sufficient quantity of litter material should be stored well before monsoon.

AUTOMIZATION IN POULTRY FARMS

Objectives:

1. To know the importance of automation on poultry farm
2. To know the different automation system used for poultry farm operations.

Need of Automation

- In 70's a farm having 10,000 birds was considered a large farm but today 1,00,000 and more farm are common
- When farm size increases
 - Total management system changes
 - More manpower required
 - More records
 - Handling and working with different age groups
- Major poultry operation like feeding, watering, egg collection, bird catching and manure removal are laborious, time consuming and daily routine job
- Labour problem is associated with large farm
- Automation is needed for large farms of more than one lakh birds to manage poultry operations
- Farms size of 10,000 to 20,000 birds, automation is a large investment but long run advantages

Automation in various system

- Feeding system
- Watering system
- Egg handling
- Bird catching
 - Light control
 - Bird weighing
 - Curtain winching system
 - Manure removal
- Medication, vaccination and disinfectants

Feeding system Automation

- Feed is major contributor in poultry operation
- Feed wastage occur during manual feeding
- Types of Feeding system depends on
 - Frequency of feeding
 - Types of feeding (*ad-libitum* or controlled)

-
- Age of birds
 - Type of birds
 - Types of housing system
 - **Automatic feeding system**

1. Trough and chain
2. Conveyer and pan
3. Trolley feeder (Cage Layer)

1. Trough and chain feeding system

- Feed is dragged in troughs by a flat chain
- Chain is start all the birds rush to in going point of chain and pick up feed and crowding occur
- Young bird jump onto the chain, be carried along and get caught and killed in corner
- System become obstacle during housing and catching of birds
- Small feed particle remain beneath the chain

2. Pan feeding system

- Center less auger was put in a tube on which round feeding pan were attached
- Electric motor at end of feeder line handle feed up to 165 m
- Conveying capacity approx. 450 kg/h

3. Trolley feeding system

- Feeding done by trolley feeders
- Pipes join with feed hopper which transport feed from hopper to feeder
- Automatic control panel operate the system as per the feeding schedule
- Uniform feeding of every bird
- Reduce possibility of ingredient separation

Advantages of Feeding System Automation

- Lower mortality
- Lower variability
- Better health and welfare
- Better feed efficiency
- Ease of on-farm management
- When flock size is larger mechanical feeding system reduces annual labour cost on feeding by about 66 then manual feeding system

Watering System Automation:

Types of watering system depend on

- System of rearing
- Size of farm

-
- Age of birds
 - Quality of the water

Automatic drinking system

- Open watering system
 - Bell drinker
 - Hang from ceiling by cord
 - Bell shaped dome encloses valve to maintain water level
 - Cup drinker
 - Valve is situated in cup with trigger
 - Trigger open & closes the valve
 - Trigger is operated by birds
- Close watering system
 - Nipple drinker
 - Small valve operated by the bird's beak
 - Nipple with cups
 - Small cup attached with nipple to catch water
 - Reduce spillage water on litter

Advantages of watering system Automation

- Clean & fresh water available continuously
- Reduces labour costs
- Decrease water spillage and wastage
- Reduces the pathogen load of the litter
- Reduced condemnation of birds

Egg handling Automation

- Collection
- Transport
- Grading
- Counting
- Packaging

Egg Collection

- Manual egg collection is extremely time consuming
- Egg collection belt installed in egg collection gutter
- Eggs roll from the sloping floor of cage onto movable belt
- Egg collection belt transport the eggs to the collection area via a conveyer where egg are graded and pack

Advantages of Automated Egg Collection

- Save time and labour
- Egg collected more often
- Ease of operation
 - Gentle egg transportation
 - Clean eggs
 - Minimum breakage

HATCHERY LAYOUT AND DESIGN

Objectives

1. To understand the role of different rooms in hatchery
2. To study the important points in constructing a hatchery
3. To understand the placement of different machines in the hatchery.

Size of the hatchery:

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

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 isolation 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 ft.
 - Walls: Fireproof material should be used in constructing the walls of the hatchery building 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 nonabsorbent 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 doors double-swinging.
 - Floor: All floors must be 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.

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- 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 if a 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:
 - Shower room
 - Getting hatching eggs into the hatchery
 - Fumigation room
 - Egg holding (Egg-cooler) room
 - Pre-incubation warming room
 - Setter room
 - Egg candling (Dark) room
 - Hatcher room
 - Chick-holding room
 - Wash room
 - Clean room
 - 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

ECONOMICS OF LAYER AND BROILER FARMING**Objective:**

1. To make project proposal for starting layer and broiler farm.
2. To have basic idea of different ingredients used to start poultry farm.

Cost and estimates for establishment of a layer farm

Following assumptions can be considered while calculating economics of poultry farming however, the assumptions may change according to market, location and prevailing conditions.

1. Floor space requirement is 700 cm² (0.75 sq. ft.)/bird up to 8 weeks of age and 1.860 cm² (sq. ft.), thereafter including the laying period.
2. Cost of construction for poultry sheds is Rs._____/m² of floor area.
3. Cost of each commercial day-old pullet chicks is Rs._____/-.
4. Only 100 pullets are transferred to the laying quarters out of 110 chicks started, thus allowing 10 chicks for mortality and culling up to point to lay.
5. Maximum of laying house mortality is 10 per cent of the birds housed. Thus 90 birds out of 100 pullets are available for sale at the end of laying period.
6. 7.5 kg of feed is required up to point of lay (i.e. up to 140 days of age) and 40 kg thereafter (141-150 days of age) for each bird.
7. Cost of starter and grower feed is Rs._____/kg, Rs._____/kg and cost of layer feed is Rs._____/kg.
8. One labour is required for every 2,000 layers, labours are engaged on daily wage basis at the rate of Rs._____/month @Rs. ____/day/labour.
9. Hen-housed production is _____eggs/layer in laying cycle (21-72 weeks of age) of one year.
10. Salvage value at the end of laying is Rs.____/- per bird.
11. Cost of labour, water, electricity, litter, medicine, etc. up to point of lay is Rs._____/bird and Rs._____/bird thereafter for all these items except labour.
12. Rs._____-/- is average expenditure per bird on account of equipments such as brooders, feeders, waterers and laying nests.
13. All the product are sold at the farm, the expenditure on transport of products is considered nil.
14. Eggs are sold on wholesale price @ Rs._____/100 eggs (average of the year).
15. 40 layers/100 chicks produce 1 tone of manure under deep litter system of housing. Manure is sold @ Rs._____/tone.

Non-recurring expenditure

i) Building (350 m ² brooder space + 930 m ² of laying house area = 1,280 m ² @ Rs.____/-.	Rs. _____/-
ii) Equipments (For 5,000 pullets @ Rs.____/pullets)	Rs. _____/-
Total	Rs. _____/-

Recurring expenditure

i) Costs of 5,500 day-old chicks @ Rs.____/chick	Rs. _____/-
ii) Cost of feeding 5,500 chicks upto point of lay @ 7.5 kg feed/bird .	Rs. _____/-
iii) Labour, water, electricity, medicine, litter, etc. upto point of lay for 5,500 birds @ Rs.____/bird.	Rs. _____/-
iv) Cost of feeding 5,000 layers @ ____ kg/bird and Rs._____/q. of feed	Rs. _____/-
v) Cost of water, electricity, medicine, litter etc. during the laying period @ Rs.____/bird	Rs. _____/-
vi) Wages for 3 labours Rs.150/day/labour for 360 days	Rs. _____/-
Total	Rs. _____/-

Capital investment

i) Building	Rs. _____/-
ii) Equipments	Rs. _____/-
iii) Cost of chicks	Rs. _____/-
iv) Cost of feeding to point of lay	Rs. _____/-
v) Cost of water, electricity, labour etc. to point of lay	Rs. _____/-
	Rs. _____/-

Receipts

i) Sale of eggs (____ eggs from 5,000 layers) @ ____ eggs/layer and Rs.____/100 eggs)	Rs. _____/-
ii) Sale of 175 tones of poultry manure @ Rs.____/tone	Rs. _____/-
iii) Sale of 3,375 gunny bags @ Rs.____/bag	Rs. _____/-
iv) Salvage value of 4,500 culled hens @ Rs.____/hen	Rs. _____/-
Total	Rs. _____/-

Gross profit

Receipts Rs. _____/-
(-) Recurring expenditure Rs. _____/-
Rs. _____/-

Net profit

(-) i) Depreciation on building 10% Rs. _____/-
(-) ii) Depreciation on equipment @ 15% Rs. _____/-
(-) iii) Interest on capital investment @ 12% Rs. _____/-
(-) iv) Insurance on capital @ 0.35% Rs. _____/-

Net profit per layer per month = $\frac{\text{Net profit}}{\text{No. of layer} \times 12}$ = Rs. _____ = Rs. _____ /-

Production cost of 1 dozen eggs =

$\frac{12 \times (\text{Recurring expenditure} - \text{Receipts from sale of birds, manure and gunny bags})}{\text{No. of eggs produced}}$

= $\frac{12 \times (\text{Rs. } \underline{\hspace{2cm}} - \underline{\hspace{2cm}})}{1,550,000}$ = Rs. _____

Amount of feed required to produce 1 dozen eggs

= $\frac{\text{Total amount of feed consumed}}{\text{Total no. of eggs produced} \times 12}$ = _____ = _____ = _____

Cost and estimates for establishment of a broiler farm

1. It will be a continuous operation and 1,000 broilers are to be started each week. As a result of this 44,000 birds will be started during first year and 52,000 in subsequent years.
2. Out of the 1,000 broilers started only 950 will be available for sale, allowing a max. of 5% mortality on the broilers started. Thus for 44,000 broilers started, only 41,800 broilers will be sold.
3. Sale of broilers will commence at the end of 5th wk & will be completed by the end of 6th wk.
4. All the broilers will be sold at the farm avoiding expenses on transport.
5. Birds will be sold on live weight basis @ Rs. _____/kg live weight. This will make no difference between whole sale and retail sale.
6. Average weight of the birds on combined sex basis will be 2000 g at the time of sale.
7. Feed conversion efficiency will be 1:1.6 i.e. 1.6 kg of feed will be required for achieving 1 kg of live body weight.
8. Commercial broiler chicks are available @ Rs. _____/chick.
9. Expenditure on account of water, electricity, litter, medicine etc. will be Rs. ___/chick.
10. Total of 4 labourers will be working at any particular time at the rate of 2,000 broilers started for each labourer. Labourers will be hired on monthly wage of Rs. ___/- per month.

11. Amount spent on account of equipment will average to Rs.____/- per bird.

12. Cost of construction will be Rs.____/sq. ft. of floor space.

13. Broiler feed will be available @ Rs._____/kg.

Non-recurring expenditure

i) Building @ Rs.____/m² (for 630 m²) Rs. _____/-

ii) Equipments @ Rs.____/bird (for 6,550 bird,
max. No. that can be kept in 7 pens) Rs. _____/-

Total Rs. _____/-

Recurring expenditure

i) Cost of 44,000 day-old broiler chicks @ Rs.____/chick Rs. _____/-

ii) Cost of 1,26,720 kg of feed @ Rs.____\kg Rs. _____/-

iii) Cost of water, electricity, litter, medicine etc. @ Rs.____/bird Rs. _____/-

iv) Labour charges for 12 months @ Rs.____/- per month for 4 labourers Rs. _____/-

Total Rs. _____/-

Grand total (Recurring + Non-recurring) Rs. _____/-

Capital investment

i) Cost of building and equipments Rs. _____/-

ii) Cost of first 8,000 broiler chicks Rs. _____/-

iii) Cost of feed for 7,600 broilers (____x ____ x____) Rs. _____/-

iv) Cost of water and electricity for 8,000 broiler chicks@ Rs.____/- per bird Rs. _____/-

v) Wages of 4 labourers for 8 weeks (for 8,000 broiler chicks) Rs. _____/-

Total Rs. _____/-

Income

i) From sale of 49,400 broilers each of 2 kg @ Rs._____/kg live weight Rs. _____/-

ii) From sale of 1,800 gunny bags @ Rs.____/bag Rs. _____/-

iii) From sale of 100 tones of manure @ Rs.____/tone Rs. _____/-

Total Rs. _____/-

Gross profit

Income Rs. _____/-

(-) Recurring expenditure Rs. _____/-

Total Rs. _____/-

Net profit

Gross profit	(-)	i) Depreciation on building @ 10%	Rs. _____/-
		ii) Depreciation on equipments @ 15%	Rs. _____/-
		iii) Interest on capital investment @ 12%	Rs. _____/-
		iv) Insurance @ 0.35% of capital	Rs. _____/-
		Total	Rs. _____/-

So net profit per broiler started = Rs. _____

Production cost of commercial broiler = Rs. _____

POULTRY BREEDS



White Leghorn



Rhode Island Red



Barred Plymouth Rock Chicken



Brahma chicken



Asil chicken



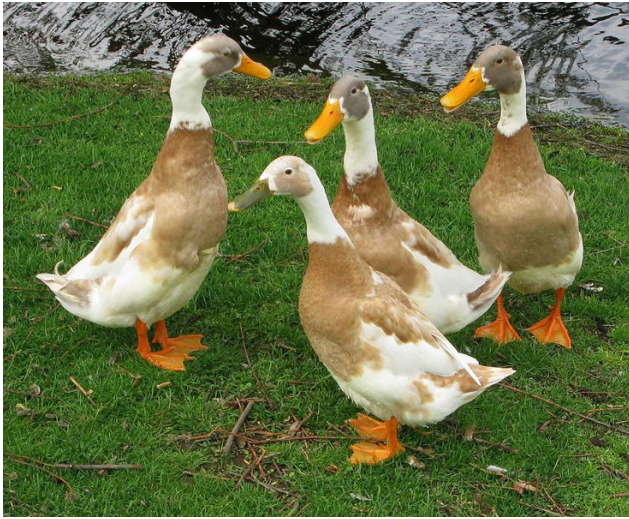
Kadaknath Chicken



Naked Neck Chicken



Frizzle Chicken



Indian Runner Duck



Khaki Campbell Duck



White pekin Duck



Japanese Quail



Beltsville Small White Turkeys



Broad Breasted Bronze Turkey



Single



Pea



Strawberry



Cushion



Walnut



Buttercup

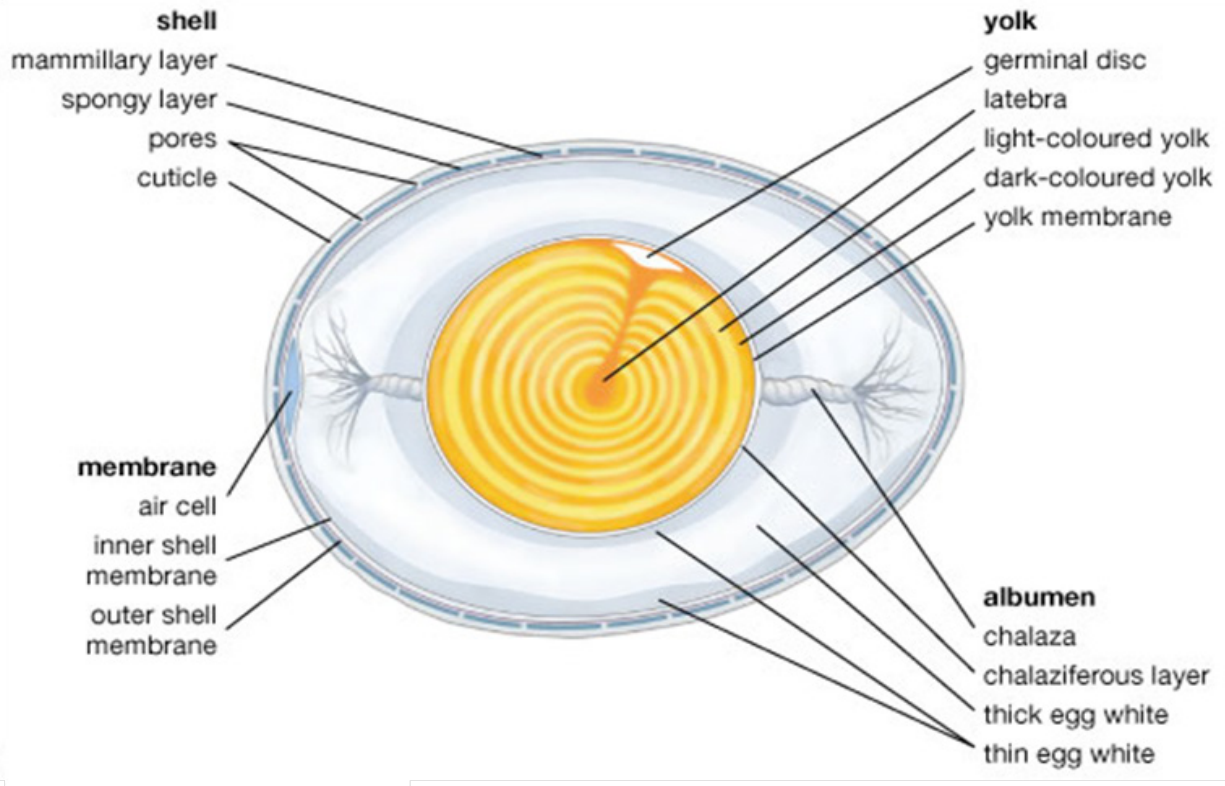


V-Shaped

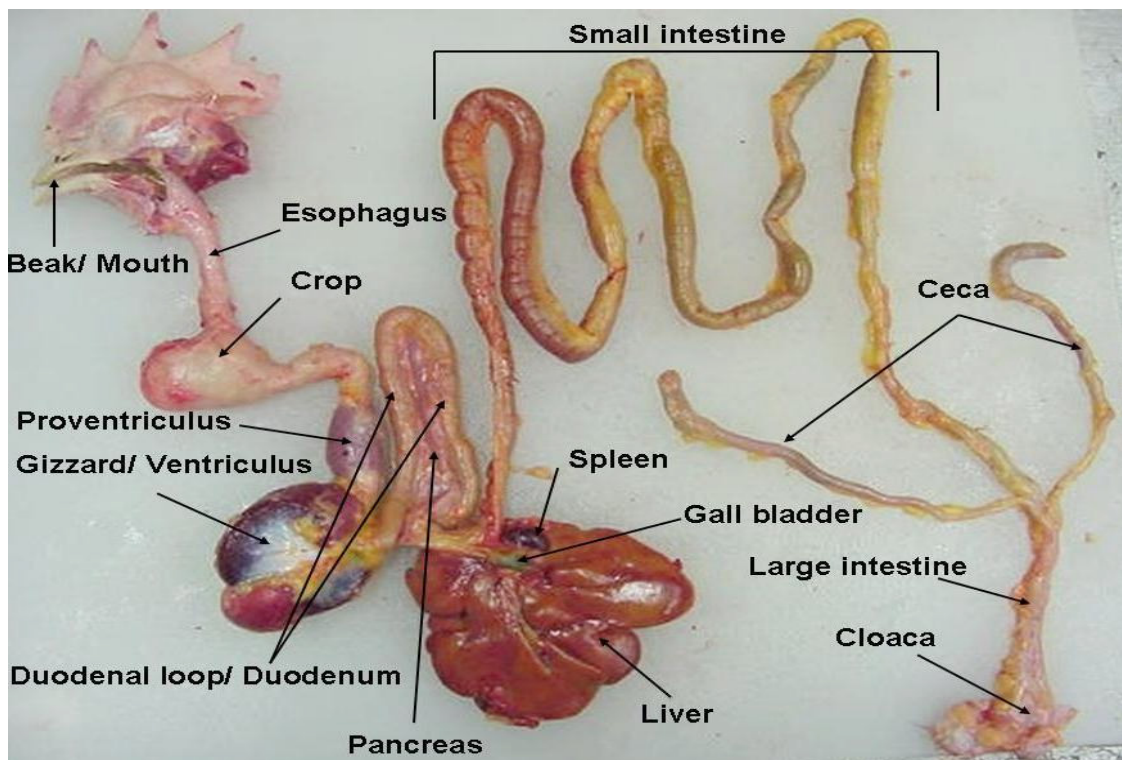


Rose

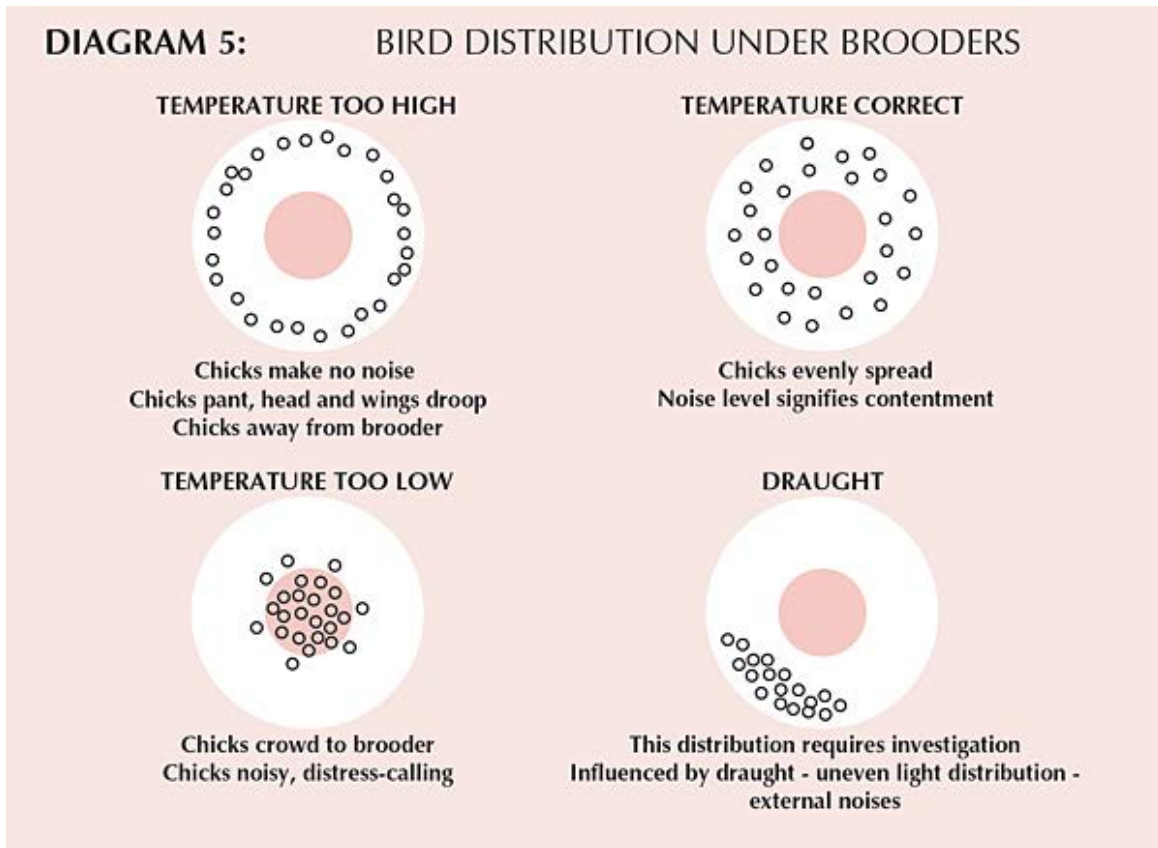
Comb pattern



Internal structure of egg



Digestive system of a chicken



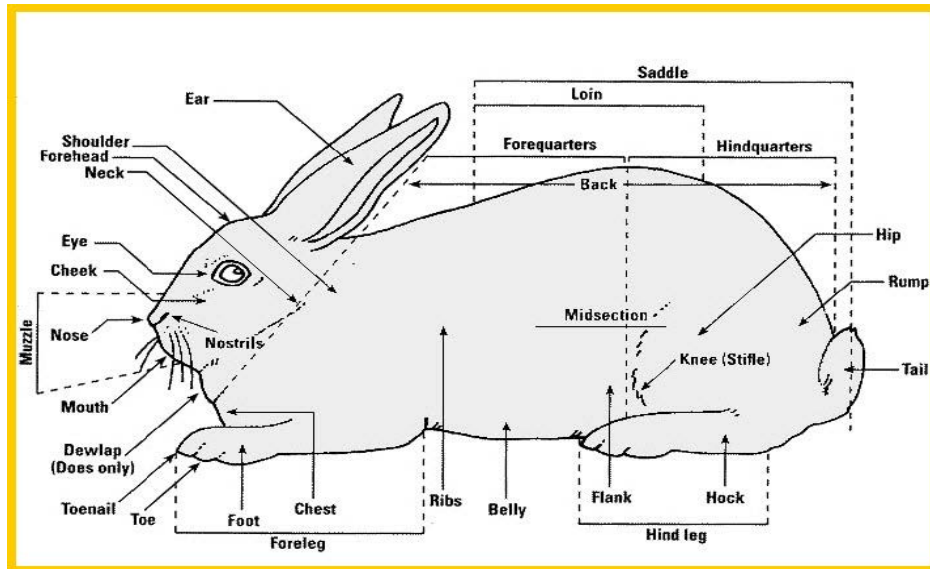
Brooding and Rearing of chicks

IDENTIFICATION OF BODY PARTS AND HANDLING, WEIGHING, SEXING AND WEANING OF LABORATORY ANIMALS

Objectives:

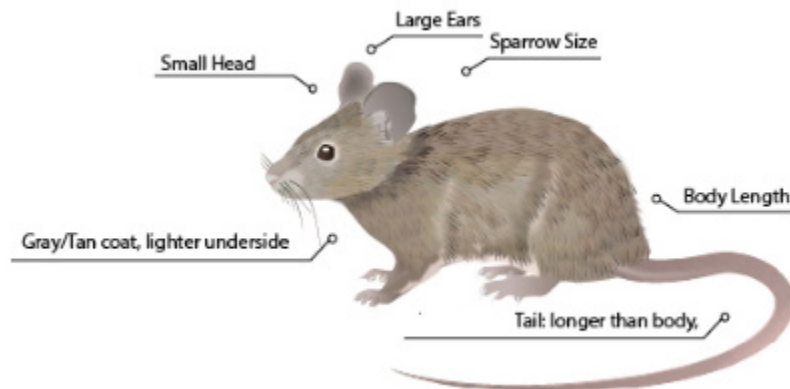
1. To acquaint the students with different body parts of laboratory animals.
2. To study different managemental practices viz. weaning, identification of sex of animal and weighing.

Body parts of rabbit



Handling of rabbit

Rabbits should always be handled firmly but gently. A rabbit should be picked up by obtaining a firm grip on the loose skin over the scruff of the neck with one hand and use the other hand to support the hind quarters. Young rabbits can be lifted by grasping them firmly over the loins, the fingers on one side and thumb on the other.

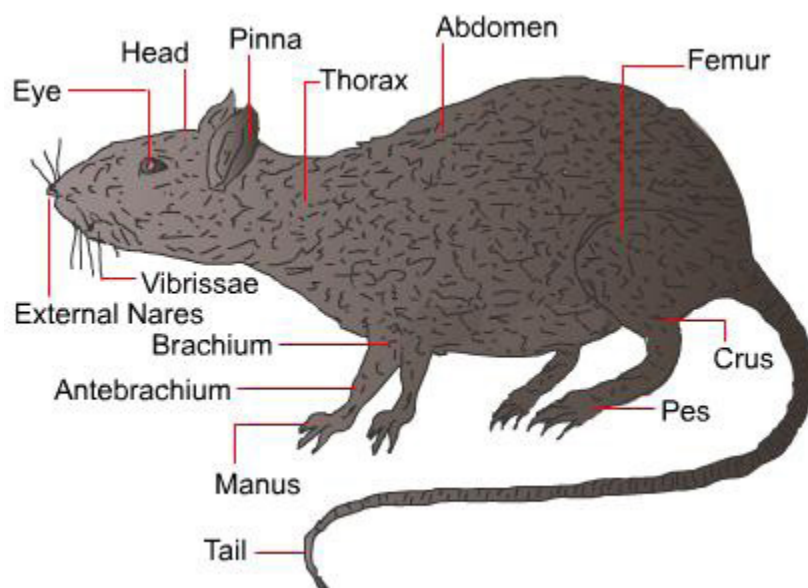


Body parts of mouse

Handling of mouse

The mouse should be picked up by the scruff of the neck using thumb and forefinger, or by holding the base of the tail with one hand and gripping the scruff with the other as described. With the mouse held this way, the handler is unlikely to be bitten and the animal is secured. A refinement of this technique allows one hand free for dosing or injecting. A mouse is restrained for injection or examination by catching it by placing it on a cage lid and grasping the loose skin behind the ears between the thumb and forefinger of one hand while continuing to hold the tail with the thumb and forefinger of the other hand. As soon as the mouse's head is restrained, the mouse can be picked up and the tail secured under fourth or fifth fingers of the hand that is restraining the mouse head. This technique leaves one hand free to inject medication or palpate the mouse.

Body parts of rats

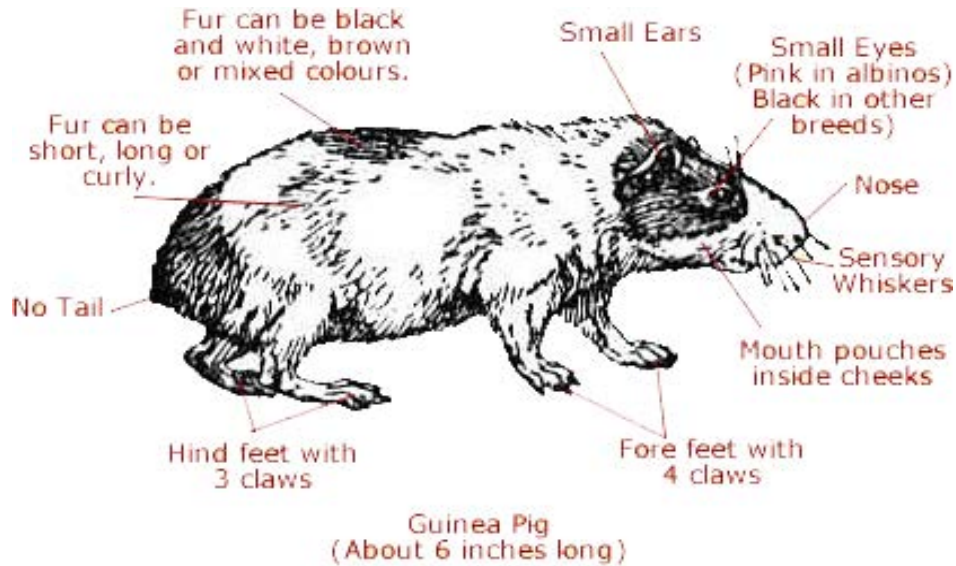


Handling of rat

The laboratory rat should be handled without gloves or forceps unless experimental procedure requires it or because the rat is particularly aggressive as a result of previous treatment. Normally, with repeated handling, rats become accustomed to the investigator's hand. If there is any uncertainty about the animal's temperament, the handler should first place his hand in the cage and let the rat touch and sniff it. He may then gently stroke the animal on the back from head to tail. When picking up a rat for the first time, the investigator should move the hand slowly from behind the animal and grip it firmly with the thumb and forefinger, forming a circle round the neck. The head and one of the front paws should be included in the ring of fingers around the neck, while the other paw should be held between fore finger and middle finger. If the investigator's hand is large and the animal small enough, the body can be laid in the palm, intraperitoneal injections can be given in this position.

The rat should be picked up by placing one hand over its back and grasping it firmly round the neck so that it cannot turn its head to bite. When animals become tamed they can be picked up by holding them around the shoulders. A pregnant animal should be given additional support by cupping the other hand round the lower part of the animal's body and legs. When picking up a rat approach should never be made from the front, but always from the rear. Care must be taken not to hesitate or retract the hand suddenly, because this will alarm the rat. If the investigator is nervous the animal will respond with defensive behavior.

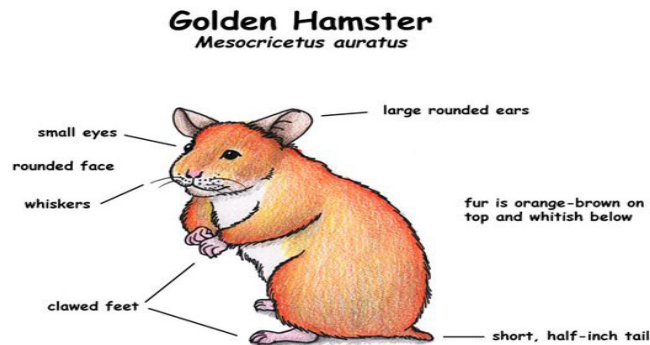
Body parts of guinea pig



Handling of guinea pig

Guinea pigs are often mishandled because they rarely bite. When they are disturbed they will race around the cage. A guinea-pig should be caught by placing one hand in front of the animal and one behind. It can be lifted by grasping under the trunk with one hand while supporting the rear quarter with the other hand. Two hands support is important, particularly with adult and pregnant animals. The grasping hand should be beneath the thorax and abdomen and the supporting hand under the rear feet or hindquarters. Grabbing the animal around the thorax and abdomen may cause injury to lung or liver.

Body parts of hamster



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Handling of hamster

A frightened hamster often appears aggressive, which it demonstrates by rolling on its back or by standing on its hind limbs and screaming at the handler. This is a little more than a defence mechanism and should be ignored. The animal may be lifted in cupped hands if it is used to being handled or by firmly grasping the loose skin at the back of the neck. The latter method of handling is preferred if manipulation is necessary; the hamster should be supported so that the fingers may be wrapped around its legs ready for examination, injection or dosing.

SEXING

Sexing is usually done at weaning along with tattooing. When the vent area is gently pressed the female will show a slit like aperture and a male will show slightly raised cylindrical round tip.

Sexing of mice

Male and female mice are differentiated by the relatively greater distance between the anus and genital papilla and presence of the scrotum in the male. Strain difference in development of the external genitalia has been observed and can lead to incorrect identification of the sex of the mouse. For example, the scrotum is not well developed in A/HeJ male compared to BALB/cJ males. The genital papilla appears more prominent in female mice that are homozygous for mutation that result in hairlessness compared to female with fur. This can result in hairless female mice being misclassified as male mice if the observer is not careful. Awareness of these strain or genotype differences and careful observation of the relative distance between anus and genital papilla will eliminate most errors in identifying the sex of mice.

Sexing of rat

The sexes can readily be distinguished because the distance between the tip of the urethra and the anus is longer in male than females. The penis of the male will be retracted and the testes may also be retracted if the rat is cool, but the wrinkled sparsely – haired scrotum at the tail root can be seen in adult males. The vagina of the females is an orifice caudal to the urethra; the mucous membrane is purple-blue in colour with concentric folds around it. The inguinal area is less hairy in females.

Method of sex differentiation

There is no difference in the anogenital distance of male and female. In neonates, sex can be determined by the shape of the genital opening. It is round in male and longitudinal slit in females. Gentle pressure anterior to the genital opening of the male will extrude the penis and it is also possible to palpate the undescended testes.

Sexing of hamster

Mature Syrian, Chinese and Djungarian hamsters can be easily distinguished by the prominent testes of the male and even in very young animal the greater ano-genital distance in the male makes identification easy. Sexing the European hamster, however, presents some problems during the season when sexual activity ceases usually from October to February. It is difficult to tell the sexes apart at this time as the vulva of the female is closed and the testis of the male are withdrawn into the abdominal cavity. At other times the criteria used for sexing other hamster species can be used.

WEANING

Weaning of mice

Mice that mature early are usually weaned at three weeks, while slow growing late maturing mice are weaned at four weeks of age. If weaning is delayed until five weeks, young female may be impregnated by the sire and the sire may become aggressive towards young males. In addition delayed weaning of one litter increases mortality in the second because of trampling and disruption of the nest.

Weaning of guinea pigs

Young are weaned at 18-21 days, or when they have reached about 180g. Female offspring may come into estrus at less than one month of age and to prevent mating by the male in the cage they should always be weaned by 3 weeks. Fostering on to an SPF mother is straight forward and hand rearing is also relatively easy. The young survive better if bottle fed rather than left to lap. A heat source and regular stimulation to urinate and defaecate are required during the first week or so of life.

Weaning of hamster

The Syrian, Chinese and European hamster can be successfully weaned at 21-22 days of age and Djungarian at 18 days. Young animals grouped together at weaning will normally be compatible with each other up to and during adult life although separation of the sexes within 1-2 weeks of weaning is desirable to prevent indiscriminate breeding in Syrian and Chinese hamsters. Providing the positioning and length water nozzles and cage design enable young animal to gain access to water, no special diets are needed post-weaning.

Weaning of rabbit

Early weaning as early as 4 weeks is practiced under commercial conditions, especially when post partum mating is practiced. Early weaning is not advisable under Indian conditions, where climate and feeding regime is moderate. It is better to wean rabbit at 6-8th week of age, which is favourable because the young ones are better grown and more resistant to any stress or digestive disturbance that may follow weaning. After weaning, youngsters are best kept in pairs or trios or in colony group of 15-20, depending upon the area available. All young stock should be separated into sexed groups before 3 months of age, when male must need to be separated into individual cages. About this time the buck begin to show aggressive behavior and attack each other, particularly in the scrotal region causing injury to the testes, so that ultimately only one intact male remains. Medium to large breed does may be left in groups until they reach 16-18 weeks of age, but it is generally customary to separate them somewhat earlier.

MARKING FOR IDENTIFICATION OF LABORATORY ANIMALS FOR PURPOSE OF THEIR INDIVIDUAL RECORDING

Objective:

1. To study different identification techniques for laboratory animals.
2. To study the importance of identification on different farm record and management.

Identification of mice

For permanent marking the mice may be marked by tattooing or freeze branding using numbers or symbols. Ear, tail and toe clipping are not recommended on humanitarian grounds. In addition, ear marking may be obliterated or damaged if there is fighting in the cages. Temporary methods of identification include pen marks on the tail, clipping or plucking unique pattern in the fur, or dyeing the fur with food dye. Pen marks on the tail disappear in one or two days. Unique patterns clipped or plucked in the fur can be expected to be visible for about 14 days when hair regrowth will obliterate the pattern.

Identification of rat

Hooded rats may be easily identified on the basis of their individual colour patterns, but where unicoloured rats are used artificial marks must be used. For the short-term marking, the fur of the head or back may be clipped, this is most effective for darker coloured rats where the paler undercoat is revealed. Albinos can be coloured with non-toxic stains or picric acid solution. Hair dyes mixed with hydrogen peroxide take 20-30 minutes to be effective, so that the rat must be anaesthetized if this procedure is to be used. Permanent marking is best carried out with tattooing numbers or symbols on the base of the tail. Recently very fine tattooing needles are available and these can be used on the ear pinna. During tattooing, the rat must be anaesthetized. Ear punching, toe clipping or tail clipping are not recommended and, apart from the fact that they involve mutilation, the marks are time consuming to decode. Ear marks can also be damaged or changed as a result of fighting between cage mates. Ear tags are also unsatisfactory because they are easily torn off.

Identification of guinea pig

There is no satisfactory method of identifying individual guinea pigs. Ear tattoos can be used with letters 0.5 x 0.25 cm in size, using black ink for albino animal and green ink for coloured ones, but such tattoos can be difficult to read and ears can become damaged by fighting. Ear tags may be used, although these tend to pull out. Coloured animals may often be identified by sketches of the colour pattern. Stains may be used for temporary identification. But these must be renewed every 3-4 weeks. A range of colour may be obtained such as yellow (saturated picric acid in alcohol), red (fuchsin), violet (methyl violet) or blue (trypan blue). Often the need for individual identification can be avoided by caging litter mates together in small groups or even by caging individual separately.

Identification of hamster

The marking of individual animal should be avoided wherever possible as no completely satisfactory method has been reported. Ear punching can be carried out as in rat and mice. Tattooing by means of a fine electric vibrator with built-in ink flow can be successfully employed on the pinna except in those species of hamsters with darkly pigmented ears.

Identification of rabbits

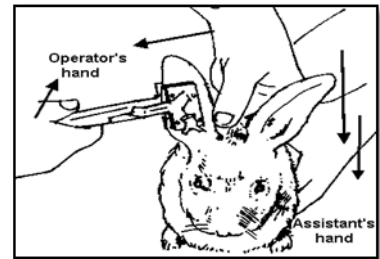
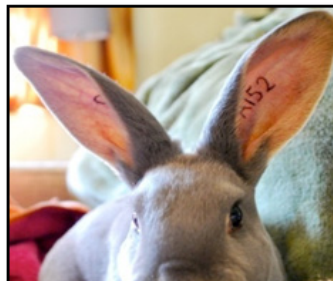
Rabbits can be marked by ear tattoo, ear tags, or leg bands. As young rabbits grow relatively quickly,

it is important to select the correct size of leg bands to avoid discomfort when mature. The most satisfactory method is tattooing, although with a few dark breeds this may present problems. The majority of breeds, including some with dark fur, have light skins and black tattooing pastes show up clearly.

Identification of Rabbit



Ringing



Ear Tattooing

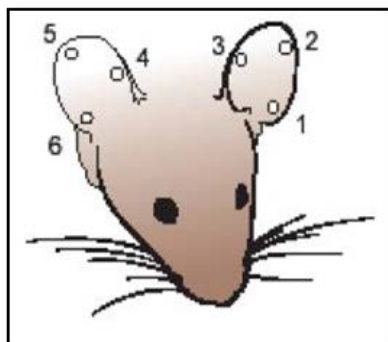
Identification of Mice and Rats



Temporary Method



Tail Marking



Ear Punching



Hair clipping in pattern



Ear tagging in Rats

FEEDING SCHEDULE OF BALANCED DIET FOR HIGH BREEDING EFFICIENCY OF LABORATORY ANIMALS

Objective:

1. To provide balanced diet to breeding laboratory animals for their high breeding efficiency.
2. To study the needs of different feeds to laboratory animals.

GENERAL CONSIDERATION

- The obvious choice for feeding laboratory animals might be seem to be a diet closely resembling that found in nature.
- When the nutritional requirement of laboratory animals are finalized, a ration can be formulated from available local raw materials to provide a standardized product which will minimize variability in productivity and also experimental results.
- The diet must be presented as a uniform mixture so that it is impossible for the animal to select some ingredients and ignore others.
- Crumbs or pellets are more acceptable to the animals. Crumbs are easy to prepare in the laboratory by incorporating a binding agent such as methyl cellulose.
- In many ways pellets or cubes offer the most satisfactory form of diet. They are generally more acceptable to the animals, less easily wasted, simple to handle and have a good storage life.
- The optimal size and hardness of the pellet is important and differ between species. Rats, which gnaw their food, prefer a large pellet than those usually supplied to guinea pigs and rabbits.
- Soft pellets encourage waste, as they easily crumble in the storage bags or the hoppers. Very hard pellets are unacceptable, particularly for young animals, which may find them too difficult to chew.
- Diets intended for gnotobiotic animals must be sterilized. Those for specific pathogen free animals must be free from pests and pathogens, so that is preferable though not essential for them also to be sterilized.
- Commonly employed methods for diet sterilization are heat, ionizing radiation and fumigation and in all instances care must be taken to minimize drastic impairment in nutritional value.
- Pasteurization (80°C) and autoclaving (121°C for 15 minutes) render the diet sterile without much loss of nutrients.
- Ionizing radiation is a very effective method of sterilization of laboratory animal diet. The source of radiation is usually ^{60}Co and although for reasons of safety and cost the process is not available in many laboratories.
- Chemical sterilization by fumigation with ethylene oxide has been applied to diet with varying success.

PRACTICAL FEEDING

- Many of the smaller or more common laboratory animals are fed diets ad libitum, however there is a tendency, particularly when the animal is not growing or reproducing, for them to eat more than they required and consequently become somewhat obese and more prone to disease and conditions associated with obesity such as kidney failure, liver necrosis and arteriosclerosis.
- This may be controlled in one of two ways, both designed to reduce intake of nutrients.

-
- First by physically controlling food intake and second by designing diets with a lower nutrient density so that, although it eats to satiation, the animal ingests less nutrients than it would on a more concentrated diet.
 - Large quantities of uneaten food left in cage may create health hazards by decaying or becoming contaminated with faeces.
 - This danger can be overcome by feeding a measured quantity of food once or twice a day.

SPECIALIST DIETS AND PRACTICES

- Laboratory animals required some specific diets to meet their nutritional requirements. they are
 - Purified diets
 - Chemically defined diets
 - Germ free diets
 - Handrearing
 - Paired feeding

PURIFIED DIETS

- Purified diet is defined as the feed in which purified components such as carbohydrates (starch, sucrose), purified protein sources (casein, lactalbumin), refined oils and synthetic vitamins and refined mineral supplements are used as ingredients.
- Such diets have sometimes been referred to as 'semisynthetic diets' but the accepted terminology is purified diets.
- They have been in use in nutritional studies and other research.

CHEMICALLY DEFINED DIETS

- For certain experimental purposes even the degree of refinement achieved by purified diets is inadequate so that "chemically defined diets" may be required.
- These are made from the basic nutrients e.g. Glucose, triglycerides, essential fatty acids, individual amino acids, vitamins and minerals which can be obtained in a chemically pure form.
- Normally used in nutritional studies, immunological works.

GERM FREE DIETS

- The gut microflora has a significant influence on the synthesis of certain vitamins (B vitamins and vitamin K). the germ free and other types of Gnotobiotic animals cannot therefore benefit from this source of nutrients.
- Because diets for Gnotobiotic animals must be sterilized they will require supplementation with those vitamins supplied by the flora in addition to the nutrients which may have been destroyed by the sterilization process.

HANDREARING

- Rearing laboratory animal by hand is a costly and labour intensive process.
- Hand rearing is employed however, to produce valuable or rare animals and in circumstances where maternal rearing is impossible or contrary to experimental requirements (caesarian derived germ-free or SPF animals or where a study of immune systems derived from the milk is being carried out).

PAIRED FEEDING

- Under many experimental conditions the interpretation may be obscured by a supplementary effect resulting from differences in food intake between experimental and control groups.
- If, for example, a group of animals undergoing treatment began to lose weight and food intake was also reduced, it would be difficult to determine whether the effect resulted from the treatment or the reduced food intake.
- Paired feeding allows food intake to be eliminated as a potential cause and to concentrate on the treatment.
- The simplest form of paired feeding is one in which each control is paired with a treated animal and feed the amount of food which the experimental animals consumed on the previous day, so that fluctuations in food intake in the experimental group are accurately reflected in the controls.

MAINTENANCE OF BREEDING RECORDS OF LABORATORY ANIMALS

Objective:

1. To study the importance of maintaining breeding records in production and other day to day activity in laboratory house.

Purpose

The purpose of a breeding colony is to supply research animals, it depends upon the demand. There will normally be a 'feedback' control which will suggest that the size of the colony should be increased if demand appears and decreased if surplus animals are being produced.

- Record maintenance
- Good records are essential in controlling the production process. They are mainly kept for two distinct purposes.
 - To gather information of scientific importance, including pedigree and performance records of individuals or group of animals.
 - To monitor and control the production process.

Output of breeding record

Information given by records are:

- Output in terms of young weaned per breeding female per week.
- Output per unit area of animal room per week.
- Percentage of usable production not issued (percentage of waste).
- Trends in production, issue, percentage wastage and other factors listed

PROPHYLACTIC MEASURES AGAINST COMMON DISEASES OF LABORATORY ANIMALS. HYGIENIC CARE AND CONTROL OF PARASITES

Objective:

1. To take measures for prevention of common diseases of laboratory animals.
2. To study different practices followed to prevent occurrence of common disease.
3. To study the prevention and control of laboratory animal parasites.

Prophylactic measures

- Sanitation is a key operation in laboratory animal care.
- Various systems of husbandry have been devised to regulate the exposure of animals to infection, entry should be restricted, use of protective cloths, overshoes will minimize the bacterial and fungal load.
- Provision of barrier unit with liquid dip, showering, complete cloth changing will minimize contamination.
- Clean cages are important during pregnancy, lactation and weaning, after the removal of sick animals and introduction of new animals.
- Newly purchased animals should be purchased from approved breeders who are maintaining health profile.
- Waste accumulated in the cages should be washed with hot water (82°C) for at least 3 minutes or a disinfectant solution like phenol, quaternary ammonium compounds or halogens should be applied.
- Where ever possible heat should be the first choice for all saturations not involving animal tissues. Hot water used at 80 °C for 1 minute or 65 °C for 10 minutes will most spore forming microbes. Its application to room surface, especially floor, pens, cages and other equipment is the simplest and most reliable disinfection method.
- Rooms or complete building can be decontaminated by clearing with high pressure hose and use of disinfecting gases or aerosols. Use of formaldehyde fumigation is a satisfactory method. The minimum concentration of formaldehyde recommended is 900 mg/m³ for 3 hours.
- The single commonest source of infection in the animal house is the introduction of disease-carrying stock. Animals may appear clinically healthy but carry a wide range of infective agents. Newly purchased animals should be quarantined for specific period.
- Guinea pigs scatter their bedding into feeders and crocks, are susceptible to Bordetella pneumonia and they require dietary supplementation of ascorbic acid. They should not be housed with rabbit, dog or cat because they may carry bordetella sub clinically.
- Hamsters are more susceptibility to climatic changes and food and water deprivation and should be cared properly.

Parasites of laboratory animals and its control

Pediculosis

Hamsters, guinea-pigs, mice and rats are all subject to pediculosis. The species usually involved belongs to the super family, Amblicera (biting lice). Their chief effects are due to irritation; the animals become restless, do not feed or sleep well and damage their skin by scratching. Consequently they may become emaciated.

Treatment and control.-

Treatment may be in the form of insecticidal dust. The agents usually used are 0.5‰ pyrethrum powder, derris powder containing 1% rotenone or 0.5% gamma benzene hexachloride. Guinea-pigs may be dipped for 15 seconds in 0.25‰ suspensions of benzene hexachloride; for rats, 0.1‰ should be used. The cages should be swabbed with insecticide.

Acariasis

Mice are very susceptible to mites of the species *Myobia* and these produce thickening of the skin and superficial scabs.

Treatment and control are the same as for pediculosis. Adult rabbits on long-term experiments and in breeding colonies frequently suffer from ear mange due to *Psoroptes cuniculi*. The lesions usually originate in the deep parts of the external ear where the mites chew the epithelium and cause scabs which may completely occlude the meatus. A purulent inflammation frequently occurs. Treatment is by daily swabbing of the affected area with an oily suspension of rotenone. Care must be taken that all debris is removed.

Internal Parasites

Among the internal parasites of small laboratory mammals, the pinworms which are found in mice, rats and rabbits are usually of little consequence and if treatment is necessary piperazine may be used. Tapeworms may not be serious pathogens, except when present in sufficient numbers to cause intestinal obstruction.

Hymenolepis nana of rats and mice is identical to the dwarf tapeworm of man, but cross-infection does not appear to occur. Yomesan is an effective therapeutic agent.

Coccidiosis in rabbits can be a serious problem, causing enteritis, hepatitis, emaciation and sometimes high mortality, especially in young animals or in animals under stress. Feed medicated with sulfamerazine or sulfamethazine at a level of 0.5‰, or sulfaquinoxaline in the drinking water, should be given for one week for treatment and prevention of this disease.

It is obvious that satisfactory parasite control in laboratory animals is essential from the point of view of humane treatment, but it is also true that from a practical point of view successful experiments cannot be performed in parasitized animals.

SHEARING OF RABBIT

Objective:

1. To acquaint the students how shearing of rabbit should be performed.

Shearing Angora Rabbits

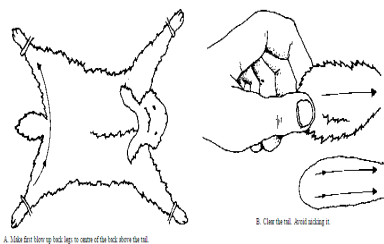
Shearing requires just as much mental effort as physical effort. Young rabbits should be ready for their first shearing at eight to nine weeks, but do not leave them any longer. Thereafter shear every 3 months.

Method

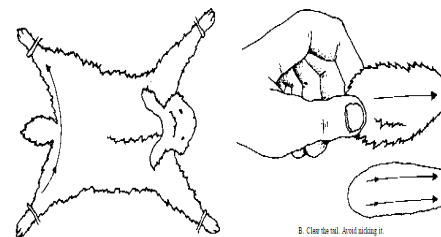
1. Use good quality electric clippers designed for the job.
2. Tie the rabbit on a flip-over shearing board. Alternatively, sit the rabbit.
3. Comb the animal to eliminate knots (mats) and any contamination with dirt or hay.
4. Remove the fibre in the order shown below. Take particular care around the doe's teats.
5. Avoid "second cuts" i.e. cutting the fibre high up off the skin, then cutting a second time close to the skin.

To prevent second cuts, ensure the hand piece is angled so the comb runs on the skin. Pulling the skin back with the free hand will prevent the comb digging in and cutting the skin.

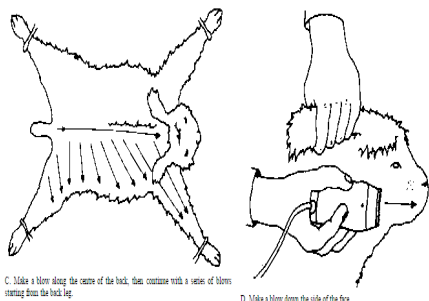
Second cuts happen easily because angora fibre is so light it doesn't fall away from the cutter. Working with an assistant who lifts the fibre away as it is cut is the most efficient way. The assistant must not pull the fibre or the shearer will cut the skin. One animal should take about 15-20 minutes to complete.



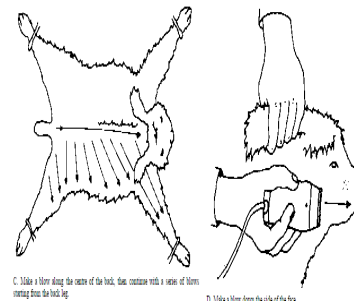
A. Make first blow up back legs to centre of the back above the tail



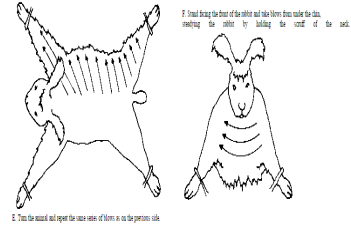
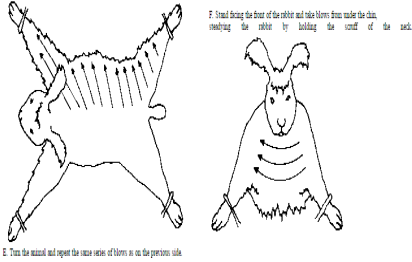
B. Clear the tail. Avoid nicking it.



C. Make a blow along the centre of the back, then continue with a series of blows starting from the back leg.

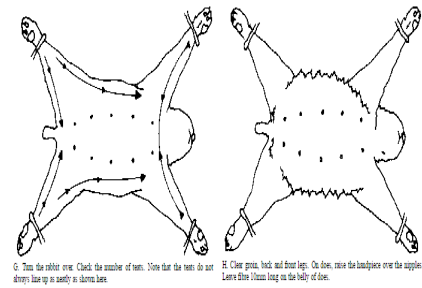
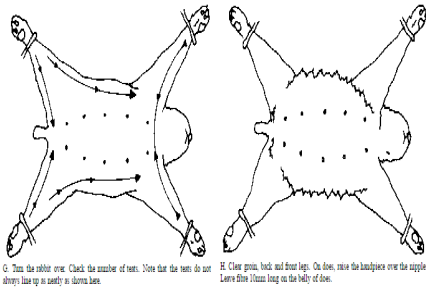


D. Make a blow down the side of the face.



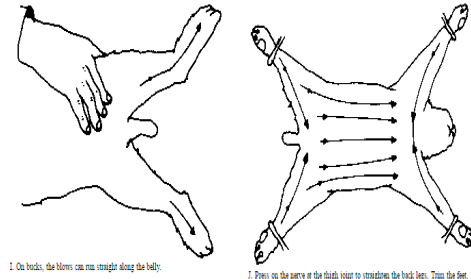
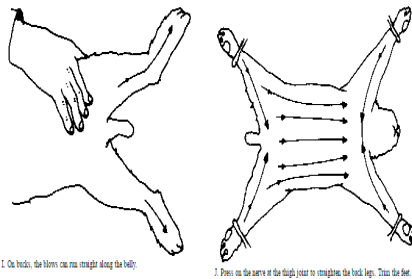
E. Turn the animal and repeat the same series of blows as on the previous side.

F. Stand facing the front of the rabbit and take blows from under the chin, steadying the rabbit by holding the scruff of the neck.



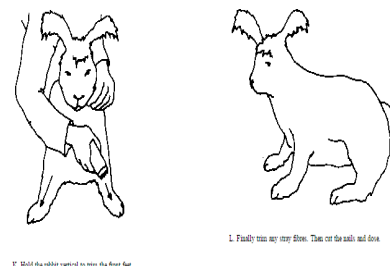
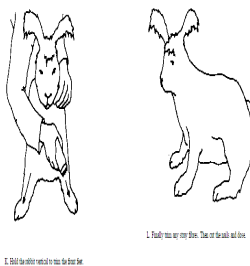
G. Turn the rabbit over, check the number of teats. Note that the teats do not always line up as neatly as shown here.

H. Clear groin, back and front legs. On does, raise the hand piece over the nipples. Leave fibre 100 mm long on the belly of does.



I. On bucks, the blows can run straight along the belly.

J. Press on the nerve at the thigh joint to straighten the back legs. Trim the feet.



K. Hold the rabbit vertical to trim the front feet.

L. Finally trim any stray fibres. Then cut the nails and dose.

Shearing angora rabbits

FEEDING AND HOUSING REQUIREMENT AND EQUIPMENTS FOR RABBIT

Objective:

1. To acquaint the students with feeding and housing requirements for rabbits.
2. To acquaint the students with different laboratory equipments required for easy rabbit management.

Housing of rabbit

In countries like India where the climate is hot but fairly constant, closed buildings are not really necessary. All that is needed is to protect the rabbits against the weather. If the cages are of wood or concrete (solid walls) it may be enough to roof each hutch. A roof should keep off rain and also heat from direct sunlight. Wire-mesh cages can be grouped under a common roof. Roof should be provided with sufficient over hang to protect the animal from sunlight and rain. The side of the building should be open and fitted with chicken mesh or chain link to protect the animals from predators. The cage system is best for commercial rabbit rearing and the cages should be erected on iron post and the manure and urine should be collected at the bottom of the pit. The pit can be removed once in six months. Rat proof building is having its own advantage of protecting the bunnies from the rats and also minimizes the feed wastage.

Deep litter system or pen system

In this system the floor must be of concrete which will make it easy for cleaning and prevent making hole by rabbits (this being their habit). The floor is to be covered with paddy husk, paddy straw, saw dust etc., with 4 to 6 inch thickness. The manure on the floor is to be removed regularly. The house may be of any length. But it is never desirable to have more than about 30 young together. So, Maximum desirable size of each pen is 5feet x 12 feet. Young rabbits can be kept in pens. Once rabbits attain puberty, they may be housed singly; especially, adult males. If kept together they will fight and cause injury.

Cage system

The cage housing system is better than any other system of housing for management, though its initial expenditure is high. In a shed, the cages are arranged in single or multiple tiers.

Different types of cages

1. Flat deck cages or single tier system

In this system the cages are all on one level. They usually open at the top and they can be suspended by chain or wire from the roof or set on feet. Litter and urine drops into pits under the cage. The depths of pit ranges from 20 cm to 50 cm. Shallow pits are cleared every 2-3 days and deep pits are cleared after a year. The advantages of this type of cages are convenience in supervision and handling of animals. The materials are having long life. In this type of cage arrangement no elaborate ventilation is required. The major disadvantage is low animal concentration per square meter of bedding.

2. California cages

- In this system, the cages are placed step by step, one deck higher than other but not above it.
- The cage on lower level opens on its top and those on upper level opens at front.
- Litter drops beneath the cage and is collected same as that of flat deck system.
- The advantage of this type of cage arrangement is slight increase in animal density per square meter of building. Remaining is same as that of flat deck cages.

-
- The disadvantage is access to upper cage and supervision of upper cage is difficult.

3. Multiple tier cages

In this system, cages are arranged one above other and the manure and urine is collected in a tray beneath the cage. The advantage of this system is higher animal concentration per square meter of area. This system requires elaborate ventilation and more labour in cleaning the sheds daily.

4. Inclined slope battery

The cages are placed one above the other. Waste slides down asbestos or metal panel into trough from which it is removed manually with scrapers, or with running water. Cages obviously open at the front

- Advantages are higher animal density and reasonable cost
- Disadvantages are waste do not drop properly, careful ventilation is required because of high animal density, access to the cages as well as supervision and handling of the animals are more difficult.

5. Compact batteries

Waste can be removed by conveyor belt or vats can be installed beneath the cage and emptied by cable operated scrapers (manual or electrical). As with the inclined slope battery, the cages must open from the front.

- The advantages of this system are maximum density of animals and reduced cost per animal housed.
- The drawbacks are:
 - Ventilation, access to cage, supervision and handling of animal are difficult
 - Poor distribution of light, quick wear and tear of materials.

Cage system for commercial farm

The cage housing system is better than any other system of housing for management, though its initial expenditure is high. In a shed the cages are arranged in single or multiple tiers. Rabbits are usually kept in cages with wire floors through which faeces can fall. The floors may be welded mesh, usually 17 mm (3/4 inch), rods or aluminium sheet with punched holes. There is some controversy concerning optimum cage size but stock cages of 46 x 46 x 46 cm (18 x 18 x 18 inches) and breeding cages of 92 x 46 x 46 cm (36 x 18 x 18 inches) appear adequate. For breeding female's nest boxes containing coir pith, hay and softwood shavings are provided a few days before parturition. The adult male and female should be housed individually hence they require single cages. The measurement of single cage for adult animal is 18 inch length, 18 inch width and 18 inch height. The floor of the cage should have a weld mesh with 1/2 inch x 1/2 inch size dimension. Whereas other five sides should be of 1 inch x 3 inch weld mesh or 1 x 1 inch weld mesh. The door should be opened from top. In general the floor space requirement for weaners is 0.2 m² per kg of live weight. Based on this weaners or growers can be housed in groups of 3 or 4 in the adult cages.

Cage material

Cages are almost invariably manufactured from wire mesh, the most satisfactory way is to use panels clipped together. The gauge of the wire from which the mesh is manufactured is important. For the floor a minimum 1.5 mm is essential but it is much better to have 2-2.5 mm. It is always necessary to check that the wire is galvanized after welding and is free from sharp points and splinters. When the mesh is not square, the shortest length wires (i.e. those closest together) should be underneath to assist in the prevention of sagging. The mesh size of floor is important, 15 mm² is satisfactory. Meshes used for the walls and top of the cage can be of a larger size than those for floor, and also of lighter gauge. The maximum size of mesh is usually considered to be 25 x 50 mm, the wire mesh should be heavily and well galvanized. As a result of constant use, cleaning,

and attach by urine chemicals, galvanizing becomes damaged. The top of the cage must be so fixed that it will operate as a door through which animals can be removed. Various opening may also have to be cut in the mesh to allow feed hoppers and external nest boxes to be fitted.

Cage support

The cages must be supported, and the method of support has an influence on the ease of working. Cages should not be supported on small walls erected for this purpose, which may prevent ventilation. Cages should therefore be supported by suspension from above. Suspension of cages has its own advantage like protection from rats and disadvantage of swing over while handling. Alternatively, round or L angle steel supports can be used, which is easy to establish and erect and it will not interfere the daily operation. The footage of steel pipe/angle may have some provision (water trap) to protect the cage from fire ants. The cage support should be of continent height (preferably 2.5 feet) so that labour can approach the animal easily and cleaning of cage is also easy.

Minimum cage size

1	Doe and litter to 5 weeks of age	0.56 m ² total area
2	Doe and litter to 8 weeks of age	0.74 m ² total area
3	Rabbits 45 to 12 weeks of age	0.07 m ² total area
4	Rabbits 12 weeks and over, other than those used for breeding (multiple occupation cages)	0.18 m ² total area
5	Adult does and bucks used for breeding	0.56 m ² total area
Minimum height should be 45 cm		

EQUIPMENT FOR RABBITS

Nest box

The nest box should be considered one of the most important item of equipment in rabbit production. It directly affects the viability of young in the pre-weaning stage, which is the high-risk mortality period (15-40 per of live born rabbits). The job of the nesting box is to reproduce conditions in the burrow of a wild doe and protect the young against attacks from the outside environment so that they can get through the first few difficult days of life in optimal comfort.

Advantage of nest box

- Nest box allows the doe to kindle and nurse her young in comfort.
- It keeps the young in a healthy, clean environment.
- Maintains the temperature constantly for the young bunnies.
- Keeps the young from leaving the nest too early.
- Prevent scattering of bunnies inside the cage results in failure of suckling milk.
- Prevent dampness form the animal's urine
- Allow the producer to monitor the litter. Removal of dead animals, introduction of baby rabbits to foster, changing of bedding material without disturbing the doe and young is possible.

Feeding equipment

Pots and troughs made up of galvanized iron, aluminium or earth can be used with an in turned lip to prevent animals scratching out food. Food and water cups can be fixed to the corner of a cage and the depth of the cup should be around 75 mm and it should be of sufficient wide for the animal to reach the bottom. It is

important that sufficient trough space should be provided to allow all animals to feed at the same time. 'J' type feed hopper can be used to supply feed from outside. They save much time and labour. They are easily fitted to the side of the weld mesh/door, the trough is projecting in to the cage with the opening for filling from outside. The lip of the trough should be fitted 110 mm from the floor of the cage/hutch. The hopper is 15-20 cm wide and the capacity should always be sufficiently large.

Hay racks

Hay and green fodder racks prevent these feeding stuffs from being contaminated by the stock. The usual type is a simple piece of wire mesh fixed to a corner of the hutch. This type is unsatisfactory, the best design should have the following features:

- Filling should be possible from outside the hutch
- The angle at which the hay is held should not be too flat
- The construction should be such that the young rabbits cannot injure themselves by getting caught in the mesh.

The most satisfactory type is the rack made as a unit and placed between two cages/hutches, thus forming partition and serving as a rack for both hutches. The most suitable mesh for hay rack is welded wire of 25 x 50 mm, the longest side of the mesh being vertical.

Watering arrangements

Cups similar to that one used for feed can be kept inside the cage for providing water, cost involved is less and easy to fix. Water cups have disadvantages like quick contamination, wastage of water by the animal, playing of young rabbits with water bowl is a common practice. Further these water bowls require regular cleaning (probable daily) to ensure safety and frequent filling is required. Care must be taken during summer to ensure availability of water throughout the day and night since, wastage and usage will be more during hot season. For hygienic watering, inverted water bottle drinker has advantage. A bottle is inverted over a small trough, which is small enough to restrict pollution. The bottle is big so that it needs to be refilled less often and this helps to observe the level of water intake by the animal.

Automatic watering

Watering is achieved by automatic watering system. Low pressure watering nipple with minimum diameter of 8 mm is essential. The nipples should be of superior quality, blocked nipples may cause reduced performance. The storage tank should not be too small and must be sited at the appropriate height above the level of nipple. This height, and hence the water pressure, at which the tank must be situated to give the appropriate pressure, usually varies between 75 cm and 2.75 m. these heights give water pressures at the nipple of 0.5 to 1.75 kg. The animals learn very quickly how to use drinkers. The nipple must be fixed to the cage or fixed separately and projected into the cage at the right level. The best height for adult is 20-25 cm and for young animal is 12-15 cm. If the nipples are too low then adults have difficulty in drinking and often cause the nipple to leak by pushing against them. The best compromised height is 15 cm for both young and adult. The nipples may work vertically, horizontally or at 45°, it varies with the manufactures.

Lighting arrangement

Lighting plays an important role in increasing the production and 16 hours light and 8 hours darkness is an ideal pattern, though young animal require little less light, but it is practically not possible since young and adult are almost and always in the same house. A minimum figure of approximately 25 lux at the level of the animal is desirable. A white fluorescent light will give 25 lux at 2m below the fitting. Two 36 watt tubes per 10 m² would provide this amount of illumination satisfactorily. Ordinary filament bulbs can be used, but the wattage per square meter has to be increased. The initial cost of fluorescent tubes is higher than that of filament bulbs, but the running cost are less.



California Cage



Multiple Tier Cages



Inclined Slope Battery



Compact Battery Cage



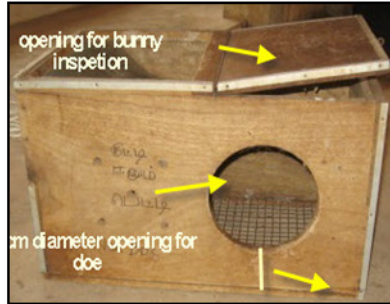
Commercial Rabbit Farm



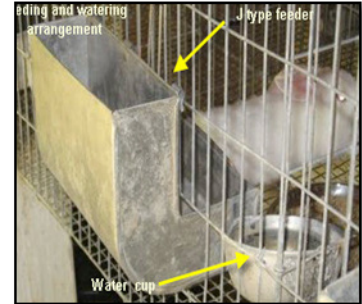
Cage Material



L - Type Cage Support



Nest Box



J - Type Feeder

PROJECTS REPORT FOR ESTABLISHING OF RABBIT FARM

Objective:

1. To provide basic knowledge to students to start a rabbit farm.

Assumption:

1. Unit will be start with 90 breedable doe and 10 buck.
2. The animals buck, doe and will be kept in cage.
3. Each kindling of doe will be give 8 kit, so 90 doe will give 720 kits.
4. Starting unit of 100 rabbits are reared up to 4 years so each year their depreciation cost will be 25%.

A. Initial capital investment:**Fixed Cost:****a) Cost of animals:****Rs.**

Purchase of 10 buck and 90 doe @ 250 Rs/-	25,000/-
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b) Cost of shed for buck, doe & Kit and cost of cage

400 Rs/- Per Rabbit	40,000/-
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c) Cost of equipments & miscellaneous cost	5000/-
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70,000/-**B. Variable cost:**

(a) Cost of concentrate:	65,880/-
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For 100 bucks and does concentrate requirement

@ 250 gm/head/day so for two months it is 1500 kg

For 720 kits 50 gm/head/day

So for two months it will require 2160 kg

Total: 1500+2160=3660 kg

Cost of concentrate 18 Rs/Kg

(b) Cost of green fodder

Adult buck/doe requires green fodder @ 500 gm/head/day	9480/-
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for two months requirement for 100 rabbits is 3000 kg.

For last month 720 kits requires 6480 kg @ of 300gm/head/day

Total 3000 kg + 6480 kg = 9480 kg green fodder @ 1 Rs per kg

(c) Labour cost

12,000/-

For 50 adult rabbits and their kits 1 labour is required

So total two labours are required with labour charge

3000 Rs/- Per month

(d) Depreciation cost of rabbits

With 25% annually, for two months it is 1042/-

(e) Depreciation cost of buildings, cages and equipments 750/-

@ 10 % annually, for two months

(f) Cost of medicines, vaccines, electricity, transportation and miscellaneous 15,000/-

Approx. Total 1, 04,152/-

C. Income 2, 33,280/-

Kindling of 90 does @ 8 kits will give 720 kits

With 10% mortality 648 kits will be there for selling

If each kit weighing 3 kg than $648 \times 3 = 1944$ kg meat.

Price of rabbit meat is 120 Rs/- per kg

D. Gross Profit = Total Income - Variable Cost

$$= 2, 33,280 - 1, 04,152$$

$$= 1, 29,128 \text{ Rs/-}$$

Net profit will be calculated by adding 12 % interest rate on fixed capital investment

$$\text{Net profit} = 1, 29,128 - 8400/6$$

$$= 1, 29,128 - 1400$$

$$= 1, 27,728 \text{ Rs /-}$$

Net profit of One month is: 63,864 Rs/-

HANDLING AND RESTRAINING OF DOG, CAT AND PET BIRD AND EQUIPMENTS FOR PET ANIMALS AND BIRDS

Objective:

1. To study different techniques of handling and restraining of dogs, cats and pet birds.
2. To acquaint the students with various equipment used to handling dogs, cats and pet birds.

Handling and Restraining of Dog:

Verbal Restraint:

Many dogs know some commands or can at least recognize authority, even if the command is unfamiliar. Commands such as SIT, STAY, COME, DOWN, NO or even HEEL may be useful tools to encourage a dog to cooperate. Also, soft quiet words can calm a frightened animal. Yelling or screaming should never be used as it can cause the animal to become more fearful or aggressive.

Physical Restraint: Tools and Equipment

Leash and Collars: The most common tool used to handle animals in the clinic is the leash. Placed around a dog's neck it normally controls even the largest dog. In the event a dog refuses to cooperate with a leash – carry him. Some dogs have never seen a leash and will freeze up to the sensation around a sensitive area like the neck. Leashes can be abused; never drag or strangle an animal with a leash; if the animal starts to struggle, pulling and jerking away from you, she is probably not leash trained. Pause and let the dog calm down and try again after reassuring her. Sometimes a quick tug on the leash will encourage a fearful dog to walk. If the dog refuses to walk, apply a muzzle (if necessary) and carry her.

When handling cats, a leash should be used as a back-up in the event the cat should become frightened and resist restraint. Make a figure-eight harness by looping the free end of a slip lead back through the metal ring. The looser loop is placed around the chest behind the cat's front legs and the other loop placed around the neck with the metal ring/handle on top between the shoulders. This will prevent the cat from escaping or injuring someone should she get loose from your restraint. The harness should be put on at intake and can be left on the cat throughout their stay.

Functions of leash and collars is to carry identification plates or tags, kill fleas, or look pretty. It is virtually impossible to place a collar tightly around the neck to preclude a determined dog from slipping out of it. An Elizabethan collar may be applied to restrain head movement. Elizabethan collars are broad sheet like collars fitted on the neck to prevent self mutilation. These can be placed on the animal in either normal or reverse position. Similar collars can be improvised from sheet of plastic or buckets.

Handling of puppies

Puppies of any breed can be handled with ease. One hand of the handler should be placed under the abdomen and chest to give support. In almost all instances puppies respond quietly, offering no resistance. If the puppy squirm to free itself, another hand should be placed on the back and puppy should be bring close to the handlers body for additional support and comfort.

EVERY animal being transported or handled in the clinic must ALWAYS wear a slip-lead. This includes puppies, cats and sedated animals. It is too easy for a frightened animal to get loose and escape. Animals presented on leash/collar should be transferred to a slip lead and the leash returned to the client so that it is not lost during the animal's stay.



Different kinds of Leads and Collars

Your hand: A very effective form of restraint, your hands are sensitive to the amount of pressure that is being exerted on the animal and can be quickly modified to the situation. Hands can be used to gently stroke a dog or to firmly grasp a struggling cat. Although hands can be the most versatile, they are also the most vulnerable to injury. Recognizing when they would not be effective is very important.

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.

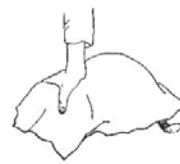


How to Use a Blanket (or Towel)
Cover the cat with a blanket or towel. Grab it through the cloth and locate the head. Hold it firmly at the base of the skull.

Turn the blanket back to uncover the cat. Then pick up the animal in the usual manner.



A



How to Use a Blanket (or Towel)
Cover the cat with a blanket or towel. Grab it through the cloth and locate the head. Hold it firmly at the base of the skull.

Turn the blanket back to uncover the cat. Then pick up the animal in the usual manner.



B

How to Use Blanket or Towel

Cover the cat or dog with a blanket. Grab it through the cloth and locate the head. Hold it firmly at the base of the skull. Turn the blanket back to uncover the cat. Then pick up the animal in the usual manner.

Control pole: The control pole is used to safely handle extremely aggressive dogs. Used appropriately it is an effective tool. Inappropriate or unskilled use can cause serious injury to the animal. The control pole may

further distress an upset animal and should only be used when the handler or other's safety is genuinely threatened. Volunteers are NOT to use the control pole unassisted. If an animal is aggressive enough to warrant the use of a control pole an experienced staff member should be consulted for assistance as the animal will also be evaluated for chemical restraint options.

Nets: The net is the primary tool used to handle fractious cats or wildlife. It allows for the safe handling and transfer of even the most aggressive small mammal. Effective use of the net requires some training and practice. If you need to handle a feral or fractious cat ask for assistance from a staff member.

Muzzles: Muzzles are used when a snappy or potentially aggressive dog must be handled. There are nylon muzzles and plastic basket available. A leash or strip of rolled gauze can be used as a temporary muzzle. Because dogs often try to remove a muzzle, it is important that the muzzle be placed securely. A weak or poorly made muzzle may lead to a false sense of security and the possibility of being bitten. Even with a securely placed muzzle, appropriate handling must be used to prevent injury from an animal that resists. Muzzles designed for cats extend up to cover the eyes, reducing visual stimulation. For some cats these can be very useful for calming the animal and helping to protect the handler from injury,

Drugs: For animals that are too aggressive or stressed to handle safely for procedures, sedation and/or general anesthesia may be necessary to allow treatment. If you are unable to handle an animal, notify a staff member to determine whether sedation is appropriate. When receiving an animal for surgery who exhibits difficult or aggressive behavior consult the Anesthesia Lead prior to kenneling the animal as we may opt to administer a pre-anesthetic sedative immediately and expedite the surgery process to minimize the animal's time in the clinic.

Capture and restraint of Small birds

Budgies, finches and canaries are usually captured bare-handed. If inexperienced, a paper towel can be used to restrain these birds. Basically, reach into the cage and when easily able to, grab the bird behind the head and neck. The hand should be cupped around the body while attempting to hold the head with the thumb and index finger on the sides of the temporomandibular joints. Holding should not be so tight, but do provide enough firm restraint so that the wings are unable to flutter freely. If a towel is used it can be dropped over the bird, locate the position of the head, grasp it firmly and gently enclose the body into the towel, encompassing the wings and feet, but with no undue pressure on the chest.

There are five basic means of holding a birds head;

1. Extend the head between the index and middle finger,
2. Grasp the head with the thumb and index finger on either side of the head at the temporomandibular joint,
3. Using three fingers, place the thumb and middle finger just below the eyes and the index finger over the head, called the 'helmet grip,
4. Crook the index finger behind the back of the head and gently place the thumb behind the lower mandible,
5. Gently circling the neck with the thumb and index finger as a tubular restraint collar would.

In each of these techniques, remember that the body should be held loosely and rest in the palm of the hand. If having difficulty with the restraint of the wings and feet, do not hesitate to use a towel.

Capture and restraint of large birds

Lovebirds, cockatiels, conures and mynah birds may be restrained bare-handed but it is preferable to handle them with a paper towel or a small washcloth due to the fact that they can impart a painful bite. These birds can still be examined by a single person. Birds larger than these, Amazons, cockatoos, macaws, for example, require the help of an assistant, particularly when it is time to examine the wings and legs. It is

possible to examine even large birds without assistance if restrained in a towel, but the examination is not as effective. If a technician is not available to help, then employ the aid of the bird owner to hold the feet while the examination is completed, however caution them.

The capture technique is fairly simple but, of course, requires practice. An appropriately sized towel for the variety of bird is essential. Tame birds can be easily caught, some will allow the towel to be wrapped around them; others may allow the towel to be placed around them while they are standing on the exam table or on the arm of the owner. Avoid frightening the bird by suddenly capturing it from above with a towel. If a bird is captured off of the owner be careful as the bird may clamp down with the beak or nails if frightened. Once the towel has been gently wrapped around the bird, locate the head and grasp it from behind through the towel.

Restraint of the head can be with one of the five techniques described earlier. With large birds techniques 4) and 5) are still preferred especially since holding birds on the side of the face may cause bruising. Assistance will be required as the examination moves down from the head as the towel will need to be unwrapped and the assistant can restrain the feet while the practitioner retains control of the head.



Handling and restraining of Birds

BRUSHING OR GROOMING AND BATHING OF DOGS AND CATS

Objective:

1. To study brushing and grooming techniques for dogs and cats.

Brushing and grooming of dogs

The amount of time spent on grooming depends on the type of hair coat; daily brushing is recommended to remove dead hair and distribute the skin's oils. Brushing down to the skin will help to remove flakes of dead skin and dandruff. In addition to regular combing and brushing, long-haired dogs need to be checked for mats of hair, which commonly occur behind the ears and under the legs. These masses of hair can usually be teased out with a comb, but they occasionally need to be cut out. Care should be taken when cutting out mats so that one does not cut the skin. Long haired dogs also have problems with burrs from plants. When cutting the hair, one should slide the comb down under the mat or burr and cut the hair on the outside of the comb. This method will be less likely to injure the dog.

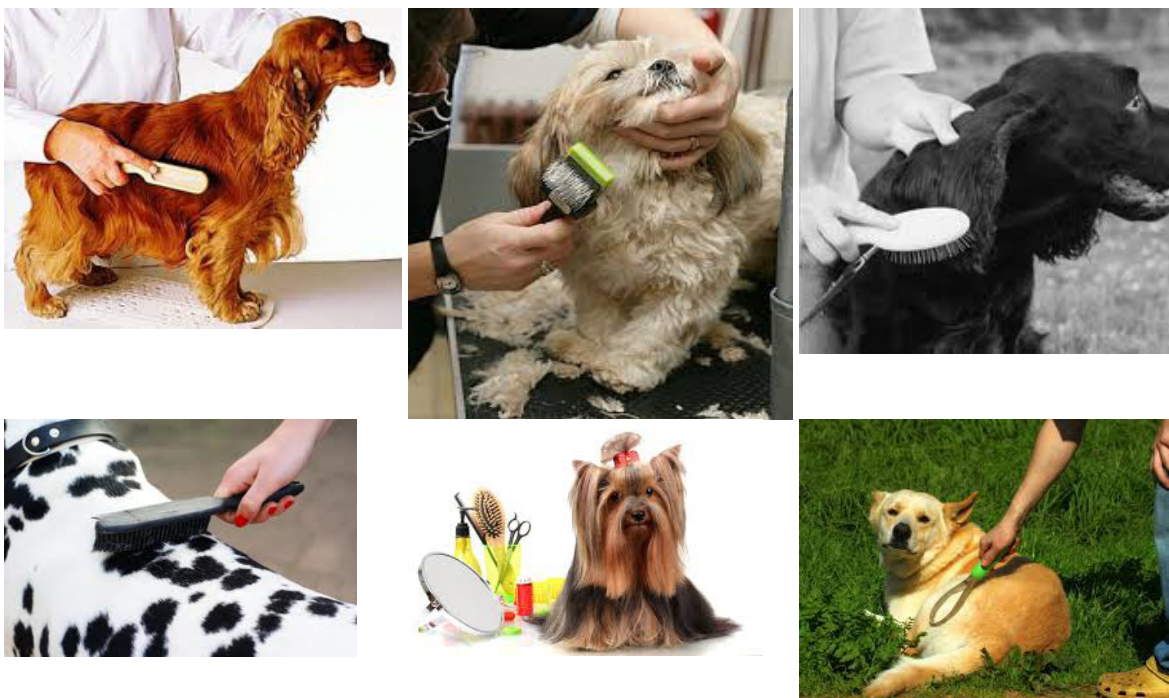


Fig: Methods of brushing and grooming of dogs and cats

Bathing of dogs

Dogs should be bathed only when they become extremely dirty; frequent bathing removes natural oils and causes the coat become dry and harsh. When bathing becomes necessary, a mild soap, baby shampoo, or coconut-oil shampoo should be used. Detergent soaps should never be used because some dogs may have skin reactions to them. Many of the shampoos for pets are medicated and help prevent parasites. When washing, one must be careful not to get shampoo in the dog's eyes. A few drops of ophthalmic ointment in the eyes may help prevent eye irritations from the shampoo. After bathing, it is important that the dog not become chilled. One should be careful of the temperature if bathing outside, and when bathing inside, one must make sure the dog is completely dry before letting it outside.



Fig: Methods of bathing dogs and cats

Grooming and Brushing of Cats

Keep your first grooming sessions short-just 5 to 10 minutes. Gradually lengthen the time until your pet is used to the routine. You should also get your pet used to being handled. Get in the habit of petting every single part of your cat-including ears, tail, belly and back-and especially the feet.

And keep in mind, a little patience can go a long way. If your cat is extremely stressed out, cut the session short and try again when she's calmer. Unfortunately, most cats do not like baths, so you may need another person to help.

Regular sessions with a brush or comb will help keep your pet's hair in good condition by removing dirt, spreading natural oils throughout her coat, preventing tangles and keeping her skin clean and irritant-free.

If your cat has short hair, you only need to brush once a week:

- First, use a metal comb and work through her fur from head to tail.
- Next, use a bristle or rubber brush to remove dead and loose hair.
- Be extra-gentle near her chest and belly.

If your cat has long hair, you will need to brush every day:

- Start by combing her belly and legs; be sure to untangle any knots.
- Next, brush her fur in an upward motion with a bristle or rubber brush.
- To brush her tail, make a part down the middle and brush the fur out on either side.

Bathing of Cats

If your cat's coat becomes greasy and oily, or if she's gotten into something sticky or smelly, she'll benefit from a bath. Use a mild shampoo that's safe to use on cats, and follow these easy steps:

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- First, give your pet a good brushing to remove all dead hair and mats.
 - Place a rubber bath mat in a sink or tub to provide secure footing.
 - Put your cat in a tub or sink that has been filled with about 3 to 4 inches of lukewarm water.
 - Use a spray hose to thoroughly wet your pet, taking care not to spray directly in her ears, eyes or nose. If you don't have a spray hose, a large plastic pitcher or unbreakable cup will do.
 - Gently massage in shampoo, working from head to tail.
 - Thoroughly rinse with a spray hose or pitcher; again, avoid the ears, eyes and nose
 - Dry your pet with a large towel.

Bathing Basics for pet birds

Bathe a bird only in warm weather or when it will have ample time to dry in a warm place. Bathe in the morning or afternoon so that your bird doesn't go to sleep wet. Blow-drying is possible, but not recommended - it can cause fright and overheating.

Use only warm, plain, clean water for bathing. Some people use commercial bathing products, but these can cause eye irritation and have added scent that your bird doesn't need-healthy birds does not have a foul odor. For an added health benefit, add a few drops of colloidal silver to the bath water, as the Johnsons do; silver is a natural antibacterial agent and does not irritate the eyes—the pioneers put silver coins in their milk and water canteens to keep the liquid fresh. Some people add drops of aloe or glycerin to the water when they plan on showing a bird in a bird show. These items make the feathers very shiny, but prolonged use is not recommended.

Cockatiels, cockatoos and African greys have a fine powder that comes from the powder-down feathers growing close to their skin. This powder serves as a natural bath to keep the feathers clean, but also serves to create allergies in their owners. You may find that no matter how much water you spray on one of these birds, it simply doesn't get wet-the water rolls right off. You might have to try harder to get a reluctant powdery bird to bathe, but the payoff is worth the work.

Grooming the Feathers

Birds groom their feathers by "preening" them. Each feather is made from thin strands that "zip up" to form the feather. Each feather has a distinct place and function. The bird must make sure that every feather is properly zipped and in place so that it can fly and regulate its body temperature. You don't have to worry about this minuscule grooming—a healthy bird will do it on its own.

Birds that live together will preen each other-this is called "allopreening." Birds in pairs groom hard to reach places, such as the top of the head. If you are your bird's only buddy, then you can help to remove the feather sheaths that emerge on his head during molting, but be careful because removing them too forcefully can hurt. Simply rub a fingernail over the sheath and it should begin to come off if it's ready - if not, your bird will let you know with a little nip!

NAIL AND TOOTH CARE, CLIPPING OF HAIRS FOR SHOW PURPOSE

Objective:

1. To provide knowledge to students regarding nail and tooth care, clipping of hairs for show purpose.

Nail Care

Since dog's nails grow in a curve, allowing them to get too long will cause the "fingers" and "toes" to splay or twist when the dog walks. This can be very uncomfortable and can ultimately lead to broken fingers and toes. Regular nail clipping can prevent this, as well as reduce the risk of torn nails. It can also save on wear and tear of your floors and carpeting.

Nails should be checked and clipped approximately every two weeks. They are probably too long if you can hear them "click" as your dog walks across the floor.

There are two styles of nail clippers made just for pets. Either style is acceptable as long as you are comfortable with how it feels in your hands, you have a clear line of sight to exactly where the blade is cutting, and the clipper has a sharp blade on it. Keep a jar of styptic powder handy to stop the bleeding in case you accidentally clip the vein.

If your puppy has white nails, you can see the pink vein through the nail. Clip off the tip of the nail, but not so much as to clip the vein. If your puppy has black nails, you will need to clip off a little at a time, looking at the nail tip straight on after each clip. When you start seeing a pale oval in the tip, it means you are near the vein and should stop clipping. If you keep the nails clipped on a regular basis, you will notice a hook at the end of a thicker part of the nail. The hook portion is what can be clipped off. Don't forget to clip the dew claws if your dog has them.

Adequate daily exercise should help to keep nails in good condition and at a good length as nails are naturally worn down. However, nails which don't touch the ground surface such as the 'thumb' nails higher up on the feet, may need to be trimmed occasionally to prevent them from getting too long, curling over and digging into the skin.

Tooth Care

Dogs can suffer from many of the same dental problems as humans (i.e., cavities, gum disease, tartar buildup, etc. Bacteria from gum disease can also get in your dog's bloodstream causing other health problems. Regular teeth cleaning will save your vet expenses and eliminate the stress of having your dog anesthetized for the cleaning procedures. Clean your dog's teeth two to three times per week.

You can use either a piece of gauze wrapped around your finger, a finger cap scrubber made for pet teeth cleaning, or a toothbrush designed for dogs. Do not use human toothpaste because it foams too much and can upset your dog's stomach. Use either toothpaste formulated for dogs, baking soda, or just water. You only need to clean the outside surface of the teeth. Your dog's tongue will keep the top and inside surfaces clean. In the beginning you may need to start by just getting the puppy used to your rubbing her gums with your finger, and then moving on to one of the tools.

How keep dog's teeth and gums healthy:

- Provide safe chew items daily.
- Chewing is a basic and natural behaviour for dogs and they need regular opportunities to chew on appropriate items.

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- Chewing also helps to keep teeth and gums healthy.
 - Chew items include dog chew toys and dental chews.
 - You may also offer a raw meaty bone once or twice a week. Always talk to your vet first to check raw meaty bones are suitable for your particular dog. Remember, bones must be raw and human-grade.

Process of hair clipping step by step

1. Take dog for a short walk to calm them down and burn off extra energy. Take a few minutes to pet the dog to make sure he is not overly stressed or scared
2. Thoroughly brush and/or comb to remove tangles and mats
3. Understand the product difference between a clipper and a trimmer. A clipper is a larger tool designed to cut longer body hair. A trimmer is more of a detail tool that is used for touch-ups.
4. Consulting specific breed, size and coat type instructions on this website, use clippers to trim excess fur off the dog's body, choosing the appropriate clipper guide comb to achieve desired length. Start with the shoulders and progress towards the tail
5. Clip as close to the body as desired, leaving at least a half-inch or more in order to maintain enough protection from the elements
6. Clip hair around the paws and tail
7. Inspect the chest to determine if any trimming is needed
8. Clip any excess fur that is hanging or isn't uniform to the rest of the body
9. Clip the head and face last, being careful of moving ears, mouth, eye lashes and nose. Choose a clip attachment adhering to your desired fur length. Place the clipper flat against the top of the dog's head with the blade spokes facing to the rear. Pull the clippers towards the back to push fur away from the upper brow.
10. Clip the muzzle by beginning at the bridge of the nose and pulling clippers downward towards the dog's mouth
11. Clip or trim between the eyes by placing the clipper guide comb or the trimmer flat against the forehead with the blade spokes facing the nose. Progress towards the nose, being extra cautious of potential head movement or jerks in order to remain safely away from the eyes
12. Gently wrap your free hand around the dog's muzzle and point it towards the ceiling. Place the guide comb against the chin, with the spokes facing the throat, and run the clippers towards the throat to trim the underside of the muzzle.
13. Hold the ear tip between fingers so that only fur rests above the fingers (no skin) and trim this hair. Repeat along the edges of the ear.
14. If necessary, gently trim excess hair in the inside of ears, using a smaller trimmer. Always avoid the ear canal.

CARE OF PUPS, KITTEN AND WEANING

Objective:

1. To provide students basic information for care of pups, kitten and weaning

Care of pup

- The pups will open their eyes by the second week. If the flooring, of the cage/room where the pups are kept is smooth, they may not get firm grip to walk.
- Hence it is better to take them out to rough ground and help them to walk. This may be necessary for two or three days, or till they learn to walk properly.
- Supplement vitamins, especially A, B, D, E and C and minerals (calcium and phosphorus) during the preweaning period itself.
- If the litter size is large, feed them from a feeding bottle. Pups with full stomach, and not crying during the night, will be the indication that they had enough feed.
- Docking and amputation of accessory digits are done simultaneously. Preferably during the first week. If performed late, the procedure become more tedious.
- Newborn should spend the majority of their time sleeping and when they are awake, nursing.
- They do not lie quietly or still when sleeping, but show activated sleep for about 75% of their sleeping hours.
- This is characterized by continual twitching, jerking, stretching, and shifting of position.
- Activated sleep is important for the development of the neuromuscular system and appears to be the mechanism by which newborn puppies develop muscle tone and begin to develop coordination.
- The most important indication of puppy health during the first few days and weeks of life is the demonstration of regular and normal weight gain.
- After the first day or two, puppies should steadily increase in weight and should double their birth weight by 7 to 10 days.
- A general rule of thumb to determine normal weight gain during the first 3 to 4 weeks of life is to expect 1 to 1.25 gram of gain per day for every pound of expected adult weight.
- Puppies typically are weaned at 6 and 8 weeks of age.

Care of kitten

Just as a human infant has vastly different needs than a teenager, a kitten will have care requirements distinct from those of a fully matured cat. In addition, you should consider a kitten's various stages of development when caring for her:

- **Under eight weeks of age.** At this early age, a kitten should still be with her mother and litter mates. Because kittens this young are unable to regulate their own temperatures, they rely on one-another's body heat to survive. In addition, they are still developing vision and leg coordination. If you adopt or foster an orphan kitten in this age group, special care will need to be taken, including bottle-feeding the kitten for every two hours up to four weeks of age and possibly helping your kitten pee and poop. It's best to consult with a veterinarian for specific instructions and advice.

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- **Eight to eleven weeks of age.** Kittens are usually weaned by eight weeks and should be eating kitten diet, which needs to be energy dense, rich in protein and highly digestible. Whether choosing dry kibble or wet food, be sure it is formulated for kittens. Other big changes will start occurring during this period as well. As your kitten begins developing complex motor skills she will become a force of nature - running, jumping, playing and exploring. This is a delightful period of kittenhood, but also one that can be dangerous to your kitten if she isn't appropriately supervised. Start setting boundaries for your kitten and keep her in a safe, enclosed room while you can supervise her.
 - **Two to four months of age.** This is a phase of rapid growth for kittens in which they'll have almost three times more energy than an adult cat. They'll need three to four individual meals a day during this time. These meals should be minimum 30 percent high-quality protein.
 - **Four to six months of age.** Kittens in this age group are reaching adolescence and, thus, sexual maturity. Talk to a veterinarian about having your kitten spayed or neutered before your kitten reaches this stage to avoid unpleasant habits like territorial spraying and accidental litters.

Weaning of Puppies

- Whether puppies are orphaned or with their mothers, weaning can generally begin between three and four weeks of age, and is ideally completed by about seven to eight weeks of age. Although it's often unavoidable, especially in the case of orphaned dogs, it's preferable to allow weaning to be a gradual process that occurs over several weeks. Puppies need time to learn important behaviors from their mother and littermates, including how to interpret signs of dominance, inhibit their own biting habits and submit to more dominant dogs.
- It is also preferable for the mother dog to slowly dry up her milk supply. Weaning can definitely be a stressful time for puppies and mother dogs and, whenever possible, should be a gradual and supervised process.
- Start by separating the mother from her litter for a few hours at a time. While separated, introduce the puppies to eating from a pan. This time apart will reduce the pups' dependency on their mother's milk and overall presence. The amount of food and the frequency and length of separation can gradually be increased. As the puppies become independent and self-confident, they can spend more and more time away from their mother until they are completely weaned.
- During the weaning process, it's a good idea to feed puppies the same high-quality puppy food they'll eat throughout their growth period right from the start. Be sure to moisten the food with warm water or canine milk replacer to create a soupy gruel that's appealing to their sensitive palates.
- For the first few feedings, pups may need encouragement to eat. For example, puppies may be allowed to lick gruel from a finger dipped into the pan. Most puppies will quickly learn to feed from the bowl. Always have fresh water available.
- To prevent the mother from overproducing milk, which can lead to painful, engorged mammary glands, it is important to observe a feeding and separation schedule both for her and the puppies. This should be discussed with your veterinarian to ensure that the puppies are receiving adequate nutrition, and that the mother's food intake is being adjusted properly when she is no longer nursing her litter.
- If you stumble across a litter of orphaned puppies or you're volunteering at a shelter, you can start the weaning process as early as three to four weeks of age. In conjunction with bottle-feeding, provide the wee ones with canine milk replacer in a shallow bowl. (If they hesitate to drink, dip your finger in the milk replacer and let them lick it, but never force their noses into the bowl.)

Weaning of kittens

- Kittens are weaned at between six and seven weeks, generally mother cat introduce solid food such as killed prey (mice) to the kittens.
- Similarly nutritional weaning of house cat also involves the introduction of solid food in the form of prepared cat food.
- In both cases, nutritional weaning involves a very gradual change in the diet from queen's milk to solid cat food or prey.
- During first introductory week soupy gruel by mixing dry food with warm water can be provided.
- The mother cat should be separated from the litter for an hour prior to each feeding to ensure the kittens are hungry and not recently suckled.
- This will shift the kitten from suckling to lapping and then to chewing.
- Gradually the added water to the dry food can be decreased when age advances.
- The length of time that the mother is separated from the litter should also be gradually increased.
- Most queens will initiate these separations voluntarily and begin to make their milk less available to their kittens by walking away or using body postures to block access to their nipples.
- By 6 to 7 weeks of age most cat nurse little but it is advisable to continue to allow interactions between the mother and her kitten until 7 to 9 weeks because these interaction are important for normal social development.

HANDLING AND RESTRAINING OF SWINE, EQUINES, CAMEL

Objectives:

1. To record physiological responses (Rectal temperature, Pulse rate and Respiration rate)
2. To examine the skin surface and treat simple wounds
3. To determine the stage of pregnancy
4. To identify the animal numbers
5. For easy transportation of animal (During loading and unloading)
6. For surgical operations (Castration, Umbilical hernia, Tail docking)
7. Blood collection
8. For shoeing and trimming the over grown hoof of horse

SWINE

Human - animal contact

Handling and restraining of pigs relies to a great extent on treating of pigs in a humane manner, so as to prevent fear and a need to escape. The first attempt is to mimic action of the owner by using simple techniques such as talking or touching the pigs. Both of its can be combined with offering food to prevent the pigs become agitated and disturbed in the presence of stranger. First level of restraining or handling relies upon establishing simple human and animal contact. The pig like any other animal will very soon recognize a person with a quite authority developed from handling pigs and will usually respond the positive way. One of the most effective forms of basic restraining is to provide the pig with food. Above three procedures, the use of voice, touch, provide food will enable to handle pigs.

General handling

The next level of restraining relies on positioning the pig to facilitate the application of certain surgical and other procedure. This includes castration, tail docking, tattooing, teeth clipping and iron injection. Many of this procedure are performed on very young piglets that are small enough to be picked and held in operator's hand. Very young piglet can be picked up and held firmly with both hands across the operator chest. This method is very useful for ear tattooing and teeth clipping. Young piglets should be caught and held by grasping the hind legs, and then holding them as in for castrating the piglets, piglets fore quarters being held between the stock persons leg, while the two hind legs are held firmly around the region of hock.

Use of aids

The simplest form of aid is a small wooden board with a handle – hole near the top. This board can be used to apply pressure to the side, near (or) front of the pig to indicate the direction you wish to take. Boards are useful when the pig to climb a very steep ramp at the back of a vehicle, or to go along a passage that is too narrow or has too many sharp bends and turnings. Large board is very useful for restraining a single large pig (or) several smaller pigs in a corner of the pen.

Large board

When moving adult pigs, or when controlling them prior to an examination, a firm grasp of the tail with a little forward pressure will help to direct the pig along a desired pathway (or) keep it in a particular

position. A bucket (or) blindfold over the head of the pig will move in a negative direction to escape the bucket. A narrow flat stick is excellent for directing a pig. The stick is not used to inflict pain, but is merely tapped on the side of the head to indicate to the animal desired direction.

Restraining

Restraint varies from confinement in an unnatural enclosure to complete restriction of muscular activity.

Methods of Restraining

I. Physical

- Smaller groups (up to 20 kg)
 - Held against operator's chest
 - Restraining the pigs by holding its front leg
 - Restraining the pig by holding its rear leg
- Medium pigs
 - Restraining the pigs on its side
 - Trough method
- Heavier pigs
 - Snout snare
 - Hog shackle method
 - Hobble method
 - Tongs method
 - By rope method

II. Chemical Restraints

- For blood collection, radiography and other diagnostic procedures.
- Acepromazine – 0.22 mg / kg body weight I/M provides mild sedation
- If immobilization is necessary ketamine – 10 – 20 mg / kg body weight
- Tiletamine / Telazol – 2 -4 mg / kg body weight
- Smaller pigs may be physically restrained and masked down by isoflurane inhalation anesthesia for less than 10 kg body weight animal.

HORSE

Approaching and handling

- When approaching a horse, always talk to the animal before touching it. Always approach it on the left side.

Leading the horse

- To lead a horse, a halter, a bridle or head collar, with shank is necessary.
- When a horse is to be led for any distance, in public a bridle should always be put on.

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- The person leading the horse should walk on the horse's left, opposite to its head, placing himself about an arm's length from the head.
 - The right hand should hold the reins close to the horse's mouth. The left hand should hold the loose ends of the coiled reins.

Backing the horse

- To back the horse, the entire rope is folded to sufficient length and placed over the noseband of the head stall.
- Holding the ends of the folded rope with the cheek pieces of the head stall, the horse is gently pushed backwards.
- Care should be taken that the head of the animal is kept as low as possible.
- Backing is done while putting the horse into the stable.
- It is also carried out to find out any defects in the loin.

Turning a horse

- It is always done away from a person holding it and never towards him.
- The horse should be turned to the right side with its hind legs as anchor.



Restraining methods

By halter

- Horse is usually handled with a halter. Halters can be temporarily constructed of rope.
- Permanent halters are constructed of nylon rope and leather (Triple stitched leather).
- The horse will stand more quietly for haltering if a rope is placed around its neck first.

Chain shank

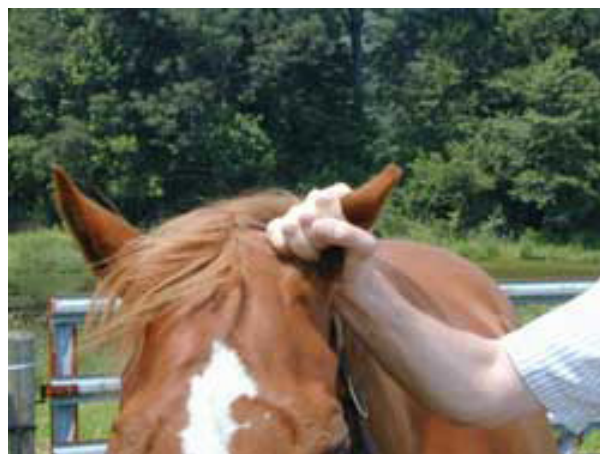
- This chain shank is frequently used for further restraining. The chain may be placed through the mouth and arched to the cheek ring on the opposite side, serving as a bridle.
- The chain may also be placed over the bridge of the nose. By gently tugging the shank, one can divert the animal's attention. The pressure exerted is tenses to pull the nose down.

Twitch



- The twitch is the most important manual tool used in equine restraint. The principle is based on the reaction to pressure applied to sensitive lip. Endorphins are released that cause lowering of the heart rate and an increased performance elsewhere on the limbs (or) on the other side of the body.
- The most satisfactory twitch consisting of a short length of chain attached to a hard wood handled approximately two feet long. A rope may also be used. A piece handled with two holes drilled at the sides to admit the rope to pass through is a satisfactory base.
- To use a twitch, grasp the twitch and the cheek piece of the halter with the right hand. Place the fingers of the left hand partially through the loop of the twitch. Don't insert whole hand to the loop, as this complicates placement of the twitch. Bring the left hand over the bridge of the nose and gently move to the upper lip. Once the operator is prepared to grasp the lip, it should be done firmly to prevent the horse from pulling away. Once the fingers have a firm grasp of the nose, the rope (or) chain is brought over the lip and right hand begins to twist the loop. Twist firmly to maintain grip, but not so tightly that produce pain.
- Don't use the twitch as a lever, the pressure on the lip should be twist not a pull. When twitching pull the head to the front legs, if the horse should strike. The handler should stand close to the shoulder on the rear side; never stand in front of the horse.
- It is more desirable to carry out a rocking motion with the handle. So the twist is released and tensed periodically.

By hand



- The hand can be used as a mild twitch. The horse's attention may be diverted by pressing on the eyelid (or) grasping a fold of skin at the shoulder.
- Some horses will refuse and fight a twitch but can be restrained by applying pressure to one (or) both ears. To do this, stand in front of the shoulder along the neck. Grasp the left ear with the right hand, the left hand grasps the halter (or) is placed over the bridge of horse nose.
- Pull the horse's head towards our side to keep the animal slightly imbalanced. As soon as the animal feels pressure on the ear, it will pull away towards the right. The tension on the ear can be increased (or) decreased by simple opening and closing the hand.

Muzzle

- They are used by man to prevent the horses from chewing upon wounds and bandages and to starve the animal before medical administration. Two types of muzzle
 - Leather box muzzle – expensive but durable
 - Wire muzzle - Cheap but less durable and comfortable
- It is a leather sheet which can be buckled on to the cheek and back stay on the head stall. It is completely convenient in the lower lip. It is used to prevent the horses from tearing its own clothing

Neck cradles

- It is used to prevent the lateral movement of the head. Ten to twelve pieces of 18 inches length and whose front ends are pointed.



- They are strung 2 pieces of wood bored longitudinally comes between each, which is bored transversely top and bottom. This applied at the neck and tied along the crest.
- It prevents the horse from turning its head to other parts of the body

Side rod (or) Stick

- The purpose is to prevent the horse from reaching a wound, bandages on the rear half of the body.
- The side stick is a wooden piece of different length to suit different horses running from the halter leading to a side ring on a surcingle.
- It has the advantage of being less restrictive than the neck cradle, but cannot be used in case of front leg injuries because, it would be possible for the horse to reach them.

Stirrup leather

- It is a long belt of leather about 5 feet long and a buckle is provided at one end.
- It is used to secure the fore limb of horse.

Blinkers

- They restrict the field of vision of horses and prevent it from seeing traffic coming up along its sides.
- The blinkers are attached to the bridle



Blinker



Cross tying

Cross tying

- It is useful to prevent a horse from moving the forequarters from side to side.
- The ropes high enough to prevent the horse from entangling the feet in the rope.
- The rope should be wither height or even higher and tied for short time. The rope should be of short length.

Blind folds



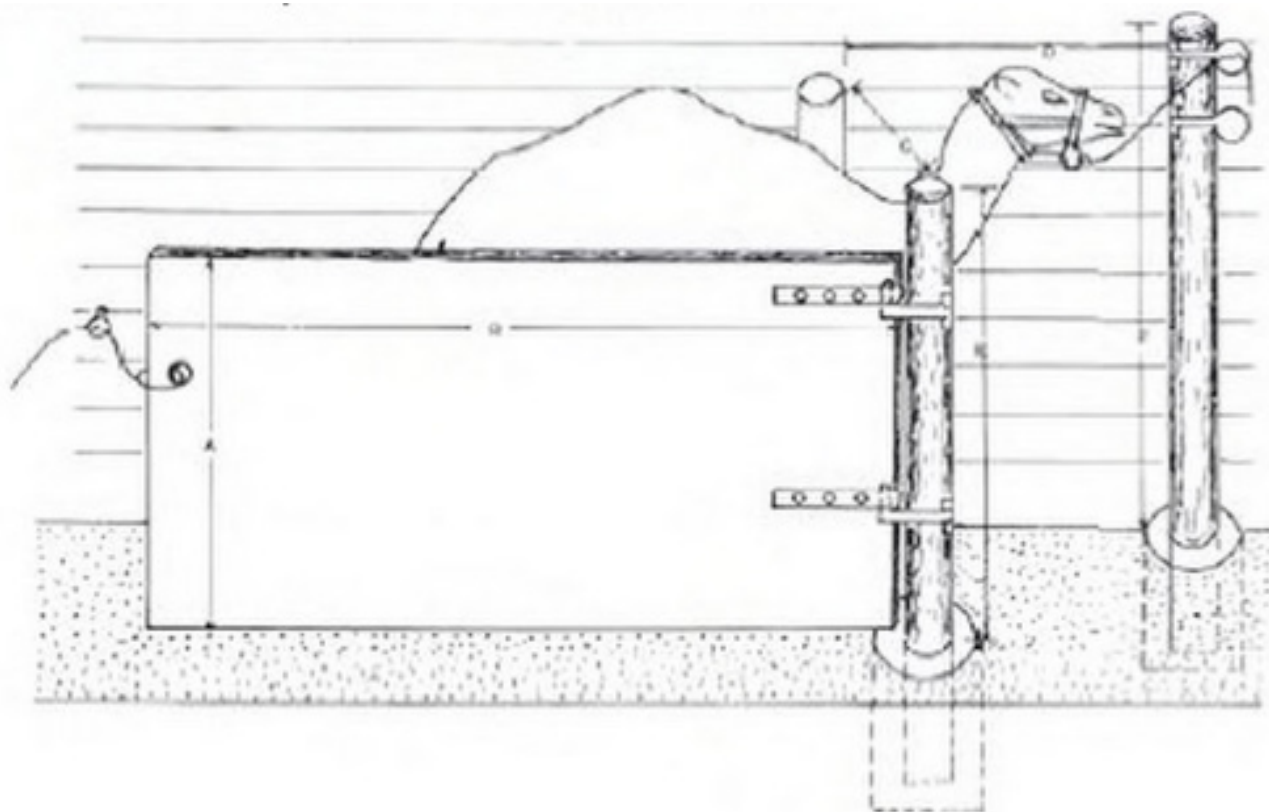
- If a horse is afraid to enter a new environment (or) new box stall, a blind fold may help.
- The blind folded horses usually more calms down and then depends on you quite it.
- Towels may also be used and special blinders are also available in market.

CAMEL

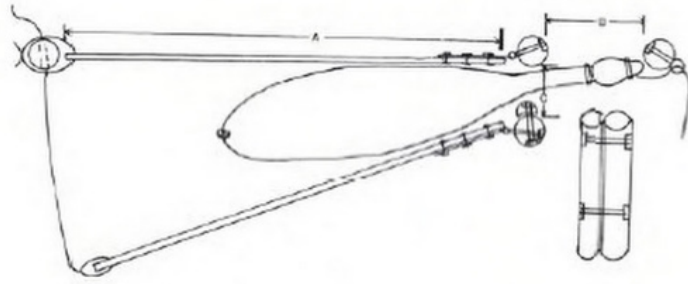
- Camel offensive and defensive behaviors include spitting, biting, and kicking. Spitting, which involves spewing the contents of the first compartment of the stomach, is aimed at people or other Camels when the animals become angry or frustrated.
- Biting may be dangerous, especially when a male camel bites, clamps on, and shakes its head, causing considerable contusions and severe lacerations.
- In camels, all four feet and legs may become formidable weapons. The front legs may strike out in any direction. The rear legs have the ability to reach forward to the extent of scratching the head. Thus, no place is safe around an untrained camel, compared with, say, a horse (at the side of the withers).

Restraining camel

- Camels may be restricted by placing them in a chute.
- One design may be constructed next to a barn or solid wall. A heavy post is set approximately 45 centimeters (cm; 1.5 feet) from another post positioned next to the wall. A 2.5-cm (1-inch) thick sheet of marine plywood—1.2 meters m (4 feet) by 2.4 m (8 feet)—is fixed on the post with heavy bolt hinges.
- Another post may be attached on the inside of one post to narrow the openings in enclosures for smaller camel. A post set 60 cm (2 feet) in the front of the shoulder posts allows the animal to be tied, thus restricting backward movement. Once the camel is tethered, the gate(s) may be swung closed, restricting side motion. Bales of hay or straw may be placed behind the camel if a rectal examination is necessary.
- Camels may be roped and snubbed to a tree or post or moved to a more contained area to be haltered.



Simple camel chute, side view



Simple camel chute, top view

Camel Nose Peg

- Dromedary camel nose pegs are normally made out of wood or plastic; they give very good control over handling a camel and are used in most parts of the world today. For the camel's protection a breakaway link is used between the nose peg and reins. Camels should not be tied together with the nose peg line.
- Bactrian camel nose pegs are often a forked wood stick sharpened on one end and painfully pushed through the camel's nose. If one of these pulls out, the camel is badly injured. As you can see, this nose peg is part way pulled through and is doing considerable damage. This type should never be used!



Dromedary camel nose peg



Bactrian camel nose peg

Camel halters

- There are basically three different types in use. The Nylon Halter, the Rope Halter, and the Chain Halter.
- Nylon halters have been known to come apart and break, and they do not give as much control as other types.
- Rope halters are very strong, lighter and give better control. Camels yawn a lot and a good fitting halter should be loose enough to give them this freedom.
- Halters should always be removed when not needed.



Nylon halters



Rope Halter

Camel Nose Rings & Jaw Ropes

- Camel nose rings and thongs are pierced through the side of the nostril and often pull out leaving big notches in the camel's nose like the one below. Jaw ropes cut into the camel's mouth, camels have weak jawbones that could be broken using a rope this way.
- Camel nose rings, nose thongs and jaw ropes should not be used.



Nose Ring Injury



Jaw Rope Injury

Sternal recumbency

- Positioning a camel in sternal recumbency (“**kushing**”) provides an opportunity to closely examine or collect specimens for laboratory tests without risk of being kicked or struck.
- Either a leather strap or rope is used to place a simple or figure-of-8 loop around the front limb when the leg is flexed at the knee (carpus).
- If only the simple loop is used around the front leg, the camel may be able to rise to its knees.
- Most camels are trained to allow hind limb physical restraint, in which a person on either side of the camel brings a soft cotton rope up behind the hind limbs below the fetlock as the camel is being directed to kush (lie down). Once the camel is recumbent, the rope is placed medial to the stifles and tied tightly over the back behind the hump.
- Rising on the forelimbs is prevented by placing a loop over a flexed limb, extending the rope over the top of the neck and securing the opposite foreleg in the same manner.

IDENTIFICATION OF PREGNANT ANIMALS, CARE DURING PREGNANCY, ISOLATION AND CARE OF FARROWING SOWS AND PIGLETS

Objective:

1. To provide basic information regarding various managerial practices viz., identification of pregnant animals, care of pregnant animal, isolation and care of farrowing sows and piglets.

Identification of pregnant animals

- Early and accurate identification of pregnant and non pregnant sows and gilts improves reproductive efficiency in commercial swine farms. Detection of returns to estrus after mating, ultrasound devices and other methods has been used for pregnancy diagnosis.
- a. **Detection of Estrus:** Observation of the sow for failure to return to estrus after mating is the most common pregnancy detection method. This technique is based on the premise that pregnant sows rarely exhibit estrus during gestation, and that nonpregnant sows will return to estrus within 17 to 24 days after breeding.
- b. **Hormone Concentrations:** Serum concentrations of prostaglandin-F₂ (PGF), progesterone and estrone sulfate have been used as indicators of pregnancy. These hormone concentrations are dynamic and considerable knowledge regarding endocrine changes in pregnant and non-pregnant sows is required prior to using these techniques for pregnancy diagnosis. Presently, determination of serum progesterone concentrations is the only test with any commercial application.
- c. **Physical Methods: Rectal palpation:** It was demonstrated that pregnancy diagnosis by rectal palpation of the sow was practical and reasonably accurate. The disadvantages of the technique were that the pelvic canal and rectum were often too small for the procedure to be used on low parity sows. False negative results, presumably due to errors in palpation technique or palpation too early, were more common than false positive diagnoses. Despite the potential application of this technique, it has not gained popularity. Other physical methods of pregnancy diagnosis include radiography, laparoscopy and vaginal biopsy.

Management of pregnant pigs

- The gestation period of a sow varies from 109 to 120 days, with an average of 114 days. Pregnant animals should be housed in groups in separate enclosures and should not be mixed with new animals to avoid fighting, which at times may result in abortion. It would also be advisable to house pregnant gilts and sows in separate groups during gestation.
- About 3 m² of dry draft-free housing should be available for each sow. The pregnant animals should be allowed to move about every day in the morning on a free range or a pasture, if available.
- A pasture area is presumed to be clean if a cultivated crop was raised since pigs were last kept on it. It is advisable to limit the size of pastures to one area.

Management at farrowing

- Farrowing time is the critical time in pig production. Even in well managed farms 25 to 30 per cent of the pigs born never reach the market.
- Death rate is high during farrowing and the first week after farrowing. Sows may be farrowed in pens equipped with guardrails and a creep space, in farrowing crates or in farrowing stalls.
- A pen equipped with guardrails and a creep space (with heating lamps in the creep space for northern part of the country) is adequate.

- The pen should be maintained at 24° to 28°C until the piglets are three or four days old and at 18° to 22°C until the pigs are approximately six weeks old.
- The heat lamps should be hung 45 cm from the floor and suitably protected.
- The farrowing pens should be thoroughly cleaned before the sow is brought in. This will prevent a large number of diseases of piglets.
- The sow should be brought to the farrowing pen at least one week prior to farrowing so that it becomes familiar with the surroundings. She should be washed thoroughly before being brought to the farrowing pen.
- Then two changes should be made in sows, ration.
- The ration should be made bulky by substituting one-third of the regular ration with wheat bran.
- The amount of ration fed should also be reduced by one-third till the sow farrows.
- The sow should be watched closely for determining the approximate time of farrowing and feed should not be given 12 hours before farrowing.

Feeding sows at farrowing and after farrowing

- When the time for farrowing is nearing more and more care is needed to wards feeding.
- About 4 to 5 days before farrowing, the sows ration should be reduced to nearly half. They should be prevented from becoming constipated by including laxative feeds like wheat bran, linseed meal etc, in the ration.
- The amount of high energy feeds like corn to be reduced and to be substituted by wheat bran.
- On the day of farrowing, it is better to give no feed at all. But enough of clean fresh water should be available throughout the period.
- It is essential not to feed the brood sow heavily after farrowing. If fed too much, she may produce milk in excess of the needs of the piglets which will lead to scours in piglets.
- The sow may be fed the same bulky ration as fed before farrowing for 3 – 4 days after farrowing.
- It is best to feed 50% of the ration on the first day and increase the ration by 200 – 300 gms daily until she is full fed.

Preparation for farrowing

- About 3 – 4 days prior to farrowing, the sow should be isolated from the rest of the herd. Moderate exercise to be continued while the animals is in farrowing quarters.
- Sanitary measures - Before being moved to the farrowing quarters, the sow should be thoroughly scrubbed with soap and warm water, home should be thoroughly cleaned with boiling hot solution or KMNO₄ solutions.
- Guard Rail – A Guard rail around the farrowing pen is an effective means of preventing sows from crushing their pigs. The rail should be raised 8 to 10 inches from the floor and should be 8 – 12 inches from the wall.
- Bedding – The farrowing quarters should be bedded with clean, fresh, good absorbent material eg. chopped hay and wood shavings.
- Artificial light – During the time of inclement weather, artificial heat must be provided. It is designed to maintain the temperature of 55o – 65 o F during winter farrowing.

Signs of approaching parturition

- The immediate indications that the sow is about to farrow are extreme nervousness and uneasiness, an

enlarged vulva, a possible mucus discharge she usually makes' a nest for young ones and milk is present in teats.

Farrowing care

- An attendant should be on hand when the sow farrows. Many piglets that would otherwise be lost can be saved if someone is on hand to assist.
- It takes generally two to four hours for complete farrowing to take place. Placentae drop one after the other, and within two hours this is completed.
- The piglets should be removed as they are farrowed and kept warm in the creep space until farrowing is complete.
- Each piglet should be cleaned of all mucus to ensure that the breathing passages are clear.
- The navel cord should be tied 2.5 cm away from the navel cut with a disinfected pair of scissors, and the stumps painted with iodine. This section will soon dry up and drop off leaving a clean non-infected navel.
- Piglets should be allowed to be nursed after birth. In about two days they settle down to their individual teats.
- They nurse eight to ten times in 24 hours in the initial period.
- Trampling by the sow should be prevented during the first two weeks.

Presence of attendant at the time of farrowing

- An attendant should be on hand when the sows farrow. Many piglets to be lost can be saved if someone is on hand to assist.
- It take generally 2 – 4 hours (maximum 6 hours) for complete farrowing to take place. Placenta drop one after the other and within 2 hours this is completed.
- Piglets should be removed as they are farrowed and kept warm in the creep space until farrowing is complete.
- Each piglet should be cleaned of all mucus to ensure that the breathing passage is clear.
- Piglets should be allowed to be nursed after birth. Within 2 days ,all the piglets settle down to their individual teats.
- They nurse 8 to 10 times in 24 hours in their initial period.

Care and management of piglets

- The baby pig begins to explore his environment within a few minutes after birth and soon finds his way to nipple and begins to suckle.
- Because of his curiosity, it is essential that the pen environment should be clean to minimize chance of exposure to disease and parasite.
- Normally individual piglets identify themselves with a particular teat during the first few days of life and jealously protect their access to it. The teat order will be set with in 10 days. But in small litter it is common for a piglet to claim more than one nipple. On the other hand in larger litters, the weakest pig may starve because they cannot compete for a nipple.
- The normal nursing behavior pattern is for a uniform time interval between each feeding over a 24 hours period. The average nursing interval is less than 1 hour so that suckling piglets receives more than 24 feeding daily, each feeding consist of only few minutes and it decreases when lactation advances.
- To prevent 'naval ill' the naval card should be tied off to prevent loss of blood and it should be cut 3-5 cm distal to the legation and this portion should be dipped in a solution of 2% iodine or 70% ethyl alcohol.

PREPARATION OF SWINE, EQUINE FOR SHOW AND JUDGING

Objective:

1. To acquaint the students with practical knowledge of swine and horse for show and judging.

Preparation of pig for show

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

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

1. **Selection of show pig:** While selecting the animal- age, pedigree, weight, sex, conformation and soundness of the animal should be considered. Hogs are generally selected at 2 to 3 months of age, weighing around 50–60 pounds so that they should attain a show weight (about 235-270 pounds) in approximately 100 days thereafter. If possible those lines are selected which has earlier history of winning the show in the past. Desirable physical characteristics are- long-body with sound feet, well developed hams and joint should be well angled.
2. **Feeding:** Initially they are fed through self feeder and later on to control weight gain they are hand fed.
3. **Exercising:** Regular walking exercise will help in maintaining the animal in good condition and make the animal more attractive in the show ring.
4. **Taming/gentling:** Animal is trained to move in desired direction. They are trained to turn to the right by gently tapping on the left jowl and vice versa. Train them to move forward by tapping lightly in front of shoulder and to stop by holding the bat in front of his nose.
5. **Trimming of toes:** Three to four weeks prior to show the toe of the pig is brought to proper shape with the help of hoof trimmer and hoof rasp is used to square-up the sole.
6. **Washing and rinsing:** This is the first step in the preparation of a pig for show and is also necessary to wash the animal before clipping. To accustom the animal to washing, it is generally started about 3 weeks prior to the show and frequency is increased to once a week before show and done again the day before the show. First the pig is wet with water to remove of the large piece of dirt and debris then soap is applied and rubbed & washed. Head of pig is washed in the last. Rag is used to wash the snout and inner side of ear instead of brush.
7. **Clipping:** It should be done at home within a week prior to the show. Clipping make a youthful, fresher appearance and enhances muscle tone acuity. It is begin from back against the grain of the hair then one side of the pig clipped at a time from the ham to the side to the shoulder up to the face.
8. **Oiling:** It makes skin soft, smooth and give shine to the hair coat. It is applied after the pig is bathed the first time and a further light application is just before the show.
9. **Showmanship:** Following guidelines should be followed during show
 - Exhibitor should be well dressed and groomed.

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- Keep the animal well groomed and watered prior to their class show begins.
 - It is better that exhibitors should watch ring layout, other classes and activities of the judge before their class show begin.
 - Enter the ring without delay when class is called.
 - The pig should be kept between the exhibitor and the judge.
 - Exhibitor should always look calm and confident, must keep one eye on the judge and another on the pig.
 - The exhibitor should foresee movement of his/her pig and the judge and should take action accordingly.
 - The pig should be kept moving at a steady pace around the ring.
 - Never touch the show pig with the hands. Show stick should be used to tap on the point of the shoulder in the region of the jowl to encourage movement.
 - The exhibitor should place himself/herself on the side of the pig away from the judge near the flank and ham/loin juncture.
 - Be prepared to follow the instructions of judge as well as to answer the queries of judge.

Horse show and judging

- A *Horse show* is a judged exhibition of horses and ponies. Many different horse breeds and equestrian disciplines hold competitions worldwide, from local to the international levels.
- Most horse shows run from one to three days, sometimes longer for major, all-breed events or national and international championships in a given discipline or breed.
- Most shows consist of a series of different performances, called *classes*, wherein a group of horses with similar training or characteristics compete against one another for awards and, often, prize money.
- There are two types of shows via
 - Horse show
 - In horse show breed characteristics, soundness, confirmation is more accounted.
 - Fancy show
 - In fancy shows they should be more decorative and attractive.

Preparation of horse for show

- The horse must be appropriately groomed and clipped, as the exhibitor is being judged on the ability to fit and show a horse “in hand”.
- The horse must be prepared months ahead of the event by being provided good nutrition to develop a healthy, shiny coat.
- Their hooves should be trimmed regularly by a farrier and kept balanced, smooth and neat.
- It should be brushed and otherwise groomed frequently to further promote a shiny coat and good overall health.
- The horse should also be exercised regularly, either in-hand or under saddle, to develop good muscle tone.
- The day before the show, the horse should be bathed and hair on its mane, tail, legs and head trimmed or clipped to meet the style standard for the particular breed of horse.
- Often special conditioners are used on the hair to make it extra shiny or silky.

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- It is very important for competitors to be very familiar with the most minute grooming and style details for the breed of horse and style of tack and clothing they choose to use in the ring.
 - A style required by one breed association may be considered illegal by another.
 - Depending on the breed of the horse and the style of tack used, the mane might be braided, left loose, or “banded” (having small rubber bands put around small sections of a short mane at the roots in order to help it lay down).
 - Horses shown with loose, flowing manes sometimes have their manes put into 5 or 6 large braids the night before, taken out just before the class and brushed to give an attractive, wavy appearance.
 - Horses required to have naturally long tails sometimes have them kept “up” when not showing, the long hairs braided up to the bottom of the dock, then the braid rolled up, with a bandage or old sock put around the hair to keep it from breaking off and to keep the tail clean. When taken down and brushed out, a tail kept in this manner is wavy and flowing in the ring. If kept up at all other times, a tail may grow so long that it drags on the ground.
 - On the day of the show, shortly before it goes into the ring, the horse is not only groomed to remove every possible speck of dirt, but it will usually have polish applied to its hooves, a light oil or conditioner placed on its muzzle, around the eyes, and other strategic areas of the head to accent its best features, and usually have a light coat dressing sprayed on its entire body for a bit of last minute shine

Training the showmanship horse

- The horse must be trained to respond instantly to any command by the handler. It must lead off promptly at a walk or trot, and stop immediately when asked.
- It must back up straight and quietly and learn to turn in a very tight circle from a walk and trot.
- The horse is also taught to “set up” to place its feet in a position, usually square on all four legs, that best shows the conformation of its breed.
- Often the horse also needs to learn to hold its head and neck up in a certain flattering position as well.
- The horse has to learn to accept standing in the setup position for long periods of time without fidgeting or falling asleep, as showmanship classes often are very long, due to the fact that exhibitors work the pattern one at a time.

Equipment and clothing

- A horse can be shown under saddle in either English or Western equipment, the handler may choose their style of equipment, but it cannot be mixed between the two styles.
- The horse shown western style is required to wear a halter and be handled with a lead shank. This is usually a well-fitted leather halter with a slim leather lead shank.
- The horse shown hunter style wears a proper English style bridle, with the handler either leading the horse by the reins or with a lead shank attached to the bit.
- The horse shown saddle seat style may, depending on breed, be shown either in a modified form of the bridle used in riding classes or in an extremely thin, refined leather or leather like halter.
- The exhibitor, male or female, must wear pants, a shirt with a tie or brooch, and boots. Some show rules require a hat. Gloves are optional, but usually worn by winning exhibitors because they provide a better grip on the lead shank and give a polished look.

Exhibition

- The rules for showmanship classes are set by organizations such as United States Equestrian Federation and the American Quarter Horse Association. While rules vary a bit from one breed or organization to another, there are general principles that usually apply in all competitions.
- It must be memorized and riders cannot carry notes or be coached while in the ring.
- Horses are usually led into the ring at a walk. Depending on the breed and the pattern, exhibitors may enter and perform the required pattern one at a time, then line up in a group on one side of the ring, other times they may all enter the ring, line up first, then work the pattern.
- Most patterns are deceptively simple: The exhibitor will lead the horse at a walk and trot, make one or two turns, stop at specific locations, and sometimes back up.
- However, all straight lines must be perfectly straight, all turns smooth and crisp, all changes of speed executed promptly.
- Orange highway cones are often used to designate the precise spot a horse and exhibitor are to walk, trot, turn or back.
- An exhibitor is not allowed to touch with the horse during a class. An exhibitor should treat each part of the pattern as a separate task leaving the maneuvers crisp, as opposed to sloppy and run together. An exhibitor should appear confident and happy; ultimately selling themselves and their horse to the judge by acting in a confident and professional manner.
- The winner of a showmanship class is usually determined by a formula that varies by the organization that sanctions the show, but usually counts grooming and cleanliness for about 40% of the score, and the pattern and handler's showmanship for about 60%.

ECONOMICS OF PIG

Objective:

1. To provide basic information to calculate economics to start a pig farm.

I. Economics of swine farming (10+1)

Pigs do have commercial importance and self employment potential. In rural areas pig husbandry can improve the standard of living of needy people both economically and nutritionally.

Basic assumptions

- 10 numbers of large White Yorkshire female pigs are purchased at 6-7 months of age at a cost of Rs. 6000 per animal and one boar for Rs. 8000/-.
- Floor space requirement for dry sow/gilt is 3.5 m², for boar and farrowing sow 16 m² & for fattener sty 2.5 m² and the construction cost is Rs. 800 per m².
- A space for feed storage-cum-office room is 30 m² and the cost of construction is 1000/ m².
- Equipment cost is Rs. 250 per adult and Rs. 150 per young.
- Interest on fixed investment is 12.5 % per annum.
- Depreciation on building and equipments @ 10 % per annum.
- Insurance charges @ 4 % of the value of animals.
- Concentrate feed requirement for adult animal is 4 kg/day and for weaner/fattener stock need 2 kg/day.
- Cost of concentrate feed is Rs.20 per kg.
- Average litter size at birth is 10 and at weaning is 8, pre-weaning mortality is 20%.
- Veterinary charges is Rs. 250/adult and Rs. 150 per weaner/year.
- Electricity charges Rs. 1000 per month.
- Labour charges at the rate of Rs. 3600/individual/month.
- Weaners/fatteners are sold at the age of 6-7 months and average weight at marketing is around 70kg.
- Selling rate is Rs. 150/kg.
- Value of manure @Rs. 50/pig/year (50 for adult and 25 for weaner/fattener)
- Sale of empty gunny bags @Rs.20/bag (75kg feed/bag) .

I. FIXED INVESTMENT

COST OF BUILDING

a.	Dry sow/gilt pen (3.5 m ² x 10 x Rs.800)	=	28,000
b.	Boar pen (16 m ² x 1 x Rs.800)	=	12,800
c.	Farrowing pen (16 m ² x 3 x Rs.800)	=	38,400
d.	Fattener (2.5 m ² x 160 x Rs.800)	=	3,20,000
e.	Office cum feed store (30 m ² x Rs. 1000)	=	30,000
	Total	=	4,29,200

COST OF EQUIPMENT

a.	For adult (Rs. 250 x 11 animals)	=	2,750
b.	For young (Rs. 150 x 160 animals)	=	24,000

COST OF ANIMALS

a.	Gilt (Rs. 6000 x 10 animals)	=	60,000
b.	Boar (Rs.8000 x 1animals)	=	8,000

II. FIXED COST

a.	Interest on fixed investment (Rs. 5,23,950 x 12.5/100)	=	65,494
b.	Depreciation on building (Rs. 4,29,200 x 10/100)	=	42,920
c.	Depreciation on equipment (Rs. 9100 x 9/100)	=	2,675
d.	Insurance charges (Rs. 68,000 x 4/100)	=	2,720
	Total fixed cost	=	1,13,809

III. VARIABLE COST

1.	a. Concentrate feed for adult pigs (11 animal x 4 kg x 365 days x Rs. 20)	=	3,21,200
	b. Concentrate feed for weaners and fatteners (80 animal x 2 kg x 240 days x Rs. 20)	=	7,68,000
2.	a. Veterinary charges for adult animals (adult 11 animal x Rs.250)	=	2,750
	b. Veterinary charges for weaners (160 animals x Rs. 150)	=	24,000
3.	Electricity charges (Rs. 1000 x 12 months)	=	12,000
4.	Labour charges (Rs. 6000 x 12 months x 2 laborer)	=	1,44,000
	Total variable cost	=	12,71,950

TOTAL COST

Total cost (total fixed cost + variable cost)	=	13,85,759
Rs. 1,13,809+ Rs. 12,71,950		

IV. RETURN

a.	By sale of 160 followers (160 animal x 70 kg x Rs. 150)	=	16,80,000
b.	Value of manure (11+80 animal x Rs. 50)	=	4,550
c.	Sale of gunny bags (total concentrate 54460 kg /75 kg=726 bags) x Rs. 20	=	14,520
	Total return	=	16,99,070
	Net return(total return - total cost) [Rs. 16,99,070 - Rs. 13,85,759]	=	3,13,311
	Net return /sow/year (Net return/10 sow)	=	31,331
	Net return/sow/month	=	2,610
	Cost benefit ratio	=	1:1.22

I. Marketing of pigs

- Before starting the pig farm, the possibility of marketing the pork should be surveyed Metropolitan cities and major cities have good demand for pork.
- Marketing of fattener as single lot as wholesale or selling through direct retail outlet are two possible ways.
- Large intensive farmers can concentrate on economic pork production and they can sell the stock in lot will be an economic way. This also helps to utilize the building and other resources fully.
- Small farmers can aim to market their port through direct retail outlets.
- Necessary awareness should be created among the consumer about the advantage of pork before selling.
- Breeding and marketing should be planned in such a way that sufficient pork should be made available during the festival seasons, when there is good demand.
- Financial assistance can be obtained from nationalized banks and lead bank like NABARD is offering financial support for such projects. For further reference NABARD model bankable projects is of much useful.

ROUTINE INSPECTION, TOOTH CARE AND VACCINATION SCHEDULE

Objective:

1. To provide practical skills to students for routine inspection, tooth care and vaccination schedule for swine.

Removal of needle teeth

Piglets are born with four pairs of sharp teeth with two pairs on each jaw. These are known as wolf teeth. These teeth have no practical value to piglets and they irritate the sow's udder during nursing or cause injury to other piglets at the time of nursing. So, it is good practice to clip or remove the needle teeth shortly after birth (0 – 3 days).

Clipping of needle teeth

Restrain the pig by grasping the head with one hand. Grasp the disinfected teeth nipper with the other hand. The open clipper should enter the mouth directly in front of and as perpendicular as possible to the teeth. If piglets are less than 2 days of age, completely cut off both teeth at once, reasonably close to the gum.

One tooth at a time may be cut if this is preferred. Do not cut the gum. If the clipping is done soon after birth, the tooth is still somewhat soft and usually will not shatter or chip, which would cause the gum or tooth to be exposed to infection.

If piglets are two days of age or older, clip off about $\frac{1}{3}$ to $\frac{1}{2}$ of the exposed teeth older pigs have teeth that are harder and will tend to shatter or chip more. Clipping off just the points of the teeth will tend to reduce both chipping and the chances of infection. Care must also be taken that the gums, lip, or tongue of the piglet are not clipped. If a cut is made so short as to draw blood, do nothing about it, but be more careful as you proceed with the next tooth. After clipping the teeth on one side, turn the piglet to give access to teeth on the other side of the head. Clip the remaining teeth.



Needle teeth



Clipping of needle teeth



After clipping

Removal of tusks from boars

One of the most obvious secondary sex characteristics of the mature male pig is the specialized type of tooth called a tusk. These tusks are the elongated canine teeth. At birth the pig has four temporary incisors plus the 4 canine teeth. These eight teeth in the newborn pig are called the needle teeth, or wolf teeth. The four canine teeth grow and develop into tusks because of the stimulation of the hormone testosterone, which

is produced in the testicles of the uncastrated male pig (boar). These teeth become quite large in the boar and project outside the mouth. They are positioned on each side of the upper and lower jaw and are about halfway between the end of the nose and the rear-most portion of the mouth. The action of the lower tusks rubbing against the upper ones causes the formation of sharp edges and points which extend outside of the mouth. The tusk is a weapon for defense, and when two mature boars are penned together they may fight viciously to establish a pecking order. When tusks are left intact, the boars may suffer severe cuts from thrusting their heads against each other. In addition, sows or gilts may be severely injured by the boar's tusks in the foreplay which precedes mating. Even the most docile boars have been known to turn on the herdsman or other animals if they become angered or disturbed.

Vaccination schedule

Disease	Age and booster doses	Dose & Route
Swine erysipelas	Around 3-4 weeks, repeat 3-6 weeks later and later every 6-9 months	1 ml s/c
Swine fever	Around 2 months of age, booster dose after 4 weeks followed by regular vaccination at 6 months interval	1 ml s/c
Foot and Mouth disease	Around 2 months of age, booster dose after 4 weeks followed by regular vaccination at 6 months interval	1 ml (polyvalent tissue)/ 2 ml (Inactivated tissue culture)

HORSE RIDING: WALKING, TROTTING, CANTERING AND GALLOPING

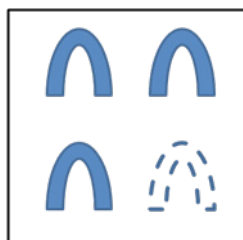
Objective:

- To acquaint the students regarding Horse riding including Walking, Trotting, cantering and Galloping.

THE GAIT

The gait describes as a specific way of going with specific sequence of limb movement that are repeated in each limb coordination. The walk, trot, and gallop have been classified as natural gaits, because their pattern in distinct and they are commonly occurring gaits.

WALK



The walk is the horse's most useful gait and has been termed 'nearly ideal for locomotion' and the "mother of all gaits" because many slow four beat gaits are modification of walk. The walk is characterized by four separate and distinct beats as each foot is placed in a regular 1-2-3-4 cadence. The speed and height of each foot placement depends upon the type of horse. During the walk the horse move forward with neck raised and arched under the body with the head in a near vertical position. The head and neck nods up and down twice during each stride but the top line remain level, as there is no lift since there no suspension phase and the weight is evenly distributed on the stance legs.

TROT

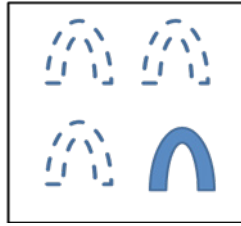


The trot is a two-beat gait in which the diagonal fore and hind legs move together. There can be a tremendous variation in the height, length and speed of trot. The pace is a two-beat gait in which the lateral fore and hind leg moves together. Because of lateral base of support, the pacer tends to throw its body from side to side and thus a pace is uncomfortable gait to ride. However, the pace is faster than the trot and is a popular gait for harness racing, when speed is preferred to action.



PACE

The Pace is a lateral two-beat gait. In the pace, the two legs on the same side of the horse move forward together, unlike the trot, where the two legs diagonally opposite from each other move forward together. In both the pace and the trot, two feet are always off the ground



CANTER

The canter is a fast, three beat gait done under restraint. Two of the diagonal legs are paired to make one beat while the remaining hind leg and foreleg act independently and are called the leading legs. Consequently, at the canter, the horse can be in either in the left or right lead.

GALLOP OR RUN



The gallop or run is the fastest gait of the horse. It is an extended canter that results in a four beat gait; the middle diagonal beat of the canter is extended to two beat because the hind foot hits slightly before the diagonal forefoot. In the gallop front and opposite hind limb leading and the outer and left hind limb lead with the sequence of foot beats indicated by numbers. A period of suspension also exists.

LAYOUT PLANS FOR STY, STABLES

Objective:

- To study the housing system of swine and horse.

Layout plans for sty

Swine buildings apart from providing protection against inclement weather should also provide proper hygienic conditions required to maintain the healthy growth of pigs. A sort of semi-indoor system of swine farming in loose houses is generally suitable in this country. However, it may be necessary to modify structural designs and/or change construction materials under an expert opinion suiting local conditions, especially at places where extreme climatic conditions prevail. Sheds for pigs are known as sties. There shall be sties to house pigs of different ages separately. Dimensions of the sties and dimensions of managers and water tanks in adult and young pig sties shall be as specified.

Flooring

It should be made of cement and concrete with grooves to prevent slipping. Provide enough slope from one end to the other for easy drainage (about 3 cm for every 2 meter length). Provide enough shade by planting trees.

Floor space requirements for different classes of pigs

Sl. No.	Category of pigs	Roofed/covered area (m ²)	Open yard (m ²)
1	Boar	6.0-7.5	8.8-12.0
2	Farrowing sow	7.5-9.0	8.8-12
3	Weaner/fattening pigs	0.9-1.8	0.9-1.2
4	Dry sow/gilt	1.8-27	

Floor should be made of conventional masonry type with cement mortal. Proper drains be provided for disposal of effluents.

Watering and feeding space requirements.

Sl. No	Particulars	Adult pig	Growing pig
1	Length of manger/pig (cm)	60-75	3-4
2.	Length of water trough/pig (cm)	6-8	3-4
3.	Width of manger and water trough (cm)	50	30
4.	Depth of manger and water trough (cm)	20	15
5.	Height of manger and water trough (cm)	25	20

Waterers and feeders should be kept inside the shed. The amount of water for boar, farrowing sow, fattening pigs and dry sow will be about 40 to 50, 18 to 20, 3.5 to 4 and 4 to 5 litres, respectively. Water needed by the hogs will depend upon following factors: Age and body size, Humidity, Ambient temperature, Dry matter in feed, Breed, Number of suckling pigs, Adaptation, Frequency of water supply, Season/weather, Quality of feed.

Kind of water needed

Clean, odourless, pure, colourless, tasteless, free from toxic substances, free from germs and parasitic ova/larvae.



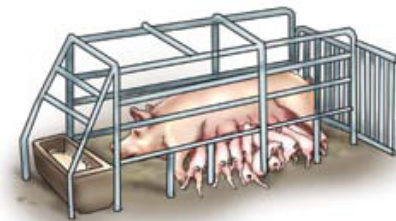
Boar sty

The boars should be housed in individual stalls. A row of stalls can be grouped under one roof. The number of stalls depends on the number of breeding boars kept on the piggery. Normally one boar per 10 breedable female in a boar sty normally 24 pens under one roof is allowed

Gilt sty and dry sow sty

On smaller farms dry sows and gilts can be housed together. On larger farms there shall be two different sties for dry sows and gilts. These are simple loose houses in which the floor shall be cement-paved in the covered area and brick-lined in the open area. These sties shall be in a row. Three to ten pigs should be housed in each sty depending on stage of pregnancy. Each sty shall normally have not more than 40 pens under one roof and these pens shall be arranged in two rows

Farrowing sty

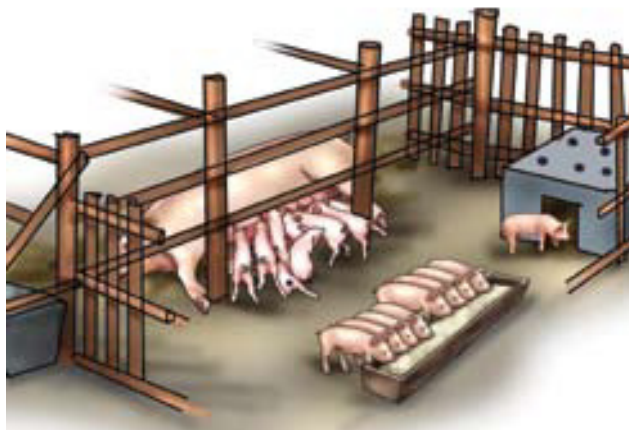


Pregnant sows are transferred to these sties 7-10 days before the expected date of farrowing and left here up to weaning of their litters (56 days). Each farrowing sty shall normally contain no more than 40 pens under one roof and each pen shall accommodate not more than one animal with the litter. Number of farrowing pen required is 10 % of the breedable female. Floor space allowance is 9 squares meter both in pen and run each pen should have the facilities of guard rail and creep area



Guard rail

The guard rails are made up of tubular iron rod of 2 to 2.5 inches thickness and fixed 25 to 30cm away from the wall and above the floor. So that the piglets can run under the rail when the sow lies down so that the crushing of piglets can be avoided in between the sow and walls.



Creep area

In corner of the pen creep area should be provided with the help of stone slab should be fitted in the corner of the pen, 25-30cm above the floor level. In that area piglet only can enter and get the creep feed. Lighting can also provide in creep area to give warmth to young ones. Since piglets having thin layer of subcutaneous fat it is more susceptible to cold stress.

Bedding

For good results 4 to 6" bedding is needed especially in winter and at first 3 days after farrowing to give warmth, softness and non slippery floor. It must be kept clean dry and evenly distributed. Wallowing tank should not be provided in the farrowing pen in order to avoid trampling of piglets in to the wallowing tank.

Weaner sty

Piglets that are weaned are housed in these pens up to six months of age. Each sty shall normally, have not more than 30 pens under one roof. Each pen may accommodate 30 piglets of age group between two to six months. Number of weaner/grower sty is equal to the number for breedable female in the farm. 0.9 to 1.8 square meter per animal under pen and run

Fattening sty

These are for housing pigs that are being transferred for the market. Each fattening sty shall normally have not more than 20 pens under one roof and each pen may have 16 to 32 animals kept for fattening purpose.

Accessory items

Apart from the building for the stock, a few subsidiary buildings like weighing yards, loading and unloading ramp, stores garbage boiling vats, wallowing tank etc. are also required on swine farms.

Simple weighing yard for pigs: This is the place where pigs are periodically collected and weighed. The details of store are more or less the same as described under cattle housing.

There shall be a permanent ramp, on swine farms for loading and unloading pigs into and out of automobiles. There shall also be a boiler room in which provisions are made for boiling garbage (before feeding to pigs) in big vessels or in jacketed vats with fore or steam generated in a boiler. There shall be one or two manure pits situated at least 15 m away from sties.

Hog wallows: Pig needs a wallow during summer because they have relatively few sweat glands. It is water pool where hogs enter into water and cool their body in summer. It is specially needed for fattening and breeding animals. *Location:* In a shady place. Proper location in relation to sties is important so that during treatment the hogs should not have access to any shallow pools or muddy holes which they usually prefer. *Types of wallows:* A masonry wallow made of concrete and cement with proper drainage system be made. Mud wallow is not at all desirable for it causes unsanitary conditions. *Size of wallow:* It depends upon size and number of animals. It is an advantageous to have large wallow enough to accommodate entire herd at one time. A wallow of 3 meters length, 2 meters width and 45 cm. Depth will easily hold a herd of 20 hogs of various ages. Where sprinklers are used one nozzle per 25 to 30 hogs is sufficient.

Construction: The top of the side and end walls of wallows should extend at least 10 cm above the surface of ground to prevent surface water running into wallow. The entrance and exit incline must have a gradual and easy slope so that hogs may enter and leave wallow conveniently. To prevent slipping, the concrete floor of incline must be roughened with a broom soon after it is laid and grooves made in it with a bar.

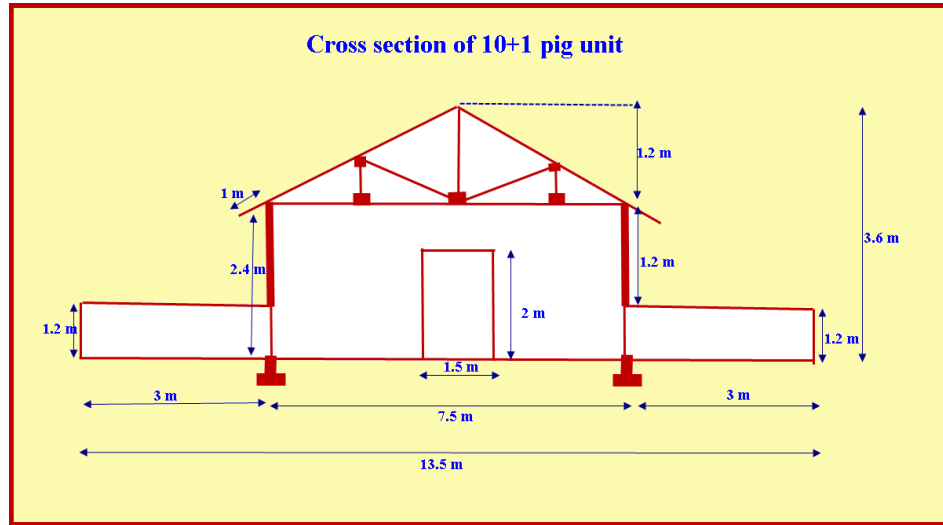
Medicated wallows: It is used for medicating or disinfection purposes. The instinctive habit of the hog to wallow in water when weather is warm can be advantageously used in treatment for external parasites and diseases caused by them (mange, scabies, and hog louse). Proper depth of liquid in wallow depends upon size and number of hogs. An 8 to 10 cm liquid will give better results than greater depth. Wallow should not be kept medicated continuously as disinfectant may cause irritation with the result hogs may refuse to enter the wallow. It should be drained, cleaned and recharged with water only. Disinfectant may be added every week or 10 days until desired results are obtained.

Precautions: Hogs are likely to drink from wallows unless water is rendered denatured by distasteful substance. For this crude oil and petroleum products are most suitable dips because of distasteful nature and tendency to spread over surface of the body. Crude oil as disinfectant may use at 1 pt per each hog. The oil floating on surface also prevents evaporation of water.

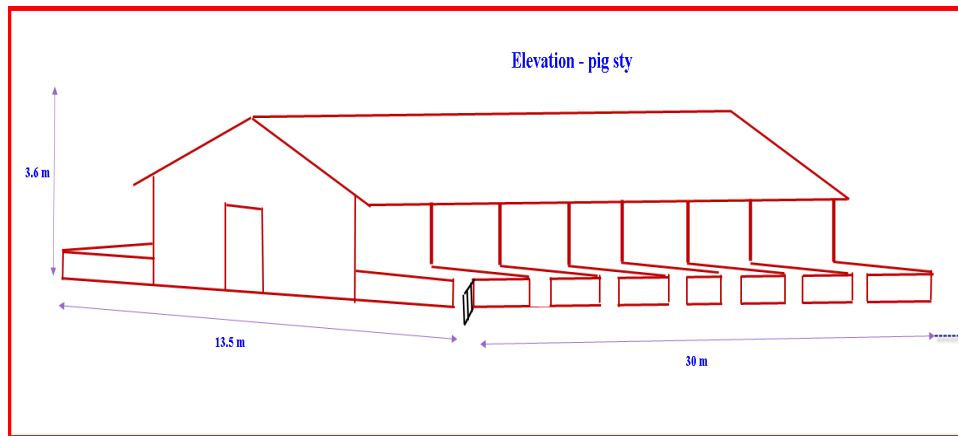
FLOOR PLAN FOR 10+1 SOW UNIT



CROSS SECTION FOR 10+1 SOW UNIT



ELEVATION OF A PIG STY



STABLES

Stall arrangement

Stalls in the stable shall be arranged in a single or double row depending upon the number of animals. The width of the passage shall be 1.5 to 2 m in single row system and 2.5 to 3 m in double row system. In double row system the stalls shall be so constructed that the horse do not face each other. The height from the floor to the roof shall be at least 4 m in the case of flat roof and 3 m from the floor level to the tie beam in gabled roof.

Dimension of stall

Size of animal	Length (M)	Width (M)	Height (M)
Small horse	3.0	2.5	1.9
Light/average/Medium	3.5	3.0	1.9
Large	4.0	3.5	1.9

Stall division

Stall division shall be of hard wood of sufficient strength or of reinforced concrete or of brick work. In case of wooden partition, a gap of at least 15 cm, between the bottom of the partition and the floor level, shall be provided.

Manger

Manger may be in 3 parts for providing grains, hay and water. The manger shall have a wide thick top of chinrest made of reinforced concrete to avoid crib-biting. The hay rack may be of either mild steel bars or wooden poles and placed lower than the animal's head and not above. Dimensions of the manger shall be 45 cm wide at the top, 22 cm wide at the bottom, 75 cm long and 30 cm deep. The bottom of the manger shall be 75 cm from the floor level. The manger may be portable or built-in type. All the corners shall be well rounded.

Functional units of stable

- Stallion stable box
- Mare's stable box
- Foaling boxes
- Young stock yard
- Teasing and covering yard
- Examination stocks
- Paddocks
- Isolation boxes
- Fencing

Stud farm layout

The ideal stud has been carefully designed and built from scratch and subsequently soundly managed as a business so that mares, stallions and young stock can be safely and efficiently cared for. The following chapter outlines the basic requirements for a two stallion stud.

Stallion boxes

Horses require roomy, well-ventilated boxes and the stallion requires a box at least 14 feet by 14 feet (4.27 m x 4.27 m) and preferably bigger to prevent boredom. Traditionally, stallions have been kept in separate yards, well away from the mares' yard but it may be desirable for stallions not to be completely isolated from the yard activities. If stallions are being frequently visited on a public stud it is wise to have strong grids on the doors to prevent the curious onlooker from constantly harassing the stallion. The stallion's name should be prominently displayed and the box should always look clean and tidy when prospective clients arrive.

Accommodation of stallion

The stallion boxes should be roomy, airy and should have plenty of light. 4.25 x 5.00 m is ideal size for the stallion box. Earthen floors are usually preferable but these require frequent replacement and thorough ramming to keep them level. With a view to maintain proper hygiene and sanitation, the floor of the stallion boxes should be made with cement concrete, impervious and non-slippery by making grooves. The floors should have very gentle slope towards the rear so that urine can flow and drained away easily. Each stallion box should be provided with an independent feeding and water trough with rounded corners to facilitate easy cleaning. There should be arrangements for proper cross ventilation and stallion boxes should have 3 m wide verandah (corridor) in front. Each box should be provided with electric ceiling fan, all windows and doors should be fly proofed and there should be arrangements for coolers/khas khas. tatties to deal with the heat effect in summer months. The stallion must be protected during winter from cold wind, by suitable wind protector. There should be open loose boxes made of pipe railings and posts, 7.25 x 7.25 m in size, well separated from each other, for keeping the stallions at night during hot summer months.

Mare boxes

There should be at least 30 boxes for visiting mares; mares with a foal at foot require boxes of at least 12 x 14 feet (3.66 m x 4.27 m), and preferably 14 x 14 feet (4.27 m x 4.27 m). A barn system is economical in terms of space and labour and can usefully take advantage of existing buildings.

Accommodation of mares

Stables for brood mares must be airy, roomy and protected from draughts. Brood mares as a rule are kept in liberty and should be provided with covered as well as open dry paddock. Covered accommodation is provided at the scale of 4.25 X 2.50 m per mare and the brood mares should be stabled in small batches if individual boxes are not possible. Ideal stable for a batch of 15 brood mares or 10 brood mares with foal at foot is 4.25 x 35.00 m covered standing and 35.00 x 75.00 m dry paddock. The feeding troughs should be provided in the covered standing and as well as in the open dry paddocks. The mares should be allowed to roam about at their will under cover or in the open. There should be a water trough, with running clean and fresh water provided outside in the dry paddock. Fencing for dry paddock should consist of upright angle iron posts with four strands of wire. Each dry paddock should have some trees to provide shade for the brood mares. The ground should be level, sandy, free from stones and holes and must have facilities for quick draining during monsoons. Each group of brood mares in the paddock should have an independent grazing paddock, easily approachable. The foaling boxes should be roomy and spacious in order to provide enough room for the mare and the foal. An ideal size for foaling box is 4.25 x 5.50 m. It should have independent watering and feeding troughs inside, should have electric ceiling fan and be provided with fly proof windows for cross ventilation, so that it does not become stuffy during hot weather. The floor of the foaling boxes should be made of cement with gentle slope of 5 cm in 3 m for the drainage of urine and water. It should have few shallow grooves to prevent the mares from slipping, to take the liquid away and keep the bedding dry.

Foaling boxes

There should be one or two spacious foaling boxes; these should be at least 14 x 16 feet (4.27 m x 4.88 m) and have a minimum of stable fittings on which the foal might injure itself. Ideally, there should be heat lamps and closed circuit television so that foalings can be carefully monitored. The boxes should be in a quiet situation with a sitting-up room containing the television monitor nearby.

Young stock yard

It may be advantageous to over-winter young horses in a yard rather than stable them individually.

- ❖ They can be put in their own stables at night and released into a covered yard by day to exercise and play.
- ❖ This provides them with a more healthy and natural environment.
- ❖ The yard must be free from dangerous projections and of an adequate size for the number of youngsters.

Teasing and covering yard

- ❖ The teasing yard should be an enclosed, and preferably covered, area convenient to the stallion boxes containing a teasing board.
- ❖ The board should be not less than four feet (1.2 m) high and ten feet (3m) long and made of a narrow pyramid of heavy wood supported by wooden or metal posts set in concrete.
- ❖ The board should be heavily padded with rubber to prevent injury to both mare and stallion and it is sometimes fitted with a roller bar along the top to help the stallion should he accidentally get a leg caught over the top of the board.
- ❖ The teasing covering yard surface should be non-slip so that the stallion can get good footing when he covers a mare, it should also be dust-free.

Examination stock and other buildings

Stocks can be used to prepare mares for covering, pregnancy testing, artificial insemination and

embryo transfer. They are designed along lines similar to cattle crushes, being sturdy cubicles used to restrain mares. Ideally, solid partitions should enclose the mare on two sides with two doors allowing access and exit.

Other buildings

Other buildings should include a tack room, feed room, office, wash box (hot and cold water and heat lamp), staff accommodation, garages for machinery, a loading ramp and hay barns.

Isolation boxes

One or two isolation boxes, situated well away from the yard, are essential to stop the spread of infectious disease. They can be used to house mares on arrival at the stud if it is suspected that they have been in contact with disease.

Equipment used in stable

Manger - Need to be positioned at about the height of the horse chest. Removable manger is the best one for horses. Mangers at ground level get dirty easily as bedding and droppings fall into the manger.

Hay net - Most satisfactory and economical method of feeding hay. A ring for the hay-net should be positioned about 5 ft. from the ground.

Feeding buckets - Should be positioned in the corner of the stable or held by hinged rings on the walls.

STRUCTURE OF HORSE FARM

		
<p>Stall arrangement & Division</p>	<p>Manger</p>	<p>Foaling Box</p>
		
<p>Young Stock Yard</p>	<p>Teasing Yard</p>	<p>Examination Stock</p>
		
<p>Horse Travis</p>	<p>Hay Net</p>	<p>Hay Net Feeding</p>