

ARD ANIMAL HUSBANDRY PART II



TOPIC - AGRICULTURE

MASTER NOTES PART IX AS PER SYLLABUS

Animal Husbandry Part II

Introduction to common feeds and fodders, their classification and utility.

Introduction to poultry industry in India (past, present and future status), Common terms pertaining to poultry production and management. Concept of mixed farming and its relevance to socio-economic conditions of farmers in India. Complimentary and obligatory nature of livestock and poultry production with that of agricultural farming.

You Tube Lectures on these topics can be accessed through following Links

Overview of Animal Husbandry: <https://youtu.be/LECWP8RV50Y>

NEXT – Part X Fishery.....

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1 Introduction to common feeds and fodders

The various feeds and fodders used in livestock feeding are broadly classified as: R+C+F

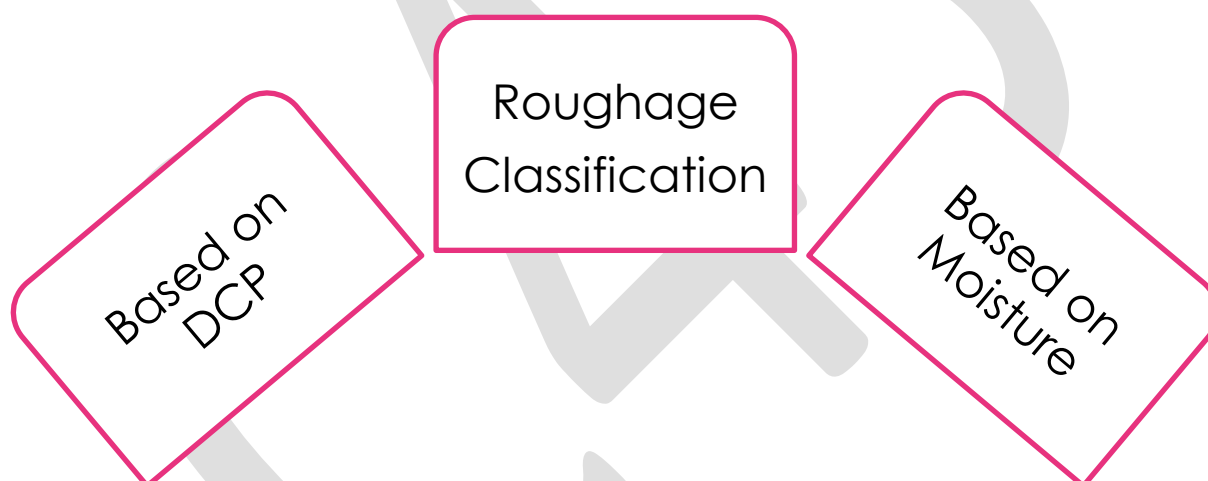
A) Roughages;

B) Concentrates;

C) Feed supplements and Feed additives.

Roughages – Roughages are the feed stuffs which contain more than **18 percent crude fiber** and **less than 60 percent** Total Digestible Nutrients. Due to higher crude fiber content, they are more bulky and have low digestibility as compared to concentrates.

Crude Fibre	More than 18%
TDN	Less than 60%



- 1) **Maintenance type** – Containing 3-5 percent DCP e.g. Green maize, oat.
- 2) **Non-maintenance type** – containing less than 3 percent DCP e.g. Straw, kadbi.
- 3) **Production type** – containing more than 5 percent DCP e.g. Berseem, lucerne. (DCP – Digestible Crude Protein)

The roughages are further classified into two major group as:

- 1) **Green / succulent roughages** – They contain about 60-90 percent moisture eg. Pastures, cultivated fodders, tree leaves, root crops and silages.
- 2) **Dry roughages** – They contain about 10-15 percent moisture e.g. Straw, Hay and kadbi.

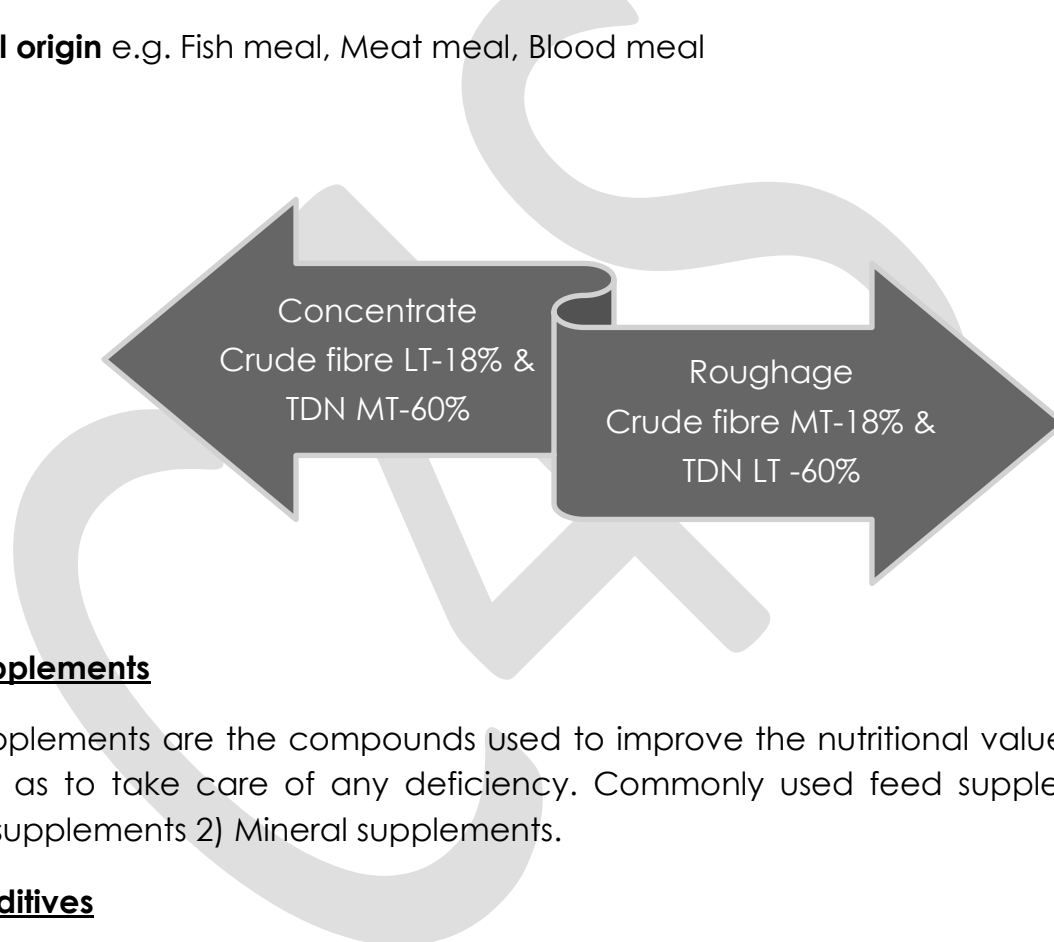
Concentrates

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These are the feedstuffs which **contain less than 18 percent crude fibre and more than 60 percent TDN**. They are less bulky and have higher digestibility. They are concentrated source of nutrients and therefore, they have higher nutritive value than roughages.

The concentrates are further classified as:

- 1) **Energy Rich Concentrates** – e.g. Cereal grains, cereal grain byproducts, Roots and tubers.
- 2) **Protein Rich Concentrates** –
 - i) **Plant origin** e.g. Oilseed cake, pulse chuni, Brewer's grains and yeast.
 - ii) **Animal origin** e.g. Fish meal, Meat meal, Blood meal



Feed Supplements

Feed supplements are the compounds used to improve the nutritional value of the basal feeds so as to take care of any deficiency. Commonly used feed supplements are 1) Vitamin supplements 2) Mineral supplements.

Feed Additives

Feed additives are the non-nutritive substances usually added to basal feed in small quantity for the fortification in order to improve feed efficiency and productive performance of the animals. Some commonly used feed additives are as below:

- 1) Antibiotics 2) Enzymes 3) Hormones etc.

The Centrally Sponsored Fodder Development Scheme is being implemented from 2005-06 with the following four components:

- Establishment of Fodder Block Making Units
- Grassland Development including Grass Reserves

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- Fodder Seed Production and Distribution.
- Biotechnology Research Projects

Under the **National Livestock Mission Scheme**, Central Government provides 50% capital subsidy (maximum up to Rs.50 Lac) to the beneficiaries of setting up of feed/fodder value addition unit for Hay/Silage/ Total Mixed Ration (TMR) TM preparation, Fodder block making or storage facilities for fodder.

The Food Safety and Standards Authority of India (FSSAI) on 6th October 2021 has issued directive specifying that all commercial feeds intended for meat and milk producing animals have to comply with the BIS specifications (Indian Standard, IS 2052: 2009-Compound Feeds for Cattle – Specifications, 4th revision) and shall carry the BIS mark which came into effect from 1st January 2022.

1.1 Common Fodder grass

Lucerne	Alfa Alfa (Queen of forages)
Berseem	Egyptian clover (King of fodder crops)
Cowpea	Lobia
Pearl Millet	Bajra
Finger Millet	Ragi
Napier	elephant grass or Uganda grass
Guinea grass	Buffalo grass
Para Grass	Buffalo grass, Water grass
Cenchrus	Blue buffel grass

2 Housing of Livestock

Row system

Type	Capacity
Single Row	12-16 Cattle
Double Row	17-50 Cattle

Shed for calves: On one side of the main cattle shed there shall be full covered shed 10' X 15' to accommodate young calves. Such sheds with suitable partitioning, may also serve as calving pen under adverse climatic conditions. Beyond this covered area there should be a 20' X 10' open area having boundary wall so that calves may move there freely.

In this way both cattle and calve sheds will need in all 50 X 50 area for 20 adult cows and followers. If one has limited resources, he can build ordinary, katcha /semi Kutcha boundary walls but feeding and water trough should be cemented ones.



Type of animal	Floor space requirement (m ²)		Maximum no of animals / pen	Height of the shed (cm)	Type of animal	Space per animal (cm)
	Covered area	Open area			Adult cattle & buffaloes	60 – 75
Bulls	12.0	24.0	1	175 cm. in medium and heavy rain fall and 220 cm. in dry areas.	Calves	40 – 50
Cows	3.5	7.0	50			
Buffaloes	4.0	8.0	50			
Down – calver	12.0	12.0	1			
Young – calves	1.0	2.0	30			
Old – calves	2.0	4.0	30			

Type of Animal	Floor space per animal (Sq. feet)		Manger length per animal (inches)
	Covered Area	Open Area	
Cows	20 – 30	80 – 100	20-24
Buffaloes	25-35	80-100	24 -30
Young stock	15-20	50-60	15 -20
Pregnant Cows	100-120	180 – 200	24 -30
Bulls Pen	120-140	200-250	24 -30

2.1 Floor space for Murrah buffalo as per NABARD Model Project

Floor space (sqft) per adult animal	50
Floor space (sqft) per calf	20

** Note 1sqm = 10.76 Sft

Age wise Housing Area

The heifers from 6 months onwards should be housed separately from suckling calves and no male calves be kept together beyond 6 months. For better allocation of resting area, calf should be provided with below stated space, i.e.

- 20- 25 sq.ft/calf for below 3 months of age
- 25-30 sq.ft from 3-6 months of age
- 30-40 sq.ft from 6-12 months of age
- 40-50 sq.ft from above one year

2.2 Feeding schedule of Calf

- After a calf attains the age of 2 weeks the amount of whole milk given to it may be cut down.
- The limit of liquid milk feeding is **10 % of it's body weight**
- At the **age of 7-15 days** the feeding of grain mixtures may be started.
- **Feeding calf starters** - Calf starter is a mixture consisting of ground farm grains, protein feeds and minerals, vitamins and antibiotics. After a calf attains the age of 2 weeks the amount of whole milk given to it may be cut down. One should then rub a small amount of starter on the calf's mouth, after each milk feeding for a few days when the calf will be accustomed to it.
- When they reach **four months of age**, one should then transfer the calves to a "growing" grain ration.
- **Feeding grain mixture** - Better growth and greater resistance to calf ailments result from consumption of grain and milk by the calf then when the calf is fed only on milk. At the age of 7-15 days the feeding of grain mixtures may be started.
- Over feeding causes '**Calf Scours**'.

Age of calf	Approx. body weight (kg)	Quantity of milk (kg)	Quantity of calf starter (g)	Green grass (kg)
4 days to 4 weeks	25	2.5	Small qty.	Small qty.
4-6 weeks	30	3.0	50-100	Small qty.
6-8 weeks	35	2.5	100-250	Small qty.
8-10 weeks	40	2.0	250-350	Small qty.
10-12 weeks	45	1.5	350-500	1-0
12-16 weeks	55	-	500-750	1-2
16-20 weeks	65	-	750-1000	2-3
20-24 weeks	75	-	1000-1500	3-5

** Focus on trend and develop overall idea no need to remember individual data

- **From six months onwards**, calves can be given the same type of concentrate mixture (14-16% Digestible Crude Protein and about 70% Total Digestible Nutrients) as used for adult cattle.

Age (months)	Approximate body weight (kg)	Concentrate mixture (kg)	Grass (kg)
6-9	70-100	1.5-1.75	5-10

9-15	100-150	1.75-2.25	10-15
15-20	150-200	2.25-2.50	15-20
Above 20	200-300	2.50-2.75	15-20

Body weight (kg)	Calf age (days)	Colostrums (lire. Per body wt.)	Whole milk (liters per body weight)	Skim milk (liters per body wt.)
Upto25	Upto5	1/10th	-	-
20-30	6 – 20	-	1/ 10th	-
25-50	21-30	-	1/15th	1/20th
30-60	31-60	-	1/20th	1/25th
40-75	61-100	-	1/25th	1/25th

2.3 Feeding schedule of Dairy cows

Feeding schedules for dairy animals (Quantity in kg.)

. No.	Type of animal	Feeding during	Green Fodder	Dry Fodder	Concentrate
(A) CROSS BREED COW					
1.	6 to 7 liters milk per day	Lactation days	20 to 25	5 to 6	3.0 to 3.5
		Dry days	15 to 20	6 to 7	0.5 to 1.0
2.	8 to 10 liters milk per day	Lactation days	25 to 30	4 to 5	4.0 to 4.5
		Dry days	20 to 25	6 to 7	0.5 to 1.0

2.4 Normal Clinical Values

Species	Temperature 1	Pulse rate, per minute	Respiration rate per minute
Cattle& buffalo	101.6	42 – 60	16 – 24
Sheep & Goat	102.6	70 – 80	18 – 30
Poultry	107.0	130 – 160	15 – 30

2.5 Feeding schedule of Lactating cows

- Proper feeding of dairy cattle should envisage minimum wastage of nutrients and maximum returns in respect of milk produced.
- A concentrate mixture made up of protein supplements such as oil cakes, energy sources such as cereal grains (maize, jowar), tapioca chips and laxative feeds such as brans (rice bran, wheat bran, gram husk) is generally used.
- Mineral mixture containing major and all the trace elements should be included at a level of **2 percent**.
- The total dry matter requirement of cattle is around 2-3 % of their body weight though high yielding animals may eat at a rate more than 3%. Such factors as climate, processing of feeds, palatability etc. influence the dry matter consumption. Good quality grasses (Guinea, Napier etc.) with a minimum of 6 % crude protein on dry

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matter basis alone can form maintenance ration of a cow of average size. But it is possible to maintain milk production of up to 3-4 kg with grass- legume fodder.

- For high yielding animals, the optimum concentrate roughage ratio on dry matter basis should be **60:40**.
- **1kg straw can replace 4-5 kg of grass** on dry matter basis.
- **An adult animal consume about 5 to 10 Kg of hay or straw per day.**
- **While young stock consume about 2 to 5 kg of hay or straw per day.**

When green grass is plenty			When paddy straw is the major roughage		
Category	Concentrate mixture (Kg)	Green Grass (kg)	Concentrate Mixture (kg)	Green Grass (kg)	Paddy Straw (kg)
Dry cows	-	25 – 30	1.25	5.0	5 – 6
Milking	1 kg for every 2.5 - 3.0 kg of milk	30	1.25 + 1 kg for every 2.5 - 3.0 kg of milk	5.0	5 – 6
Pregnant	Production Allowance + 1 to 1.5 kg from 6th month of pregnancy	25 - 30	Maintenance + production + 1 to 1.5 kg from 6th month of pregnancy	5.0	5 - 6

- Feeding schedule for different classes of adult cows (approximate body weight-250 kg)
- The heifers **attaining weight of 200 kg** (minimum) may be considered of age at first breeding.
- In India hand milking of cows is still the most common practice. Cow's are milked from left side.

2.6 Feeding schedule as per NABARD Model project for dairy cow

Feeding Schedule Per Day

	Lactation Days			Dry Days	
	Price (Rs)	Qty. (kg)	Cost Per Day (Rs)	Qty. (kg)	Cost Per Day (Rs)
Conc. Feed	18	2	36	1	18
Green Fodder	0	20	0	15	0
Dry Fodder	2	3	6	4	8
Total			42		26

****Focus on Quantity not Price**

- The average productivity (per day milk yield) of cross bred, indigenous cows and buffaloes in India was 7.02 Kg, 2.36 Kg and 4.89 Kg (Basic Animal Husbandry Statistics, Ministry of Agriculture, GoI).
- It is preferable that animals face north when they are eating fodder under the shade.

3 Milking

There shall be an individual standing in the milking barns and the number of standings required should be 25% of total number of milch animals in the herd.

Milking: The udder and teats should be washed with warm water mixed with **KMnO₄ solution** and wiped to dry before milking solution and wiped to dry before milking. The milking should be conducted cleanly, gently, quietly, quickly and completely by suitable method of milking. It should be completed within optimum time period of seven minutes.

Dimensions of milking barn

- Length of standing space : 1.5 – 1.7 m
- Width of standing space : 1.05 – 1.2m (80% of length, of standing space)
- Width of central passage : 1.5 – 1.8 m
- Width of feed alley : 0.75 m
- Width of gutter : 0.30 m
- Overhang : 0.75 m

Milk Room

Production Capacity	Room Size
400 to 700 litres	3.7 m x 5m size of room and an additional 0.37 m ² for every 40 litres of milk production.
100 litre	3.75m x 3m

Milking Machines

- **Milk Machines** - 1.5 litre to 2 litres per minute.
- **Pressure** – 352mm Hg- Cattle; 400mm Hg in Buffaloes
- **Bacterial Count** – should be less than 50,000 per ml.

Blood circulation while milking

- To produce **1 liter of milk 400-500 liters** of blood have to pass through the udder. When a cow produces 60 liters of milk per day, 24,000- 30,000 liters of blood are circulation through the mammary gland.

The two main types of dairy barn (Cow house) stalls are the stanchion stall and tie stall.

1. **The stanchion stall:** It is one of the standard dairy cow stalls. It is equipped with a stanchion for fastening a cow in place.' Usually there is a stall partition in the form of a curved pipe

between the stalls to keep the cows in place and to protect their udders and teats from being stepped on by other cows.

2. The Tie Stall: The tie stall requires a few inches longer and wider than the stanchion stall. It is designed to provide greater comfort to the cow. In addition to larger size, the chain tie gives the cow more freedom. Instead of the stanchion, there are two arches, one on each side of the neck of the cow. The cow is fastened by means of rings fitted loosely on the arch pipe,; and connected to a chain which snaps to the neck strap on the cow. The correct space between arches is 10-12 inches.

4 Calving

- Pregnant animals are transferred to a calving pen 2 to 3 weeks before the expected date of calving.
- Calving pen of **3m x 4m (12 m²)** is essential to keep the animals in advanced stage of pregnancy.
- It should be located nearer to the farmer's quarters for better supervision.
- The number of calving pens required is **5-10%** of the number of total breedable female stock in the farm.
- The number of bulls required being one for every **50 breedable females**.

Care of Breeding Bull

The care and proper management of breeding bull is important for success of breeding programme.

Selection: The breeding bulls should be selected from good pedigree

Feeding:

- The properly balanced ration should be given which contains adequate energy, protein, minerals & vitamins.
- Feed to male calf after discontinuation of milk, it should be provided with good quality, legume hay and 2 to 2.5 kg of concentrate having 12-15% DCP.
- Feeding to mature bull: Should be fed adequately to keep it on good flesh but not over fat, sufficient amount of green feed, 1 kg of good quality hay (DM) and 1.5 kg of concentrates per 100 kg of body weight per day will keep in good breeding condition.
- The breeding calf if provided with good feeding practices it will develop in a vigorous nature mature bull & reach sexual maturity of young age.

Housing:

- The bull should be housed in a separate bull pen measuring 15' X 10' dimension.
- The stall should open into strongly fenced paddock into which the bull has free access & movement.

- The pen should have stanchion to which the bull can be tied during cleaning time.
- The feeding & watering arrangement should be made in the pen and paddock.

5 Colostrum Feeding

What is Colustrum?

Bovine colostrum is a milky fluid that comes from the udder of cows the first few days after giving birth, before true milk appears. This fluid contains proteins called antibodies. These antibodies may fight bacteria and viruses that cause diseases.

- Colostrum's between **2 to 2.5 liters daily** for the first 3 days following its birth.
- Immunoglobulin in Neonatal calves is only **0.97 mg/ml** at birth, It increase to 16.55 mg/ml level after first colostrum's feeding at 12 hr and subsequently on the second day shows a peak of 28.18 mg/ml.
- Colostrum -Protein 3-5 times, Rich in Vit A, Mg, Mn, Cu,Fe
- Temperature - Between 99oF and 102oF for better digestibility

Milk let Down (Milk ejection) - Physical stimulation of the teats, either by the calf's suckling or the milkers hands, excite receptors from which nerve impulses are sending to the posterior pituitary gland causing secretion of the hormone oxytocin. The hormone is transported via the blood to the mammary gland. Because both hormones and nerve impulses are involved in the milk ejection reflex, it is called a neurohormonal reflex. **Oxytocin** stimulates the contraction of the alveoli and small ducts thereby emptying the milk into the larger ducts and the cistern. Hereafter the milk can be evacuated from the udder.

CALF MANAGEMENT

1. The interval from the first signs of sexual receptivity at Oestrus (heat) to the next estrus is called **estrus cycle**.
2. The chain of physiological events that begins at one Oestrus period and ends at next is called as **Oestrus cycle**.
3. Feed the calf with first milk i.e. colostrum **at least for 48 hours**. The **antibodies present in colostrum** protect the calf against diseases and it has a laxative effect the rate of feeding should be about 10% of the calf s weight per day up to a maximum of **5-6 liters per day**.
4. The colostrum is the **first secretion of cow after calving**. It is thick and yellow in color. It contains 4 to 5 times more protein and 10 to 15 times more vitamin-A than normal milk. Protein of colostrums contains much higher proportion of globulins. The globulins are to be the source of antibody presumed developing the defense mechanism in the calf for many infections. Colostrum is also rich in minerals like Cu, Fe, Mg and Mn. It also contains several other vitamins like Riboflavin, Cholin, Thiamine, Pantothenic acid etc., which are for growth of calf.
5. The calf is best maintained in an individual pen or stall for the first few weeks. **After about eight weeks it may be handled with a group**.
8. Dehorn the calf preferably within **15 days after birth**.
9. Teats of the udders of heifers in excess of four should be removed.
10. At the age of **3 months** the calf should be vaccinated against **Anthrax** and **fifteen days** there after it should be vaccinated against **B.Q**

- | | |
|-----|--|
| 13. | Dehorning the calves: at the age of 2-3 weeks (Some say 7-10 days) , bull calves should be castrated suitably. |
| 14. | Castration of bull calf: At age of 2-3 months , bull calves should be castrated suitably. |
| 19. | After 6-8 weeks, calves may be grouped according to age, sex. |

6 Dehorning & Castration

Dehorning: remove the horns from (an animal).

Castration: Castration is 'removal of the testicles' in very young male cattle. Castrated male cattle (steers) are generally less aggressive and easier to handle, are less likely to fight causing injury to other animals, and are less likely to damage fences.

- **Dehorn** the calf within **7-10 days** after birth with red hot Iron or caustic potash stick or electrical method.
- **Dehorning Paste** contains Calcium hydroxide 37.8% and Sodium hydroxide 24.9% - 8 weeks
- **Disbudding** involves destroying the horn-producing cells (corium) of the horn bud - best age is **3 to 6 weeks** of age.
- **Deworm** the calf regularly to remove worms using deworming drugs. Deworm at **30 days** interval.
- **Milking thrice** is better than twice since 10 - 15 % more milk can be produced.
- Extra concentrate mix of **1.25 to 1.75 kg** should be provided for pregnant animal as pregnancy allowance.
- Extra concentrate at the rate of **1 kg** for every 2 to 2.5 liters of milk should be provided.
- **Normal Work** - 6 hours of carting or 4 hours of ploughing. **Heavy Work** - 8 hours of carting or 6 hours of ploughing
- **Castration** – 8-9 weeks

7 Hosing in Poultry

The commercial poultry sector is organized and 80% of market share is captured by commercial sector. Basically two systems are commonly followed in our country. The poultry house should face **south or east** in moist localities for morning sunlight.

For economic production of laying hens it is always better to keep them in small unit of 15 to 25 birds. This number can go up to a maximum limit of 250 birds. In commercial poultry farms units of 125 or so are advisable. Where there is a long house, partitioning at every 20 feet should be made to eliminate drafts, etc.

Ventilation in the poultry house is necessary to provide the birds with fresh air and to carry off moisture. Since the fowl is a small animal with a rapid metabolism its air requirements per unit of body is high in comparison with that of other animals. A hen weighing 2 kg and on full feed, produces about **52 liters of CO2 every 24 hours**. Since CO2 content of expired air is

about 3.5 per cent, total air breathed amounts to 0.5 liter per kg live weight per minute. A house that is tall enough for the attendant to move around comfortably will supply far more air space than will be required by the birds that can be accommodated in the given floor space.

There are four systems of housing generally found to follow among the poultry keepers. The type of housing adopted depends to a large extent on the amount of ground and the capital available.

- **Free-range or extensive system**
- **Semi-intensive system**
- **Folding unit system**
- **Intensive system** A. Battery system B. Deep litter system

Free range system: This method is oldest of all and has been used for centuries by general farmers, where there is no shortage of land.

Semi-intensive system: This system is adopted where the amount of free space available is limited, but it is necessary to allow the **birds 20-30 square yards per bird** of outside run. Wherever possible, this space should be divided giving a run on either side of the house of **10-15 square yards per bird**, thus enabling the birds to move onto fresh ground.

Folding unit System: This system of housing is an innovation of recent years. In portable folding unit's birds being confined to one small run, the position is changed each day, giving them fresh ground and the birds find a considerable proportion of food from the herbage are healthier and harder. For the farmer the beneficial effect of scratching and manuring on the land is another side effect.

The disadvantages are that food and water must be carried out to the birds and eggs brought back and there is some extra labor involved in the regular moving of the fold units.

The most convenient folding unit to handle is that which is made for 25 hens. A Floor space of 1 square foot should be allowed for each bird in the house, and 3 square feet in the run, so that a total **floor space to whole unit is 4 square feet per bird, as with the intensive system.**

A suitable measurement for a folding house to take **25 birds is 5 feet wide and 20 feet long**, the house being 5' X 5', one third of this. The part nearest the house is covered in and the remaining 10' open with wire netting sides and top.

Intensive system: In this system the birds are confined to the house entirely, with no access to land outside, and it is usually adopted where land is limited and expensive. This has only been made possible by admitting the direct rays of the sun on the floor of the house so that part to the windows are removable, or either fold or slide down like windows of railway train

to permit the ultraviolet rays to reach the birds. Under the intensive system, Battery (cage system) and deep litter methods are most common.

A. Battery system: This appliance is the inventor's latest contribution to the commercial egg farmer. **This is the most intensive type of poultry production and is useful to those with only a small quantity of floor space at their disposal.** Nowadays in large cities hardly a poultry lover can spare open lands for rearing birds. For all such people this system will prove worthy of keeping birds at minimum space.

A battery cage system is a housing system practiced by farmers raising poultries in wire-welded cages. 1-5 cages are connected into a row and are stacked to 3-9 tiers which forms a set of chicken cages. Multiple sets of battery cages can be arranged in a chicken house with the aisle between each other.

In the battery system each hen is confined to a cage just large enough to permit very limited movement and allow her to stand and sit comfortably. The usual floor space is **14 X 16 inches** and the height, **17 inches**. The floor is of standard strong galvanized wire set at a slope from back to the front, so that the eggs as they are laid roll out of the cage to a receiving gutter. Underneath is a tray for droppings. Both food and water receptacles are outside the cage. Many small cages can be assembled together; if necessary it may be multistoried. **The whole structure should be of metal so that no parasites will be harbored** and thorough disinfection can be carried out as often as required. Provided the batteries of cages are set up in the place which is well ventilated and lighted, is not too hot and is vermin proof and that the food meets all nutritional needs, this system has proved to be remarkably successful in [lie tropical countries. It may be that as it requires a minimum expenditure of energy from the bird, which spends its entire time in the shade, it lessens the load of excess body heat. The performance of each bird can be noted and culling easily carried out. Pullets, which are more often used than birds of over one year, should be placed in the cages at least one month before they are expected to lay.



The feeding of birds in cages has to be carefully considered, as the birds are entirely dependent on the mash for maintenance and production. To supply vitamins A and D, cod liver oil, yeast, dried milk powder are useful/ and fish meal or other animal protein, and balanced minerals and some form of grit must be made available.

As in each cage there will be only pullets so one can never expect fertilized eggs, hence the vegetative eggs will be there, which can be preserved for a longer time than fertilized eggs at ordinary room temperature but can never be used for hatching purposes.

Cage system: The cage system of rearing birds has been considered as a super intensive system providing floor area of 450-525 sq.cm. (0.6-0.75 sq.feet) per bird. In cage the birds are kept in one, two or three per cage, arranged in single or double or triple rows.

Cage fatigue: Cage fatigue is considered to a physiological derangement of mineral electrolytes imbalance. Leg weakness is common in caged birds.

Fatty live syndrome: It is a problem met with caged layers

7.1 A and H type Battery cages

A-type and H-type battery cages offer distinct advantages and disadvantages for poultry farming. **A-type cages provide higher bird density and lower initial investment** but require

meticulous management and attention to bird welfare. H-type cages offer improved automation, reduced labor costs, and better control over bird density and hygiene but involve a higher upfront cost. Ultimately, the choice between A-type and H-type battery cages depends on the specific requirements, scale, and budget of the poultry farming operation. Poultry farmers should carefully consider these factors to select the battery cage system that best suits their individual needs and ensures optimal bird welfare and productivity.

B. Deep litter system: In this system the poultry birds are kept in large pens up to 250 birds each, on floor covered with litters like straw, saw dust or leaves up to depth of 8-12 inches. Deep litter resembles to dry compost. In other words we can define deep litter, as the accumulation of the material used for litter with poultry manure until it reaches a depth of 8 to 12 inches. The build-up has to be carried out correctly to give desired results, which takes very little attention.



Deep litter system is commonly used in all over the world. On the deep litter, provide 700 cm² floor area per chick till 8 weeks of age. In a hover with one m diameter, 250 chicks can be brooded. Spread the litter to a depth of 5 cm on the floor before introducing chicks and build it up to a depth of 15 cm by adding litter material, at the rate of about 2 cm per week. This would require approximately 10 kg of litter material/sq.meter

A unit of 2000 layers is usually considered as economical for commercial egg production. In the case of broilers a unit intake of 250 chicks per week is usually considered as viable.

Advantages of Deep Litter System:

Safety of Birds: Birds on range or even in a netted yard can be taken by wild animals, flying birds, etc. When enclosed in deep litter intensive pen which has strong wire netting or expanded metal, the birds and eggs are safe.

Litter as a source of food supply: It may come as surprise to learn that built-up deep litter also supplies some of the food requirements of the birds. They obtain "Animal Protein Factor" from deep litter and some work indicates that this could learn that birds obtain sufficient of this to enable to suitable feed ration to be prepared with only a vegetable protein such as groundnut meal included in the feed. The level of vitamins such as riboflavin increases up to nearly three-fold. According to experiments conducted. The combination of this and the Animal Protein Factor is necessary to good hatchability of eggs and early growth of chickens.

Disease control: Well managed deep litter kept in dry condition with no wet spots around water has a sterilizing action. The level of coccidiosis and worm infestation is much lower watered kept on good deep litter than with birds (or chickens) in bare yards and bare floor sheds particularly where water spillage is allowed.

Labour saving: This is one of the really big features of deep litter usage. Cleaning out poultry pens daily or weekly means quite a lot of work. With correct conditions observed with well managed litter there is no need to clean a pen out for a whole year; the only attention is the regular stirring and adding of some material is needed.

The valuable fertilizer: This is a valuable economic factor with deep litter. According to McArdle and Panda, 35 laying birds can produce in one year about 1 tonne of deep litter fertilizer. The level of nitrogen in fresh manure is about 1%, but on well built-up deep litter it may be around 3 per cent nitrogen (nearly 20% protein). It also contains about 2 per cent phosphorus and 2 per cent potash, its value is about 3 times that of cattle manure.

Hot weather safeguard: This is an important feature in a hot climate. The litter maintains its own constant temperature, so birds burrow into it when the air temperature is high and thereby cool themselves. Conversely, they can warm themselves in the same way when the weather is very cool. Accordingly, it is a valuable insulating agent.

Unlike battery hens, cage-free hens are able to walk, spread their wings and lay their eggs in nests, vital natural behaviors denied to hens confined in cages.

.....

Brooding in poultry farming is the provision of an optimum environment for birds in the early part of their life by the application of an external heat source. This is usually from day-old until the chicks are able to regulate their body temperature efficiently.

Artificial brooding: Chicks newly hatched out require supplementary heat till they grow feathers. The period of brooding is usually **up to 4-5 weeks of age** and a little longer in cold season. Artificial brooding can be carried out in deep litter houses or in electrically operated brooder batteries. Temperature required for brooding is **1 –2 Watt/chick**. Use five bulbs of 60 Watts per unit of 250 chicks. The rule of thumb is that one Infra-red bulb **of 250 watts for every 250 chicks**. Position the bulb 50 cm above litter. Optimum and uniform temperature inside the incubator is very essential for obtaining satisfactory results. The incubator temperature should be maintained as recommended by the manufacturer. It usually varies **from 99.5° to 100.5°F (37.2°C - 37.8°C)** for forced draft-type incubators and about 1°F higher for still-air incubators.

Natural Brooding: Hatching of eggs refers to the production of baby chicks. In early days eggs were hatched by placing them under broody hens. Desi hens proved to be ideal for this purpose. **Only 10 to 12 eggs can be put under 1 hen**. This method of hatching is highly unsatisfactory for large-scale production of baby chicks.

Humidity in the incubator affects hatchability. Dry and wet bulb thermometers are used for measuring humidity. In fowls egg takes about **21 days** to hatch. The relative humidity should be around 60 per cent during the first 18 days of incubation and 70 per cent in the last 3 days for optimum hatchability.

The eggs are candled from fifth to seventh days of incubation to remove infertile eggs and on 18th day to remove dead germs. As soon as the eggs are collected, store them at a temperature between **10 and 16°C** with a relative humidity of **70 - 80%**.

Testing of Incubated Eggs

Thumb rule for feeding broilers

Kg feed per 100 birds - Age in days/4.4

Litres of water per 100 birds - Age in days/2.0

7.2 Egg Production Cycle as per FAO

Birds usually start to lay at around **five months (20-21 weeks)** of age and continue to lay for **12 months (52 weeks)** on average, laying fewer eggs as they near the moulting period.

The typical production cycle lasts about 17 months (72 weeks) and involves three distinct phases, as follows.

PHASE I Small chicks or brooders 0-8 WEEK	This phase lasts from 0 to 2 months (0-8 weeks) during which time small chicks are kept in facilities (brooder houses) separate from laying birds.
PHASE II Growers 9-12 WEEK (some author 9-20 week)	This phase lasts about 3 months, from the ninth to the twentieth week of age.
PHASE III Layers 13-72 WEEKS	Growers are transferred from the grower house to the layer house when they are 18 weeks old to prepare for the laying cycle. Birds typically lay for a twelve-month period starting when they are about 21 weeks old and lasting until they are about 72 weeks old.

8 Poultry Breeds

American Class Poultry Breeds	<ul style="list-style-type: none">• Rhode island reds Poultry Breed• Plymouth Rock Poultry Breed• White Plymouth Rock Poultry Breed• New Hampshire Poultry Breed - large brown shelled eggs
Asiatic Class Poultry Breeds	<ul style="list-style-type: none">• Brahma Poultry Breed – light & dark
English Class Poultry Breeds	<ul style="list-style-type: none">• Sussex Poultry Breed – light & red• Australorp Poultry Breed• Orpington Poultry Breed
Mediterranean Class Poultry Breeds	<ul style="list-style-type: none">• Leg horn Poultry Breed - World's number one egg producer• Minorca Poultry Breed• Ancona Poultry Breed• Fayoumi Poultry Breed
Indian pure Breed	<ul style="list-style-type: none">• Aseel – Peela, yakub, kajal, CARI NIRBHEEK (Aseel Cross)• Chittagong• Kadaknath, CARI SHYAMA (Kadakanath Cross)• Busra -Maharashtra, Gujarat• HITCARI (Naked Neck Cross)• Miri – Assam
Krishibro	commercial Krishibro has highly resistance against the common poultry diseases like Ranikhet and Infectious bursal disease.

NABARD Mentorship by Clarity

Gram Priya	Layer type, used by rural and tribal family, 230-240 eggs, making tandoori
Vanraja	Backyard Poultry, Multicoloured

9 Utility Classification

- Game: Aseel
- Meat type : Cornish
- Egg type : Leghorn
- Dual type : Rhode Island Red
- Fancy / Exhibition type : Silky, Frizzled, Bantams, Nacked neck etc.,

10 Highest producing states

Egg	Andhra Pradesh
Poultry meat	Haryana
Meat	Uttar Pradesh

11 NABARD Model Projects

NABARD Model projects are projects which acts as guideline for granting loans. Some point in these projects which are asked in exams, compilation of such points from Animal husbandry is listed below.

11.1 Important points from Dairy Farming model – Murrah Buffalo

Floor space (sqft) per adult animal 50
Floor space (sqft) per calf 20
Lactation days 270
Dry days 150
Concentrate 5kg in lactating days and 2 Kg in dry days
Green fodder 25kg in lactating days and 20 Kg in dry days
Dry Fodder 4kg in lactating days and 5 Kg in dry days
Loan Repayment within schedule – 5years

11.2 Important points from Dairy Farming model – Cow

Lactation days 270
Dry days 120
Concentrate 2kg in lactating days and 1 Kg in dry days
Green fodder 20kg in lactating days and 15 Kg in dry days
Dry Fodder 3kg in lactating days and 4 Kg in dry days
Repayment of loan five years

11.3 INDIGINIOUS POULTRY BROILER FARMING

In India, backyard poultry, produces 30 to 35% of the eggs
Central Poultry Development Organisations (CPDOs) located at four regions viz. Chandigarh, Bhubaneswar, Mumbai and Bengaluru
Brooding - time period that the chicks need to be kept inside or with a heat lamp, Brooding arrangements are required to be provided to the day old chicks in first week.
Day old chicks will be reared for 55-60 days under deep litter system.
The birds will attain body weight of 1 kg on 60 days of their age
Most commercial broilers reach slaughter weight between four and seven weeks of age, although slower growing breeds reach slaughter weight at approximately 14 weeks of age
Repayment schedule – 5years

11.4 Poultry Layer Farming

Only 6% of the eggs produced in the country are converted into processed egg products mainly for export
Floor space per bird in brooder cum grower house (deep litter system) – 1 sft per bird
Floor space per bird in layer shed (cage system) – 0.85 sft per bird
Feed requirement upto laying, i.e. 20 weeks- 8.5 (kg per bird)
Feed requirement during laying 40 (kg per bird) - 52 weeks laying
Most hens will lay their first egg around 18 weeks of age and then lay an egg almost daily thereafter. In their first year, you can expect up to 250 eggs from high-producing, well-fed backyard chickens. So number of layer weeks is around
Repayment schedule – 8years
The incubation period for chicken eggs is 20 to 21 days , and increases up to 30 days for other poultry. After sitting for some days, a broody hen can be given some newly hatched chicks and, if they are accepted, the original eggs can be removed and replaced with more chicks.

**** Department of Animal Husbandry and Dairying, Government of India, is implementing **Poultry Venture Capital Fund (PVCF)** under “Entrepreneurship development and Employment generation” (EDEG) of National Livestock Mission. It is a bankable programme and the Central Government is providing subsidy through National Bank for Agricultural and Rural Development (NABARD) for those beneficiaries taking loan for PVCF.**

**** A **National Institute of High Security Animal Diseases (NIHSAD), Bhopal** under Indian Council of Agricultural Research (ICAR) has been specially designated as National Referral Laboratory for diagnosis of Avian Influenza**

11.5 Goat Model Project

The goat belongs to the family Bovidae (hollow-horned ruminants) and is the member of the genus Capra.

NABARD Mentorship by Clarity

For its size the goat can consume substantially more feed than cattle or sheep, viz. 6.5 to 11 per cent of its body weight in dry matter when compared with 2.5 to 3 per cent for cattle or sheep. This means that the goat can satisfy its maintenance requirement and produce milk from forage alone.

The provision of salt licks is very important for goats as they secrete a good amount of sodium and chloride ions in milk. The salt often helps to tone up the system and may even have some effect in removing worms from the body. Salt to the extent of 2 percent may also be mixed with the daily grain ration of goats.

Blue Tongue can be identified by means of clinical signs. Vector *Culicoides* transmits blue tongue virus

Goat is often called 'poor man's cow' in India
Generally one acre irrigated land can accommodate 25 goats under intensive system.
Non-leguminous fodder can be fed with leguminous fodder in 1:1 ratio and balance diet for stall-fed goat normally contain concentrate, dry fodder and green fodder in 1:1:1 ratio.
Under semi intensive system, Bengal goat, Barbari, Beatal, Jamnapari etc. are suitable. Black Bengal is one of the world famous breed available in the eastern India
Female goats are referred to as does or nannies, intact males are called bucks or billies, and juvenile goats of both sexes are called kids.
Kidding percentage – 1st Year – 140; 2nd Year – 160
Inter Kidding period (months) – 8 Buck can be kept @ 1:9 ratio in a farm and to avoid inbreeding the buck should be replaced after every eighteen months. Castrate all the male goats which are not selected for breeding at the age of 2-4 weeks. Age of sexual maturity- 10-15 months or at least 25 kg body weight. The doe giving kids after every 8-9 months with twins / triplet kids should be selected. Feed colostrum (first milk) within 72 hrs of birth
Mortality in kids (%) – 15
Culling % - 20
Gestation Period – 150 days

Recommended floor space for different age groups are as follows:

AGE GROUP	FLOOR SPACE
0-3 months	0.5 - 1.0 sq ft
3-6 months	1.0 - 2.5 sq ft
6-12 months	2.5 - 3.5 sq ft
Buck:	5 sq ft
Doe:	6.5 sq ft

Breeds

SINGHAREY: Native breed of Sikkim and also seen in adjoining Himalayan region of West Bengal and Nepal.

BLACK BENGAL: Skin is of superior quality and is in demand both in India and abroad in the footwear industry

JAMUNAPARI: Found in Etawah district in U.P. Used for dual purpose

BEETAL: Found in Punjab

Himalayan breed:

Pashmina: These are small dainty animals with quick movements. They are raised above 3400 m elevations in the Himalayas, Ladakh and Lahaul and spiti valleys. The yield of pashmina varies from **75-150 g/goat**.

Chegu: This breed is found in the mountainous range of spiti, yaksar and Kashmir. Used for draught (pack) to carry salt and small loads.

Changthangi: Horns are large turning outward, upward and inward forming a semicircular ring. yields warm delicate fibre - pashmina (cashmere, pashm).

Northern Region

The states which comes under the region are Punjab, Haryana and parts of Uttar Pradesh.

Jamnunapari: Native of Etawah district of Uttar Pradesh. These are large sized, tall, leggy with large folded **pendulous ears** and prominent **Roman nose**. They carry long and thick hair on their hind quarters and has a **glossy goat**. Horns are **short flat**. The body weight of adult bucks and does varies from 65 to 86 kg and 45-61 respectively. The average daily milk yield in 2.25 to 2.7 kg. The milk yield in a lactation period of, 250 days varies from 250 - 300 kg with 3.5 percent fat content. The Jamunapari goats have been used for evolving the famous Anglo -Nubian breed of goats in **England**. Average age at first kidding is 20-25 months.

Beetal: Mainly found in Punjab and this breed is **evolved from Jamunapari breed**. Color is red and tan, heavily spotted on white. Bucks weight 65 - 86 kg does weight 45-61 kg does yield about 1 kg milk daily, bucks may have a beard.

Barbari: This breed is found in **Etawah, Etah, Agra and Mathura** districts of U.P, kamal, Paniphat and Rothak in Hariyana, color varies with white, red and tan sports being common. These are small and short haired, with erect horns. Adult buck weighs from 36 - 45 kg and the doe from 27 -36 kg. They are usually stall fed and yield 0.90 to 1.25 kg of milk (fat 5%) per day in a lactation period of 108 days. **They are prolific breeders and usually kid twice in 12 -15 months.** This breed is highly fit for intensive rearing.

Central region

This region includes Rajasthan, Madhya Pradesh, Gujarat and northern parts of Maharashtra, Marwari, Mehsana and Zalwadi. They are **derived from Jamunapari breed**. Commonly found in Rajasthan, Gujarat and Madhya Pradesh. These breeds come in different color combinations. They yield between 0.75 -1 kg of milk per day.

Berari: found in Nagpur and Wardha district of Maharashtra and Ninar district of Madhya Pradesh. These are tall and dark colored breeds. Doe yields about 0.6 kg of milk per day. **Kathiwari:** This breed is native of Kutch, Northern Gujarat and Rajasthan. The goats have black coat with reddish color marks on the neck. The doe yields about 1.25 kg of milk per day.

Southern region

The states under these region include parts of Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu and Kerala.

Surti: Surti goats resemble Berari goats and possess white, short legs. Surti is popular in Bombay, Nasik and Surat. Does are good milk producers yielding 2.25 kg per day.

Deccania or Osmanabadi: These have originated from a mixture of the goats of the plains. They are black, mixtures of white and black or red are also found. The milk yield is 1.4 to 2.25 kg per day.

Malarbar (or) Tellicherry: found in Northern Kerala

GBRI: This is a mixture of two more type of goats. The color is not uniform and may vary from black to white. The milk yield is 0.9 to 2.8 kg/day.

Eastern Region

This region consists of West Bengal, Assam, Tripura, Orissa and Part of Bihar.

Black Bengal: The goats of this breed are found in 3 colours viz. Black, Brown and White. They are small short breeds. The meat of this breed is of superior quality. Bucks weigh 14-16 kg and nannies 9-14 kg. Does kid twice in a year, twins are common. The skin of Bengal goats are of excellent quality and is in great demand in India and **abroad in footwear industry**. Average age at first kidding is 9-10 months

Assam Hilly breed: These are smaller dwarf breeds of goats found in the hilly tract of Assam and other eastern states.

Exotic Breeds

The principal exotic dairy breeds of goats are Toggenberg, Sannen, French Alpine and Nubian. They are all noted for their higher milk yield and most of these breeds, were imported to India to improve milk yield of our local breeds and to upgrade our non-descript goats.

Toggenberg: it is originated in the Toggenberg valley in north Switzerland. Skin is very soft and pliable. Usually both male and female are hornless. The adult doe weights 65 kg or more and the bucks more than 80 kg. Average milk production is 5.5 kg per day. The butter fat content of milk 3-4 percent. The male usually has longer hair than females.

Sannen: Native of Sannen valley of Switzerland noted for its consistency and high production. Color is white or light cream. The face may be slightly dished and the ears point upward and forward. Both sexes are normally polled but sometimes horns do appear. Does weight 65 kg and the bucks 95 kg. Average milk yield is 2 - 5 kg per day during a lactation period of 8 -10 months. Milk fat 3 - 5%.

Alpine: This breed was originated in Alps mountains. It was derived from French, Swiss and Rock Alpine breeds. No distinct color has been established. Excellent milkers and they have horns. Average milk yield is 2 - 3 kg with buffer fat of 3 -4%.

Nubian: Originated in Nubia of North eastern Africa. Also found in Ethiopia and Egypt. It is a long legged and hardy animal. This breed along with Jamunapari of India together with native breeds of U.K. formed the cross bred Anglo Nubian breed of goat.

Anglo Nubian: It is a big animal with a fine skin and glossy coat, -pendulous ears and Roman nose. Anglo Nubian is known as the Jersey cow of the goat world. Udder is large and pendulous with bigger teats. There is no fixed color. Bucks weight 65 - 80 kg and does from 50 -60 kg. Average milk yield in 3 - 4 kg/day. Peak yield may even go up to 6.5 kg or more.

Angora: Originated in Turkey or Asia minor. It produces a superior quality fibre called mohair. The soft silky hairs cover the white body. If not shorn during spring the fleece drops off naturally as summer approaches. Average fleece yield is 1.2 kg. Good animals yields even up to 6 kg. The Angora is small in size with shorter legs. Horns are grey, spirally twisted and inclined backward and outward. Tail is short and erect.

11.6 Sheep Model Project

An adult female is referred to as a ewe an intact male as a ram, occasionally a tup, a castrated male as a wether, and a young sheep as a lamb.

Sheep will eat varied kinds of plants compared to other kind of livestock. This makes them excellent weed destroyer

Central Sheep & wool Research Institute, **Avikanagar, Rajasthan**

Usually the repayment period of loan for sheep farming is 6 to 8 years.

Space requirement - Shed @ **10 sq.ft for ewe,20 sq.ft for ram and 4 Sq.ft for kid**

Adult Mortality rate – 5%, Lamb mortality rate – 15%, Culling rate among ewes – 20%

Lambing 80% in first year and 90% from II year onwards

Interlambing period in months – 9

Breed

Exotic breeds of sheep	<p>Merino: Native of Spain - origin for most of the wool breeds in the world. Colour-white. Fleece yield male: 4-5 kg and ewes 3-4 kg/annum. Merinos have large number of skin folds.</p> <p>Rambouillet: Developed from Merinos in France. They are large, rugged, fast growing sheep and are good wool producers. Skin is pink. Ewes are good mothers, and prolific. Average wool yield is 4.5 to 5.5 kg.</p>
Mutton breed	<p>Suffolk - Native of U.K. large animals with black face, ears and legs. Head and ears are entirely free from wool. Average wool yield 2-3 kg. Mature rams weigh 100-135 kg and ewes from 70-100 kg.</p> <p>Dorset: Native of U.K. two types polled and horned Dorsets. Face, ears and legs white in colour and free from wool. Wool yield is 2.75 to 3.25</p>
Dual purpose breeds	<p>Corriedale: Native of New Zealand. The parent breeds involved in developing Corriedale are Lincoln, Leicester and Merino. Adult rams: 80 to 100 kg Ewes: 55 to 85 kg. Annual wool production: 4.5 to 5.5 kg. Both sexes are polled. Colour: White may have black spots.</p>
Others	
Rambouillet	Developed from Merinos in France . They are large, rugged, fast growing sheep and are good wool producers. Rambouillets imported from Texas (USA) to India. Average wool yield 4.5 to 5.5 kg.
Corriedale	Native of New Zealand
Karakul	They are of poor mutton quality and fleece is also very coarse. Karakul is mainly raised for their pelts (Fur).
Neelgiri	wool purpose breed
Trichy	wool purpose breed
Mandya & Nellore	South breed of sheep. Nellore is the tallest breed of sheep in India, resembling goats in appearance
Decanni	The wool is of a low grade and is a mixture of hair and fine fibres, mostly consumed for the manufacture of rough blankets (Kambals)

11.7 Pig Model Project

The pig has got highest **feed conversion efficiency** i.e. they produce more live weight gain from a given weight of feed than any other class of meat producing animals **except broilers**

They are prolific with shorter generation interval. A sow can be bred as early as 8-9 months of age and can farrow twice a year. They produce **6-12 piglets** in each farrowing. In most pig units, daytime farrowing is preferable, being easier to manage and more efficient for the business.

Pigs are known for their meat yield, which in terms of **dressing percentage ranges from 65-80% in** comparison to other livestock species whose dressing yields may not exceed 65%.

Pork is the most nutritious with high fat and low water content and has got better energy value than that of other meats. It is rich in vitamins like Thiamin, Niacin and Riboflavin.

Pig farming provides quick returns since the marketable weight of fatteners can be achieved within a period of 6-8 months.

The exotic breed mainly comprises Hampshire, Large White York Shire, Duroc, Landrace, and Tamworth while some of the popular indigenous pig breeds include Ghungroo, Niang Megha, Ankamali, Agonda Goan and Tany-Vo. The indigenous breeds are small sized, slow growing, produce small number of litters and have low quality pork. India's average meat yield of indigenous breeds is around **35 Kg/animal, which is quite low in comparison to world average of around 78 Kg/animal.**

The eastern and north eastern regions of the country comprise around 63 percent of the pig population. The highest pig population is in state of Assam

Purchase animals in two batches at the interval of three months.

Cull the old animals after **10-12 farrowings.**

For every 10 sows one boar must be maintained for maximum fertility.

Breed the animals when it is in peak heat period (i.e. 12 to 24 hours of heat).

Male piglets not selected for breeding should be castrated preferably at the age of 3-4 weeks which will prevent the boar odour in the cooked meat thus it enables production of quality meat.

The sale of **piglets at 2-3 months** of age will yield quick returns and enables the pig farmer to concentrate their efforts on maximizing the productivity of breeder stock

Pregnancy in pigs lasts for 3 months 3 weeks and 3 days. A well-fed sow will produce at least 10 piglets (litter) from each pregnancy and may have 2 litters each year. The average gestation period of sow is about 112-115 days the normal litter size is 8-10 piglets. Older sows as larger litter size with high birth weight.

Male piglets not selected for breeding should be castrated preferably at the age of 3-4 weeks which will prevent the boar odour in the cooked meat thus it enables production of quality meat. Boars should not be used for breeding earlier than 8 months of age. A young boar can be used for 15-20 sows in a season and older ones may be used for about 25-45 sows.

Creep feeding: Piglets take dry feed at 2-3 weeks. Provision of additional nutrients at this time is essential to have maximum growth and development. Creep feed is also called as pig starter for vigorous growth the thriftiness, sows milk alone is not sufficient for piglets. Creep feed contains 25-30% CP. Creep is a device by which piglets are allowed access to the concentrate mixture. It may be arranged at the corner of farrowing pen. Creep feed is fed from 14-56 days. The composition is as follows.

Weaning of piglets: Usually weaning is done at 7-8 weeks. The sow should be separated from the piglets for a few hours each day to prevent stress of weaning and its feed is reduced gradually.

Breeds

Large White Yorkshire	Yorkshire sows are noted as good mothers. Most extensively used exotic breed in India.. It is an excellent breed for the purpose of crossbreeding
Middle White Yorkshire	The breed is accepted as excellent pork pig, reaching slaughter weight early and with a high percentage of lean meat to bone.
Landrace	The origin of this breed is Denmark, where it has been bred and fed to produce the highest quality bacon in the world.

	Desi	Exotic
Litter size at birth	7.5	10
Birth weight (Kg.)	0.91	1.4
Weaning weight (kg.)	4.1	13.5
Weaning percentage	54	78.5
Dressing percentage	66	68
Maturity (Months)	14	8 - 10

12 Mixed Farming

Mixed farming is a type of farming which involves both the growing of crops and the raising of livestock

S.No.	Wetland	Dryland	Rainfed land
1.	Crop	Crop	Crop
2.	Livestock farming	Livestock farming	Buffalo farming
3.	Fish farming	Goat rearing	Goat rearing
4.	Goat rearing	Poultry	Agro forestry
5.	Poultry	Mushroom seed Production	
6.	Pigeon growing	Sericulture	
7.	Mushroom growing	Gobar gas	

12.1 Types of Poultry Enterprise

	Backyard poultry	Farm flock	Commercial poultry farm	Specialized egg production	Integrated egg production
Subdivision of egg production	Pullet growing, feed production	Hatchery production separate from farming	Feed production separate from poultry farms	Chicken meat production becomes independent of egg production	Separate enterprises reintegrated as a business
Main management characteristics	Natural hatching	Artificial hatching and sexing	Feed mixing	Egg processing plant	Controlled- environment houses
Type of farming	Subsistence farming	Mixed farming	Joint egg and meat production	Eggs industry(single commodity)	Egg complex
Labour	Part-time	Part-time	Full-time	Division of management and labour	Separate daily work and random work
Building	Free range	Water feeder	Water feeder	Manure disposal equipment	Egg belt automatically controlled house

12.2 Relationship- Complimentary & Obligatory

Crop production along with other enterprise like poultry and livestock can be complimentary or obligatory depending upon the type of farming system and requirement. By complimentary it refers to the fact that often different species of livestock (cattle, horses, sheep, goats, pigs, chickens) can graze on the farm at the same time without really competing with each other. This is due to the fact that they are all quite selective in what they eat and they mostly eat different things. The relation becomes obligatory when you are practicing Organic farming crop requires organic manure and livestock requires green feed.

13 Classification of Diseases:

A. According to mode of origin

1. Hereditary diseases: are transmitted from parents to the offspring.
2. Congenital diseases: are acquired during intra-uterine life.
3. Acquired diseases: are acquired after birth.

B. According to specific causes:

a) Specific diseases: are produced by a specific pathogen or factor. They are subdivided into

- i) Infectious diseases: are caused by pathogenic organisms.
- ii) Non-infectious diseases: are caused by physical or chemical or Poisonous agents, nutritional deficiency or disturbed metabolism.

E.g.

1. Deficiency diseases – Rickets.
2. Metabolic diseases – Milk fever
3. Poisoning – Pesticide poisoning

b) Non-specific disease: those diseases whose causes are indefinite or multiple e.g. Pneumonia

C. According to mode of spread:

1. Contagious disease: sprout by means of direct or indirect contact, e.g. FMD; HS All infections discuses may or may not be contagious but all contagious dieses are injections.

2. Non-contagious diseases: do not spread by means of direct or indirect contact. E.g. Rickets.

D. According to clinical signs:

1. Preacute disease is characterized by very short course (few hours to 48 hours) and very server symptoms e.g. Anthrax,

2. Acute disease is characterized by a sudden onset, short course (3-14 days) and severe symptoms e.g. FMD, RP.
3. Subacute disease: whose course is 1-4 weeks and severity is less than acute one. E.g. Sub acute mastitis
4. Chronic disease: whose course is more than 4 weeks and signs are not severe in character e.g. Tuberculosis

E. According to intensity and spread of diseases:

1. Sporadic disease: affects one or few animals and shows little or no tendency to spread within the herd e.g. Johne's disease.
2. Enzootic/Endemic disease: means an outbreak of disease among animals in a definite area or particular district. E.g. Anthrax, H.S.
3. Epizootic/Epidemic disease: which affects a large population of animals in large area at the same time and spread with rapidity e.g. FMD, RP.
4. Panzootic /Pandemic disease: is a widespread epidemic disease of world wide distribution e.g. Influenza
5. Zoonotic disease: a disease which can be transmitted from animal to man and vice versa e.g. Anthrax, Brucellosis.

13.1 Disease

- Cabinet announced a special scheme for control of **Foot and Mouth Disease (FMD) and Brucellosis**.
- The entire cost of the scheme is to be borne out by the Central Government.
- The scheme includes vaccination coverage to 30 crore bovines, 20 crore sheep or goat, and 10 million pigs.
- Brucellosis control program shall extend to cover 100% vaccination coverage of 3.6 crore female calves.

Disease	Causal Organism
Anthrax	Bacteria cause Septicemia
Black Quarter	Bacteria,
Brucellosis	Bacteria

Foot and Mouth	Virus
Milk Fever	Due to fall in serum calcium
Mastitis	Bacteria

13.2 Foot and Mouth Disease



Foot and mouth disease is a highly communicable disease **affecting cloven footed animals** and is characterized by fever, formation of vesicles and blisters in the mouth, udders, and teats and on the skin between the toes and above the hooves. Animals recovered from the disease, present a characteristically rough coat and deformation of the hoof. In India, the disease is not serious for livestock and seldom progresses to a fatal issue, but it occurs practically all the year round and, being widespread, it assumes a position of importance in livestock industry. Although buffaloes, sheep and goats are also susceptible to the disease, they are seldom affected. Under experimental condition, goats have been found to be more susceptible than sheep.

The disease spreads very commonly by direct contact or, indirectly, through infected water, manure, hay and pastures. It is also conveyed by cattle attendants through their clothes or through their hands when the latter have been recently used in milking affected animals. It is known to spread through recovered animals, field rats, porcupines and birds, while improperly sterilized canned meat may also be a vehicle of the infection

The virus and its characters:

The virus occurs in a high concentration in the lesions of the mouth, feet and udder. At the height of temperature the virus is present in the blood in a low concentration and becomes soon localized in vesicles in the parts of the body mentioned above.

Symptoms:

The virus gains entry into the circulating blood of animal through injury in the lining membrane of the mouth, tongue, intestines, clefts of hooves and other similar parts. The incubation period in natural infection is about two to five days. In artificial infections, the temperature rises to 104 to 105°F. In about 24 to 48 hours and at this stage the virus occurs in the circulation, being eventually carried to distant parts of the body, where it causes the formation of vesicles.

Diagnosis: Its quick spread and the occurrence of lesions in the feet of affected animals are characteristics of the foot-and-mouth disease. It presents some similarity to Rinderpest from which, however, it is readily differentiated by the absence of diarrhoea and by the

presence of foot lesions. Confirmation of the diagnosis may, where possible, be obtained by the intradermal inoculation of vesicular fluid or a suspension of vesicular epithelium into guinea pigs which, as a result of such inoculation, usually develop characteristic lesions of the disease.

Treatment:

No scientific evidence is obtainable in support of claims that foot and mouth disease is curable by the use of therapeutic agents. The use of drugs by field workers is only resorted to as a measure of aiding in the natural process of recovery. Thus, the external application of antiseptics contributes to the healing of the ulcers and wards off attacks by flies. A common and inexpensive dressing for the lesions in the feet is a mixture of coal tar and copper sulphate in the proportion of 5: 1.

Control and prevention:

Prevention is known to be the only dependable method of dealing with foot-and-mouth disease. In countries where the disease does, not exist or where its incidence is very low, legislative action has been taken to make it obligatory to notify all suspected cases of foot-and-mouth disease. The usual measures adopted in these countries consist in the slaughter of all affected and in-contact animals, a thorough disinfection all utensils and clothes of attendants and a strict watch over animals in the neighboring areas. The slaughtered animals are buried to a depth of five feet in the ground and covered with lime and earth. The affected premises are not used for at least 30 days, and are tested for infectivity at the end of this period by allowing small groups of animals into them to commence with.

13.3 Black Quarter – Animal Disease

- Synonyms: Black – leg, Farrya
- It is an acute infectious and highly fatal, **bacterial disease of cattle**. Buffaloes, sheep and goats are also affected. Young cattle between 6-24 months of age, in good body condition are mostly affected. It is soil-borne infection which generally occurs during rainy season. In India, the disease is sporadic (1-2 animal) in nature.
- Etiology: It is caused by *Clostridium chauvoei*
- Transmission: The disease spreads through Ingestion of contaminated feed and Contamination of wounds.

13.4 Mastitis – Animal Disease

- Synonyms: Mastitis, Dagadi
- Mastitis-**denotes an inflammation of the udder**, this disease is responsible for heavy financial losses to dairyman due to discarding of abnormal milk, reduced milk production and butter fat, decreased market value of cow and cost of drugs and veterinary services.

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- In addition to this, the mastitic milk causes dreadly diseases like tuberculosis, brucellosis, sore throat, food poisoning etc. in human beings.
- Etiology: Infectious agents:
 - Bacteria – Streptococcus, Staphylococcus, E. coli
 - Viral diseases – Cow pox, FMD
 - Fungus – Aspergillus, Candida, Cryptococcus
 - Mycoplasma
- Detected – **strip cup test**

13.5 Rinder Pest – Animal Disease

- Synonyms: Cattle plague, Bovine typhus, Bulkandi
- It is an acute highly contagious viral disease of ruminants and pig. Crossbred and young cattle are more susceptible to this **virus**.
- Etiology: It is caused by paramyxovirus.
- **Postmortem findings – Zebra markings in intestine.**

13.6 Infectious Bursal Disease (IBD-GUMBORO)

- Gumboro is very important **viral disease** noted in almost all part of the world and was first reported in 1962 in U.S.A. Sudden onset in young chicks preferably broilers in acute form with high mortality is a characteristic symptom. Mortality reaches at peak quickly and returns to normal usually after a course of 5 to 10 days. The survivals show retarded growth and often unproductive.
- **Enterotoxaemia and Pulpy Kidney – Animal Disease**
- The first named condition affects adult sheep and the second young lambs, both being caused by Clostridium welchii, Type D. Both diseases run an acute course and are highly fatal.

14 Pregnancy testing in cattle

1. Use of ultrasonic devices: It can be tested 30-35 days of pregnancy.
2. Progesterone assay:
3. Pattern of Vaginal Smear:
4. Immunological Techniques: In this, serum from pregnant animals tested which shows containing a factor "early pregnancy factor" (EPF)
5. Barium chloride test: When 5-6 drops of 1% barium chloride solution is poured to 5 ml. of urine clear white precipitate is formed in non-pregnant cows
6. Pregnant mare serum test (PMS): This test is presently applicable to mares only. It is conducted by using 10 ml blood serum collected from mare between 50-85 days after fertilization..

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7. Scanning: The pregnancy can be easily diagnosed by the equipment called '**oviscan**' in sheep, cattle, horses & dogs. The equipment helps to establish pregnancy within 30 days of fertilization in sheep.

NEXT – PART X

Fishery

Fisheries: Fisheries resources, management and exploitation - freshwater, brackish water and marine; Aquaculture- Inland and marine; biotechnology; post-harvest technology. Importance of fisheries in India. Common terms pertaining to fish production.

Feedback can be submitted to E-Mail: Clarity4sure@gmail.com

Notes will be updated as and when required and reposted in telegram channel

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Q1. Which of the following best defines Roughages?

- a. **More than 15 percent crude fiber and less than 50 percent DCP**
- b. **Less 15 percent crude fiber and More than 50 percent DCP**
- c. **More 18 percent crude fiber and less than 60 percent DCP**
- d. **Less than 18 percent crude fiber and less than 60 percent DCP**
- e. **None**

Q2. 1) Antibiotics 2) Enzymes 3) Hormones are examples of

- a. Growing Ration
- b. Concentrates
- c. Feed Supplement
- d. Feed Additive
- e. None

Q3. Which of the following Fodder is also known by name "ELEPHANT GRASS"?

- a. Lucerne
- b. Napier Grass
- c. Berseem
- d. Fodder Maize
- e. None

Q4. What is Floor space per calf according to NABARD Model project for Murrah Calf?

- a. 10 sft
- b. 20 sft
- c. 30 sft
- d. 40 sft
- e. 50 sft

Q5. When calf reach **months of age**, one should then transfer the calves to a "**growing**" grain ration?

- a. 1
- b. 2
- c. 3
- d. 4
- e. 5

Q6. CALF SCOURS in cattle is due to?

- a. Excessive weight

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- b. Excessive work
- c. Excessive feeding
- d. Excessive Medicine
- e. None

Q7. 1kg of straw can replace how many Kg of Grass in cattles?

- a. 1-2
- b. 2-3
- c. 3-4
- d. 4-5
- e. 5-6

Q8. As per NABARD Model Project what is ratio of Concentrate: Green fodder: Dry fodder in Lactating cows?

- a. 1:10:20
- b. 1:15:10
- c. 1:15:4
- d. 1:10:15
- e. None

Q9. Which of the following chemical is used to wash udder of cow before milking?

- a. Citric Acid
- b. Sodium benzoate
- c. Formaldehyde
- d. Potassium Permanganate
- e. None

Q10. Milking machine should create a pressure of how many Hg to Milk Buffaloes?

- a. 100
- b. 200
- c. 300
- d. 400
- e. 500

Q11. How many bulls are required for breeding of 50 breedable cows?

- a. 1
- b. 2
- c. 3

- d. 4
- e. 5

Q12. How many litre of first milk i.e. Colostrum is being provided to calf for first three days?

- a. 1-1.25 ltr
- b. 2-2.25 ltr
- c. 3-3.25 ltr
- d. 4-3.25 ltr
- e. None

Q13. Which of the following hormones help in MILK Letdown?

- a. Progesterone
- b. Thyroid
- c. Oxytocin
- d. Zeranol
- e. Estradiol

Q14. Dehorning of cattle is done in how many days?

- a. 7-10
- b. 10-18
- c. 14-21
- d. 18-24
- e. None

Q15. Which of the following milking frequency is considered best?

- a. Once
- b. Twice
- c. Thrice
- d. Four times
- e. None

Q16. The usual floor space required in BATTERY system of poultry rearing is?

- a. 20x10 inch
- b. 10x10 inch
- c. 14x16 inch
- d. 16x22 inch
- e. None

Q17. What is depth of litter required in Deep litter system of poultry rearing?

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- a. 1cm
- b. 2cm
- c. 3cm
- d. 4cm
- e. 5cm

Q18. In fowl eggs take how many days to HATCH?

- a. 7 days
- b. 14 days
- c. 21 days
- d. 28 Days
- e. None

Q19. Typically birds start laying after how many weeks?

- a. 10
- b. 15
- c. 20
- d. 25
- e. 30

Q20. Young female chicken of 9-20 week age and has started laying is termed as?

- a. Snood
- b. Pullet
- c. Chick
- d. Croiler
- e. Grower

Q21. Blue tounge disease in Goat is caused by?

- a. Virus
- b. Protozoa
- c. Bacteria
- d. Fungus
- e. None

Q22. Inter kidding period for goat is how many months?

- a. 3
- b. 5
- c. 8

- d. 10
- e. None

Q23. Pashmina yield how many gram of wool per goat?

- a. 30-50 gm
- b. 50-75 gm
- c. 75-150gm
- d. 100-200 gm
- e. None

Q24. Which breed of Goat is known for PENDULOUS ears?

- a. Beetal
- b. Black Bengal
- c. Jamunapari
- d. Barbari
- e. None

Q25. Dressing % of pigs range from?

- a. 30-40
- b. 40-60
- c. 60-70
- d. 65-80
- e. None

Q26. 3month 3 week and 3 days is Gestation period for?

- a. Goat
- b. Pig
- c. Sheep
- d. Cow
- e. Buffalo

Q27. Milk fever in cattle is caused by?

- a. Bacteria
- b. Drop in calcium level
- c. Virus
- d. Drop in Potassium level
- e. None

Q28. Act of parturition is called as "WHELPING" in?

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- a. Goat
- b. Sheep
- c. Swine
- d. Ass
- e. Horse

Q29. Which of the following breed of goat is popular in foot wear Industry?

- a. Beetal
- b. Barbari
- c. Chegu
- d. Bengal
- e. Deccani

Q30. National Institute of High Security Animal Disease is in?

- a. Avikanagar
- b. Bareilly
- c. Bhopal
- d. Bangalore
- e. None

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