

**Course Code:ASC1**

**Course Title: Fundamentals of Animal Science**

**Credit Hours: 3 (2+1)**

**Full Marks: 75**

**Theory: 50**

**Practical: 25**

### **Objective**

Upon the successful completion of the course, the students will be able to identify and recognize different breeds of common domestic animals and birds and will understand their management skill, nutrition and feeding principles, breeding concept and housing requirement, milk and milk formation and let down mechanism.

### **Syllabus**

Introduction, importance, scope and statistics of livestock in Nepal, terminologies, Common breeds of livestock in Nepal, care and management of different group of ruminant, non-ruminant and poultry, Housing different group of animals, feeding and nutrition, general breeding practices, common animal products

### **Course breakdown**

#### **Theory**

<b>SN</b>	<b>Topic</b>	<b>Lectures</b>
1	Introduction, Importance, scope and problems and statistics of livestock and their products in Nepal	1
2	Vocabulary of animal production and common managerial practices in livestock and poultry farming	1
3	Breed characteristic of indigenous and exotic breeds recognized in Nepal- Cow, Buffalo, Sheep, Goat, Pig and poultry.	2
4	Care and management of ruminant animals- calf/kid, heifer/grower, dry/suckling, pregnant, breeding male and draft animals	2
5	Care and management of non-ruminants- Piglets/chick, gilt/pullet, sows/layers, broiler finisher and breeding boar	2
6	Housings requirements- types, floor space, feeder and waterer and construction materials for cattle, goat, pig and poultry	2
7	Waste disposal/utilization, sanitation and bio-security	1
8	Feed classification and common feedstuffs and their nutrient content in Nepal	1
9	Feed formulation and feeding standard for ruminant and non-ruminants	2
10	Use of NPN compounds, feed supplements and feed additives	1
11	Functions and deficiency symptoms of protein, carbohydrate and ether extract	1
12	Functions and deficiency symptoms of macro/micro minerals and Vitamins	1
13	Storage, processing and mixing of diet and feed ingredients	1
14	Feeding management and nutrient requirement of ruminant and non-ruminant	2
15	Systems of breeding and selection methods	1
16	Heritability, dominant and recessive gene, calculating gene frequency	1
17	Herd/flock records and performance testing	1
18	Global warming and its impact on livestock farming methods of mitigation	1
19	Definition, composition and nutritive value of milk in the human diet	2
20	Factors affecting milk composition and adulteration of milk	2
21	Flavors and off- flavors in milk	1

22	Hormones related to mammary gland development and milk let down process	1
	<b>Total</b>	<b>30</b>

### **Practical**

<b>SN</b>	<b>Topic</b>	<b>Lectures</b>
1	Visit of a dairy farm, poultry farm, piggery and observe housing systems, breeds and records in nearest commercial farm	1
2	Identification of different equipment used in animal and poultry farm	1
3	Casting, castration and docking	2
4	Ration formulation for dairy animal, pig and poultry	3
5	Debeaking, vaccination, dipping and drenching	2
6	Cleaning and disinfection of the barn/shed	1
7	Identification of feeds and fodder	1
8	Different methods of animal identification/numbering	2
9	Grooming of dairy cow and practice on hand milking	1
10	Fat, SNF and Total solid determination of milk	1
	<b>Total</b>	<b>15</b>

### **References**

- 1 A Text Book of Animal Husbandry, GC Banerjee, Oxford and IBH
- 2 Livestock and Poultry Production, Singh and Moore
- 3 Livestock Production Management, Sastry *et al*, Kalyani Publisher
- 4 Principles and Practices of Dairy Farm Management, Jagdish Prasad, Kalyani Publisher
- 5 Poultry Husbandry, Jull, M. A, Tata McGrawhill Publisher
- 6 Outlines of Dairy Technology, Sukumar De, Oxford and IBH Publisher
- 7 Poultry Production and Management, Prasad and Niraj, Kalyani Publisher

## INTRODUCTION, SCOPE AND STATISTICS

### Introduction

Livestock plays a very important role of agriculture production system of Nepal. The share of agricultural sector is about 33 percent in the national Gross Domestic Products (GDP). The share of livestock to national AGDP is about 24% of agricultural production. The agriculture GDP in 1984/1985 was 51.22% as compare to 39.16 in 2002/2003, 38.15 in 2004/2005, 34% in 2009/10 and 33% in 2015.

Agricultural production alone is not sufficient to meet the food requirement of the people. This is especially true in the mountain and hill of the country. Livestock and crop farming are dependent on each other in Nepal because of the small land holding by majority of farmers. Mixed crop animal farming system has been traditionally practiced. In most cases, these integrated farming systems have been proved to be sustainable and efficient. Livestock act as insurance against crop failure. Livestock are dependent primarily on crop by-products and take care by surplus family labor, which may not have immediate opportunity cost in the village. Sustainability of agricultural production has received greater emphasis during recent years because of continuing increase in human population accompanied by degradation of the global environment and the need to increase food production from limited cultivable land.

Livestock constitutes an integral part of agriculture in the developing countries, because of their motive power which is essential for agricultural operations in a small land holding situation. Livestock supplies milk, meat, wool, skin, manure and other important commodities for the betterment of humankind. Nearly 20 percent household cash is earned through livestock. Often neglected in calculations of livestock's contribution is the value of draught power. Livestock are the only source of plowing, crop harvesting and transportation in the hill and mountain thus by contributing millions of rupees input.

### Importance and Scope of Livestock farming

Livestock can be utilized for agricultural development through following ways to make this enterprise sustainable:

#### 1. Food Source

##### Milk

Milk is regarded as the best food materials among all class people. Milk contains protein fat, solid not fat (SNF), vitamins, minerals and other elements required for the good health of people. The annual milk production from cattle and buffalo in the year 2009/2010 was 1497429 MT, where buffalo contributed 1068300 MT. and cow contributed 429129 MT.

##### Meat

Meat and meat products are important sources of nourishment for mankind. Meat contains high quality absorbable protein as compare to vegetable source, and it contains all the essential amino acids. Meat is good source of fat which provides heat and energy. Meat is rich in phosphorous, iron and copper consider as important minerals. It is also good source of vit. "B" and fat soluble vitamin "A". The annual meat production for the year 2009/10 was recorded as:

Buffalo	:	162358 Mt.
Mutton	:	2705 Mt.
Goat	:	50315 Mt
Chicken	:	17551 Mt
Pig	:	17059 Mt
Duck	:	225 Mt.
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Total	:	<b>250213 Mt.</b>

Source: Agri. Business Promotion and Statistics Division. Ministry of Agriculture and Cooperatives 2009/2010.

### **Eggs:**

The number egg production is expected to grow by 2.98 percent. So, the total number of eggs produced in the country is estimated at 648 million of which 635 million eggs (98%) is from fowl and the rest 13 million eggs (2%) is from ducks. The more eggs are produced from hill than terai and the least produced from the mountain. In egg production, percentage share of different ecological belts are as below.

<b>Belts</b>	<b>Hen</b>	<b>Duck</b>	<b>Total</b>
Mountain %	6	1	6
Hills %	51	15	50
Terai %	43	84	44

## **2. Source of Draft Power**

Animals are the largest contributors of farm power in Nepal. Plowing the field, transportation of goods, threshing different kinds of crops, crushing sugarcane, pulling the cart are the major activities performed by animals. It is estimated that 2 millions bullocks are used for draft purpose in Nepal. In the mid-western hills, sheep and goats are used to carry load. One individual animal can carry up to 6-8 kg load.

## **3. Source of Fertilizer and Energy**

Dung, urine and other by-products of animals are converted into valuable manure by composting. Farm yard manure (FYM) is a good source of nitrogen and mineral for crop production. An adult cattle/buffalo produces about 11 tons (30 Kg per day) of Fresh manure per year. In Nepal cattle/buffalo manure is an important source of fertilizer. In the hill and mountain region, it is the only source of fertilizer that has been used in the crop field. Considerable quantity of cattle/buffalo dung is also converted into cakes which are used for fuel purpose for cooking and other domestic works. Fresh dung is also use to produce Gas for cooking and light.

## **4. Source of Livestock Feed**

A large amount of slaughter house by-product and significant quantity of carcass and carcass wastes are - being processed for manufacturing of meat meal, blood meal, bone meal etc. for farm animals and poultry.

## **5. Source of Woolen Products**

Sheep is mostly reared for wool and meat. Hand knot carpets made out of wool are exported in Germany and other European countries. Winter wear like Radi, Pakhi is widely used by mountain people which are made out of sheep and Chyangra wool. The sheep population in Nepal is 8,01,371 (2009-2010) in number and the wool production is about 600 tons annually.(0.75Kg/animal).

### **Scope**

- Requirement of meat, milk and their products is higher than the production. Requirement and need of milk/head/day recommended by Indian council of medical research is 283 ml/day. Daily meat requirement is 45 g. /person/day.
- Climate and geographical factor is favorable to keep different livestock species in different parts of the country. Such as Yak, Nak can be raised successfully in the Himalayan range.

- Reduce the cost of inorganic fertilizer by using manure.
- Barren, unfertile land can be utilized for housing and construction in which agricultural farming is not possible.
- Utilization of animal by products such as meat meal, bone meal, blood meal etc.
- Utilization of agricultural by products such as straw, bran, oil cakes etc.
- Utilization of Industrial waste like molasses, grain godown sweeping etc.
- Scope to export animals and animal product to foreign countries there by earning of foreign currency. (eg. Import of live animals from India alone Rs. 26,8300,000/- where as export is Rs. 41 million only).
- Employment opportunity. All the family members may be employed partially or full time.

### **Problems/Constraints**

1. **Economic condition:** Majority of Nepalese farmers have small size land holding. Because of the limited space for grazing and the production of pasture, livestock farming becomes difficult. Farmers cannot afford the expensive feed for their animals. High yielding improved breeds of livestock are also expensive to purchase and also they need special care to grow better.
2. **Technical knows how:** Poor knowledge about breeding, feeding, management and lack of facilities hinders the farmer to get profit out of this business. Well trained technician are also not available in remote areas.
3. **Market facility:** Market is always becoming a problem to the livestock producers. Marketing of livestock and their products are not systematized. Middleman always gets opportunity to take benefit by paying fewer efforts. Livestock product is being sold at lower price from the farm gate which is later sold in higher price to the consumer by middle man. Animal product processing facilities are also very poor in this country.
4. **Credit facility:** Development of a credit system started in the 1950's. Although the system has undergone an impressive development it only supplies about 25% of the total credit to rural sector. About 90% of the credit to the agricultural sector is supplied by the Agriculture Development Bank of Nepal.
5. **Religious constraints:** Muslims and majority of Hindu community do not eat pork and they do not keep swine to their farm. Improved breed of different species needs extra care and balanced diet to grow better, while indigenous breed can be taken care by providing with a comparatively simple agricultural by products and locally available grasses.
6. **Shortage of grass land:** Forests are being overgrazed. Cutting of the forest is becoming a continuous phenomenon to fulfill the need of fire wood. Looping of fodder leaves, seasonal burning of the forest caused fast destruction of the grazing area. The lack of fodder hinders the overall growth and production of livestock output and cause poor health condition of the animals. It is estimated that the food deficit is up to 40 per cent.
7. **Control of disease and Parasites:** Preventive measures for disease and parasites are rarely taken into consideration. Farmer runs after the technician only when animals are severely affected by disease. Because of the no availability of the appropriate medicine in the rural areas, animal cannot be treated properly. Only those farmers who live near the city area may take advantage of trained technician and receives correct medicine for their animals.
8. **Insurance Scheme:** Livestock insurance scheme have recently introduced and therefore it is not widely known and applied. The national Insurance Company established in 1988/89, was

basically for the large commercial farms. Only a few farmer have make use of this scheme which has limited geographical coverage.

- 9. Support System:** The activities of various organization like Government, NGO's and INGO's are responsible for agricultural development but their role are not seen effective. These organizations are more interested to support farming system rather they are interested in other activities.
- 10. Costly feed:** Almost two third of total running cost is feed cost. It is one major area of investment. Almost of our Nepalese farmers are not able to afford costly feed which they required for their animals.
- 11. Poor transportation facility:** In our country most of transportation is road transportation and there is no any railways treks. Proper designed animals' transportation is not available in our country.
- 12. Others:** Low genetic potential for production (low productive breed), adverse effect of climate (temperature, solar radiation, humidity, precipitation, etc)

### Terminology Used in Livestock Production

**Breed:** It is groups of animal that are result of breeding & selection have certain distinguishable characteristics. / A group of animals related by decent & which are similar in most of the characters like general appearance, size, colors, horns it is called breed. / A breed may be defined as a cluster domestic animal of a species where individuals are homogenous in certain distinguishable characteristics which differ from one to other group of animals.

**Species:** A group of individuals which have certain common characteristics that distinguish them from other group of individuals with in species the individuals are fertile when in different Species they are not.

**Sire:** The male parent of the calf.

**Dam:** Female parent of the calf.

**Calf:** Young one of cattle or buffalo below the age of six months is called calf.

**Heifer:** The younger female of cattle above age of six months to first calving.

**Cow:** The adult female of cattle from the date of first calving is called cow.

**Bull:** It is unsaturated of, cattle used for breeding or covering the cows.

**Bullock:** It is the castrated male of cattle used for work.

**Service:** The process in which mature male covers the female i.e. in heat with the object to deposit spermatozoa in the female genital tract is called service.

**Conception:** The successful union of male and female gametes & implantation of zygote is known as conception.

**Gestation:** It is the condition of female when developing foetus in present in the uterus.

**Gestation period:** The period from the date of service (actual conception) to the date of parturition is termed as parturition period or pregnancy period. This period varies according to species of animals e.g. is cows 279-283 days, in buffalo 310 days, sheep 148-152 days, goat 150-152 days

**Parturition:** The act of giving birth to young one is called parturition.

**Lactation period:** The period after parturition in which the animal produces milk.

**Dry period:** The period after lactation in which the animal does not produce milk.

**Calving interval:** The period between two successive calving is calving interval.

**Average:** It is the sum of production divided by No. of animals.

**West Average:** It is the average daily milk yield of a cow is lactation.

$$\text{W.A} = \frac{\text{Total milk yield. of a lactation (kg or Lt).}}{\text{Lactation period (days)}}$$

**Herd Average:** It is average daily milk yield of milking animal in a herd.

$$\text{H. A.} = \frac{\text{Total milk yield of a day}}{\text{No. of milking animals}}$$

**Overall Average:** It is average daily milk yield of the animal in the period of calving interval.

$$\text{O.A.} = \frac{\text{Total milk yield of lactation}}{\text{Calving interval (days)}}$$

**Environment:** The sum of all external influences to which an individual is exposed.

**Genotype:** The complete genetic makeup of an individual- or its combination of genes it possesses which influences its characters. Several different genotypes may.

**Phenotype:** The external appearance or some other overall or measurable characteristics of an individual or it is the actual expression of the character as determined by his genes & the environment in which he has lived.

**Half sib:** Half brothers or half sisters

**Full sib:** Full brothers or full sister.

**Heredity:** The occurrence of genetic factors derived from each of its parent in an Individual.

**Heritability:** The percentage of variation in individual characteristics between related individuals which is due to true genetic difference.

**Repeatability:** It is the expression of the same trait at different times in the life of the same individual or the tendency of an individual to repeat its performance e.g. dairy cow in successive lactation.

**Allele:** One or two or more alternative forms of a gene. Alleles are those genes which may appear at same locus in homologous chromosome.

**Gene:** It is the unit of inheritance, which is transmitted in gametes or reproductive cells. It is the physical basis of heredity.

**Dominance:** A gene is said to be dominant when its characteristic effect is expressed in the heterozygote as well as homozygote, i.e.  $Aa < AA$ . Ability of gene to cover in block out expression of its allele or genes that have observable effect when present in any one member of a chromosome pair.

**Recessive:** Which genes have number observable effect unless present in both members of a chromosome pair.

**Lethal:** (Deadly) A gene or genes that cause death of an individual which are possessed by them during pregnancy or at the time of birth.

**Prepotency:** The ability of certain individuals to stamp or impress their characters upon their offspring or prepotency is the ability to transmit characteristics to offspring to a marked degree.

**Fertility:** Ability of an animal to produce large number of living young.

**Fecundity:** It is the potential capacity of the female to produce functional ova regards of what happens to them after they are produced.

**Sterility:** Inability to produce any offspring.

**Free martin:** A sterile heifer born twin with the male.

**Cryptorchids:** The failure of testes to descend fully into the scrotum. If one testes is in scrotal position the male is usually fertile but if both are retained in the abdominal cavity sterility usually reported.

**Atavism:** The reappearance of a character after it has not appeared for one or more generation.

**Buller:** Cow always in estrus condition.

**Teaser:** A vasectomized (castrated) bull used to detect the heat or estrus of female (cow).

**Herd:** It is a group of cattle or buffalo.

**Flock:** It is the group of sheep, goat or poultry birds.

**Steer:** The male cattle that is castrated when he is still a calf or before the development of sexual maturity is called steer.

**Veal:** The meat of calf below the age of 3 months.

**Beef:** The meat of- cattle past calf stage.

**Pork:** The meat of swine.

**Mutton:** The meat of sheep & goat.

**Chevon:** The meat of goat

**Wedder:** A castrated sheep is called wedder.

**Prolificacy:** Ability to produce large number of offspring. The animal is said to be prolific.

**Variation:** The degree to which individuals differ with respect to the extent of development of expression of characteristics.

**Puberty:** It is the period when reproductive tract & secondary sex organs/characteristics start to acquire their mature form. Before onset of puberty the reproductive tract of heifer grows proportionately to body growth but beginning at about 6 months age growth rate of these organs is much greater than body growth. At about 10 months of age the rapid growth phase of the reproductive tract ceases & this signifies the end of puberty. Heifer reaches puberty earlier than bull.

**Inheritance:** Transmission of genetic factors from parent to offspring's.

**Germplasm:** The material on the basis of heredity taken collectively. The sum of gene constitution of an individual.

**Foetus:** A term for developing young one during last quarter of pregnancy.

S. No.	Species	Female	Male	Young one	Act of parturition	Average Life Yr
1	Cattle	Cow	Bull	Calf	Calving	16-20
2	Local Buffalo	Buffalo	Buffalo Bull	Calf	Calving	16-20
3	Goat	Doc	Buck	Kid	Kidding	12-15
4	Sheep	Ewe	Ram	Lamb	Lambing	12-15
5	Swine	Sow	Bore	Litter	Furrowing	8-10
6	Horse	Mare	Stallion	Foal	Whelping	18-22
7	Ass	Jennet	Jack	Foal	Whelping	14-18
8	Fowl	Hen	Cock	Chick	Hatching	3-4
9	Duck	Duck	Drake	Chick (Duckling)	Hatching	4-5

### Terms Used in Poultry Production

**Hen:** A matured female chicken generally above 20 weeks of age.

**Cock:** A matured male chicken above 20 weeks of age.

**Pullet:** A young female chicken from 9 to 20 weeks of age.

**Cockerel:** A young male chicken from 5-8 months of age.

**Chick:** A young male or female fowl below 5 weeks of age.

**Day-old chick:** Hatched out chick is called as day-old-chick up to 24 hours.

**Grower:** A young chick of 9th week to 20th week of age of either sex.

**Brood:** A group of chicks of same age raised in one batch is called as a brood.

**Brooding:** The process of rearing the young chick from day old stage to 4 to 6 weeks of age during



which, heat is to be provided to keep them warm.

**Brooder:** A device for providing artificial heat to the chicks.

**Broiler:** They are the hybrid chicks having rapid growth and attaining about 1.5 kg weight during the period of 6 weeks of age. Sold for table purpose within 8 to 10 weeks period. They possess a very tender and delicious meat.

**Capon:** It is a young male birds of which testicle are removed.

**Layer:** An egg laying female chicken up to one year after starting the laying of eggs.

**Broody:** A hen which has stopped laying eggs temporarily.

**Clutch:** The number of eggs laid by a bird on consecutive days. A clutch of 3-4 eggs is preferred.

**Moulting:** The process of shedding old feathers and growth of new feather in their place moulting normally occurs once in a year.

**Culling:** Removal of unwanted bird from the flock is known as culling e.g. old non-laying birds, sick birds and masculine hens are removed.

**Pause:** It is the period between two clutches in which eggs are not laid by hen.

**Hen-day-production:** This is arrived by dividing total eggs laid in the season by the average number of birds in the house.

**Hen-housed-average:** This is arrived at by dividing the total number of eggs laid in the season by the number of birds originally placed in the house. No deductions are made for any losses from the flocks.

### Terminology Related to Different Species

#### Cattle:

<b>Bull:</b> Adult male	<b>Cow:</b> Adult female
<b>Calf:</b> New born one	<b>Heifer:</b> Young female
<b>Calving:</b> Act of giving birth	<b>Bullock or steer:</b> Castrated male

#### Buffalo:

<b>Buffalo Bull:</b> Adult male	<b>Buffalo Cow:</b> Adult female
<b>Buffalo bull calf:</b> Young male	<b>Heifer:</b> Young female
<b>Calf:</b> New born one	<b>Herd:</b> Group of animals

#### Sheep:

<b>Ram:</b> Mature male	<b>Ewe:</b> Mature female
<b>Lamb:</b> Young Sheep	<b>Flock:</b> Group of animals
<b>Lambing:</b> Act of parturition	<b>Gimmer:</b> A yearling ewes

#### Goat:

<b>Buck:</b> Male goat	<b>Doe:</b> Female goat
<b>Kid:</b> Offspring	<b>Kidding:</b> Process of giving birth

#### Pig:

<b>Boar:</b> Adult male	<b>Sow:</b> Adult female
<b>Gilt:</b> Young female	<b>Boarling:</b> Young male
<b>Piglet:</b> New born one	<b>Hog:</b> Castrated male
<b>Coupling:</b> Act of mating	<b>Farrowing:</b> Act of parturition
<b>Grunt:</b> Sound of Pig	<b>Pork:</b> Meat of Pig/hog
<b>Runt:</b> Piglet, usually last to be farrowed	

#### Poultry:

<b>Capon:</b> Castrated male chicken	<b>Layer:</b> Chicken raised for egg production
<b>Broiler:</b> Chicken raised for meat production	<b>Pullet:</b> Chicken which is ready to lay eggs.

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<b>Cockerel:</b> The young mature male which has not started breeding.	<b>Moulting:</b> The process of shading-off feather.
<b>Cock:</b> Matured male chicken	<b>Hen:</b> Matured female.

#### **Duck:**

<b>Duck:</b>	A mature female
<b>Duckling:</b>	Newly hatched or immature baby duck
<b>Drake</b>	A mature male duck

#### **Pigeon:**

<b>Squab:</b>	Immature baby pigeon, used for meat.
<b>Coop:</b>	A pan or small room perch made for pigeons.

#### **Turkey:**

<b>Fryer/Roaster:</b>	A young immature turkey of either sex.
<b>Yearling Hen Turkey:</b>	Matured female turkey usually less than 15 months of age.
<b>Yearling Tom Turkey:</b>	Matured male turkey usually less than 15 months of age.

#### **Horse:**

<b>Stallion:</b>	A mature male.
<b>Mare:</b>	A mature female.
<b>Filly:</b>	A young female up to 3 years of age.
<b>Foal:</b>	A young of either sex under 1 year of age.
<b>Mule:</b>	Hybrid of jack (donkey stallion) and mare.
<b>Hinny:</b>	Cross between jannet (female donkey) and stallion

## **Taxonomy of Farm Animals and Birds**

Taxonomy is the science of classification applied to living things. It involves their identification, naming and arrangement. In this classification system each individual type of organism is called a *species*.

*Species* or organism having close similarities are arranged in a group known as genus. Genus with similar characteristics are put in the same family. Similar family into orders and order into classes. Two Latin names are used to describe each organism. The generic name refers to its genus and is written with a capital letter and the specific names indicate its species and are written with a small letter. For example *Ovis aries* refers to species known as *aries* belonging to the genus *ovis* in case of sheep.

All domestic animals are mammals (class Mammalia of sub phylum vertebrata). Mammals

- a. Possess mammary glands or udders
- b. Are viviparous (Give birth to fully developed young ones) and
- c. Nurse their offspring with milk produced in their mammary gland.

Zoologically, some animals are more closely related than others. Animal that are closed to each other in the zoological classification (Taxonomy) possesses more or less similar physical and physiological characters and require similar modes of feeding of feeding and management.

In general the taxonomic system is constructed into seven major hierarchal divisions.

1, Kingdom 2. Phylum 3. Class 4. Order 5. Family 6. Genus 7. Species

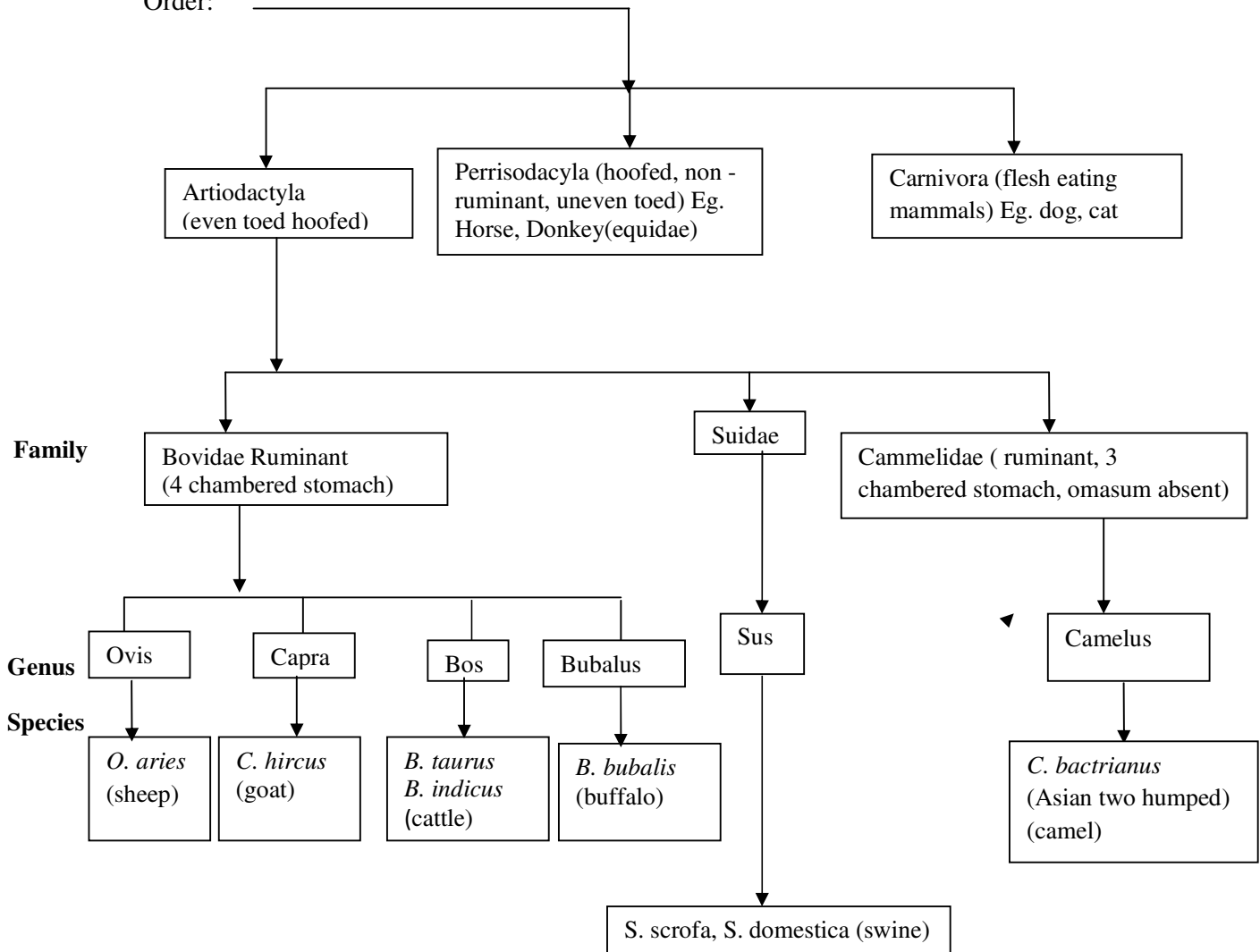
## Taxonomy (Zoological classification) of common domestic animals)

Kingdom: Animal

Phylum: Chordata (having backbone)

Class: Mammalia (animals producing young ones and suckle mammary gland).

Order:



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**Class Note of LPM 111 (Introductory Animal Science)**

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**Taxonomy (Zoological classification) of Bird)**

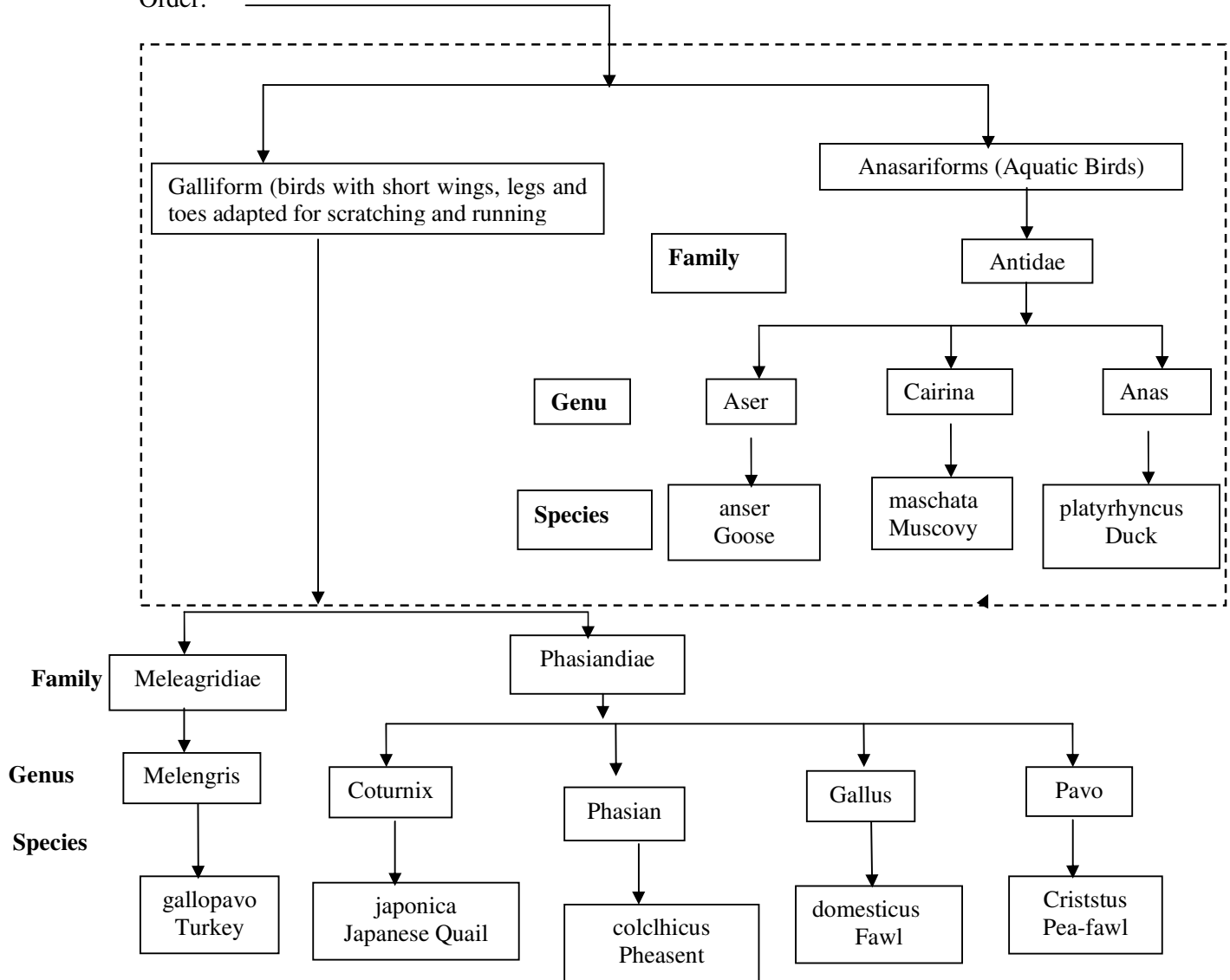
Kingdom: Animal

Phylum: Chordita

Class: Aves

Sub-Class: Neornithes ( Without teeth)

Order: \_\_\_\_\_



## **Breeds of Cattle**

### **Cattle:**

Indigenous cattle are maintained as a major source of draft power and manure. Religious and legal protection provided to cattle has resulted in indiscriminate increase in aged and unproductive cattle population. Milk production is about 15-180 lit per lactation extending over a period of 180-200 days. The low productivity is attributed to poor genotype, inadequate nutrition and exposition to a range of diseases and parasites. The calf mortality is high. Cows are mostly mated by natural services.

### **Indigenous breeds:**

In midhill the black hill zebu is the predominant breed. Body weight is 200-250 kg of adult bull and 120-160 kg of adult cow. In the far west region of achhame, another distinct zebu breed named achhame has been described. This breed is smaller than black hill zebu cattle. Adult bull is 150 kg and adult cow is 100-120 kg. In the high Himalaya region a small number of humpless cattle are found named Lulu (western region) and kirko (eastern region). Adult is weighting 200-250 kg and adult cow is weighting 100-150 kg.

#### **a. Kirko or Lulu:**

These are mountain cattle found in Himalayan region of Nepal especially in Mustang, Manang, Dolpa, Mugu, Humla district. They are small and humpless cattle. They are mostly black in color and sometimes with brown or white. Body coat is hairy and horns are small and projected upward and outward. Bulls and cows are mostly used for cross breeding with Naks and Yaks respectively for producing chauri. They are very hardy and can go up in the alpine pasture for grazing along with Yaks and Naks. Cows yield 1.5 lit of milk per day and contain 5-6 % fat. Lactation period ranges from 6-10 mths. The live weight of lulu bull ranges from 200-250 kg.

#### **b. Siri:**

It is a famous draft breed of eastern hills of Nepal. The animals have thick hair coat. The cows are fairly good milker averaging 1360 liters per lactation if they are selected and stall fed. The bullocks are suitable for mountains region.

#### **c. Terai:**

It is hump type cattle. Multipurpose use: milk, manure and draft. Females are poor milk yielders and males are good animals for transport and ploughing the land. Coat color is white or red but mixed color is also available. It is located in Terai region of Nepal and suitable for tropical and subtropical region. The age at first calving is 53 months with calving interval of 1.12 years. Milk yield is 1-1.5 liters a day.

#### **d. Pahadi:**

This is a zebu cattle raised in mid hills of country ranging from 1000-2000 meter above the sea level. Although, the breed is low milk yielder the cattle are resistant to most disease and external parasites. Body color varied from black to white i.e. black, brown, grey, white, spotted black and white. Males are good draft animals. The age at first calving is 50 mths and calving interval is 1.45 yrs.

#### **e. Achhami:**

This breed is also one of the smallest breed of hill cattle raised from 1400-2000 masl. Locally it is called Naumuthe Gai. It is resistant to most animal disease and external parasites. Body color varies from black to white. Its temperament varies from docile to wild. This breed first calves at

the age of 42 mths and yields 0.5-1.25 liters milk a day. The achhamese population is decreasing year after year. This breed is localized in Achham district of western Nepal. This breed is in a line of extinction if appropriate measures are not adopted in time.

**f. Yak/ Nak**

The hairy animals are alpine cattle raised from 3000-5000 masle and are found in Nepal, Tibet, Mangolia, Russia and India. Male is called Yak, female is Nak and crossbred with zebu cattle called chauri. These animals are popular for producing milk, milk products and meat in the mountains and castrated males are used for transportation and draft power in the remote mountains.

Its temperament varies from docile to wild. The milk production varied from 220 kg to 720 kg in the lactation period of 150-180 days. Total yak/nak population is estimated to be around 8500 in the Himalayan belt of the country. Their calving interval is about 1.5 years. Body color varies from black to white. Ear is straight. Tail having swampy switch. The dark black-brown coat is dense, wooly although the color is variable in domestic yaks. The shoulders are high and humped, with a broad, drooping head. The short legs have broad hooves and large dewclaws as an adaptation to mountainous environments. The horns are found in both sexes, though those of the females are considerably smaller and shorter. They grow up to 51 cm / 20 inches long in females, and 95 cm / 38 inches in males. The curved horns grow out from the sides of the head and curve upwards.

Nak (female) crosses with Zebu cattle (male) gives dimjo jhophyo (male which is sterile) and dimjo jom (female). Yak (male) crosses with Zebu cattle (female) gives urang Jhophyo (male which is sterile) and Urang jom (female).

### **Exotic breeds:**

**a. Hariyana:**

Hariyan is an Indian dual type of cattle characterized for both milk production and drought purpose. Bullocks are powerful animals and good for transport and rapid ploughing. Cows are fairly good milkers.

**Distinguishing characters:**

Small head with long narrow faces from which emerge short and somewhat horizontal horns which grow longer and curve upwards and inwards in bullocks. Small and sharp ears. Navel flap is absent. Long and compact barrel shaped body. Legs are sturdy and long with well-shaped hoofs. Pin bones are prominent. Tail is short, thin and tapering towards the end with a black switch reaching just below the hocks. In cows udder is well developed with prominent teats. These are generally white or light grey in color. Average milk production is 1400 liters per lactation.

**b. Sahiwal:**

It is a milch breed of cattle. Average milk yield is about 2150 lits in 300 days of lactation period. Loose skin (hence named lola), short legs, stumpy horns, broad head. General colors are various shades of red, pale red and dark brown splashed with white. Horns are short and thick, do not exceed 3 inches. Massive hump (in male), voluminous dewlap and pendulous sheath. Long tail almost reaching to the ground, tapering to a good black switch. Navel flap is prominent in female. Males weight about 340 kg.

**c. Red Sindhi**

This breed is otherwise called as Red Karachi and Sindhi and Mahi. Originated in Karachi and Hyderabad (Pakistan) regions of undivided India and also reared in certain organized farms in our country. Colour is red with shades varying from dark red to light, strips of white. Milk yield ranges from 1250 to 1800 kgs per lactation. Bullocks despite lethargic and slow can be used for road and field work.

**d. Jersey**

It is a dairy cattle originated in Island of Jersey in England. It is a good milk yielders having the highest fat percentage.

**Distinguishing characters:**

Straight top line. Heads have a double dish. Coat color generally fawn (light yellowish brown) with or without white markings. Switch is mostly black and sometimes it may be white. The muzzle is black and has a light encircling ring. It can withstand tropical and humid climate more than Holstein- Friesian. Animals are inclined to be nervous and sensitive. Bulls are often vicious. These animals are capable of utilizing roughages efficiently. A male weight about 675 kg and females weight about 450 kg. Average milk production is 4000 liters/lactation of 305 days with fat percentage of 5.5.

**e. Holstein-Friesian**

It is exotic dairy cattle originated in Holland and is popular for high milk production.

**Distinguishing characters:**

It is black and white patched, humpless, comparatively big animals having long leg with large feeding capacity and udders. Head is long, narrow and straight. A male weight about 1000 kg and females weights about 675 kg. Average milk production is about 6150 liters/lactation of 305 days with 3.5 % fat.

**f. Ayrshire:**

It is regarded as hardy breed of dairy cattle, originally found in ayshire, a country of Scotland. It is slightly bigger than Jersey and smaller than Holstein.

**Distinguishing characters:**

Straight top lines. Good udders. Long horns which are turned upwards in male. Females are especially poll. They have shorter and thicker neck in comparison to other breeds. Animals are over active and difficult to manage. Male weight about 850 kg and females weight about 550 kg. Average milk production is 4840 liters per lactation of 305 days with 4.1 % fat.

**g. Brown Swiss:**

This is also an exotic breed of cattle introduce mainly to upgrade Nak and local cows of hills and mountain districts. This breed is mostly concentrated in Dolakha district as it is farmed at Jiri livestock farm. It is a multipurpose breed and originated in Switzerland. Breed is used for transport, milk and beef in Switzerland.

**Distinguishing characters:**

Large heads which are usually dishhead and thick loose skin. The coat color is light fawn (yellowish brown) in color. Animals are not aggressive as those other breeds. Quite docile and easily manageable. More heat tolerant than Jersey. A male weight about 900 kg and female weight about 625 kg. Average milk production is 5250 liters/lactation of 305 days with 4.1% fat.



## **Indigenous Breeds of Buffalo**

### **a. Lime**

The breed is water buffalo located in low to mid hills. It is located from 700 to 1500 masl (meters above the sea level). Black coat color in combination with white and brown is white in combination with brown, white chevron below neck region. White eye brow. White color below the knee. It has sickle shaped horns. Multipurpose uses: milk, meat, manure and draft. This breed first calves at 5 yrs of age and yields 2-3 liters of milk per day having a lactation period of 305 days. Adult weights about 300-325 kg (female). It has a calving interval of 20 months.

### **b. Parkote**

This breed is raised in the mid hills from 1500-2400 masl. Body color is slightly grey, mostly horns are curved with sickle shaped. Broad head with long forehead. It is a hardy and good converter of roughages like rice straw wheat straw e.t.c. Multipurpose uses: milk, meat, manure and draft. Its weight is 400 kg for he buffalo and 330 kg for she buffalo. Its temperament is semi wild. Its age at first calving is 3-5 yrs and yields 2-3 liters milk per day.

### **c. Gaddi**

This breed is located in far western region. Body coat color is white but black is also found with white spot on forehead. Long tail. Short thick legs. Multipurpose uses: milk, meat, manure and draft. Milk yield is 3-5 liters per day that is more than other local breeds. Adult weight is 400 - 450 kg (females). Age at first calving is 5 years with calving interval of 20 months.

## **Exotic Breeds of Buffalo**

### **a. Murrah:**

Origin: Punjab, Haryana and Union territory of Delhi

It is noted for milk production. Average lactation yield is 1400-1800 liters with a 7% fat percentage of in a lactation period of 9-10 months.

#### **Distinguishing Characters:**

Small and clean head. Forehead slightly prominent. Short horns, flat and turning backwards, upwards and curling inwards in a spiral form. Body massive, long and deep. Prominent well developed udder and good sized teats. Long tail with white switch reaching to the fetlock. Adult weight is about 400-450 kg. Popular coat color is jet black with white marking on tail, face and extremities.

### **b. Jaffarabadi:**

Origin: Located in the purest form in the Gir forest of Kathiawar especially towards Jaffarabadi in India. Heavy milkers.

#### **Distinguishing characters:**

Heavy head, bulging and prominent forehead. Broad, flat horns, droppings on each side of the neck and turning up at the points with a loose curve. Body is wedge shaped. Udder is large and well developed. Usually black in color, with white patches on face and legs and switch.

### **c. Nili Ravi:**

Origin: Montgomery district of West Pakistan and Ferozepore district of Punjab

#### **Distinguishing characters:**

Heavy body. Males are commonly used for heavy draft and females are heavy milkers. The average milk is 1600 liters in a lactation period of 250 days. The usual color is black with white markings on forehead, face, muzzle, legs and switch. Tail is long, almost touching the ground.

**d. Surti**

Iso known as Deccani, Gujarati, Talabda, Charator and Nadiadi. The breeding tract of this breed is Kaira and Baroda district of Gujarat. Coat colour varies from rusty brown to silver-grey. The horns are sickle shaped, moderately long and flat. The peculiarity of the breed is two white collars, one round the jaw and the other at the brisket region. The milk yield ranges from 1000 to 1300 kgs per lactation. The peculiarity of this breed is very high fat percentage in milk (8-12 per cent).

**e. Meshana**

Mehsana is a dairy breed of buffalo found in Mehsana, Sabarkanda and Banaskanta districts in Gujarat and adjoining Maharashtra state. The breed is evolved out of crossbreeding between the Surti and the Murrah. Body is longer than Murrah but limbs are lighter. The horns are less curved than in Murrah and are irregular. Bullocks are good for heavy work. The milk yield is 1200-1500 kgs per lactation.

### **Indigenous Breeds of Goat**

There are four common recognized and identified goat breeds in Nepal. They are Chyangra, Sinhal, Khari and Terai Goats.

**a. Chyangra**

These are found in Trans Himalayan region of Nepal above 2400 masl and are raised under migratory system along with Bhyanglung Sheep. The population has been estimated to be about 6% of the total goat population in the country.

Horns are long, thick, twisted upwards and backwards. They have coarse but silky long hair reaching up to the knees, beneath which a fine under-coat of Pashmina or Cashmere is present. Most of the Chyangra goat are white or black with stripes in the face, though various colors are also present. The average body weight is 35-40 kg of male and 27-30 kg of female. Chyangra are late maturing and produce the first kid by the age of 2 yrs. It is used as pack animals.

**b. Sinhal**

Sinhal are generally found in high hills at an elevation of 1500-3000 masl. They are generally kept with Barwal sheep as a mixed flock. This breed comprises about 35% of total goat population. The sinhal is heaviest among the native goat breeds of Nepal. They are generally black, light brown and white in color with coarse hairs (rough or loose in texture) covering the body. Both sexes have horns. The sinhal goats are also late maturing producing first kid by the age of 2 yrs with kidding interval of one year. Its weight is about 32-42 in male and 30-40 in female. It is used as pack animals.

**c. Khari:**

Khari goat are wide spread and more abundant (50%) than other indigenous breeds and are presents in mid hills. Khari goats are relatively small bodied with body weight ranging between 20-40 kg. They are more prolific among the four indigenous breeds and can adopt in different agro climatic zones. From the different locations of Nepal seven color variants were identified with dominance of black followed by brown. The average body weight for male and female goats is 28-40 kg and 17- 26 kg. Khari goats produce first kid by the age of 478 days with kidding interval of 268 days.

**d. Terai Goat**

Terai goats constitute about 9% of the total population of Nepal and are found in the southern

most plains (terai). This breed appears to be recently developed from the population origination from Jamunapari and native breeds. They display a wide range of variations within the breed. They have short hairs. The horns are straight, ears are semi pendulous. Coat color vary from black, white, brown, brown mixed with red, black with white marking ash color and black and white on ear. The average adult body weight of male Terai goat is 30-35 kg and that of female is 18-32 kg. The average age at first kidding is 15-16 mths and the kidding interval is 7-8 mths.

### **Exotic Breeds of Goat**

#### **a. Jamunapari**

It is a dual purpose (meat and milk) goat breed found in Itawah district of U.P, India. This is a tall and large goat breed. The adult body size of Jamunapari, goat is 65-75 kg. A lower body weight (38-45 kg) of adult Jamunapari goat has been reported. They have long legs. Coat color varies but mostly black or brown coat is common. The distinctive feature of this breed is highly convex Roman nose and very long, flat and drooping ears. Both sexes have horn and are similar in shape. Goats are more suited to grazing/browsing than stall feeding management. The age of first kidding is 25 months with kidding interval of 14 months. This breed has been introduction in Nepal for improving weight traits of indigenous breeds and has been extensively used in Terai and hill region of Nepal for cross breeding/upgrading.

#### **b. Barbari:**

This breed is supposed to be originated from Barbara of Somali Land in Africa and commonly found in U.P and Hariyana in India and in West Pakistan. The Barbari goat is small with compact body. The average adult body weight is 35.8 kg for male and 22.6 kg for females. Coat color varies but white with distinctive red spots are common. Ears are short and pointed upwards and outwards. Both sexes have twisted horns and male have large thick beard. The breed thrives are suitable under stall feeding system of management. The age at first kidding is 19 months with kidding interval of 9 months.

#### **c. Beetal**

This breed is also dual purpose and resembles to Jamunapari in most aspect. The breed is found in Punjab and Hariyana of India and has been introduced in the Terai district of Nepal. The beetal goats are large in size with mature body weight of 59 and 35 kg for male and female respectively. The animals are mostly black and brown in color with typical Roman nose but not as Jamunapari, long flat curled and drooping ears and with medium sized horn in both sexes. The age of first kidding is 762 +/- 42 days with kidding interval of 368 +/- 24 days.

#### **d. Sannen:**

It was developed in the sannen valley of Switzerland. It is predominantly white or creamy white in color. The mature male weight 65-80 kg whereas the mature female ranges from 50-60 kg. They may or may not have horns. Both sexes have short hair and ears stand erect pointed forward. Face is straight and dished. They are the largest of all dairy goat breeds.

#### **e. Black Bangal**

Black Bangal is found in West Bangal, Assam and in the adjoining areas. They are dark black in color or sometimes white or spotted. The skin is comparatively superior to other breeds. They are prolific breeders and commonly have twins. Two kidding are possible in a year. The milk production capacity is poor and sometimes kids may require additional milk supply during early stages of growth. They are short-legged, compact animals with a deep body and wide chest and a straight back. The body weight of adult buck varies from 19 to 30kg and that of doe 13 to 22 kg.

**f. Toggenberg**

The Toggenburg goat is the oldest known dairy goat breed. It was originated from the Toggenburg valley in the Canton of St. Gallen, Switzerland. And the breed was named after the region in Switzerland, from where the breed originated. Today there are more than three hundred goat breeds available throughout the world. And among these goat breeds, the Toggenburg goat is considered the oldest breed. The nickname of the breed is *Togg*.

The Toggenburg goat is a medium sized animal. They are sturdy, vigorous and very alert in appearance. They have soft, fine, short or medium length hair and their hair is laying flat. Their color is solid, varying from light fawn to dark chocolate with no preference for any shade. They have erect ears which are carried forward. The Toggenburg does have well developed udder, and they are also noted for their excellent udder development. On average, a mature Toggenburg buck weights about 68-91 kg and a doe weights at least 55 kg.

### **Indigenous Breeds of Sheep**

Native breeds of sheep found in Nepal

**a. Bhayanglung:**

It is found in high hills raised specially in the northern region at the altitude ranging between 2500-4000 meters above the sea level. It represents 4% of the total indigenous sheep population of Nepal.

**Distinguishing Characters**

Generally white coat color with variable head from white, brown and black. Horn is of various shapes: straight, sickles, twisted and spiral. Small dropping ears. Roman nose and short tail. Legs are short and strong. It weight about 60-90 kg and is maintained in a transhumance system according to season. It produces fine wool, soft in comparison to other Nepalese breed. The average annual wool production is 1 kg per two shearing and carpets and rugs are being prepared from this wool.

**b. Baruwāl:**

The principle breed of high altitude above 1500-2500 masl is Baruwāl. These are mostly distributed in Western hills and mid-Western mountains and hills. Baruwāl sheep flocks including about 15% sinhal goats graze, migrate in mountain alpine pastures and reach up to show line in summer and during winter they come down grazing and browsing on pastures and forest even at and around village farms. It represents 63% of the total indigenous sheep population.

**Distinguishing characters:**

Generally white coat color but head color differs from white to black. They have close flocking instinct and have remarkable travelling ability. Rams have long curved horns and ewes are polled. Roman nose, small atrophic ears and a short tail. The animal weights 25-30 kg. Coarse wool and is suitable for making radi.

**c. Kage**

It is considered to be the third purest Nepalese breed and generally found in the valley of Kathmandu, Pokhara, Banke, Makwanpur and Nuwakot. They can thrive from 600-1650 masl and represents 21% of the total indigenous sheep population.

**Distinguishing Characters:**

Coat color is white except on head region. Head mostly brown, short tail. Coarse wool type sheep. Ears are erect. Wool suitable for making radi/pakhi. Males have sickle shaped horn and

ewes are polled. Female 20-25 kg and males are 20-35 kg. They attain sexual maturity at the age of 18-24 months and give three lambs per two years. They produce 500 gms wool per year with two shearing.

**d. Lampuchre**

It is found in Terai region. It represents 12% of the total population.

**Distinguishing Characters:**

Coat color is mostly white but sometimes black or brown. Long tail and hence name is Lampuchre. Suitable for hot climate. Meat type sheep. Males are larger than females and have horns. Adult body weight is 20-40 kg. Wool is of very inferior quality and the production is 0.4 kg/shearing.

### **Exotic Breeds of Sheep found in Nepal**

**a. Merino**

It is the most popular fine wool breed of the world. It is originated from Spain. It is also termed as golden footed sheep.

**Distinguishing Characters:**

White faced sheep with white feet. Ewes are polled while the rams have rather large, heavy, spirally turned horns. Most of the portion of fore and hind legs are covered with wool. It is extremely hardy and can survive under adverse weather and grazing conditions.

**b. Rambouillet**

It has been developed in France as a breed but is a descend of the old Spanish merino. It is a medium or long wool breed.

**Distinguishing Characters:**

Large breed with white hair around the nose and ears. They are large with mature rams weighing about 110-125 kg whereas the ewes about 70-90 kg. The ram may have horned or polled whereas the ewes are polled. They produce an excellent fine wool fleece.

**c. Polworth**

This breed is evolved from Australia by mating with one quarter of Lincoln and three quarter of Merino. It is polled predominantly. It has long, soft and fine wool. Mature ewes is 50-60 kg and ram is 66- 80 kg. Wool weight is about 6.7 kg/year. It is dual type breed that is for meat and wool type.

**d. Lincoln**

The origin of sheep is England. Lincoln had a heavy wool presents that are often twisted into spiral near the end. Lincoln produces 9.1 kg/ year wool. This is referred as world's largest breed of sheep. Adult body weight of male is 113-160 kg and female is 90-133 kg . They are rectangular in form and of great width.

**e. Leicester**

The Border Leicester sheep is a dual-purpose breed of domestic sheep originated from United Kingdom. It has a long and dignified history, and was developed in 1767 in Northumberland, England. Robert Bakewell created the Dishley Leicester sheep by crossing the old Lincolnshire breed with the Leicestershire type sheep and the Dishley Leicester sheep breed became very popular with the local farmers.

The Border Leicester sheep are large sized animals. Their bodies are long and are completely white in coloration. They have well sprung ribs and a wide, strong back. Their nose is black and the ears are large in size, upright and alert. Feet of these animals are also of dark color. Legs and head of these animals are generally free of wool and only covered in short white hairs (making it easier for shearing). Both rams and ewes are generally polled. Average live body weight of the mature Border Leicester ewes is between 90 and 120 kg. And the mature ram's average live body weight varies from 140 to 175 kg.

### **Indigenous Breeds of Pigs**

Indigenous black pigs are maintained in scavenge conditions in the village by certain ethnic group of farmers who accept pork. These are mostly maintained in poor sanitary conditions without any economic consideration. While improved pigs have been maintained both for breeding and fattening at and around urban centers with the commercial background. Pig farming is getting more popularity around the urban centers.

Pig is a multiparas animal and it can produce many piglets at a time. They grow very fast and produce excellent quality of meat resulting quick income generation. Certain tribes of people – Rai, Limbu, Magar, Sunuwar, Tamang, Majhi, Damai, Kami and Tharu Chaudhary etc prefer pig meat more than meat from other animals. Pig meat has more demand at eastern Nepal and at urban centers where hotels and restaurants of international standards are present. People from eastern hills prefer black pigs than white. Black pigs produced at Pakhribas Agriculture Center are highly inbred as a result prolificacy has been deteriorated with comparatively slow growth rate. These black pigs required improvement for regenerating more prolificacy has been deteriorated with comparatively slow growth rate. These black pigs required improvement for regenerating more prolificacy vigor.

#### **a. Chawche:**

It is a local black is maintained especially in hill region at scavenges condition. In the night it is housed in temporary sheds without any sanitary measures. Is is more resistant to diseases. Its weight is about 800 gm in birth and the adult male weight is 32 kg and female weight is 24 kg. It is fed household waste, rice bran, brewery grain at least two times a day.

#### **b. Hurra:**

It is a local brown and black pig of Terai maintained mostly in group at poor sanitary condition. The hair of the neck and top line are straighter upward. They are more resistant to diseases. Its weight in birth is about 700 gm and its adult weight is about 49 kg for male and 45 kg for female. Its population is declining. It is a scavenge pig left early in the morning around settlement area for grazing. It is not fed at the house.

#### **c. Badel (Wild pig)/ Bampudkya:**

It is a wild pig. Mostly castrated males are fattened for about a year for slaughter. Its demand is quite high in the urban markets during festival season. The adult male weight is 20 kg and female is 19 kg.

#### **d. Black Pakhribas Pig:**

It is totally black developed in Pakhribas Agricultural Station in Eastern part of Nepal. It is developed by crossing with Saddle back, Tamworth and Hampshire. It is popular in eastern part of our country. They are more aggressive and more diseases resistant breed. Its adult male weight is about 150-190 kg and female is about 95-160 kg and at birth their weight is about 1 kg.

## **Exotic Breed of Pig**

### **a. Landrace:**

Originally it is a denish pig popularly breed to produce highest quality bacon in the world. It is a white pig characterized by long deep side, square ham, short legs with heavy lop ears (dropping ears) inclined to the front above the eyes. It has a long snout. The carcass is leaner with less back fat and lard. The breed is popular for its high prolificacy and for efficiency of feed utilization. In Nepal Landrace is used for developing crossbreed.

### **b. Large white Yorkshire:**

Large white Yorkshire is a popular English bacon breed having noted mothering quality. It farrows and raises many liters at the time as the mother yields more milk. The pig is white in color with moderately long head, face slightly dished, snout broad and identical erect ears. Mature boar weight about 300-450 kg while sow weight 250-350 kg. It is widely used for cross breeding.

### **c. Duroc:**

It is an American breed, red in color with shades varying from a golden to cherry red color. It has dropping ear. It is less aggressive. It is popular for its excellent growth rate and feed efficiency. It is an early maturing; farrowing many litters and is good mother. Mature boar weight about 400 kg and sow 350 kg. The carcass is considered as a good meat type. It is widely used for cross breeding.

### **d. Hampshire:**

It is a medium type English breed popular for pork production. It is a black pig with white strip around the back popularly known as Saddleback. It is well known for excellent growth rate and feed efficiency. It is an early maturing, farrows 8-10 liters and is a good mother. Mature boar weight about 400 kg and sow 350 kg. The carcass is considered as a good meat type. It is widely used for cross breeding.

### **e. Tamworth**

The Tamworth originated in central England. Long heads and impressive snouts enable these pigs to be efficient foragers. Long, strong legs and sound feet give Tamworth pigs the ability to walk for considerable distances. Ginger red coats make the pigs adaptable to a variety of climates and protect them from sunburn. Tamworths have an active intelligence, and they are agreeable in disposition. Sows are prolific, able to produce and care for large litters. The piglets are vigorous and often have 100% survivability. Both sexes of this breed reach a mature weight of 227-272 kg.

## **Indigenous Breed of Poultry**

### **a. Sakini:**

They are especially reared in rural area of hill region. They have slim body, strong and energetic. The adult weight is about 1.5-2 kg. They have sickle shaped feather in their tail region. They can gave up to 78 eggs /year. They are highly resistant to diseases.

### **b. Powkh ultya:**

There are found in rural area of Nepal. But their numbers is declining day by day. The feathers of this breed of poultry is faces towards the head region so named it powkh ultya. It is about 1.5 -2 kg in adult. They can gave 50 -70 eggs/year.

**c. Ghatee Khuilae(Naked neck):**

They are also found in rural area of Nepal. There is absence of feather in their neck region thus named ghatee khuilae. It is also 1.5-2 kg in adult.

### **Exotic breeds of poultry American breeds**

**A. New Hampshire**

This breed has single comb. The body is less rectangular in shape than Rhode Island Red. This breed is dual purpose breed. It is very hardy and produces large brown eggs. In female the lower neck feather are distinctly tipped with black. The main tail feathers are black. The breed is quite popular in Nepal.

**B. Rhode island reds:**

It is originated from Rhode Island in New England. The bird has somewhat long rectangular body which is also broad and deep. The back is flat and breast is carried well forward characteristics which make it a good meat producing birds. The tail presents sickle feathers and tail feathers are black. In the lower neck of the female there is slight black marking at the base. The usual color is brownish red but white and brown are not uncommon.

**C. Plymouth rock:**

This breed has rather a long body, fairly broad prominent breast. Birds have single comb. There are 7 common varieties in this breed based on blue, barred, white, buff, silver penciled, partridge and Columbian. They are excellent flesh and the hens are good layers.

### **English breed**

**A. Australorp:**

It is developed in Australia principally for egg production rather than meat. The back is somewhat long, and body slopes gradually towards the tail. The comb is single, the body is black, beak is black, shank and toes are black and white. They produced brown shelled egg.

**B. Sussex:**

There are 3 varieties in this breed such as light Sussex, speckle Sussex and red Sussex. These light Sussex has been introduced by Pakhribas agricultural centre, Dhankuta, Nepal. The birds belong to this breed has long bodies which are broad at shoulder with good depth from front to ears. The birds have brown colored shanks, beaks and toes. They have single comb. Birds are primarily of meat type but good laying strains have been developed.

### **Mediterranean breeds**

**A. Leghorn:**

There are 12 varieties in this breed. Among them white leg horn which is especially breed for egg production is the most popular for production of egg rather than for the production of table meat. White leg horn has excellent feed efficiency. The eggs are white in color. All the varieties of this breed have yellow beak, skin, shank and toe. There are single comb.

**B. Minor:**

Birds of this breed possesses long body, large sized comb and wattle. Large white ear lobes, long strong bodies, legs set squarely under the powerful looking body are the distinct characteristics of this breed. The beak, shanks and toes are black. They are excellent producer of large white eggs. The egg shell is chalk white in color.



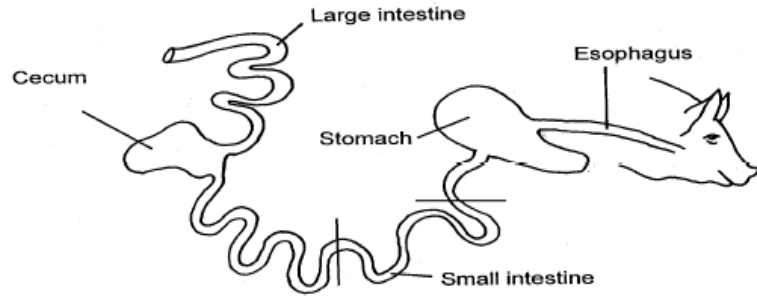
**Different commercial breeds found in Nepal:**

Broilers are chickens (*Gallus gallus domesticus*) bred and raised specifically for meat production. Chickens are one of the most common and widespread domestic animals, typical broilers have white feathers and yellowish skin. Most commercial broilers bred for meat reach slaughter weight at between 5 to 7 weeks of age. Because of this young age, much of their behavior and physiology is that of an immature bird. Broilers are usually grown as mixed-sex flocks in large sheds under intensive conditions, but some strains can be grown as free-range flocks. Both male and female broilers are reared for their meat.

Around seven commercial broiler breeds and six layer breeds of chickens are reared commercially in Nepal. Among broiler breeds, Cobb holds a 70% market share, followed by Hubbard, Marshall, Indian River Ross 308 and others. For layers, Hy-Line Brown has the biggest market share of 40% followed by Lohmann Brown (30%).

## The Digestive Organs of Non-Ruminants

Non ruminants are animals having simple stomach. Animals belong to this group are pig, horse, dog and cat. The digestive organs of non-ruminants are much simpler they differ from ruminants, mainly in the structure of stomach and large intestine. The general descriptions of other parts are more or less similar to the ruminants. The digestive system can be divided as:



### A. Alimentary Canal

The alimentary canal of all the animals is made up of mouth, pharynx, esophagus, stomach, small intestine, large intestine, rectum and anus. It is just like a long muscular tube whose main functions are prehension, mastication, digestion, absorption of food and elimination of the undigested materials.

### Mouth

It is an organ of prehension, mastication and insalivation. It includes teeth, tongue, hard and soft palate and salivary glands are situated in the mouth. The cavity inside the mouth is known as mouth cavity or buccal cavity.

### Pharynx

This is the connecting tube between the mouth and esophagus. Its main function is to provide passage of food from mouth to esophagus.

### Esophagus

This is a long, thin tubular structure running from pharynx to stomach. The main function of this organ is to provide passage of food from mouth to stomach.

### Stomach

The stomach is located just behind the left side of the diaphragm. The stomach is subdivided into (1) Cardia (entrance) (2) Fundus (3) Pylorus (termination). Unlike ruminants, non-ruminants have small stomach. Thus an adult pig of 200 kg and a horse of 450 kg have a total stomach capacity of only about 10 litres. Ruminant stomach occupies about 80 % of the digestive tract. Where as, stomach capacity makes up about 30% in pigs and less than 10% in horse.

### Function:

1. Storage of food, mixing of this food with gastric secretion.
2. Slow emptying of the food from the stomach into the small intestine at a rate of suitable for proper digestion and absorption by the small intestine.

### Small Intestine:

The small intestine divided into three parts (1) Duodenum (2) Jejunum and, (3) Ileum.

**Duodenum:** is the first part of small intestine. The function is (1) To receive the food from stomach (2) Ducts from the pancreas and liver enter the first part of the duodenum and pour their digestive juices. (3) Almost all nutrients of foods are digested in the duodenum. The main organ in the monogastric animal for the absorption of dietary. Nutrients is the small intestine.

**Jejunum:** The function is:

- (1) To receive the food from duodenum.
- (2) Secretion of intestinal juice
- (3) Digestion of food constituents and to prepare food for absorption.
- (4) Storage of food for some time.
- (5) Absorption of nutrients from the walls of the intestine and their transportation into the blood stream.

**Ileum:** is the last part of the intestine joins large intestine.

The function is:

- (1) Digestion of partially digested food, absorption and transportation into the blood stream.
- (2) Transport of food residue to large intestine.

**Large Intestine:**

It consists of the caecum, which is a blind sac and the colon which terminates at the rectum and anus. Microbial digestion of food is brought about by the action of bacteria and protozoa (MO), which are of special significance in ruminant digestion.

In simple stomach animal microbial activity occurs in large intestine i.e. Caeca. Even the pig with it's short and simple tract, harbours sufficient MO in it's large intestine to digest more than half of the cellulose in concentrated foods. The horse has a simple stomach but greatly enlarged caecum and colon, and these organs are inhabited by MO with activities very similar to those of rumen MO. Part of the ingested food (such as soluble CHO and proteins) should be digested by the host animals through own enzymes and absorbed from the small intestine, where as more resistant components (such as \cellulose and hemicellulose) are digested by caecal fermentation.

The caecal fermentation yields volatile fatty acids which are subsequently absorbed and metabolized. \Digestion of protein in the hind gut is not fully understood. \but it has been claimed that microbial protein synthesized in the caecum are subsequently hydrolyzed and absorbed from that organ as amino acid. Among all the farm animals, horses and rabbits have the largest and most complex large intestine. In these species caecum (15%) and colon (47%) together make up about 62% of the capacity of alimentary canal. In pig and man which have simpler large intestine, it constitute only about 37% and 17% respectively of the total capacity.

**Function:**

- (1) To receive and store the food and feed residue coming from small intestine.
- (2) Absorption of those nutrients (water and minerals) which escaped absorption from the wall of small intestine takes place in the rectum.
- (3) Temporary storage of feed residue in the rectum.
- (4) Rejection of the residue through anus.

**B. Accessory Digestive Organs:**

It includes (1) Teeth (2) Tongue (3) Salivary gland (4) Liver glands (5) Pancreas.

**Function**

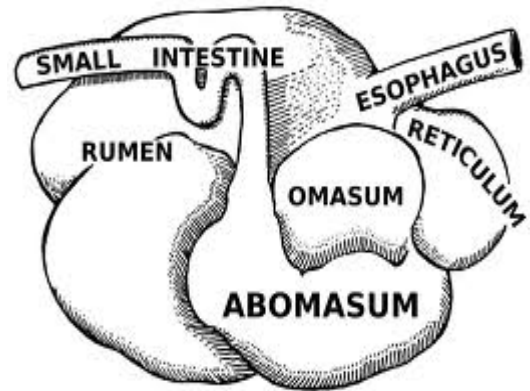
- (1) Lip, tongue and teeth helps in prehension, or carrying the food to mouth.
- (2) Entered food is masticated or chewed by teeth.
- (3) Tongue contains taste buds which help to feel the taste of food when it comes to the mouth.
- (4) Mouth contains salivary glands (Paratid, sub lingual, and Mandibular) situated behind the walls of the buccal cavity.
- (5) Salivary glands add saliva to the mouth which clean the mouth, lubricates the food, help in dilution and digestion of food materials.
- (6) Liver gland is the largest gland in the body and a important organ of metabolism. The bile which is conveyed to the duodenum by the ducts of the liver and within the liver to duodenum and the gall bladder. All domestic animals except the horse have this gall bladder. Bile plays an important role in digestion and absorption of lipids (fat).
- (7) Pancreas is a dual organ secretes pancreatic juice into the duodenum. The exocrine parts of the pancreas secrete the digestive enzymes and sodium bicarbonate, while the endocrine part secretes hormones insulin and glucagons, which enter directly into the blood stream.

## Digestion in Ruminants

Animal consume feed for the maintenance of the body, growth and reproduction. The feed has to be digested and absorbed to be utilized to perform these body functions. In the process of digestion, complex proteins, carbohydrates and fats present in the feed combination with water breaks down into simpler compound can be absorbed easily. The digestion takes place through the action of enzymes in the alimentary canal.

### The Digestive Organs of Ruminants

Animals such as the cow, sheep and goat which possesses four compartmental stomach, as distinct from mono-gastric animals, such as man, pig, dog and rat. Digestive tract of mono-gastric animals differs in structure and function from the ruminants. This difference is more marked in stomach region. The ruminating buffaloes fed on grass chew 30 times per minute, renewing the cud every 40second, taking 50 second to do so. Cattle on the other hand, chew on the average 50 times per minutes and renew the cud every 60 seconds, taking 10 second to do so.



The digestive tract is composed of the mouth, esophagus, stomach, small and large intestine. The stomach of ruminants is divided into the (1) Rumen (2) Reticulum (3) Omasum and (4) Abomasum.

### Mouth and Esophagus:

This is the location where food enters the system and is chewed. Salivary glands which are found in the mouth secrete a copious amount of saliva help to dilute the ingested food. Saliva (pH 8.2) helps to reduce acidity in the rumen and also aids in the transfer of food from the mouth to the rumen via the esophagus.

### Rumen and Reticulum:

The rumen microorganisms digest about 70 percent of the digestible dry matter, converting them into soluble and gaseous compounds. These are absorbed directly through the rumen wall into blood. Thus only about 30% of the ingested food passes through the rumen further in the alimentary canal. The rumeno-reticular contraction causes the passage of the fine food particles to the omasum.

Rumen and reticulum are discussed together since each compartment is separated by low partition. Eighty percent of the capacity of the stomach is related to the reticulo-rumen. The contents of the reticulum and rumen intermix freely. The wall of reticulum is honey comb in structure and is often the location where the hard object will be found. The rumen is the main fermentation vat where billions of micro organisms attack and break down the relatively indigestible feed components of the ruminant diet. The rumen MO plays three important functions; 1. They degrade complex polysaccharides to volatile fatty acids which supply the energy need of animal. 2. They synthesize all the essential amino acids which are required by the host animal. 3. The microbes also synthesize the vitamin B-complex required by the host animal.

**Omasum:**

After fermentation in the reticulum and rumen the feed passes through the omasum. While the function of the omasum is not entirely clear it acts as a filter pump to sort liquid and fine food particles. Course fiber particles are not allowed to enter the omasum. Also the omasum may be the site for absorption of water, minerals and nitrogen.

**Abomasum:**

The abomasum is the true stomach and the only site on the digestive tract that produces gastric juices (hydrochloric acids and enzymes, pepsin and rennin). In the new born calves, abomasum makes up about 80% of the total stomach volume, while in the mature cow it amounts to only 10 percent. Ingesta only remain here for 1-2 hrs.

**Small Intestine:**

The small intestine is the location where a further breakdown of the food materials occurs. Secretions of enzymes, pancreatic juice and bile aid in further digestion of the ingesta. This generally occurs in the upper portion of the intestine. The end products of the digestion process are absorbed in the lower section of small intestine.

**Large Intestine:**

The large intestine is the place where residues of the ingested feeds are deposited. Feed residues do undergo some fermentation. There are absorption site for water, minerals and nitrogen.

**Difference between Ruminants and Non ruminants**

SN	Ruminants	Non Ruminants
1	Stomach is divided into four compartments.	They have a simple stomach.
2	Belongs to family Bovidae	Belongs to family Suidae (swine), Equidae (horse) etc.
3	Rumination, regurgitation occurs	Does not occurs.
4	Microbial digestion of cellulose and hemi cellulose occurs in the rumen and reticulum.	Digestion is mostly mechanical. Feed is broken down into mouth to smaller particles. Little microbial activities occur in the large intestine.
5	Microorganisms like Bacteria and Protozoa helps synthesize amino acids and vitamin B-complex.	They should be supplemented in the diet.
6	Incisor teeth are situated in the lower jaws only. Whereas canine teeth are absent.	Both Incisor and canine teeth are present.
7	They can survive only on green fodder.	They also need concentrate ration.
8	Mostly horned (except in polled animals).	Horns are absent.
9	Even toed hoof.	Single hoofed animal.

## Housing for Livestock

For dairy cattle, care should be taken to provide comfortable accommodation for individual cattle. Three important parameters such as (1) Proper sanitation, (2) Durability, (3) Arrangements are the key for the production of clean milk under convenient and economic conditions.

### Location of dairy buildings:

The points- which should be considered before the erection of dairy buildings are as follows:

1. **Topography and drainage:** A dairy building should be at a higher elevation than surrounding ground to offer a good slope for rainfall and drainage for the wastes of dairy to avoid stagnation within. A leveled area requires less site preparation and thus lesser cost of building. Low lands and depressions and proximity to places of bad odour should be avoided.
2. **Soil type:** Fertile soil should be spared for cultivation. Foundation soil as far as possible should not be too dehydrated or desiccated. Such a soil is susceptible to considerable swelling during rainy season and exhibit numerous cracks and fissures.
3. **Exposure to the sun and protection from wind:** A dairy building should be located to a maximum exposure to the sun in the north and minimum exposure to the sun in the south and protection from prevailing strong wind currents whether hot or cold. Buildings should be placed so that direct sunlight can reach the platforms, gutters and mangers in the cattle shed. As far as possible, the long axis of the dairy barns should be set in the north-south direction to have the maximum benefit of the sun.
4. **Accessibility:** Easy accessibility to the buildings is always desirable. Situation of a cattle shed by the side of the main road preferably at a distance of about 100 meters should be aimed at.
5. **Durability and attractiveness:** It is always attractive when the buildings open up to a scenic view and add to the grandeur of the scenery. Along with this, durability of the structure is obviously an important criteria in building a dairy.
6. **Water supply:** Abundant supply of fresh, clean and soft water should be available at a cheap rate.
7. **Surroundings:** Areas infested with wild animals and dacoits should be avoided. Narrow gates, high manager curbs, and loose hinges, protruding nails, smooth finished floor in the areas where the cows move and other such hazards should be eliminated.
8. **Labour:** Honest, economic and regular supply of labour is available.
9. **Marketing:** Dairy buildings should only be in those areas from where the owner can sell his products profitably and regularly. He should be in a position to satisfy the needs of the farm within no time and at a reasonable price.
10. **Electricity:** Electricity is the most important sanitary method of lighting a dairy. Since a modern dairy always handles electric equipments which are also economical, it is desirable to have an adequate supply of electricity.
11. **Facilities, labour, food:** Cattle yards should be so constructed and situated in relation to feed storages, hay stacks, silo and manure pits as to effect the most efficient utilization of labour. Sufficient space per cow and well arranged feeding mangers and resting areas contribute not only to greater milk yield of cows and make the work of the operator easier but also minimizes feed expenses. The relative position of the feed stores should be quite, adjacent to the cattle barn. Noteworthy features of feed stores are given below:

- Feed storages should be located at hand near the centre of the cow barn.
- Milk-house should be located almost at the centre of the barn.
- Centre cross-alley should be well designed with reference to feed storage, the stall area and the milk house of Housing:

### **Type of Housing**

The most widely prevalent practice in this country is to tie the cows with rope except some organized dairy farms belonging to Government, co-operatives or Military where proper housing facilities exist. It is quite easy to understand that unless cattle are provided with good housing facilities, the animals will move too far in or out of the standing space, defecting all round and even causing trampling and wasting of, feed by stepping into the mangers. The animals will be exposed to extreme weather conditions all leading to bad health and lower production. Dairy cattle may be successfully housed under a wide variety of conditions, ranging from close confinement to little restrictions except at milking time. However two types of dairy barns are-in general use at the present time.

1. The loose housing barn in combination with some type of milking barn or parlour.
2. The conventional dairy barn.

### **Loose housing system**

Loose housing maybe defined as a system where animals are kept loose except milking and at the time of treatment. The system is most economical. Some features of loose housing system are as follows.

1. Cost of construction is significantly lower than conventional type.
2. It is possible to make further expansion without much change.
3. Facilitate easy detection of animals in heat
4. Animals feel free and therefore, prove more profitable with even minimum grazing.
5. Animals get optimum exercise which is extremely important for better health and production
6. Overall better management can be rendered.

The floor and manger space requirement of dairy cows are give in Table below

**Other Provisions:** The animal sheds should have proper facilities for milking barns, calf pens/ calving pens and arrangement for store rooms etc. In each shed, there should be arrangement for feeding, manger, drinking area and loafing area. The shed may be cemented or brick paved, but in any case it should be easy to clean. The floor should be rough, so that animals will not slip. "The drains in the shed should be shallow and preferably covered with removable tiles. The drain should have a gradient of 1" for every 10' length. The roof may be of corrugated cement sheet, asbestos or brick and rafters. Cement concrete roofing is too expensive. Inside the open unpaved area it is always desirable to plant some good shady trees for excellent protection against direct cold winds in winter and to keep cool in summer.



**Table:**

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

### **Cattle shed**

The entire shed should be surrounded by a boundary wall of 5' height from three sides and manger etc., on one side. The feeding area should be provided with 2 to 2 % feet of manger space per cow. All along the manger/ there shall be 10" wide water trough to provide clean, even, available drinking water. The water trough thus constructed will also minimize the loss of fodders during feeding. Near the manger, under the roofed house 5' wide floor should be paved with bricks having a little slope. Beyond that, there should be open unpaved area (40' X 35') surrounded by 5' walls with one gate. A plan for such a house along with the plan for calves shed and their sections are shown in Fig, 105, it is preferable that animals face north when they are eating fodder under the shade. During cold wind in winter the animals will automatically lie down to have the protection from the walls.

### **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.

### **Conventional Dairy Barn**

The conventional dairy barn is comparatively costly and is now becoming less popular day by day. However, by this system cattle are more protected from adverse climatic conditions.

The following barns are generally needed for proper housing of different classes of dairy stock on the farm.

1. Cow houses or sheds
2. Calving box
3. Isolation box
4. Sheds for young stocks
5. Bull or bullock sheds.

### **Cow sheds**

Cow sheds can be arranged in a single row if the numbers of cows are. Small say less than 10 or in a double row if the herd is a large one. Ordinarily, not more than 80 to 100 cows should be

placed in one building. In double row housing, the stable should be so arranged that the cows face out (tail to tail system) or face in (head to head system) as preferred.

**Advantages of Tail to tail system:**

1. Under the average conditions, 125 to 150 man hours of labor are required per cow per year. Study of Time: Time motion studies in dairies showed that 15% of the expended time is spent in front of the cow, and 25% in other parts of the barn and the milk house, and 60% of the time is spent behind the cows. Time spent at the back of the cows is 4 times more than, the time spent in front of them.
2. In cleaning and milking the cows, the wide middle alley is of great advantage.
3. Lesser danger of spread of diseases from animal to animal.
4. Cows can always get more fresh air from outside.
5. The head gowala can inspect a greater number of milkmen while milking. This is possible because milkmen will be milking on both sides of the head gowala.
6. Any sort of minor disease or any change in the hind quarters of the animals can be detected quickly and even automatically.

**Advantages of Head to Head system:**

1. Cows make a better showing for visitors when heads are together.
2. The cows feel easier to get into their stalls.
3. Sun rays shine in the gutter where they are needed most.
4. Feeding of cows is easier; both rows can be fed without back tracking.
5. It is better for narrow barns.

**Floor:** The inside floor of the barn should be of some impervious material which, can be easily kept clean and dry and is not slippery. Paving with bricks can also serve ones purpose. Grooved cement concrete floor is still better. The surface of the cow shed should be laid with a gradient of 1" to 1 1/2 from manger to excreta channel. An overall floor space of 65 to 70 sq.ft. Per adult cow should be satisfactory.

**Walls:** The inside of the walls should have a smooth hard finish of cement, which will not allow any lodgment of dust and moisture. Corners should be round. For plains, dwarf walls about 4 to 5 feet in height and roofs supported by masonry work or iron pillars will be best or more suitable. The open space in between supporting pillars will serve for light and air circulation.

**Roof:** Roof of the barn may be of asbestos sheet or tiles. Corrugated iron sheets have the disadvantage of making extreme fluctuations in the inside temperature: of the barn in different seasons. However, iron sheets with aluminum painted. Tops to reflect sunray bottoms provided with wooden insulated ceilings can also achieve the objectives. A height of 8 feet at the sides and 15 feet at the ridge will be sufficient to give the necessary air space to the cows An adult cow requires at least about 800 cubic feet of air space under topical conditions. To make ventilation more effective continuous ridge ventilation is considered most desirable.

**Stall design:** The two main types of dairy barn 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.

The stanchion should be so contracted and arranged as to allow the cows the greatest possible freedom. There should be several links of chain at the top and bottom of the stanchions and sufficient room on each side of it to permit (lie animal to move its head from side to side. It is important to provide for the comfort of the cows and to line them up so that most of the droppings and urine go to the gutter. Practically, it is not possible to fit every cow to her stall properly. To compensate this, many stanchions have adjustments so that they can be set forward if the cow is too large for the stall or backwards if the cow is too small. The cow can be fastened easily and quickly with the stanchions and is held more closely in place than other types of ties. However/ she is held more rigidly and therefore, the stanchion is less comfortable than other types of fasteners.

**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. This prevents the cow from moving too far forward in the stall. It is important that in this type of stall, the arches and all other stall parts are kept lower than the height of the cows.

The cow has more freedom in the tie stall then in the stanchion, large cows and those with large udders get along better in them because of freedom they enjoy. It is not desirable to have a tie chain in a small stall.

**Manger:**

Cement concrete continuous manger with removable partitions is the best from the point of view of durability and cleanliness, A height of 1'-4" for a high front manger and 6" to 9" for a low front manger is considered sufficient low front mangers are more comfortable for cattle but high front mangers prevent feed wastage. The height at the back of the manger should be kept at 2'-6" to 3'. An overall width of 2' to 2 W is sufficient for a good manger.

**Alley:**

The central walk should have a width of 5'-6' exclusive of gutters when cows face out, and 4'-5' when they face in. The feed alleys in case of a face out system should be 4' wide, and the central walk should show a slope of 1" from the centre towards the two gutters naming parallel to each other, thus forming a crown at the centre.

**Manure gutter:**

The manure gutter should be wide enough to hold all dung without getting blocked, and be easy to clean. Suitable dimensions are 2' width with a cross-fall of 1" away from standing. The gutter should have a gradient of 1" for every 10' length. This will permit a free flow of liquid excreta.

**Doors:** The doors of a single range cowshed should be 5' wide with a height of 7', and for double row shed the width should not be less than 8'-9'. All doors of the barn should lie flat against the external wall when fully open.

**Calving Boxes:**

Allowing cows to calve in the milking cowshed is highly undesirable and objectionable. It leads to sanitary milk production and spread of disease like contagious abortion in the herd. Special accommodation in the form of loose-boxes enclosed from all sides with a door should be furnished to all parturient cows. It should have an area of about 100 to 150 sq. Ft With ample soft bedding. It should be provided with sufficient ventilation through windows and ridge vent.

**Isolation Boxes:**

Animals suffering from infectious diseases must be segregated soon from the rest of the herd. Loose boxes of about 150 sq. Ft are very suitable for this purpose. They should be situated at some distance from the other barns. Every isolation box "should be self contained and should have separate connection to the drainage disposal system.

**Sheds for young stocks:**

Calves should never be accommodated with adult in the cow shed. The calf house must have provision for daylight ventilation and proper drainage. Damp and ill-drained floors cause respiratory trouble in calves to which they are susceptible. For an efficient management and housing, the young stock should be divided into three groups, viz., young calves aged up to one year, bull calves, i.e., the male calves over one year and the heifers or the female calves above one year. Each group should be sheltered in a separate calf house or calf shed. As far as possible the shed for the young calves should be quite close to the cowshed. Each calf shed should have an open paddock or exercise yard. An area of 100 square feet per head for a stock of 10 calves and an increase of 50 square feet for every additional calf will make a good paddock. It is useful to classify the calves below one year into three age groups, viz., calves below the age of 3 months, 3-6 months old calves and those over 6 months for a better allocation of the resting area. An overall covered space of:

1. 20-25 square feet per calf below the age of 3 months,
2. 25-30 square feet per calf from the age of 3-6 months,
3. 30-40 square feet per calf from the age of 6-12 months and over, and
4. 40-50 square feet for every calf above one year,

Should be made available for sheltering such calves an air space of 400 to 500 cubic feet per calf is a good provision under our climatic conditions. A suitable interior lay-out of a calf shed will be to arrange the standing space along each side of a 4-feet wide central passage having a shallow gutter along its length on both sides. Provision of water through inside each calf shed and exercise yard should never be neglected.

**Bull or Bullock shed:**

Safety and ease in handling a comfortable shed for protection from weather and a provision for exercise are the key points while planning accommodation for bulls or bullocks. A bull should never be kept in confinement particularly on hard floors. Such a confinement without adequate

exercise leads to overgrowth of the hoofs creating difficulty in mounting and loss in the breeding power of the bull.

A loose box with rough cement concrete floor about 15' by 10' in dimensions having an adequate arrangement of light and ventilation and an entrance 4' in width and 7' in height who make a comfortable housing for a bull. The shed should have a manger and a water trough. If possible, the arrangement should be such that water and feed can be served without actually entering the bull house. The bull should have a free access to an exercise yard provided with a strong fence or a boundary wall of about 2' in height, i.e., too high for the bull to jump over. From the bull yard, the bull should be able to view the other animals of the herd so that it does not feel isolated. The exercise yard should also communicate with a service crate via a swing gate which saves the use of an attendant to bring the bull to the service crate.

### **Housing for sheep and goat**

Housing of sheep \goat is not a serious problem. It is enough if the goats are provided with a dry, comfortable safe and secure place, free from worms, and affording protection from excessive heat and inclement weather. In Nepal, the system of sheep and goats raising varies according to the ecological belts. In the high hills (above 2000 m) sheep and goats are raised in the transhumance system. They move to the high alpine pasture during the summer and come down to about 1200 m altitude during the winter. In the lower hills and terai, sheep and goats are usually allowed to graze in the communal grazing lands, forests or fallow lands according to the seasons during the day and are in housed during the night.

Sheep and goats are usually herded near by the shepherd's tent or cave during the night in open area in the high hills. If they have to stay for long period due to the availability of good pasture, they are padlocked usually in a circular or rectangular paddock constructed with wooden planks, which are raised vertically as closely packed pillars. There is usually only one door passage.

Sheep and goats are usually housed in the side rooms of the farmer's house or in lower hills and terai region of Nepal. The floors are usually raised 45-60 m from the ground level and slatted with bamboo poles, wooden planks or beaten bamboos. To protect the animals from predators and drought walls made using wooden poles. Lightning system is not made available in the pen. Many farmers protecting newborn from cold by keeping them in own house.

Sheep and goat are prone to respiratory infection if kept in enclosures without ample ventilation. Slatted floors housing system is slightly modified system of housing (Slatted floors housing) sheep and goat prevent respiratory trouble.

**Slatted floors housing:** - This system of housing is preferred in the area where wood and bamboos are available in cheaper rate where as there is shortage of bedding materials. The essential requirement in the construction of slatted floors is that complete freedom from under floor draughts must be achieved. There should also be ample room beneath the slats so that the under floor can hold manure for a certain period of time without cleaning. The slats must be laid parallel to the entrance doors, so that from the eye level of sheep when they enter the building the floor appears solid. Such floors can easily be lifted by two men for cleaning and disinfections. Although the spacing and size of slats depends upon the wood type (durability),

breed and the number of animals to be housed, size has been 37.5mm x 37.5 mm-tapered 35mm on under side width and a 12.5mm to 20mm gap. The depth of the dung pit to the slats is usually 0.9m. The height of the pen side is 1.0m. Animals are fed from common hayracks and concentrate troughs mounted on the pen side nearest to the central gangways.

### **Buildings for sheep and goat farms**

**General flock pens:** -Adult breeding ewes or nannies are housed in this pen. Ewes or nannies pens are constructed either with concrete floor or with slatted floors. One adult unit is provided with 0.8 to 1.5 Sq. M. floor space each pen should accommodate 40-50 ewes or nannies. The pen usually includes one or two hay or fodder racks parallel located along the walls, which are raised to about 75 cm. from the floor. Just beneath the racks, concentrate feeders are used in such a way that animals cannot step into feeder.

**Shed for ram or buck:** - Rams or bucks are housed separately in these pens so as to control unwanted breeding. 2.2m x 1.25m floor space is provided to each animal and there should be provision of hay rack and concentrate feeder.

**Lambing or kidding pens:** - These are the maternity pens. Pregnant ewes or nannies are housed individually in these pens. These pens shall be made draught free. Pens should be provided with some heating device, particularly in the cold season to keep the new born warm. Proper bedding with dries straw or saw dust helps better survival of the newborns. The pen is provided with hayracks and concentrate feeder.

**Lamb / kid pen:** - Lambs or kids from weaning up to attaining maturity are housed in these pens. Usually lambs / kids are housed in groups of 40-60 animals per pen. The pen is provided with hayracks and concentrate feeder.

**Sick animal pen:** - Away from the general pen, one or more (depending on flock size) sick animal pens of about 3 x 2 x 3 M size may be constructed. Such pen should be free from any contamination, well ventilated and with smooth surface so that harmful germs cannot grow or survive.

**Shearing room:** - This is the place where sheep are shorn and hence, a shearing room is required only on farms where sheep are kept for wool. This room should be well lit by having large glass windows all around. The floor should be cement paved and surface made smooth and a collecting room attached to it.

**Accessory buildings:** - Next to the shearing room shall be located the wool store for storing wool and shearing equipments. The room should be made dust and damp-proof. There should also be weighing yards, stores for concentrate mixture medicines, farm equipment etc. and shed for hay straw storage at convenient places. Another important structure required on a sheep farm is the dipping tank.

**Building for milch goat:** - Milch goats are rarely seen in Nepal, although Jamunapari goats in the western Nepal sannen and local goats in some town areas are being used as supplementary milk producers. All the goat milk is used only for home consumption in Nepal. When there is

large number of milch goats the shed is divided into a number of stalls, one stall for each doe. This facilitates milking and stalls feeding of goats individually. The stalls may be arranged in two rows with a passage between them. The dimension should be 1.2m x 0.8m

## **Poultry Housing**

Poultry is housed for comfort protection, efficient production and convenience of the poultry man.

### **Essentials of Good Housing:**

**Comfort:** The best egg production is secured from birds that are comfortable and happy. To be comfortable a house must provide adequate accommodation; be reasonably cool in summer, free-from draft and sufficiently warm during the winter provides adequate supply of fresh air and sunshine; and remain always dry. Given these the hen responds excellently.

**Protection:** Includes safeguards against theft and attack from natural enemies of the birds such as the fox, dog, cat kite, crow, snake, etc. The birds also should be protected against external parasites like ticks, lice and mites.

**Convenience:** The house should be located at a convenient place, and the equipment so arranged as to allow cleaning and other necessary operations as required.

### **Location of Poultry House:**

In planning a poultry house, the location should be taken into consideration. In selecting site for poultry houses the following factors should be considered.

1. **Relation to other building:** The poultry house should not be close to the home as to create unsanitary conditions. On the other hand it should not be too far away either because this will require more time in going to and for in caring for the birds. In general at least three trips should be made daily to the poultry house in feeding, watering, gathering the eggs, etc.
2. **Exposure:** The poultry house should face south or east in moist localities. A southern exposure permits more sunlight in the house than any of the other possible exposures. An eastern exposure is almost as good as a southern one. Birds prefer morning sunlight to that of the afternoon. The birds are more active in the morning and will spend more time in the sunlight.
3. **Soil and drainage:** If possible the poultry house should be placed on a sloping hillside rather than a hilltop or in the bottom of a valley. A sloping hillside provides good drainage and affords some protection. The type of soil is important if the birds are to be given a range. A fertile well drained soil is desired. This will be a sandy loam rather than a heavy clay soil. A fertile soil will grow good vegetation which is one of the main reasons for providing range. If the poultry house is located on flat poorly drained soil, the yards should be tiled otherwise the birds should be kept in total confinement.

4. **Shade and Protection:** Shade and protection of the poultry house are just as desirable as for the home. Trees serve as a windbreak in the winter and for shade in the summer. They should be tall, with no low limbs. Low shrubbery is no good as in their presence the soil becomes contaminated under the shrubbery, remains damp/ and sunlight cannot reach it to destroy the disease germs. One thing we should remember that plenty of sun shines should be available at the site.

#### **Housing requirements:**

**Floor space:** The smaller the house the more square feet are required for each hen. Bigger pens have more actual usable floor space per bird than smaller pens. The recommend at as suggested might be useful regarding floor, feeders and watering space.

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:** 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 CO<sub>2</sub> every 24 hours. Since CO<sub>2</sub> 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 bird's that can be accommodated in the given floor space.

**Temperature:** Hens need a moderate temperature of 50°F to 70°F. Birds need warmer temperature at night, when they are inactive, than during the day. The use of insulation with straw pack or other materials, not only keeps the house warmer during the winter months but cooler during the summer months Cross ventilation also aids in keeping the house comfortable during hot weather.

**Dryness:** Absolute dry conditions inside a poultry house is always ideal condition dampness causes discomfort to the birds and also gives rise to the diseases like colds, pneumonic etc. Dampness in poultry house caused by: (1) moisture rising through the floor; (2) leaky roofs or walls; (3) rain or snow entering through the windows; (4) leaky water containers; (5) exhalation of birds.

**Light:** Daylight in the house is desirable for the comfort of the birds. They seem more contented on bright sunny days than in dark, cloudy weather. Sunlight in the poultry house is desirable not only because of the destruction of disease germs and for supplying vitamin-D but also because it brightens the house and makes the birds happy. Birds do fairly well when kept under artificial lights.

**Sanitations:** The worst enemies of the birds, i.e., lice, ticks, fleas and mites are abundant in poultry houses. They not only transmit diseases but also retard growth and laying capacity. The



design of the house should be such which admits easy cleaning and spraying. There should be minimum cracks and crevices. Angle irons for the frame and cement asbestos or metal sheets for the roof and walls are ideal construction materials, as they permit effective disinfection of the house. When wood is to be used, every piece should be treated with coal tar, cresol, or similar strong insecticides before being fitted.

### **Purpose of Housing**

- To protect birds from inclement weather like excessive heat or cold.
- To protect birds from direct sun rays and rain.
- To minimize effect of dampness, especially in rainy season.
- To provide safety from their predators like dogs, cats, foxes wild animals etc.
- To apply scientific management practices easily for improving productive performance.
- To provide suitable atmosphere for expression of full genetic potential.

### **Essentials of Good Poultry House Location**

- There should be good drainage facility. Sandy loam type of soil is desirable. The elevation should be higher than surroundings.
- The house should be such that the floor is well exposed to sunlight.
- Protection from wind.
- Market should be near.
- Availability of cheap labor.
- Availability of water and electricity.
- Good transportation facilities.
- Surrounding should be safe, clean and peaceful.
- Other infrastructures like bank, school, post office etc. should be near.

### **Layout Plans for Poultry House Construction**

The following points must be taken into consideration while making the layout plans for the poultry house.

#### **1. Orientation of House**

The orientation should be such that the morning sunlight should enter the poultry house.

- East west direction
- Width wall facing West and East.
- Length wise sides to North and South.

#### **2. Foundation of House**

The foundation of house should be raised to about 0.6-0.9m height to avoid dampness and to keep out surface water during rainy season.

#### **3. Floor**

The floor should be moisture proof, plain, free from cracks and crevices and easy to clean.

#### **4. Walls and Partition**

Partition is done of 1m height of bricks and cements lengthwise. And above that wire-netting is better to maintain effective cross ventilation. Full wall was made in breath wise.

#### **5. Ventilation**

In case of brooder house in cage system, small ventilation of about 0.4m width and 0.6m length are installed in every 3m section of side walls on both sides of house. The center height of house is about 10ft and side height of 6ft is optimum.

**6. Doors**

It is placed to side walls facing North or South. 1m wide and 2m height is desirable. Small disinfectant ditch at the entrances as a footbath should be managed.

**7. Width of Poultry House**

For effective cross ventilation needed 6.20-9.0m. If greater than 9m, birds in centre of houses are severely deprived of adequate ventilation.

**8. Length of Poultry House**

As per your need

### **Types of Housing System of Poultry**

Brooding, housing system of poultry can be categorized into the following types:

**1. Free Range System**

This is the oldest method and now has been replaced by intensive system due to relatively more advantages. A range should provide shelter, greens, feed, water, shade and safety. Foraging is the major source of feeding for birds. The average stocking density of adult birds in this system is 250 birds per hectare. Scientific management practices cannot be followed in this system. Hence this system is not suitable for commercial purpose.

**2. Semi-Intensive System**

In this system, birds are confined to house in night time but they are also given access to runs. Generally, outside run of 16-24 sq. m per hen is provided. In this system also there is only slight control over birds and scientific management practices cannot be applied.

**3. Intensive System**

Birds are totally confined to houses. For the commercial production of birds, intensive system is used.

**Advantages of Intensive System**

- Minimum land is sufficient.
- Scientific management can be employed.
- Production performance is better.
- Saving of labors.

### **Types of Intensive System of Housing**

**Deep Litter System**

The bedding materials like rice husk saw dust, ground-nut hulls or sugarcane bages called litter are used to rear birds on floor.

**Advantages of Deep Litter System**

- Safety to birds.
- Birds receive nutrients like Riboflavin, Cynocobalamin and 'Animal Protein Factor' from the litter.
- Litter is a bad conductor of heat, so provides warmth in cold weather.
- Excellent manure is produced.
- Germs like Salmonella are killed by heat produced by fermentative action.

- Control of humidity in the house.

### **Disadvantages of Deep Litter System**

- If not cared properly, remains moist and full of foul smell.
- Damp litter produces ammonia which can be problematic.
- If not cared properly, problem of Coccidiosis may be seen.
- Requirement of balance feed at all times.

### **Litter Management**

The success of deep litter system mostly depends on skillful management of litter during entire period of rearing. Caking of litter should be avoided. For this regular stirring of litter should be done. The waterer should be checked for leaking of water. The wet litter should be removed and may be replaced with fresh ones. The ammonia level produced by litter should not exceed 25ppm. Proper ventilation should be maintained to keep litter dry. To control dampness in litter mix 1kg lime or 0.5kg superphosphate per 15 sq.ft floor area.

### **Cage System**

It is the more intensive type of poultry production and involves rearing of poultry on raised wire netting floor in smaller compartments called cages. This system has been proved very efficient for laying operations. Feeders and waters are attached to cages from outside. The droppings are either collected in trays underneath cages or on belts for it or on the floor or deep pit under cages, depending on types of cages.

### **Advantages of Cage System**

- Less space per bird is required. Generally one third spaces as compared to deep litter.
- Better flock supervision.
- Pecking and cannibalism minimized.
- Saving of labor.
- Better disease prevention and control of infection.
- The major litter borne problem like Coccidiosis are eliminated.
- Less mortality rate.
- Less expensive on medication.
- The cost of litter and litter management problems are totally eliminated.
- Definite feed saving up to 10gm/bird/day.
- Breakage of egg is reduced.

### **Disadvantages of Cage System**

- Initial investment is higher.
- Sometimes problems of “Cage Fatigue” may be observed in overweight birds.

### **Types of Cages:**

#### **1. Stair-Step (reverse) type Cage**

It is also known as California type. The compartments are arranged step-wise in two or three tiers on stands in two or three rows. Droppings may fall on ground or in deep pit under cages. The droppings may be removed once in 6 months or after 12 months.

## 2. Battery Cages

It is also known as Vertical cages. The compartments of cages are arranged one above the other on stands with a tray or shift belts under the compartments for collection of droppings. Droppings are preferably removed every day or at least on alternate day in this system.

## 3. Flat Deck Cages

This is a single tier cage system popularly used for rearing chicks up to 8 wks, for easy handling of them in modern methods of poultry production and management. Each cage is usually 1m square block fitted on stand. Lengthwise each cage is divided into two compartments and each compartment consists of 20 chicks. Up to 4wks of age, waterer are provided from width wise and then from both the sides (length and breadth). Feeders to cages are attached to both sides of length wise. Dropping can be easily removed along with the shifting of chicks to grower houses at 8 wks of age.

### Floor space requirement in different system

System	Age	Floor Space/ birds
Deep litter	0-4 wks	0.5 sq.ft
	4-8 wks	1.0 sq.ft
	8-12 wks	1.5 sq.ft
	12-16 wks	2.0sq.ft
	16-20 wks	2.5 sq.ft
	More than 20wks	3.0 sq.ft
Cage system	0-6wks	33 sq. inch
	6-18wks	45 sq. inch
	Above 18 wks	72 sq. inch

## Brooding of Chicks

Care and management of chicks is known as brooding of chicks. In case of broilers, till four weeks of age and in case of layers till six to eight weeks of age are called chicks. Brooding plays a major role in growing efficient layers and broiler finishers as it is development period for body of birds. This is a very sensitive period because chicks do not have ability to regulate body temperature for the first five days and thermoregulatory system is not fully developed until two weeks of age. Extra effort during the brooding phase will be rewarded in final flock performance. Brooding of chicks has following components:

## Temperature

Chicks require appropriate temperature. Variation towards higher or lower leads to more mortality or slower growth. Temperature is usually measured at level of 6cm above floor and 6-8cm inside the edge of warm zone of brooder.

Age (week)	Brooder temperature (°F)	House temperature(°F)	Age (week)	Brooder temperature (°F)	House temperature(°F)
1	95	81	5	75	61
2	90	76	6	70	56
3	85	71	7	70	56
4	80	66	8	70	56

Too high or too low temperature results in slow feathering; retarded growth; piling; pecking and mortality. Behavior and distribution of chicks under and around the brooder is the best guide for judging correctness of temperature instead of thermometer.

Device for providing artificial heat is called brooder. Electric hover or canopy is used commonly. Height of brooder depends on need of brooding temperature but at least 10-14cm clear space above chicks. Bulbs of different intensity like 200, 100 or 60 watts can be used to reduce or increase temperature. Infra-red lamps of 250 watts can also be used with an added advantage of germicidal effects of org

### **Chick Guard**

Chick guards are placed as a barrier to avoid straying away of birds from heat source. Guard area should be gradually expanded and removed after 7-8 days. Cardboard or metal sheet of 45cm height placed in a circular manner at a distance of 85-90cm from the edge of brooder and can be increased to 130cm as age advances.

### **Floor Space**

System	Age (weeks)	Floor space/bird (sq. ft.)
Deep litter system	0-4	0.5
	4-8	1.0
	8-12	1.5
	12-16	2.0
	16-20	2.5
	>20	3.0
Cage system	0-6	33 sq. inch
	6-18	45 sq. inch
	>18	72 sq. inch

### **Feeding and Watering Space**

Age (week)	Feeding space/ chick (cm) Linear type	Watering space/ chick (cm) Linear type
0-2	2.5	0.25
3-6	4.0	1.0
7-12	7.5	1.0
>13	10.0	1.5

For efficient growth of chicks frequent feeding (4-5 times) in a day with ad-libitum fresh water.

### **Litter or Bedding**

Rice husk saw dust, groundnut hulls, straw etc. are used as comfortable bedding material for rearing poultry. Spread the litter/ bedding material with depth 4-5cm and increase to 8-10cm as age advances. Daily stirring should be done to avoid caking and to keep dry and loose to reduce ammonia odor. On an average, litter should contain around 18-24% of moisture.

### **Ventilation**

Brooder should be well ventilated for excellent growth performance and health of birds. High moisture level also can lead more ammonia fumes causing irritation of eyes and respiratory distress. Level of ammonia should be below 25ppm and carbon-dioxide should be below 0.5%

and oxygen availability should be 21%. Excessive dust causes irritation of respiratory tract and increase disease incidence.

### **Light**

Generally chicks are provided with continuous light; sunlight in day time while in night, with using electric bulbs or tubes up to 8 weeks of age. Light helps in faster development of feathers, increased feed intake and essential for vision.

### **Housing of Swine**

Good housing with adequate accommodations incorporating all essential requirements of pigs must be provided so that the animals can grow quickly and efficiently. This is only possible through scientific housing which includes the provision for fresh air, exercising, sunlight, protection from inclement weather conditions. Care, management, comfort and safe of the pig have to be considered. Breeding pigs should be kept in proper house for obtaining quick growth, efficiency and economic return. Pig house could be constructed in a single or double row of pens with a walking space in between. The pen should be facilitated with feed and water trough at convenient place or keeping the room dry and warm. Door facility should be provided in each pen for easy movement of pigs from one room to another. The house should be constructed at cement mortar for making strong and roofed for protection from unfavorable weather conditions. Each separate pen should be facilitated with run yard that is used to obtain fresh air, sunlight, for doing exercise and to dung at one corner. It is recommended to maintain different stock in separate rooms for convenient management. It becomes economic to maintain growing stock of same age fattened in a room. There should be separate isolation box for sick animals.

### **Systems of Housing Pigs**

- i) **Open air system**
- ii) **Indoor system**

A combination of these two is however practiced in most of the parts of various countries. The size of the enterprise, the type of pigs to be reared or produced, the availability of land and the climatic conditions, management system (pasture or indoor) are the guiding factors for choosing the housing system. In case of farms with small holdings no special purpose pig house is necessary but in a specialized farm accommodating a large number of animals, there may be the necessity of constructing special purpose house for different categories of stocks e.g. breeding stock and store pigs.

### **Location**

The farm should be located near the city or location where there is a heavy demand of pork products (for minimizing the cost of transport) and it should be accessible by road. Proximity to public utilities like electricity, water supply and other necessary facilities like labor, good drainage system should be available or accessible. The buildings should be situated in such a way that doors and windows will receive maximum sunlight and the pigs will get shelter from prevailing direction of wind.

## **Constructional Details**

### **Floor**

One of the essentials of a big building is a warm, dry bed free from draught. Floor should be hard, impervious to liquid and easy to clean. A concrete floor should be laid on a hard foundation with a rough surface.

### **Roof**

It should be water proof and should not be a bad conductor of heat. R.C roof or tiles are excellent for this purpose. In colder regions the roof should be insulated. Thatched roof or tiled roof may also be provided in pig housing.

### **Wall**

Walls should be 4'-5' high from the floor. Brick and concrete are the best materials for the construction of walls for a height of about 3' from the floor while the remaining 1 or 2 feet may be of wood or 1" G.I Pipes. Wood can also be used but it must provide a flush surface to pigs, otherwise will gnaw it.

### **Troughs**

About 72-80% of cost of pig production is debited to food. So the position and construction of feed trough is considered to be an important factor. A trough space of about 12 inches should be provided to each swine to facilitate proper feeding without scrambling and fighting. All troughs should be strong, easy to clean and fitted in such a way that pigs cannot tilt them.

### **Water Supply**

It is required for cleaning and drinking purpose. Fresh drinking water should always be available to the pigs all the year round. Automatic drinking bowls are the best way for providing water to pigs but too costly.

### **Floor Space Requirements**

Floor space requirements are generally influenced by system of management, age and size of animals. Generally following floor spaces are recommended:

Fattening Pigs: 10-16 sq.ft per pig

Fattening pigs in yards: 30-40 sq.ft per pigs

Farrowing pigs: 60-80 sq.ft per sow and litter

Boar pens: 40-50 sq.ft per pig

## **Description of Permanent Buildings**

### **Boar Pen**

In the conventional house-breeding boar should be individually housed in separate strong pen having nearly 50 sq.ft enclosed floor space and 120 sq. ft. yard for run. The breeding boar uses the yard for runway, obtaining fresh air and sunlight and even dung at one corner. The height of the pen should be not less than 4 1/2 ft. high. Boar pen should be so arranged that the breeding gilts and sows maintained in the house be able to see and smell each other for stimulates sexual behavior.

### **Farrowing Pen**

Provision of a separate breeding house is preferred. The pregnant sow should have separate pen for farrowing and rearing litters up to the stage of weaning. The pen should have floor space of 60-80 sq.ft attached with 120sq. ft. yard for run. The yard is usually used for obtaining fresh air, sunlight, running and to dung at one corner. The feeding trough and drinking water facility should be located inside the enclosed pen at convenient place and the pen should be dry and warm. A creep space should be made at one side of the pen to coop or brood the newly born piglets, where heating is arranged. The creep space is separated by guardrails of G. I. pipes where only piglets can enter but not the sow. the piglets should be fed creep feed at this creep space since third day of their birth to weaning.

### **Dry Sows and Gilts House**

They do not require any special accommodation; however, dry sows and gilts could be housed in separate pens away from main breeding pen. Separate feeding, water trough and runway arrangements can be made available. They could be either kept individually in a pen or in-group in a large room. Each pig requires about 40 sq. ft. floor space for comfortable accommodation.

### **Weaners and Fatteners Pen**

Weaners and fatteners of same age can be housed in separate pens having feeding, water trough and runway facilities. Fattening pig is required nearly 10-16 sq.ft. of floor space individually.

### **Segregation Shed (Isolation Box)**

In the intensive system of pig keeping there is always chance of becoming some pig sick. The sick pigs should be timely identified, separated and kept in a segregation house away from the main units. Here the sick pig should be treated and kept on observation unless it is not properly cured.



## Care and Management of Different Farm Animal

In Nepal livestock form an integral part of Agriculture. In fact the country's national economy is closely knit with Agriculture and livestock. It is therefore, a matter of great importance that the livestock are maintained in good health and provided proper management "The productive potentialities of livestock are controlled by three principal factors namely i) genetic makeup ii) Nutrition iii) Environment including the climatic conditions

### What is management?

Management is the art and science of combining ideas, facilities, processes, materials and labors to produce and market a worthwhile product for service successfully.

### Manager:

A manager is an organizer and a converter he converts resources in to product. This is just as true for our dairy farm as for our biggest industries; he converts labor soil fertility hay silage and other inputs in to milk. These transformations do not occur by happenstance. They are the results of a purposeful and premeditated force called management.

### Function of Management:

A manager must perform five major functions. He must plan, organize, coordinate, direct and control. The manager's role is that of a 'decision maker' i.e. who must decide what to do., how to do it, when to do it.

### For successful performance of management process, the manager must

1. **Observe:** Gather information about all resources technologies, alternative market outlet Sources of capital credit needed and items affecting successful operation
2. **Establish goals:** Clearly set and the objectives to be achieved.
3. **Identify problems:** Find the obstacles or stumbling blocks which. Hinder the progress to goals.
4. **Analyze:** Compare alternative methods of reaching goals, in terms of capital labor and other assets.
5. **Decide:** Choose a plan of action and set out clear-cut procedure.
6. **Act:** Put chosen plan into operation.
7. **Be responsible:** Assume responsibilities for the consequences, of the actions taken.
8. **Evaluate:** Measure results and compare with goals.
9. **Control:** Keep a careful check on production level.
10. **Adjust:** Keep the operating system flexible to take the advantage of new development tools and management

### Tools and management:

Some of the tools which are helpful in acquiring accurate information about dairy business and in guiding management decision are as follows:

1. **Farm records:** No business can be operated successfully without a good system of accounting for a dairy farm. The account should include the following
2. **Complete inventories:** At the beginning and end of the year including a summary of all assets, debts and net worth.

3. Production records (including main animal products - and their byproducts.
4. Current expenditure and receipts-including quantity sold)
5. Annual production and financial summary.
6. Analysis of year's records to determine strong and weak points.

### **Care and Management of Newly Born Calf**

All dairy operations must be planned with due regard to the comfort the animal. After calving the cow will usually be up and will begin to dry the calf, if for some reason the cow is unable to get up then the calf should be dried with a towel or other suitable material.

1. Make sure that all mucus is removed from the nose and mouth. If the calf does not start to breathe, artificial respiration should be used by alternately compressing and relaxing the chest wall with the hands after laying the calf on its side.
2. Naval cord should be cut with sterilized scissors leaving "form the body and then entire naval cord be disinfected by Deeping it into a cup containing tincture of iodine.
3. Normally the calf will be on its feet and ready for suckling the dam within an hour. Some assistance in this stage is useful. Clean the udder before the calf starts sucking.
4. Feed the calf with first milk i.e. colostrum at least for 48 hours. The colostrums should be fed within half an hour after birth. Delay in its feeding causes the calf to loose the ability to absorb antibodies across its inertial walls. 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.
5. 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.
6. 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.
7. Take body weight of the calf and identify the calf by tattooing.
8. At the age of 15 days 32-40 CC of H.S. serum should be inoculated.
9. Dehorn the calf preferably within 15 days after birth.
10. Teats of the udders of heifers in excess of four should be removed.
11. 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

The future of any herd depends upon how calves are raised. One has to raise one's own calves to make a good herd. So the calf rearing should be taken upon scientific lines and it should be achieved economically.

### **Management practice up to six months:**

1. Provide fresh, clean water all times, particularly when milk feeding is induced discontinued
2. Giving of identification mark which is necessary for keeping proper records, proper, feeding, better ore and management.
3. Dehorning the calves: at the age of 2-3 weeks, bull calves should be castrated suitably.

4. Castration of bull calf: At age of 2-3 months, bull calves should be castrated suitably.
5. Removal of extra least: In female calves, the following points to be noted
6. Housing: While housing the calves/ the following points to be noted.
7. Calf pen should be close to cow shed.
8. Pen should provide sunlight; good ventilation floor should not be slippery.
9. After 6-8 weeks, calves may be grouped according to age, sex.
10. The feed boxes & watering equipment should be provided in the pen.

### **System of Calf Rearing**

**1. Sucking methods:** In this method, the calf is allowed to stay with its mother and allowed to suckle only a little before and after of milking the cow. The calf gets whole milk throughout lactation.

#### **Advantages:**

- i) This is natural system of feeding.
- ii) The calf gets contamination free milk.
- iii) No much care is required to take during feeding.
- iv) The mother-calf affection developed.

#### **Disadvantages:**

- i) If calf dies, the cow refuses to let the milk.
- ii) It cannot be ascertained about over feed or under feeding of the calf.
- iii) If milk is infected the infection may be to calf.
- iv) The actual quantity of milk yield of cow cannot be calculated.
- v) The post partum heat is late.

### **2. Weaning method:**

In this system, the calf is taken away from its mother either just after the birth or after 2-3 days of birth, sometimes it is allowed till the period of colostrum feeding. After that, the calf rearing is entirely by isolation system.

The immediate step, after weaning of the calf is to teach it to drink milk is very important

1. **Nipple system:** Used for 3-4 days-aged calves. A pail containing milk equipped with rubber nipple used which the calf sucks.
2. **Hand fiddling:** When the calf develops appetite insert two fingers of right hand into the mouth while holding milk in left hand at convenient height for the calf. While calf suckles the fingers, the muzzle is gradually pressed down into milk pan. This way calf learns to drink milk.

#### **Advantage:**

- i) Cow continues to give milk whether calf is alive or not.
- ii) The calf can be culled at an early stage.
- iii) It can be fed scientifically as per requirements no problem of under feeding and over feeding.
- iv) The actual amount of milk produced by cow can be determined.
- v) Milking without calf is more hygienic & sanitary.
- vi) Cow becomes regular breeder; the calving interval is less than the unweaned calves.

### 3. Milk feeding schedule to the calf:

The calf after weaning from the Jam, it should be fed with the whole milk, skim milk and re-constituted milk and also calf starters in gradual age. The temperature of the milk must be body temp. I.e. 39°C, the utensils used must be clean and sterilized; the milk should be fed twice a daily.

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	1/10 <sup>th</sup>	-	-
20-30	6 – 20	-	1/ 10 <sup>th</sup>	-
25-50	21-30	-	1/15 <sup>th</sup>	1/20 <sup>th</sup>
30-60	31-60	-	1/20 <sup>th</sup>	1/25 <sup>th</sup>
40-75	61-100	-	1/25 <sup>th</sup>	1/25 <sup>th</sup>

### Calf Starters:

It is mixture of grain protein feeds, minerals, vitamins & antibiotics. It has been evolved for use with limited whole milk. An ideal calf starter contains 20% DCP, & 70% TDN. If the calves raised with calf starter, the schedule is:

Age(day)	Whole Milk (Kg)	Skim Milk (Kg)	Calf Starter in Kgs.
0-5	Colostrum	-	-
6-7	2.75	-	-
8-14	3.25	-	-
15-21	2.75	1.00	0.10
22-28	1.75	2.00	0.20
29-34	1.00	3.00	0.30
35-42	0.50	3.50	0.50
43-56	-	3.50	0.75
57-84	-	2.50	1.00
85-112	-	0.50	1.25
113-140	-	-	1.75
141-182 (up to 6 months)	-	-	2.00

## Care of Heifer

### Heifers-can be reared by two methods:

- i) Outdoor system/grazing method.
- ii) Indoor system.

#### i) Outdoor system:

The heifers are reared mainly on grazing. The following are management points in this system:

1. They should be shifted daily from one grazing land to another.
2. Pasture plots be grazed rotationally containing legume grass.
3. Grazing land must have provision of shade & supply of cool drinking water.
4. Concentrates and minerals may be fed through troughs located in the field.

## ii) Indoor system:

In this system, they are confined by compound and provided with shelter. The main points to be considered in this system are;

1. **Feedings:** They should be provided with good quality of hay or roughages & concentrates or grains. The feed must be rich in nutrients like proteins, energy, minerals, and vitamins.
2. **Housing:** 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- 5 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
3. **Exercise:** In this system, the care is to be taken that they should get sufficient exercise which removes stiffness in limbs, -keep thrifty growing & maintain normal appetite.
4. **Culling of heifers:** Those having anatomical defects, bad deposition, poor growth & late maturity should be culled.
5. **Control of parasites:**
  - **De-worming of heifers:** Worms interfere with absorption of food nutrients ultimately interfere with host's growth, therefore heifers be de-wormed after every 4-6 months.
  - **Control of Ectoparasites:** Ectoparasites like ticks, lice etc. should be treated to control such parasites by dipping or spraying with 0.5% BHC or other insecticides like 1% Malathion spray is effective. The regular grooming is also helpful.
6. **Vaccination of heifers:** At 6 months of age, heifer should be vaccinated for & Mouth disease, T.B. & Rinderpest diseases. While older heifer should be vaccinated for Anthrax, Black quarter.
7. **Age of Breeding:** Many factors affect the age of breeding i.e. Breed, system of feeding, and quality of nutrition. Under average manage mental conditions of feeding & care, the heifers attaining weight of 200 kg (minimum) may be considered of age at first breeding.
8. **Steaming up:** A pregnant heifer few days prior to calving must be fed liberally is called steaming up. It is done for the reasons that, heifer continues to grow, she has to bear an unborn viable calf, and she must maintain her good health during lactation period. For steaming up heifers must be given 1.5 kg concentrate mixture.
9. **“Breaking-in” heifers:**
  - **Care in training heifers:** Heifer should be handled with kindness. They should be trained to load with halter from an early age, which helps to make docile cow.
  - **Housing pregnant heifer with milch herd:** This practice to heifers should start about a month prior to Calving to accustom them their place in barn.

## Care of Lactating/Milking Animals

The routine of management practices like feeding and milking and caring should be followed some time each day, being animals are more sensitive habitual for timing.

1. **Feeding & watering:** The adequate clean & fresh water should be provided. An adult dry cow drinks 30-32 liters of water per day besides it requires 4 liters of water for every liter of milk production. Also, the water consumption increases when air temperature rises.

**Feeding:** The following feed should be fed to cow for one week to recoup energy i.e. 1 kg cooked bajra per day + 1 coconut + 100 gin methi seed + 100 gin shepu + 100 gm Aaliv + 100 gm sweet oil.

**Regular feeding for milk production:** The production ration should. Be given the additional allowance of ration for milk production over and above maintenance requirement. One kg additional amount of concentrates is required for every 2.5 kg of milk.

2. **Housing:** Good housing is required for protecting animals from heat, rains and winds. Also, proper drainage, ventilation and exposure to sunlight must be there. These factors must be available in any type of housing chosen.
3. **Cleaning & grooming:** Cows should be kept clean both for clean milk production and health of animals, it requires daily brushing which removes, dirt and loose hair. The regular grooming helps to keep skin clean, helps for blood circulation.
4. **Disease control:** The prevention of disease & parasite infestation of the herd is most important. To achieve this, keep the sanitation by keeping the housing & other places clean and regularly disinfected. Many diseases are also prevented by timely vaccination.
5. **Exercise:** The cows should be provided free movement to give the needed exercise.
6. **Milking:** The udder and teals should be washed with warm water mixed with KMnO<sub>4</sub> 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.
7. **Breeding:** Cow should be bred at 60 days after date of parturition which helps good reproductive health of cow.

### **Care of Pregnant Animals**

The early single or latter 1/3 period of the gestation period is important period in view of care and management.

- **Feeding:** It is necessary to provide adequate feeding to meet nutritional requirements of both mother and foetus. The challenge feeding (extra feeding) should be given from 5th month of pregnancy @ 1.25 - 1.75 kg of concentrate mixture and give 3.4 - 4.5 kg from 8th month onwards, over and above maintenance ration to Zebu and crossbred animals. Provide adequate clean water.
- **Drying of Cow:** The pregnant cow-should be dried above 60 days before expected date of calving. To conserve the nutrients which are required for developing foetus & increased milk yield.
- **Housing:** Pregnant animal approaching parturition should be isolated and kept in calving pen which should be clean, well ventilated, bedded and disinfected. This helps to take special Care regarding feeding management, to avoid crowding, mounting by other animals, to avoid infection from oilier animals.
- **Care at expected Date:** To know expected date of calving is a must to take care at time of parturition. Careful watch should be kept close to expected date of parturition. Do not interfere the normal act of calving. If there is dystokia provide time, veterinarian help.

## Care of Breeding Bull

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

1. **Selection:** The breeding bulls should be selected from good pedigree
2. **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.
3. **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.
4. **Exercise:**
  - It is needed to keep normal appetite, retain breeding power and good health.
  - Males which received plenty of exercise produce larger ejaculation containing more sperms of higher activity.
5. **Training:**
  - Bull should be trained to be lead with bull staff at an early age population is a pressure on limited sources, so timely culling of the unwanted animals is desired.

## Care and Management of Pullets

This is most skillful operation as the quality of pullet during growing stage matters much, for expression of full genetic potential of bird during egg production. The prime aim of growing management is to develop a pullet which will come into lay around 18-20 weeks of age with proper body development having body weight of 1.25 to 1.35 kg. The broiler parents at this age should weight around 2.6 and 2.1 kg respectively for male and female. Depending on breeds, varieties and feed restriction, the body weight can vary.

The care and management essentially remains the same as that of chicks except that they neither require artificial heat nor artificial light in the night. As the age advances floor, feeder and water spaces are increased to 900- 1900 cm<sup>2</sup>, 7 to 10 cm (linear) and 1.5 to 2.5 cm (linear) respectively. Water intake depends on temperature, humidity, constituents of feed, air circulation, activity and age. The intake of water is higher when temperature exceeds 28°C and keeps on rising with increase in temperature.

Periodical deworming (once in 2.5 to 3 months) usually one week prior to R<sub>2</sub>B vaccinations is helpful to keep away birds from parasite infestation. Preferably deworming should be carried out either early in the morning or late in the evening to avoid the stress on birds. If required, 0.7 cm layer of top litter is removed and fresh litter can be added to avoid re-infestation. Pullets are reared on natural day length and never provided artificial light. If this is not observed early maturity of pullets can lead to production of number of smaller eggs and increased incidence of prolapse and egg bounds. In case of heavy coccidiosis outbreak, the complete litter may be replaced with fresh one to have effective control of infection. Second debeaking is done during growing at the age of 14-16 weeks. The vaccination as per schedule is also completed with proper care. The representative birds (5 to 10%) should be weighed weekly to assess the growth performance.

The body weights and maturity of broiler breeders during pullet stage is controlled by adopting suitable feed restriction programmed. Generally qualitative and quantitative restrictions are followed to avoid reduced egg production and hatchability in future and increased feed cost during rearing. Here, also body weight of sample pullets must be recorded to know the growth performance and to regular feeding programme.

### **Care and management of Layer**

Maximum hen-housed egg production with fair egg size, feed efficiency and minimum mortality are the prime goals of layer farming. Beside good genetic makeup of bird, management during laying plays an important role to achieve the above mentioned targets in egg production. Following are the vital aspects of efficient layer management.

#### **Segregation and Transfer of Pullets**

Ready to lay pullets should be shifted from grower to layer sheds around 16 to 18 weeks to allow 1 to 2 weeks adaptation period before laying starts. During pullet rearing it is quite possible that in spite of providing highly suitable management facilities, some pullets may lack in size and development of body. In real sense, genetics itself allows one to two percent culling. Such underdeveloped pullets should be segregated while transferring them to layer sheds and be housed in separate compartments or cages or sections of house in case of deep litter, to allow them to avail extra nutrition to achieve normal standard of growth. These segregated pullets are fed 2 percent extra proteins along the additional minerals and vitamins including liver tonics to gain normal growth within 3-4 weeks. The pullets which are blind, crippled, emaciated, injured and infected are discarded at the time of shifting.

#### **Floor, Feed and Water Space**

Floor space of 1800 to 2200 cm<sup>2</sup> per bird on deep litter and 337-375 cm<sup>2</sup> per bird in cages is recommended for layers. Breeders are provided with little higher space of 2300 to 2700 cm<sup>2</sup> depending on size of birds. About 12 to 15 cm linear feeder space and 2.5 cm water space per bird is adequate during laying. On deep litter system one laying nest for every 4-5 hens with perch at entrance is provided for comfortable laying and clean egg production. An inadequate management facility leads to reduced egg production and feed efficiency; increased disease incidence and mortality and sometimes cannibalism also.

#### **Temperature in Layer House**



The comfortable temperature for optimum laying ranged from 18.3° to 21°C (65° to 70°F). Both higher and lower temperature affects the egg production and quality of eggs adversely. Egg production starts declining when temperature rises more than 27°C while egg size starts reducing from temperature of 24.5°C onwards only. The higher temperature in general is more harmful to birds than lower temperature. The effects of cold weather become more prominent when temperature drops below 12.8°C.

### **Supply of Artificial Light**

From 21 weeks onwards, the layers should be provided with artificial light, starting with total 14 hours duration and gradually (1/2 hour per week) be increased to reach to 16 hours and kept constant up to 42 weeks of age. At the age of 43 weeks it is again gradually increased to 17 hours. The day length is considered to be 11 hours in winter and rainy season while 12 hours in summer for providing total light. The total artificial light may be divided equally in morning and evening. The appropriate lightning schedule stimulated egg production by 4 to 6 percent, while irregularities in lighting can cause drop in egg production. The intensity of light at bird eye level is important to stimulate egg production, which is 0.9 to 1.2 foot candle. A bulb of 40 watts with reflector hanged at height of 2.2 m above floor level for 3.5 m<sup>2</sup> floor space provides correct intensity. But the bright illumination: Layer should never be exposed to reduced light schedule which lowers down production considerably. Breeder management is similar to layer management except their diet contains extra protein. Mn and Vitamin E enhance fertility and hatchability. Breeder males and females should be reared separately from day-old age, which ensures uniformity in growth reduces culls and gives better production during laying.

### **Reducing Stress**

Factors such as vaccination, medication specially antibiotics in disease outbreaks, improper and restricted feeding, extreme weather changes, starvation, high production and shifting from one to another house induces stress in chickens. This results in drop in egg production, poor growth and increased susceptibility to diseases. Administration of electrolytes, vitamins, minerals, controlling effects of weather changes helps to reduce or combat the stress on birds.

### **Feeding and Watering**

Not only the quality and methods of feeding adopted also play an important role in making profits from layers. The chicken like white leghorn layers should consume about 105-110 gm of feed/day/bird, while dual purpose breeds like RIR, Newhampshire, etc. will eat around 115-120 gm/day/bird on an average. Higher or lower intake less than recommended requirement indicate impairment in quality of feed or stress/ disease condition which should be corrected accordingly. Minimum two feedings should be followed to avoid staleness and wastage of feed. All mash or pellet feeding is good method of feeding to achieve optimum performance of layers. Birds should be provided fresh, clean, cool and portable drinking water all the time. As a thumb rule bird drinks 2.5 to 3 times of water of feed consumed depending on season and size of birds.

### **Vaccination**

From 42 weeks of age onwards, every month, layers should be vaccinated lasota vaccine through drinking water to boost up immunity and to maintain proper titre levels of antibodies against Ranikhet disease.

### **Culling**

It is one of the constant and important operations to be practiced at least bimonthly to improve economy of farming to remove focus of infection.

### **Record Keeping and Analyzing**

Relevant record keeping of food intake, egg production, vaccination, medication, mortality, culls, receipts and expenditure and periodical analysis of them helps in correcting mistakes and improvement in management to increase profitability.

### **Housing**

The layer houses should be well-ventilated, reasonably cool in summer and warm in winter but free from drafts. The open-sided poultry sheds which are popular in our country, fulfills above requirement with specific management in summer and winter. They are cheap for construction and easy for maintenance also.

## **General Care and Management of Swine**

### **Care of the Breeding Boar**

Young male piglets of pure breed which are comparatively long, strong, growing fast and have better feed conversion efficiency are selected for replacement of breeding boar. During breeding, the boar is responsible to transmit half of the gene to its progenies so success of pig production depends upon breeding boar. Looking at the performance of the progenies the breeding boars are retained for future breeding. Usually proven breeding sire of older age is retained for breeding, so care has to be taken for avoiding inbreeding.

Preferably all mature breeding pigs should be kept separate in individual pen having minimum 48 sq. ft floor space attached with a runway of 100-150 sq. ft area. The boar pen should be so arranged that the breeding sows of the other pens should see and smell at all the time. Such arrangement stimulates successful breeding.

Breeding boar should not be over fed and become fattened. Feed should be limited at 750 gm daily per 45 kg of body weight for a mature breeding boar. So in order to maintain its health it should be fed appropriate feed and allowed for sufficient exercise. They should be allowed for grazing or fed some green grass in its daily allocation. Plenty of fresh water should be available for drinking. Long and sharp tusks of the breeding boar have to be clipped, as these become dangerous to the caretaker and as well as to other animals. The breeding boar should be handled carefully as rough treatment may cause vicious and dangerous.

### **Care and Management of Sow and Litter at Farrowing Time**

Deworming should be done three weeks before farrowing. The pregnant sow at her advanced pregnancy should be thoroughly washed with soap and warm water to disinfect adhering parasite eggs and other germs and transferred in a clean and disinfected farrowing pen 6-7 days before the due date. Bedding with rice straw, husk and saw dust should be placed in the farrowing pen and it should be comfortable to the animal. Laxative feed should be provided to the pregnant sow three days prior to farrowing. Over feeding should be avoided three days prior to farrowing and 12 hours after farrowing. As a sow farrows many piglets at a time they should be protected from cold and crushing from the heavy body of the sow. In another corner there should be a provision of a creep space or a coop separated with the guardrail and bedding and heating mechanism is arranged. The piglets run inside the creep space to protect from crushing. The piglets are fed creep feed containing nearly 20 per cent protein in the creep space, which cannot be approached by the sow. Height of the rails should be around 10 inches to one foot and partitioned in few places so that only the piglets can go in for protection and warming.

### **Care and Management of Piglets, Growing Stock, Lactating Sows, Feedlot Stock**

The requirements of lactating sow are greater than those during the gestation period. A rule of thumb method is to provide daily 2-3 Kg ration for maintenance plus 0.2-0.5 Kg for each piglet the sow is nursing. Lactating sows should be supplied adequate feed and clean water. Concentrate feed allocation should be made for suckling sow. In case any teat injury is observed in the teat due to piglet's suckling, should be immediately treated. The sow should be allowed to rear the piglets for 6-8 weeks. Properly fed sow can be mated within one week of weaning. It is important to give proper attention to the feeding of breeding sows and gilts. "Flushing" (feeding liberally before breeding) the sows and gilts for 8-10 days just before breeding time encourages onset of heat in time and increases ovulation as well. However, feeding during suckling period is equally important.

Anemia is a very common nutritional disease of the piglets. This condition can be prevented by injecting iron to all newborn piglets. Piglets are born with four pairs of sharp teeth, with two pair on each jaw. These are known as wolf teeth. They are of no practical value to the piglets and they may irritate the sow's udder during nursing and even cause injury to other fellow piglets. It is good practice to clip these teeth shortly after birth. Piglets are allowed to suckle the milk for 6-8 weeks there after they can be weaned at any time. During weaning the sow should be removed from the piglets rather than the other way round, which allows the piglets to remain in the same environment.

All male piglets that are to be fattened for marketing should be castrated by open method at 1-2 weeks of age. Selected piglets kept for breeding should be individually identified by ear notching. Notch at the apex of right ear indicates 1, at the middle of the dorsal edge 3, at the middle and root of the ventral edge of the ear is 2 and 5 respectively. 100 is marked in the center of the ear. Similarly 10, 30, 20, 50 and 200 are marked at the similar positions in the left ear.

Growing piglets after weaning can be grown jointly till they are 8-9 months old. They should be fed two times a day and water should be supplied continuously. Feed allocation should be increased according to the growth and age. Vaccination against swine fever and deworming should be done at 4-6 weeks age. Selected replacement stock should be reared separately while feedlot stock of both sexes can be fattening jointly till they are disposed.

## **IMPORTANCE OF BARN SANITATION**

Barn sanitation meant basically disposal of wastes. Improper waste management causes transmission of contagious disease to the animals as well as human beings. Proper cleaning and sanitation removes most of the germs and parasites along with dirt, thereby increasing the efficiency of animals and prevent economic losses due to infection.

Sanitation prevents occurrence of diseases and helps in minimizing contamination and production of good quality milk and milk products.

Factors important to maintain sanitation are as follows:

1. Adequate Ventilation: Proper ventilation without draft and without accumulation of moisture on wall and ceiling.
2. Proper disposal of manure, feed waste and other excreta twice daily and keeping manure pit covered with straw to prevent breeding place of flies.
3. Smooth and wide enough gutter for holding accumulated droppings and with proper slope to facilitate drainage of liquid excreta.
4. Use of easily cleaned type of watering and feeding utensils.
5. Good lighting program through doors, windows, and ventilators to facilitate proper cleaning and keeping floor dry. Electricity should also available during night time.
6. Use of clean bedding materials.
7. Avoid use of permanent pastures to check the parasitic infestation.
8. Burning of all sweeping and scrapings of the barn.
9. Routine program of deworming to check internal parasites.
10. Use of insecticide to control external parasites.
11. Sufficient water source is required for washing the animals and for washing of floor and utensils.
12. Use of disinfectants.

## **FARM WASTE HANDLING**

Feces of animals attracts abundant flies and they contain large number of bacteria some of them are pathogenic to animals and human beings. Similarly, the urine and other excreta, contaminated food and water of sick animals and dead carcass are source of contamination to healthy herds. Burning or deep burial of dead animal and spreading of lime is safe.

Dung, urine and bedding materials should be disposed in compost pit or drainage disposal system so that the shed hygiene is not disturbed and cattle shed are free from dung and urine. Cleaning of sheds with clean water and provision of right types of gutter in the stalls are preconditions of waste disposal.

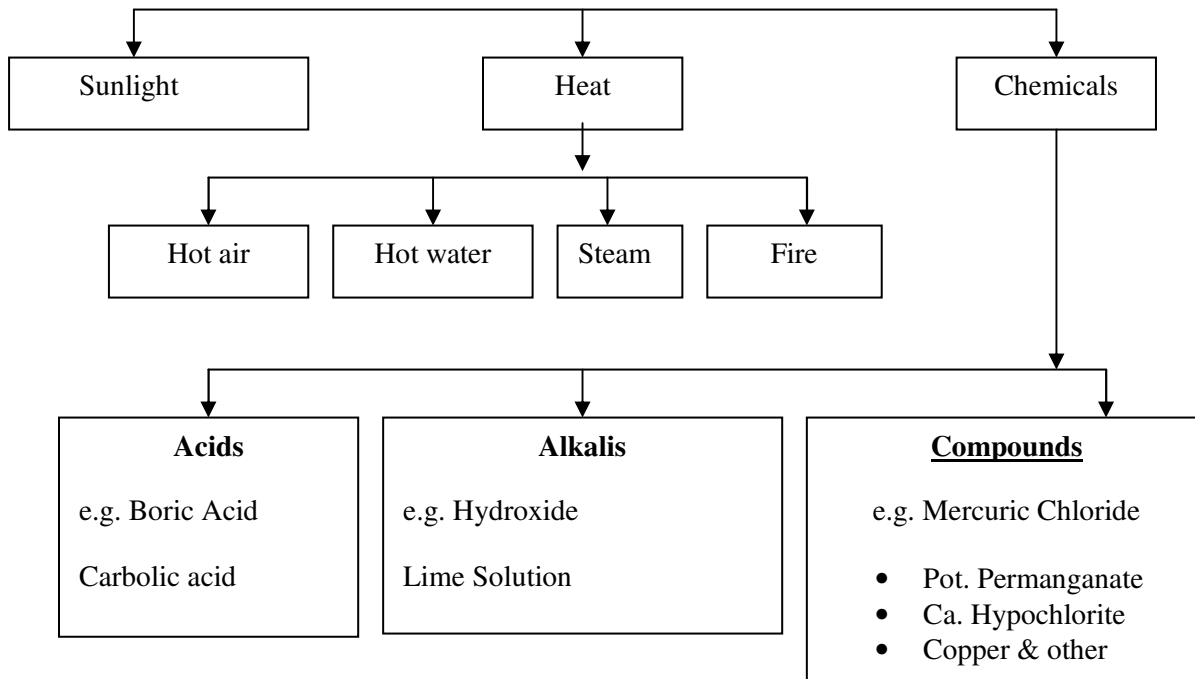
### **Disinfectant**

Compound used to kill bacteria and parasites are called disinfectant. It may be either physical or chemical. Physical disinfectant are heat, sunlight and electricity while chemical, are solid, liquid and gases. Steam also may be used.

## Disinfectant

Some parasiticides or insecticides which destroy animal parasites such as lice, mites, ticks and fleas are termed as disinfectants used externally under sanitary control program.

### TYPE OF DISINFECTANTS



#### Common Disinfectants, Concentration & Method of Use

1. Boric acid 5-6% solution, splashing on floor, walls, equipments, wounds etc.
2. Phenol 2-5% solution in water, splashing on metallic objects and clothing.
3. Lime 1/2Kg/gallon water, sprinkle, floor, walls, and ground.
4. Potassium permanganate 1: 10,000 solution in water, splashing on floor, gutter and troughs.
5. Mercuric chloride 1:1000 solution, splashing on floors, gutter and stanchions (Extremely poisonous) etc.
6. Iodine 2-5% solution in alcohol, wiping on cuts, wound and skin etc.
7. Calcium hypochlorite (Bleaching powder): Dusting on floors, gutters, passages.
8. Sulphonamide, dusting powder is used in wounds (effective against streptococci).

## **Disposal of animal waste and their management**

Sewage means waste material from household, kitchen, garden, cattle shed etc this sewage should be properly removed and disposed so as to make environment clean and healthy. Following are some of the methods to collect and remove the waste.

### **Cattle shed sewage**

It contains grass, feed waste, dung, bedding, urine and wash water. The solid waste can be picked up by the use of shovel and taken to compost pit or manure pit. The urine and the remaining solid waste can be washed off with the water and collected to the liquid manure collecting tank through the drain pipes.

### **Method of sewage disposal:**

There is no single method of sewage disposal which is equally suitable in all circumstances. The choice of particular method is governed by local factors such as cost and availability of labour. The principle methods of sewage disposal are as follows:

#### **a. Sorting:**

This means separation of degradable and non degradable materials. The degradable materials includes papers, garbage, organic matter etc and non degradable includes bottles, plastics, glass etc the former one can be disposed of by making manure or compost making and later one should be recycled for future use.

#### **b. Dumping:**

It is done for dry waste. Waste is dumped in a low lying open area far away from the human and animal dwelling. The major disadvantages are

Waste is exposed to fly and rodents.

It becomes the source of off smell.

The loose waste is dispersed by the action of wind.

Drainage from dumps contributes to the pollution of ground as well as surface water source.

#### **c. Sanitary land fill:**

This is the most satisfactory method of sewage disposal where suitable land is available. One of the methods involved in the disposing of waste is a trench made at suitable area, compactly placed and covered with earth materials. Chemical, bacteriological and physical change occurs in buried waste. The temperatures rise above 60 degree within 70 days and kills all the pathogens and hasten the decomposition process. Then it takes 2-3 wks to cool down. Normally it takes 4-6 months for complete decomposition of organic matters.

#### **d. Incinerators:**

Waste materials can be disposed hygienically by burning. Burning can be done in open place, incinerator (metal drum). It is a quick and easy way to get rid of large quantities of ry green waste. Burning reduces the volume of rubbish. But also fire produces toxic gases as well as ash and debris can cause pollution to the neighbors’.

#### **e. Composting:**

It is the process of nature where organic matter breaks down under bacterial action resulting in the formation of relatively stable humus like material called compost which has a considerable manorial values for soil. The principle by product are carbon dioxide, water and heat. The heat produced during composting is about 60 degree centigrade or higher over a period of several days. All the eggs and larvae of flies, pathogens and weeds are destroyed. At the end the compost contains very few or no disease producing organisms and contain small amount of nitrate and phosphorus which are essential for plant growth. The size of compost pit depends upon the amount of sewage to be disposed or the number of animal raised in the farm. The depth of pit greater than 3 feet is not recommended because of slow decomposition. At first a layer of sewage is spread on the bottom of the pit followed by layer of soil. Then again the layer of sewage is added over the soil. The sewage and soil are placed alternatively until the sewage is at the top level of 30 inch above the ground level. It is then covered with soil and is kept for composting. With in some days temperature rises to 60 degree or even more due to bacterial activities that kill the eggs, larvae of parasite, pathogens etc at the end of 4- 6 months the composting is complete and can be used as manure.

#### **f. Manure pit:**

When solid manure is collected separately, it should be stored properly in manure pit so that they get decomposed and there is no chance of fly havoc. Composting is done in compost pit (if only manure is kept than it can be called manure pit). It should be located as far as possible from animal shed considering labor requirement and the availability. Manure pit should be 10 m distance from wells, rivers and tanks. It must be impermeable to water. The size of manure pit depends upon the quantity of manure produced per day in farm which can be calculated on an average of 30-40 kg/head/day. Under our local condition a 0.5m deep and 4\*3 m area pit can be constructed for normal use.

#### **g. Liquid manure:**

The liquid manure and wash water run out of the shed by gutter. All the drains lead to liquid manure storage tank. This liquid manure can be used to the field by mixing with running water.

### **Biosecurity**

Biosecurity is a practice designed to prevent the spread of disease onto your farm. It is accomplished by maintaining the facility in such a way that there is minimal traffic of biological organisms (viruses, bacteria, rodents, etc.) across its borders. Biosecurity is the cheapest, most effective means of disease control available. No disease prevention program will work without it.

There are the basic principles of Biosecurity

- Isolation
- Traffic Control/ Quarantine
- Sanitation
- Vaccination

Isolation refers to the confinement of animals within a controlled environment. A fence keeps your birds in, but it also keeps other animals out. Isolation also applies to the practice of separating birds by age

group. In large poultry operations, all-in/all-out management styles allow simultaneous depopulation of facilities between flocks and allow time for periodic clean-up and disinfection to break the cycle of disease.

Traffic Control includes both the traffic onto your farm and the traffic patterns within the farm.

Sanitation addresses the disinfection of materials, people and equipment entering the farm and the cleanliness of the personnel on the farm.

Vaccination is a regular process of administration of live, dead or attenuated biological liquids inside the body on fixed date to prevent from various viral and bacterial diseases.

**Infectious diseases can be spread from farm to farm by:**

- Introduction of diseased birds.
- Carcasses of dead birds that have not been disposed of properly.
- Impure water, such as surface drainage water.
- Rodents, wild animals and free-flying birds
- Insects
- Contaminated feed and feed bags
- Contaminated delivery trucks, rendering trucks, live hauling truck
- Air-borne fomites
- Egg transmission
- Feed contaminated at the manufacturing plant.
- Live or contaminated vaccines.
- Human feet, hands and clothes.

Of all the possible breakdowns in biosecurity, the introduction of new birds and traffic pose the greatest risk to bird health. Properly managing these two factors should be a top priority on your farm.



## **Use of NPN in Ruminants Feeding**

Urea is used as most common non-protein nitrogen feed source for ruminants, which contains 46.7 percent of nitrogen. It is fed as a replacement for a part of the protein in a ration. The ability of microorganisms presents in the rumen of ruminants, use of feeding urea reduces the need for imported protein supplements with no deleterious effects on the animal. Treating with urea is based upon its transformation into ammonia. The amount of urea included in concentrate mixtures for cattle or sheep should not exceed 3 percent and usually the addition of 1 to 1.5 percent will prove adequate. Favorable results have been recorded with ensiling urea to green maize at the rate of 0.5 percent of the weight of the fresh forage. Urea feeding has several advantageous effects on body weight, growth rate, and higher milk yields, even under adverse conditions. Source of readily available carbohydrates, frequency and level of feeding urea, proper mixing, solubility of proteins, adequate supply of minerals, etc. are the factors affecting urea utilization in ruminants. Excess level of urea feeding may develop a problem of urea toxicity (poisoning), due to poor mixing of feed or to errors in calculating the amount of urea to add to the ration. Methods are needed to reduce the fast rate of urea breakdown in the rumen to ensure slow absorption. Research on slow release pellets or on new compounds that would allow urea to be released in about five hours would safeguard its use.

### **Precautions for Feeding Urea**

As previously shown, urea can be harmful to cattle if the proper precautions are not taken to insure success. These precautions include:

- Formulate diets precisely with feed components with known energy and crude protein values from laboratory analysis.
- Use urea to provide no more than one-third of the total protein requirement in the ration.
- Feed the ration at least twice daily to prevent an ammonia overload.
- Weigh all feed components precisely and make sure the urea is mixed completely and uniformly in the ration.
- Do not start feeder cattle on diets with urea. Rather, use plant proteins in starting rations and then convert to urea-containing rations after 30 days of feeding. Cattle will often have a period of lower intake and lower weight gains during initial feeding of urea-containing rations.
- Urea contains only nitrogen for protein, so mineral, vitamin, and energy values should be adjusted with other diet components.
- Higher rumen-bypass proteins such as distillers grains (where the more of the protein is absorbed in the lower gut and outside the rumen) are complementary to urea in rations.

# Feedstuffs and their Classification

Feedstuff is any material fed to animal for providing nourishment. The feedstuff includes variety of feeds, fodders and other by-products. These feedstuffs are composed of nutrients essentially required by animals for their survival and production.

Nutrients is a substance or any food constituent that nourishes the body and helps in maintenance, growth, production and reproduction of an animal the feed nutrients are divided into six classes as water, protein, carbohydrates, fats, vitamin and minerals.

## Classification

The various feedstuffs used in livestock - feeding are broadly classified into following groups:

- |                       |                     |
|-----------------------|---------------------|
| (I) Roughages         | (II) Concentrates   |
| (III) Feed supplement | (IV) Feed additives |

### (I) Roughages:

Roughages are the feed stuffs which contains more than 18% crude fiber (CF) and less than 60 percent Total Digestible Nutrient (TDN). Due to higher crude fiber content, they are more bulky and have low digestibility as compare to the concentrates.

The roughages are further classified into two major groups, they are:

1. **Succulent/Green Roughages:** They contains about 60-90% moisture e.g. pastures, cultivated fodder, tree leaves, root crops and silage.
2. **Dry Roughages:** They contain about 10-15% moisture. E.g. straw, Hay, etc.

### Succulent Roughages:

1. **Pasture:** Pasture is the most convenient and economical for maintaining larger livestock. Young rapidly growing grasses are rich in protein and highly palatable. Pasture includes various grasses and shrubs grown naturally. The crude protein (CP) may vary between 3-13% while CF varies between 20 to 40%.

2. **Cultivated Fodders:** These include specially cultivated fodders for feeding the animals in order to provide good quality fodder throughout the year. These are classified into two groups:

**a) Leguminous fodders:** They consist of stem and leaves of a plant belonging to leguminous family. For example, lucern, Berseem, cowpea etc. They fix atmospheric nitrogen due to presence of Rhizobium bacteria in their root nodules and hence have higher nitrogen content. They are palatable, rich in calcium, protein and vitamins like vit 'A' and vit. 'D'. Lucern and berseem must be fed along with dry fodder to avoid risk of bloat.

**b) Non Leguminous Fodder:** Maize, Jowar and Sudan grass are most common kharif fodder. Most of the fodder belonging to this group having 0.5-1.0 percent Digestible Crude Protein (DCP) and 11-15% TDN. Oat, Barley is most important Rabi non-leguminous fodder crops. Oat is considered as an excellent fodder crop for milch animals which contains 2% DCP and 17% TDN on fresh basis. Non leguminous perennial fodder crops consist of Napier grass, Guinea grass, Para grass. Non-leguminous fodder contains low protein, low mineral, low vitamin and also less palatable. Maize is an ideal cereal fodder for cattle because of its high palatability, nutritive value and hence heavy yield potential. It is also called as 'King of fodder'.

3. **Tree Leaves:** These are commonly used for feeding of sheep and goat. These are also used for feeding of dairy cattle and buffalo during scarcity of fodders. Young tender leaves are good in protein content and low in fiber. Some important tree leaves are: Pipal, Bel, Babul, zizyphus numlaria, Bauhinia variegata etc.

**4. Root Crops:** The main characteristic of root crops are their high moisture content 75-90% and relatively low crude fiber content 5-11% and present in most digestible form. The important root crops are: carrot, turnip, tapioca (*Manihot utilisima*), sugar beet.

**1. Silage:** The most economical method of raising livestock is to feed them on grasses and legumes directly from the field. Because of the seasonal influences grass and legumes are not available throughout the year in adequate quantity. Therefore silage and hay are preserved for the time of crisis. Silage is obtained after controlled an aerobic fermentation of succulent fodders. Silage is generally prepared from green cereal crops like maize, jowar and bajra. They also can prepare from legume fodders and grasses. The grass silage is less nutritive than legume silage.

## (II) **Concentrates:**

Concentrates are feedstuffs which supplies primary nutrients i.e. protein, carbohydrate and fat at higher level but contains less than 18% crude fiber and more than 60% TDN they are less bulky and have higher digestibility. On the basis of crude protein (CP) content of air dry- concentrates, these are classified as:

- (1) Energy rich concentrates - when CP content is less than 18%
- (2) Protein rich concentrates - when CP value is more than 18%

### (1) **Energy rich concentrates:**

#### a) **Cereal grains:**

- (i) They are rich in carbohydrate i.e. starch
- (ii) They contain low amount of moisture and fiber
- (iii) Their protein content is between 8-12%
- (iv) They are deficient in vitamin 'D' and calcium but moderately rich in Phosphorus and Vitamin 'E'.
- (v) They are highly palatable and digestible.
- (vi) Example: Maize, Jowar, Bajara, Oat, Barley.

#### b) **Cereal By-products:**

##### ➤ **Brans:**

- (i) An outer covering of cereal grains obtained during processing of grains into flour.
- (ii) They are higher in protein (12-13%) than cereal grains.
- (iii) They are rich in phosphorus.
- (iv) They are laxative in action.
- (v) Example: Rice bran, wheat bran.

##### ➤ **Rice Polish:**

- (i) It is finely powdered material obtained during polishing rice grain after initial removal of hulls and bran.
- (ii) It is good source of energy
- (iii) It is rich in vitamin 'B' - complex especially thiamine, niacin and riboflavin
- (iv) Its CP content is about 12-14%
- (v) It is low in CF than rice bran and contains higher amount of fat.

### (2) **Protein Rich Concentrates:**

Ingredients that contain more than 18% of their total weight in crude (total) protein are generally classified as protein feeds. Protein is one of the critical nutrients, particularly for young, rapidly growing animals and high producing adults. Protein rich concentrates may be divided according to the source of origin such as:

- a) **Plant Origin Protein Concentrates:** They are also called as vegetable protein concentrates:
- (i) They contain insufficient quantity of essential amino acids therefore they are unable to fulfill protein needs of body.
  - (ii) They are of low quality as compared to animal protein.

- (1) **Oil seed cakes:** are the by-products left after extraction of oil from oil seeds. Such as, groundnut cake, cotton seed cake, soybean cake, sesame (Til) cake, mustard cake.
- (i) These are good sources of vegetable protein and CP content varies between 30-45%.
  - (ii) They are usually rich in phosphorus.
  - (iii) They are good in vitamin B-complex.
  - (iv) Higher digestibility.
  - (v) Soybeans cake contains highest amount of CP than other cakes.

## 2. **Pulse Protein:**

Pulses are seeds of leguminous plants. They are used primarily for human consumption but they are also fed to livestock when it is available in reasonable price. All the pulses contain components which possess anti-nutritional properties. So processing before feeding like cooking, germination and fermentation can reduce risks of feeding pulses to livestock.

- (i) Pulses, such as, lentil, khesari, black gram, arhar seed etc. are good source of protein. (CP 10-14%).
- (ii) Rich in phosphorus
- (iii) Good source of energy.

## 3. **Brewers grains and Yeast:**

Brewer's grains: are prepared from barley after soaking and germination. They contain about 18% CP and 15 CF.

Brewer's Yeast: is prepared from barley which is rich in proteins and contains about 42% CP. It is more - digestible and is good source of vit. B-complex. It is rich in phosphorus and low in calcium.

## b) **Animal Origin Protein Concentrates:**

- (i) These are the feedstuffs derived from animal tissues.
- (ii) These are used as protein source for animal feeding and their CP content is between 40-80%.
- (iii) They contain good quality proteins as they have better essential amino acid composition.
- (iv) They are good source of vitamin B-complex and minerals.
- (v) Animal proteins are used mainly in Poultry and pigs.
- (vi) Example: Meat meal, fish meal, blood meal, feather meal.

## c) **Non-protein Nitrogen Feeds stuffs (NPN):**

### **Urea:**

- (i) It is NPN substance used as source of - Nitrogen for ruminant animals.
- (ii) The ruminants can synthesize microbial proteins from the nitrogen source and fulfill their protein requirement.
- (iii) Feed grade urea contains 45% nitrogen and can replace about 30% of protein in the ration of adult animal.
- (i) For efficient utilization of urea, the readily available energy source like starch or molasses should be - included in the diet.

### **Special Feeds**

**Urea:** (discussed above)

#### **Molasses:**

- (i) It is the by-product obtained from sugar industry during refining of sugar.
- (ii) It is excellent source of energy.
- (iii) It improves palatability of ration.
- (iv) It is used up to 10-15% in ration of ruminants.
- (v) It acts as an appetizer
- (vi) It stimulates rumen microbial activity.
- (vii) Cane molasses is good source of trace minerals (Fe, I, Cu, Co. etc.)

#### **Fats and Oils:**

- (i) They include animal fats and vegetable oils.
- (ii) Increases the energy content of ration.
- (iii) They reduce dustiness of feed or ration.
- (iv) They are added up to 5-10% in swine and poultry rations however, up to 2-6% in cattle ration.
- (v) In young ruminants, higher levels are also added as milk replacer.

### **(III) FEED SUPPLEMENTS**

Feed supplements are the compounds used to improve the nutritional value of basal feeds so as to take care of any deficiency.

#### **a) Vitamin Supplements:**

Now a day's use of vitamin supplements has become essential part of livestock ration. Usually the different feedstuffs used for livestock feeding are deficient in one or more vitamins, and to fulfill the deficiency vitamin supplementation is done. The commercial vitamin mixture is also available in the market.

#### **b) Mineral Supplements:**

- (i) Mineral requirement of animal varies with the age, size, sex type and stage of production; therefore, ration may not supply the required quantity leading to mineral deficiency conditions.
- (ii) The good source of minerals is bone meal, common salt, calcium carbonate, rock phosphate etc.
- (iii) Some commercially available mineral mixture like - Minimix, Milk min, Nutrimix, Aromin can be used in the ration.

### **(IV) FEED ADDITIVES:**

Feed additives are the non-nutritive substances usually added to basal feed in small quantity in order to improve feed efficiency and productive performance of the animals. They neither provides nutrients nor used as a drug for - treatment of disease.

#### **a) Antibiotics:**

- (i) Antibiotics are the antibacterial chemical substances produced by the living organism which inhibits the growth or kills the bacteria.
- (ii) The commonly used antibiotic feed additives are - Terramycin, Zink bacitracin, flavomycin etc.
- (iii) They are added in smaller quantity.
- (iv) Use of antibiotic feed additives are beneficial in cattle and buffalo calves up to 3 months of age (Pre-ruminant stage) and in poultry up to 8-10 wks.
- (v) Its effect is more marked in animals reared under unhygienic condition.

#### **b) Enzymes:**

- (i) Enzymes are the organic biological catalysts produced by living cells.

- (ii) They improve the digestion of proteins, carbohydrate, fats and thereby increase feed efficiency.
- (iii) Synthetic or naturally occurring enzyme feed additives are amylase, lipase, protease, pepsin and pancreatin.
- c) **Hormones:**
  - (i) Hormones are chemical substances produced by endocrine glands.
  - (ii) The use of hormone as feed additives is not common.
  - (iii) They improve the performance of animal in respect of growth, reproduction and other body functions.
  - (iv) They may cause letdown of milk from rudimentary teats.
  - (v) Their use in pregnant animals may lead to abnormal calf birth.

**Note:**

TDN: It is simply a figure which indicates the relative energy value of a feed to an animal.

$TDN = DCP\% + DCF\% + DNFE\% + DEE\% \times 2.25$

The percentage TDN content of any feed represents energy of heat value of that particular feed. Since fat on oxidation provided 2.25 times more energy as compared to carbohydrates. Hence the figure multiply by 2.25.



## Feedstuffs and their Classification

### Livestock Feed

