

CHAPTER – 15

IMPROVEMENT IN FOOD RESOURCES

INTRODUCTION

There is a need to introduce production efficiency of crops and livestock because rapid increase in population
No major scope of increasing area of land under cultivation.

Increase in food production without degrading our environment and disturbing the ecological balance i.e. **Sustainable Practices** are required in agriculture and animal husbandry.

TYPES OF CROPS

Cereals: wheat, rice, maize, millets and sorghum. Provide carbohydrates for energy requirements.

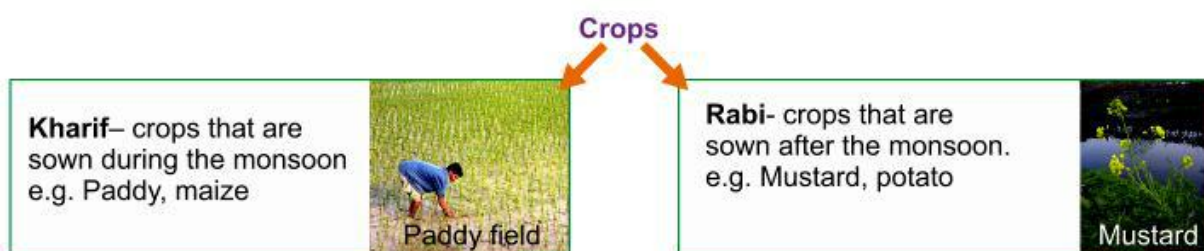
Pulses: pea, gram, black gram, green gram, pigeon pea and lentil. Provide proteins

Oilseeds: soya bean, ground nut, sesame, castor, mustard, linseed and sun flower. Provide necessary fats.

Vegetables, spices and fruits provide vitamins and minerals.

Crop means plants of same origin grown together in bulk. Every crop requires different climatic condition, while some crops grow together on one season. The climatic condition, warmth, photo-period for growth and completion is required for different crops. Two seasonal change types :

- Kharif crops
- Rabi crops.



Agricultural Practices- Practices used to cultivate crops are called agricultural practices.



Main seasonal plants are divided into two broad categories. The crops that grow in monsoon period is called Kharif crops which is around June to October. The crops that are harvested in winter period are called Rabi crops which are around November to April.

RABI CROPS

Rabi crops or Rabi harvests are the crops in agriculture that are sown in winter or cold season. They are harvested in the spring. Rabi is Arabic word which in actual means “spring”. Thus the word “Rabi” is used frequently in subcontinent. Rabi is grown around the month of November to April in our subcontinent. The water collected from the rain in this season is the main source of water in these plants. Rabi crops require greater amount of irrigation. Thus heavy raining may ruin a Kharif crop but it is healthy and beneficial for Rabi crops. These crops are then taken out at departure of the monsoon rains. The harvesting may begin by April or may. Major Rabi crops that are harvested in subcontinents are wheat, grams, peas, mustard, linseed and barley. Most of the crops are under Rabi season. It is an integral crop in our area.

KHARIF CROPS

Kharif crop refers to the farming, plowing, reaping and harvesting of any household plant sown in the rainy season. It is derived from mochas words in subcontinent. In subcontinent they are popularly known as monsoon plants. They are cultivated for autumn harvest. By the beginning of first rain in July during south west rainy season in monsoon the crops are sown. Its begins at April 16 to October 15 in Pakistan, while in India Kharif season varies state to state in may and ending latest by January. Popularly in subcontinent it starts in June and ends by October. The Indian subcontinent is referred to areas covering India, Pakistan, Nepal and Srilanka. These crops are totally dependent on quantity of rain and water as well as its timings. Too much or too less will affect its growth and the whole effort can go wasted. The harvesting period coincides with the beginning of winter/ autumn in Indian subcontinent it is called Kharif period or Kharif crops. The major Kharif crops that are harvested in sub continent are paddy, soya-bean, maize, pigeon-pea, and cotton, green and black grams.

DIFFERENCE BETWEEN KHARIF AND RABI CROPS

- Kharif crops sown between April and May while Rabi crops are sown between September and October.
- Kharif crops are harvested after monsoon rains while Rabi crops are produced after winter. ➤ Kharif crops are popularly known as monsoon crops while Rabi crops are called winter or spring crops.
- Kharif crops are completely relying over the rain like if less or more in quantity while Rabi can deal with whatever water is present for irrigation. Rain has less impact over Rabi crops.
- The major examples that can be counted as Kharif crops are sunflower, rice, sugar cane, soya bean and tea while Rabi crops can be wheat, barley, pea, gram and mustard.

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Q1. What do we get from cereals, pulses, fruits and vegetables?

Answer:

Cereals provide us with carbohydrates. Also, they are a rich source of energy.

Pulses give us proteins.

Fruits and vegetables are a rich source of vitamins and minerals. A small amount of proteins, carbohydrates, and fats are also present in them.

IMPROVING CROP YIELD

The practices involved in farming are divided into three stages. They are

Choice of seeds for planting

Nurturing of the crop plants

Protection of the growing and harvested crops from loss.

Hence the major activities for improving crop yields can be classified as

- Crop variety improvement
- Crop production improvement
- Crop protection improvement

CROP VARIETY IMPROVEMENT

This approach depends on finding a crop that can give a good yield. Some of the factors for which variety improvement is done are:

- **Higher yield:** for increasing the productivity per acre.
- **Improved quality:** quality considerations vary from crop to crop as per the requirements.
- **Biotic and abiotic resistance:** crops should have sufficient resistance to biotic factors (diseases, insects and nematodes) and abiotic stresses (heat, cold, frost etc.)
- **Change in maturity duration:** the shorter the duration, the more economical is the variety.
- **Wider adaptability:** it can be grown in different climatic conditions.
- **Desirable agronomic characteristics:** tallness and profuse branching for fodder crops. Dwarfness is desired for cereals.

Common factors for crop improvement

○ Higher Yield	To increase the productivity of the crop per acre.
○ Improved Quality	Quality of crop products vary from crop to crop. Baking quality in wheat, protein quality in pulses, oil quality in oil seeds, etc.
○ Biotic and abiotic resistance	Crop production is decreased due to biotic (diseases, insects, pests, etc.) and abiotic factors (heat, cold, salinity and drought). Varieties resistant to these stresses can improve crop production.
○ Change in maturity pattern	Shorter maturity period; uniform maturity makes the harvesting process easy and reduces losses during harvesting.
○ Wider Adaptability	One variety can be grown under different climatic conditions in different areas. Developing varieties of wider adaptability helps in stabilizing crop production.
○ Desirable agronomic characters	Tallness and profuse branching are desirable characters for fodder crops. Dwarfness is desired in cereals. Developing varieties of desired agronomic characters give higher productivity.

This can be achieved by two methods; hybridisation and genetically modified crops.

Hybridisation

In genetics, hybridisation is the process of combining different varieties or species of organisms which are genetically dissimilar to create a hybrid. It can be inter varietal, inter specific, intergeneric.

Genetically modified crops

Here the crop is improved by introducing a gene that would provide desired characteristics.

CROP PRODUCTION MANAGEMENT

It involves different practices carried out by farmer to achieve higher standards of crop production. It includes the following:

NUTRIENT MANAGEMENT

IRRIGATION

CROPPING PATTERN

NUTRIENT MANAGEMENT

The higher yields of crops mainly depend upon input applications like improved seeds, fertilizers and modern techniques of sowing and harvesting. Plants require a number of nutrients for their growth and development.

Plants get nutrients from air, water and soil. Nearly 16 elements are essential for plant growth and reproduction.

On the basis of the requirement by the plants, they are further classified into Macro Nutrients and Micro Nutrients.

MACRO NUTRIENTS

Elements which are needed in large quantities for growth of the plants are called Macro Nutrients. They are Carbon, Hydrogen, Oxygen, Nitrogen, Phosphorous, Sulphur, Potassium, Calcium, Magnesium and Iron.

MICRO NUTRIENTS

Elements which are needed by the plants in very small quantities are called Micro Nutrients. They are Manganese, Copper, Molybdenum, Zinc, Boron and Chlorine.

Deficiency of these nutrients affects physiological processes in plants including reproduction, growth and susceptibility to diseases. To increase the yield, the soil can be enriched by supplying these nutrients in the form of manure and fertilizers.

MANURE

Manure is an organic substance and is prepared by the decomposition of plant and animal wastes.

Advantages of Manure

- Manures helps in enriching the soil with organic matter and nutrients.
- It helps in increasing the soil fertility.
- Water holding capacity of soil is increased.
- Helps in improving soil texture.
- Save our environment from excessive use of fertilizers.

Manure is classified into **two types** according to the biological material used:

COMPOST AND VERMI-COMPOST

Composting: It is the process in which farm waste material (cow dung, domestic waste, sewage waste etc) is decomposed in pits. Compost is the aerobically decomposed remnants of organic matter which is rich in nutrients.

Vermicomposting: It is the process which involve use of earthworms to hasten the process of decomposition of plant and animal refuse.

GREEN MANURE

Leguminous plants like Sunn-hemp or Cluster Bean are grown and then mulched by ploughing them back into the soil. This helps in enriching the soil with Nitrogen and Phosphorous.

FERTILIZERS

Fertilizers are chemicals commercially produced in factories and used as plant nutrients. They supply Nitrogen, Phosphorous, Potassium, etc., They are used to ensure good vegetative growth giving rise to healthy plants.

Advantage: They help in good vegetative growth and produce healthy plants.

Disadvantage :

- Excessive use of fertilizer leads to pollution of water.
- Continuous use of fertilizer lead to decrease in soil fertility because organic matter of the soil cannot be replenished as microorganisms present in soil get harmed due to fertilizer.

Application of fertilizers results in higher yield of crops. At the same time, it increases the cost of farming. As the fertilizers are water soluble chemicals, large part of the fertilizers applied is washed away due to excessive irrigation. They are not fully absorbed by the plants.

This excess fertilizer is washed away into the ponds, lakes, canals and rivers, resulting in the growth of unwanted plants like Water Hyacinth, algae, etc. These plants disturb the water bodies and the flow of water. As a result, fishes and other living organisms do not get sufficient sunlight and oxygen and die.

DIFFERENCES BETWEEN MANURES AND FERTILIZERS

Manures	Fertilizers
1. Manure is a natural substance obtained by the decomposition of cattle dung, human waste and plant waste.	1. Fertilizer is a mineral or chemical compound containing nutrients like Sulphur, Phosphorous, Nitrogen, etc.
2. Manures are organic substances.	2. Fertilizers are inorganic compounds.
3. Manures can be prepared in fields.	3. Fertilizers are manufactured in factories.
4. Manures contain all nutrients but in small quantities.	4. They contain higher quantities of one or more specific nutrients.
5. Manures add plenty of humus to soil and improve the texture of the soil.	5. Fertilizers do not result in the addition of humus to the soil.
6. Manures are not easily absorbed because they are less soluble in nature.	6. Fertilizers are soluble in water and it is easily absorbed.
7. Manures are less soluble; they are not easily washed away from the soil and hence their effect is long lasting.	7. Fertilizers are easily washed away by water and hence their effect is of shorter duration and require repeated application.

☞ Fertilizers which are derived from living organisms are called Bio-fertilizers. The main source of bio-fertilizers are bacteria, cyanobacteria and fungi. Bio-fertilizers are renewable and nonpolluting sources of plant nutrients. They also improve the soil condition. Rhizobium and Cyanobacteria such as Anabaena and Nostoc are some common bio-fertilizers.

ORGANIC FARMING

It's a farming system in which use of chemicals such as fertilizers, herbicides, pesticides etc are reduced. It involves the use of following components:

Organic manure

Recycled farm waste

Bio-agents such as culture of blue green algae in preparation of bio fertilizers

Bio pesticides such as leaves of neem or turmeric for grain storage

Healthy cropping patterns such as mixed cropping, intercropping and crop rotation which will also help in controlling growth of weed, pest and insects.

IRRIGATION

Irrigation is necessary for crops to get water during their growing season.

Source of irrigation:

- **Wells:** There are two types of wells, namely dug wells and tube wells. In a dug well, water is collected from water bearing strata. Tube wells can tap water from the deeper strata. From these wells, water is lifted by pumps for irrigation.
- **Canals:** This is usually an elaborate and extensive irrigation system. In this system canals receive water from one or more reservoirs or from rivers. The main canal is divided into branch canals having further distributaries to irrigate fields.
- **River Lift Systems:** In areas where canal flow is insufficient or irregular due to inadequate reservoir release, the lift system is more rational. Water is directly drawn from the rivers for supplementing irrigation in areas close to rivers.
- **Tanks:** These are small storage reservoirs, which intercept and store the run-off of smaller catchment areas.
- **Rain water harvesting**
- **Watershed management:** building of small check dams which helps in increasing ground water level and helps in reducing soil erosion.

CROPPING PATTERNS

Different ways of growing crops can be used to give maximum benefit.

MIXED CROPPING

It is growing of two or more crops simultaneously on the same piece of land. It is also known as multiple cropping. This type of cropping leads to an improvement in the fertility of the soil and hence increase in crop yield because when the two crops are properly chosen, the products and refuse from one crop help in the growth of the other crop plant and vice-versa. Mixed cropping is an insurance against crop failure due to abnormal weather and plant pests.

Soyabean + pigeon pea, Maize + urad dal (black gram), Groundnut + sunflower, Wheat + Chick Pea.

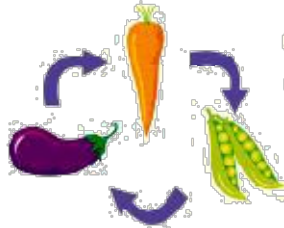
Advantages of Mixed cropping:

- No risk of crop failure,
 - Increase in yield,
 - Improvement in soil fertility
 - Minimizing Pest Damage.
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Cropping patterns - Allows soil to retain nutrients

1. Mixed cropping – practice of growing two or more crops simultaneously in the same field.
Soyabean + Pigeon pea
Cotton + Mung bean

2. Crop rotation is the practice of growing a series of dissimilar/different types of crops in the same area in sequential seasons



3. Intercropping – practice of growing two or more crops simultaneously in the same field in rows with definite row patterns such as 1:1, 1:2 or 1:3



Advantages:

1. Improves soil structure and fertility.
2. Increases productivity per unit area.
3. Mitigates the build-up of pathogens and pest.

INTER CROPPING

Intercropping is the agricultural practice of cultivating two or more crops in the same space at the same time in a definite pattern. Row- type intercropping involves the component crops arranged in alternate rows. This may also be called **alley cropping**. A variation of row cropping is strip cropping, where multiple rows (or a strip) of one crop are alternated with multiple rows of another crop. Intercropping also uses the practice of sowing a fast growing crop with a slow growing crop, so that the fast growing crop is harvested before the slow growing crop starts to mature.

DIFFERENCE BETWEEN INTER CROPPING AND MIXED-CROPPING

Sr. No	Inter Cropping	Mixed Cropping
1	The main object is to utilize the space left between two rows of main crop	To get at least one crop under favorable conditions
2	More emphasis is given to the main crop	All crops are cared equally
3	There is no competition between both crops	There is competition between all crops growing
4	Inter crops are of short duration & are harvested much earlier than main	The crops are almost of the same duration
5	Sowing time may be same or different	It is same for all crops
6	Crops are sown in different rows without affecting the population of main crop when sown as sole crop	Either sown in rows or mixed without considering the population of either hope so this help uh thumbs up plz..

SELECTION OF CROPS FOR MIXED CROPPING AND INTERCROPPING:

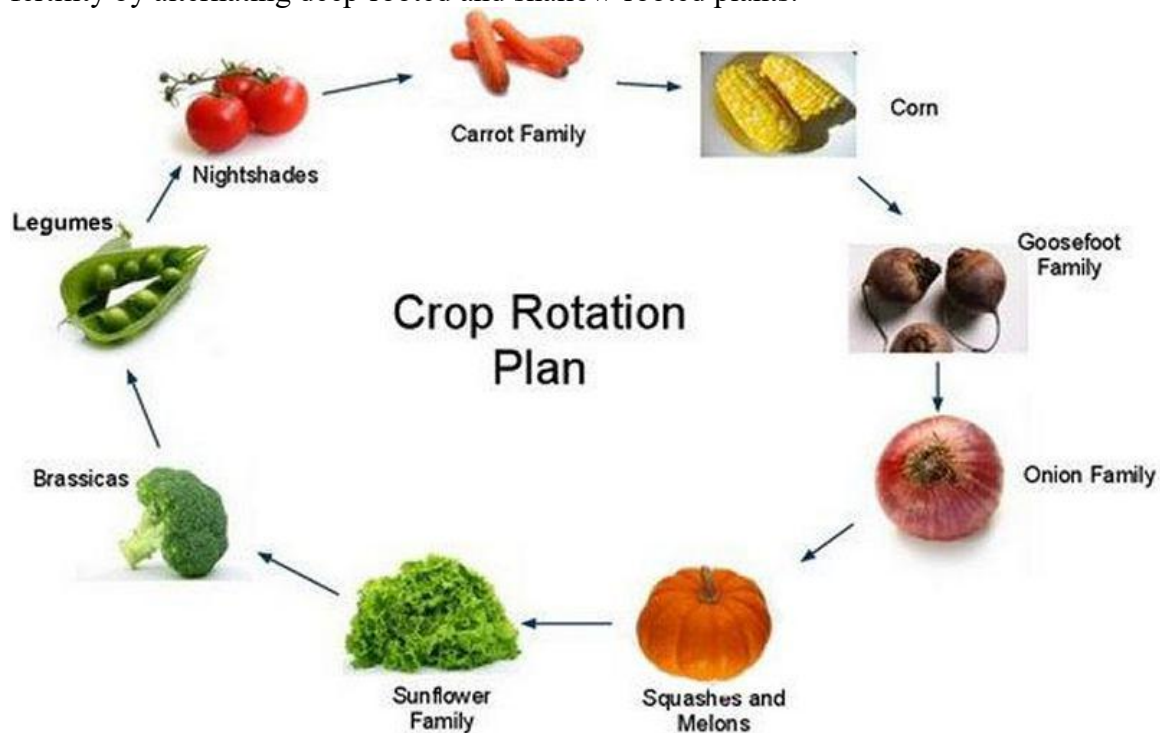
Crops are chosen whose nutrient requirements are different so that maximum utilisation of the soil nutrients takes place. Also, their water needs, rooting patterns etc are different. Besides the advantages mentioned for mixed cropping,

Intercropping has the following additional advantages:

- Application of pesticides and fertilizers is more convenient due to well defined patterns of crops.
- Harvesting of crops is also easier.

CROP ROTATION

It is the practice of growing a series of dissimilar types of crops in the same area in sequential seasons for various benefits such as to avoid the buildup of pathogens and pests that often occurs when one species is continuously cropped. Crop rotation also seeks to balance the fertility demands of various crops to avoid excessive depletion of soil nutrients. A traditional component of crop rotation is the replenishment of nitrogen through the use of green manure in sequence with cereals and other crops. Crop rotation can also improve soil structure and fertility by alternating deep-rooted and shallow-rooted plants.



Advantages:

Crop rotation avoids a decrease in soil fertility, as growing the same crop repeatedly in the same place eventually depletes the soil of various nutrients. A crop that leaches the soil of one kind of nutrient is followed during the next growing season by a dissimilar crop that returns that nutrient to the soil or draws a different ratio of nutrients, for example, rice followed by cottons. By crop rotation farmers can keep their fields under continuous production, without the need to let them lay fallow, and reducing the need for artificial fertilizers, both of which can be expensive. Rotating crops adds nutrients to the soil.

CROP PROTECTION MANAGEMENT

Field crops are infested by a large number of weeds, insect pests and diseases. If weeds and pests are not controlled at the appropriate time then they can damage the crops so much that most of the crop is lost. When the crop is in the field, it needs protection against:

- **Weeds** e.g.– Xanthium, Parthenium (weeds are considered to be harmful as they compete for food, space and light with the desired crop. They reduce crop production taking up the nutrients meant for the crops.

- **Insect Pests** - Insect pests attack the plants in three ways: (i) they cut the root, stem and leaf, (ii) they suck the cell sap from various parts of the plant, and (iii) they bore into stem and fruits. They thus affect the health of the crop and reduce yields.
- **Pathogens**- Microbes like bacteria, fungi and viruses cause diseases. Spores of these pathogens may be transmitted through soil, water and air.

To control these :

Herbicides, Pesticides, fungicides should be used.

Weed control methods also include mechanical removal. Preventive methods such as proper seed bed preparation, timely sowing of crops, intercropping and crop rotation also help in weed control. Some other preventive measures against pests are the use of resistant varieties, and summer ploughing, in which fields are ploughed deep in summers to destroy weeds and pests.

Prevention for preventing the growth of weeds,

- Proper seed bed preparation,
- timely growing of crops,
- intercropping , crop rotation,
- use of resistant varieties and
- summer ploughing is done.

STORAGE OF GRAINS

Factors responsible for such losses are biotic— insects, rodents, fungi, mites and bacteria, and abiotic— inappropriate moisture and temperatures in the place of storage.

Negative Effects of these factors on grains:

- Degradation in quality,
- loss in weight,
- poor germinabilty,
- discoloration of produce-
- Leads to poor marketability

PREVENTION AND CONTROL METHODS USED BEFORE GRAINS ARE STORED:

- ☞ Cleaning of produce before storage
- ☞ Drying of produce first in sunlight and then in shade to reduce moisture content
- ☞ Fumigation using chemicals (fumigants) to kill pests

ANIMAL HUSBANDRY

The branch of agriculture which deals with the feeding, shelter, health and breeding of domestic animals such as cattle, pigs, horses and fowls is called animal husbandry.

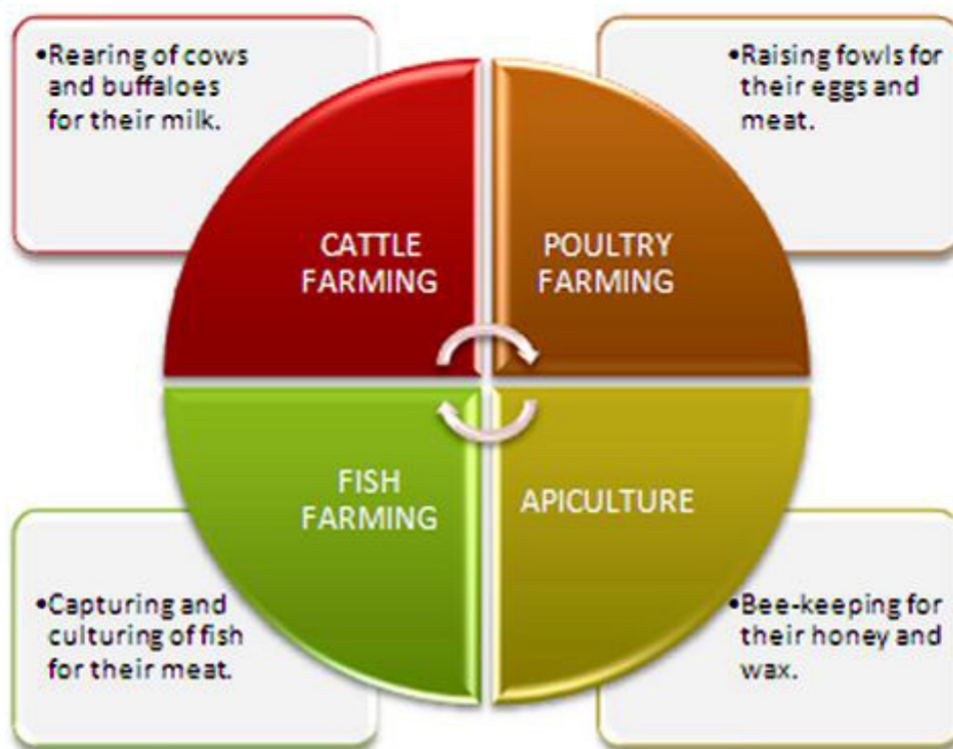
The various elements of animal husbandry are :

- Proper feeding of animals.
- Provision for clean drinking water for animals.
- Proper shelter for animals.
- Prevention and cure of animal diseases.
- Proper breeding of animals.

ADVANTAGES OF ANIMAL HUSBANDRY

As animal husbandry is scientific management of farm animals, it serves many uses for human beings.

- It helps in enhancing milk production
- It increases egg production
- It increases meat production
- It increases fish production
- It helps in proper management of agricultural wastes.



The rearing of animals on large scale is called **animal husbandry**. **Food, shelter and health** are the most important aspect of animal husbandry.

Meat, egg, milk, honey, silk, lac, wool and leather are the products that we get from animals.

Useful animals can be divided into the following categories based on the products they give us.

Milk yielding animals - dairy animals - cows, buffalo and goat

Meat and egg yielding animals - sheep, pig, fish, poultry and duck

Draught animals - mule, donkey, horse, bullock

Wool and skin yielding animals - sheep, goat, cow, buffalo and camel

Animals yielding other products - honey from bees, silk from silk moth and pearls from oyster

CATTLE FARMING

A cattle farming is the practice of rearing cattle by providing facilities for raising livestock. Livestock includes domestication of cows, buffaloes, sheep, goats, pigs etc. A cattle farming is carried out to raise cows and buffaloes as important livestock. The two major species of Indian cattle are *Bos indicus*, or cows, and *Bos bubalis*, or buffaloes.

MILCH ANIMALS AND DROUGHT ANIMALS

On basis of their utility, cattle are classified into two types namely milch animals and draught animals.

- Milch animals or dairy animals produce milk. Males of this type are not useful for working on farm.
- Draught animals are used for carrying out agricultural work like tilling, irrigation and carting. Cows belonging to this category are poor milk-yielding varieties.

Dairy Farming: On the other hand, near the first and last quarters of the moon, when the pulls of the sun and the moon act at right angles to each other, high tides are exceptionally low, and are called **neap tides**.

High milk yielding breeds.



Common diseases in cattle:

- Anthrax
- Food and mouth disease
- Worms

MANAGEMENT PRACTICES FOR CATTLE FARMING

Management practices for cattle include cleaning, sheltering and feeding.

Cleaning involves periodic washing to get rid of dirt and loose hair.

Shelter facilities include well ventilated roof sheds which protect cattle from rain, cold and sun.

Feeding of cattle includes supply of uncontaminated and balanced diet. Animal feed are of two types namely roughage feed and concentrate feed.

- Roughage feed contains high fibre content and provides energy. It comprises fodder grasses, silage and legumes rich in fibre.
- Concentrate feed is a mixture of cereals, seeds and oilseed cake rich in protein content. This type of feed is easily digestible and it helps the animal in increasing body weight.

Cattle should be protected from diseases. Diseases in cattle are caused by both external and internal parasites. External parasites live on the skin and cause skin diseases.

Internal parasites affect the stomach and intestinal parts. Certain preventive measures of diseases in animals are listed.

- Proper disposal of dead animals and animal wastes.
- Shelters should be clean, dry and well ventilated.
- Periodic visit of veterinary physician to check the animals.
- Hygienic management of animals and animal products.

Infectious diseases are caused by pathogens like bacteria, viruses and fungi. Sheds should be cleaned and disinfected regularly. Vaccination against various diseases should be provided to farm animals. Vaccination should be given against various diseases.

Milk production centres should be maintained for the animals which give birth to young ones. Milk production depends on duration of lactation period. Lactation period is the

period following the birth of a calf during which milk is produced by the animal.

Lactation period can be enhanced by administering certain hormonal injections.

Cross-breeding is done between foreign and local breeds of animals to facilitate the growth of animals with desired qualities. e.g. Foreign breed like Jersey cow, with long lactation period, is crossed with local breed like Red Sindhi cow, with high resistance to disease, to obtain offspring of desired qualities like long lactation period and high resistance to diseases.

ADVANTAGES OF CROSS-BREEDING Cross-breeding helps in the development of certain desired characteristics in animals.

To increase milk production

To increase resistance against diseases.

To enhance the varieties with longer lactation period.

To rely on less amount of quality feed.

POULTRY FARMING

Poultry farming is the practice of raising fowl for egg production and chicken meat. Fowls are used for producing eggs and broilers are used for producing meat.

Cross –breeding is common in poultry to develop new varieties with the desirable traits. e.g Indian breed Aseel is cross-bred with the foreign breed Leghorn.

Cross-breeding is used to develop offspring with desirable traits. The desirable traits includes:

- number and quality of chicks;
- dwarf broiler parent for commercial chick production;
- summer adaptation capacity/ tolerance to high temperature;
- low maintenance requirements;
- reduction in the size of the egg-laying bird with ability to utilise more fibrous cheaper diets formulated using agricultural by-products.

Management practices for poultry farming are elucidated.

Maintaining optimum temperature

Providing hygienic housing conditions

Providing a protein-rich diet with high levels of vitamin A and K, and

Preventing and controlling pests and diseases.

Poultry farming is the practice of raising birds like chickens, turkeys, ducks and geese for meat or eggs for food. They are kept in shelters called poultry farms.



Hen varieties such as **Rhode Island Red**, **Black Minorca** and **HH260** have been developed for eggs.



Brahma and **Cochin** are bred for their meat. **Plymouth Rock** is ideal for egg production and meat.



FISH FARMING

Fish farming is also called as aquaculture. This is culturing of fish for commercial purposes. Fish is a cheap source of animal protein.

TYPES OF FISHERY

Fin fishery and Shell fishery

Fish production involves fin fishery and shell fishery. Two main species of finned true fish are Catla and Rohu, and that of shellfish such as prawns and molluscs.

Capture fishery and culture fishery

Fish are obtained by capture fishing as an economic source for their meat.

- Capture fishing involves capturing of fish from sea water or fresh water. Culture fishing involves culturing the fish in small enclosures.
- Capture fishing is classified into marine fishery and inland fishery depending upon the resources used for fishing.

Culture fishery involves rearing of fish in small structures like wells.

- Fish farming can be done in the rice field where both grains and fish can be harvested from the farm.
- As feeding habits of fish differ from species to species, many varieties can be reared on the same farm. Composite fish farming is rearing of different varieties of fish in the same area. e.g. Composite fish farming includes Catla, the surface feeders, Rohu, feed in the middle zone of a pond, Mrigal and common carp, the bottom feeders, and grass carp, feeding on weeds. These species can co-exist in a single pond, and thus, increase the yield of fish from the pond.

Marine fishery and Inland fishery

- Mariculture is the culture of fish in marine water.
- Marine fishery involves fishing in salt water regions.
- Some examples of marine fish are Pomphret, Tuna and Mackerel.
- Fish are captured by locating large schools of fish, in the open sea, with the help of satellites and echo-sounders.
- Marine fish of high economic value are farmed in seawater. Shellfish, such as prawns, mussels and oysters are also farmed in seawater. Oysters are cultivated for their pearls.

Distinguishing features between Capture fishery, Mariculture and Aquaculture

CAPTURE FISHERY	MARICULTURE	<u>AQUACULTURE</u>
Fishes are caught from natural water resources.	Involves culturing and harvesting of fin fishes and shell fishes.	Involves culturing and harvesting of fish, prawns, crabs etc.
No seeding and rearing are required.	Fish seeds are introduced and fish are reared.	Fish and other organisms are seeded and reared.
This type of fishing is done both in marine and inland waters.	Fishing is done only in sea water.	Fishing is done both in fresh water and marine waters.

Inland fisheries involve fresh water canals, ponds, reservoirs, rivers from which fish are captured.

Estuaries are the regions where fresh water mixes with sea water. These are rich sources of fish.

Fish farming encounters the problem of lack of quality seed or eggs. Fish are bred in ponds by hormonal stimulation. Fish are injected with hormones that stimulate the production of eggs or seed. This ensures the supply of pure fish seed in desired quantities.

APICULTURE

The scientific method of rearing honeybees for honey and wax is called 'Apiculture' or 'Bee keeping'. Beehives are enclosed structures in which honey bees live and raise their young.

- The practice of maintaining honey bee colonies in beehives is called bee-keeping or apiculture. Apiaries or bee farms are established for commercial production of honey.
- Bee-keeping is a cheap and popular agricultural enterprise.
- Honey produced in bee-hives is the source of honey used in food and medicines. Taste and the quality of the honey depend upon the flowers the bees visit for nectar collection.
- Wax obtained from these hives is used in ointments, polishes etc.

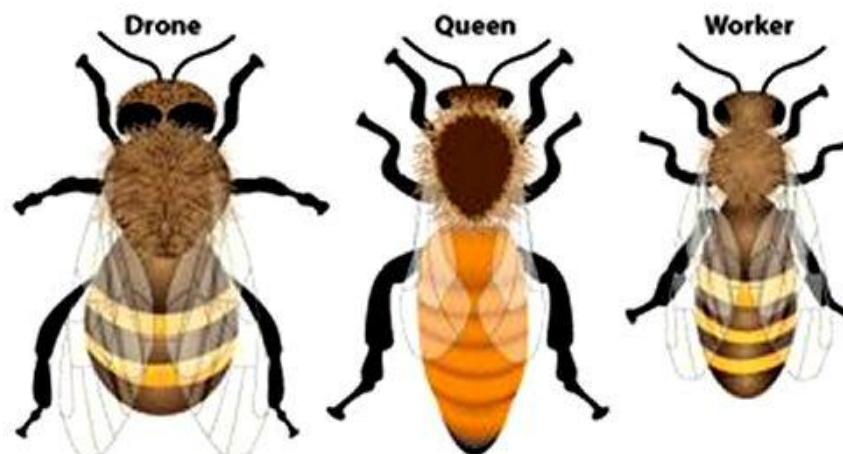
TYPES OF BEES

There are three types of bees in a colony.

Queen – The only fertile female in the hive and it's function is to lay eggs.

Drones – These are fertile male bees and it's function is to mate with queen bee and fertilize the eggs.

Workers – These are sterile females. They take care of the queen and young bees, collect nectar build honey combs and protect the bee hive.



HONEYBEE VARIETIES

Indigenous varieties

Apis Indica – Common Indian honey bee.

Apis dorsata – Rock bee

Apis florea – Little bee.

Exotic varieties

Apis mellifera (Italian bee)

Apis adamsoni (South African bee)

ECONOMIC IMPORTANCE OF HONEY BEES Honey bees are used in the production of honey and bee wax.

USES OF HONEY

Honey is an energy rich food. For eg. 1 Kg of honey contains 3200 calories of energy.

Honey contains sugars, minerals, vitamins, enzymes and pollen.

Honey is an antiseptic and contains formic acid as the preservative.

Honey is a blood purifier, a cure against cough, cold, sore throat, ulcers of tongue, stomach and intestine.

Honey is helpful in building up the haemoglobin content of the blood.

Honey is used in the preparation of bread, cakes and biscuits.

BEE WAX

It is utilized in the manufacture of cosmetics, lubricants, cold creams, shaving creams, polishes, candles, ointments and in medical preparations.