From the dawn of civilization man has used animals for food and work. The dog was probably the first animal man domesticated because dog could easily be trained to do a number of tasks. Cows, buffalo, bulls and bullocks, together called cattle play an important role in the economy of rural India. On the basis of utility, domestic animals can be grouped int four types:

1. Milk producing or milch animals: cows, buffaloes and goats.
2. Meat – egg producing animals: ducks, fowls, sheep, pigs and goats.
3. Working or draught animals: they are used for agricultural work and transportation like camels, buffalo, horses, mules etc.
4. Fibre and skin yielding animals: sheep, goats, cattle, horses etc. We obtain useful things like wool, leather, medicines etc.

Animal husbandry: Animal husbandry is the scientific management of livestock. It can be defined as the science of rearing, feeding, breeding, disease control and utilisation of animals. Animal based farming includes cattle, goat, sheep, poultry and fish farming.

Need of Animal Husbandry:

1. Animal husbandry is required to meet the increasing demand of animal based goods like milk, meat, eggs, leather, etc., according to the size of the population and living standards of the people.
2. Fish production: there is lot of potential for increasing the production of freshwater and marine fishes. Efficient hatching fish from eggs and their proper care can be learnt from animal husbandry.

3. Animal husbandry sets guidelines for proper management and systematic approach to animal rearing. However there are some handicaps in the promotion and growth of livestock industry like shortage of feed and fodder, lack of care, poor genetic potential of livestock and climatic conditions.

Cattle Farming: In India, cattle husbandry is done for two purposes, i.e. milk and draught labour for agricultural work (such as tilling, irrigation and carting). Cattles in India belong to two different species:

1. Bos indicus (cows) is the scientific name of oxen. Some important breeds of cows are Sahiwal, Gir, Red Sindhi and Haryana. They serve to provide milk and as draught animals.
2. Bos bubalis (buffaloes): buffalo can live for 2 years. Some indigenous breeds of buffalo are: Nili – Ravi, Murrah, Mehsina and Surti. Buffalo milk is richer in fats, proteins, Vitamin E, calcium, phosphorous.

On the basis of the work done by cattles, they can be divided into:

- Milch animals: These are the milk producing females or dairy animals, e.g. Sahiwal, Gir, etc.
- Draught animals: These are the ones, which are used to do labour work in farms, e.g. Malvi, Nageri, etc.

Lactation Period: It is the period of milk production after the birth of a calf. Milk production largely depends on the duration of the lactation period. We can increase the milk production by increasing the lactation period.

Milk yield: Cows milk is nutritionally at par with buffalo's milk with slight difference in fat and proteins. Ghee prepared from cow's milk serves as a medicine in Ayurveda. Buffalo's milk is whiter than cow's milk and is commercially more useful than cow's milk for production of butter, ghee atc.

Breeds of Cattle:

1. Indigenous or local breeds: They are selected because of their high resistance to disease, e.g. Red Sindhi and Sahiwal.

2. Exotic or foreign breeds: They are selected because of their long lactation period, e.g. Jersey and Brown Swiss.

These two breeds can be cross-breed to get both the desirable qualities in animals.

Farm Management for Cattles: Efficient farm management is essential for humane farming, better health of the animals and production of clean milk. The measures for farm management are as follows:

- Proper cleaning and shelter facilities are required for cattles.
- Regular brushing should be done to remove dirt and loose hair.
- Shelter should have provision for clean drinking water
- Shelter should provide protection from predators
- The cattle should be sheltered in well-ventilated roofed sheds in order to protect them from rain, heat and cold.
- The floor of the cattle shed should be sloping to keep it dry and to facilitate cleaning.

Food Requirements of Cattles: the food consumed by animals is called feed. Requirements of food for dairy cattles are of following two types:

- For maintenance: Food required supporting the animal to live a healthy life.
- For producing milk: The type of food required during the lactation period.

Different types of animal feeds are:

1. Roughage: This is largely fibrous, containing low nutrients, e.g. green fodder (jowar, bajra, ragi etc) hay and legumes.

2. Concentrates: These are low in fiber and contain relatively high levels of proteins and other nutrients, e.g. cereals like gram, bajra and chana.

Apart from the above mentioned products, some feed additives containing micronutrients promote the health and the milk output of dairy animals. It should also be noted that cattle should be given balanced rations with all the nutrients in proportionate amounts.

Relation between feed and milk yield: Cattle production in India is about 25% of the world cattle production, but the total milk production in India is 5% of world's total milk production. The low milk yield in our country is due to:

1. Poor quality of feed
2. Shortage of feed and fooder
3. Low milk yielding indigenous breeds

Diseases in Cattles: Like other animals, cattles also suffer from a number of diseases, which besides causing death, also reduce milk production. The parasites of cattle can be of following types:

1. External parasites: They live on skin causing skin diseases, e.g. lice, mites, etc.
2. Internal parasites: They include worms affecting stomach and intestine and flukes that damage the liver.

Symptoms of diseases:

1. Normally becomes inactive and stops eating.
2. Its yield is reduced.
3. It may have red eyes and running nose.
4. It may pass coloured urine and loose dung.

Prevention of diseases: Cattles also get infectious diseases by infection from various bacteria and viruses, e.g. foot and mouth disease, cowpox and rinderpest (viral diseases), anthrax, haemorrhagic septicemia, black quarter (bacterial diseases), etc. As preventive measure, vaccinations are given to farm animals against many viral and bacterial diseases. They should be cleaned, bathed and groomed frequently. External parasites like lice can be

ABHYAS Academy, Behind Pragat Shiv Mandir, Near Govt. College, Nishat Cinema Road, Ambala Cantt.
Ph No. +91-171-2631595, 9416541198, e-Mail: anusethi1968@yahoo.com Website: www. abhyasonline.in

controlled by applying insecticide solutions. A Nutritive diet also increases resistance against diseases.

Poultry Farming: Poultry includes hens, ducks, turkey and geese, is kept for eggs and meat. The practice of keeping and breeding these birds is called poultry farming. Therefore, improved poultry breeds are developed and farmed to produce layers for eggs and broilers for meat. For the improvement of poultry breeds, cross-breeding is done successfully between Indian or indigenous (e.g. Aseel, Basara, Cochin) and foreign or exotic (e.g. Leghorn, Plymouth Rock) breeds. These cross-breeding programs are focused on to develop desirable traits like:

- Quality and quantity (number) of chicks.
- Dwarf broiler parent for commercial chick production.
- Summer adaptation capacity/tolerance to high temperature.
- Low maintenance requirements.
- Reduction in the size of egg-laying bird with ability to utilise more fibrous cheaper diets formulated using agricultural byproducts.

Egg and Broiler Production for Poultry: Broiler (are chickens that have attained a weight of about 1kg or more) chickens are fed with vitamin-rich supplementary feed for good growth rate and better feed efficiency. Care is taken to avoid mortality and to maintain feathering and carcass quality. They are produced as broilers and sent to market for meat purposes. Broilers and egg layers have different housing, nutritional and environment requirements. The daily food requirement for broilers is protein rich with adequate fat. The level of vitamin-A and K is kept high in the poultry feeds.

Maintenance of the Shelter for Poultry: The following practices are required:

1. Proper cleaning and sanitation of the shelter.
2. Maintenance of temperature and hygiene in the shelter.
3. Proper ventilation.
4. Large area for shelter to make it spacious.
5. Preventive and control checks to reduce disease and pest occurrence.

Poultry Diseases and their Prevention: Poultry fowl suffer from various diseases caused by various agents (pathogens). They are listed in the table:

Causative Agent	Disease
Fungi	Aspergillosis
Virus	Fowl pox, Marek's disease, bird flu and dermatitis
Bacteria	Diarrhoea, cholera and tuberculosis.
Parasites	Ascarids, cecal and capillaria.

They also suffer from nutritional deficiency diseases. These diseases can be prevented by:

1. Providing nutritional diet to poultry birds.
2. Proper cleaning and sanitation of shelter.
3. Vaccination of poultry birds can prevent the occurrence of infectious diseases. Loss of poultry during an outbreak of disease can reduce by proper vaccination.
4. Spraying of disinfectants at regular intervals the shelter.

Fish Production: Production of fish includes both finned true fish and shellfish like prawns and molluscs). It is a cheap of animal protein for our food. Vitamin A and D are obtained from fish liver oil. The two ways of obtaining fish are:

1. Capture fishing: It is a method of obtain from natural resources. It is undertaken inland and marine waters.
2. Culture fishery: It is the method of obtaining fish from fish farming or pisciculture undertaken mostly inland and near seahorses.

Fishing can be done by both these methods in marine and freshwater ecosystems.

Aquaculture: production of useful aquatic plants and animals like prawns, fish, lobsters, crabs etc using various types of water resources is called aquaculture.

Pisciculture: production and management of fish alone.

Inland Fisheries: It includes fishery in freshwater and brackish water. Freshwater resources include canals, ponds, reservoirs and rivers. Brackish water resources, where seawater and freshwater mix together such as estuaries and lagoons, are also important fish reservoirs. However, the yield of capture fishing is not high in such inland water bodies. Thus, most high fish production from these resources is done through aquaculture. Sometimes fish culture is done in combination with rice crops, so that paddy crop gets ample of water and fishes get food.

Marine Fisheries: Marine fishery resources in India include 750 coastline and the deep seas beyond it. Popular marine fishes are pomfret, mackerel, tuna, sardines and Bombay duck. High economic value marine fishes are:

1. Finned fishes: Mullets, bhetki and pearl
2. Shellfishes: Prawns, mussels, oysters and seaweeds.

Oysters are also cultivated for the pearls produce. Yield of fishes can be increased by locating large schools of fish in the open sea with the use of satellites and echo-sounders.

Composite Fish Culture (Polyculture): Fish production by cultivating a single species (monoculture) gives a low yield and demands higher cost. In composite fish culture, a combination of 5 or 6 fish species are cultivated in a single pond having different food habits, so that they do not compete for food with each other.

Advantages of Composite Fish Culture are:

1. Both local and imported fish species are used.
2. Different food habits are advantageous, as all the food in the pond is consumed by the fishes.
3. The fish yield from pond is high, e.g. Catla is surface feeder, Rohu feeds in the middle-zone of the pond, Mrigal and common carps are bottom feeders, grass carp feeds on weeds in the pond.

Disadvantage of Composite Fish Culture are: As many of the fishes breed only during monsoon. Thus, one of the major problems of fish farming is the lack of availability of good quality seed. To overcome, fishes are breed in ponds using hormonal stimulation, which ensure the supply of pure fish seed in desired quantities.

Note: Mari culture as marine fish stocks get further depleted. The demand for more fish can only be met by culture fisheries, a practice called mariculture. The marine fishes are cultivated in coastal waters of India on commercial basis. It includes mullets, bhetki, eel, milk fish, etc.

Bee-Keeping: It involves owning and taking care of bees. Honeybees are the most studied insects as they play a critical role in honey production and pollination. Honey is known to be widely used thus; its production has become an agricultural enterprise these days. It is scientifically known as apiculture. It is the method of rearing, care and management of honeybees for obtaining honey, bees wax, etc. For commercial honey production apiaries or bee farms are established. Apart from the production of honey, beehives also act as a source of wax that is used for various medicinal preparations.

Advantages of Bee-Keeping:

1. It provides various products like honey (for eating or making other products), wax (used in medicinal and cosmetic preparations), bee venom, etc.

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2. It acts as an additional source of income activity for farmers.
3. It helps in increasing crop yield by better pollination.
4. Require low investment.

Varieties of bees used for commercial honey production:

Out of the above-mentioned species, A. mellifera has been brought in the country in order to increase yield of honey. This is the main variety used for the commercial honey production.

Scientific Name	Common Name
Apis cerana indica	Indian bee
Apis dorsata	Rock bee
Apis floria	Little bee
Apis mellifera	Italian bee

Italian Bees: Italian honeybees are said to be the world's most widely distributed honeybee. They are thought to have evolved in the Italian peninsular South of tile Alps. They can build colony populations in the spring and maintain them for the entire summer.

Advantages of Italian Bees:

1. They have high honey collection capacity.
2. They are stingless. They can stay in a given beehive for long periods and breed well.

Value of honey Depends: on pasturage or flowers available to bees for nectar and pollen collection.

Taste of honey Depends: on adequate quantity of pasturage and kind of flowers available.

Artificial Beehive, Apiary and Honey Collection: an artificial beehive is a box with wooded chambers for laying eggs, storage of newly arrived nectar, collection of honey and storage of honey.

An Apiary is the place where bees are kept. A series of hives constitutes an apiary. It is set up in a place where there is an abundance of flora so that nectar collection is maximum.

Swarming: is the mass emigration of bees of a hive to settle down elsewhere in order to form a new hive. Swarming is not a beneficial exercise for honey production. This is because the formation of a new hive takes time and energy of the bees, thus reducing nectar.

Artificial insemination

The introduction of semen into the genital tracts (vagina) of females by artificial means is called **artificial insemination.** The technique of artificial insemination has proved to be a boon to animal breeders because it improves the quality of livestock.

1. Collection of semen: The semen from a healthy and hardy male of a particular breed is collected by artificially exciting them. This may be done mechanically or electrically.

2. Preservation of semen: The collected semen is preserved by freezing or by chemical methods depending upon the animal. The semen is diluted and preserved in vials.

3. Introduction of semen: This preserved semen is then injected artificially into the vagina of the chosen female during its maximum fertility period (heat).

The following should be observed for successful artificial insemination.

1. The male donor should be healthy and of the best breed to produce high-quality semen.
2. The female should be of sound health. She should be of proper age for reproduction.
3. The time of insemination should be proper. It should be done during the reproductive cycle of the female.
4. Proper instruments and techniques should be adopted for inseminating.

Advantages of artificial insemination: This method has the following advantages.

(i) It helps in producing high-yielding breeds of milch animals. In general, the process brings about genetic improvement.

(ii) This method of breeding animals is cheaper because semen from a single bull can be used to impregnate several thousand cows (about 3,000) at distant places. The preserved semen in vials can be easily sent to different places for artificial insemination. There is no need to transport the bulls to different places.
(iii) Artificial insemination ensures good-quality progeny because the selective breeding of animals with desired characteristics becomes easier.
(iv) This method of breeding animals is more reliable than the natural method of breeding.
(v) High-quality semen is available in preserved conditions throughout the year, while a bull of good breed may not be available all the time at all the places.

Dr V Kurien (born on 26th November, 1921) is regarded as the father of White Revolution, which refers to a scheme that increased milk production in India. He established and developed this scheme of milk production successfully. He formed the National Dairy Development Board (NDDB) to manage this scheme.

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