



**T.Y.B.A.
SEMESTER VI (CBCS)**

**RURAL DEVELOPMENT
PAPER - VI**

APPLIED AGRICULTURE

SUBJECT CODE : 86594

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T.Y.B.A. RURAL DEVELOPMENT PAPER NO. VI
APPLIED AGRICULTURE
SEMESTER- VI
(Revised Syllabus Implemented from Nov-2022)

1. Animal Husbandry:

- Concept & Scope,
- Significance in Rural Development
- Dairy Development
- Goat & Sheep Rearing

2. Poultry:

- Concept & Scope,
- Significance in Rural Development
- Essential Factor
- Schemes for Promotion of Poultry

3. Fishery:

- Concept, Nature & Scope,
- Significance in Rural Development
- Types
- Scheme for Promotion of Fishery.

4. Processing of Agro-Allied Products

- Concept and nature of Processing of products in agro-allied sector.
- Types of products in agro-allied sector.
- Importance of Processing of products in agro-allied sector.
- Significance of products in agro-allied sector in Rural Development.



ANIMAL HUSBANDRY

UnitStructure:

- 1.1 Objectives
- 1.2 Introduction
- 1.3 Concept of Animal Husbandry
- 1.4 Scope of Animal Husbandry
- 1.5 Growth of markets and promoting livestock development
- 1.6 Role of Animal Husbandry in Human Welfare Management
- 1.7 Live stock Extension
- 1.8 Strategies and programs for 12th plan
- 1.9 Women and Live stock
- 1.10 Strategies and Programs
- 1.11 Summary
- 1.12 Questions For Self-Study

1.1 OBJECTIVES

- a) To understand the concept and scope of animal husbandry.
- b) To understand the importance of animal husbandry in rural development.
- c) To know the various government schemes for the development of animal husbandry.
- d) To understand the role of women in animal husbandry.

1.2 INTRODUCTION

Ever since the beginning of human civilization, humans have depended on animals for many requirements like food, clothing, labor, security, and other things. Humans have consistently taken efforts to improve the breeds of domesticated animals to make them more useful. The development of animal species of desirable qualities, through creating better breeds, has been an important human achievement.

In India agriculture has been practiced for thousands of years along with rearing of animals for meat, milk and clothing. For this the humans had to gain knowledge of animal species that could be domesticated to ensure

maximum productivity. This helped them to be familiar with the animal habits, assist with births and to treat them during ailments and diseases. In India a large number of farmers depend on animal rearing for their livelihood. Animals mainly bullocks are the major source of power for both farmers and dryers besides providing milk, meat, eggs, wool and hides. Livestock, meat, eggs, milk, hides etc. are the major products for the farmers. Livestock are just not mere animals for farmers they treat them as their companions. Farmers, farms and farm animals together are a good farming eco-system in India.

Livestock has been an integral part of India's agricultural and rural economy since time immemorial. It has been supplying energy for crop production in various agricultural operations, in terms of draught power and organic manure. They in turn derive their own energy requirements from crop by products and its residue. New inventions in bio-chemical and mechanical technologies recently have weakened the synchronization between livestock and crops. Livestock contribute over 1/4th of the agricultural GDP (Gross Domestic Product) and engage about 9% of the agricultural labor force in rural India. Now-a-days livestock are valued as source of food, but in recent year's livestock production and productivity has decreased at a considerable rate. In 12th five-year plans livestock sector is expected to emerge as an engine of agricultural growth and demand for animal food products. Significant barrier to the commercialization of livestock production is the under-developed livestock market.

1.3 CONCEPT OF ANIMAL HUSBANDRY

Animal Husbandry is one of the most important occupations of the farmers in India. Animal husbandry is the science of looking after and breeding animals-used in agriculture, providing animal products, and animals for research purposes or as domestic pets. The branch of science dealing with the study of various breeds of domesticated animals and their management for obtaining better products and services from is known as Animal Husbandry. It is called Live stock Management, when it incorporates the study of proper utilization of economically important domestic animals.

Animal husbandry covers a wide range of activities like caring and grooming of animals, livestock farming, accommodation and hygiene and including other disciplines – agriculture, veterinary science and genetics. Animal husbandry includes domestication of animals for milk, meat, eggs, wool, skin and hides, etc. and use them for draught and transportation. India has about 500 species of animals, but only a few are domesticated for different uses. This includes animals like bullocks, cow, buffalo, goat, sheep, pig, camel, horse, donkey, mule, oxen, yak, etc.

Animal husbandry plays an important role in the Indian rural economy. Many of the practices involved in animal husbandry come from being brought up on farms wherein a large number of animals are reared and raised. This is seen mainly in the rural areas. In India children are taught at an early age how to take care of the animals their parents have raised so that they also can take over farms and ranches as adults. In developed

countries there are programs that help the children learn to take care and how to raise the animals. In many parts of the world, people are practicing animal husbandry as farmers, sheepherders, ranchers or simply taking care of large groups of livestock.

In India dairying is regarded as an instrument for social and economic development. The country's milk is supplied through millions of small producers, who are dispersed in the rural areas. Income from crop production is seasonal, but dairying provides as table income all the year round. It is an important economic incentive for the small farmer. The farmers maintain an average herd of one or two milch animals, comprising of cows and/ or buffaloes. As dairying requires small land base and ample labor is available farmers are encouraged to practice dairying as an subsidiary occupation. Now a large number of modern milk and milk product factories have been established. The organized dairies in India have been successfully engaged in the routine commercial production of pasteurized bottled milk for Indian dairy products.

Sheep rearing is another branch of livestock rearing. Sheep with its multi-facet utility for wool, meat, milk, skins and manure, form an important componen to frural economy. It provides a dependable source of income to the she pherds through sale of wool and animals.

Goat rearing in India is a very important component in dry land farming system. Goat is known as 'Poor man's cow'. With very low investments goat rearing can be made in to a profitable venture for small and marginal farmers. Goats are reared for milk and meat. Goat scan efficiently survive on available shrubs and trees in adverse harsh environment in low fertility lands where no other crop can be grown. Goati samulti-functional animal and plays a significant role in the economy and nutrition of landless, small and marginal farmers in the country.

Pig farming is adapted to both diversified and intensified agriculture. Pigs convert inedible feeds, forages, and certain grain by products obtained from mills, meat by products, damaged feeds and garbage into valuable nutrition. The faces of pig is useful in maintaining soil fertility. With a small investment on building and equipment, proper feeding and sound disease control program the farmer can profitably utilize his time and labor in this subsidiary occupation.

Rabbit rearing or farming is also a part of livestock rearing. Rabbits are basically reared for meat, fur and wool. They have great potential to convert the absolute feed into quality products for human beings. Rabbits can be fed with forage, low grain diet that is largely non-competitive with human food. Its meat is highly nutritious, tasty and excellent in quality and is rich in protein, low infat, cholesterol and sodium. They are both suited for both small scale and large scale commercial production.

Poultry farming is the raising of domesticated birds like chickens, ducks, turkeys, and geese for the purpose of meat oreggs for food. Poultry are farmed in great numbers with chickens being the most numerous. More than 50 billion chickens are raised annually as a source of food (both meat

and egg). Poultry keeping, in India, has for a long time remained a rural cottage enterprise. The common village hen receives very little attention and care. As a result its productivity also is low. But now poultry is one of the fastest growing segments of the agricultural sector. The production of eggs and broilers has risen at a rate of 8-10% annually. As a result, India was the fifth largest egg producer and the eighteenth largest producer of broilers in the world.

1.4 SCOPE OF ANIMAL HUSBANDRY

Livestock plays an important role in generating income and employment in the rural areas. Besides assisting in crop production it also contributes to household income. It utilizes human resources in a better way as it provides full time occupation at the location it self along with providing balanced nutrition in the form of milk, egg, and meat and farm power. Animal husbandry plays a major role in providing self-employment. A large section of women are engaged in this. Livestock products also are very good export earners.

Pursuing career in animal husbandry can be either continuing the family farming business or to obtain academic qualifications in specialist topic. Those who take this subject at under graduate level would be less interested in caring for live stock and more likely they would specialize in degrees in veterinary medicine, pharmacy (specializing in animals), or join in companies manufacturing products for livestock. Some people who raise livestock may join classes in animal husbandry to learn how to dock tails, make use of new technology and techniques. Besides agriculture animal husbandry is employed in raising of animals for scientific and medical research. For testing and taking trials of new drugs animals are often required in large numbers. So they are raised and kept in identical conditions, so that valid comparison can be made between different groups. The animals used for testings should be healthy as it involves carefully regulating a number of different factors like temperature, ventilation, lighting and sanitation, as well as food and water. For this a detailed knowledge of the specific species is essential.

Diverse and changing role of livestock:

Livestock is nothing but a capital asset that is produced in the past and contributes to future product output. Investment in livestock raises the production in the farms through extension of land area that can be used, diversification of the productive activity on the farm and by raising livestock value of output and as a result total agricultural production per hectare increases. Livestock production is categorized into grassland-based, mixed farming and land less production system. The land less production system is mainly responsible for the growth in supply of meat production. The landless livestock production system is a labor using technology. Mixed crop livestock production system is important, as it is the source of the bulk ruminant live stock production. In this the livestock is fed on crop by-products, other plant material, contributes draught power, manure, additional sources of food and also income, savings and emergencies.

Institutions constitute the formal laws and rules. Along with the informal norms of behavior and conventions, which governs access to resources, transactions between individuals and organizations group activity? Livestock are generally privately owned, but for land and other natural resources, private freehold tenure is the only one alternative. Institutional change may have a critical influence on economic development. Transaction costs are low in a traditional village society. It is based more on relational contracting. Historical stagnation and contemporary underdevelopment in developing countries lack effective institutions. Open access to pasture land may lead to over-grazing and degradation. Private or community ownership is preferred. The farm household is a unit of production and consumption. Labor hire for livestock is generally based on long-term contracts to avoid problems of uncertainty, performance monitoring and asset specificity. Animal health services are important in reducing losses due to animal disease. Technological change plays a key role in agricultural development. Development of market infrastructure and institutions is essential for economic growth.

1.5 GROWTH OF MARKETS AND PROMOTING LIVESTOCK DEVELOPMENT

Agricultural markets have increased and expanded with the growth of international trade. Trade in livestock production is said to be increasing but it represents only a small proportion of total value.

Now in recent years the scene has changed in developing countries as they have started exporting goods rather than importing them. Milk and poultry meat are one of the exported items in the country.

The demand for increased livestock production is increasing, and as a result the livestock is contributing to the incomes and welfare of the rural poor. For new livestock business; additional physical and or financial capital is necessary. But later on the replacement can be home bred. Human capital having the knowledge of husbandry and skills is needed. Technological innovations should be appropriate to the resource base. Access to market outlets and input delivery systems is also necessary. There is a need for improvement in the area of water supplies and draught relief, technical improvements in animal health, nutrition and production system. There is vast scope in the livestock business for import substitution and saving foreign exchange. Improvement in the traditional backyard systems is necessary along with the development of an institutional framework. This can promote equitable contracts between commercial processors and small holder producers and joint action by small holders in establishing processing and marketing facilities. Institutional development requires strengthening of rural roads and communications, property rights and contractual agreements, and organizations that provide credit, animal health services and other inputs. Research has been done in animal and veterinary public health, for age crops and the utilization of crop by-products, improved animal husbandry

and production systems and breeding, but it is not up to the extent that is needed in the rural areas. Socio economic research is needed in the existing production systems, institutions for land tenure, credit, labor hire, input delivery and product marketing.

The importance of livestock and their products is increasing as consumer demand expands with population growth and rising incomes. This growth in consumption of livestock and its product is reflected in improvements in the average human nutritional status due to intake of animal protein. Livestock products are costly than the staple crop products, so diets in most developing countries generally include lower levels of intake of animal products than the developed and industrialized countries. However wherever domestic production of livestock has failed to keep pace with the growing demand so imports of livestock products have increased considerably. Livestock play an important role in contributing to rural livelihoods, employment and poverty relief. In mixed and integrated farming systems livestock contribute to both intensification and diversification of income streams. It is not only an additional income but also increase crop yields. Draught animals may also contribute to expansion of crop production by saving in labor requirements. Livestock may provide a service against emergencies, while in many societies it also serves social and cultural function. It also acts as a quantitative measure of family status.

1.6 ROLE OF ANIMAL HUSBANDRY IN HUMAN WELFARE MANAGEMENT

Animal Husbandry is a branch of agriculture dealing with the care and management of livestock. It deals with the feeding, breeding, housing and health care of livestock to gain maximum benefits. Livestock refers to farm animals (cow, buffalo, sheep, goat, pig, horse, camel, poultry, fisheries, etc.) that are reared by humans for commercial purpose or for recreation purposes.

Livestock has been used by humans for animal products like-milk, eggs, meat, wool, silk, honey etc.

The word Husbandry means the management of domestic affair. It is used in connection with proper feeding, breeding, health-care, housing etc. more than 70% of the world livestock population is in India and China, but it contributes to only 25% of the world farm produce. As a result new techniques have to be used to improve quality and productivity along with the old traditional methods of animal breeding and care.

Role of Animal Husbandry in Human Welfare-

- a) Dairy Products-Milk animals can be used as a source of milk and dairy products like yogurt, cheese, butter, ghee, paneer, ice-cream etc.
- b) Meat-it is a good source of animal dietary protein and energy.
- c) Fiber- Livestock produce a variety of fiber. Sheep and goat produce wool, deer and sheep for leather.

- d) **Fertilizer**-The dung of these animals can be used as excellent manure and can be spread in the fields to increase the crop yields. Cow dung is also used to plaster the walls and for flooring also in rural areas. Cow dung cakes are used as fuel for cooking and other domestic purpose. Bones of animals are also used as fertilizers.
- e) **Labor**- Prior to steam power the only source of non-human labor were the livestock. Animals such as bullocks, horses, donkey, yak were used for mechanical energy. Still in many parts of the world they are used now also for operation like ploughing fields, transporting goods and many other functions.
- f) **Land Management**- Animals are grazed sometimes as a way to control weeds and under growth.

Management of Farm and Farm Animals:

Management is the art and science of combining ideas, providing facilities, different processes, materials and labor to produce and give services or market a worthwhile product successfully in the market. Some of the management procedures areas follows.

Dairy Farm Management:

It includes the management of animals for milk and its products for human consumption. Cow, buffalo, goat and sheep are the generally preferred animals for dairy products. The milk yield from cow and buffalo is more than goat and sheep. Cow milk contains carotene, which gives yellow color to the milk. Ghee from cow milk fed on green fodder is more yellow than fed on dry fodder. Buffalo milk does not contain carotene. Dairy management deals with the processes and systems that increase yield and improve quality of milk. They are as follows-

1) Four essential methods for livestock improvement are breeding, weeding, feeding, and heeding:

- a) The animals both male and female selected for breeding should be of superior quality.
- b) Uneconomic animals should be prevented from reproducing is the aim of weeding.
- c) Feeding is an important aspect of livestock improvement. Each animal should be given balanced ration.
- d) Heeding means paying attention to the animals. It implies good animal management and general supervision including housing care and maintenance of proper cleanliness and hygiene.

2) Health Care:

According to World Health Organization (WHO) definition of health this "Health is the state of complete physical, mental and social well-being and not merely the absence of disease." A healthy animal eats drinks and sleeps well regularly. So good health is also important.

3) Resistance to diseases:

The animal is protected from diseases if looked well and also it can develop resistance to diseases.

4) Suitable Environmental conditions:

Sufficient light, water, air, suitable temperature, adequate ventilation and well drainage housing system should be provided.

5) Regular Inspections:

Regular visit by veterinary doctor is necessary. It requires regular inspections and the records should be maintained properly. In short we can say the productive potentialities of livestock are controlled by three principle factors- i) genetic makeup ii) nutrition iii) environment including the climatic conditions.

1.7 LIVE STOCK EXTENSION

In India agriculture is a state responsibility, the implementation of livestock policy is also at state level even though the policy has been established at the national level. The state policies addressing critical needs in dairy development have not been yet clearly defined across the country. Even though some of the developed states have a well-defined policy, they have problems in implementing the policies.

The hurdle in the effective implementation of the livestock policy is the lack of clarity between the roles of state Livestock Development Agency and the State Department of Animal Husbandry, Dairying and Fisheries. The other problem is that of availability of funds to implement the livestock activities. There is a need to emphasize the importance of dairying to small holders incomes, so that they direct more resources towards dairy development. Extension of knowledge, technology and service to the grass-root level is of paramount importance for the growth of the sector. Extension services for livestock have been a nonstarter severely hampering its growth compared to the crop sector. Animal husbandry is considered as a subsidiary occupation. The extension format and methodology developed for crop production are considered to take care of the livestock sector. This is not true because both the central and state government have given extension low priority. Only 1% of the total budget is allocated for the extension activities of this sector.

In the recent past, the livestock sector in India has emerged as an important source of agricultural growth and rural development. The change in the production systems, increased participation of women category, technological advances in breeding, feeding, management and health require distinct extension approaches and set-up. Door step delivery of services in artificial insemination, immunization, health coverage, credit facilities, market coverage is essential. Emphasis should be laid on wider dissemination of information through intensive contact and electronic media.

Utmost priority should be given to develop appropriate livestock extension system, so that its potential for agricultural growth and rural development can be fully exploited. Various technical, advisory and financial needs of different livestock production systems and species need a differentiated approach of providing extension and input services by knowledgeable and skilled workers. Special KVKs should be established that would lay emphasis on various livestock activities with the support of para-vets, NGOs and other development organizations. They should also support education to farmers and up gradation of skills of para-vets and field guides. The shortage of technical manpower for work in the field should be addressed appropriately. Public-Private-Partnership (PPP) in extension should be encouraged and made partners in PPP mode for effective management of services. A major program on livestock extension, delivery of services and women empowerment should be initiated to enhance the efficiency of production.

The veterinary and animal science service is a highly specialized area. It involves management and health care of the livestock and poultry, prevention of diseases, disease diagnosis, meat and food inspection, including milk and milk products, quarantine, animal welfare, feed for mulation and testing, dissemination of technologies besides administration and management. The scope for export of livestock and hygienically produced livestock products has increased due to Globalization and World Trade Agreements (WTA). Shortage of manpower is a major concern. Veterinary infrastructure in general is poor and in adequate and there is need for strengthening it.

1.9 WOMEN AND LIVE STOCK

The central and state governments economic policies have enhanced and sustained agricultural growth. They were not able to address adequately the deeply entrenched economic and social in equalities in the Indian societies. Women are the custodian and producers of agricultural products and translate these products in to food and nutrition of their households. Women spend most of the in come sources on the education and nutrition of their children.

Growing population, rising income and rapid urbanization are the reasons for rising in the demand for livestock production. Globalization of agricultural food markets has exposed the livestock producers to global competition. This has transformed the national and global market for generating sectoral and national competitive advantage. It has created conditions that compel and enable Sectorial decision-makers to creatively utilize the opportunities to establish competitive advantage not only at farm level, but also at industry levels. Due to this India is leading in global livestock product market through sustained and all-round improvements in quality and efficiency. Participation of women in the growth and modernization of the livestock sector would need to promote gender sensitive institutional, legal and technological change in turn promoting productivity, excellence and competitive advantage.

Live stock production in India is largely in the hands of women folk. Most of the animal farming activities like fodder collection, feeding, watering and health care, management, milking and household level processing, value addition and marketing is performed by women. Livestock are important for the livelihood culture of women. Women have limited alternative opportunities for employment. As women have little resources to improve animal productivity it is difficult to manage risk and buy good quality animals for productivity enhancement. The under-privileged group of women should be helped to earn better and grow out of subsistence by giving them knowledge of appropriate technology, skills, market linkages, and information and service delivery systems.

As there is inequity in the ownership of productive assets i.e. land and livestock and despite the women's considerable involvement and contribution to the livestock production, the gender inequalities do not allow them access to technologies, credit, information, inputs and services.

The rapidly increasing livestock product demand has created opportunities for women empowerment. Appropriate policies and institutional arrangements would help women in harnessing the objectives.

1.10 STRATEGIES AND PROGRAMS

Major approach and efforts should be such that they should enhance women's access to livestock assets so as to enable them to avail benefits of various livestock development programs and policies. Women self-help groups or women livestock producers association can be involved to avail credit for securing livestock and inputs, insurance to manage risks and input and services to improve animal productivity. The procedural requirements to avail policy benefits should be relaxed for women livestock keepers. They should also be provided additional incentives in terms of subsidies on interests and insurance premium.

Special programs should be initiated for developing women entrepreneurship along the livestock value chain. This must include the production, processing and marketing so that they are able to face challenges that come in the production and marketing of livestock. As women are closely associated with the animals, they have better understanding and knowledge of the animal behavior in respect of reproduction, feeding, symptomatic changes in animal health and their response to external factors. Enhancement of women's skill in various aspects animal breeding, health, feed and nutrition, management and marketing is necessary. Women entrepreneurship should be developed in rearing of quality calves and heifers and marketing.

Dairy Co-operatives, Agri-Business and Marketing firms should register more women members or suppliers of dairy products. As the production systems are highly internalized based mainly on farm and family resources, it is necessary to boost animal productivity and income of the women. For this, there is a need for appropriation of technologies and improve animal health and nutrition through appropriate training

programs, extension programs. This can enhance their capacity in clean livestock production and livestock management to improve resilience of livestock to climate change.

Social entrepreneurship approach should be adopted at village level especially in the ecologically fragile areas. Social engineering is more necessary than technical expertise to develop common property resources. There is need for improvement of animals that would survive well with the ecological fragile environment along with the empowerment of women. To enhance the effectiveness of women-oriented live stock development programs, there is a need to correct gender bias in veterinary education, research and service delivery education.

Centrally Sponsored Projects:

Livestock Health in rural areas.

National Project for cattle and buffalo Breeding.

Assistance for Modernization of Slaughter Houses and Carcass Utilization Plants.

Assistance to States for Feed and Fodder Development. Livestock Insurance.

Establishment/ Modernization of Rural Slaughter Houses. Livestock Census.

Integrated Sample Survey Scheme for Estimation of Major Livestock Products.

Directorate of Animal Health (National Program for Prevention of Animal Diseases).

Central Cattle Breeding Farms.

Central Mini-kit Testing Program on Fodder Crops. Central Poultry Development Organization.

Regional Stations For Forage Production & Demonstration. Central Herd Registration Scheme.

1.11 SUMMARY

Livestock have been an integral component of India's agricultural and rural economy since time immemorial, supplying energy for crop production in terms of draught power and organic manure, and in turn deriving their own energy requirements from crop by products and residues. The advances in bio-chemical and mechanical technologies, however, have weakened the synergy between livestock and crops. Livestock are now more valued source of food and contribute over one-fourth to the agricultural gross domestic product and engage about 9% of the agricultural labor force. The livestock sector has been growing faster than crop sector; however, in recent years, the growth both in livestock production and productivity has decelerated considerably. Livestock sector is expected to emerge as an engine of agricultural growth in the 12th plan and beyond in view of rapid growth in demand for animal food products.

Achieving growth rate of 5-6%, however, would require addressing challenges of shortage of feed and fodder and frequent occurrence of some deadly diseases. The sector has remained under-invested; and neglected by the financial and extension institutions. Livestock markets are under-developed, which is a significant barrier to the commercialization of livestock production. Besides, the sector will also come under significant pressure of increasing globalization of agri-food markets.

1.12 QUESTIONS FOR SELF-STUDY

- 1) What is the concept of animal husbandry ?
- 2) Write in brief the scope for animal husbandry.
- 3) Explain the growth of markets and promotion of livestock development.
- 4) What is the role of animal husbandry in human welfare management ?
- 5) Write short note on:
 - a) Livestock extension
 - b) Strategies and programs
 - c) Strategies and programs for 12th plan
 - d) Women and Livestock



DAIRY FARMING

Unit Structure:

- 2.1 Objectives
- 2.2 Introduction
- 2.3 Benefits of dairy farming
- 2.4 Selection of Dairy Cattle
- 2.6 Breeds of Cow's
- 2.7 Exotic Dairy Breeds of Cattle
- 2.7 Breeds of Buffaloes
- 2.8 Care and Management of Milch Animal
- 2.9 Summary
- 2.10 Questions

2.1 OBJECTIVES

- 1) To know the benefits of dairy farming.
- 2) To know the different breeds of cattle.
- 3) To learn to take care of milch animals.
- 4) To know the factors affecting breeding efficiency.

2.2 INTRODUCTION

Dairy farming was traditionally a family business. But today it has grown to a large extent to an organized dairy industry with technological specializations in every step of the processes. Tremendous growth in dairy farming equipment is seen and it helps modern dairy farms to manage thousands of dairy cows and buffaloes. Many of the dairy farms in the villages still manage and run organic dairy farms and supply the milk to get processed by large companies and then sell to their outlets. To give maximum profit to the firms the best approach is to create and run a sustainable dairy farm. It also takes care of the effects of dairy farms on environments and animals for a longer period.

India is the largest milk producer of the world and milk has been marked as the number one farm commodity. The white revolution had made spectacular landmarks in the Indian milk production scenario. Rural prosperity by dairy farming was the need of the hour. Today livestock

production has taken a new turn by venturing itself on commercial basis. Judicious balanced feeding round the year is the reason behind the higher production potential of the crossbred animals and its economic sustainability. The major constraint in animal production at present is the chronic shortage of feed coupled with the poor quality fodder. In the recent system of intensive livestock production an increase in the concentrate feeding has increased the milk production cost and substantially decreased the profits of farmers. The increasing cost of feedingredients and its seasonal variability has added to the gravity of the situation. Green fodder is essential component of feed for the high yielding milch animals as the desired level of milk production depends on it. The quality of herbage based animal feed and fodder is responsible for the sustainability of dairy industry in India.

2.3 BENEFITS OF DAIRY FARMING

There are many benefits of starting dairy business. The main importance and benefits of dairy farming are as follows:-

As dairy farming is a traditional business there is no need to worry about marketing your products. As dairy product is available all the year round, you can easily sell your products all over the country. Dairy farming is eco-friendly as it doesn't pollute the environment. Highly skilled labor is not required for dairy farming business. With the help of family labor you can easily setup small-scale dairy farm. Dairy farming provides great business opportunities to the educated unemployed young generation. Maximum production is ensured by, proper planning and management. The climate and environment of India is suitable for various highly productive native Indian and foreign breeds.

Commercial and small-scale dairy farming in India plays an important role in the total milk production and Indian economy. Most of the dairy farmers in India raise animals on small scale by traditional methods, as they are not aware of the modern farming methods and improved dairy farming techniques. Due to this some farmers are losing their investment and not getting benefit. Almost all regions of India are suitable for setting up dairy farming business. Maximum production with profit from dairy farming business can be ensured if there is proper business plan, well managed and taken care.

Advantages of Dairy farming:

While starting dairy farming business it is mandatory to know the advantages of dairy farming business system. Milk is the primary source of calcium mineral and nutrients for people.

- 1) As dairy industry is not totally reliant on rainfall, development is possible even on days when climate is very hot and dry.
- 2) Intake of dairy foods is increasing by both vegetarians and non-vegetarians.

- 3) The amount of milk that has been marketed has never gone down and even though the provider has surpassed the need, the price has remained the same.
- 4) Promotion of milk is very easy, compared to the items from other sectors. Costs of promotion are very low for any dairy and there is no need for unique stores for milk.
- 5) Dairy agriculture is the only industry where earnings are as sure in 30 days.

Problems of Dairy Farming in India

The main limitations of dairy farming in India are as follows:

Most of the farmers are not serious about total expenditure and profit from this business. Value of the green fodder is not calculated and counted which they grow with the crop in their fields. High infrastructure and feeding cost is the main constraint of dairy farming business.

Most of the farmers are not conscious about the breeding process of the animals depend up on various factors, due to lack of proper publicity and public announcement by the government. They are unaware that animal breeding is a biological phenomenon and getting expected milk production depends on proper breeding process.

2.4 SELECTION OF DAIRY CATTLE

The first and most important step adopted in dairy farming is the proper selection of dairy cattle. Proper identification of animals and to keep records is very essential. Cross breed animals with exotic inheritance is preferred. In cross breeds, 50% of the native germplasm is helpful to retain the adaptability, heat tolerance and disease resistance traits of local animals. The best policy adopted is maintaining animals sustainable to the situation. Animals brought from different agro-climatic conditions cause many problems, as they cannot adjust to the new environment easily. So as far as possible the animals should be purchased from similar environmental conditions.

Selection of dairy breeds:

Cows-

Selecting a calf in calf show, a cow in a cattle show by judging is an art. A dairy farmer should build up his own herd by breeding his own herd. The guidelines to select a dairy cow are as follows:

- 1) Animals should be purchased during the months of October and November.
- 2) Animal purchased from cattle fair should be selected based upon its breed characters and milk producing ability.

- 3) Organized farm reveal's the complete history of animal as they maintain history sheet or pedigree sheet.
- 4) A cow should allow any body to milk, and should be docile.
- 5) The maximum yields by dairy cows are noticed during the first five lactations. Generally selection should be carried out during first or second lactation.
- 6) Maximum yield is noticed till 90 days after calving.
- 7) There successive complete milking has to be done and an average of it will give a fair idea regarding production by a particular animal.

Characteristics of high yielding dairy cows:

- a) Animal should have wedge shaped appearance of the body.
- b) Attractive individuality with femininity, vigour, harmonious blending parts, impressive style and carriage.
- c) The breed should have bright eyes with lean neck.
- d) The udder should be well attached to the abdomen.
- e) There should be a good network of blood vessels in the skin of the udder.
- f) All four quarters of the udder should be well demarcated with well-placed teats.

2.5 BREEDS OF COWS

There are many native and highly productive foreign breeds available. Cows and buffaloes together can be raised in separate rows under the same shed. Cow's milk has low fat than the buffalo's milk. For profitable commercial dairy production the popular and common buffalo milch breeds are Murrah, surti, Mehasani, Jaffrabadi, Badhawari etc. Gir, Sahiwal, Red Sindhi, Tharparkar are popular cow breeds. The highly productive foreign breeds like HolsteinFreisian, Brown swiss, Jersey etc. All these breeds are suitable for Indian climate.

Breeds of Cows:

Gir-This breed is also known as Bhadawari, Desan, Gujarati, Kathiawari, Sorthi and Surati. Originated in Gir forests of south Kathiawar in Gujarat, also found in Maharashtra and adjacent Rajasthan. Basic color of skin is white with dark red or chocolate-brown patches or sometimes black or purely red. Horns are peculiarly curved, giving a 'half-moon' appearance. Milk yield is 1200 to 1800 kg per lactation. This breeds age at first calving is 45-54 months and the inter calving period is from 515 to 600 days. Gir cows are known for its hardiness and disease resistance.

Red Sindhi- This breed is also known as Red Karachi and Sindhiand Mahi. This breed was originated in Karachi and Hyderabad (Pakistan) regions of undivided India and also is reared in certain organized farms in our country. Its color is red with shades varying from dark red to light, strips of white. Its milk yield is 1250 to 1800 kg per lactation. Age at first calving is 39-50 months and intercalving period is from 425-540 days. Bullocks can be used for road and field work, though they are lethargic and slow.

Sahiwal – This has its origin in Montgomery region of undivided India. This breed is also known as Lola (loose skin), Lambi Bar, Montgomery, Multani Teli. This is the best indigenous dairy breed. Its color is reddish dun or pale red, sometimes flashed with white patches. It is a heavy breed having symmetrical body with loose skin. Average milk yield is 1400-2500 kg per lactation. Age at first calving of this breed ranges from 37-48 months and the calving interval is 430-580 days.

Indigenous Draught Breeds of Cattle:

Hallikar - It originates from the former princely state of Vijaynagaram, presently part of Karnataka. Its color is grey or dark grey. This breed is compact, muscular and is of medium size. It has prominent forehead, long horns and strong legs. It is best known for its draught capacity and especially for its trotting ability.

Amritmahal- Its origin is in Hassan, Chikmagalur and chitradurga district of Karnataka. This breed was developed by the Maharaja of Mysore. These breeds are grey, but the shade may vary from white to near black. Its muzzle, feet and tail are usually black. They have long horns that end in sharp black points.

Khillari- Their origin is in Solapur and Sitapur districts of Maharashtra. They closely resemble the Hallikar breed. Its color is grey-white. But the new born have dusty red color that disappears in couple of months. It has long black horns sometimes pinkish running in a peculiar fashion. The bullocks of this breed are fast and powerful.

Kangayam- They are also known as Kongu and Konganad. They were originated in Kangayam, Dharmapuram, Perundurai, Erode, Bhavani and part of Gobichettipalayam taluk of Erode and Coimbatore district. Coat is red at birth, but changes to grey at about 6 months of age. Bulls of this breed are grey with dark color in hump, fore and hind quarters. The horns are spread apart. They are nearly straight with a slight curve backwards. Cows are grey or white in color. They are also observed in red, black, fawn and broken colors. Their eyes are dark and prominent with black rings around them. They are of moderate size having compact bodies.

Bargur- This breed is found around Bargur hills in Bhavanitaluk of Erode district. It is developed for work in uneven hilly terrains. This cattle is brown in color with white markings. Some animals are white or dark brown in color. This breed of animals are well built, compact and medium in size. They are well known for their speed and endurance in trotting.

They are very cautious in behavior and tend to stay away from strangers.

Umblachery- It is also called Jathimadu, Mottaimadu, Molaimadu, or Therkathimadu. This breed is originated in Tanjavur, Thiruvarur and Nagappattinam districts of Tamil Nadu. They are known for their strength and sturdiness and are suitable for wet ploughing. The calves of this breed are generally red or brown at birth with the characteristic white marking on face, limbs and tail. The legs have white markings below the hocks like socks. The bullocks of this breed are dehorned which is a peculiar practice in Umblachery cattle.

Pulikulam- It is commonly seen in cumbum valley of Madurai district in Tamil Nadu. It is also known by the names Jalikattumadu, Kidaimadu, Senthurai. It is small in size, usually grey or dark grey with farm markings. It has a well-developed hump. They are mainly used for penning in the field and ploughing. The characteristic feature of this breed is the presence of reddish or brownish spots in muzzle, eyes, switch and back. Their horns have backward curving of Mysore type cattle.

Indigenous Dual Purpose Breeds of Cattle:

Tharparkar- This breed was originated in Tharparkar district (Pakistan) of undivided India and also found in Rajasthan. It is also known by names White Sindhi, Gray Sindhi and Thari. They are of medium size, compact and their horns are lyre shaped. Their body color is white or light grey. The bullocks of this breed are suitable for ploughing and casting. The milk yield from the cows is 1800 to 2600 kg per lactation. First calving age ranges from 38 to 42 months and inter calving period is 430 to 460 days.

Haryana- The origin of this breed is in Rohtak, Hisar, Jind and Gurgaon districts of Haryana. They are also popular in Punjab, Uttar Pradesh and parts of Madhya Pradesh. The bullocks are powerful at work, but their horns are small. The cows are good milkers and yield about 600 to 800 kg of milk in lactation. Their age at first calving is 40 to 60 months and inter calving period is 480 to 630 days.

Kankrej- It is otherwise called Wadad or Waged Wadhia. Its origin is in southeast Rann of Kutch of Gujarat and adjoining Rajasthan (Barmer and Jodhpur district). They have lyre shaped horns. Their color varies from silver-grey to iron-grey or steel black. It is valued for fast, powerful, draught cattle. They are useful in ploughing and carting. The cows are good milkers and yield about 1400 kg per lactation.

Ongole- Also known as Nellore. Originated in Ongole taluk in Guntur district of Andhra Pradesh. It is a large muscular breed having well developed hump. It is suitable for heavy draught work. Color is white or light grey. Average milk yield per lactation is 1000 kg. First calving age is 38 to 45 months, while the inter-calving period is 470 days. This breed is exported to South East Asian and American countries for the development of meat cattle.

Krishna Valley- It is originated from black cotton soil of the watershed of the river Krishna in Karnataka and also is found in the border districts of Maharashtra. The animals of this breed are large. They have a massive frame with deep, loosely built short body. Their tail almost reaches the ground. It is commonly grey white in color with a darker shade on four quarters and hind- quarters in male, while the adult females are more whitish in appearance. The bullocks are powerful animals useful for slow ploughing. They are valued for their good working qualities. The cows of this breed are fair milkers and the average yield per lactation is about 900 kg.

Deoni- It is also known as Dongerpati, Dongari, Wannera, Waghyd, Balankya, Shevera. Its origin is in western Andhra Pradesh. It is also found in Marathwad a region of Maharashtra state and adjoining parts of Karnataka. Their body color is usually spotted black and white. Bullocks are suitable for heavy cultivation. First calving age ranges from 894 to 1540 days and inter calving averages 447 days.

2.6 EXOTIC DAIRY BREEDS OF CATTLE

Jersey- Its origin is in Jersey Island in U.K. it is the smallest animal of the dairy types of cattle. This breed has adjusted very well to the climate of India. So it is widely used in cross breeding with indigenous cows. Jersey cattle have typical color of reddish fawn. They have a compact and angular body with dished forehead. They are economical producers of milk with fat 4.5%. The age at first calving is 25 to 30 months and inter calving is 13 to 14 months. The average milk yield is 4500 kg per lactation.

Holstein Friesian- It was developed in the northern parts of Netherlands, especially in the province of Friesland. They possess large udder and they are ruggedly built. The mature cows weigh around 700 kg. they are the largest dairy breed. The typical marking of black and white makes them easily distinguishable. Average milk production of cow is 6000 to 7000 kg per lactation, but the fat content is low i.e. about 3.45%. Age at first calving is 29 to 30 months and inter calving is 13 to 14 months.

Brown Swiss- Brown Swiss breed has its origin in the mountainous region of Switzerland. In its origin place it is well known for good milk production and its rugged nature. The Karan Swiss is the excellent cross-bred cattle obtained by crossing this breed with Sahiwal cattle at NDRI, Karnal. The average milk production is 5000 kg per lactation with the fat content of 4%. First calving age is 28 to 30 months and calving interval is 13 to 14 months.

Red Dane- It is developed in Denmark. Its typical body color is red, reddish brown or even dark brown. It is a heavy breed where in males weigh up to 950 kg and mature females weigh 600 kg. The lactation period of this cattle varies from 3000 kg to 4000 kg. The fat content is 4% and above. The age at first calving is 28 to 30 months and calving interval is 13 to 14 months.

Ayrshire - This is the most beautiful dairy breed and its origin is in Ayrshire in Scotland. They are very active animals, but it is hard to manage them. They do not produce milk and fat like other dairy breeds. They are also known as Dunlop cattle or Cunningham cattle.

Guernsey- They have their origin from small island of Guernsey in France. Its color varies from cherry red to brown. Mahogany and white is a variation in color. The milk of this breed may help to reduce the risk of certain cancers as it contains an exceptionally high content of beta carotene, which gives golden color to the milk. The milk yield from this cattle breed is 6000 kg per lactation. The fat content is 5% and the protein content is 3.7%. this breed is more advantageous than the other breeds due to its high efficiency of milk production, low incidence of calving, difficulty and longevity.

Dairy Breeds of cattle-

Jersey cross- Jersey cross breeds are produced by cross breeding the indigenous breeds of cow with jersey semen. They are suitable dairy animals for tropical plains of our country. They are well adapted to our climate and have better heat tolerance than other exotic crosses. They are of medium size. Jersey crosses may show 2-3 times increase in the milk yield in the first generation, depending on the milk production potential of our indigenous cows.

Holstein Friesian crosses- These crosses are more suitable for cooler climatic regions like the hilly areas as they are less tolerant to heat. They have less resistance to tropical diseases than jersey crosses. The milk yield is higher in Holstein Friesian crosses, but the fat percent is less.

2.7 BREEDS OF BUFFALOES

The buffalo species originated in India. The buffaloes are classified into river and swamp types. Both are called *Bubalus bubalis*. Majority of the animals are river type. Swamp type are also found in certain parts of the country specially in eastern parts of India. India is considered as the home tract of some of the best buffalo breeds. Indian buffaloes are an important source of milk supply today and yield nearly three times as much milk as cows. Indian buffaloes are water buffaloes. There are about 10 indigenous standard breeds of buffaloes, well known for their milking qualities.

Murrah- It is the most important breed of buffaloes originated in Rohtak, Hisar and Jind of Haryana and Nabha and Patiala districts of Punjab. The color is usually jet black with white markings on tail and face and extremities sometimes found. An important character of this breed is tightly curved horn. It is massive having comparatively long neck and head, but the head of females is short, fine and clear cut, hips are broad and fore and hind quarters are drooping. The she buffaloes of this breed are one of the most efficient milk and butter fat producers in India. Average lactation yield vary from 1500-2500 kg. Age at first calving is 45-50 months and inter calving period is 450-500 days.

Nili Ravi- This breed is found in Sutlej valley in Ferozpur district of Punjab and in the Sahiwal district of Pakistan. The color is black with white marking on forehead, face, muzzle, legs and tail. The head is elongate, bulging at top and depressed between eyes. The most desired character of the female is the possession of white markings. The horns are small and coiled tightly, and the neck is long, thin and fine. The frame is medium sized. The peculiarity of the breed is the wall-eyes. The milk yield per lactation is 1500-1850 kg per lactation. Age at first calving is 45-50 months and the inter calving is 45-50 months.

Bhadawari- Its origin is in Agra and Etawah district of Uttar Pradesh and Gwalior district of Madhya Pradesh. Its body is wedge shaped and medium sized. The head is comparatively small and the legs are short and stout and the hooves are black. The hind quarters are uniform and higher than the forequarter. The peculiarity of this breed is the light copper colored body with the eyelids copper or light brown color. Two white lines 'Chevron' are seen at the lower side of the neck like that of Surti buffaloes. Its horns are black and curl slightly outward, downward before running backward parallel and close to neck, and finally turning upward. The ox are good draught animals with high heat tolerance. This breed is an efficient converter of coarse feed into butter fat. It is known for its high butter fat content. The fat content varies from 6 to 12.5 %. The average milk yield per kg is 800 to 1000 kg.

Jaffarabadi- The origin of this breed is Kutch and Jamnagar districts in Gujarat. This breed is found in its pure form in the Gir forests. They have massive head and neck as they are massive animals. Their forehead is very prominent, wide with a slight depression in the middle. Their horns are heavy that are inclined to droop on each side of the neck. The horns are curved but not curved tightly than in Murrah. They are usually black in color. These animals are owned and maintained by the nomads the Maldharis and they are traditional breeders. Average milk yield is 100 to 1200 kg. The ox are heavy and used for ploughing and carting.

Surti- It was originated in Kaira and Baroda district of Gujarat. Its skin is black or brown in color and coat color varies from rusty brown to silver grey. The body is of medium sized and well shaped and the barrel is wedge shaped. Its head is long with prominent eyes. The horns are moderately long and flat and of sickle shape. Two white collars round the neck and brisket is the speciality of this breed. The age at first calving is 40-50 months and the inter-calving period is 400-500 days. Milk yield is 900 to 1300 kg and the high fat percentage in milk is 8-12% which is the peculiarity of this breed.

Mehsana- This breed of buffalo is found in Mehsana town in Gujarat state and adjoining Maharashtra state. Color is mostly black; only a few have black-brown color. It is a cross breed of Surti and the Murrah breed. Body is longer and the limbs are lighter than in Murrah. Their head is longer and heavier. Its horns are irregular in shape, but are less curved at the end but are longer compared to Murrah breed. It has good persistency. The milk yield ranges from 1200 to 1500 kg and the inter calving period ranges from 450 to 550 days.

Nagpuri (Ellichpuri)- It was originated in Nagpur, Akola and Amravati districts in Maharashtra. It is a black colored animal with whit patches on face, legs and tail.. It is also known by names Ellichpuri or Barari. It has sword shaped horns long, flat and curved, bending backward on each side of the back almost to the shoulder. The advantage of this type of horns is that it helps to protect from wild animals and can move easily in the forest. The neck is little long and the face is long and thin. Average milk yield is 700 to 1200 kg per lactation and the age at first calving is 45 to 50 months and the inter calving period is 450-550 days.

Godavari- It is breed formed from cross breeding of the native buffaloes with the Murrah breed. Its origin is Godavari and Krishna deltaic area. They have a compact body and are of medium size. Its color is predominantly black with a sparse coat of coarse brown hair. Their peculiarity is that the average milk yield per day is 5-8 litres per day with high fat content and the lactation yield is 1200 to 1500 litres. They breed regularly and have a short calving interval compared to Murrah breed.

Toda- It is the name given to the breed after the ancient tribe Toda of Nilgiris of south India. At birth the coat color of the calf is generally fawn, while in adults the coat color is fawn and ash-grey. This breed of buffalo is quite distinct from other breeds. They are indigenous to Nilgiri hills. The animals have a thick hair coat all over the body. The animals have long body, deep and broad chest, and short and strong legs. They have heavy head with horns set well a part. The horns curve inward, outward and forward. The animals are gregarious in nature.

Pandharpuri- It is native of Kolhapur, Solapur districts of Maharashtra. It is of medium size and have long narrow face. It has very prominent and straight nasal bone, comparatively narrow frontal bone and long compact body. Its body color varies from light black to deep black. The typical characteristic feature of this breed is that the horns are very long and curve backward, upward and usually twist outwards. The horns are so long that they extend beyond shoulder blade and sometimes upto pin bones.

2.8 CARE AND MANAGEMENT OF MILCH ANIMAL

The milch animals should be properly fed and necessary care and proper management practices should be followed, to get high milk production during any lactation.

The animals should be provided with green succulent forage together with leguminous hay or straw to the extent an animal can consume. By doing this the animals maintenance requirements are met with through forage only. Salt and mineral supplements should be given to maintain the lactation.

Always treat the animals in gentle manner and with kindness. Never frighten or excite the animals.

Maintain proper records of breeding and calving of the animals to ensure a steady flow of milk through out the year.

Pay individual attention to feed each animal according to its production and maintain individual production records.

Keep up regularity in feeding.

Provide water to drink at will or at frequent intervals.

Regularity should be there in milking. Milking thrice is better than twice.

Rapid, continuous dry hand milking should be practiced without undue jerking of teats. Milking should be done with whole hand.

Cows should be trained to let down milk without calf suckling.

Shelter should be provided during the hot part of the day in the form of loose housing system so that they can get maximum exercise.

Grooming of the cows and washing of the buffaloes before milking help in clean milk production and also will keep the animal hide pliable.

Wallowing of the buffaloes or water spraying on their bodies will keep the buffaloes comfortable especially in summer.

Common ailments should be properly detected and treated.

Common vices like kicking, licking, suckling, etc should be properly detected and taken care of.

Provide sufficient dry period between calving at least 60-90 days. If it is not sufficient the milk yield in subsequent lactation will be reduced.

Check for mastitis regularly. Vaccination against important diseases is must. Also guard the animals from insects and pests.

Number the cows and record the particulars pertaining to milk, fat %, feed taken, breeding, calving and drying dates.

Factors Affecting Breeding Efficiency :

Factors affecting breeding efficiency of cattle areas follows:

- 1) Number of ova-** The first limitation on the breeding efficiency of fertility of an animal is the number of functional ova released during each cycle of ovulation. The time of mating in relation to ovulation is important for effective fertilization.
- 2) Percentage of Fertilization-** The second limitation is fertilization of ova.
- 3) Embryonic Death-** From the time of fertilization till birth, embryonic mortality may occur due to a variety of reasons. Hormone deficiency, accidents in development, over-crowding in the uterus, insufficient nutrition or infections in the uterus or hormonal imbalance may cause failure of Implantation of fertilized ova which die subsequently.

- 4) **Age of first pregnancy-** Breeding efficiency can be lowered by increasing the age of first breeding. The mature size of the female is affected little if they are bred at a lower age.
- 5) **Frequency of Pregnancy-** The breeding efficiency of the female can be enhanced, by lowering the interval between successive pregnancies. Life time efficiency is increased if the female is bred at an early age for the first time and rebred at almost the earliest opportunity after each pregnancy.
- 6) **Longevity-** The length of parent life is an important part of breeding efficiency. The longer the life of parents, smaller is the percentage of milch animals needed for replacement every year.

Housing:

Good housing plays an important role for keeping the animal healthy, productive and disease free. Required space inside the house is necessary for the proper production. Ensure availability of all types of essential facilities like proper ventilation, sufficient flow of fresh and clean air, sufficient space in the house.

Feeding:

Always feed the animals with sufficient amount of nutritious food, as feeding good and high quality nutritious food ensures proper growth and good health of the animals. Give green food in large quantity as it helps the animal to produce more milk. Along with nutritious food always provide clean and fresh water.

Care & Management:

The key to every livestock farming business is taking good care of the animals. Try to keep them free from all types of cattle diseases. Timely vaccination is necessary. Regularly provide the animals with nutritious food and clean water. Keep stock of necessary medicines and other useful materials handy.

Marketing:

In India there is a great demand for dairy products and therefore marketing the dairy products is not a problem. Dairy products can be sold at almost at every place in the country.

2.9 SUMMARY

To produce the targeted quantity of green fodder the best option is to maximize the fodder production per unit area and per unit time. High yielding fodder crops and fodder crop sequences are important to harness year round fodder production. At this juncture intellectual stimulation and economic rewards are essential to attract and to retain youth in dairy farming for sustainable development. This could be achieved only by generation of meaningful and viable technologies and transferring the same for adoption by the millions of rural folk.

2.10 QUESTIONS FOR SELF- STUDY

1. Give the benefits, advantages and problems of dairy farming in India.
2. Answer in brief- The different breeds of cows.
3. Answer in brief- The different breeds of buffaloes.
4. Write in detail about the caring and management of milch animals.
5. What are the factors affecting the breeding efficiency of dairy animals ?
6. Write short notes :
 - a) Selection of dairy breeds
 - b) Exotic breeds of cows



DAIRY INDUSTRY

Unit Structure:

- 3.1 Objectives
- 3.2 Introduction
- 3.3 Scope of Dairy Industry in India
- 3.4 Operation Flood
- 3.5 Opportunities and challenges in the Indian Dairy Industry
- 3.6 Export Potential
- 3.7 Factor Condition for Dairying
- 3.8 Branding Of Traditional Milk Products
- 3.9 Summary
- 3.10 Questions

3.1 OBJECTIVES

- 1) To study the scope of dairy industry in India
- 2) To study the problems related with this sector
- 3) To study the efforts made by Indian government to increase milk production
- 4) Effect of Globalization and Liberalization on dairy industry in India

3.2 INTRODUCTION

Dairy industry in India traditionally has been an integral part of the country's economy. In India dairying is regarded as an instrument for social and economic development. The country's milk supply comes from millions of small producers, who are dispersed through out the Indian rural areas. All these farmers maintain an average herd of one or two milch animals, comprising of cows and /or buffaloes. The farmers are encouraged to practiced airying as an subsidiary occupation to agriculture due to amplelabor and less land space. Income from agriculture is seasonal, butdairying provides a stable income all the year round and is like animportant economic incentive for the small farmer. The cross bred technology in the Indian Dairy Industry has augmented the viability of the dairy units by increasing the milk production per animal.

Subsequently milk production also increased at an exponential rate while the benefits of an increase in milk production also reached the consumers from a relatively lower increase in the price of milk.

India is the world's largest producer and consumer of dairy products. Almost the entire produce is consumed in the domestic market. Though India has the world's largest cattle population, the average output of an Indian cow is significantly low. The other problems related with this sector are the shortage of fodder, its poor quality, inadequate transport facilities and poorly developed infrastructure, resulting in lack of elasticity on the supply side that is expected.

The situation is buoyant on the demand side. The sustained growth of the Indian economy and the consequent rise in the purchasing power, more and more people can afford to buy milk and other dairy products.

The Indian government and other stake-holders efforts led to an increase in milk production. The factors responsible for this are new found interest on the part of the organized sector, new markets, easy credit facilities, dairy friendly policies by the government, etc. Dairy farming has now evolved from just an agrarian way of life to a professionally managed industry-The Indian Dairy Industry. This is an indication of another white revolution in the country.

Now India is the highest milk producer in the entire globe. India is known as the 'Oyster' of the global dairy industry, giving lots of opportunities to the entrepreneurs globally. The Indian dairy industry has achieved this strength of a producer owned and professionally managed co-operative system, despite the facts that a majority of dairy farmers are illiterate and run small, marginal operations and for many farmers, selling milk is their sole source of income.

To capitalize on the largest and fastest growing milk and milk products market can be a dream of any nation in the world. Liberalization has led to a rapid growth of the Indian dairy industry, providing good opportunities for multinational companies and foreign investors to release the full potential of this industry. To manage the national resources to enhance milk production and upgrade milk processing using innovative technologies is the main objective of the Indian dairy industry.

3.3 SCOPE OF DAIRY INDUSTRY IN INDIA

Globalization and Liberalization are the main factors of the new economy in India and is now on the fast track today. Industrial production is increasing at a great speed and dairy industry is no exception to that. There is no doubt there is tremendous scope for the growth of the dairy industry as the imports and exports are getting liberalized in the global economy, with the World Trade Organization coming into effect from 1st April 2001. As the standard of living in the importing countries rise, exporting countries will increasingly concentrate on whole milk powder and cheese with the assistance of butter and skimmed milk powder. As the cost of milk production in India is lowest, there is vast potential for the export of dairy products. The major factor influencing production of dairy products is

the newer use that may be developed through Research and Development support. Milk proteins are being utilized increasingly replacing animal and vegetable proteins in special bakery products and instant foods. Through the application of membrane proven process, milk proteins isolates are produced and are utilized for ice milk mixes and such other applications. There is tremendous scope for the broadening of the product range and some of the products. There are more than thousand varieties of cheese, out of which Cheddar, Mozzarella, Gouda and Processed cheese are manufactured in India. Varieties of milk shakes are also increasing where in milk and fruit pulp are mixed in different proportions to produce different beverages. Some of the beverages can also be produced in dehydrated form and can be excellent health food. Many of the organized dairies are involved in the manufacture of varieties of traditional milk based sweets like pedha, paneer, shrikhand, etc which can go national. As the world is getting integrated into one market, quality certification is becoming essential. International Organization for Standardization (ISO) and Hazards Analysis and Critical Control Point (HACCP) certification also is essential in the market. There is great scope for introducing newer plants adopting new processes by the dairy industry in India. Another promising area in dairy industry is the packaging of dairy products. Non Residential Indians and Overseas investments can take place in manufacturing dairy processing equipment, fruit packaging equipment and equipments for biotechnology related to dairy industry.

3.4 OPERATION FLOOD

The National Dairy Development Board (NDDB) launched Operation Flood Program under the chairmanship of Dr. Kurien for the transition of Indian milk industry from a situation of net import to that of surplus production of milk in the country. Operation Flood Program was launched in 1970. It has led to the modernization of India's dairy sector and also created a strong network for procurement processing and distribution of milk by the co-operative sector. The main thrust of this program was to organize dairy co-operatives in the milk-shed area as of the village, and link them to the four Metro cities, the main markets for milk. The efforts taken by NDDB have not only led to increased production, but also have led to the emergence of dairying as an important source of employment and income generation in the rural areas. The operation flood program also has led to an improvement in yields, longer lactation periods, shorter calving intervals, etc. by using modern techniques.

Establishment of milk collection centers and chilling centers has enabled minimization of wastage due to spoilage of milk. It also has enhanced the life of raw milk. Operation Flood has been one of the world's largest dairy development programs. A few other countries have also adopted the model of India's White Revolution, after the success achieved in India by adopting the co-operative route.

Operation flood the successful Indian dairy development program analyzed how food aid can be utilized as an investment in building an institutional infrastructure and can bring about national dairy development.

Total contribution to the economy-

The Indian Dairy Industry is involved in the manufacture of various dairy products like cheese, curd, yoghurt etc. It is also engaged in the production and processing of milk and cream. The Indian Dairy Industry (IDA) specializes in the procurement, production, processing, storage and distribution of dairy products. In the international scenario India as a nation stands first in its share of dairy production.

Employment opportunities-

The Indian Dairy Industry provides gainful employment to a vast majority of the rural household especially the women folk. Job opportunities are mainly in the fields of production and processing of dairy products. An individual having bachelor degree course in dairy technology can easily avail the opportunity to work in this industry. One has to qualify the All India Entrance Test affiliated to the Indian Council Of Agricultural Research for the graduation course in dairy technology. Later on he can pursue for Master's degree. Following job opportunities are available–

Dairy Scientists- A dairy scientist has to deal with the collection of milk and take care of high yielding variety animals.

Dairy Technologists- The dairy technologist is the procurement officer who takes the responsibility of collecting milk from farmers, milk booths and cattle rearers. He should well understand the latest technology that is applicable in maintaining the quality of milk in the process of transporting it to the desired location.

Dairy Engineers- They are appointed to set up and maintain dairy plants.

Marketing Personnel- They deal with the sale and marketing of milk together with milk products.

Intensive Dairy Development Program (IDDP) – The schemes modified under this program were on the basis of the commendation of the evaluation studies launched during eight-plan period and are still being continued.

Strengthening Infrastructure for Quality and Clean Milk Production (CMP) – This scheme was launched in October 2003, a centrally sponsored scheme having the main objective of improving the quality of raw milk produced at every village level in India.

Dairy Venture Capital Fund- This was introduced in the Tenth Five Year Plan to bring structural changes in the unorganized sector that would measure milk processing at the village level, marketing of pasteurized milk in a cost effective manner, quality or up gradation of traditional technology to handle commercial scale using modern equipment's and management skills.

The country's 12th plan aims at taking the current milk output from 115-116 million tons to 150 million tons or so by the year 2017. The plan lays

more emphasis on increasing the productivity, so that the costs milk and milk products can be kept down.

3.5 OPPORTUNITIES AND CHALLENGES IN THE INDIAN DAIRY INDUSTRY

Dairy industry is of crucial importance to India as it is the world's largest producer of milk, accounting for more than 13% of world's total milk production. It is the world's largest consumer of dairy products, consuming almost 100% of its own milk production. Dairy products are a major source of cheap and nutritious food to millions of people in India. It is the only acceptable source of animal protein for large Indian vegetarian population, particularly among the landless, small and marginal farmers, children and women. Dairying is considered as one of the activities aimed at alleviating the poverty and unemployment especially in the rural areas in the rain-fed and drought prone regions.

Main areas of concern in the Dairy Industry

- 1) Competitiveness, cost of production, productivity of animals- As in developing countries, demand for quality dairy products is rising it is therefore necessary to increase competitiveness of Indian dairy industry. Efforts should be made to reduce cost of production. The factors that can reduce the cost of milk production are increasing productivity of animals, better health care and breeding facilities and management of dairy animals. Indian government and dairy industry can play a vital role in this direction.
- 2) Production, processing and marketing infrastructure- It is essential that we should develop proper production, processing and marketing infrastructure, capable of meeting international quality requirements, if India has to emerge as an exporting country. A comprehensive strategy has to be formulated with suitable legal backup for producing quality and safe dairy products.
- 3) More attention on buffalo milk based special products- As the availability of buffalo milk is in large proportion, India can focus on buffalo milk based special product, like Mozzarella cheese, to meet the needs of the target consumers.
- 4) Import of value added products and export of lower value products- The liberalization policy has made it possible for Indian companies to import more value added products and export lower value products. The dairy industry has to prepare itself to meet the challenges in the future.
- 5) Provision of SPS and TBT at international level- It is to be ensured that provision of Sanitary and Phytosanitary Measures Agreement (SPS) and Technical Barriers to Trade (TBT) Agreement are based on application of sound specific principles.

IDA is the apex body of the dairy industry in India and was established in 1948. The members of this apex body are from co-operatives, MNC's, corporate bodies, private institutions, educational institutions, and government and public sector units. It functions closely with the dairy producers, professionals and planners, scientist and educationist, institutions and organizations associated with the development of dairying in India. IDA has been providing a common forum to knit together the dairy fraternity. An apex policy body called the Central Executive Committee (CEC), headed by the President, supported by two Vice-Presidents and 19 Executive Committee Members, manages the association. IDA has emerged as a platform for assimilation and dissemination of knowledge, as an important tool for policy making in the dairy sector in India. IDA organizes seminars, symposia and exhibitions on wide range of topics catering to various segments of professionals, scientists, institutions and organizations associated with the development of dairying in India. IDA provides technical and scientific information to all the members both to individual as well as institutions. Indian Journal of dairy science a publication of IDA is a bimonthly journal, which primarily covers research articles, mainly to organize periodic conferences, seminars and workshops on subjects of current interest to maintain an inventory of the dairy scientists, research workers and dairy planners and professionals employed in the different sphere of the dairy industry including consultants in the field. IDA being a representative body of the Indian dairy sector intervenes from time-to-time on the policy issues like pre-budget memorandum, addressing issues arising out of tariff rates, import / export, sanitary standards etc. IDA addresses the issues arising out of WTO / SPS etc. it has a fairly well equipped library and maintains Data Bank, which stores information on Indian Dairy Industry as well as international Dairy Industry.

The objective of IDA:

- 1) It involves the advancement of dairy science and industry, farming, animal husbandry, animal sciences and its branches including dairy farming and research on breeding and management of dairy livestock.
- 2) To promote and participate in every way the rational and economic development of dairy science, industry and farming in the country in association with co-operatives, industry, or any other organization, national or international, having similar aims and objectives.
- 3) To collaborate with most of the societies, associations or any other organizations, national or international, having similar aims and to participate in meetings held in India or abroad.
- 4) To assume functions when asked to do so, on behalf of Government towards the advancement of dairying.
- 5) To adopt an appropriate logo for the association and to permit the use thereof by its members on such terms as may seem appropriate.

- 6) To promote good standards and to foster the growth of the dairy industry in general and for the purpose engages in consultancy activities.
- 7) To setup laboratories and do such like or other things are necessary for the purpose.
- 8) To promote dairying, for the benefit of livestock and agricultural farmers as a part of animal husbandry activity in particular and agricultural farming in general.
- 9) To organize training, exhibitions mostly help in establishment of dairy farm as a part of animal husbandry activity for the benefit of agricultural, livestock and dairy farmers.

3.7 EXPORT POTENTIAL

Indian Traditional Milk Products:

There are a large variety of traditional Indian milk products like- Dahi, Lassi, Makkhan, Ghee, kheer, Basundi, Rabdi, Paneer, khoya. The market for these indigenous based milk food products is difficult to estimate as most of these products are manufactured at home or in small cottage industries catering to the local areas. Consumers purchasing dairy products look for freshness, quality, taste and texture, variety and convenience. The products like dahi, and sweets like kheer, basundi, rabdi are manufactured and sold by local milk and sweet shops as they are perishable items and have a shelf life of less than a day. Consumer's loyalty is built by keeping consistency in the quality, taste and freshness. Several sweet shops have built a strong brand franchise and have several branches located in various parts of acity, stateor country.

India has the potential to become one of the leading countries in milk and milk product exports. As India is located amidst major milk deficit countries in Asia and Africa, as a result major importers of milk and milk products are Bangladesh, China, Hongkong, Singapore, Thailand, Malaysia, Philippines,

Japan, UAE, Oman and other gulf countries are all located closeto India.

As the milk production is scale insensitive and labor-intensive cost of labor is low. And so the cost of production of milk is significantly lower in India.

There is a vast market for the export of traditional milk and milk products such as ghee, paneer, shrikhand, rasgullas, and other ethnic sweets for the large number of Indians scattered all over the world. So the major concerns in export competitiveness are Quality and Productivity of milk and milk products.

Quality- Training should be provided to improve the quality to bring it up to international standards, which needs significant investment in milk procurement, equipment's, chilling and refrigeration facilities.

Productivity- It is imperative to improve productivity of Indian cattle to have an exportable surplus in the long-term and also to maintain cost competitiveness.

3.8 FACTOR CONDITION FOR DAIRYING

Factor conditions for dairying entail the quality of animals, human resources and technical skills, land availability, capital, credit, infrastructure and other inputs relevant to the value chain.

The quality of animals is essential in determining its milk productivity and hence overall production. Low productivity per animal hinders the development of the dairy sector. The low productivity is a result of ineffective cattle and buffalo breeding programs, limited extension and management on dairy enterprise development, traditional method of feeding not based on scientific feeding methods, limited availability and affordability of quality feed and fodder. The limited supply of quality animals is exacerbated by policies limiting inter state movement of animals.

Animal health and breeding services provision, veterinary infrastructure development and vaccinations are the responsibility of the state government. These services have been provided free or at a subsidized rate.

Herd- A very large number of indigenous animals with low productivity and a small portion of cross breed animals are reared.

Breed- Strengthening of indigenous breed is not there due to lack of policy focus. Poor awareness of quality feed hinders productivity.

Feed- The farmers are not interested in quality feed due to the low price of milk and increasing feed costs.

Veterinary medicine- Availability of veterinary medicine is not an issue but duplicate or cheap medicine is an issue.

Human Capacity- a) Farmer technical capacity, knowledge and new techniques are not accessible. Major issue in many parts of the country is the support services, technical capacity and accessibility to good quality veterinary services. b) Organization and Managerial capacity- Organizational and managerial capacity of farmers co-operatives is very poor. c) Entrepreneurial Capacity- Entrepreneurial capacity is hindered by a low capacity to risks in credit or finance market. i) Formal Credit Mechanisms- Access to formal credit mechanism is very poor. ii) Informal Credit Mechanism- Easily accessible but at a very high interest rate.

External economies- Transmission of learning-Very poor extension support services, lead to a poor knowledge transfer.

Social Capital and Trust- Properly managed strong social capital and trust in the villages can sustain dairy farmer organizations if properly managed.

The milk co-operatives and NGO's provide services in many states in addition to the state department of animal husbandry. Also the trained private sector artificial in semination AI technicians provide services with a nominal fee. Along with this state livestock development agencies are set up as autonomous bodies to offer services in animal breeding in the form of procurement, production and distribution of breeding inputs (semen and liquid nitrogen), training and promotional activities.

Even though so many efforts are taken, the availability of services remains limited. Due to lack of co-ordination the cattle and buffalo breeding programs did not have the desired impact. Also, extension activities in dairy management are lacking. As the farmers lack information of feeding and management practices they are not able to take advantage of the potential of their animals. Giving proper knowledge to women folk involved in livestock rearing would enhance dairy production considerably.

Crop residues like coarse straws, fine straws, leguminous straws, pulses straws and sugarcane tops are the single largest bulk feed material available to farmers for feeding livestock, especially the ruminants. A major constraint in availability of the fodder resources is lack of efficient management of common property resources.

Concentrates used for fodder include coarse grains like maize, sorghum, bajra and other millets, cereal products like rice bran/ polish and various oil meals, including groundnut cake, mustard cake, coconut cake, soybean meal, cotton seed meal and sesame cake. The rising price of feed is a major concern, so in many places co-operatives are involved in producing feed concentrate and selling at subsidized rates to the farmers. Unless adequate measures are undertaken to augment the scarcity of fodder resources, it would be a major constraint in the development of the dairy sector.

Lack of regulations to ensure quality is also an important issue regarding the feed of livestock and as a result all kinds of substandard feeds are available in the market.

Formal / informal credit- As the access to credit is very less expanding the herd of livestock is extremely difficult. There is little

access to formal credit through the co-operatives. Private traders and agents of private companies provide informal credit but at a higher interest rate. Taking loan from a trader binds the farmer to sell the milk to that trader only often at a very low price.

Vaccines/ Medicines- Government and private sectors are involved in the production of medicines and vaccines, but quality control is a critical issue. There is a doubt or an important policy question whether the government should manufacture medicines and vaccines or it should take a regulatory role to ensure quality and availability at a reasonable price.

Related Supporting Industries- Strong and supporting industries are essential for the development of any industries. In case of dairy industry, the National Dairy Research Institute pursues research and education in all the aspects of dairying- microbiology, chemistry, technology, engineering, animal genetics and breeding, livestock production and management, animal nutrition, animal physiology, dairy economics and dairy extension education.

Processing capacity- Lack of processing capacity in the country, including processing by bulk chilling.

Processing capacity- Government gives subsidies on bulk chilling and processing infrastructure.

Transportation and distribution- Transportation costs for procurement are high due to low productivity.

Dairy farmer services- Health and breeding services can be hanced. Extension is almost non-existent.

Specialized finance and credit- It exists only on paper, but is difficult to access. There is significant private sector investment in feed manufacturing and the manufacturing of medicines and vaccines.

Processing capacity- There is immense scope to increase the processing capacity and direct a major share of milk and milk products through the formal channel.

3.9 BRANDING OF TRADITIONAL MILK PRODUCTS

Ghee is the only traditional milk product, which is currently marketed in branded form. The main ghee brands are Sagar, Milk man (Britannia), Amul (GCCMMF), Vijaya (AP Dairy Development Co-operative Federation), Verka (Punjab Dairy Cooperative), Everyday (Nestle) and Farm Fresh (Wockhardt).

Increasing urbanization and changing consumer preferences has led to the possibility of large-scale manufacture of indigenous milk products also. There is versatility in the equipment's in milk manufacturing that can be adapted for several products. For example, equipment's used to manufacture yoghurt can also be adapted for large scale production of Indian curd products like dahi and lassi. Under the aegis NDDB significant research work on dairy equipment's has been done.

Mafco Limited sells Lassi under the Aarey brand and flavoured milk under the Energee franchise (in the western region, mainly in Mumbai). Britannia has launched flavored milk in various flavors in tetra packs.

GCMMF has also launched packed paneer under the Amul brand. It has also created a new umbrella brand "Amul Mithai" for a range of ethnic Indian sweets in major Indian markets.

Western milk products such as butter, cheese, yoghurt have become

popular in the Indian market only a few years back. With increasing urbanization consumption also has been increasing. The major brands producing these products are Amul, Vijaya, Sagar, Nandini, Aarey, Britannia, Dabon, Verka, Vadilal. But Amul has become more aggressive with the launch of new variants such as Mozzarella cheese, cheese powder, etc.

Milk powder / Dairy whiteners- Major skimmed milk brand sare Sagar (GCMMF) and Nandini (Karnataka Milk Federation), Amul Full Cream milk powder is a whole milk powder brand. Leading brands in dairy whitener are Nestle's Ebvery day, GCMMF's Amulya, Dalmia industry's Sapan, Kwaliti Dairy India's Kream Kounty, wockhardt's Farm Fresh and Britannia's Milkman Dairy Whitener.

Nestle's Milkmaid is the leading brand in the condensed milk market. The only other competitor is GCMMF's Amul.

Nestle (Cerelac and Nestum) is the market leader in the infants food segment. On the second position is Heinz (Farex). This is a category where brand loyalties are very strong, as mothers want the best for their babies. Wockhardt is a new entrant in this field proposing to launch new baby food Easum containing moongan easily digestible pulses.

3.10 SUMMARY

India is the highest milk producer in the entire globe. India is known as the 'Oyster' of the global dairy industry, giving lots of opportunities to the entrepreneurs globally. The Indian dairy industry has achieved this strength of a producer owned and professionally managed co-operative system, despite the facts that a majority of dairy farmers are illiterate and run small, marginal operations and for many farmers, selling milk is their sole source of income.

To capitalize on the largest and fastest growing milk and milk products market can be a dream of any nation in the world. Liberalization has led to a rapid growth of the Indian dairy industry, providing good opportunities for multinational companies and foreign investors to release the full potential of this industry. To manage the national resources to enhance milk production and upgrade milk processing using innovative technologies is the main objective of the Indian dairy industry. Globalization and Liberalization are the main factors of the new economy in India and is now on the fast track today. Industrial production is increasing at a great speed and dairy industry is no exception to that.

3.11 QUESTIONS FOR SELF-STUDY

- 1) What is the scope for dairy industry in India ?
- 2) Write in detail 'The Operation Flood'.
- 3) What are the opportunities and challenges in the Indian dairy industry?

4) What is the role and objective of Indian Dairy Association - IDA ?

Dairy Industry

5) What are the factor conditions for dairying ?

6) Write short note son :

a) Export potential of dairy industry

b) Branding of traditional milk products

c) Impact of globalization and liberalization on Indian dairy industry



GOAT FARMING

Unit Structure:

- 4.1 Objectives
- 4.2 Introduction
- 4.3 Advantages of Goat Rearing
- 4.4 Different Breeds of Goat
- 4.5 Exotic Breeds of Goat
- 4.6 Goat Rearing and Integrated Farming System
- 4.7 Breeding and Management of Goats
- 4.8 Food and Fodder of Goats
- 4.9 Diseases in Goats and their Remedies
- 4.10 Summary
- 4.11 Questions

4.1 OBJECTIVES

- 1) To study the role of goat rearing in India
- 2) To study the different breeds of goat
- 3) To know the advantages of goat farming
- 4) To study goat rearing and integrated farming system
- 5) To study the management and breeding of goats

4.2 INTRODUCTION

Goat rearing plays a significant role in the rural economy of the country specially, in the mountainous, semi- arid and arid regions of India. As goat is a multi functional animal it plays an important role in the economy and nutrition of rural landless, small and marginal farmers. Goat rearing is practiced on large scale in rural India. Goats are kept as a source of additional income and as an insurance against disasters and calamities. Goats can survive on available shrubs and trees. In India goats are used during the ceremonial feasting and they also have religious and ritualistic importance in many societies. Increasing demand of goat meat and milk in India is a hope for widely spreading this industry. In India goats are among the main meat-producing animals and also, goat meat is preferred to other

meats. Goats are also suitable for milk, fiber and skin production. High quality manure also is obtained from the goats that help to increase the production of crops. So commercial goat farming is becoming very popular in India.

4.3 ADVANTAGES OF GOAT REARING

Goats are friendly animals and enjoy being with the people. Goats are multipurpose animals producing milk, meat, fibre and skin together. The initial investment in goat farming is very low as the goats housing and management costs is low due to its small body size and docile nature. In short goat farming requires less space and additional facilities. In small goat farming they share their homes with owners other live- stocks. In drought prone areas risk of goat farming is very less compared to other livestock species. Goats are prolific breeders. They achieve sexual maturity at the age of 10-12 months and it starts giving milk at the age of 16-17 months. Twinning is very common. Both male and female goats have equal value. The goats can thrive well on thorny bushes, weeds, cropresidues, agricultural by- products not suitable for humans. So we can say they are ideal for mixed species grazing. Goats can improve and maintain grazing lands and also reduce bush encroachment with out harming the environment. Without causing any environmental issues slaughtering and dressing operation and meat disposal can be carried out. Goat milk is easy to digest than cow milk because of small fat globules and is naturally homogenized and improves appetite and digestive efficiency. Goat milk is non allergic and has anti-fungal and anti-bacterial properties. So it can be used to treat urogenital diseases of fungal origin. Goat is also called as a walking refrigerator for the storage of milk. It can be milked a number of times in a day. Goat rearing creates employment to the rural poor people. Ample scope is there to establish cottage industries based on goat meat and milk products, skin and fiber.

4.4 DIFFERENT BREEDS OF INDIAN GOATS

Around 19 well-defined Indian breeds of goats are scattered throughout the country. Other than this there are a number of local non-descript goats found in India. The well- defined goats are classified based on their locations.

They are -

**a) Himalayan Region b) Northern Region c) Eastern Region
d) Southern Region e) Central Region**

a) Himalayan Region (Hilly Area)

States of Jammu and Kashmir, Himachal Pradesh and parts of Uttar Pradesh come under this region.

1) Pashmina-This breed is small dainty animal with quick movements. They are raised in the Himalayas, Lahaul, Ladakh and Spiti valleys. Softest and warmest fibre is produced by this breed, which is used for high quality fabrics.

2) Chegu- This breed yield pashmina, good meat and less quantity of milk. They are found in the mountainous ranges of Spiti, Yaksar and Kashmir.

3) Himalayan Breed- This breed is found in Kangra and kullu valleys, Sirmur, Chamba and Simla in Himachal Pradesh and parts of Jammu hills. Their local names are gaddi, jamba, Kashmiri as per the areas where they are reared. The goat of this breed is white haired and sturdily built.

b) Northern Region

States of Punjab, Haryana and parts of Uttar Pradesh come under this region. Important milch breeds of goats come from this region.

1) Beetal- This breed is evolved from Jamunapari breed and mainly found in Punjab. The color of this breed is red and tan, heavily spotted on white. Does give milk about 1 kg milk daily and bucks may have a beard.

2) Barbari- It is found in Etawah, Etah, Agra and Mathura districts of Uttar Pradesh, Kamal, Panipat and Rohtak in Haryana. The breed is small and short haired, with erect horns and varies in white, red and tan spots. They are stall fed and yield 0.90 to 1.25 kg of milk daily. They are highly fit for intensive rearing. They usually kid twice in 12-15 months.

3) Jamunapari- This breed is the native of Etawah district of Uttar Pradesh. They are large sized, tall, leggy having large folded pendulous ears and a prominent Roman Nose. They carry long and thick hair on their hind quarters and have glossy coat. They have short flat horns. The daily milk yield is 2.25 to 2.7 kg. The Anglo-Nubian breed of goat in England is evolved from Jamunapari goats.

C) Eastern Region

This region covers the areas of West Bengal, Assam, Tripura, Orissa and some part of Bihar.

1) Assam Hilly Breed- these breeds are smaller dwarf breeds of goat and are found in the hilly tract of Assam and other Eastern states.

2) Bengal- This breed is small short and found in three colors black, brown and white. Their meat is of superior quality. The skin of this breed is of excellent quality and there is a great demand for it in India and a broad in footwear industry. Does kid twice in a year.

D) Southern Region

States of Maharashtra, Gujarat, Andhra Pradesh, Tamil Nadu and Kerala come under this region.

1) Osmanabadi or Deccania- They are a mixture of goats of the plains. Their color is black, mixtures of white and black or red. They yield 1.4 to 2.25 kg daily.

2) Malabar or Tellicherry- This breed is found in Northern Kerala.

3) Surti-They resemble Berari goats having white, short legs and are popular in Mumbai, Nasik and Surat. The milk yield per day is 2.25 kg.

4) GBRI- They are a mixture of two or more types of goats. They may vary from black to white and their color is not uniform. They yield 0.9 to 2.8 kg of milk daily.

E) Central Region

The are as included in this region are Rajasthan, northern parts of Maharashtra, Madhya Pradesh and Gujarat.

1) Marwari, Mehsana and Zalwadi- These breed is derived from Jamunapari breed and is found in different color combinations. It is commonly found in Gujarat, Rajasthan and Madhya Pradesh. The milk yield per day is 0.75 to 1 kg.

2) Kathiawari- it is a native of Northern Gujarat, Rajasthan and Kutch. This breed have black coat with reddish color marks on the neck. They yield 1.25 kg of milk per day.

3) Berari- This breed is found in Nagpur and Wardha districts of Maharashtra and Ninar district of Madhya Pradesh. They are tall dark colored goats. The daily milk yield of this breed is 0.6 kg.

4.5 EXOTIC BREEDS OF GOATS

The exotic breeds are noted for their higher milk breeds. They were imported to India to improve milk yield of the local breeds.

They are as follows-

1) Sannen- This goat is a native of Sannen valley in Switzerland. It is famous for its consistency and high production. Their color is white or light cream. The ears point upward and forward and face is slightly dish-shaped. The average milk yield is 2 to 5 kg per day.

2) Toggenberg- Its origin is in Toggenberg valley in north Switzerland. Its skin is very soft and pliable and the male goat has usually long hair than females. Both male and female goats are hornless. Average milk production per day is 5.5 kg.

3) Angora- Its origin is in Turkey or Asia. It is small in size with short legs. Its horns are grey and spirally twisted and are inclined backward and outward. Their tail is short and erect. The soft silky hair covers the white body. This breed produces mohair, which is a superior quality fibre. The fleece drops off naturally as the summer approaches if it is not shorn during spring season. The average fleece yield is 1.2 kg, while in good animals it is even up to 6 kg.

4) Alpine- Its origin is in Alp Mountains. It is a cross breed of French, Swiss and Rock Alpine breeds. No distinct color had been established. They are excellent milk givers and have horns. The milk yield is 2 to 3 kg daily.

5) Nubian- Nubia in North Eastern Africa is the origin place of this breed. It is also found in Ethiopia and Egypt. It has long legs and is a hardy animal.

6) Anglo Nubian- This Anglo Nubian breed was derived by cross breeding Nubian, Jamunapari breed of India with native breeds of U.K. It is a big animal with a fine skin and glossy coat. It has pendulous ears and Roman nose. This breed is known as the jersey cow in the goat world. They have no fix color. Average milk yield is 3 to 4 kg per day and also can increase up to 6.5 kg or more.

4.6 GOAT REARING AND INTEGRATED FARMING SYSTEM

Goat housing is an important aspect of goat rearing. The basic necessities of goat housing are location with low, as well as hilly areas, good irrigation, quality air, tree shades etc. Goat houses must have good height so that goats can stand tall. The goat house should be well ventilated, should have sufficient space for feeding, there should be proper drainage system in the house. An individual goat should be provided a space of at least 4 m². Supply of fresh water, milking space, dry space for keeping feeds, good and dry flooring with proper bedding is also required. The houses should protect the goats against wild animals and bad weather conditions. Proper management schedule should be maintained for all the activities in the farm. Effective cleaning mechanism is much necessary as chances of infection are more. Sufficient staff should be there to carry out the activities like feeding, cleaning, hair trimming, dehorning, hoof trimming, separation etc.

Free grazing system is suitable for large farms, but management of wandering goats is a big task. Goats allowed to graze freely during day time at controllable space will be good as it helps the goats to graze good herbs as well as grass.

Stall Fed Farming-

This is an intensive integrated farming systems where in the stall fed goats fit in. The milky-type animals are ideal for integrated farming system. Many farmers have successfully run stall fed goat farms and found it was more productive and profitable. Goats are the most efficient converters of farm and crop residues into excellent organic manure.

Goats relish the stalks and residues of most of the nutritious cereals when mixed with green fodder (grasses and subhabul). Special goat feeds can be formulated by using millets and oil cakes. The actual cost of raising the goats is minimized as the cost of feed and labor gets distributed over the farming operations. The goatmanure is ideal to be used as a fertilizer in the fish ponds and all other crops, is also a good material as a base for vermicomposting. The space required per adult animal is about one square meter. Stall fed goat farming is said to be an ideal occupation for the small and marginal farmers and also landless agricultural laborers.

To keep a small herd of goats small shed having good cross ventilation is sufficient. A deep litter system with bedding material of paddyhusk and ground nut shell is ideal for raising goats. The bedding material should be changed after six months. The bedding should be turned periodically to remove the fowl odor in the shelter. The dung and urine collected on the bedding material is enriched organic manure. The biological activity in the deep litter system keeps the shelter warm in winter and cool in summer.

Goat farming with stall-feeding can be managed in small yards. It is economical and rewarding enterprise for the small, marginal and landless farmers.

It is of utmost importance to provide exercise paddock for the goats reared in stall fed system. An enclosure measuring 12 m x 18 m is sufficient for 100 to 125 goats. Trees giving shade should be planted to provide adequate comfort in summer. Animals should be allowed to roam in the enclosed area for some fixed period so that they can breathe sufficient fresh air and exercise.

Goats are robust animals having resistance to many diseases. Still they are to be vaccinated against foot and mouth disease, pests and tetanus regularly. They have to be de-wormed twice in a year to keep them in good stead.

4.7 MANAGEMENT AND BREEDING OF GOATS

Take care of goats by always monitoring their activities. Healthy goats and weak goats should be kept separate and necessary treatment should be provided to the weak goats. Vaccinate the goats in time prevents the unwanted problems and keep the goats healthy and productive. Prevent the goats from going outside the farm area. Always feed the goat's fresh and nutritious food along with sufficient amount of green elements. Special care has to be taken of breeding bucks and does.

Modern and well-established scientific principles, practices and skills are to be used to gain maximum economic benefits from goat rearing.

Management of goat's shelter (goats house) –

Shed should be constructed on dry and properly raised ground. Avoid water logging and marshy areas for the shed. Floors should be elevated in heavy rainfall areas and low-lying areas. The shed should be 10 ft. high and good ventilated. Does should be housed in groups up to around 60 per pen, while bucks should be housed in individual pens. Proper shade and cool drinking water should be provided for the animals in summer. Dung and urine should be disposed properly. Adequate space should be provided for the goats so as to avoid over stocking or crowding.

Selection of Goat Breeding Stock and its Management –

A veterinary doctor and bank's technical officer should be consulted before purchasing the animals. The animals to be purchased should be in

good health and have good physical features. Animals that are ready to breed and in the prime stage of production should be purchased. Suitable identification mark should be there to identify newly purchased animals. The newly purchased animals should be vaccinated against the diseases. The newly purchased animals should be kept separate and observed for 15 days before mixing them with the general flock. Unproductive animals should be identified and replaced by the animals that are farm born or by newly purchased ones. Breed the animals at an interval of 8-9 months for maximum productivity. The kidding should be avoided during peak periods of summer and winter. The old animals should be culled at the age of 6 years and above.

Goat Diseases and its Management –

If illness is suspected consult the nearest veterinary aid center. The farmer has to be alert for any signs of illness. If the animals have reduced the food intake, having fever, abnormal discharge or any unusual behavior is seen in the animal, immediately consult the nearby veterinary doctor. The animals should be protected from common diseases. Segregate or separate the sick animals immediately from healthy ones and take necessary measures for disease control in case of outbreak of contagious diseases. Regularly deworm the animals. Examine the faeces of animals to detect eggs of internal parasites. If found treat the animals with suitable drugs. To minimize the health disorders and illness provide clean and pure and uncontaminated feed and water to the animals. The animals should be vaccinated regularly as per the vaccination schedule program. The common diseases found in goats are Mastitis, Foot Rot, Brucellosis, Internal Parasites, External Parasites, Poisoning and Bloat.

4.8 FEEDING MANAGEMENT OF GOATS

Goats are very active eaters and easily cover large areas in search of their favorite plants. It is for them to pick the most nutritious plant parts in the form of small leaves, fruits and flowers because of their split upper lips and small mouths. Goats do not eat everything that comes in front of them. They reject all materials that are low in quality. They select only those grasses, which have high protein content and are easy to digest. They choose both warm and cool season grasses and legumes for foraging over bush and weeds.

Bushes and shrubs should be there for the animal browsing, and supply of cultivated fodder from own farm or from surrounding farms must be ensured. Offer roughages ad lib so that this meets 2/3 of the energy requirements. Half of the roughages should include leguminous green fodder and the remaining half should be grass and tender tree leaves.

Concentrates must be provided if there is no good quality green fodder. The kids should be fed colostrum up to 5 days and later on kid's starter rations. From 15 days onwards the kids should be given green leguminous fodder. Salt and water is to be given at all times. During breeding season the bucks and does should be given additional concentrates. All the necessary nutrients should be provided to the animals for proper growth.

If the goats are totally stall-fed they should be provided with around 3-4 kg of green fodder, 1-2 kg of dry fodder and 200-250 gms of ready made seeds as concentrates. If the goats are partially stall-fed and partially free range, then feed the goats with 50% of the above quantities in the stall. The kids should be allowed to suckle enough colostrum in the beginning, for their natural immunity. Supplementary special kidration should be started for the kids after 10 to 12 days of birth but milk feeding should be continued up to 2.5 to 3.0 months. Adult goats should be given green leaves of shrubs like Subabul, Shewari, Pangara, Anjan, Babul beans.

Preservation of Green Forage Crop – Silage

Silage is the food stuff for goats prepared by preserving green forage crops by acidification. It has two phases aerobic phase and second anaerobic phase. The aerobic phase occurs in presence of oxygen. Oxygen present in the forage is consumed; by the plant material through the process of respiration. Excessive aerobic fermentation reduces energy content of the silage. It might cause heat damage to proteins.

The anaerobic phase begins when available oxygen is used up by respiration and aerobic bacteria cease to function. The anaerobic bacteria multiply and the fermentation process begins. Fermentation completely ceases after 3 to 4 weeks. The pH becomes very low; as a result all the microbial growth is inhibited.

To enhance the feed quality and reduce spoilage limited air should be present in the silage. Silage density increases with increasing moisture content, shorter cut length packed silage depth and amount of packing.

Feeding Management

The different goat rearing systems are as follows-

1) Extensive Grazing System-

In extensive system of grazing the goats are left in the entire pasture for grazing for the whole season. Feed cost is much reduced in this system. It is not conducive to make the best use of the whole grasses. So it is suggested to practice rotational grazing method.

Rotational Grazing System-

In rotational grazing system the pastureland should be divided into several sections by temporary fences. The goats are then moved from one section to another section. By doing this the first section will have sufficient grass cover to provide for second grazing by the time the entire pasture is grazed. In this system of grazing parasitic infestations are controlled to a great extent. It also helps to provide quality fodder for most of the year. It is suggested to graze the lambs first and then bring in ewes to finish the feed left by the kids.

2) Semi-Intensive System of Grazing-

It is an intermediate compromise between extensive and intensive system of goat grazing followed in some flocks having limited grazing. It involves extensive management with controlled grazing of fenced pasture. Stall-feeding, shelter at night under shed and 3-5 hour grazing and browsing on pasture is the provision in this system of grazing. Feed of cost is increased in this system.

Advantages of Semi-intensive system of grazing-

The requirement of nutritious food is fulfilled both from grazing and stall-feeding. Medium to large flocks of 50 to 350 heads and above can be managed in this system. Cultivated forage is utilized during the lean period. Harvesting of good crops for kids both for meat and milk is possible. As less labor is required more profit can be gained.

3) Intensive System of Grazing-

It is also called as zero grazing system. In this system the goats are continuously kept under housing confinement with limited access in which they are stall-fed. Here the goats are not left to fend themselves with minimum care. This system requires more labor and more cash input. But the advantage of this system is that the animals can be closely supervised and animals can be controlled. This system makes use of the dung as a good fertilizer. More number of animals can be adjusted in less space.

4) Rearing in Mud Floor-

Once in a year 1-2 inches of mud surface should be removed in this method. The disease occurrence in the shed will be reduced with the application of lime powder once in a month. To prevent water stagnation shed should be constructed in elevated area.

5) Rearing in Deep Litter Shed-

The animals in this system are reared on the litter materials like groundnut husks, sugarcane tops etc. are spread on the floor for a depth of $\frac{1}{2}$ feet. The urine and dung mixed with the litter material are used as fertilizer. Once in six months the litter material should be removed. The litter material should not be over wet in heavy rain, as this would cause the production of ammonia gas.

6) Rearing in Elevated Floor Shed-

The initial investment in this system is high. The animals are reared in the wooden floor sheds in a distance of 3m from the floor. This system requires less labor, but for fodder production more irrigated land is required. The elevated sheds will be clean. The urine and dung will be collected on the floor. This requires periodical removing once in six months.

A) Feeding does in different stages

- a) **Feeding of breeding does** – There is no need of supplement concentrate mixture if good pasture is available. But in poor grazing conditions animals should be supplied with concentrate mixture in proportion of 150–350g of concentrate per animal per day depending on the age. The digestible crude protein level of concentrate mixture used in the adult feed is 12%.
 - b) **Feeding does during the first four months of pregnancy-** Grazing in good quality pasture for 4-5 hours per day should be allowed in pregnant animals and they should be supplemented with available green fodder at the rate of 5kg per head per day.
 - c) **Feeding the does during the last month of pregnancy-** In this period the fetus grows by 60-80%, so the animals should be allowed to graze in very good quality pasture for 4-5 hours per day. Or else due to parturition and lack of energy in the feed can cause pregnancy toxemia in does. The animals also should be fed with concentrate mixture at the rate of 250-350g per animal per day. Their ration should be also supplemented with green fodder at the rate of 7kg per head per day.
 - d) **Feeding the does at the kidding Time-** Soon after kidding the doe must be given enough slightly warm water. Immediately after kidding the grain allowance should be reduced but good quality dry roughage is fed. Usually it is preferred to feed lightly on the day of parturition, but allow plenty of clean and cool water to drink. After parturition the ration of the doe can be gradually increased so that she receives full ration with bulky and laxative feed stuff in divided doses during the first few days.
 - e) **Feeding Lactating Does** - They should be given 6-8 hours for grazing along with 10 kg cultivated green fodder per day, 400g of concentrate mixture per day, 800 g of good quality legume hay per day.
 - f) **Feeding Non Pregnant Does**—There is no need to give concentrate mixture if the availability of pasture is good but if not there then the animals should be supplemented with 150-200 g of concentrate per animal per day.
- B) Feeding Bucks for Breeding** - Usually the common practice is to allow the bucks to graze with the does so that he also gets the same ration as the does. This will meet the nutritional requirements of the buck.

C) Feeding the kids

- a) **Feeding the kids from birth to three months of age-** Feed the young ones with colostrum immediately after birth. The young one and the dam should be kept together for 3-4 days so that the young one has frequent access to milk. But after that up to weaning feed the kids for 2-3 times a day with milk. As the kid is about 2 weeks of age it should be

trained to eat green rough ages. It should be provided with the concentrate mixture (Creep Feed) at the age of one month up to 2-3 months of age. The creep feeding gives more nutrients for the rapid growth of kids.

- b) Feeding after 3 months to 12 months of age-** The kids should be allowed to graze in the pasture for about 8 hours per day. They should be supplemented with concentrate mixture with protein of 16-18% at a rate of 100-200 g per animal per day. They should be given dry fodder at night in summer months and during rainy days.

4.9 SUMMARY

Goat is a multifunctional animal it plays an important role in the economy and nutrition of rural landless, small and marginal farmers. Goat rearing is practiced on large scale in rural India. Goats are kept as a source of additional income and as an insurance against disasters and calamities. Goats can survive on available shrubs and trees. In India goats are used during the ceremonial feastings and they also have religious and ritualistic importance in many societies. Increasing demand of goat meat and milk in India is a hope for widely spreading this industry.

4.10 QUESTIONS FOR SELF-STUDY

- 1) What are the advantages of goat rearing ?
- 2) Name the different breeds of goat in India.
- 3) Write in detail goat rearing and integrated farming system.
- 4) Discuss management and breeding in goats.
- 5) Feeding management of goats-discuss.
- 6) Discuss the feeding management and different goat rearing systems in India.
- 7) Answer in short the feeding of different age groups of goats.
- 8) Write short note on :
 - a) Exotic breeds of goat
 - b) Stallfed farming



SHEEP REARING

Unit Structure:

- 5.1. Objectives
- 5.2. Introduction
- 5.3. Importance of Sheep Farming
- 5.4. Scope for Sheep Farming
- 5.5. Indian Breeds of Sheep
- 5.6. Exotic Sheep Breeds
- 5.7. Rearing of Sheep
- 5.8. Feeding Management
- 5.9. Diseases found in Sheep's
- 5.10. Summary
- 5.11. Questions

5.1.OBJECTIVES

- 1) To know the importance of sheep rearing
- 2) To study the advantages of sheep farming
- 3) To study the scope for sheep rearing
- 4) To study the different breeds of sheep in India
- 5) To study the different sheep rearing systems
- 6) To learn the diseases in sheep's and their remedies

5.2. INTRODUCTION

Sheep farming is one of the traditional business and occupations of the people in many countries around the world since ancient times. Sheep farming means rearing sheep's at commercial level, for the purpose of meat, milk and wool production. In short sheep rearing is the raising and breeding of domestic sheep. With proper facilities sheep can be raised on small and large scale. Sheep can be reared as free range or under housing inside a shed. It is an important of dryland farming system. With very low investments it can be made a profitable venture for small farmers, marginal farmers and landless laborers. Commercial sheep

farming business is very profitable, as investment is repaid in a short period. Sheep with its multi-facetutility for wool, meat, milk, skins and manure, for man important component of rural economy particularly in the arid, semi-arid and mountainous areas of the country. Through sale of wool and animals, it provides a dependable source of income to the shepherds.

5.3. IMPORTANCE OF SHEEP FARMING

Sheep are raised mainly for their wool, milk, skins and manure production. Sheep meat is popular in all types of people through out the world as it is very tasty and nutritious. Mutton is one kind of meat, towards which there is no restriction by any community in India and further development of superior breeds for mutton production will have a great scope in the developing economy of India. It is a reliable source of income for the people engaged in animal farming business. Sheep farming is a great source of income and can eradicate poverty from the barren, desert, semi-arid and mountainous areas. Sheep in India are mostly maintained on natural vegetation on common grazing lands, waste lands and uncultivated (fallow) lands, stubbles of cultivated crops and top feeds (tree lopping). They are rarely kept on grain, cultivated fodder or crop residue. The productivity of Indian sheep is lower than those of agriculturally more advanced countries. But their productivity cannot be considered as inefficient considering their nutritional and physical environment. The major reasons for the low productivity of sheep are inadequate grazing resources, diseases causing high mortality, morbidity and consequent reduced production, and serious lack of organized effort for bringing genetic improvement. Sheep are mostly reared for wool and meat. Sheep's skin and manure constitute important sources of earning. Milk from sheep is of limited importance so Indian sheep is not regarded as dairy sheep. A number of rural-based industries use sheep's wool and skin as raw material. Sheep manure also is an important source of soil fertility.

Sheep farming and its advantages:

- 1) Sheep farming can be started using small capital.
- 2) A small and simple house is sufficient for the sheep.
- 3) Less labor is required for sheep farming business than any other livestock business.
- 4) As sheep's reproduce in a short span the foundation stock is relatively cheap and the flock can be multiplied rapidly.
- 5) Sheep can be used for cleaning unwanted plants from the garden or field as they eat different kinds of plants.
- 6) Sheep hardly destroy trees and plants.
- 7) Sheep are economical converter of grass into meat and wool and eat varied kinds of plants compared to other kind of livestock. This makes them excellent weed destroyer.

- 8) Products obtained from sheep are used for different purposes. The production of wool, meat and manure provides three different sources of income to the shepherd.
- 9) Sheep can adapt themselves to almost all types of environment, as they are very strong and hardy animal.
- 10) Sheep can be raised with other livestock animals, as they require less space for living.
- 11) Proper management and care in commercial sheep farming creates employment and a good source of income for the unemployed educated youths.
- 12) Commercial sheep farming can play an important role in the national income of the country.
- 13) There is an opportunity to earn foreign exchange as the sheep products have a huge demand in the international market.
- 14) Export of sheep products can increase national income.

5.4. SCOPE FOR SHEEP FARMING

The contribution of sheep to total meat production in the country is more than 14% and the contribution of sheep through export of meat is more than 8% of the total export value of agricultural and processed food products. Live sheep are also exported for meat purpose. Sheep's skin also is exported in the form of leather and leather products. Amongst the livestock owners shepherds are the poorest and sheep make a valuable contribution to the livelihood of this section. The Central Government had established the Central Sheep and Wool Research Institute (CSWRI) in Rajasthan on realizing the importance of sheep in Agrarian economy. Many sheep breeding farms were established during various plan periods throughout the country. Sheep development activities were initiated under the programs like DPAD, MFAL, SFDA, ISDP's. Setting up of woolboards in important wool producing states was envisaged. Some states have setup wool development corporations and federations.

5.5. INDIAN BREEDS OF SHEEP

There are around 40 breeds of sheep in India out of which 24 breeds are distinct. The breeds vary from the non-woolly breeds in the southern peninsular region usually kept for mutton and manure. Apparel wool breeds are reared in the northern temperate region. There are no specific breeds in a strict sense if we classify

The sheep breeds. Majority of breeds lack characteristics of a fixed nature.

Animals having distinct characters localized to a place and different from those of other places are termed as breeds and are given some local name.

There are neither breeding societies nor agencies to register animals of a particular breed, maintain flock books and ensure purity of the breeds. Very little efforts have been made to conserve and improve then ative breeds other than government farms. Only a few important breeds of sheep are maintained for pure breeding and producing stud rams for distribution to the farmers. In India most of the breeds of sheep have evolved through natural adaptation to agro-ecological conditions and limited artificial election for particular requirements. Generally most of the breeds have been named after their place of origin and on the basis of their prominent characters. Among the most widely distributed nativesheep breeds most prevalent are Marwari and Deccan.

Sheep are contributing much to the India's economy and are used for producing cloth, carpet and mutton.

The available sheep breeds in India are as follows:-

A) Sheep Breeds in Eastern Region-

1) Balangir - It is an important sheep breed in eastern regions of India. They are light brown in color with short ears and knobby. Their fleece is extremely coarse. This breed is mainly raised for its wool and mutton.

2) Tibetan – This breed is popular for producing beautiful wool, which is used for manufacturing carpet.

3) Bonpala –Fleece from this sheep is also used for making carpet. The fleece of this sheep is black or white.

Ganjam, Garole and Chottanagpuri are also the breeds available in the eastern region of India and they are mainly raised for mutton.

B) Sheep Breeds in the Northern Region-

1) Gaddi- It is a popular sheep breed in northern region of India. This breed is of medium size with short and flat tails. Generally the fleece color is white but black, brown or tan color wool is also seen in Gaddi sheep. The two types of sheep breeds originated from Gaddi are Kashmir and Merino sheep. The fleece produced by these sheep is of good quality and is considered as one of the finest wool in the world. The fleece is used usually used for cloth production.

2) Bakharwal - This is an endangered species of breed available, but only a few numbers is available.

The other sheep breeds available in the northern region are Changthangi, Karhah and Gurez. Wool from Changthangi and Gurez sheep is used for making carpets and wool from Karhah is used as apparel wool.

C) North western Region -

1) Magra - This sheep is very popular breed and highly available in the Bikaner district of north western region of India. This breed produces high quality and extremely white wool, and their wool is used for

producing fine carpet. Magra ewes can be bred only after 18 months of their age, and they produce only one kid at a time per lambing.

2) Chokla - This breed has dense coat and hairless faces.

3) Marwari - This sheep has long legs, black face and a prominent nose. Tail is short and pointed. Fleshy appendages under throat, known as wattles are often present. This breed is hardy, yielding coarser carpet variety white wool of mixed hairy composition. They are highly resistant to worms and diseases.

The other important breeds available are Sonadi, Kher, Jalauni, Jaisalmeri, Pugal, Marwari, Malpura etc. These breeds are suitable for both carpet wool and mutton production.

D) Southern Peninsular Region -

1) Deccani - This breed is very popular in the southern peninsular region of India. As this breed is very hardy it can adapt itself well with the extreme temperatures of the southern region. They are mainly raised for mutton production.

2) Madras Red - It is also raised for mutton. The fleece of this breed is usually brown in color and extremely short.

3) Mecheri - It is found in Salem, Karur, Erode, Namakkal and some parts of Dharmapuri districts of Tamilnadu. It is medium sized having pale purplish skin color. There are no horns for both the sexes. Their tail is smaller and slender. It is a meat purpose breed.

4) Neelagiri - They are found in Neelagiri district of Tamilnadu. They are medium weighing animals. Majority of sheep are found in white color, but certain sheep are found with purple spots on their body and face. Their ears are broad and drooped out. Females do not have horns. This breed is for wool purpose.

5) Tiruchi Black - They are distributed in Tiruchi, Perambalur and Salem districts of Tamilnadu. These are smaller breeds with black color all over the body. Ears are small facing forward and downwards. Adult males have horns and female without horns. It is wool purpose breed.

6) Nellore - This breed is found in Nellore, Prakasam and Ongole districts of Andhra Pradesh. This breed is tall with little hair except at brisket, withers and breech. They have long and drooping ears. It is the tallest breed of sheep in India. They resemble to goats in India. It has long face and long ears with the body densely covered with shorthair. Majority of animals carry wattles. Majority of flocks are fawn or deep red fawn color. In this breed rams are homed and ewes are polled.

7) Mandya-This breed is found in Mandya district of Karnataka. They are small animals white in color. Sometimes face is light brown in color and may extend up to the neck. This breed has a compact body with typical reversed "U" shaped conformation from the rear. Their ears are long, leafy and drooping. Both the sexes are polled. This breed is the best for mutton among the Indian breeds.

The other breeds available in the southern region are Vembur, Nellore, Nilgiri, Hassan, Tiruchy Black, Rammand White, Mandya, Mecheri, Kilakarsal, Kanguri, etc. all these breeds are raised for mutton production.

Indian breeds of sheep based on utility can be classified in to the following:-

1) Apparel wool breeds : Hissasrdale, Nilgiri, Kashmir Merino, Avivastra, Bharat Merino are cross breeds of native sheep with dual-purpose exotic fine wool and mutton breeds.

2) Superior carpet woolbreed are Chokla, Nali, Magra, Jaisalmeri, Pugal, Patanwadi, Tibetan, Bonpala, Gaddi, Rampur Bushair, Poonchi, Karnah, Gurez, Changthangi, Avikalin.

3) Coarse carpet wool breed are Malpura, Sonadi, Muzaffaranagari, Jalauni, Deccani, Bellary, Coimbatore, Chhotanagpuri, Balangiri, Ganjam, Bhakarwal, Shahabadi

4) Hairy meat breeds are Nellore, Hassan, Mecheri, Kilakarsal, Vembur, Ramnad White, Madras Red, Tiruchi Black, Kenguri. The sheep's are maintained primarily for meat production in the Southern Peninsular region. The wool produced is very coarse, hairy and colored; which is suitable only for extremely rough carpets, barrack blankets and kamblies.

All the above breeds are suitable for different production purpose, but are not suitable for commercial production. For commercial sheep farming business the following sheep breeds are considered Bannur, Bellary, Cheviot, Deccani, Hassan, Merino, Rambouillet, South Down.

5.6. EXOTIC SHEEP BREEDS

1) Dorset- This is a native of U.K and are polled and horned. Its face, ears and legs are white in color and is free from wool. It produces mutton of superior quality. It is a hardy breed capable of performing well under most of the conditions.

2) Suffolk- This is also a native of U.K. It is a large animal with black face, ears and legs. Its head and ears are entirely free from wool. Rams and ewes are polled. Ewes are very prolific and excellent milk giving animals. This breed, when imported to India, has performed poorly than the Dorset's.

3) Merino - This is the most popular fine wool breed of the world. It was originated in Spain. This breed is extremely hardy being able to survive

under adverse weather and poor grazing conditions. It is white-faced sheep with white feet and most of the head and legs are covered by wool. Rams have horns and ewes don't have horns. The ewes of this breed live and yield longer than any other breed.

4) Rambouillet - This breed was developed in France. It has large head with white hair around the nose and ears. Rams have horns and ewes don't have horns. Excellent fine-wool fleece is produced by this breed. The fleece of this sheep breed is heavy, close, compact, and covers most of the body including face and legs.

5) Cheviot - This breed was primarily developed in Scotland. It is a medium wool breed. It has small erect ears, clean white face and white legs covered with short white hair, but the nose, lips and feet are black.

6) Southdown - This is one of the oldest English breed and has greatly contributed to the development of many other breeds of sheep. This small sheep is excellent for mutton production. Its body is low-set, compact, wide and deep with legs wide apart. It has broad head and face is light brown colored.

5.7. REARING OF SHEEP

The different sheep rearing systems are as follows-

1) Extensive Grazing System-

In extensive system of grazing the sheep are left in the entire pasture for grazing for the whole season. Feed cost is much reduced in this system. It is not conducive to make the best use of the whole grasses. So it is suggested to practice rotational grazing method.

Rotational Grazing System -

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4) Rearing in Mud Floor-

Once in a year 1-2 inches of mud surface should be removed in this method. The disease occurrence in the shed will be reduced with the application of lime powder once in a month. To prevent water stagnation shed should be constructed in elevated area.

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The animals in this system are reared on the litter materials like groundnut husks, sugarcane tops etc. are spread on the floor for a depth of $\frac{1}{2}$ feet. The urine and dung mixed with the litter material are used as fertilizer. Once in six months the litter material should be removed. The litter material should not be over wet in heavy rains as this would cause the production of ammonia gas.

6) Rearing in Elevated Floor Shed -

The initial investment in this system is high. The animals are reared in the wooden floor sheds in a distance of 3m from the floor. This system requires less labor, but for fodder production more irrigated land is required. The elevated sheds will be clean. The urine and dung will be collected on the floor. This requires periodical removing once in six months.

5.8. FEEDING MANAGEMENT

High quality and nutritious food keeps the sheep's healthy, disease free and productive. Always feed fresh and nutritious food to the animals. Sheep's eat all types of green grasses, plants and almost everything edible that comes in front of them. Provide the sheep's with sufficient amount of clean and fresh water along with the provision of good food. The feeding and grazing conditions vary from place to place. The most suitable and favorable time for grazing is the onset of monsoon till the onset of winter. During summer the grazing resources become very so during this period supplementary feeding is necessary. Attention should be given to pasture improvement and management as sheep thrive well on pasture.

Rotational grazing should be followed to ensure availability of good pasture all the time. Rotational grazing helps to avoid worminfection and unthriftiness. Conserve the fodder for the lean period in the form of hay and silage. Plant fodder trees in the pasture as it provides shade and fodder in the lean period. Depending on the physiological status and availability of grazing resources in the pasture concentrate on the supplementary feeding.

Water :

Depending on the physiological status and temperature indifferent seasons water requirement of the sheep also vary. At least once a day the sheep should be given water at the rate of 2-3 litres per head per day. The younger ones requirement is 1-2 litres of water every day. But the cross-breeds requirement of water is 5-6 litres per day during the summer. Sheep breeds from the arid region have good adaptation to water restriction. The flock should be weighed at least once in a week.

Feeding lambs up-to two weeks - Ewe's milk is the best food for lambs for their early growth and rapid gain. Lambs depend totally on dam's milk for two weeks. Colostrum contains anti bodies, which protect the lamb from infections and is also rich in fat, protein and vitamins, etc. to enhance the milk production in ewes they are to be fed good ration during the last six weeks of gestation.

Feeding to suckling ewes – Ewes should be fed good milk producing rations during the suckling period. Good legume hay with little or no grain should be fed to the ewe for a week. The amount of grains can be increased after she is milking freely and her bowels are free showing no sign of constipation. Hay is not needed, if pasture is available.

Feeding adult sheep- Suckling ewes must be fed with 150gms of concentrate with mineral mixture and salt, while the roughage part is taken care by grazing.

Feeding Breeding Rams- Breeding rams are to be fed with good quality green fodders like maize, cowpea, doob grass, berseem, etc. as they meet all their requirements. 150-200 gms concentrate should be given to the rams if the forages fed are of poor quality like straw or sorghum hay.

Feed for kids		Feed for adults	
Brokenmaize	22%	Brokenmaize	37%
Broken gram	20%	Broken gram	15%
Almond cake	35%	Almond cake	25%
Wheat	20%	Wheat	20%
Mineral salt	2.5%	Mineral salt	2.5%
Salt	0.5%	Salt	0.5%

5.9. DISEASES FOUND IN SHEEP AND THEIR REMEDIES

Sheep can be infected by a variety of infectious and noninfectious diseases. The diseases contagious to people are called zoonotic diseases or zoonosis. As certain diseases prevent the import and export of livestock the government authorities must be reported. The basic thing to the production of sheep's is a sound management program to keep animals healthy. The producers should observe the animals closely, so that the individual and the whole herd or flock remains healthy and productive. There should be no compromise in dealing with the health of animals. Dealing with the diseased animal will pose some human health risk. Not all the sheep diseases cause problems, but some zoonotic diseases cause problems not only to the care takers, but also to those who come in contact with them.

Common Diseases and Their Control

The two important factors resulting in heavy losses in the sheep production and their improvement programs are Morbidity and Mortality. Prevention is better than cure perfectly applies to the sheep as they respond less to the treatment given when sick.

A) Non-Infectious Diseases

Approximately 80% of deaths in sheep have occurred due to non-infectious diseases. The major causes reported are starvation, mismothering and behavior, nutritional and environmental stress, reproductive problems and predation.

1) Pneumonia - It is the most common and important pathological conditions in sheep. It is characterized clinically by increased respiration, coughing and abdominal breathing. If some fluid by mistake enters the animal's respiratory tract, its head should be lowered immediately and slapped a few times.

2) Ruminal Tympany (Bloat) - This is generally seen in "greedy feeders" when lush green pasture is available. Bloating occurs due to over-distention of the left flank either due to free gas or froth. Tie a bitter (neem) stick in the mouth to increase the secretion of saliva. Oral administration of sweet oil with turpentine oil or at times formalin is advisable.

3) Rumen Acidosis - An acute illness due to excess production of lactic acid in the rumen cause ingestion of large amounts of highly fermentable carbohydrate feeds. Normal saline, sodium bicarbonate and anti-histaminics are advised.

4) Intussusception - It occurs commonly due to nodular worms, change in feed and local intestinal problems. Emergency surgery is the only option.

5) Deficiency Diseases –The deficiencies of cobalt, copper, calcium, phosphorous, vitamin D and A are to be treated with mineral diet supplement, green pasture and copper and cobalt sulphate.

6) Pregnancy Toxaemia (Ketosis) -This disease is caused due to lack of nutrition and short periods of starvation (40hrs) during the last two months of pregnancy. Treatment comprises of intravenous administration of 50% glucose, supply of molasses in the food and additional concentrate to be provided in the last two months of pregnancy. The other disease include spoisoning due to the pesticides used on crops, snake bite, wounds during the monsoon season.

B) Infectious Diseases

1) Blackleg - This is an acute infectious disease and takes place through skin wounds. Penicillinis used for treatment.

2) Enterotoxaemia (pulpy kidney) – It is an acute disease and affects animals in a high state of nutrition on a lush feed, grass orgrain. Can be treated with Suphadimidine. Reduction in feed in take and vaccination are the two other major controls.

3) Tetanus – Is an acute infectious disease of the voluntary muscles. Common routine operations like shearing, docking, castration and even vaccination is followed. Tetanus antitoxin isadministered.

4) Pasteurellosis - It occurs by the inhalation or ingestion of the infected material. Preventive vaccination is advised.

5) Paratuberculosis (Johne's disease) - It is a chronic disease seen in older animals. No treatment is successful.

6) Sheep Pox – It is a highly contagious viral disease spread by contact with infected animals and contaminated articles or by inhalation. Vaccination is the best control.

7) Foot and Mouth Disease - It is an extremely contagious acuteviral disease. Antibiotics are recommended but vaccination is the best control.

8) Contagious Ecthyma- It is a viral disease and antibiotics are suggested to check secondary infections.

9) BlueTongue-It is an infectious but non-contagious exotic disease of sheep. Antibiotics are recommended to check secondary infections.

5.10 SUMMARY

Sheep farming is one of the traditional business and occupations of the people in many countries around the world sinceancient times. Sheep farming means rearing sheep's at commercial level, for the purpose of meat, milk and wool production. In shortsheep rearing is the raising and breeding of domestic sheep. With proper facilities sheep can be raised on small and large scale. Sheep with its multi-facet utility for wool, meat,

milk, skins and manure, form an important component of rural economy particularly in the arid, semi-arid and mountainous areas of the country. Through sale of wool and animals, it provides a dependable source of income to the shepherds.

5.10 QUESTIONS

- 1) Give the importance of sheep rearing in India and give its scope and advantages ?
- 2) Write in detail the Indian breeds of sheep.
- 3) Discuss the different sheep rearing systems in India.
- 4) Answer in brief the feeding management in sheep's.
- 5) What are the different diseases found in sheep's and what remedies are suggested ?
- 6) Write short note on Exotic breeds of sheep.



POULTRY-I

Unit structure:

- 6.1 Objectives
- 6.2 Introduction
- 6.3 Concept
- 6.4 Scope
- 6.5 Methods of Breeding Chicken
- 6.6 Mating Methods
- 6.7 Incubation and Incubation Management
- 6.8 Objectives for egg Production
- 6.9 Essentials of Poultry Farming
- 6.10 Importance of Poultry in Rural Development
- 6.11 Holistic Approach towards Poultry Farming
- 6.12 Summary
- 6.13 Self-Study

6.1 OBJECTIVES

- 1) To review the poultry occupation
- 2) To acquaint with the traditional and cross breed birds.
- 3) To know the scientific techniques used to rear the birds.
- 4) To provide information about poultry products.
- 5) To understand the importance of poultry in rural development.
- 6) The role of poultry as a source of employment.

6.2 INTRODUCTION

Poultry farming is the raising of domesticated birds like chickens, ducks, turkeys, and geese for the purpose of meat or eggs for food. Poultry are farmed in great numbers with chickens being the most numerous. More than 50 billion chickens are raised annually as a source of food (both meat and egg). Poultry keeping, in India, has for a long time remained a rural cottage enterprise. The common village hen receives very little attention

and care. As a result its productivity also is low. But now poultry is one of the fastest growing segments of the agricultural sector. The production of eggs and broilers has rose at a rate of 8-10% annually. As a result, India was the fifth largest egg producer and the eighteenth largest producer of broilers in the world.

The poultry sector in India has undergone a total change in structure and its operation. A significant feature of India's poultry industry is its transformation from a mere backyard activity to a major commercial activity in a very short span of four decades.

Sizeable investments in breeding, hatching, rearing, and processing has involved in the transformation. Indian farmers have started to rear hybrid birds ensuring faster growth, good livability, excellent feed conversion and high profits to birdrearsers. The growth in the Indian poultry is due to the initiative of private enterprises, minimum government interference, considerable indigenous poultry genetics capabilities and great support from the veterinarians, poultry feed, equipment, and the processing industries. India is one of the very few countries in the world that has put into place a sustained Specific Pathogen Free (SPF) egg production project.

6.3 CONCEPT

Even though poultry development has done very well during the last three decades, the growth has been restricted to commercial poultry. Rural backyard poultry contributing nearly 30% to the national egg production is still neglected. Private poultry producers are not able to attend the needs of rural consumers. The private commercial sector is reluctant to enter the rural backyard poultry sector as they aim for higher and quick profits, through large investments. The commercial poultry sector has adopted integrated approach of contract farming. They use high input and high output birds.

The fact that a fairly significant proportion of the landless and marginal farmers make their living from poultry and other animals like cow, buffalo, goat, sheep, etc. Using poultry as a tool; small farmers, marginal farmers and landless labor families can be enriched not only in terms of income raising, employment generation, nutritional status, fostering community development, gender empowerment and environment protection.

6.4 SCOPE

Poultry industry in India has undergone change during the last three decades. Initially it was considered only as a backyard activity. But suddenly due to need of employment and income in the rural areas rural youth turned their attention to this activity. They learned the new techniques and other processes in the poultry activity. Now it is one of the most successful; income generating occupation. Now India is the 5th largest producer of eggs and ninth largest producer of poultry meat. India was well positioned at the 18th place in the world poultry production. There

is an over whelming response from all fields that are related and concerned with poultry activity. A strong platform for poultry in India has been created and is experimenting with new techniques and innovations for processed chicken meat, medicines, feed additives, health products, related equipment's, management of the poultry industry and other technical services.

6.5 METHODS OF BREEDING CHICKEN

Different basic methods of breeding are out and out breeding, flock sourcing, flock mating, rolling mating, and spiral mating.

Out and Out breeding – It is simply a system of bringing in new roosters from different sources every year. This system is also used in pure bred flocks- same breed roosters are sourced every year, but source is changed every year. Here all females can be maintained as one flock. But it is difficult to manage productive traits as the source flocks for the roosters will each be strong in some traits while it will be weak in others.

Flock Sourcing- In this method also new rooster is brought every year. The advantage is improvement of traits overtime, relying on the efforts of the master breeder, and the retention of known good qualities. The disadvantage is that one has to rely on someone else for quality new roosters.

Flock Mating- It is a method in which flock of chicken are bred as one unit. Here the ratio is 20 males to 180-200 females. The chickens decide who mates whom. This system is commonly used in commercial hatcheries.

Rolling Mating- This method is also known as Old Farmers Method. In this method you have to separate two flocks every year during the breeding season. Some in breeding occurs in this system, but many birds have little relation to each other. This is a simple system having advantage of requiring only two flocks.

Spiral Mating- In this system three or more matings are setup every year. The rotation or spiral mating comes from males of one family being used only with female of the next family. The advantage of spiral mating is that close relatives are never mated. This can go on many decades without adding new chickens.

6.6 MATING METHODS

The number of females to be mated to each male varies depending on the breed, age, health and sexual activity of the male. The two main methods of mating are Natural mating and Artificial In semination.

A) Natural Mating – In this method males are allowed to mate with females naturally. This method can be further categorized into:-

1) Pen Mating- A group of hens is allowed to mate with a cock in a pen. The ratio of male to female is 1:10 or 12 for light breeds, while it is 1:8 or 10 for heavy breeds. The fertility rate is low due to preferential mating.

2) Flock Mating-

It is a mass mating system where 2 or more males are mated with several females in a single pen. Male to female ratio is 1: 12 to 15 for light breeds and 1: 10 to 12 for heavy breeds. In this method the male bird gets a choice to mate with the female he chooses. The fertility is high, suited in commercial poultry.

3) Stud Mating- In this system the male is kept separately in a coop or a pen and one by one females are put into the coop for mating. More offsprings can be obtained. Here the ratio is one male to many females and the result is high fertility. This system involves more work and labor.

4) Shift Mating- In this system the sires are shifted to breeding pens. By shifting the male, a female can be mated with several males and her breeding worth can be evaluated more precisely. The drawback of this system is the problem of accuracy of the percentage of the progeny. The main advantage of this system is that a large number of males can be tested in limited space.

B) Artificial Insemination

Artificial Insemination means the deposition of semen into the reproductive tract of a female by means other than the natural method. In many poultry projects artificial insemination has gained considerable attention. Artificial insemination is extensively used with freshly collected semen in large breeding farms. In this procedure semen from the male is collected and inseminated into the female. It is mainly used in heavy birds whose fertility is generally low in pen mating. It is generally practiced when the flock has an apparent fertility problem. Some training is required on the part of both the operator and male in artificial insemination.

Advantages of artificial insemination in poultry-

- 1) Efficient use of males can be done as the requirement of males is lesser than compared to natural mating.
- 2) Production of fertile eggs is possible in cages.
- 3) Multi locational testing of outstanding sires can be done.
- 4) Preferential mating and physical incompatibility can be avoided.
- 5) Accurate recording of pedigree is possible.
- 6) Fertility is higher by 5-10%.
- 7) Use of large male with small female and small female with large male is possible.
- 8) Interspecies hybridization is possible.

Artificial Insemination process includes-

- a) Preparation of males.
- b) Preparation of equipments required for the collection of semen.
- c) Collection of semen from males.
- d) Evaluation or testing of semen.
- e) Diluting the semen
- f) Deposition of semen in vagina of females.

Good results of Artificial Insemination can be achieved by following the steps given below.

- 1) Avoid any kind of stress to the birds before artificial in semination.
- 2) For good fertility Artificial in semination should be done twice a week.
- 3) Insemination should be done when no hard shelled egg is present in the uterus.
- 4) The intervals between inseminations should be maintained.
- 5) Artificial insemination equipment should be cleaned thoroughly and sterilized before use.

6.7 INCUBATION AND INCUBATION MANAGEMENT

To make poultry raising successful it is necessary to practice good management. The success or failure in the poultry business depends on the man in management. This statement is quite true as other factors are equal.

Incubation can be considered less than two headings natural incubation, the hatching of eggs under a hen, and artificial incubation, the hatching of eggs in an incubator. Both types of incubation are practiced in India. But many would opt for more efficient artificial incubation rather than natural incubation.

A) Natural Incubation

Natural incubation will be practiced in India till there are sufficient incubators and trained hatchery men are available to satisfy the demand for one day old chicks. Chickens are kept for egg production. A broody hen is not profitable unless and until she sits on eggs or brooding chicks. Efforts should be taken to see that the hen sits on as many eggs as possible i.e. 10 to 15 eggs at a time so that the best use of her time is made. At the end of the first week it is possible to see with the candle and discard the infertile eggs. This can be done when several broody hens are set at the same time. The chicks that hatch from two hens can be placed under one mother and the second broody hen can be again made to sit on 10 to 15 more eggs to hatch another brood. One mother hen can take care of at least 25 chicks if the weather is warm.

The efficiency of natural incubation can be increased; by setting eggs under a broody hen on the same day that your hatchery man sets an incubator. The eggs will hatch at about the same time and the incubator chicks can be placed under a mother hen at night, which she usually adopts.

People object to improved breeds as they seldom become broody. The inherited factor of broodiness is not seen in the improved breeds. So problems may rise when there will be no mother hens to hatch and take care of chicks. In short we can say natural incubation and natural brooding to artificial brooding will create a problem. But the one who wants to commercialize the poultry business will have to practice artificial incubation method.

B) Artificial Incubation

If the poultry business is developed in India like other countries then artificial incubation is likely to replace mother hen.

The benefits of artificial incubation are –

- a) Time of hatching can be controlled and there is no need to wait and find broody hens.
- b) At a time many chicks can be hatched to meet the poultry man's requirement.
- c) Compared to natural incubation improved incubators and trained hatchery men get good and better hatches.
- d) Artificial incubation and artificial brooding reduce the hazards of diseases, predators and parasites.

There are two types of incubators -

- 1) The cabinet type incubators are small. More time is required to keep the temperature adjusted in cabinet incubators.
- 2) The forced draft types are large. The commercial hatchery men prefer the forced draft type incubator's as they are more efficient. The temperature and humidity controls are automatic and more sensitive in this incubator. In this type temperature variations are less subject to changes with the outside temperature.

Transport of day old chicks to distant places without food is possible, as nature has provided them with sufficient food from the unabsorbed egg yolk to support them for 2-3 days. If the chicks reach their destination in time i.e. within two days they might arrive in good condition. They can be shipped in cheaply constructed bamboo baskets or cardboard boxes. At least 20 to 25 chicks should be placed on the dried grass in the shipping bamboo basket to keep them warm.

Many factors affect the hatch ability of eggs which ever method of incubation is used. It is not possible to determine which eggs will hatch and produce a live chick. Following are some factors that affect hatchability.

- a) The hatchability is reduced due to high temperatures in many parts of India. So the hatching eggs should be gathered at least four times a day in hot weather and place them in cool and moist places.
- b) Eggs laid by pullets hatch better than the eggs laid by older hens.
- c) Eggs laid by good layers hatch better than that of eggs laid by poor layers.
- d) In-breeding of hens may reduce the hatchability.
- e) Hatchability is decreased if the food given to hens is deficient in vitamins A, D, and Riboflavin.
- f) Small eggs, extra-large eggs, cracked or misshapen eggs, porous or poor shells also reduce the hatchability.
- g) If incubators are not regulated or managed properly the hatchability is reduced.

6.8 OBJECTIVES OF POULTRY PRODUCTION

To commercialize the poultry business in India new techniques were used on large scale. Maximum production of eggs and growing broilers in less time was possible due to this technique.

6.8.1 Objectives for egg production:

1) To obtain more production of eggs-

Hens laying maximum eggs are selected for the egg production. The aim is that the hens will lay eggs for a longer period.

2) Disease resistance capacity should be high-

Healthy hens can give increased production of eggs rather than diseased hens having less resistance. So hens are selected having good and high resistance to diseases.

3) Size and weight of the eggs-

From the commercial point of view importance is given to big sized eggs and more weight. A comparative study is done and then the breed is selected.

4) Size and weight of the bird-

Birds small in size and heavy are beneficial from commercial point of view. A comparative study of the production technique is done and then the breed is selected.

5) Requirement of food-

Hens eating less food and giving more eggs would prove profitable. So accordingly such birds are selected for production.

6) Hardness of the shells-

In commercial poultry business eggs are transported to different places. If the egg shell is hard break age of eggs can be negligible or very less. The hardness of the shells is because of the inheritance. So such birds having this inheritance are selected.

7) Quality of the egg yolk-

Consumers prefer to buy eggs having big egg yolk. So here also proper selection of birds is very much necessary.

6.8.2 Objectives for Broilers-

1) Maximum growth in less time-

Many batches of broilers can be produced if breeds selected have the qualities of maximum growth in less time. As a result expenses on management and medicines are reduced and can get maximum production.

2) More weight and less food-

The breeds should be such selected who will convert the food eaten into meat in less time. If done so the expenses on food can be less and heavy broilers can be produced. This would be more profitable for the poultry business.

3) More resistance power-

If disease resistant birds are used for production healthy and fit birds can be produced. This will reduce the expenses on medicines and can get good sized and good colored birds, which can give maximum profit.

6.9 ESSENTIALS OF POULTRY FARMING-

a) Capital:

Fixed capital is necessary for the shelter of birds, to purchase equipment's and other necessary facilities to be provided for poultry farming. Rotating capital is also necessary to purchase good quality breeds, veterinary facilities and medicines.

b) Space for poultry establishment:

While selecting place for poultry establishment it should be such that there should be no water logging. Land with slope, soil mixed with sand and water should flow easily is more useful. Big trees should not be there in the vicinity of the poultry farm as the birds sitting on it may be responsible for the spread of diseases. But small trees, bushes are essential as they help to keep the climate cool.

c) Electric Supply:

Modern equipment's used in poultry farming require electricity. Also to control the temperature in the shelter or house regular electric supply is amust.

d) Water Supply:

Sufficient water supply is necessary for poultry business. Pure drinking water with good food helps to increase the weight of the birds at a faster rate. For cleanliness of the surrounding are a and the shelter water is necessary.

e) High Quality Breeds:

Success of poultry business depends on the good and highqualitybreeds.

f) Market Facility:

Before starting the poultry farming business it is necessary to see the availability of the market. As eggs are perishable items it has tobe seen whether the daily production can reach the market in time. Even for the broilers market availability is a must. If there is no market near by for the ready poultry products the producer might incurr loss.

g) Scientific Know how:

Hybrid variety of chicken production was started in India in 1962. Last fifty years we have started making use of scientific knowledge in the field of poultry farming. The producer must have the knowledge of different types of poultry breeds, diseases and its remedies and vaccinations available, management technique, food for the poultry birds, techniques of production, poultry birds shelter, scientific technology and available market facility. Changing with the new technology is the key to success of poultry business to gain maximum profit.

h) Food of the poultry birds:

Food of the poultry birds is an important factor of poultry business. Profit and loss in this business is decided on the expenses on food done for the poultry birds. Right management of food means not to waste bird food, giving food to the poultry birds in a balanced manner so that percentage of profit can be increased. Balanced food is to be given to the birds depending on their age and necessity.

i) Medical Supply:

Poultry birds are more prone to disease easily. If after starting the business the birds are infected the percentage of profit minimizes. So the producer always has to be ready with vaccination facility and in case of sudden occurrence of epidemic or disease supply of medicine is an important factor.

6.10 IMPORTANCE OF POULTRY IN RURAL DEVELOPMENT

Rural development is the process of improving the quality of life and economic well being of the people living isolated and thinly populated areas. Rural development actions are mainly aimed for the social and economic development of the rural areas. Rural development aims at finding the ways to improve the rural people with the participation of the rural people themselves so as to meet the necessities of the rural area. The outsider may not understand the life style, culture, language and many other things prevailing in the local area. The main objective of rural development has been to remove poverty and fill the gap between the rich and the poor. Keeping in view the planning policy, various schemes of development, especially agricultural development, the main occupation of the rural people, have been introduced.

Agriculture, with its allied sectors, is no doubt the largest livelihood provider in rural India. It also contributes a vast significant figure to the Gross Domestic Products (GDP).

Poultry farming has occupied an important place in the Indian economy. Poultry farming is playing an important role in the eatery business in India as the fast food culture is growing. It has emerged as the fastest growing segment in the agricultural livestock industry. Poultry industry has not only grown in size but also in productivity. This has been only possible because of the availability of infrastructure facilities, birds, quality feed, modern automatic systems in poultry houses etc. ICAR is playing a vital role in the development of poultry industry.

1) Employment and Self-Employment Generation-

The poultry industry has given rise to many subsidiary industries like compounded feed, equipment, pharmaceuticals, hatchery operation and processing of poultry products. Poultry farming plays an effective role in rural development as it helps the rural population to earn income on regular basis. Poultry dropping is very good manure for crops. It also serves as the source of raw material for industrial products. Poultry keeping provides employment not only for those who are engaged in the production of eggs and chicken meat but also for hatchery operators, feed dealers, building material providers, egg cases and trucks, processors on eggs and poultry products and also the dealers engaged in the marketing of eggs.

2) A part of balanced diet-

Protein deficiency is common in infants and growing children in a large section of the society living below poverty line. India tops in the list of countries facing nutrition problem. Egg is a good source of nutritious food for all ages as it has high protein and is easily digestible. The World Health Organization (WHO) considers egg as the best protein food for humans. This industry in India is recognized as an organized and scientific based industry and also is a potential tool to fight poverty and malnutrition.

3) A business for the poorer sections-

Poultry farming plays an effective role for the rural population to earn a regular income. The inputs required to start this business are locally available. Local artisans in the villages can manufacture the simple equipment's needed for feeding, watering, and sheltering for small units of poultry business. Even women can be employed in poultry farming as well as in marketing of eggs.

4) Use of barren land-

Land requirement for poultry business is small. Barren land cannot be used for agricultural operations. So this land can be used for poultry farming. As the poultry birds have bad smell it is better this business is done on the out skirts of the village. So maximum use of barren land has to be done in this business.

5) Agricultural Subsidiary occupation-

Poultry sector is gaining great importance in India as it meets the growing demand of millions of people. Eggs and poultry meat are less costly, so middle – class people are willing to improve their nutritional standards. Its importance among the rural population has increased due to the growth of manpower in this sector. Urbanization, industrialization, rapid increase in the middle-income population and changing socio-cultural habits, the demand for processed poultry products is increasing fast in India. The urban population has high purchasing power and consumes more meat and eggs. So this business can be done as a subsidiary occupation or as a main business.

6.11 HOLISTIC APPROACH TOWARDS POULTRY FARMS

1) Rural Production and Social Organization-

There were some limitations in the centrally sponsored scheme “Assistance to State Poultry Farms” which was a step towards boosting rural poultry production. The scheme will cater to inter mediate rungs of poultry farmers who will rear the chicks in the mother units and also help in providing the backyard poultry rearer with 4-8 week old reared chicks so as to minimize the high chick mortality. The training will be more intensive and provided at the door steps. The formation of self-help groups will flourish community development, gender empowerment and promote the concept of saving money and build self-confidence and social security in the long term.

2) Cluster approach –

It is important that economic viability must be considered for financing by institutions and sustainability of a project. It is to be ensured that whatever little surplus production is there, it should effectively be channelized into a well-defined market set-up. This will expand and upgrade the backyard activity level, for which cluster approach is essential.

3) Backward and forward linkage-

The backward linkages are requirement of minimum infrastructure, inputs, feed, health services etc. The forward linkages are marketing of eggs, meat, poultry products. Both these have to be provided by a resource or link agency. These units should concentrate on inputs and services including procurement, rather than production.

4) Mother Units and Mobilizing NGO's/ SHG's-

Suitable NGO's should be involved for operating the mother units. It is necessary that they form Self Help Groups (SHG's) at the backyard level, as the SHG can address the problems of their micro financing as well as foster dependence for common cause on other members with common interest. For the success of the program economic viability and deep commitment of the mother units is essential. Even the financial institutions will come forward to assist this highly motivated and confident group.

5) Convergence of Poultry Activities-

Poultry farming is one of the components of the many developmental programs for rural farmers, women, tribal's and other weaker sections of the society. NABARD and NCDC finance the poultry business. The proposal envisages linkages with other developmental agencies and programs through connecting networks between agencies/ programs and research institutes, State Agricultural Institutions, ICAR institutions, etc. this would help in the effective implementation of the program and also offer platform for trouble shooting and problem management.

6) Outreach of Services-

District Rural Development Agencies (DRDA's) who help in increasing the out reach of activities and help in extension through District / Block Extension teams. Suitable Link Worker Couples (LWC)/ Community Link Workers (CLW)/ Village Facilitators (VFs)/ Poultry Link Workers (PLWs), are selected through mass contact programs and trained intensively for skill and serviced is semination. This additional tier of workers will increase the out reach and also will develop the necessary rapport with in and between the villages through their link and help sort out common problems. Link workers will be from the same villages and preferably more forward farmer couples, who along with their own operations will provide inputs and services to other villagers.

6.12 SUMMARY

The domestication of poultry took place several thousand years ago. This may have originally been as a result of people hatching and rearing young birds from eggs collected from the wild, but later involved keeping the birds permanently in captivity. In recent years poultry farming has developed faster. It is now not merely an allied activity or subsidiary occupation but is practiced as an independent business giving maximum profit. Rural and urban youths are attracted to this business. New

techniques of production, modern equipment's and improved variety of birds are used today. Because of new technique and technology more sustainability is seen in this business.

6.13 QUESTIONS FOR SELF-STUDY:

- 1) What is poultry farming ? Give its concept and scope.
- 2) Answer in detail – Artificial Insemination
- 3) Discuss incubation and incubation management.
- 4) What are the essentials of poultry farming?
- 5) Importance of poultry in rural development – discuss.
- 6) Discuss the holistic approach towards poultry farming
- 7) Write short notes on:
 - a) Breeding Methods
 - b) Mating Methods
 - c) Factors affecting hatchability
 - d) Objectives of egg production
 - e) Objectives of broilers



POULTRY-II

Unit Structure:

- 7.1 Objectives
- 7.2 Introduction
- 7.3 Varieties of chickens
- 7.4 Shelter
- 7.5 Management of poultry occupation
- 7.6 Food for chicken
- 7.7 Diseases and Medical Treatment
- 7.8 Summary
- 7.9 Questions

7.1 OBJECTIVES

- 1) To know the varieties of chicken producing eggs and for meat production.
- 2) To study the shelter of chickens.
- 3) To understand the management of poultry business.
- 4) To study the constituents of chicken food.
- 5) To know the diseases of poultry birds and their remedies.

7.2 INTRODUCTION

Poultry keeping, in India, has for a long time remained arural cottage enterprise. The common village hen receives very little attention and care. As a result its productivity also is low. But now poultry is one of the fastest growing segments of the agricultural sector. The poultry sector in India has underg one a total change instructure and its operation. A significant feature of India's poultry industry is its transformation from a mere backyard activity to a major commercial activity in a very short span of four decades.

Sizeable investments in breeding, hatching, rearing, and processing has involved in the transformation. Indian farmers have started to rear hybrid birds ensuring faster growth, good livability, excellent feed conversion and high profits to bird rearers. The growth in the Indian poultry is due to the initiative of private enterprises, minimum government interference,

considerable indigenous poultry genetics capabilities and great support from the veterans, poultry feed, equipment, and the processing industries. India is one of the very few countries in the world that has put into place a sustained Specific Pathogen Free (SPF) egg production project.

A strong platform for poultry in India has been created and is experimenting with new techniques and innovations for processed chicken meat, medicines, feed additives, health products, related equipment's, management of the poultry industry and other technical services.

Using poultry as a tool; small farmers, marginal farmers and landless labor families can be enriched not only in terms of income raising, employment generation, nutritional status, fostering community development, gender empowerment and environment protection.

7.3 DIFFERENT VARIETIES OF CHICKEN BREEDS

Hundreds of chicken breeds exist and are domesticated for thousands of years. The combined factors of geographical isolation and selection for desired characteristics have created regional types of chicken breeds with distinct physical and behavioral traits and are passed on to their off spring. Physical traits like size, plumage color, comb type, skin color, number of toes, amount of feathering, egg color and place of origin are used to distinguish chicken breeds. They are also roughly divided whether will be used for eggs, meat or for ornamental purpose or for dual purpose of eggs and meat.

7.3.1 Breeds of Chicken for Egg Production:

1) Leghorn :

Leghorn chickens are the most popular chicken breeds due to their ability to produce approximately 300 eggs per year. This breed was the most important in commercial egg production. There are approximately 24 recognized varieties of it. The laboratories for embryonic and avian biological research, because of their prolific egg laying capacities, prefer them. The Leghorn originates from Livorno Italy and its cross bred provides a rarely broody, mobile, and efficient scavenging chicken.

Most leghorn chickens have single combs. There are several color varieties that have rose combs. They occur in recognized colors –white, red, black, tailed red, light brown, dark brown, black, blue, buff- Columbian, barred, exchequer and silver.

Leghorns are nervous types and noisy types of chickens around humans and can fly. Due to their nature they do not make good pets and less popular as a homestead breed.

2) Black Minorca:

Minorca is one of the heaviest of the light breeds. It originates from the Mediterranean. This breed was developed from imported Castilian fowl of Spain in England. They are utility fowl and lay large eggs. They were once

in the class of wide spread large flocks for laying and meat production, like the leghorn breed, which is the smallest of this class. The distinction of the Minorca is its large white ear patch, which makes it recognizable at a distance. They occur in Black, White, and Blue color. Its egg color is white.

3) Rhode Island Red:

Rhode Island breed chickens are very popular for dual-purpose poultry breed and are preferred among the backyard chicken farmers. They are available in two types Rhode Island Red and Rhode Island White. They adapt very well to all forms of freerange as well as combined settings. The red variety is capable of producing 200-250 large eggs annually, which are brown in color. However the cock is very aggressive. The Rhode Island has yellow shanks and performs well under most conditions and rarely goes broody. The Rhode Island breed is one of the most famous egg laying chicken breeds. It appears in various shades of red with some black. The White Rhode Island is a very rare breed.

4) Australorp:

Australorp is a breed originated in Australia from the English Orrington in a bid to improve on their utility. They were known as Black Utility Orrington's. Australorp breed is well suited to Australian conditions and is one of the most efficient egg layers as it averages over 300 eggs per hen per year in commercial selling. But the backyard poultry producers should not expect more than 250 eggs a year. The Black Australorp is an ideal bird for free-range production as they have good temperament. They are quiet chickens, easily contained and handled. Australorps are hardy, dual purpose types of chicken. Originally developed for exceptional egg laying, they also are a good meat bird, with reasonably early maturity and white skin.

Australorps are large and soft feathered. They occur in Black with green shine the original color. The other color chickens developed are blue and splash.

7.3.2 Breeds for Meat Production:

Poultry sector is gaining great importance in India as it meets the growing demand of millions of people. Eggs and poultry meat are less costly, so middle-class people are willing to improve their nutritional standards. Its importance among the rural population has increased due to the growth of manpower in this sector. Urbanization, industrialization, rapid increase in the middle-income population and changing socio-cultural habits, the demand for processed poultry products is increasing fast in India. The urban population has high purchasing power and consumes more meat and eggs.

The varieties used for meat production are:

1) New Hampshire:

They originate from New Hampshire in the US. Though it is a dual-purpose

bird it formed the basis of early broiler industry. Medium heavy in weight, it matures early and dress esanice, plump carcass as either a broiler or a rooster. The mature birds color is rich chestnut red, of a lighter and more even shade than the Rhode Island Reds. They possess a deep, broad body, grow feathers very rapidly, are prone to go broody and make good mothers. The comb is single and medium to large in size; and in females it often lops over a bit. They are competitive and aggressive. It is a fair producer of large brown eggs but the New Hampshire was developed more for meat production than egg production.

2) White Sussex:

The Sussex breed is also one of he top breeds. They were originated in Sussex in England. They are very distinctive types of chickens having white body with a black tail and black wing tips, neck being whites triped over with black. Other colors include Brown, light, red, speckled, silver, and white and coronation. The most famous Sussex is light Sussex. There are many varieties and colors of this breed and they are quite adaptable to any type of environment. Because of their unique nature all the farmers prefer them. The Sussex is for dual purposes types. It is good meat bird maturing quickly for a heavy breed and may go broody. Their capacity to lay eggs is 250 large beige eggs per year. The Sussex chicken is an alert, docile breed and adapts to any surrounding, comfortable in both free range and confined spaces. So many farmers, especially the hobbyists love to keep this chicken breed at their homes.

3) Plymouth Rock:

Plymouth Rock is the first in line of the top most chicken breeds. One of the most common of the mall is the black and barred ones. Barred Rock chickens originated in the United States and became very popular. Apart from their names barred coloring they also occur in blue, buff, Columbian, Partridge, silver laced, silver penciled and white. They are large birds with excellent table qualities. They are generally docile, but occasionally aggressive.

They adapt well to confinement and are easy to handle. They are cold, hardy, dual-purpose fowl, useful for meat and egg production. Some varieties are developed only for eggs and some are developed only for meat. They tend to go broody and make good mothers. Overall they are good producers of light to medium brown eggs, yielding approximately 200 eggs per year. These birds are ofa calm and friendly nature, due to which they are best suited to being kept in any setting.

4) Wyandotte:

The Wyandotte breed originated in the US, but now with the co-operation of the British it is a well-rounded dual purposes bird.The Wyandotte is a medium sized bird. It occurs in colors like white, gold laced and silver laced which are common. They also exist in Black, buff and Columbian, partridge and silver penciled color. The Wyandotte is suited to cold conditions, which make them optimal for free range of production.

Wyandotte is docile, friendly and make good pets. The hens are broody and take good care of their young ones. They mature early having big breasts. They are also good layers. It is a reasonable egg producer of about 180-200 eggs per year. It is an excellent source of meat. They need regular washing as their thick feathering about the vent area becomes dirty with feces.

7.4 POULTRY HOUSING

Another important factor for commercial poultry production is making a suitable poultry housing. There are many ways for making a good poultry house for poultry birds. It is not expensive like buying land. Make sure that, the house or cages sufficient and spacious enough to accommodate the birds and should have necessary space and facilities. The design of the house depends on the breeds selected and type of production.

Following things should be considered while making a poultry house :-

- 1) The house must be well ventilated, as good ventilation system ensures good health and proper growth of the birds.
- 2) Sufficient amount of fresh air and light should be there inside the house.
- 3) The house should be south facing, as it will help the entrance of sufficient amount of clean and fresh air.
- 4) The distance from one house to another house should be at-least 40 feet if the poultry business is on large-scale commercial production.
- 5) Keeping the house clean and fresh before bringing the chicks into the farm is very essential.
- 6) All types of harmful animals and predators should be prevented.
- 7) The house should be well facilitated so that rain water, cold winds cannot enter in the house.
- 8) The house should be built in a calm and quiet place.
- 9) A proper drainage system inside the house will help to clean the house easily.
- 10) Keep all equipment in proper distance in the house. Keep the house and equipment always clean in a regular basis.

The type of housing used depends on the amount of ground and the capital available to a large extent.

The four systems of poultry housing generally followed are as follows:-

- 1) Free Range System or Extensive System
- 2) Semi-Intensive System

3) Folding System

4) Intensive System

a) Battery System

b) Deep Litter System

1) Free Range System:

This is the oldest method used where there is no shortage of land and has been used for centuries by general farmers. This system allows great space to the birds on land where they can find an appreciable amount of food. The food can be in the form of herbage, seeds and insects, provided they get protection from predatory animals and infectious diseases and parasitic infestation. Due to the advantages of intensive methods this system is the perfect system.

2) Semi-Intensive System:

This system is adopted where there is availability of limited free space. It is necessary to allow 20-30 square yards per bird outside run for the birds. Wherever possible, this space should be divided giving a run on either side of the house of 10-15 square yards per bird. It enables the birds to move on the fresh ground.

3) Folding Unit System:

This housing system is an innovation of recent years. In this portable folding unit birds are confined to one small run. So the position has to be changed everyday to give the birds fresh ground. The birds find a considerable proportion of food from the herbage, which are healthier and harder. The beneficial effect of scratching and manuring on the land is a side effect for the farmer.

The disadvantage of this system is that the food and water has to be taken to the birds. Eggs are to be brought back. Extra labor is involved in the regular moving of the fold units. The unit made of 25 hens is the most convenient folding unit to handle. A total floor space of 4 square feet per bird to the whole unit has to be kept, that means a floor space of 1 square foot is to be allowed for each bird in the house, and 3 square feet in the run has to be kept for the birds. A suitable measurement for a folding house to take 25 birds is 5 feet wide and 20 feet long. The part that is nearest to the house is covered in and the remaining 10' open with wire netting on the sides and top.

4) Intensive System:

This system is usually adopted where there is limited land and is expensive. Here the birds are confined to the house entirely without any access to land. This has been made possible by allowing the sunrays to fall directly on the floor of the house so that the windows are removable, or fold or slide down to permit the ultraviolet rays to reach the birds. Battery

or cage system and deep litter methods are most common.

a) Battery System-This appliance is the inventor's latest contribution to the commercial poultry business. This system is use ful to those having a small quantity of floor space at their disposal. This is the most intensive type of poultry production. Now a days it is very difficult to spare open lands in big cities for rearing birds. This system will prove worthy for all those people who can keep the birds in minimum space.

In battery system each and every hen is confined to a cage just large enough to permit very limited movement. It only allows her to stand and sit comfortably. Usually the floor space in this system is 14 x 16 inches with a height of 17 inches.

The floor is made of strong galvanized wire and is set at a slope from back to the front so as to see the laid eggs are rolled out of the cage to a receiving gutter. Underneath is placed a tray for droppings. Food and water receptacle both are outside the cage. Many small cages can be assembled together or it may be multi-storied as per the necessity. The whole structure of the cage should be made of metal so that no parasite will be harbored and can be carried out as often as required through disinfection. The batteries of the cage should be set up in well-ventilated and lighted place. It should not be too hot and vermin proof. The food should meet all nutritional needs. As the bird spends its entire time in the shade, it lessens the load of excess body heat. As a result the expenditure of energy from the bird is minimum.

The feeding of birds in the cages has to be carefully monitored, as they are totally dependent on the rearer for maintenance and production. Availability of vitamin A and D, codliver oil, yeast, dried milk powder is necessary. Also fishmeal or other animal protein, balanced minerals and some form of grit must be available. Performance of each bird should be noted so that culling can be easily carried out. Pullets used more often than birds of over one year, should be placed in the cages at least one month before they are expected to lay eggs. As there will be only pullets in the cage one can never expect fertilized eggs. There will only be vegetative eggs that can be preserved for a longer time, than fertilized eggs at ordinary temperature. They can never be used for hatching purpose.

b) Deep Litter System:

Deep litter system resembles to dry compost. In this system the poultry birds are kept in large pens. The number of birds kept in each pen is 250 birds. The floor is covered with litters like straw, saw dust, or leaves up to the depth of 8-12 inches. We can define deep litter system as the accumulation of the material used for litter with the poultry manure till it reaches a depth of 8-12 inches. The build-up has to be carried out correctly for the desired results, that require every little attention.

1) Safety of birds:

The birds and eggs are safe when enclosed in deep litter intensive pen, which has strong wire netting or expanded metal.

Litter as a source of food supply: It is surprising to learn that built-up litter also supplies some of the food requirements of the birds. The birds obtain “Animal Protein Factor” from deep litter system. It is interesting to note that with only a vegetable protein such as ground nut meal included in the feed the birds obtain sufficient of animal protein factor. The level of vitamins such as riboflavin increases up to nearly three-fold. According to the experiments done the combination of riboflavin and animal protein factor is necessary to good hatchability of eggs and early growth of chickens.

2) Disease Control:

Well-managed deep litter kept in dry condition has a sterilizing effect with no wet spots around water. The level of worm infestation is less if the birds kept on good litter condition, but in bare yards and bare floor sheds particularly where there is water spillage the level of infestation is high.

Labor Savings: It is an important feature of deep litter system. Cleaning of poultry pens daily or weekly requires lot of work. If proper care is taken and correct condition observed and well managed litter there is no need to clean a pen for a whole year. The only attention required is the regular stirring and adding of some material.

The valuable fertilizer: This is a valuable economic factor with deep litter. In this system it is said that the birds can produce about 1 ton of deep litter fertilizer. Nitrogen level in fresh manure is about 1%, while on well built-up litter it may be around 3%. The other contents are 2% phosphorous and 2% potash. The value of this manure is about 3 times than that of cattle manure.

3) Hot Weather Safeguard:

This is an important feature of this system in hot climate. The litter maintains the constant temperature. When the temperature is high the birds burrow themselves into the litter to keep themselves cool. Vice versa they can warm themselves when the weather is cool. In other words we can say it is valuable insulating agent.

7.5 POULTRY MANAGEMENT

Poultry management refers to the practices or production techniques in animal husbandry that help to maximize the efficiency of production. In order to optimize production sound management practices is a must. Scientific poultry management aims at maximizing returns with minimum investment.

Brooder Management:

1) Brooder House: Brooder house should be dirt-free, rain-proof and protected against predators. Brooding pens should have windows covered with wire mesh for adequate ventilation. Dusty environment irritates the respiratory tract of the birds. Dust is one of the vehicles of transmission of diseases. Lots of moisture causes ammonia fumes, which irritate the respiratory tract and eyes of the birds. Comfortable environment is created if there is good ventilation.

2) Sanitation and Hygiene: All movable equipment's like feeders, waters and hovers should be removed from the house, cleaned and disinfected. All litters are to be scraped and removed. The interior as well as exterior of the house should be cleaned under pressure. The house should be disinfected with any commercial disinfectant solution at the recommended concentration. Insecticide should be sprayed to avoid insect threat. Malathion spray/ blow lamping or both can be used to control ticks and mites. New litter should be spread after each cleaning. The insecticides if necessary should be mixed with litter at recommended doses.

3) Litter: Depending on the availability and cost suitable litter material like saw dust and paddy husk should be spread to a length of 5 cm. To prevent caking the litter should be stirred at frequent intervals. Only dry litters are to be used. If any wet litter is there it should be removed immediately. This prevents the odor like ammonia.

4) Brooding Temperature: To provide right temperature in the brooder house heating is an essential part. Too high or too low temperature slows down the growth of birds and causes mortality. The temperature of the first week should be 95° F (35°C) and there after reduced by 5° F per week till it reaches 70°F (21·10C). The brooder should be shifted at least 24 hours before the chicks arrive. Maximum and minimum thermometer should be hanged in each house to control over the differences in the house temperature. The behavior of the chicks provides better indication, whether they are getting the desired amount of heat. The chicks try to get closer to the source of heat and huddle down under the brooder if the temperature is less than required and when the temperature is too high, the chicks will get away from the source of heat and may even gasp. The chicks will be evenly scattered when the temperature is perfect. Brooders are not necessary after the chicks are about 3 weeks old, in hot weather. Several devices can be used for providing artificial heat. Many a times, electric bulbs of different intensities are used to provide heat in the brooder house. In such cases regulation of temperature is difficult but not impossible. Infrared lamps are also good for brooding. The height and number can be adjusted as per temperature requirement in the brooder house.

5) Brooder Space: Brooder space of 7-10 inch (45-65cm 2) is recommended per chick. When small pens are used for brooding, dimension of the house must be taken into consideration. Over crowding results in starve-outs, culls and increase in disease problems and infestation.

6) Brooder Guard: Hover guards are placed 1.05 to 1.50 m from the edge of hover, to prevent the straying of baby chicks from the source of heat. They are not necessary after a week.

7) Floor Space: To start with, floor space of 0.05m² should be provided per chick. It should be increased by 0.05 m² after every weeks until the pullets are about 20 weeks of age. For female broiler chicks the floor space should be at least 0.2 m² and for male chicks it should be 0.15m². This should be provided till 8 weeks of age. Broiler pullets and cockerel chicks should be raised in separate pens as it would be beneficial.

8) Water Space: Plentiful of clean and fresh water is a must. 50 linear cm of water space has to be provided per 100 chicks for the first two weeks. It has to be increased to 152-190 linear cm at 6-8weeks. The chick fountains are to be left in for several days till the chicks have located the new water source when you change from chick fountain to water trough. To reduce spoilage of water the height of waters should be maintained at 2-5cm above the back height of the chicks. Antibiotics or other stress medications may be added to water if necessary. All waters should be cleaned daily.

7.6 POULTRY FEED MANAGEMENT

Keep fresh feed available at all times, to maintain healthy birds. Limit the amount of feed in feeders to avoid wastes. It is a good practice to fill hanging feeders only three-fourths full, and trough feeders only two-thirds full. For efficient feeding, keep the lip of the feeder pan in a hanging tube-type feeder at the level of the bird's backs.

Non-automatic trough feeders should be filled early in the morning, also during the day whenever feed supplies get low. The left over feed should be removed before refilling the feeders. Contaminated and moldy feed should not be given to the birds. The feeders should be cleaned when ever necessary.

A close check on birds weight and their feed consumption has to be kept. First indication of trouble –a disease outbreak, molt, stress, or poor management is a drop in feed intake. Keep feed as fresh as possible. Store feed in a dry, rat and mouse proof place, where it will not be subject to damage from moisture or losses from rodents. Store the feed in a large galvanized garbage can with a tight lid to prevent damage.

Use a Growing Ration:

Feed supply store can provide you with a growing ration, which contains everything, the chick's need to grow into productive hens. For 6-14 weeks, the ration should contain 17% protein and for 15-20 weeks the ration should contain 14%. Supplementing the mash with grain will reduce the overall cost, near the end of the rearing phase.

Pullets begin to receive grain as soon as they start eating growing mash. Corn, wheat, barley, oats, millet, grain sorghum, or combinations from all of these can be used. Begin with the ratio of grain to mash 10:100. Increase

the proportion of grain until the

pullets get equal parts of grain and mash. Use separate hoppers for grain and mash. When the pullets are 18-20 weeks old replace the growing mash with laying mash.

Feeding birds on range:

Range (green feed) cannot provide a complete diet for birds.

They need additional nutrients of a growing ration.

Table scraps, garden products and surplus milk can be useful feed supplements to reduce costs. Peelings, stale bread and leafy vegetables such as cabbage, cauliflower, turnips, are useful. Instead of onions, onion flavored eggs can be fed. Fresh or sour milk is a valuable feed. Avoid feeding spoiled or moldy feeds. The chickens should also receive in soluble grit. Grit is available in chick or hen size. Grit should be available free choice, 2 or 3 days per month. Fine gravel is an acceptable substitute for purchased grit.

It is important to note that calcium, bone or seashells do not substitute for grit. Calcium sources dissolve in the birds system, grit does not. Grit is used as “teeth” to grind up hard grains etc., and should be granite or some other hard rock and should be angular, not rounded from stream bottoms. Laying hens need a large amount of calcium for egg shells which can be fulfilled by free choice feeding of oyster shell or calcium grit. Dried egg shells also can be fed back to the hens. Feed loses its quality when stored for longer period.

7.7 POULTRY DISEASE AND THEIR REMEDIES:

There are many common and important diseases that affect the respiratory system (air passages, lungs, air sacs) of poultry. Due to modern systems of management, usually with high poultry densities, these diseases are able to readily spread.

1) Fowl Pox:

There are two forms of fowl pox. The dry form is characterized by, raised wart-like lesions on un-feathered areas (head, legs, vent, etc.). Un-thriftiness and retarded growth are typical symptoms of fowl pox. In laying hens, infection results in a transient decline in egg production. In the wet form there are canker-like lesions in the mouth, pharynx, larynx, and trachea. The wet form may cause respiratory distress by obstructing the upper air passages. Fowl pox is transmitted by direct contact between infected and susceptible birds or by mosquitos. Virus-containing scabs also can serve as a source of infection. The virus, enter the blood stream through the eye, skin wounds, or respiratory tract. Mosquitos are the primary reservoir and spreaders of fowl pox on poultry ranges. No treatment is available. Thus, it is possible to vaccinate to stop an outbreak. The wing-web vaccination method is used for chickens. Fowl pox

outbreaks, can be controlled by spraying to kill mosquitos. However, if fowl pox is endemic in the area, vaccination is recommended.

2) Newcastle Disease:

Newcastle disease affects all birds of all ages. In such species, it causes a mild conjunctivitis. There are three forms of Newcastle disease—mildly pathogenic, moderately pathogenic and highly pathogenic. Newcastle disease is characterized by a sudden onset of clinical signs which include hoarse chirps (in chicks), watery discharge from nostrils, gasping, facial swelling, paralysis, trembling, and twisting of the neck (sign of central nervous system involvement). In adult laying birds, symptoms can include decreased feed and water consumption and a dramatic drop in egg production. The Newcastle virus can be transmitted short distances by the airborne route or contaminated shoes, caretakers, feed deliverers, visitors, tires, dirty equipment, feed sacks, crates, and wild birds. There is no specific treatment for Newcastle disease. Antibiotics can be given for 3–5 days to prevent secondary bacterial infections. For chicks, increasing the brooding temperature 5°F may help reduce losses. Vaccination, good sanitation, and implementation of a comprehensive biosecurity program can prevent this disease.

3) Marek's Disease:

Chickens between 12 to 25 weeks of age are most commonly clinically affected. Marek's disease is a type of avian cancer. Tumors in nerves cause lameness and paralysis. Tumors can occur in the eyes, liver, kidney, spleen, gonads, pancreas, proventriculus, lungs, muscles, and skin can cause blindness, incoordination, un-thriftiness, paleness, and weak labored breathing, and enlarged feather follicles. Marek's usually occurs in chickens 12 to 25 weeks of age and Lymphoid Leukosis usually starts at 16 weeks of age. The Marek's virus is transmitted by air within the poultry house and is in the feather dander, chicken house dust, feces and saliva. Infected birds carry the virus in their blood and are a source of infection for susceptible birds. There is no treatment for this disease. But chicks can be vaccinated at the hatchery. While the vaccination prevents tumor formation, it does not prevent infection by the virus.

Infectious Bursal Disease (Gumboro):

Species affected are chickens. In affected chickens, there is rapid onset of the disease with a sudden drop in feed and water consumption, watery droppings which leads to soiling of feathers around the vent, and vent pecking. The virus is spread by bird-to-bird contact, contact with contaminated people and equipment. The virus is shed in the bird droppings. It can be spread by air on dust particles. Dead birds are also a source of the virus and should be incinerated. There is no specific treatment. Vitamin-electrolyte therapy is helpful. A vaccine is commercially available.

4) Avian Influenza (Fowl Plague):

Avian influenza can occur in most species of birds. The mild form produces listlessness, loss of appetite, respiratory distress, diarrhea, transient drops in egg production, and low mortality. The highly pathogenic form produces facial swelling, blue comb and wattles, and dehydration with respiratory distress. Avian influenza is spread by contaminated shoes, clothing, crates, and other equipment's. Insects and rodents may carry the virus from infected to susceptible poultry. There is no effective treatment for avian influenza. Good husbandry, proper nutrition, and broad-spectrum antibiotics may reduce loss from secondary infections if the disease is in its mild form. A vaccination program used in conjunction with a strict quarantine has been used to control mild forms of the disease. Strict quarantine and rapid destruction of all infected flocks remains the only effective method of stopping an avian influenza outbreak.

7.8 SUMMARY

Poultry keeping, in India, has for a long time remained a rural cottage enterprise. The common village hen receives very little attention and care. As a result its productivity also is low. But now poultry is one of the fastest growing segments of the agricultural sector. The poultry sector in India has undergone a total change in structure and its operation. A significant feature of India's poultry industry is its transformation from a mere backyard activity to a major commercial activity in a very short span of four decades. As this business gives regular income, the standard of living of the people is improved and in turn helps in the rural development.

7.9 QUESTIONS FOR SELF-STUDY

- 1) What are the different varieties of chicken breeds ?
- 2) Which breeds of chicken are used for meat production ?
- 3) Discuss the four systems of poultry housing.
- 4) What are the advantages of deep litter system ?
- 5) What is poultry management ?
- 6) Discuss poultry feed management.
- 7) Which diseases affect the poultry birds and what are their remedies ?
- 8) Write short notes on:
 - a) Poultry Keeping
 - b) Poultry housing



FISHERIES–I

Unit Structure:

- 8.1 Objectives
- 8.2 Introduction
- 8.3 Concept of Fishing
- 8.4 Scope of Fishing
- 8.5 Importance of Fishing
- 8.6 Benefits Of Fish Farming
- 8.7 Aquaculture
- 8.8 Fishing Techniques
- 8.9 Steps To Start Fish Farming
- 8.10 Fish Farming Methods
- 8.11 Government Programs
- 8.12 Summary
- 8.13 Questions

8.1 OBJECTIVES

- a) To understand the concept and scope of fishing
- b) To study the importance and types of fishing
- c) To study the preservation of fish
- d) To study the fish farming methods

8.2 INTRODUCTION

Fishing in India is a major industry in its coastal states. About 14.5 million people are engaged in fishing. India has 8,118 km of marine coastline. India is a major supplier of fish in the world. Shrimps are one of the major varieties of fish exported. The giant tiger prawn and Indian white prawn are the species chosen for aquaculture. Marine and fresh water catch fishing combined with aquaculture fish farming is a rapidly growing industry in India. Fish as food offers India one of the easiest and fastest way to address malnutrition and food security. Higher productivity, knowledge transfer for sustainable fishing, continued growth in fish production with increase

in fish exports have the potential for increasing the living standards of Indian fishermen. Fishing and aquaculture in India has along history. For centuries India had a traditional practice of fish culture. Brackish water farming is also an age-old system in India.

8.3 CONCEPT OF FISHING

Fishing is the activity of trying to catch fish. Fishing techniques include hand gathering, spearing, netting, angling and trapping. The term fishing may be applied to catching other aquatic animals.

8.4 SCOPE OF FISHING

Fishing in India employs about 14.5 million people. Rich marine and in land water resources, fisheries and aquaculture of India offer an attractive and promising sector for employment, livelihood and food security. Half of world's countries receive fish products from India. It has created export driven employment opportunities in India and also greater food security for the world. Indian fisheries and aquaculture has witnessed lot of improvements in craft, tackle and farming methods during the past decades. Central and state governments also have shown interests in the creation of required harvest and post-harvest infrastructure.

8.5 IMPORTANCE OF FISHING

The importance of fishery in a country cannot only be measured by its contribution to the GDP of the country, but also take into consideration that fisheries resources and products are fundamental components of human feeding and employment. Fisheries resources are the self-renewable character. If fishery resources are well managed then their duration is unlimited. The fundamental basis for the conservation and management of fisheries, stem from the biological characteristics. When fish consumed in small quantities, it comprises a nutritionally important part of many people's diets in developing countries. Fish is a vital source of proteins and micronutrients, and improves the quality of protein in largely vegetable and starch based diets. It also provides essential amino acids. Fish is also rich in iron, zinc, magnesium, phosphorous, calcium, vitamin A, and vitamin C and iodine. It also contains fatty acids for the development of brain and body.

8.6 BENEFITS OF FISH FARMING

A commercial fish farming business has many advantages.

They are as follows:

- 1) Fish and fish products have huge demand not only in India but also all over the world. It is one of the common favorite food menu in the Indian diet.
- 2) There is always a high demand for fish in the market and also the prices are high for the fish and its related products.

- 3) The climate in India is most suitable for fish production and fish farming.
- 4) Various types of water sources are easily available.
- 5) Different types of fast growing fish are available and farming those fish species ensures rapid returns in investments.
- 6) Integrated fish farming is profitable as the feeding cost is less, easily available species, low cost labor and gives maximum production.
- 7) Fish farming in India is a profitable business with less risk, providing financial freedom and permanent income opportunities. Commercial fish farming can create new employment opportunities with new income.
- 8) Fish farming can be taken as an allied or subsidiary occupation, if you have all the necessary facilities for starting the business.
- 9) Minimum capital is required to start this business.

8.7 AQUACULTURE

India laid the foundation for scientific fish farming (carp fish) between 1970 -1980. The production level was very high of 8-10 tons per hectare per year in an incubation centre. This transformed the Indian aquaculture into a modern enterprise. Fishing industry got a major investment boost after the economic liberalization policy of India in 1990's. Indian breeding and culture technologies deal primarily with the different species of carp, catfish, murals and prawns. The two points taken into consideration while adopting the culture systems are the inputs available in the area and the financial or investment capabilities of the farmer. Extensive aquaculture is carried out in large water bodies and the only input is fish seeds. Semi intensive culture also utilizes natural productivity, elements of fertilization and feeding.

India also practices different culture systems. They are

- 1) Integrated fish farming with poultry, piggery, horticulture
- 2) Intensive pond culture with supplementary feeding
- 3) Composite carp culture
- 4) Running water fish culture
- 5) Weed based carp poly-culture
- 6) Pen culture
- 7) Cage culture

Ponds and tanks are the prime resources for fresh water aquaculture in India. Currently less than 10% of India's natural potential is used. The total

brackish-water area under cultivation is only just over 13% of the potential water area available. There is greater opportunity for productive shrimp farming in India. Fresh water aquaculture activity is practiced in the states of West Bengal, Orissa, Andhra Pradesh, Punjab, Haryana, Assam and Tripura. Brackish water aquaculture is mainly practiced in Andhra Pradesh, Tamil Nadu, Orissa and West Bengal.

8.8 FISHING TECHNIQUES

Fishing techniques are methods for catching fish. Fishing techniques include hand-gathering, spear fishing, netting, angling and trapping. Artisanal fishers use traditional methods of fishing, recreational fishers use angling methods and commercial fishers use netting methods.

1) Hand Fishing:

It is possible to fish and gather many sea-foods with minimum equipment's by using the hands. Sea food gathered by hands is as easy as picking shellfish or digging crabs or clams. Pearl divers traditionally harvested oysters by free diving.

2) Spear fishing:

Spear fishing is an ancient method of fishing, where in an ordinary spear or specialized instruments like harpoon, trident, arrow or eel spear are used. Some fishing spears use slings or rubber loops to propel the spear.

3) Netting:

Fishing nets are meshes usually prepared by knotting relatively thin threads. Netting is the principal method of commercial fishing. The other methods also used are longlining, trolling, dredging and traps.

4) Artisanal techniques:

a) Chinese fishing nets - They are shore operated lift nets. Huge mechanical contrivances hold out horizontal nets. The nets are dipped into the water and raised again or else they cannot be moved.

b) Limpkin nets - The limpkin fish take shelter under the rafts, seeking shade, and are caught by the fishermen using large mesh nets.

c) Cast nets - Cast nets also called throw nets are round nets with small weights distributed around the edge. The net is thrown by hand in water in such a way that it spreads out and sinks in water. As the net is hauled back fish are caught in that. This has been used since thousands of years.

d) Drift nets - These nets are not anchored. They are mostly used in the coastal waters.

e) Ghosts nets- These are lost nets and are a menace to marine life.

f) Gillnets- Fish which try to pass through by snagging on the gill covers are trapped in these nets and they can neither advance nor retreat.

g) Hand nets- They are also called scoop nets. These nets are small nets held open by a hoop. They are used for scooping up fish near the surface of the water. If the nets have a long handle they are called dip nets. They are called landing nets when used by anglers to help land fish. As hand netting does not harm fish they are used for tag and release or capturing aquarium fish.

h) Tangle nets- They are also known as tooth nets. They have smaller mesh size and are designed to catch the fish by teeth or upper jaw bone instead of gills.

i) Trawl nets- These nets are large nets, conical shaped. They designed to be towed in the sea. The trawl is pulled by one or more boat. These boats are called trawlers and the activity of pulling the trawlers through the water is called trawling.

j) Seine nets- These nets are large fishing nets and can be arranged in different ways. Purse seine, Danish seine and beach seine are the different types of seine nets.

5) Angling: This method of fishing is done, by using a hook. The hook is attached to a line and sometimes weighed down by a sinker to sink in the water. The hook is baited with lures or bait-fish. Angling is the principal method of sport fishing. Commercial fishing also uses this method of fishing and is called longling or commercial trolling.

Angling with a rod: An angler in his float tube plays a hooked pike. Fishing rods give more control of the fishing line.

6) Line Fishing: Fishing with a fishing line is called Line Fishing. Fishing line is a cord made for fishing. Its parameters are its length, material and weight. The factors for chosen for a given fishing environment include breaking strength, knot strength, UV resistance, cast ability, limpness, stretch, abrasion resistance and visibility. Modern fishing lines are made from artificial substances. Drop lining, Hand lining, jiggrpole, jigging, long lining, stabbing, trolling, trot lining are different fishing lines.

7) Bank Fishing: Bank fishing is fishing from riverbank and similar shorelines. Bank fishing's done by using a fishing rod and reel. Nets, spears and traps are also used. Bank fishing has its own requirements like local knowledge, water depth, bank structure, location, time of the day and the type of lures and baits.

8) Casting: It is the act of throwing the fishing line out over the water using a flexible fishing rod.

9) Float tubes: These are small doughnut shaped boats having and under water seat in the hole. Float tubes are used for fly-fishing. They help the angler to reach in deep water.

10) Fly fishing: They are made with specially fly rods and fly lines. Fly-fishing is adistinct and ancient angling method. Artificial flies are used as lures.

11) Boat fishing: It is done from a boat, from shoreline or river bank. Compared to fishing from land, fishing from a boat allows more access to different fishing grounds and species of fish.

12) Remote control fishing: This is done by using remote controlled boat. This technique is becoming popular.

13) Trapping: Traps are universal and seem to have been independently invented. Traps are of two types permanent traps or semi-permanent traps.

Destructive Techniques of Fishing:-

Destructive fishing practices cause irreversible damage to the aquatic habitats and ecosystem. If used inappropriately many fishing techniques can be destructive. Some examples of destructive fishing are using explosive, bottom trawling, cyanide fishing, fish toxins, muroami.

8.9 STEPS TO START FISH FARMING

Fish is the cheapest and most easily digestible animal protein. It was obtained from the natural resources for consumption long back. The scientists were forced to adopt various methods to increase the fish production. Due to over exploitation and pollution the availability of fish declined to a great extent. It has now become easier to increase the fish production and its availability under controlled or artificial fish farming methods. Fish farming can be done in village ponds, tanks or any other new water body to improve and increase financial status. Employment opportunities are generated for skilled and unskilled youth. The most advanced and popular technology developed in fish farming is the fish culture in which more than one type of compatible fishes are cultured simultaneously. This technology is known as Composite Fish Culture. It enables to get maximum fish production from a pond or a tank with available resources. Any perennial fresh water pond or tank can be used for fish culture. Even seasonal ponds can be used for fish culture for a short duration.

To start fish farming business various steps have to be followed. They are pond preparing, selecting fish breed, feeding the feed, taking care and management and the main step is marketing.

1) Pond Preparing-

The main infrastructure of fish farming is the pond. Without this commercial fish farming cannot be practiced. Fish can be raised in both the ponds seasonal and permanent ponds. Fish farming in seasonal pond will require some fast raising and quick maturing breeds of fish. Pond has to be prepared properly before stocking minnow in the pond. The bottom of the pond should be cleaned accurately and should be fertilized. PH value and soil of the pond should be checked. If the environment of the pond is perfect then the farmer is assured of high production and good profit.

2) Fish Breed-

The overall production and profit depends on the proper selection of fish breeds. Select the fish breeds that would be suitable in the area. Certain factors are to be considered while selecting the fish breed. They are market demand of fish, maintaining facilities, natural facilities, sufficient water, effective utilization and some other factors depending on the area. The suitable fish breeds that can be used for fresh water farming in ponds are Katla, Rohu, Grass Carp, Silver Carp, Common carp, Tilapia, Koi, Shrimp, and various types of cat fish. Numerous fish breeds can be raised together for the proper utilization of the pond.

3) Feeding-

Most of the farmers in the country depend on natural feeds of pond. But good and high quality fish feed will to maximize the production. In commercial farming fish has to be fed with high quality and nutritious food. Most popular and highly profitable integrated fish farming systems are fish-poultry, fish- dairy, fish- pig, fish-paddy, fish-goat, fish-vegetables.

4) Care and Management-

Good care of fish has to be taken along with the good environment in the pond and high quality feed. The growing fish in the pond requires more attention, care and management. PH level between 7-8 is best suitable for fish farming. Predators are to be prevented from entering the pond and also take essential steps to prevent fish diseases. Prevention is better than cure, so taking the utmost care of pond is the prime concern.

5) Marketing-

You can desire good and high production of fish with proper marketing facilities available. The main facility of commercial fish farming is that the fish can be sold at a proper price. The fishermen in India sell their product in the nearest local market. There is a great demand for Indian fish in the inter national market also.

Fish farming in India is an ever-increasing business. Growth in population will increase the demand for food. So there are more opportunities for the youth of India to get employment and earn income. It can also solve the problem of poverty, unemployment and hunger in the country.

8.10 FISH PROCESSING

Fish processing is the processes associated with fish and fish products between the time fish are caught or harvested, and the time the final product is delivered to the customer. Fish are highly perishable. A major concern underlying during the processing operations is to prevent fish from deteriorating. The most obvious method for preserving the quality of fish is to keep them alive until they are ready for cooking and eating.

Fish processing is subdivided into fish handling and the manufacture of

fish products. Fish handling is the preliminary processing of raw fish. Another natural subdivision is that primary processing is involved in the filleting and freezing of fresh fish to distribute to fresh fish to retail and catering outlets. The secondary processing involves chilled, frozen and canned products for their retail and catering trades. Now-a-days fish processing is undertaken by artisan fisherman, on board fishing or fish processing vessels, and at fish processing plants.

Other methods used to preserve fish and fish products are

- a) Controlling the temperature using ice, refrigeration or freezing.
- b) Control of water activity by drying, salting, smoking or freeze drying.
- c) Physical control of microbial loads by adding acids.
- d) Oxygen deprivation like vacuum packing.

Usually more than one of these methods is used. The cold chain should be maintained, when chilled or frozen fish or fish products are transported by road, rail, sea or air. Insulated containers or transport vehicles and adequate refrigeration is required for this transport. Fish processing also deals with proper waste management and with adding value to fish products. There is an increasing demand for ready to eat fish products that do not need much preparation.

8.10.1 Handling the Catch:

When the fish is harvested for commercial purposes, they need some pre-processing so that they can be delivered to the next part of the marketing chain in fresh and undamaged condition.

Common handling processes are:

- 1) Transferring the catch from the fishing gear to the fishing vessel.
- 2) Holding the catch before further handling
- 3) Sorting and grading
- 4) Bleeding, Gutting and Washing
- 5) Chilling
- 6) Storing the chilled fish
- 7) Unloading the fish when the fishing vessel returns to the port.

The order of operations varies with the fish species and the type of fishing used to catch it, size of the fishing vessel and how long it is at the sea, and the nature of market it is supplying.

The common practice and obvious way of keeping fish fresh is to keep them alive until they are delivered to the buyer or ready to be eaten. The fish are placed in a container in clean water and the dead and damaged fish are removed from that. The water temperature is lowered to starve the fish to reduce their metabolic rate. Fish can be kept alive in floating cages, wells and ponds. Holding basins are used in aquaculture, where the water is continuously filtered and its temperature and oxygen level is controlled.

Live fish is transported by methods like simple artisanal method in which fish are placed in plastic bags with an oxygenated atmosphere, to sophisticated methods wherein trucks filter and recycle the water and add oxygen and regulate temperature.

8.10.3 Preservation

Preservation techniques are necessary to prevent spoiling of fish and also lengthen shelf life. Spoilage bacteria are the specific bacteria that produce the unpleasant odors and flavors associated with spoiled fish. Preservation techniques work by interrupting one or more of the needs like right temperature, sufficient water and oxygen and surroundings that are not too acidic.

Classification of preservation techniques is as follows:

a) Control of Temperature :

The metabolic activity in the fish from microbial or autolytic processes can be reduced or stopped on decreasing the temperature. This can be achieved by refrigeration where the temperature is dropped to 0 °C or freezing where the temperature is dropped below -18°C.

On fishing vessels, the fish are refrigerated mechanically by circulating cold air or by packing the fish in ice box. Chilled seawater is also used to maintain low temperature. Once chilled or frozen, further cooling is necessary to maintain the low temperature for the fishes.

An effective and safe method of preserving the freshness of fish is to chill with ice by distributing ice uniformly around the fish so that the fish remains moist and in an easily stored form suitable for transport. Recent development is pumpable ice technology. Pumpable ice flows like water and it cools fish faster than fresh water solid ice methods and eliminates freeze burns.

b) Control of Water Activity:

The water activity in a fish is defined as the ratio of the water vapor pressure in the fish to the vapor pressure of pure water at the same pressure and temperature. Traditional techniques such as drying, salting and smoking have been used for thousands of years. Recently the techniques added are freeze-drying, water binding humectants, and fully automated equipment with temperature and humidity control. A combination of all

this is often used.

In heat orionizing irradiation method, heat is applied by cooking, blanching or micro wave heating, in a manner that pasteurizes or sterilizes fish products. This method kills the bacteria that cause decomposition. Sterilized products are stable at ambient temperatures up to 40 °C, but to ensure they remain sterilized they need packaging in metal censor restorable pouches before the heat treatment.

c) Chemical Control of Microbial Loads:

Bio-preservation is achieved by adding antimicrobials or by increasing the acidity of the fish muscle. Acidity is increased by fermentation, marinating or by directly adding acids (acetic, citric, lactic) to fish products. Other preservatives include nitrites, sulphite, sorbets, benzoates and essential oils.

d) Control of the oxygen reduction potential:

Reduction of the oxygen around the fish can increase shelf life and this is done by controlling the atmosphere around the fish, or by vacuum packaging.

Controlled atmospheres have specific combinations of oxygen, carbon dioxide and nitrogen.

e) Combined Techniques:

Two or more techniques are often combined to improve preservation and reduce unwanted side effects. Common combinations are salting and drying, salting and marinating, salting and smoking, drying and smoking, pasteurization and refrigeration and controlled atmosphere and refrigeration.

Waste produced during fish processing operations can be solidor liquid.

Solid wastes include skin, viscera, fish heads and fish bones which can be recycled in fish meal plants or it can be treated as municipal waste.

Liquid wastes include blood water and brine from drained storage tanks, and water discharges from washing and cleaning. This waste should be disposed without damage to the environment and the aquatic ecosystem.

f) Transport:

Fish is traded live, fresh, frozen and is transported in ships, by land and air. Much fish is traded internationally. Live , fresh and frozen fish need special care.

Live fish: Live fish need oxygen, carbon dioxide and ammonia when they are transported. The fish are often starved before they are transported to reduce their meta bolism and increase packing intensity.

By Air:

Around five percent of the global fish production is transported by air. It needs special care in preparation, handling and careful scheduling.

By Land or Sea:

Maintenance of the cold chain, for fresh, chilled and frozen products and the optimization of the packing and stowage density are the most challenging aspects of fish transportation by sea. This requires the use of insulated containers of transport vehicles and adequate quantities of coolants or mechanical refrigeration.

g) Finish products:

Finish products of fish are presented for marketing in one of the following forms.

- 1) Whole Fish-The fish remains as it is from water with no processing done.
- 2) Drawn Fish- The fish remains the whole with its internal organs removed.
- 3) Dressed Fish- Fish is scaled and internal organs removed and ready to cook.
- 4) Pan Dressed Fish- A dressed fish, which has had its head, tail and fins, removed to fit in the pan.
- 5) Filleted Fish- It is the fleshy side of fish cut length wise from the fish along the back bone.
- 6) Fish Steaks- Large dressed fish with across section of the back bone.
- 7) Fish Sticks- Pieces of fish cut into portion of 3/8 inch thick. They are ready to be cooked coated with batter and breaded.
- 8) Fish Cakes- They are prepared from flaked fish, potatoes, and seasonings, shaped into cakes, coated with batter, breaded and then packed and frozen and are ready to be cooked.

8.11 GOVERNMENT PROGRAMS

The government of India launched National Fisheries Development Board in 2006 with the activities focused on

- 1) Intensive aquaculture in ponds and tanks
- 2) Fisheries Development in Reservoirs.
- 3) Coastal Agriculture
- 4) Mari-culture

- 5) Sea-wood Collection
- 6) Infrastructure-Fishing Harbors and Landing Centers
- 7) Fish Dressing Centers and Solar Drying of Fish
- 8) Domestic Marketing
- 9) Technology Up-gradation
- 10) Deep Sea Fishing and Tuna Processing

Its headquarter is in Hyderabad, located in a fish shaped building. The implementation of two programs for in land fisheries–

a) Establishing Fish Farmers Development Agencies and b) National Program of Fish Seed Development led to encouragingly increased production of fish in the country.

8.12 SUMMARY

Fishing in India is a major industry in its coastal states. Marine and fresh water catch fishing combined with aquaculture fish farming is a rapidly growing industry in India. Fish as food offers India one of the easiest and fastest way to address malnutrition and food security. Higher productivity, knowledge transfer for sustainable fishing, continued growth in fish production with increase in fish exports have the potential for increasing the living standards of Indian fishermen. Fishing and aquaculture in India has along history. For centuries India had a traditional practice of fish culture. Brackish water farming is also an age-old system in India.

8.13 QUESTIONS FOR SELF-STUDY

- 1) Explain the concept, scope and importance of fishing in India.
- 2) Discuss Aquaculture.
- 3) Give the different fishing techniques used for fishing.
- 4) What are the steps taken to start fishing?
- 5) What is the different preservation techniques used to prevents poiling of fish?
- 6) Write short notes on:
 - a) Benefits of fishfarming
 - b) Fish processing
 - c) Handling the catch
 - d) Handling live fish
 - e) Government programs to support fish farming



AGRO-ALLIED SECTOR PRODUCTS

Unit Structure :

- 9.1 Objectives
- 9.2 Introduction
- 9.3 Concept of agro-allied business sector (Industry)
- 9.4 Types agro-allied businesses.
- 9.5 Need of agro-related business.
- 9.6 Problems of agro-allied business field
- 9.7 Summary
- 9.8 Questions

9.1 OBJECTIVES

- 1) To understand the concept of agro-related business sector.
- 2) To understand types agro-allied businesses,
- 3) To know the need for processing on production in agro-related business.
- 4) To know the problems in agro-allied business field

9.2 INTRODUCTION

Agriculture is the main occupation in our country. It provides employment to nearly 50% people of total population. It contributes 25% to national income, but comparing with other develop countries Indian agriculture is still traditional and dependent on monsoon. We use more labor in our farms but other develops countries use more machinery involving high amounts of capital. In India you can see small farms but large sized farms can see in the other develop countries. We use low quality seeds and fertilizers but other develop countries use HYV seeds and high quality fertilizers.

All above differences leads to low productivity of the Indian agriculture sector Agricultural production is low in India. India produces 27 Qtls. wheat per hectare. France produces 71.2 Qtls per hectare and Britain 80 Qtls per hectare. Average annual productivity of an agricultural laborer is 162 dollars in India, 973 dollars in Norway and 2408 dollars in USA.

In India methods of production of agriculture along with equipment are traditional. It is due to poverty and illiteracy of people. Traditional technology is the main cause of low production.

To increase the productivity of agriculture sector and income of the Indian farmers, government and farmers need to put stress on the agro-allied activities to overcome the issue of low productivity of the agriculture as well as related fields.

9.3 CONCEPT OF AGRO-ALLIED BUSINESS

“When the income from agriculture is not guaranteed, farmers have an alternative source of income. Therefore, the occupations that are carried out, or the occupations that are possible are called **agro-allied** occupations or business.”

Agriculture and other allied activities mainly include animal husbandry, poultry, dairy, piggy, pisciculture (fishery), apiculture (producing honey), and sericulture (producing raw silk from caterpillars).

9.4 TYPES AGRO-ALLIED BUSINESSES

The sectors allied to the agriculture sector are, dairy farming, poultry and milk production, fishery, animal husbandry etc. All these sectors are integrated to aid proper planning and effective execution of the developmental policies. All above mentioned allied sector activities classify mainly in three categories that is Livestock, Horticulture, and Fisheries.

A) Livestock Sector (livestock includes dairy, sheep, goat, poultry and piggy)

Livestock sector is an important sub-sector of agriculture which provides nutrient-rich food products, draught power, organic manure and domestic fuel, hides and skin and is a regular source of cash income for rural households.

i) Dairy farming:

Dairy farming consists of raising mother animals and collecting the milk that they produce after giving birth. Though cows are the most commonly farmed animal within the dairy industry, there are other animals that are also raised for their milk. According to the Food and Agriculture Organization of the United Nations, cattle produce 81 percent of milk, buffalo produce 15 percent, goats 2 percent, sheep 1 percent, and camels 0.5 percent.



<https://www.loksatta.com>

ii) Sheep & Goat rearing:

Goat rearing: is an enterprise which has been practiced by a large section of population in rural area. Goats are among the main meat-producing animals in India and have huge domestic demand. Goat rearing under intensive and semi-intensive system for commercial production has been gaining strength.

Sheep rearing: The practice of raising and breeding domestic sheep is known as Sheep rearing. Sheep are raised principally for their meat (lamb and mutton), milk (sheep's milk), and fiber.

iii) Poultry farming: poultry farming, rising of birds domestically or commercially, primarily for meat and eggs but also for feathers. Chickens, turkeys, ducks, and geese are of primary importance.

iv) Piggery: Pig *farming* or pork *farming* is the raising and breeding of domestic pigs as livestock, and is a branch of animal husbandry.

v) Apiculture: “Apiculture is the scientific method of rearing honey bees. Apiculture or beekeeping is the care and management of honey bees for the production of honey and wax.

B) Horticulture Sector (horticulture includes fruits, vegetables, flowers, spices, aromatic and medicinal plants, sericulture etc.)

India has maintained leadership in the production of many commodities like mango, banana, acid lime, coconut, cashew, ginger, turmeric and black pepper. Presently, it is the second largest producer of fruits and vegetables in the world. India is next only to China in area and production of horticulture sector.

i) Fruits & vegetables Production:

Fruit production: The word Pomology is made up of the Latin language word “Pomum”, meaning “fruit”, and Greek language word “logy”, meaning science, and this, the science of fruit production, is called pomology.

ii) Vegetable farming: growing of vegetable crops, primarily for use as human food. Vegetable farming operations range from small patches of crops, producing a few vegetables for family use or marketing, to the great highly organized and mechanized farms.

iii) Floriculture: floriculture, branch of ornamental horticulture concerned with growing and marketing flowers and ornamental plants as well as with flower arrangement.

iv) Aromatic and medicinal plants Production: There are so many plants now found in the world, which are identifying as medicinal and aromatic properties. Cultivators are cultivated them as a crop. However, our knowledge of medicinal crops has mostly been inherited traditionally.

The cultivation of medicinal and aromatic crops provides sustainable means of natural source of high value industrial raw material for pharmaceutical, agrichemical, food and cosmetic industries and opens up new possibilities for higher level of gains for farmer with a significant scope for progress in rural economy.

v) Sericulture Sector: Sericulture is a major sub-sector comprising the textiles sector. Sericulture emerged as an important economic activity, becoming popular in several parts of the country, because of its short gestation period and quick recycling of resources. It suits all types of farmers and exceptionally marginal and small land holders as it offers rich opportunities for enhancement of income and creates family employment round the year. India is the second largest producer of silk in the world.

C) Fish farming and Preservation: (Marine, in land and aqua farming), The fisheries and aquaculture sector is recognized as the fast growing sector in Indian agriculture providing nutritional security to the food basket, contributing to agricultural exports and engaging about 20 million people in different activities.

Fish farming: fish farming also called **Aquaculture**. Fish culture, or Mari culture, the propagation and husbandry of aquatic plants, animals, and other organisms for commercial, recreational, and scientific purposes.

Fish preservation is the method of increasing the shelf life of fish and other fish products by applying the principles of different branches of science in order to keep the fish, after it has landed, in a condition wholesome and fit for human consumption.



<https://www.slideshare.net>

9.5 NEED OF AGRO-RELATED BUSINESS

There is need of agro-related business in the rural development of India can be explained as follows.

1. Employment supply

As agriculture allied industries are essentially small-scale operations, their employment generation potential is high. As the amount of capital investment and employment is high, employment opportunities are available to the rural people. These industries play an important role in reducing semi-unemployment, seasonal unemployment, hidden unemployment and open unemployment in rural areas.

2. Supplementary Businesses to Agriculture

Many agriculture-related industries are complementary or auxiliary to agriculture. This helps in increasing the income of the farmers.

3. Less capital

Capital is scarce in India. In such a situation, agriculture allied industries which can be set up with less capital play an important role to achieve economic development.

4. Existence in rural areas

Majority of agro-allied industries are found to be localized in rural areas. E.g. Sugar Industry, Silk Industry, Handloom Industry etc. Thus the side effects of urbanization can be avoided. Many social and political and other problems are found due to urban industry. Industries in these rural areas help reduce the pressure of urbanization.

5. Scope for local raw materials

Industries based on agro-allied industries generally use local raw materials. Therefore, the farmers' income increases by getting a fair price for their produce.

6. Balanced development

As large industries are mainly concentrated in urban areas, urban areas are developed and rural areas remain underdeveloped. But if agriculture-related industries increase in the country, it is possible to reduce the disparity in economic development through regional development.

7. Cottage industry

Many agro-allied industries can be carried out by farming families in their own homes, thus providing employment to members of their household (family).

8. Low technology

Many agriculture related industries like fish farming, animal husbandry, dairy production, and beekeeping can be started with little technology. That means it can be done easily by less educated rural people due to their ease of installation.

9. Product diversity

Agriculture allied industries produce various goods. So there is diversity in it.

10. Adequate use of natural resources

The natural resources of the country can be properly and fully utilized as the raw materials required for agricultural industries are obtained from local production.

11. By product generation

As the sugar industry and some other industries produce complementary goods i.e. by-products, the production becomes diversified. It also helps in reducing the average cost of production.

12. Use of medicinal plants

Medicinal plants found in remote hilly areas are also used in agro-related industries, thus helping the development of nomadic tribal tribes.

13. Increase in rural income and poverty alleviation

By setting up agro-related industries in rural areas, their produce is used as raw material or processing industries are established and their farm produce gets better prices and their income increases. Moreover, supplementary agricultural industries help in increasing their income. It is possible to increase the income of the people in the rural areas and bring them above the poverty line. Overall it can be said that the participation of agriculture allied industries is important in poverty alleviation.

14. Reducing economic in equality

Economic disparity is high in rural areas. The development of agriculture-related industries also increases the income level of the low income group by providing them with complementary occupations. It helps in reducing economic disparity in rural areas.

15. Development of storage facilities

The growth of agro-allied industries leads to the development of storage facilities for agricultural produce in rural areas.

16. Development of transport and communication

Agriculture-related industries lead to the development of road transport in rural areas. There is an increase in means of transportation and convenience. The development of communication tools like post, telegraph, telephone, fax, and internet, mobile also helps in achieving the objective of balanced development planning.

17. Increase in rural savings

Agriculture allied industries increase the income of rural people and increase their saving capacity. Basically, since the consumption capacity of the rural people is low, a large part of the surplus income is saved and available for the development of the country.

18. Increase in basic amenities

Facilities like roads, electricity, water, education, banks, cooperatives, transport system, post come into being in rural areas due to agriculture related industries. Therefore, overall development of the rural areas is encouraged.

19. Market Development

An advantage of the increase in primary amenities is the emergence and development of markets to sell agricultural produce. Especially with the emergence of the Co-operative Markets movement, their success also increased. This seems to have benefited the agricultural producers in many ways. Also, there is an increase in activism in politics.

20. Scope for rural entrepreneurship

In many places, new entrepreneurs from rural areas make their debut in this field as little capital and little technology is required for setting up industries. This gives an opportunity to the combination skills they have in place.

21. Development of Co-operative Societies

A co-operative is a voluntary association of weaker parties. Factories on co-operative principles have started to grow in rural areas. Agriculture allied industries include processing, production, distribution, credit,

transportation, storage, buying and selling activities etc. In almost all sectors, the cooperative movement has flourished in rural areas.

22. Export growth

The products of numerous agricultural industries like silk cloth, tea, coffee, sugar, textiles, jute, and spices are being exported. Recently, an industry has started developing to increase the export of fruits by processing them. Such exports provide valuable foreign exchange to the country.

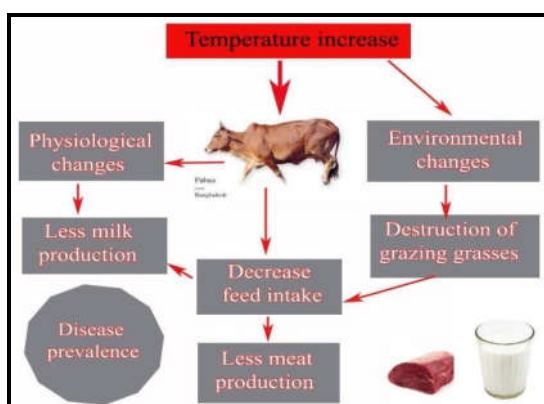
23. Changes in people's living conditions

While summarizing all the above activities, it can be seen that agriculture related industries are improving the living conditions of people in rural areas and agriculture related industries are working to transform rural areas. Let us see some examples. These examples will make it easier for you to understand this part.

9.6 PROBLEMS OF AGRO-ALLIED SECTOR

i) Infrastructure and rural support service: the production of agro-allied sector requires irrigation, power, machinery, credit, energy and telecommunication facilities, marketing services, transport services which includes railway, roads, shipping and communication facilities etc. All these facilities and services which help in industrial and agricultural production constitute collectively the infrastructure of an economy. States of India have large disparities.

ii) Climate change: Livestock are adversely affected by the detrimental effects of extreme weather. Climatic extremes and seasonal fluctuations in herbage quantity and quality will affect the well-being of livestock, and will lead to declines in production and reproduction efficiency. Climate change is a major threat to the sustainability of livestock systems globally. Consequently, adaptation to, and mitigation of the detrimental effects of extreme climates has played a major role in combating the climatic impact on livestock.



<https://www.pashudhanpraharee.com>

iii) Deterioration of the natural resource: Over consumption of natural resources results in environmental degradation, reducing the effectiveness of essential ecosystem services, such as the mitigation of floods and landslides. This leads to increased risk from disasters, and in turn, natural hazards can further degrade the environment.

iv) Limited Knowledge: The absence of information, lack of awareness and limited knowledge about opportunities in agro-allied sector, Even knowledge about technology and production systems is also a major hurdle.

v) Quantity and standard: Development of Agro-allied sector is also depend on the quantity of products. The quality suffers because of lack of standardization while processing of raw material in agro-allied sector. These factors exert additional pressure on agro-allied industries in terms of operations related to production.

9.7 SUMMARY

The agriculture and allied sector continues to be pivotal to the sustainable growth and development of the Indian economy. Not only does it meet the food and nutritional requirements of 1.3 billion Indians, it contributes significantly to production, employment and demand generation through various backward and forward linkages. Moreover, the role of the agricultural and allied sector in alleviating poverty and in ensuring the sustainable development of the economy is well established. The farmer welfare-centered approach to agricultural development can empower the rural masses with higher income and employment and make balanced development a reality. Hence, in policies of poverty alleviation and enhancing sustainable development, agriculture has enormous potential

9.8 QUESTIONS

- 1) Define the concept of agro-related business and write its importance.
- 2) State various types' agro-allied businesses.
- 3) Elaborate the various problems in agro-allied business field

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PROCESSING OF AGRO-ALLIED SECTOR PRODUCTS

Unit Structure :

- 10.1 Objectives
- 10.2 Introduction
- 10.3 Concept of Processing of agro-allied sector products
- 10.4 Scope of Processing of agro-allied sector products
- 10.5 Types of Processing of agro-allied sector products
- 10.6 Importance of Processing of agro-allied sector products
- 10.7 Government schemes related to agro-allied sector
- 10.8 Problems Faced by processing of Agro-allied sector Industries
- 10.9 Summary
- 10.10 Questions
- 10.11 References

10.1 OBJECTIVES

1. To study types of Processing of products in agro-allied sector.
2. Study process examples on products in agro-allied sector.
3. To study the importance of processing products in agro-allied sector.

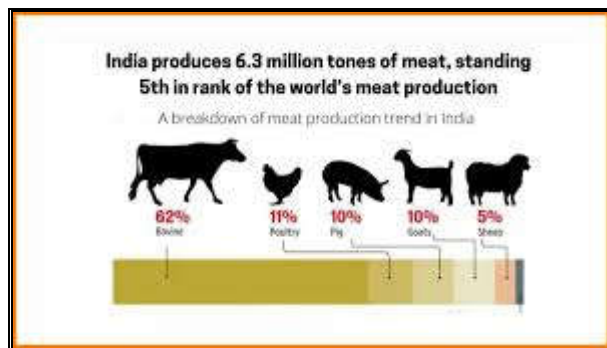
10.2 INTRODUCTION

The rural agro-allied sector processing industry can play a vital role in rural poverty alleviation, employment generation and sustainable development in our country. It can enhance farm incomes by offering a ready market for products in agro-allied sector, generate off-farm employment, and reduce rural–urban migration. Rural-based food processing industries are mostly small- and medium-sized enterprises (SMEs) and face such constraints as poor infrastructure, shortage of entrepreneurial talent and skilled manpower, limited access to appropriate technologies, volatile demand, and small profit margins

Nowadays Indian agriculture is expected to lead to a significant transformation of the economy through improvements in the sector's productivity. The sector is divided into a number of subsectors: crops,

cocoa, livestock, forestry, and fisheries etc. Here especially we are going to discuss the topic related to processing of agro-allied products that is products in the livestock fishery and so on.

Processing is an important activity related to the agricultural and allied sector and is dominated by predominantly small- and medium-scale firms. There are a lot of opportunities to add value to agro-allied commodities.



<https://www.insightsonindia.com>

10.3 CONCEPT OF PROCESSING OF AGRO-ALLIED PRODUCTS

1. An agro-industry is an enterprise that processes biomass, i.e. agricultural raw materials, which include ground and tree crops as well as livestock and fisheries, to create edible or usable forms, improve storage and shelf life, create easily transportable forms, enhance nutritive value, and extract chemicals for
2. Agro-based industries are industries that use plant and animal-based agricultural output as their raw material. Also, they add value to agricultural output by processing and producing marketable and usable products.

10.4 SCOPE OF PROCESSING OF AGRO-ALLIED SECTOR PRODUCTS

With urbanization and industrialization, agriculture land is shrinking day by day. Whereas demand for food is on rise with the increasing population and enhanced purchasing power of the people. Agro-allied sector have the potential to provide employment for the rural population not only in production of agro-allied sector, but also in off-farm activities such as handling, packaging, processing, transporting and marketing of food and agro-allied sector products.

The scope of agro-allied sector industries in India is pretty high because of the fact that the country is predominantly dependent on agriculture. According to the statistical data for the year 2020, the agriculture sector in India contributes about 18% to India's GDP. Also, approximately 42% of the Indian population is employed in the agricultural sector alone. The share of the population employed in the agriculture and allied sector has

been declining year after year because of various reasons. However, it still remains the largest sector employing the majority of the population.

Agro-allied sector industry is regarded as the sunrise sector of the Indian economy because of its huge potential for growth, likely socio economic impact, specifically on employment and income generation and for the ability to generally keep itself recession proof. Also, approximately 70% of the population is dependent on agriculture and agro-allied sector industries. According to the economic survey 2014-15, conducted by the Central Statistical Office, agro-allied industries consistently grew in India during the period 2009-10 to 2013-14. Some estimates also suggest that in developed economies, approximately 14% of the total workforce engages in the agro-processing sector directly or indirectly, whereas in India, only about 3% of the workforce finds employment in this sector. The data highlighted above reveals the underdeveloped state and the vast potential of growth in this sector.

10.5 TYPES OF AGRO-ALLIED SECTOR PRODUCTS

Agro-allied sector industry in India can be broadly classified into the following types:

- a. **Livestock Sector** (livestock includes dairy, sheep, goat, poultry and piggery)
- b. **Horticulture Sector** (horticulture includes fruits, vegetables, flowers, spices, aromatic and medicinal plants, sericulture etc.)
- c. **Fish farming and Preservation:** (Marine, inland and aqua farming).

- a. **Livestock Sector** (livestock includes dairy, sheep, goat, poultry and piggery)

i) **Meat processing:** Meat processing technologies were developed particularly in Europe and Asia. The European technologies obviously were more successful, as they were disseminated and adopted to a considerable extent in other regions of the world – by way of their main creations of burger patties, frankfurter-type sausages and cooked ham. Indian states like Andhra Pradesh, West Bengal, Maharashtra, Kerala, Delhi, Uttar Pradesh, and Rajasthan are the key areas of processed meat production in India. The total processing capacity in India is over 1 million tons per annum, of which 40-50 percent is utilized. India exports about 1,713,723.61 tons of Animal Products in 2021-22, mostly buffalo meat. Indian buffalo meat is witnessing strong demand in international markets due to its lean character and near organic nature.

ii) **Poultry meat Processing:** Poultry meat Poultry meat is the fastest-growing component of global meat demand, and India, the world's second-largest developing country, is experiencing rapid growth in its poultry sector.

iii) Milk and milk products: India continues to be the largest producer of milk in the world. The total milk production was 165.4 MT during 2016-17, with per capita availability of 355 grams per day. Among milk products, ice cream is one of the major processed products with an estimated market size of ` 4000 crore growing at 15% year on year growth. The packaged milk market in India is to the tune of 450 LLPD, which is worth ` 55000 crore per annum.



<https://www.youtube.com>

Milk powder, flavored milk, ice-cream, curd, butter, cheese, ghee etc. are other potential milk products manufactured in India. Sectoral Paper on Food Processing | 9 recent trends in Milk Processing: Freshly drawn raw milk has its own anti-microbial defense mechanism, i.e. lactoferrin, lacto peroxidase, lysozyme, and possibly N-acetyl- β -D-glucosaminidase (NAGase). But this anti-microbial defense mechanism of milk is temporary, which with time gets weaker, making milk prone to microbial spoilages. Conventionally, milk processing is done by heating of the milk to certain temperature for fixed duration of time, which causes significant reduction in microbial population. Various levels of thermal treatments are practiced for processing milk based on the thermal harshness of treatments, i.e. thermization, pasteurization and sterilization. Thermal processing has been widely adopted as the treated product is recognized safe for consumption with longer storage life. But with advancement of understanding, particularly in the domain “Dairy Science”, some undesirable changes are reported during heating of milk, such as, browning, development of a cooked flavour, loss of nutrients, inactivation of bacterial inhibitors and impairment of rennet ability, etc. Therefore, the need of non-thermal processing was realized and its practical applicability in milk processing was considered as an alternative to conventional heat treatment. The term non-thermal processing is a novel concept of processing which is limited not only to milk but also to other food products. Non-thermal food processing targets elimination of micro organisms or any other biological entities without causing significant rise in temperature, which prevents chain of undesirable reactions in foods.

b. Horticulture Sector (horticulture includes fruits, vegetables, flowers, spices, aromatic and medicinal plants, sericulture etc.)

Fruit Processing:

i) Wines are produced by fermentation of fruit juice or pulp by varieties of the yeast *Saccharomyces cerevisiae*, named 'wine yeasts'. Sugars in the juice, together with added sugar, are converted into alcohol and carbon dioxide. During fermentation, it is important to keep air out of the vessel to enable the yeast to produce alcohol and to prevent contamination by bacteria and moulds. Wines are preserved by their natural acidity and raised levels of alcohol (8-13%).



<http://www.fruitprocessingline.com>

ii) Jam, Jellies and Marmalades Cooking jams, jellies and marmalades using fruits, sugar, pectin and edible acids is one of the oldest food preserving processes known to mankind and presents a way of making food stable by increasing the content in soluble solids. The quality criteria for jams and marmalades are decisively determined by the flavour, colour and consistency as well as state of preservation and distribution of fruits. These properties depend to a high degree on the raw materials used, with special importance given to the proper selection of suitable fruits.

c. Fish farming and Preservation: (Marine, inland and aqua farming).

Marine Products Marine Products Indian fisheries and aquaculture is an important sector of food production, providing nutritional security to the food basket, contributing to the agricultural exports and engaging about 14 million people in different activities. With diverse resources ranging from deep seas to lakes in the mountains and more than 10% of the global biodiversity in terms of fish and shellfish species, the country has shown continuous and sustained increments in fish production since independence.



<https://www.gea.com>

India has the largest coastline with good potential for marine products. India produces 11.40 MT of fish. Riding on a robust demand for its frozen shrimp and frozen fish in international markets, India exported 11.35 lakh MT of seafood worth an all-time high of US\$ 5.78 billion (₹ 37,870 crore) in 2016-17 with USA and South East Asia continuing to be the major importers while the demand from the European Union grew substantially during the period. Frozen shrimp maintained its position as the top item of export, accounting for 38.28% in quantity and 64.50% of the total earnings in dollar terms. Shrimp exports increased by 16.21% in terms of quantity and 20.33% in dollar terms. Frozen fish was the second largest export item, accounting for a share of 26.15% in quantity and 11.64% in dollar earnings, registering a growth of 26.92% in terms of value.

10.6 IMPORTANCE OF PROCESSING OF AGRO-ALLIED SECTOR PRODUCTS

1. Employment Generation:

Small/large/medium scale processing industries are set up due to agro-allied industries. Skilled and unskilled workers are required in large quantities for this. Due to this industry, it is seen that employment opportunities are available to both types of workers on a large scale. From the point of view of employment generation, agro-related industries play a very important role.

2. Increase in National Product:

An increase in national income raises the standard of living of the people. Agriculture allied industries help to increase the national income. Due to the creation of direct agricultural industries and auxiliary or complementary industries i.e. industries supplying spare parts to agricultural industries, the national income has been increased by alternative production to a large extent.

3. Increase in Economic Development:

Agro-allied industries provide capital and services to farmers. (e.g. seeds, training, inputs, production and markets) Agro-allied industries are of great importance for increasing agricultural productivity, for continuous demand for agricultural products, for increasing agricultural adventure of farmers.

4. Aid in poverty alleviation:

Agro-industry helps increase productivity and creates chains for small holders. In turn, it helps in poverty alleviation. That is, the number of small, very small, landholders, artisans, landless farm laborers is large at the village level. This component provides large-scale farm employment and skilled employment in agro-based industries. Women are also accommodated in industry or agriculture according to their capacity. Therefore, the standard of living of the people in the areas where the

agricultural industries are located has certainly improved and helped in poverty eradication.

5. Help prevent migration:

A large number of skilled and unskilled workers migrate from rural areas to urban areas and suburbs in search of employment. In such a case, if agriculture related industries are created at the village level, it has helped to limit the migration of landless agricultural laborers, small and marginal land holders to a great extent.

6. Limitation on Civil Issues:

As employment opportunities are available at the village or taluka level, migration to the big cities has been prevented, which has helped to some extent to curb the internal social problems caused by migration to urban areas.

7. Raises financial status:

Agricultural industry has contributed to various types of development due to the processing of agricultural produce produced in rural areas. Due to the creation of employment at the village level, the poverty in the village is decreasing. There is a big gap between the attractiveness of manufacturing to urban areas and the training in it. However, since the agricultural industry is small/medium in nature, this greatly inhibits migration and contributes significantly to regional development.

8. Help improve food quality in rural areas:

Lack of employment leads to poverty and then the food available is meager. But the agriculture allied industry is helping in employment generation. Alternatively, it has helped to improve the economic condition of people in rural areas. Of course, this has resulted in improvement in food quality.

9. Equal development of agricultural sector and industrial sector:

Many of the components required in the agricultural sector especially for machines, tractors, nut bolts, nails, screws etc. and their manufacture requires industrial sector. In such a case, as all the goods required for agriculture are produced in the industrial sector, it is seen that the industrial sector is also developing equally with the agriculture related industries.

10. Secondary production from perishable goods:

Agricultural produce is perishable in nature. It is also seasonal in nature. Processing of such goods gives the goods a useful life. It increases durability. Goods can be obtained in off-season also.

11. Short training and skills:

People in rural areas have acquired skills in traditional occupations. It is seen that employment has been achieved by giving short training to women and other groups as per the need in agriculture related industries.

In such a variety of ways, you can be convinced of the information about agriculture related industries. Agriculture allied industries have an important place in the overall Indian economy. Therefore, the development of the country will be determined by the development of the rural areas

However, while starting an agricultural industry, it is necessary to keep some important points in mind.

1. Before starting the agricultural industry, it is necessary to study all the agricultural tools.
2. Also, it is necessary to study the entire district in depth about the activities, interests, and scope for your business.
3. Before starting a business, it is important to study the existing businesses, their status, and balances.
4. It is necessary to make full use of the equipment, plot, and capital labor that we invest. For this, it is important to consider these factors through a complete study survey.
5. Proper use of trained facilitators and appropriate technology is important.
6. It is necessary to determine the current and future policies by studying the credit policy, market and future demand for our product.

The following problems are strongly felt while doing this business.

1. Storage and handling of food grains.
2. Improvements in food processing technology.
3. Use of by products.
4. Effect of monsoon and changing crop pattern.
5. Lack of proper guidance for modernization.
6. Lack of financing.
7. Market uncertainty regarding manufactured goods and raw materials.
8. Seasonal nature of crops.

Professionals can definitely benefit if they enter the agro processing industry by considering such issues before hand.

Overall it can be said that agriculture affiliates are becoming important today.

10.7 GOVERNMENT SCHEMES RELATED TO AGRO-ALLIED SECTOR

Livestock insurance Scheme

This scheme aims to provide protection mechanism to the farmers and cattle rearers against any eventual loss of their animals due to death and to demonstrate the benefit of the insurance of livestock to the people and popularize it with the ultimate goal of attaining qualitative improvement in livestock and their products.

Scheme on Fisheries Training and Extension

It was launched to provide training for fishery sector so as to assist in undertaking fisheries extension programmes effectively.

National Scheme on Welfare of Fishermen

This scheme was launched to provide financial assistance to fishers for construction of house, community hall for recreation and common working place. It also aims to install tube-wells for drinking water and assistance during lean period through saving cum relief component.

National Food Processing Policy The objective of policy is to reduce wastage, increase value addition, and ensure better prices of farmers while ensuring availability and quality produce to consumers. The major highlights of policy is given below: → Single window clearance system → Promote fruit processing clusters → Strengthen agriculture marketing infrastructure → Facilitation of land allotment → Promote mega food parks/food parks → Support development of logistic infrastructure → Compliance with food safety regulatory requirements → Support to business units

Pradhan Mantri Matsya Sampada Yojana (PMMSY):

The PMMSY was announced in the Union Budget 2019-20 and it is designed to address critical gaps in fish production and productivity, quality, technology, postharvest infrastructure and management, modernization and strengthening of value chain, traceability, establishing a robust fisheries management framework and fishers' welfare. The PMMSY is an umbrella scheme with two separate Components namely (a) Central Sector Scheme (CS) and (b) Centrally Sponsored Scheme (CSS). PMMSY has been approved at a total estimated investment of Rs.20,050 crore comprising of Central share of Rs.9407 crore, State share of Rs.4880 crore and Beneficiaries contribution of Rs.5763 crore. PMMSY has been implemented in all the States and Union Territories for a period of 5 (five) years from FY 2020-21 to FY 2024-25.

Other enabling support for investment → Government of India facilitates the investment in the food processing sector through a number of incentives announced from time to time. The major incentives are as under: Income tax relief under sections 80 IB, 35 AD and 10 AA of

Income Tax Act, 1961 → Exemption of Goods and Services Tax for 45 categories of food products and a lower rate of 5% for 49 categories of food products → GST for food processing machinery ranges from 5% (machines for cleaning, sorting or grading, seed, grain or dried leguminous vegetables; machinery used in milling industry or for the working of cereals or dried leguminous vegetables other than farm type machinery and parts thereof), 12% (dairy machinery, milking machines), 18% (machinery for the industrial preparation or manufacture of food or drink, other than machinery for the extraction or preparation of animal or fixed vegetable fats or oils) to 28% (freezers and refrigerating equipment, etc.)

10.8 PROBLEMS FACED BY PROCESSING OF AGRO-ALLIED SECTOR

Like with any other industry in India, Agro-allied industries also face some constraints, which seem to bedevil their development. Some of these constraints and problems include:

1. Small Landholdings:

Small landholdings make it difficult for farmers to achieve economies of scale because of which farmers are forced to rely on subsistence farming.

2. Seasonal nature:

This means that the farmers have a very small window to reap the benefits of their hard labor. In recent times, climate change has affected weather patterns because of which there has been an adverse effect on agricultural production.

3. Perishable nature of products:

Agro allied sector products are also perishable in nature because of which they require huge infrastructure in the form of cold storage, excellent road connectivity. India suffers on both accounts, forward and backward linkages.

4. Variability:

Agro-allied industries involve variability in the quantity and quality of raw materials. Quantity of raw materials suffers because of fluctuations in weather and soil conditions. The quality suffers because of lack of standardization. These factors exert additional pressure on agro-allied industries in terms of operations related to production, scheduling and quality control.

5. Limited Knowledge:

The absence of information, lack of awareness and limited knowledge about opportunities, technology and production systems is also a major hurdle.

6. Competition:

India is increasingly facing competition from other countries in the region such as Bangladesh, which offer similar advantages in terms of low labor costs and soil fertility.

The Government of India has taken serious note of these constraints. It has introduced several policy measures in order to ensure the growth and development of Agro-allied industries in India.

10.9 SUMMARY

Agriculture allied sector industries are becoming important in order to ensure the price stability of the produce to increase the continuous purchasing power of the farmer for the proper utilization of the maximum produce coming from the farm. Agriculture allied industries are playing an important role in providing employment opportunities to skilled and unskilled labor in rural areas and improving the standard of living in rural areas. Agriculture-related businesses have also contributed greatly to the development of transport and communication facilities in rural areas. Entrepreneurial attitude is increasing among the enterprising people in rural areas. Financial institutions have helped in the development of rural areas. There has been a change in the attitude of rural people towards financial institutions. Rural masses are moving towards financial institutions. This is certainly a matter of happiness. Savings have started to improve.

10.10 QUESTIONS

1. Explain the scope of agriculture allied sector industries.
2. State the types of agro-allied sector production.
3. Explain types of processing of agro-allied sector products with example.
4. Explain the importance of processing of agro-allied sector products.
5. Explain in detail the problems faced by agriculture allied sector industries.

10.11 REFERENCE

1. <https://www.tractorjunction.com/blog/agro-based-industries-in-india-types-importance-scenario/>
2. <https://www.loksatta.com/career-vrutannta/mpsc-exam-study-agriculture-and-agricultural-allied-areas-akp-94-2549786/>



APPLIED AGRICULTURE

Time : 3 Hrs

Marks : 70

Please check whether you have got the right question paper.

N. B: 1. All question are compulsory.

2. All questions carry equal marks.

Q.1 Discuss the factors required for dairy farming.

OR

Explain the importance of animal husbandry in rural development.

Q. 2 Explain the poultry farming in rural development.

OR

State the various components of poultry business management.

Q. 3 Explain the types of fishing in detail.

OR

State various methods of fish preservation.

Q. 4 State the importance of the production process in agriculture related industries in rural development.

OR

Explain in detail the nature of agriculture related industries.

Q. 5 Write short notes (Any Two)

1) Types of Sheep

2) Breeds of Chickens

3) Brackish water fishing

4) Types of production processes in agriculture related industries

