Chapter 2

Mixed Farming System – A Theoretical Framework
## CHAPTER 2

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CHAPTER 2

MIXED FARMING SYSTEM – A THEORETICAL FRAMEWORK

In view of low per capita availability of land, increasing population pressure and little scope for mobilization of further land for crop production, agriculture turned to be less dependable to provide adequate livelihood opportunities for a majority of rural population. As milk production enterprises require relatively less land and more labour to generate a given level of income compared to crop production, mixed farming system suits the small and marginal farmers with less land. The agricultural strategies also need to focus on livestock activities being the chief source of animal protein to replenish nutritional requirements of people. Thus mixed farming system combining crop production and milch animal is apparently befitting to our agrarian economy.

As such any inquiry regarding mixed farming system demands an idea about the ideal conditions under which mixed farming system will operate and possible constraints. The present chapter intends to offer all related issues in a theoretical framework and is presented in five subtitles viz., (i) types of farming system, (ii) mixed farming system, (iii) ideal system, (iv) mixed farming in various countries and (v) conclusions.

2.1 Types of Farming System

Farming is an income and employment generating activity. It refers to different practices that are used in carrying out the farming operations. The farmer needs food for his family as well as feed and fodder for his livestock. He also needs cash for production inputs and other essential items. As such, central to the classification of farming is the farmer himself who works under natural and socio-economic environments. There are many different types of farming followed by the farmers, depending upon the interest and resources.
A Specialised Farm is one where 50 per cent or more of income is received from a single source (crops, livestock, dairy, poultry, etc.). When only a few enterprises are run by the farmer, in which he has acquired special knowledge, it is known as Specialised Farming. It may be considered specialization as he pursues production of only one commodity for market, so that the farmer depends on a single source of income. A trend towards specialized farming is evident in areas where there are special market outlets and economic conditions are fairly uniform for a long period.

A Diversified Farm is one that has several production enterprises or sources of income. But no source of income equals as much as 50 per cent of the total income from the farm. On such a farm, the farmer depends on several sources of income. When a farmer is engaged in a multitude of farm enterprises, it is referred to as Diversified Farming. It achieves the stability of income because even if the return from one crop is low, the return from another will be steady enough to avoid the risk of putting all eggs in one basket. In Kerala, the farmers have learned the art of allocating their scarce resources to alternative uses and sustain themselves on a self supporting agrarian system. Diversified Farming has helped them in utilizing their labour, capital, equipments and land in an optimum fashion and makes it a regular full-year enterprise wherein neither their resources lie idle nor the flow of income gets disturbed.

Mixed Farming is the most relevant system of farming in Indian conditions, because of small size of holdings and unsound economic state of the average Indian farmer.

Generally under mixed farming crop production is combined with animal production. Livestock enterprise is complementary to crop production and vice-versa, depending on the relative emphasis given to one or the other. Agricultural economists consider that a farm to be called as a mixed farm, 10%-15% of its gross income must be contributed by livestock components (Sastry et al., 1994).
2.2 Mixed Farming System – Definitions and Determinants

2.2.1 Definitions and Features

In the report of National Commission on Agriculture (1976) mixed farming has been defined as a system of both crop and animal husbandry for efficient and effective use of land, labour and capital stock. They stated that crop raising alone can not provide sufficient income for the economic well-being of the farmers due to frequent calamities like drought, floods, etc. They further stated that in order to make yearround use of resources and particularly the labour potentials of the farm families, subsidiary occupations should be organized amongst the farmers. Dairying is an enterprise that can supplement the income and reduce underemployment of large number of small, marginal and agricultural labourers.

According to Sadhu and Singh (1993) mixed farming may be treated as a special case of diversified farming. In majority of cases, mixed farming manifests itself in the combination of crops and livestock and that is why this combination is almost treated as synonymous with mixed farming. This particular combination of enterprises is important in the sense that these support each other and add to the farmers’ profitability. The farmer raises his livestock on the by-products of crops grown. He utilizes the existing manpower and equipment and need not incur any additional expenses. Similarly, by raising livestock, he draws a number of benefits from it for crop cultivation. The two enterprises, therefore, sustain each other with not much additional cost but on the other hand, it augments the income of the farmer and provides him more economic soundness.

According to Raju and Rao (1990) mixed farm is that type of diversified agriculture, in which a farmer invariably devotes to livestock production as a complementary enterprise. At least 10 per cent of the gross income must be contributed by the livestock and the upper limit being 49 per cent under Indian conditions.

Substitution of different enterprises will depend upon relative returns, other inputs required and degree of risk involved. Once the major enterprise has been
selected, supplementary enterprises can be adjusted until an optimum combination is reached where returns are maximized and the labour is employed optimally. Here at this point labour efficiency will be at the maximum. A well adjusted and diversified farming is highly conducive in improving the labour efficiency in the Indian farms. Johi and Kapur (2002) suggested that milch cattle yield is high in rainy season due to availability of green fodder and grass. Addition of dairy cattle to crop farming can thus absorb surplus labour in the slack season. If lactation periods are adjusted so that maximum milk flow is in the slack season, which is quite possible through scientific methods, labour utilization can be better rationalized throughout the year.

Special features of mixed farming system are, thus, the following.

(i) This system involves the integration of crops and animals on the same farm.

(ii) The waste products of one enterprise (crop residues) are used by the other enterprise, which in turn results its own waste product (manure) back to the first enterprise.

(iii) Improved forages can be introduced into annual and perennial cropping systems to provide feed for livestock.

(iv) Animals provide manure for the maintenance and improvement of soil fertility.

(v) The sale of animals and animal products can provide cash income.

(vi) Livestock act as a storehouse of capital and an insurance against crop production risks.

(vii) Animals grazing vegetation under trees crops can control weeds and help to increase yield of the plantation crops.

(viii) Development of livestock sector promotes gender equity since women play an important role in livestock production.
(ix) It helps in diversifying the sources of income and employment for resource poor farmers and landless labourers and thus offers considerable potential for poverty alleviation.

Mixed farming systems are the backbone of Asian agriculture. These systems have many distinctive features such as avoid the spread of risk, small size of farms, integration of crops and animals, traditional system, low use of inputs, practicing in high lands, semiarid/arid tropics and subhumid/humid tropics, diversification in the use of production resources and multipurpose roles of crops and animals.

2.2.2 Determinants of System

The choice and size of the enterprises in the mixed farming depend upon the availability of natural resources such as land, labour, capital, technical expertise and market facilities. The optimum combination of these components is the foremost criterion to effectively recycle the by-products, to maintain the soil health and productivity. Also the choice of the enterprises and their management must ensure that the interaction between the enterprises should be the most complementary with least contradiction.

The major determinants of the mixed farming system in a particular location are the agro-ecological conditions. Climate and soil determine which crops can be grown. Feed resources provide a direct link between crops and animals and interaction of the two, largely dictates the development of such systems.

The factors determining mixed farming are of two kinds viz., (i) physical factors, (ii) economic factors. The important determinants under physical factors are climate, soil and topography.

a) Climate

The distribution of rainfall, sunshine, temperature and other climatic conditions greatly determine which enterprise the farmer should choose.
b) Soil

Different soils suit different enterprises, depending upon the different qualities possessed by them. It is due to variations in soil that different crops are localized in different areas in India.

c) Topography

It greatly tells upon the temperature and soil fertility and hence it has a significant bearing upon the choice of farming that is practised.

The important determinants under economic factors are marketing costs, changes in relative value of farm products, availability of labour and capital, land value, cycles of over and under production, competition between enterprises, personal likes and dislikes and prevalence of pests and diseases (Sadhu and Singh, 1993).

2.3 Ideal Mixed Farming System

Ideal mixed farming system depends on the availability of ideal conditions. Rationale of mixed farming system and conditions for ideal system are enunciated here.

2.3.1 Rationale

Rationale of a system is its inherent advantages to the stakeholders as well as society in general. In India, mixed farming offers the following advantages:

a. Milch cattle act as drought animals for crop production and rural transport.

b. Mixed farming helps the maintenance of soil fertility.

c. It tends to give a balanced labour load throughout the year for the farmer and his family.

d. It permits proper use of the farm by-products.
e. It offers higher returns in farm business.

f. It makes judicious utilization of all resources.

g. It will generate income and employment on a sustainable basis.

The farm family remains underemployed during most part of the year. The possibilities of supplementing the incomes of the vulnerable sections of farmers utilizing the surplus family labour, which would have otherwise remained idle, in subsidiary occupations such as rearing of cattle and buffaloes, will have to be explored to the maximum extent possible. What is required, therefore, is a well balanced mixed farming system in which small farmers take up one or more subsidiary occupations in addition to crop cultivation for maximizing their net income from unit area of land. Thus livestock plays an important role in risk control within mixed farming. The mixed farming system is an ideal choice to sustain the land and livestock resources. This system has prevailed since ages due to the fact that agriculture farming and livestock maintenance are complementary to each other both at production and consumption levels. It increases the rural prosperity, nutritional status to people and effective and efficient utilization of resources for higher returns. It is an instrument for socio-economic change so as to eliminate poverty in rural areas.

Mixed farming system is the most relevant system of farming in Indian conditions, because of small size of holdings and unsound economic status of the average Indian farmer. Vast majority of farms in our country are mixed farms with established complementary relationship between crops and livestock. Crop byproducts like straw, cereal and grain husks are used for feeding livestock. Byproducts of livestock can be used for manuring the fields. While cash and grain crops give income at harvesting season, milch buffaloes and cows are the most extensively reared species on mixed farms. Mixed farming also results in higher returns from a unit of land holding.

Thus the relevance and potential importance of mixed farming systems are associated with the complementarity of the crop and livestock subsystems resulting
in increased total productivity. The other major relevance of mixed farming systems are diverse and efficient use, reduced risk, better use of farm labour for higher productivity and increased income, improved use of space, efficient use of biological and chemical energy in the system and less dependence on external inputs, development of sustainable systems that use recycling, involve no pollution and are consistent with environmental protection, increased economic output and development of stable farm households (Devendra, 1995).

2.3.2 Ideal Mixed Farming System

In India, for making the mixed farming to be an ideal system is to diversify the economic activities in an interdependent and integrated manner at micro level with the available resources. It is possible even for a resource poor farmer and for him integrated system is more important to maximise the profit through proper utilization of scarce resources in a farming system approach. An ideal mixed farm ensures recycling of residues, optimum resource use, and higher employment, minimises risk and uncertainties and provides for stable farm income. Knowledge of the linkages and complementarities existing among these enterprises will help develop a farming system in which waste of one enterprise is more efficiently used as input in another within the system. In India, integration of cropping with mixed farming enterprises as a production system in a farm to utilize the complementary economic and ecologic interaction of each enterprise so as to achieve profitability and multiple benefits of the system approach is known as Integrated Farming System.

Ideal and real systems will differ to the extent of discrepancy between ideal and real conditions prevailing in the society. Mixed farming can be ideal when deficiency of one component is compensated by the associate enterprises. If one component enterprise itself is sufficiently profitable or both components are not complementary, ideal system will not work. Discrepancy between ideal and real is inefficiency which can be eradicated by selecting optimum combination of enterprises and efficient use of resources. Optimum activity mix can determine ideal mixed farming enterprises and resource use efficiency can be ensured by
employing more of productive resources or reducing the less productive inputs. Thus ideal mixed farming system assumes two important preconditions viz. (a) complementarity of enterprises at farm (production) and family (consumption) and (b) efficient use of given resources. All these conditions in turn are closely linked to input/output markets, resource base of farmers, government policies, agroclimatic conditions, etc. Bridging the gap between ideal and real is the objective all sound production policies, based on the conditions explained here.

2.4 Mixed Farming System in Different Countries

Mixed farming system adopted in abroad, India and Kerala are elaborated in this section to get an idea about prevailing practices and conditions under various regional contexts.

Mixed farming in one form or the other is prevalent all over the world. But the practices differ from tract to tract and region to region. In many parts of the country farmers using modern methods considerably increased investments in grain production. Side by side with developments in crop production there was progress in improving the livestock, particularly through crossbreeding programmes. The technological developments in crop and livestock production have helped the farmers over large areas in different parts of the world to appreciate the advantages of adoption of mixed farming for bettering their economic conditions.

2.4.1 Mixed Farming Systems Abroad

One of the main features of Asian agriculture is the crop/livestock integrated farming systems. Farmers generally raise crops to meet the basic food requirements of the family. Livestock is raised either for draught purposes or for the market to meet the cash requirements. Most families also raise livestock in anticipation of some special occasion such as religious festivals and others. The majority of the farms on which such systems occur are operated by small farmers and landless agricultural labourers. Many of them are living in subsistence levels, consuming whatever they produce. Productivity on these farms is generally low.
because they are least benefited from the technological advances in crop/livestock production.

Mixed farming systems in the Asian region are varied. Farming practices have been developed as a response to environmental dictates, especially temperature, altitude, type of intensity of animal production and human intervention. Diversification of resource use spreads risk and provides stability. Farmers consciously diversify the use of resources to produce a mix of activities that are economically rewarding. The inclusion of animals is based on the consideration that they provide power, food, supplementary income, insurance and a safe investment.

In the upland areas in Central Sri Lanka, crop production involves trees (coconuts and fruits), root crops and herbs in stratified layers. Livestock, mainly dairy cattle, goats and poultry, are integrated with about 20 per cent of these farms.

Mixed farming systems including both crop and livestock are widespread at all altitudes in Latin America (Voccaro, 1997). On large farms, as in the South American Savannas, integration is becoming common despite traditional separation of crops and livestock.

The prevailing mixed farming systems in the communal areas of Zimbabwe is based on small holder mixed farming using animal draught power and a minimum of purchased inputs. Livestock are essential for cropping as they provide work and manure, and their outputs such as milk and meat contribute to household consumption and income.

Mixed farming systems, involving complementary interactions between crops and livestock such as using animal traction and manure for cropping and feeding crop residues to livestock, are increasing in sub-Saharan Africa (Powel et al., 1995). Traditional specialized production systems of shifting cultivation and nomadism are being replaced by more sedentary forms of crop and livestock production that involve permanent cultivation and reduced grazing. The greatest
potential opportunity for increasing agricultural productivity exists through mixed farming in the subhumid and wetter parts of the semiarid zone.

In Spain (Encisco *et al.*, 1995), during the last decade, many farmers have moved from the traditional cereals or horticultural production towards diversification, combining traditional crops with livestock production. Farmers are thus making better use of resources, particularly labour and have often managed to increase their income to the extent that they are able to continue farming and remain in rural areas.

In Thailand (Chantalakhana, 1990) most of the people depend directly on agriculture for their subsistence and survival, with small farm systems forming the backbone of traditional agriculture.

In Philippines the integration of aquaculture with livestock production offers increased efficiency in resource utilization, reduced risk by diversifying crops and livestock, and this provided additional food and income.

It is reported that in Argentina’s Pampean region (Pizzarro and Cocciamani, 1994), the main activity of the owner contractor farmers is crop production, with small amounts of land devoted to pigs. They form groups of small farmers who follow a crop pasture rotation system. As they have enough traction and equipment for tillage, they rent additional land on yearly basis.

Mixed crop/livestock farming systems are predominant in South East Asian countries. Animal production contributes a variable but significant proportion of farmers’ income. Animal production involves both ruminants and non-ruminants and variety of systems integrated with crops. Systems vary as a function of agroecological zone and intensity of farming operations.

There was a well balanced and comprehensive mixed farming system which enabled Denmark to become one of the leading exporters of foods of animal origin like butter, cheese, bacon and poultry meat. The success story of Denmark (Prabhakaran and Raut, 1980) is clearly illustrative of the fact that the small
holdings are likely to be economically more viable than large holdings. Realizing this, utmost priority is given to integrated rural development in the current Five year plan and under this the implementation of special programmes particularly suited to the small and marginal farmers are receiving greater attention.

Five distinct types of mixed farming systems are found in Asia in the various agroecological zones as followed in Table 2.1.

**Table 2.1 Agro Ecological Zones and Mixed Farming Systems in Asia**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Agroecological zone</th>
<th>Growing period (days)</th>
<th>Crops</th>
<th>Animal</th>
<th>Mixed farming benefits</th>
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<tbody>
<tr>
<td>1.</td>
<td>Rainfed temperature and tropical highlands (MRT)</td>
<td>&lt;110</td>
<td>Barley, millets, potatoes, fruits</td>
<td>Yak, cattle, sheep</td>
<td>Traction, transport, manure, reduced risk, survival</td>
</tr>
<tr>
<td>2.</td>
<td>Rainfed humid and subhumid tropics (MRH)</td>
<td>180-365</td>
<td>Maize, rice, wheat, sugarcane, plantation crops</td>
<td>Buffalo, cattle, pigs, chicken, ducks</td>
<td>Traction, transport, income, manure, crop residues</td>
</tr>
<tr>
<td>3.</td>
<td>Rainfed arid and semi arid tropics (MRA)</td>
<td>75-180</td>
<td>Sorghum, rice, millet, groundnuts, soyabean, pigeon pea, cotton</td>
<td>Camels, donkey, cattle, goats, sheep, chicken</td>
<td>Traction, transport, income, manure, reduced risk, survival</td>
</tr>
<tr>
<td>4.</td>
<td>Irrigated humid/subhumid tropics (MIH)</td>
<td>180-365</td>
<td>As MRH</td>
<td>As MRH</td>
<td>As MRH</td>
</tr>
<tr>
<td>5.</td>
<td>Irrigated arid/semiarid tropics (MIA)</td>
<td>75-180</td>
<td>As MRA</td>
<td>As MRA</td>
<td>As MRA</td>
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</table>

Source: Devendra 1997

a) Rainfed temperate and tropical highlands (MRT)

The Hindu-Kush Himalayan region is an excellent example of mixed farming involving both animals and subsistence crops. Yaks are multipurpose
animals for tillage, transport, milk, meat and hair. Sheep and goats provide meat, milk and fibre and some pack services. The main crops are potatoes, barley, wheat, millets and fruits.

b) Rainfed humid/subhumid tropics (MRH)

The system includes mainly annual cereals, soyabean, vegetables, ruminants and non-ruminants. Cattle and buffalo are the most common ruminants. Pigs and chicken are common and thrive on crop byproducts. In upland areas tree crops such as coconut, oil palm and rubber are becoming common. In much of Southeast Asia the native herbage under trees enables integration of livestock, especially small ruminants and the development of a sustainable animal production system.

c) Rainfed arid/semi arid and subtropics (MRA)

Rainfall is much lower in this zone and a major constraint to crop growth. The main crops are millets, sorghum and date palm. This is the natural home of small ruminants and camels which provide security and survival for very poor farmers and landless peasants. Limited crop growth is associated with reduced feed availability. In South Asia, northeast Thailand and eastern Indonesia, where this ecosystem is common, increasing human and animal population pressures have resulted in severe resource degradation. Animal production is usually more extensive than in the previous agroecological zone.

d) Irrigated humid/subhumid tropics (MIH)

This high rainfall area is the heart land of intensive cropping. Most swamp buffalo and to a lesser extent, cattle are found here and are closely associated with draught and transport operations. Farmers are generally wealthier than in other agroecosystems. Increasing labour productivity and affluence are reflected in more use of tractors for cultivation. Ducks, pigs and poultry thrive on the abundant crop residues. Animals and intensive crop production in this ecozone are illustrations of a successful integrated and sustainable agricultural system.
e) Irrigated arid/semi arid tropics and subtropics (MIA)

These areas are mainly in South Asia and animals are of secondary importance. Large and small ruminants subsist on crop residues and limited grazing. Irrigation allows increased fodder production which reduces the feed deficit and promotes dairy development especially in periurban areas.

2.4.2 Mixed Farming Systems in India

In India, small-scale mixed crop - livestock farming is the common and most dominant form of animal husbandry. For small and marginal farmers, animal husbandry based on family labour and residues and byproducts of crops grown on their own land continue to be a substantial source of income and employment. There is considerable spatial and temporal variation in the mixed crop livestock systems in India. A major feature of these systems is the great diversity and complexity in the crops grown and livestock species raised and these systems are constantly evolving over time. Agroclimatic, technological and socioeconomic factors account for spatial and temporal variations. Demand for livestock products is increasing fast due to population and income growth, urbanization and change in tastes and preferences. Livestock products also have a higher income elasticity of demand compared to cereals, pulses, fruits and vegetables.

Indian farmers have a long tradition of integrated farming, primarily involving large ruminants like cow and buffalo and small ruminants like goat and sheep. Crop-livestock, crop-fish, agroforestry and other forms of integrated farming systems can help to provide both additional channels of household income and opportunities for value addition. The integration of crop and livestock production is a factor which strongly influences the sustainability of a farm. In rural areas, the people are primarily concerned with the cultivation of food crops, and their interest in livestock rearing depends mostly on the time available after having paid sufficient attention to their main occupation.

The highland mixed farming system incorporates the cultivation of a range of cereals, legumes, tubers, fodder, fodder trees and livestock. In the more remote
areas, where mineral fertilizers are very costly or unavailable and distance to markets is prohibitive, the flow of nutrients to cultivated land is generally originating from grazing or cutting of fodder trees form woodland areas at higher altitude. In more accessible areas, the opportunity for successful vegetable production, particularly potatoes, can result in highly intensive system of commercial production. Similarly, in the hills of Himachal Pradesh there has been a large expansion in horticulture, particularly the apple orchards. Generally, ruminant livestock are important parts of the system as they provide draught power, milk, manure and cash income.

The rainfed mixed farming system is not supported by any large irrigation system but in many instances relatively small areas irrigated from tanks reduce vulnerability to drought and permit dry season cropping. This traditional tank-based supplementary system has been further enlarged in recent decades by the use of tube wells. Crops grown within the system include wheat, barley, vegetables, and fodder crops in the cooler northern areas, while maize, sorghum, Finger millet, vegetables, chickpea, pigeonpea, green gram, black gram and groundnuts are more common in the warmer climates of Southern India. In smaller areas, soyabean, rapeseed, chilli, onions and sesame are grown mainly as cashcrops. Double cropping is possible only where irrigation is available. The coarse grains, pulses and oilseeds are grown on the upper parts of the landscape. Some fruit trees such as mango are grown in homegardens. Livestock are important parts of the farming system which supports the largest share of cattle, sheep and goats in the region and they usually provide the major part of the farm family’s cash income, particularly through sales of adult animals or young stock, since most areas are too remote for commercial milk production.

It is reported that (Harishkumar et al., 1994) for a small holding of one hectare under canal irrigated conditions in a semi-arid tract of land in Haryana, mixed farming of cross-bred cows is more efficient for the utilization of land, capital, inputs and the labour resources of the farmer. In dry farming area of Haryana there is scope for increasing farm employment and income by integrating
the livestock enterprise with crop farming and by adoption of the new dryland agricultural production technologies.

2.4.3 Mixed Farming Systems in Kerala

Mixed farming systems in Kerala represents a typical land use pattern, which maintains a variety of crops and trees along with other allied enterprises viz., livestock and poultry spread around houses and operates at different levels of intensification. Different types of crops, livestock, poultry and/or fish production is carried out mainly for satisfying the varied needs of farmers and a complex interaction exists among soil, plants, animals, other inputs and environmental factors. Integration of livestock with crops is peculiar to Kerala, where the most preferred animal is cow. Mixed farming system has been one of the survival strategies of the traditional farmers of Kerala since quite long time. Mixed farms represent a promising land use system and are common in Kerala, where the average size of farm household is small. The area around the house or farmyard is normally planted with a wide assortment of crops, which not only offer shelter and privacy, but also contribute diversity and quality to the diet of the farm family. Coconut is a major crop in the households of the coastal belt of Kerala. Homestead is a special type of farming system commonly seen in Kerala and parts of North Eastern India.

The three basic types of farming systems followed in Kerala (John and Mercy, 2003) are (a) coconut based system comprising a number of intercrops like pepper, arecanut, cocoa, clove, banana, ginger, turmeric, tubers, fodder crops, pineapples, pulses, oilseeds, vegetables, green manure crops and cover crops, (b) rice based system in low lands with single or two crops of paddy, summer vegetables, pulses or oilseeds with or without aquaculture components and (c) homestead farming system including a large number of components like perennials, food and fodder crops, livestock, fishery, poultry, apiary etc.

Livestock rearing is constantly gaining momentum and contributing significantly towards the upliftment of the poorest among the poor. Further, the
milk is an important additional source of income and nutrition to the family of the farmer. The availability of regular liquid cash from daily sale of milk not only helps in dairy production through purchase of compound feed and other inputs, but also helps in improving crop production through purchase of other farm inputs like quality seeds, fertilizers, pesticides, weedicides etc. In addition to this, the rural households are capable of procuring items of daily use from sale of milk.

It is found that coconut based farming system is a time-tested practice in Kerala. Due to the availability of sufficient interspace in coconut garden, a variety of crops are grown as intercrops. With the integration of livestock component in homesteads it became a necessity to raise quality fodder crops. The declining land availability made the farmers to try fodder cultivation in coconut gardens to sustain a viable dairy unit. Byproduct utilization in coconut based farming system is in its maximum and is sufficient to meet the fuel requirements of a farm family. In both Pokkali and Kuttanadu rice ecosystems, integrated farming with rice, fish, livestock and poultry has been developed. Studies by Salam et al. (1992) about farming system have helped to evolve a homestead model for coastal uplands of southern Kerala under irrigated conditions. Crop-livestock integration with one crossbred cow and its calves or two female goats and kids or ten birds of poultry reared on kitchen waste imparted sustainability to the system. Pepper was trailed on coconut, arecanut and jack and no separate standards were provided.

In coconut, various subsidiary enterprises could also be integrated to generate more employment and income for the family. One such viable and compatible system has been developed at Central Plantation Crops Research Institute, Kasargod in an 1.2 hectare area with the following enterprises such as (a) Cultivation of grasses in the interspaces, (b) Dairying with 5-6 milch animals, (c) Poultry birds (100 number broiler birds each per batch), (d) Japanese quails (100 number), (e) Rabbits (10 female and 4 male), (f) Aquaculture (625 m² surface area), (g) Agriculture with Indian bees and (h) Biogas unit (3 m³ area).
2.5 Conclusions

In mixed farming, the two main components, viz., land and livestock act complementary to each other. Thus in the mixed farming system of land use, farm products and their byproducts are better utilized and fetch more income. The practice of mixed farming not only varies from country to country but also place to place within a country, depending upon the agroclimatic conditions, size of land holdings, availability of inputs and marketing facilities. The average size of holding in Kerala, viz., 0.27 hectare is very small as compared to other part of our nation. In this context, subsidiary occupations like rearing of livestock in combination with different crops become a necessity for the farmers to make the maximum use of their limited resources and labour capacity in order to supplement their present income. In Kerala, since a vast majority of the farmers are practicing mixed farming in one form or the other especially due to the home garden culture attached to every independent houses, it is necessary to carry out investigations in detail with special reference to the rearing of dairy animals in an era of declining prices of agricultural products and reducing opportunities for alternative employment for farmers.

Mixed farming is a system originated out of compulsion or necessity to insulate the farm families against the uncertainties in farm income by using given resources which otherwise would have fetched zero opportunity cost. Mixed farming systems are, thus, pursued by the farmers throughout the world in one or other combination of agricultural enterprises, depending on various determinants. Therefore an ideal mixed farming model and inefficiency prevailing in the existing systems varies with various conditions. It takes us to the conclusion that the degree of discrepancy (between ideal and real) and measures to bridge them will be highly location and farm specific.