CHAPTER I

INTRODUCTION

General Background

While there is general agreement that significant advances have been made and great success has been achieved in the production of food grains in the country, it is conceded that the benefits of this higher growth and productivity in agricultural sector have generally gone to progressive farmers who also happen to be those with large holdings, having irrigation facilities. The small and marginal farmer households which constitute about 70 per cent of the operational holdings of the country, by and large have been left out and suffer badly from underemployment, lower productivity and low incomes under the existing system of crop farming. In the effort, therefore, to achieve social justice in the rural areas, farming programme should be geared to increase the income and employment

1/ According to 26th round of NSS (1971-72), there are about 27.4 million marginal farmers and 13 million small farmer households in the country. For details, see : H.Laxminarayan and S.S.Tyagi, "Some Aspects of Size Distribution of Agricultural Holdings", Economic & Political Weekly, Vol.11(41), October 9, 1976.
potential of small holding, through diversifying farm production and increasing the productivity of crops and animals per unit of land and time.

The prominent place of dairying in the economic and social context of a predominantly agrarian country can hardly be overstated. The National Commission on Agriculture, in its Interim Report has recommended that as a method for providing rural employment and increasing milk production in the country dairying be encouraged on the holdings of small farmers, marginal farmers and also by landless labour. This would result in: (i) increased employment and more regular employment throughout the year, (ii) increased milk production, (iii) maximization and stabilization of income, (iv) regular flow of income and increased efficiency, and (v) effective defence against risk and uncertainty in agriculture.

State of Dairying in India

With one-fifth of the world's cattle and one-half of world's buffalo population in the country, one would expect a substantial contribution to the

national economy from the dairy sector. In reality the productive capacity of our animals is far from economical and average annual milk yield per cow is estimated at 173 kg and that for buffalo at 493 kg (Amble, 1965).

Out of a total cattle population of about 179 million, 54 million are the breedable cows and 29 million buffaloes are breedable out of the total buffalo population of 58 million. Little over one-fourth cattle and two-fifths of buffaloes constitute the milch females of breedable group. Only about 41 per cent of cows and 53 per cent of buffaloes remain in milk, the rest being dry. This is an alarming situation calling for immediate and strenuous efforts for development in breeding programmes, feeding schedules and other dairy management practices as well as their adoption.

Advances of international importance have been made in the production of food grains in the country, while progress in the area of milk production has not been substantial. The milk

production in the country has gone up from 17.15 million tonnes in 1951 to about 25 million tonnes in 1977 which has not kept pace with the increasing human population. In contrast to this the new wheat technology has led to spectacular production gains in India. The total wheat production rose from about 7.0 million tonnes in 1951 to about 30 million tonnes in 1977. With break-through in cereal production, the time is now ripe for the diversification of the agricultural economy through development of milk enterprise.

The present per capita availability of milk in the country is estimated to be 112 gms which is much below the nutritional requirements of about 210 gms. More alarming is the fact that the per capita milk consumption in the country is on the decline. According to a 12 year study conducted by

1/ With only about 12 million cows, USA produces about 50 million tonnes of milk a year while with 75 million breedable cows and 29 million breedable buffaloes, our current milk production is only half of that of USA.

5/ The Nutrition Expert Group of the Indian Council of Medical Research has recommended 300 gms of milk for pre-school children, 250 gms for school children in the age group of 7-12 years and for boys and girls from 13-18 years of age, and 200 gms for adult men and women and an additional 150 gms for expectant mothers. These are for vegetarian population. For non-vegetarian people, the recommended requirements range from 200 gms for children to 100 gms for adults.
the Union Agricultural Ministry, estimated per capita milk consumption during 1968-69 was 105 gms as compared to 136 gms during 1955-56, even though the milk production rose by 2.61 million tonnes in the same period.

The milk production at present stands at about 25 million tonnes per annum. The economic demand for milk in 1978-79 is estimated to be about 38 million tonnes on the basis of the projected population growth rate of about 2 per cent during 1971-79, contemplated income growth rate is 5.5 per cent per annum and an income elasticity coefficient of 1.6 for milk. If the recommended nutritional allowance of 210 gms per capita per day is to be made available by 1978-79, the production requirement of milk in 1978-79 (end of Fifth Five Year Plan) would be of the order of 48.5 million tonnes for feeding the projected mid-year population of 632.66 millions in 1978-79.

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7/ Approach Paper on Development of Animal Husbandry and Dairying during the Fifth Five Year Plan, Govt. of India.
Dairying in Kerala

Kerala is one of the smallest and most thickly populated states in India. The average per capita availability of land in Kerala is only 0.11 hectares. It is notable that 91 per cent of land holdings are under two hectares and that almost 60 per cent of the holdings are less than 0.4 hectares. Diversification of farm economy to increase the net returns as well as to create employment potential is, therefore, essential. Development of animal husbandry and dairying can provide a very congenial solution in such a situation.

According to 1972 census, the cattle population of Kerala is 2.8 million, and of these only 1.2 million are the breedable females. In addition, the state has half a million buffaloes out of which about 0.15 million are of breedable age. However, only 45 per cent of cows and 59 per cent of buffaloes remain in milk during the year. The average milk yield per day per animal in milk is estimated to be 1.2 kg for a cow and 2.2 kg for a buffalo. These statistics reveal that dairy

farming enterprise in Kerala is marked by a low productivity of cattle.

The annual production of milk in Kerala is estimated at 0.42 million tonnes which provides an average per capita availability of 55 gms of milk per day - the lowest in the country. To raise the nutritional standards of 21.35 million human population of Kerala to a minimum desirable level of 210 gms per capita per day, milk production in the state should rise to about 2.3 million tonnes by 1978-79 i.e. the end of the Fifth Five Year Plan. This suggests that Kerala needs a manifold development in the field of dairying.

Increased milk production in Kerala is not only required from the view point of a higher nutritional standard but also to improve the socio-economic conditions of over a million small and marginal farmer households all over the state who can look forward to increased employment and additional income if the productivity of cattle could be improved and dairy farming becomes a

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profitable enterprise. The current high cost of feed and fodder and depressingly low yields of indigenous non-descript cows has made dairy farming a highly unremunerative enterprise.

The need for increasing cattle productivity and milk production is well recognised in Kerala and the state is paying increasing attention for the improvement of cows. Systematic efforts for the development of dairying began with the launching of the Key Village Scheme and the first block under this programme was established in Trivandrum in 1952. This was later followed by the Intensive Cattle Development Project (ICDP) in 1969. At present there are two ICDPs, one at Alwaye with four regional centres, and the other at Palghat with two regional centres.

In 1963, the Indo-Swiss Project was set up with the assistance of the Swiss Technical Cooperation Service. The Project aims at the creation of a new breed of cattle adapted to Indian conditions alongside a systematic promotion of fodder production.
Feed Availability and Requirement

The low productivity of Indian cattle is attributable to a combination of several factors of which poor genetic potential, poor feeding and management and inadequate health cover are largely responsible for this state of affairs. The central and state governments have introduced various cattle and buffalo improvement programmes (All India Key Village Schemes (1952), Intensive Cattle Development Projects (1964), Crossbreeding Projects etcetera) from time to time but scant attention has been given to development of feed and fodder resources. An improved animal can express its full genetic potential only under adequate and balanced feeding, therefore, a systematic programme for the development of fodder should form an integral part of cattle improvement programmes in the country.

The estimates of the requirements and availability of green fodder, roughages and

10/ Proper feeding and management of animals alone can increase the milk yield in the country up to about 30 per cent. See: N.C. Wright (1952), Report on the Development of Cattle and Dairy Industry in India, Manager Pub., ICAR, New Delhi.
concentrates were made by the Joint Committee of the Nutritional Advisory Committee of I.C.M.R. and the Animal Nutrition Committee of ICAR (1954); and subsequently by the Sub-Committee of the Central Council of Gomamvardhana (1961). Both these estimates show a wide gap between the requirements and availability of both fodder and concentrates. Ranjhan (1973) reported that availability of straw, ladbies (dry stalks) and roughage was 206 million tonnes, while to meet the dry matter requirement of all the present bovine population, about 335 million tonnes of these roughages are required if they are to be fed scientifically. An increase in supply by 65 per cent is, therefore, sought for. The availability of concentrate feeds like oilcakes, brans and chunnies was 14 million tonnes while the requirement is estimated at 33 million tonnes for maintaining entire livestock. Therefore, the supply of concentrates should be enhanced by 120 per cent to meet the requirement of all categories of animals.

The country-wide assessment of livestock feed during the Fifth Five Year Plan was made by a special

committee on livestock feed and fodder (1974) appointed by Govt. of India, Ministry of Agriculture and Irrigation. These estimates are based on the projected livestock and poultry populations for the year 1978-79 for different categories of animals in accordance with the levels of production. The report estimated that supply of dry fodder, green fodder and concentrates was deficit by 26.00, 258.00 and 25.1 million tonnes respectively as compared to quantities required.

Whatever estimate one may be inclined to accept, a very considerable portion of cattle in the country are underfed and maintained on the verge of starvation resulting in slow growth, late maturity, long calving intervals, poor milk yield and a high susceptibility to diseases. Obviously the country is caught up in a vicious cycle of "poor feed - poor productivity".

**Specification of the Problem**

In Kerala both human and cattle population exert pressure on land and the latter is often

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12/ See: Ministry of Agriculture and Irrigation, Report of the Committee on Livestock, Feed and Fodder, Govt. of India, September, 1974.
considered as a heavy burden on the economy, but in fact it harbours tremendous potential for the rural development from which a large number of under-employed landless labourers, marginal and small farmers can derive benefits. The existing non-descript cattle population consists of small stunted animals which cannot be much improved by selective breeding in a reasonable length of time. The state government, therefore, is paying increasing attention for improvement of cows through crossbreeding. The Indo-Swiss Crossbreeding project is a pioneering effort in this direction. The project's crossbreeding and fodder production programmes have been in operation in Alleppey and Idukki districts of Kerala state since its inception. It is essentially with this background that these two districts were chosen for the present study.

Dairy feeding involves many complex technical and economical considerations which must be accounted in the determination of optimal feeding plans (Burt, 1957). For economic milk production, a study of the relationship between feed and milk is likely to assist the dairymen. The tools of choice making in dairy farming
cannot be understood easily until one examines the fundamental relationships which underlie them. Production function analysis provides knowledge about functional relationships between inputs and output and enables more practical recommendations. The differential effect of different feeds on milk production will enable the choice of suitable feed for sustained dairy farming. This will help the dairy farmers, planners and the institutional agencies connected with dairying to a large extent.

In a biological system, the effect of any input may not be of immediate occurrence. In such conditions, we may expect only the lagged effects of inputs distributed overtime. While the short-run effect of feed will measure the impact of current feeding on milk yield, the long-run effect will indicate the integrated effect of feed over longer period of time in the past. The knowledge of these effects will provide guidelines to the farmers on the efficient feeding practices.

The rapid increase in population growth and expanding demand for agricultural products together with the paucity of farm resources in the state require a careful examination of the production alternatives and the possibility of increasing the
efficiency of resource use in dairy farming. In view of the changing market conditions and the other factors in the developing economy, the study of allocative efficiency in resource use is of immense importance. The present study is, therefore, an attempt to explore the imbalances that are existing in the present utilisation of feeds and suggest necessary adjustments which may result in maximising incomes on farms.

Prices of feeds and milk vary with the changes in market conditions and the dairymen need to select rations that minimise their cost of milk production. It is in this context that the dairy economist has to help the farmers in decision making regarding the types of feeds and fodders to be grown and to be purchased from the market so as to meet the nutritional requirement of cattle for profitable milk production.

Precisely the study is unique in that the investigation is carried out in actual farm conditions to suggest more practical and precise feed plans for Brown Swiss Crossbreds and non-descript cows in the state.
Keeping these considerations in view, the present investigation has been taken up with the following objectives.

Objectives

1. To examine feed-milk relationship for Brown Swiss Crossbred cows and non-descript cows in high ranges and plains of Kerala state.
2. To analyse the short-run and long-run effects of feeds on milk production for these breeds.
3. To evaluate the feed allocative efficiency of dairy farmers in the study area, and
4. To determine the optimum combination of various feeds for different levels of milk production and for different price structures for the breeds under study.

Organisation of the Study

The study has been presented in six chapters. Chapter I introduces the problem with objectives and limitations of the present investigation. A brief resume of the earlier work carried out in the fields of milk production economies and linear programming receives attention in chapter II. The analytical framework for the study is presented in chapter III. Topographic, agro-climatic and socio-economic features of the study area are described in chapter IV. Results
of the study and discussion thereon figure in chapter V, followed by summary and conclusions in chapter VI.

Limitations of the Study

Several problems are encountered in studying different aspects of feed-milk relationship under field conditions. They limit the outcome of the investigation in one way or the other. The major problems encountered are identified here.

1. A striking feature of dairy cattle feeding in Kerala is the involvement of multiplicity of feed stuffs in atomistic form in the ration. This makes the process of weighing the feed stuffs intricate. Further data on feeds fed to the animals were recorded once in a fortnight on the day of the visit of the investigator to the sample household. The weak assumption that a feed material fed on the reported day has been supplied to the animal for the full preceding fortnight is likely to mar the efficiency of the estimates.

2. There remains a problem in characterizing the feed inputs and time periods. Often no more can be done than to specify the inputs in such generic
classes as green fodder, dry fodder, concentrates etcetera, with an attempt being made to ensure that the feed within each such category is of some specified uniform quality. Even if feed inputs could be characterized in terms of a basic standard referring to the chemical and physical character of feed, there exists problem of feed evaluation in that the physiological efficiency of a feed does not hold a direct relation either with its price or nutrient content in most cases.

3. The values of total digestible nutrients (TDN) and digestible crude protein (DCP) indicative of protein and energy contents of feeds available in the study area has been worked out from the values given by Sen and Ray (1966). However, nutrient content of same type of feed stuff (especially forage) is affected by many factors associated with growing the crop such as soil type, amount and nature of fertilisers applied, available moisture, stage of harvesting and the like. In the present study the average reported values have been taken as chemical analysis of feed stuffs is not feasible under field conditions. Therefore, true nutrient content of a feed stuff may be somewhat higher or lower than stipulated in the analysis.
4. In the present study total digestible nutrients (TDN) has been used to express energy allowances in feed stuffs. However, more recently Net Energy (NE) system is being adopted as the accepted standard to express energy values. Determination of net energy (NE) is much more complicated and could not be attempted under field conditions in this study.

5. The accuracy of the estimate of the nutritional status as estimated by the present study is questionable on account of lack of reliable feeding standards for crossbred animals in the study area. The current feeding standards are based, for the most part, on data obtained with low producers, and they assume that energy requirement per unit of milk produced is the same at all levels of output.

6. While using the present feeding standards for lactating animals it is presumed that the maintenance requirement of non-lactating and lactating cow is the same. Brody (1945), and Neville and McCullough (1969) reported that in general the maintenance requirements during lactation for housed animals is about 40 per cent and for grazing animals about 100 per cent more than the maintenance requirements of cows during the dry period.
7. In the present investigation least-cost rations were formulated for lactating cows only. However, to safeguard the interest of the dairy farmers least-cost rations need to be formulated not only for animals in milk but also for dry cows and young stock.

8. Research resources being limited, the researcher has to seek a compromise between the objectives and problems of a study like this. It is important that sufficient animals be examined to provide reliable information. Still, excessive stalls of animals cannot be used for want of sufficient resources.