Alternative Agriculture as a Method of Strengthening the Agricultural Sector in Sri Lanka: A Case Study on the Coconut Triangle

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Abstract

Agriculture is the primary source of income for predominantly rural population (75 per cent) in Sri Lanka. During the past five decades, compared to the overall average annual economic growth rate of 4.2 per cent, agricultural sector expanded at a significantly low rate of average 2.6 per cent per annum. To overcome this problem, agricultural diversification as an alternative method of generating additional source of income through sustainable development has been introduced in some of the agro based areas in Sri Lanka. This study examines the outcome of the alternative agriculture and concludes that use of conventional resources in conjunction with new method forms the best basis for gains in strengthening of agriculture.

Key Words: dairy activities, diversification, poverty line, sustainable agriculture and ultra poverty

I Introduction

Since the days of British colonial rule, agriculture has been a paramount force in Sri Lanka's economy. The livelihood of nearly 85 per cent of the population living in the rural sector is based on agriculture or agriculture related activities. Today, 75 per cent of the population lives

in the rural sector. With nearly 40 per cent of the labour force work in the agricultural sector, these factors contribute 18 per cent of Sri Lanka's GDP and 23 per cent of the country's export earnings[1]. While Sri Lanka's overall average annual economic growth rate over the past five decades has been about 4.2 percent, growth in the agricultural sector unfortunately has expanded at a significantly lower rate—2.6 per cent average per annum. Furthermore, the per capita income of Sri Lankans working in the agricultural sector is about 42 per cent lower (Rs. 2620) than the national average (Rs. 4503). In the case study that follows, we will show how agricultural diversification has helped both the farmer and the environment in the "Coconut Triangle Area" of Sri Lanka.

The development of the predominantly agricultural-based rural sectors is considered to be one of the principal challenges for development in the Third World. Because the rural sectors of many developing countries tend to be comparatively larger than the urban sector, factors that positively influence agricultural development directly affect poverty reduction in those economies (World Bank, 1999). It has been shown that agricultural diversification is a desirable outcome, whether a result of development process dynamics or deliberate policy choice (Millikan and Hapgood, 1967; Bainard and Cooper, 1968; Jabara and Thompson, 1980; Jaffee, 1992; Delgado, 1995; McCall and Valdes, 1999). Therefore Governments in developing countries have much to gain by promoting increased output diversification at both the farm and national levels (Petit and Barghouti, 1992; Siamwalla et al., 1992). Benefits of farm diversification include high and more stable farm incomes and employment, greater long-term prospects for farm income growth, and more environmentally sustainable farming systems (Amaratunge and Shiratake, 1999).

According to the "Alternative Agriculture" published by the United

1 Central Bank of Sri Lanka, 1998

Sates National Research Council (1995), how new agricultural practices for maintaining an environmental friendly and sustainable agriculture are implemented, rests finally with the farmers themselves. But most of the farmers income is under the poverty line and it is unreasonable to expect them to sacrifice or contribute to any new alternative method unless there are clear financial benefits for them. Furthermore, while people in the Third World are usually less concerned about environmental issues, alternative systems that offer environmentally favorable solutions with increased financial benefits are more likely to be adopted by farm households into their day-to-day agricultural activities. But how can these goals be accomplished? Initially it is the responsibility of appropriate research organizations and/or government authorities to help identify and implement new agricultural practice, such as agricultural diversification—a practice that benefits both farmer and environment.

Historically this area was known as a monoculture area and most of the farmers were engaged in paddy and coconut cultivation. The Dairy Development Project was designed to improve farmer income in the Coconut Triangle area as an alternative method to the agric-monoculture through systematic integration livestock practices into the farming system. The project had its origin in the 1971 as a result of several studies by the World Bank, the Food and Agriculture Organization (FAO) [as implemented in the "International scheme for co-ordination in dairy development"] and by the United Nations Development Program (UNDP) [as implemented in the "Agricultural Diversification of Uneconomic tea and rubber land"]. The project was officially declared on 10, February 1974 and commenced on 1, August 1979.

The data in this study was derived from a field survey of 98 dairy farmers (representing 93 per cent of the total dairy farmer population) and 22 non-dairy farmers working and living mainly within the following four villages: Kobeigane (K), Thuttiripitigama (T), Elukhena (E) and

Pallewela (P). These villages are all within the authorized limits of the Coconut Triangle, an area with an agro-climatic zone favorable for coconut production. The sample eliminates were selected on a random basis while the first identification was done purposely to capture the farmers who engaged in diversified agriculture.

II Results and Discussion

1. General Information

The Nature of Employment

As shown in Table 1, milk farming was not recorded as a full time employment as it was always carried out as a part-time engagement. Majority of the farmers (65 per cent) were engaged in milk farming with paddy and coconut farming together while other milk farmers were engaged either in paddy or coconut farming. However, in this regard farmers who do not sell coconut (own consumption only) have not been considered. In considering the working days in agriculture and off farm activities, all the milk farmers were engaged in diary activities daily (see Table 2). However, 58 per cent of milk farmers were engaged in other farm activities while 21 per cent were engaged both in other agricultural activities and off farm activities. This data has further revealed the fact that, diary industry covers the major portion of day-to-day activities of the farm households. The farmers who supply milk daily and work for 91 days in agricultural activities were recorded as 14 per cent and those who are engaged in non-agriculture in a similar number of days while supplying milk daily were again recorded as 6 per cent. This reveals the fact that the farmers were heavily depending on milk farming.

Table 1 Types of Agricultural Diversification in the Coconut Triangle

Type of Agriculture	Farm Families	
	Number of Families	Percentage of Families from the Sample
Milk+Paddy+Coconut	64	65
Milk+Coconut	10	10
Milk+Paddy	24	24
Total	98	100

Source: Field Survey 1999 April

Table 2 Nature of Work

Sector	Working Days Per Year		
	365	182	91
Milk Producing	98	0	0
Milk & Other Agriculture	57	13	17
Milk, Other Agric. & Non Agric.	21	7	7

Source: Field Survey 1999 April

Level of Education

Although Sri Lanka is a developing nation, the values of the recent (1997/98) social indexes namely literacy rate (88.6 per cent), infant mortality rate (14 per thousand live births), death rate (5.9 per thousand) and average live expectancy at birth (73), etc. prevail at very high levels, which can be compared with even developed nations. These high values can be mainly attributed to the direct social welfare policy packages adopted by the successive governments since attaining independence in 1948.

Consequently, the literacy rate of the milk farmers (Table 3) in the area under consideration was too recorded as approximately 98 per cent, where as in the case of normal farmers, literacy rate was 100 per cent for the whole area. Majority of the milk farmers (90-100 per cent) in Kobeigane have been completed secondary or even higher education,

while in other villages this was recorded between 80 to 90 per cent. This high rate of intelligence among the farmers could be an advantage in terms of the future expansion of environmental friendly agricultural activities in the area.

Table 3 Level of Education

Category	Level of Education (by person)									
	Milk Agriculture					Non Milk Agriculture				
	K	T	E	P	GT	K	T	E	P	GT
No Schooling	0	1	1	0	2	0	0	0	0	0
Primary	7	2	2	1	12	0	0	2	0	2
Secondary	15	20	20	21	76	2	4	2	4	12
Upper Secondary	1	2	3	2	8	2	2	1	2	7
Technical Level	0	0	0	0	0	0	0	0	0	0
University level	0	0	0	0	0	1	0	0	0	1

Source: Field Survey 1999 April

Availability of Land

According to the usage of land, it is divided into four main sectors: household agriculture (coconut farming), paddy, other agriculture and non-agriculture. Ownership of a household agricultural land was a common feature among all the milk farmers. However, approximately 86 per cent of the milk farmers had their own paddy lands while few of them owned other agricultural land (nine per cent) and non-agricultural land (one per cent). When considering the non-milk farming agricultural households, it is found that 36 per cent of farmers do not have land for coconut farming and this has become one of the reasons for not being engaged in diary farming. In Sri Lanka generally coconut cultivation is practiced at homesteads and in terms of agricultural export earnings coconut becomes next to world famous Sri Lanka's "Ceylon" tea. As milk farming is carried out in homesteads, introduction of diary farming

to this area has become an ideal diversification, which can get the maximum use of agricultural resources while generating some additional income.

In the case of area wise land utilization, in all four areas 60 per cent of milk farmers owned small plots (less than one acres.) of paddy and other agricultural land while 62 per cent of them owned more than one acres. of household agricultural land. On an average basis 38 per cent of farmers owned more than two acres. of coconut land (see Table 4).

Table 4 Land Availability at Village Level

Extent (Acres)	Paddy								Household Agriculture							
	Milk Agriculture				Non Milk Agriculture				Milk Agriculture				Non Milk Agriculture			
	K	T	E	P	K	T	E	P	K	T	E	P	K	T	E	P
≤0.25	6	1	0	1	0	0	0	0	0	1	0	3	0	0	0	0
0.26—0.5	2	5	6	7	3	0	1	0	3	2	8	8	1	1	2	0
0.6—1	5	9	10	0	0	2	0	1	3	6	6	5	0	1	0	2
1.1—1.5	5	1	3	0	1	0	2	1	4	6	4	2	1	0	0	1
1.6—2	4	1	2	3	5	0	0	1	4	2	2	3	0	0	1	1
>2	6	5	4	4	1	1	1	2	9	8	6	3	1		1	1
Extent (Acres)	Other Agriculture								Non Agriculture							
	Milk Agriculture				Non Milk Agriculture				Milk Agriculture				Non Milk Agriculture			
	K	T	E	P	K	T	E	P	K	T	E	P	K	T	E	P
≤0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.26—0.5		3	0	1	0	0	0	0	0	1	0	0	0	0	0	0
0.6—1		2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1.1—1.5		1	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Source: Field Survey 1999 April

Availability of Labour at Family Level

The common feature is to use family labour rather than the hired labour for agricultural activities. Available evidence suggests that during

the harvesting season there are some instances where hired labour is used which normally accounts for a maximum of six days per annum. The remuneration given for hired labour varies according to the sexes, for a man it is around Rs. 125 and for a woman it is normally Rs. 75 per day. The reduction of hired labour and high social cooperation among the farming community has led to develop group farming in this surveyed region. Further results reveal that (Table 5) out of the total agricultural families 33 per cent had the ability of supplying two or three persons for their own agricultural and milk farming purposes while those who have the ability of supplying four or more consisted 35 per cent. However, in normal milk farming families, 50 per cent have the ability of supplying only two persons for their agricultural activities.

Table 5 Availability of Family Labor at Village Level

Available Labour (Persons)	Milk Agriculture				Non-Milk Agriculture			
	K	T	E	P	K	T	E	P
≤2	3	8	13	8	0	3	3	4
3	3	9	10	10	1	1	1	0
4	8	7	3	3	1	0	1	1
5	4	2	0	3	2	1	0	0
6 to 8	3	1	0	0	1	0	0	1
9 to 11	0	0	0	0	1	0	0	0

Source: Field Survey 1999 April

Within the surveyed region, Kobeigane has the largest supply of labour, and recorded as 71 per cent as families, which have the ability of supplying four or more people for the purposes of agriculture as well as milk farming while in other regions this rate appeared at low levels (Thuttiripitigama: 37 per cent, Elukhena: 12 per cent and Pallewela: 25 per cent). In considering the supply of labour among the farmers who did not involve in milk farming, Kobeigane has the largest supply. Non-availability of optimum level of labour too, was found to be another

reason for not being engaged in milk farming activities by normal agricultural households.

Market for the Raw Milk

The creation of appropriate markets for agricultural goods in the Developing World is one of the most difficult problems in rural area development at present. Commonly used marketing infrastructures such as wholesale, retail and assembly markets have not been effectively utilized and the storage facilities are unable to effectively minimize post harvest losses and to reduce health risks. However, in Sri Lanka, even without developing the marketing infrastructure to higher standards, the farmers within the "Coconut Triangle Cooperative" have achieved successes by selling their milk immediately to the purchaser. Thus, the implementation of this alternative agricultural diversification practice has successfully created a market for raw milk and definitely proven to be one of the most important reasons for strengthening poor farmer incomes.

The marketing of the raw milk is totally organized by the milk farmers' organization of this region. Average of 80 per cent of raw milk from the average milk supply is sold to Nestle International Company while these farmers organization consume the rest of the milk supply at there own small scale factory to produce some milk byproducts to the market. Thus Nestle International is the biggest buyer of raw milk for these farmers. Milk supply for the last fifteen years (1984-98), has increased over 100 per cent from approximately 1.6 million liters to 3.2 million liters and this shows the successfulness of the alternative diversification in the rural community. This can be seen as an important practice where Multinational Companies and rural farmers in the Third World work together for their mutual benefits.

Sustainable Development

There is increasing recognition that economic growth will not necessarily or automatically lead to protection of the environment (Sandra S. Batle, 1992). The international discourse on the sustainability of development is primarily concerned with the rights of future generations to the services of natural and human produced assets. Because of the importance in protecting the environmentally sustainable industry, agricultural diversification practices has both led to protection of the environment while contributing indirect benefits to the related sectors, as explained below.

Within the rural economy of Sri Lanka, cattle are treated as a prestigious resource because in the context of the poor farmers, cattle is seen as a capital resource. As a draught animal, cattle are used for activities such as paddy fields preparation, crop harvesting and transportation of the harvest. They also supply organic fertilizer, which minimizes the environmental hazards of man-made fertilizers and pesticides. From paddy cultivation the milk industry obtains paddy straw as non-commercial food item for their cattle. Cattle often use the paddy fields as grass lands (during the off seasons) the coconut industry such as supply of organic fertilizer, transportation of harvest, etc. which indirectly help to reduce the cost of production as well as to provide healthy food for the community and acts as a substitute to other harmful artificial chemicals, pesticides, etc. in agricultural activities in order to provide safe and nourishing food production while minimizing. All these activities became inter-related only after the introduction of the milk industry as an alternative method for agriculture through the diversification within this area. Successfulness of financial objectives of the farmers can be understood by considering the current membership of 15,000 families against the membership of 58 agricultural families at the beginning.

Current scientific, technological, socio-economic, and environmental

trends are causing farmers to reconsider their practices and look for alternatives. Many farmers are turning to farming practices that reduce purchased off farm input costs and potential for environmental damage through more intensive management and efficient use of natural and biological resources. The success of these farmers indicates that these alternative farming practices hold promise for many other farmers and potentially significant benefits for the nation.

2. Income Analysis

Since no single farmer is engaged only in milk farming, his income basically contains income generated from milk, other agriculture and off farm agriculture. Income generated from paddy, vegetables, fruits, etc. become important in relation to other agriculture. Family units who receive a monthly income of Rs. 1001 to Rs. 2000, have become the largest category, which recorded an income of 33 per cent from milk, 25 per cent from other agriculture and 30 per cent from off farm activities.

The family units who have an income of Rs. 2001 to 3000 receive 28 per cent from milk and 12 per cent from both the agricultural activities and off farm agriculture, reveals the fact that a major portion of income is being generated from milk farming. However in the case of a normal agricultural family in Sri Lanka income is mainly generated from agricultural activities as well as off farm activities. Therefore milk income, which these farmers receive, is somewhat special compared to the normal situation in the country. This is some kind of a diversification of agriculture and around 15 per cent of the farming families generate an additional income of around Rs. 756 to 1000 per month. This minimum additional income of Rs. 756, which is created by milk farming, is 18 per cent worth of the amount of the World Bank poverty line categorization (US $ 2 per day) and 25 per cent worth of the amount of the ultra poor line categorization (US $ 1.5 per day). Further, it has revealed that the

average milk income has been ascertained as 38 per cent from the total farm income within the sample region.

In this study two indexes are used to measure a country's poverty level, namely the Per Capita Income and the World Bank measurement. According to the World Bank measurement in the year 1999, people who receive less than US $ 2/day/person is categorized as poor, while in which the US $/day/person is less that 1.5 is categorized as ultra poor[2]. In terms of this criterion, Sri Lankans who receive less than Rs. 4260 are considered as those who belong to the poverty line while the ultra poor line less than Rs. 3000 per month. Using these measurement standards as a guide, we have evaluated the influence of milk industry to the income (situation before and after the milk industry) of the milk farming community of the sample.

According to the sample statistics, before the introduction of milk industry 67 per cent of the people within the test area were found to be at the poverty line (who had an income from agriculture and non agriculture). After the introduction of the suitable diversification as a method of strengthening the agriculture sector, this level of poverty was reduced to 24 per cent, thereby eliminating poverty as defined above in 76 per cent of all the families in the area. Furthermore, it was found that 58 per cent from the lowest 24 per cent of the family units surveyed have been able to overcome the ultra poor situation.

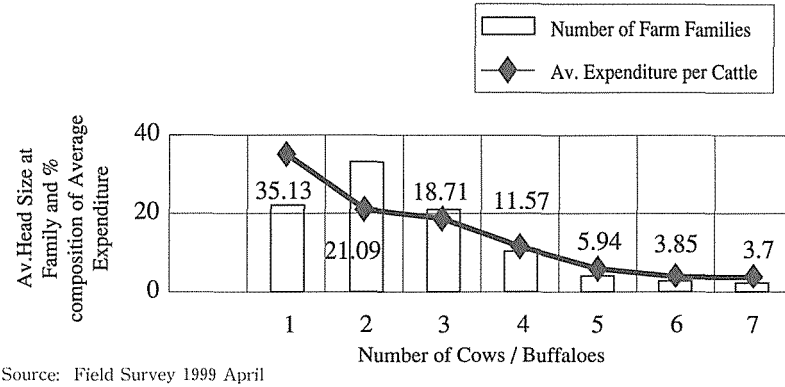
The positive effects of this alternative method on the rural farmers are also seen using Per Capita Income as a guide. In 1998, the per capita income in Sri Lanka was Rs. 4503. However, the data show that without milk farming 68 per cent of the families in the study were below the per capita level, whereas, with milk farming this value has reduced to 28 per

2 US $ 2 per day (Rs. 142 and roughly Rs. 4260 per month) is the poverty point and ultra poor point is US $ 1.5 per day (Rs. 106.5 and roughly Rs. 3000 per month) Poverty data, World Bank Website, 1999.

cent. In addition, another 63 per cent of the families were able to avoid the ultra poor situation.

Generally the gross profit become high in milk farming because of the comparatively low gross expenditure due to the interrelated advantages among the different crops. For the majority of the farming families (87 per cent) the gross profit varies from 70 per cent to 100 per cent from their respective gross income level. Receiving such high profits against the expenditure reveals the fact that the milk industry in this region is operating under a very narrow and substantial or traditional level.

Figure 1 Comparison of Average Expenditure Over Ownership of Cattle



Source: Field Survey 1999 April

In small farmer diversified agriculture, the average milk farming expenditure is inversely proportional to the number of cattle. Thus, there is a tendency to utilize more and more cattle on their farmlands. However, as shown in Figure 1, within the sample region the farmers who own 5-7 cattle recorded a very low level of expenditure.

Cattle Population and Milk Supply

The number of cattle population within the investigated area was recorded as 262. Since milk farming is carried out as a part time activity the approximately ownership of cattle recorded three cattle per milk

farmer. Farmers who owned five or more cattle, recorded comparatively a low parentage. The common types of cattle were Gergy (46 per cent), Friesian (12 per cent), Shaiwal (15 per cent), Gergy Cross (19 per cent) and Buffalo (7 per cent). However these areas can be further expanded and developed by promoting more cattle to get maximum utilization of own farmlands and other resources.

Milk production on a small-scale basis is the common situation in all four villagers. With regard to the milk supply, approximately 32 per cent of the farming families supply a range of 2.6 lt. to 5 lt., while 23 per cent supply 5.1 lt. to 7.5 lt. Those who supply between 7.6 lt. to 14.9 lt. were recorded as 26 per cent and those above 15 lt. were recorded as 17 per cent from the sample. However, only 2 per cent of the families were found as minimum milk suppliers (less than 2.5 lt.) within the surveyed area. Considering the area wise milk yield, Thuttiripitigama recorded the highest milk yield (2.87 lt.) while Elukhena (2.86 lt.), Pallewela (2.13 lt.), and Kobeigane (1.65 lt.) recorded according to the numerical order. The herd size in Kobeigane was recorded as 3.43 2.88 in Elukhena, 2.2 in Thuttiripitigama and 2.21 in Pallewela respectively.

3. Living Conditions of Farmers

The living standards of the farmers were also evaluated in terms of housing conditions, the household amenities and the availability of an electrical power supply. Based on these criteria, compared to the normal agricultural households, milk farmers enjoyed a higher standard of living conditions. Roofs, floors, walls and toilets in the majority of farmer houses (over 85 per cent) were in good condition (90 per cent). At the village level too, all these conditions were satisfied in over 90 per cent of the homes.

Most of the farmers (66 per cent) used electricity as the main source of energy while a minority (34 per cent) still uses kerosene oil. However,

electricity was not used for cooking purposes. Most used firewood for cooking while only one per cent used gas. The high usage of firewood is mainly because of its free availability and cooking with firewood gives additional taste to the food.

In order to ascertain the living conditions it was essential to consider the various utility items used by the milk farming families. It was found that the majority of the farming families (above 50 per cent of the sample) had television, radio, and sewing machines, motor bicycles and push bicycles. However the refrigerator as a household item was not so common (only nine per cent from the sample). In addition, 18 per cent out of the total milk farmers used their own tractors and water pumps for farming and other agricultural activities where under normal circumstances renting of these machines is the common situation in the rural sector.

III Concluding Remarks

A growing movement has emerged during the recent past to question the role of the agricultural establishment in promoting practices that contribute to problems, such as the decline of family farms, continued neglect of the living and working conditions for farm laborers, increasing costs of production, and the disintegration of economic social and environmental conditions in rural communities of the country. Today this movement for sustainable agriculture is garnering increasing support and acceptance within mainstream agriculture. Not only does sustainable agriculture address many environmental and social concerns, but also it offers innovative and economically viable opportunities for the farmers. Due to the introduction of the diversified agriculture there has clearly been paramount importance in paving the way for a better life for farmers, and promotion of such activities will benefit not only the living

standards of the rural farming community but will also conserve natural resources and prevent harmful disasters for future generations. Further it is important to state that, the income generation of milk to the farmers' income has a vital impact on poverty alleviation in this region.

Considering the total income level reported by the rural farmers who practice the diversification of agriculture, all four villages have tremendously benefited from the alternative method, and about 50 per cent of the families have achieved high-income standards while approximately 30 per cent have been able to over come from the ultra poor income level to enjoy better living conditions.

The introduction of a diversified agriculture has been paramount in paving the way for a better life for the Sri Lankan farmers. However, can more be done to help further improve their life? From our study, we have learned that the average herd size of a farming family is around 2.8 while the average milk yield is around 6.2. Because cattle herd size and the average milk yield do not perfectly correlate in same direction at village level, it may well be worthwhile to mobilize the available resources to redefine dairy activities under the diversification scheme separately to order to better suit to the specific characteristics within the four geographical areas tested.

Other factors concerning cattle need to be considered as well. For example, we found a clear inverse relationship between cattle number and cattle cost. In the diversified agricultural setting of the Coconut Triangle, the more cattle a farmer owns the cheaper the cattle cost. This encourages for the utilization of more and more, cattle in their own farmlands. However, the situation is not so clear-cut as more often then not, the farmers have access to lowbred, low milk producing cattle. Hence the correct option in this direction would be to introduce highbred cattle as more as possible. When considering the resource profile of the farmers, such as land labour and time availability, there are enough financial

excess to further develop diary activities as well as the other agriculture in the authorized are of the Coconut Triangle.

Considering all these facts, it is worthwhile to recommend milk farming as a suitable agricultural diversification for poor farming communities for other rural areas too. However, there can be limitations in expanding the rural development only through agricultural diversification. Therefore, it is important to give attention to agro-based small industries in order to absorb excess resources as to continue to practice these new agricultural availabilities as much as possible. In this direction the expansion of the factory owned by the diary farmers organization, which consumes nearly 20 per cent of average milk supply by the farmers can play another vital role in the next phase of the present process of diversification.

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