Integrated Farming Systems Management for Sustainable Sericulture - a Case Study

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Introduction

Integration of crop farming along with livestock, poultry etc., benefit the farmers considerably, in terms of improvement in livelihood. In India, sericulture, a flourishing sector of many farming communities is found profitable and a lucrative monetary venture. Of late, sericulturists have initiated mixed farming of sericulture along with aquaculture, floriculture, horticulture, livestock and poultry and thereby improved their economic condition considerably. Karnataka, a leading state in mulberry sericulture is becoming a model in introducing Integrated Farming Systems in the field of sericulture.

In Karnataka, Kolar district is the largest producer of mulberry raw silk accounting for 38.37 per cent of the production in the state and also has the distinction in dairy and horticulture crops especially in production of tomato and potato. The present case study envisages the impact of an economically viable and sustainable mixed farming by integrating the different components like sericulture, livestock, poultry, enhancement in farm income and FYM production. This is in view of the estimate by Central Silk Board, Bangalore and Prof. S. Jayaraj Foundation, Chennai, that there is a deficit of around 98 per cent in FYM production, during a study on Integrated Nutrient Management –Integrated Pest Management during 2005-07, in the adopted farmers' holdings of Kolar district.

Methodology

The present study was conducted in three villages of Kolar district in Karnataka, India, namely, Hosepet, Beechgondahalli and Chowdadenahalli during the period 2005-2008. The livestock of Rambule hybrid sheep, developed by the Agricultural University, GKVK, Hebbal, Bangalore and coloured chicken hybrid - Giriraja poultry birds, developed by researchers at the Department of Avian Production and Management (DVPM), Hebbal, Bangalore, were supplied to 27 farmers (Rambule sheep- 29 pairs and 8 females and Giriraja birds -10 chicks per farmer) with a subsidy of 50 per cent in case of chicks and Rs. 400/- subsidy in case of sheep. The Rambule sheep were confined to rearing sheds and were fed with waste mulberry leaves and branches besides other feed like grasses

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etc. On the other hand, the Giriraja birds were raised as free roaming birds and fed with locally available material besides discarded silkworm larvae.

For the present study, the growth of Rambule sheep and Giriraja birds and income generation, production of manure of both sheep and poultry birds and cost economics were estimated and the data were statistically analysed.

Results and discussion

Integrated Farming System has proved to be beneficial to farmers because even if the main crop fails due to adverse weather conditions or price fluctuations in the market, the loss can be supplemented by selling the produce of other intercrops or animal products. The present case study analyses the sericulture farmers of Kolar district of Karnataka state who have undertaken the rearing of Rambule hybrid sheep and Giriraja birds for subsidiary income besides increasing their FYM production with animal residue (Fig 1).

Rearing of hybrid sheep helps, not only in terms of availability of meat and milk to the consumers but also in improving the availability of finer quality wool for value

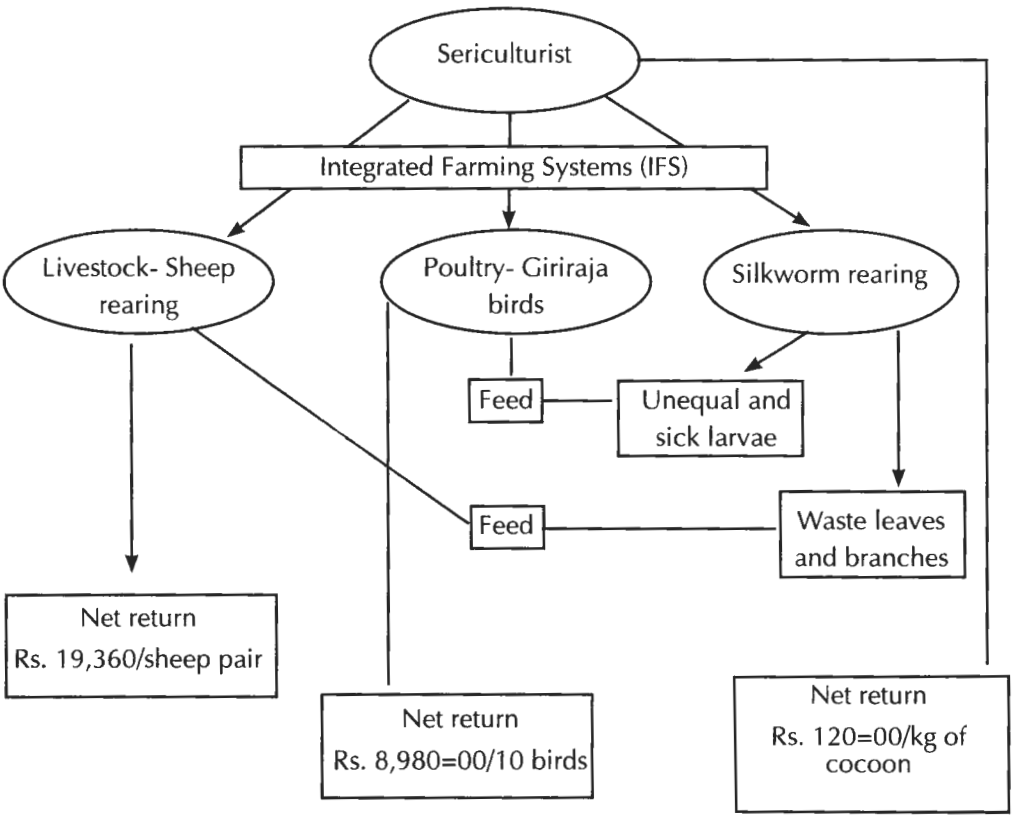
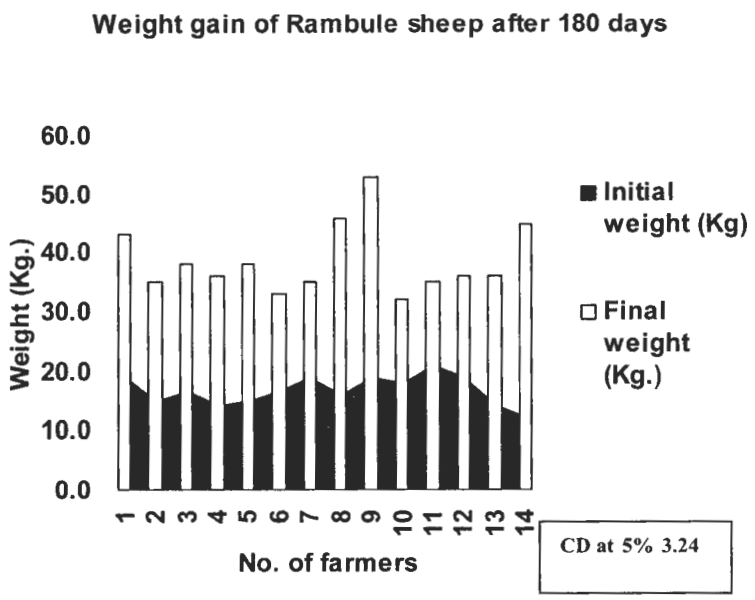


Fig. 1. Flow chart of IFS of sericulturist of Kolar district

added woolen product manufacture. Rambule hybrid sheep is known in Kolar district for the production of quality meat, milk and coarse wool to ensure better remuneration to farmers. Some farmers in the region are highly specialized in breeding sheep to sell to other farmers. Morphometric studies on the growth of Rambule sheep revealed the weight gain of 20.54 kg after 180 days (Fig. 2).

Fig 2. Weight gain in Rambule sheep



There is a big gap in the availability of highly nutritious eggs and chicken meat between urbanites and malnourished rural people. Egg is the cheapest source of animal protein in rural areas. Rearing of poultry birds is a common activity in villages in the backyards of households. This activity not only improves the nutritional status, but also supports the economy of rural families. Since local poultry birds are less productive in terms of egg production and low weight gain, it does not improve the income levels of rural families to the expected level (Singh, 1994). In order to upgrade backyard poultry, Giriraja birds were reared for their eggs and meat by the selected sericulturists. The birds have a high egg production potential along with better growth compared to local varieties and are suited for mixed and backyard farming. The birds attained maturity from the 22nd week after hatching. Females attained a body weight of about 3 kg and the males about 4 kg with an average weight gain of 3.76 kg after 180 days. The birds were sturdy and had a high longevity. Being good scavengers, they feed on a variety of insects, green foliage and farm and kitchen wastes. A pair of Giriraja chicken fetches an income

of about Rs. 1910 for two years through the sale of their eggs and meat. The diffusion of maintaining Giriraja birds was quick and the other fellow farmers collected the eggs of Giriraja birds and started incubating to upgrade their backyard poultry. Giriraja birds survive like any other native birds and do not demand either sophisticated or modernized rearing practices. Farmers noticed that the birds need no special care, and they attained 3 – 4 times more weight with an egg production of 75 – 90 eggs/year/bird as against 65-70 eggs/bird/year in local birds. Each egg weighed about 55-60 g. The eggshell is brown in colour and thicker than that of other commercial eggs and does not break easily. The eggs are priced at the rate of Rs. 4.00 in the local market. Through the sale of eggs, every family started earning an income of Rs. 280-360/bird/year. Thus the income levels of the families increased to a greater extent as compared to the earlier days.

The economics of rearing Rambule sheep and Giriraja birds indicated the accrual of net income of Rs. 9,680 per sheep and Rs. 8,980 for 10 chicks, at the end of the 2nd year (Table 1 and 2). Madhava Swamy (1985) observed that the net returns were higher by Rs 620, Rs 5,198 and Rs 1,598 in diversified farms of agriculture farming, poultry and sheep rearing, respectively over the crop enterprise farm in Kurnool district of Andhra Pradesh. Singh (1994) compared three types of farming system and found that the mixed farming with 3 cross bred cows gave the highest net return of about Rs 21,000.

Table 1. Economics of Hybrid Sheep Rearing	
Expenditure:	
Cost of each sheep of Rambule hybrid	
(3-5 months old) weighing 15-20 kg/sheep	: Rs. 1,800 =00
Feed & veterinary treatment for two years	: Rs. 4,700=00
Income:	
At the end of 2nd year, hybrid sheep weighs about 80 kg.	
As per the market rate Rs. 200/- per kg on the basis of live animal weight	
80 kg x Rs.200/-	: Rs. 16,000=00
Output of wool Rs. 30/kg App. 6 kg/ sheep	: Rs. 180=00
Net returns:	
Income from one sheep Rs. 16,180=00 – Cost of each sheep Rs. 6,500=00	
	= Rs. 9,680=00
Anticipated returns for two sheep:	**Rs.19,360=00**

Table 2. Economics of Backyard Poultry Rearing

Expenditure	
Initial cost of Giriraja chicks of 35 days old @ Rs.27/chick	
For ten chicks :	Rs. 270=00
Feed: grains 20 kg /10 chicks/two years@Rs.15/kg:	Rs. 300=00
Total :	**Rs. 570=00**
Income:	
1st Year profit	
No. of eggs laid by one bird @ Rs 4=00	
90 eggs x Rs. 4=00 :	Rs. 360=00
2nd year profit	
No. of eggs laid by one bird @ Rs 4=00	
70 eggs x Rs. 4=00:	Rs. 280=00
At the end of 2nd year, cost of meat from	
Each bird (approximately 4 - 5 kg): Rs. 315=00	
Total income	**Rs. 955=00**
Net returns per bird (Rs 955=00 – 57=00) = Rs. 898=00	
Anticipated net returns for 10 birds: Rs. 8,980=00	

It was estimated that Rambule sheep produced 250g faecal matter/sheep and Giriraja birds produced 50g faecal matter/10 birds for making FYM. After the supply of the sheep and poultry birds, the deficiency of FYM has come down a little by 1.4 to 5.3 per cent (Table 3) with efficient recycling of the organic crop residue. Further, the waste obtained from the animals not only provides organically rich manure but also helps in manufacturing biogas.

Table 3. Manure of Rambule sheep and Giriraja birds in FYM production

Village	Land Holding (ac)	FYM (MT)/Annum						
		Requirement (MT)	Before adoption		After adoption		Imp. In Produc. (MT)	Reduction in Deficiency%
			Production	Deficiency %	Production	Deficiency %	Production	Deficiency %
Chowdadenahalli	40.6	538.3	146.15	72.85	158.91	71.48	2.76	1.37
Beechgondahalli	56.4	691.0	165.62	76.03	179.64	74.00	14.02	2.03
Hosepet	32.8	402.0	131.53	67.28	152.79	61.99	21.26	5.29
Av./Total	129.8	1631.3	443.30	72.83	491.34	69.88	48.04	2.95

Livestock and poultry based integrated farming system (IFS) is ideal for small and medium scale farmers. It is not only eco-friendly, but also more economical for farmers to raise animals in an integrated farm. The additional benefits that the farmers can derive from the IFS, through the recycling of faecal matter and other crop residue as renewable resources, provide the essential means of production such as FYM, feed and fuel that can make most farming activities economically viable and ecologically sustainable.

The results of this case study indicate that integrated farming systems with Rambule sheep and Giriraja birds are excellent interventions, which can augment the income of sericulturists to improve their socio-economic status. It is important that such interventions are undertaken in similar agro-ecological regions for enhancing the profitability and quality of life of the farming community.

References

Chan, G.L., 1985 Integrated Farming System. Elsevier Science Publications, Amsterdam, Netherlands. Pp. 34-56.

Madhava Swamy, G. 1985. Effect of diversified farming on income and employment. Indian Journal of Agricultural Economics. 40(3): 333.

Mehta S C., Vij P K, Nivsarkar A E and Sahai R. 1995. Sheep husbandry practices in Sonadi and Malpura breeding tract. The Indian Journal of Small Ruminants 1: 1-7.

Prein, M., 2001. Integration of Aquaculture into Crop-Animal Systems in Asia. In: Agricultural Systems, 71. Elsevier Science Ltd, Amsterdam, Netherlands. pp 127-146

Ramrao W Y, Tiwari S P and Singh P 2005 Crop-livestock integrated farming system for augmenting socio-economic status of smallholder tribal of Chhattisgarh in central India. Livestock Research for Rural development. 17(90): from http://www.cipav.org.co/lrrd/lrrd17/8/ramr17090.htm

Singh K P 1994 Integrated Farming System - Concept and Scope, Symposium of Resource Management and Crop Productivity. February 16-18 at the CCSHAU, Hissar, India. Pp.69-85.

Swaminathan M S 1981 Indian agriculture - Challenges for the Eighties, Agriculture Situation of India. 36(6): 349-59

Role of Rural Women in Farm Management Decision Making Process

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Introduction

Rural women play a significant role in domestic and socio-economic life of the society. As per 2001 census, agriculture and allied industrial sectors employ as much as 89.5 per cent of total female labour. In the case of working population, rural female participation rate is 27.2 percent which is nearly thrice of the urban female participation rate (9.7 per cent).

Indian rural women, in addition to participating in different farm operations and activities also help in decision making with regard to farm practices, operations and household affairs. Successful management of the farm and family is totally dependent upon taking the right decision at the right time and execution of the same with proper zeal and ability. Thus, women have a considerable role in decision making in home as well as in farm affairs and thus play an important role in the development process.

A study was taken up with the objective of examining the role of women in farm management decision making process.

Methodology

The study area was Sangamner tahsil of Ahmednagar district of Maharashtra state. Four villages were selected and from each village 30 families were selected as the sample, thus making it a sample size of 120 farm families. Out of the 120 samples, 30 samples were selected from each size group of farmers viz. I , II, III and IV, being landless families, group having holding size of 0.01 to 2.00 ha, 2.01 to 4.00 ha and above 4.01 ha, respectively. Thus the sample for the study consisted of 120 families from Sangamner tahsil of Ahmednagar district of Maharashtra state. The data were collected with the help of a questionnaire specially designed for the purpose. The data pertains to the agricultural year 2004-05. The data of the sample families were compiled according to size groups of farms.

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Decision making function

Chi-square test was used to quantify the decision making process of farm women. The following formula was used:

$$x^2 = (1/n1n2) \sum \frac{(aini-bini)^2}{(ai+ bi)}$$

Where, i = 1,2,3,4 (four size groups of farms)

x^2	=	Chi-square statistic
n1n2	=	Product of the number of women workers.
a1	=	Number of women workers involved in decision making of group-I
b1	=	Number of women workers not involved in decision making of group-I
a2	=	Number of women workers involved in decision making of group-II
b2	=	Number of women workers not involved in decision making of group-II
a3	=	Number of women workers involved in decision making of group-III
b3	=	Number of women workers not involved in decision making of group-III
a4	=	Number of women workers involved in decision making of group-IV
b4	=	Number of women workers not involved in decision making of group-IV
n1	=	Total number of women workers involved in decision making.
n2	=	Total number of women workers not involved in decision making.

Results and Discussion

1. Working Members of Sample Families

The information relating to working members of sample families is given in Table 1. It is observed from the table that the average number of workers in the landless families, Group-II, III and IV were 3.15, 3.20, 4.23 and 4.02 respectively. On an average, the number of workers was 3.65 per family.

The average number of men and women workers in the farm families increased with increase in the size of holdings upto size group-III and the same decreased in size group-IV.

Table 1 . Proportion of Workers in the Sample Families

Sl. No.	Size Groups	Size limit (Ha)	No. of Cultivators	Proportion of workers in the sample families	
				Men	Women
1	Landless	-	30	1.69	1.46
				(53.65)	(46.35)
2	Small	0.01 to 2.00	30	1.75	1.45
				(54.69)	(45.31)
3	Medium	2.01 to 4.00	30	2.53	1.70
				(59.81)	(40.19)
4	Large	Above 4.00	30	2.18	1.84
				(54.23)	(45.77)
	Total		**120**	**2.04**	**1.61**
				(55.89)	**(44.11)**

2. Decision Making

There are a large number of activities in which women workers participate in decision making. Though decisions of these activities are expected to be taken by each sample family, women workers from each sample family may or may not be involved in each decision. In other words, some of the women workers may participate in decision making in one activity, while women from another family may not participate in that activity. The extent of participation of women workers would differ from one activity to another. The following major activities are identified where women workers participated in decision making process in the present study. All those identified activities in which women have participated in different magnitudes depend upon their involvement. In order to specify the magnitude of involvement, the results of chi-square test are presented in the Tables.

2.1 Decision making relating to Purchase of Items of Family Consumption

It can be seen from the table that the results are highly significant with Chi-square value of 18.63. The study shows that the women from landless and small size groups participated much than the women from the medium and large size groups. The involvement of women workers in decision making was 56.67 per cent comprising the women of landless labourers who were involved to the extent of 70.00 per cent, women of small farm size group to the extent of 73.33 per cent, and women of medium size group to the extent of 50.00 per cent. The involvement of the women from large size group was to the extent of 33.33 per cent.

Table 2. Involvement in Decision Making relating to Purchase of Items of Family Consumption

N=120

Size group	Involvement in Decision Making				Total	
	Involved		Not Involved			
I	21	(70.00)	9	(30.00)	30	(100.00)
II	22	(73.33)	8	(26.67)	30	(100.00)
III	15	(50.00)	15	(50.00)	30	(100.00)
IV	10	(33.33)	20	(66.67)	30	(100.00)
Total	**68**	**(56.67)**	**52**	**(43.33)**	**120**	**(100.00)**

(Figures in the parentheses are the percentages to the total)

Chi-Square = 12.76xx (Highly significant)

The result of chi-square test revealed that women are involved in decision making process to a greater extent.

2.2 Decision making regarding Purchase of Farm Input

A large number of inputs are home produced while others are required to be purchased from market. Some of the inputs have to be used at the proper time, in certain quantities and a few with some skills. Therefore, there are several decisions to be taken in this regard. The extent to which women of different size groups influence such decisions on sample farms was tested through the statistical test and the data are presented in Table-3. The chi-square value 4.91 shows that there is non significant relationship. On an average nearly 37.78 per cent women workers are involved in decision-making

Table 3. Involvement of Women Workers in Decision Making regarding Purchase of Farm Inputs

N=90

Size group	Involvement in Decision Making				Total	
	Involved		Not Involved			
I	00.00		00.00		00.00	
II	16	(53.33)	14	(46.67)	30	(100.00)
III	10	(33.33)	20	(66.67)	30	(100.00)
IV	8	(26.67)	22	(73.33)	30	(100.00)
Total	34	(37.78)	56	(62.22)	90	(100.00)

(Figures in the parentheses are the percentages to the total)

Chi-Square = 4.91 (Non significant)

The women workers from the size group-II are involved in decision making to the extent of 53.33 which was greater than group-III and IV, where the extent of involvement was 33.33 and 26.67 per cent, respectively.

2.3 Decision Making regarding Crops to Grow

It was thought that women from economically low status i.e. from size group-II, are consulted in decision making regarding crops to grow, while those from economically better status are not consulted with regard to taking up several crops on the farms. This is because the women from medium and low economic status tend to always plan for different requirements of their families and therefore, it was thought that they would be involved in decision making to a larger extent in that respect.

Table 4. Involvement of Women Workers in Decision Making regarding Crops to Grow

N=90

Size group	Involvement in Decision Making				Total	
	Involved		Not Involved			
I	00.00		00.00		00.00	
II	16	(53.33)	14	(46.67)	30	(100.00)
III	10	(33.33)	20	(66.67)	30	(100.00)
IV	7	(23.33)	23	(76.67)	30	(100.00)
Total	33	(36.67)	57	(63.33)	90	(100.00)

(Figures in the parentheses are the percentages to the total)

Chi-Square = 6.02x (significant at 1 per cent level)

However, the above comments have been partially proved as evidenced from the data in Table 4. The result of chi-square test is 6.02 which is significant. The chi-square value implies that the women workers from the size groups-III and IV, were involved in the decision making process regarding crops to grow to some extent.

2.4 Decision regarding Area Allocation of Crops

Decision regarding area allocation of crops is thought to be taken by men counterparts of the farm family, but even then the women are consulted in the transaction related to area allocation for the crops. This was tested through a statistical test. The chi-square test gives the result 5.76 which is not significant. The data also shows that at overall level about 38.00 per cent of the women were involved in decision making regarding the allocation of crops. The women from size group-III and IV were involved to a lesser extent in decision making.

Table 5. Involvement of Women Workers in Decision Making regarding Area Allocation of Crops

N=90

Size group	Involvement in Decision Making		Total
	Involved	Not Involved	
I	00.00	00.00	00.00
II	16 (53.33)	14 (46.67)	30 (100.00)
III	11 (36.67)	19 (63.33)	30 (100.00)
IV	7 (23.33)	23 (76.67)	30 (100.00)
Total	34 (37.78)	56 (62.22)	90 (100.00)

(Figures in the parentheses are the percentages to the total)

Chi-Square = 5.76 (Non-significant)

2.5 Decision regarding Disposal of Farm Produce

Which farm produce, where it is to very important decisions in the farm business. The decision regarding disposal of farm produce are dominated by men. The result of the chi-square test applied to work out the extent of involvement in decision making regarding disposal of farm produce is given in Table-6.

Table 6. Involvement of women workers in Decision Making regarding Disposal of Farm Produce

N=90

Size group	Involvement in Decision Making		Total
	Involved	Not Involved	
I	00.00	00.00	00.00
II	16 (53.33)	14 (46.67)	30 (100.00)
III	11 (36.67)	19 (63.33)	30 (100.00)
IV	8 (26.67)	22 (73.33)	30 (100.00)
Total	35 (38.89)	55 (61.11)	90 (100.00)

(Figures in the parentheses are the percentages to the total)

Chi-Square = 4.58x (Non significant)

It can be seen from the table that the results are non significant with the chi-square value of 4.58. The result of chi-square test revealed that women are involved in decision making process to a very small extent.

2.6 Decision regarding Repayment of Loan

Farm women are lagging behind in advising heads of the families, who are male

members in respect of borrowings. The results of Table 7, where this has been presented indicates non significant relationship.

Table 7. Involvement of Women workers in Decision Making regarding Repayment of Loan

N=90

Size group	Involvement in Decision Making				Total	
	Involved		Not Involved			
I	00.00		00.00		00.00	
II	14	(46.67)	16	(53.33)	30	(100.00)
III	10	(33.33)	20	(66.67)	30	(100.00)
IV	7	(23.33)	23	(76.67)	30	(100.00)
Total	31	(34.44)	59	(65.56)	90	(100.00)

(Figures in the parentheses are the percentages to the total)

Chi-Square = 3.64 (Non significant)

The result of chi- square test revealed that women are not involved in the decision making process.

2.7 Decision making regarding Disposal of Milk and Milk Products

Farm women are expected to be involved in the decision making regarding disposal of milk and milk products by utilizing it for meeting family needs, for sale and other purposes. The investigation in the involvement in decision making regarding the disposal of milk and milk product showed positive results. The results of the chi-square test are presented in Table 8.

Table 8. Involvement of Women Workers in Decision Making regarding Disposal of Milk and Milk Products

N=120

Size group	Involvement in Decision Making		Total
	Involved	Not Involved	
I	16 (53.33)	14 (46.67)	30 (100.00)
II	10 (33.33)	20 (66.67)	30 (100.00)
III	10 (33.33)	20 (66.67)	30 (100.00)
IV	5 (16.67)	25 (83.33)	30 (100.00)
Total	**41 (34.17)**	**79 (65.83)**	**120 (100.00)**

(Figures in the parentheses are the percentages to the total)

Chi-Square = 9.00xxx (significant at 1 per cent level)

The chi-square value obtained is 9.00 which was significant, implying that the women were involved in decision making regarding disposal of milk and milk products to a great extent.

Conclusion

It can therefore be concluded that though the women farmer is heavily involved in agriculture in western Maharashtra, the level of her participation in decision- making is quite low, because of dominance of men in the family, illiteracy, less exposure to the outside world, lack of confidence, shyness, lack of knowledge regarding improved agriculture which were the major reasons. To overcome this, short duration training programmes should be conducted in decision making process. This will not only improve the knowledge and skill of women workers but will also help to expose them to different types of settings and also explore entrepreneurial abilities of farm women.

References

Bajaj, S. S. and Shaikh, A. M. (1989). Role of farm women in decision making regarding Agriculture. Maharashtra Journal of Extension Education, 8:185-188.

Geethalakshmi, G., Roghuprasad, K. P. and Suresha, S.V. (2002). Comparative study on the farm activities performed by landless farm women labourers in the irrigated and rainfed areas of Shimoga District. Current Research-University of Agricultural Sciences, Bangolore 31:5-6, 99:100:3 ref.

Kadlag, Sangita (1993). Role of women in decision making in farming in Sangamner tahsil of Ahmednagar district. A thesis submitted to Mahatma Phule Krishi Vidyapeeth, Rahuri.

Kamble, A. S., Havaldar, Y.N. and Katacrki, P.A. (2002). Farm women decision making family and farming activities in family and farming activities in Bellary District of Karnataka. Karnataka J. of Agril. Sciences

Kavita, L. and Reddy, M.S. (2002). Problem and suggestions from farm women for effective time utilization in farm activities. Current research, University of Agricultural Science, Bangalor 31: 5-6, 78-80.

Nawadkar, D. S. and Gavali, A. V. (2003). A study of farm and Non-farm employment and income of the farm families in Maharashtra. A Report of the Research Work Done on Agricultural Economies, During 2003 at M.P.K.V., Rahuri.