CONTRIBUTION OF DAIRYING TO INCOME, EMPLOYMENT AND FOOD SECURITY OF RURAL FARMING HOUSEHOLDS – AN EMPIRICAL ANALYSIS *

Introduction

Dairying in India is an occupation of small farmers. Over 60 percent of close to 11 million farmer members in about 100,000 village milk cooperatives all over the country are small, marginal and even landless producers. Dairying has not meant just producing milk leading to India emerging as the largest milk producer in the world. Dairying has provided livelihoods to millions of the poorest in our country and for many it is the sole source of livelihood bringing cash into their hands, twice a day every day of the year... In India, as is the case in many other developing countries, the distribution of livestock among the poorest is far more equitable than the distribution of land. Livestock therefore play an extremely critical role in supporting and sustaining livelihoods of a large number of poor. Livestock are often the only livelihood option available to the landless as common property resources are being increasingly captured by individuals for private gain. (Patel, 2004)

Objectives of the study

The present study is an attempt to analyze the nature and extent of contribution of dairying to income, employment and food security of rural farming households. Since, dairying is practiced in a mixed farming rural set up in most parts of the country; the target population studied was primarily the milch animal holding households (MAHs) of a rural district, i.e. Vaishali district.

The specific objectives of the study were –

1. **To analyse the impact of dairying on the income distribution & employment generation of rural farming households.**

2. **To evaluate the contribution of dairying to the food security of rural farming households.**

Methodology
(a) Project Area –
  Location
  The district of Vaishali came into existence on 12/10/1972. Earlier it was a part of the old Muzaffarpur district. Vaishali district is located at 25° to 30° North latitude and 84° to 85° east longitude. It is surrounded by the river Ganga in south, Gandak in west; district Muzaffarpur in north & Samastipur in East. Vaishali District lies in the semi-tropical Gangetic plane and it is linked with the state capital Patna through famous Mahatma Gandhi Setu. The District is spread over 2036 sq km area.

  Demography
  There are three sub-divisions and 17 Blocks in the District. The District has 1638 revenue villages, 291 Gram panchayats and 3 towns. The total population of the district is 2.72 million, out of which **2.53 million is its rural population (93 percent).** The literacy rate of the district is 50.5 percent. The SC & ST population comprises about 21 percent of the total population of the district. The total number of households in the district are 4,12,669 (Census, 2001).

  According to the Village Enumeration, NDDB, 2001 about 45 percent of the total number of households in the district are Milch Animals Holding Households (MAHs).

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* This study is a continuation of a previous study by the same author, titled *Characteristics of Milch Animal Holding Households (MAHs) of Vaishali district.*

(b) Sampling Design –

A sample of 10 villages that have substantial population of MAHs was randomly selected in the district. A sample of 20 households in each selected village was surveyed randomly. It was ensured that among the selected households, 15 were MAHs and 5 non-MAHs. Thus the total sample consisted of 150 MAHs and 50 non-MAHs. The data of non-MAHs were used for control and comparison purposes.

During a preliminary analysis, it was found that MAHs of Vaishali district do not constitute a homogeneous population and land holding by MAHs prominently resulted into heterogeneity or disparity among them. Hence, based on the land holding of a household, MAHs were classified into marginal (0.05 – 2.5 acres) and small farmers (2.5 – 5 acres) for in depth analysis and better results. Almost all the farmers who got selected into the sample frame had land holding ranging from 0.05 to 5 acres.

(c) Data Collection –
The data was collected from randomly selected households on a structured questionnaire. The collected data pertained chiefly to the demographic characteristics, income & employment status, assets holding, consumption pattern, savings and dairying business.

(d) Analytical tools used –

The analytical tools employed for data analysis were as follows –

1. **Tabular analysis**: The measures of central tendency, i.e. Mean, Standard Deviation and Coefficient of Variance were used to analyse the collected data in a tabular form.

2. **Lorenz curve**: It was used to measure the distribution of income (including and excluding income from dairying) and employment among the milch animal holding households of Vaishali district. The data was analyzed for the marginal and small farmers separately. The study used the procedure proposed by Kakwani and Podder (1976) for computing Lorenz curve.

The Lorenz curve equation can be represented as -
$$y = a\,\Pi\gamma^A\,(\sqrt{2} - \gamma^B)$$

Where, a > 0 and therefore y > 0 i.e., Lorenz curve lies below the egalitarian line. The estimates of a, A and B was computed using the following regression equation -

$$\text{Ln } Y = \text{Ln } a + A\,\text{Ln}X_1 + B\,\text{Ln}X_2 + \mu_{it}$$

Where,
$$Y = \frac{P - Q}{\sqrt{2}}, \qquad X_1 = \frac{P + Q}{\sqrt{2}}, \qquad \text{and} \qquad X_2 = \sqrt{2} - X_1$$

Where, P and Q are the co-ordinates of the Lorenz curve. They are the cumulative frequencies of households and their incomes respectively.

3. **Gini Concentration Ratio (GCR)**: It is the most widely used measure of inequality in the distributive process, and the same was used to analyze the inequality in the distribution of income and employment derived from dairying. GCR is equal to twice the area between Lorenz curve and the egalitarian line. It varies from 0 to 1. If its value is zero, it denotes perfectly equal distribution, while if it is 1, it denotes perfect inequality. It is computed using the following formula -

$$GCR = 2 \int_{0}^{2} f(\Pi)\, d\Pi$$

Which for a specific Lorenz curve is -
$$Y = 2a\,(\sqrt{2})^{1+A+B}\,\beta_{(1+A,\ 1+B)}$$

4. *Food Security Index*: Aggregate Household Food Security Index (AHFSI) is most widely used to measure the household level of food security of the respondents. AHFSI is an indicator of per capita food availability for human consumption. Food balance sheets are used to know about the consumption pattern and availability of calories to the respondents.

Hence,

AHFSI = 100-[H{G+{1-G)I^P}+0.5Ω}{1-H[G-(1-G)I^P]}]100 ...(Thomson & Metz, 1997)

But due to the non-availability of data on height and weight of the respondents, which is essential for the estimation of AHFSI; the difference of means test was used to indicate the difference in the nutritional status, and hence food security of different categories of households. The difference of means test can be described as under:

***Difference of Means test*:** It is used to test the equality (or difference) between means of two samples. In the present study, it was used to test the difference between the nutritional level and hence the food security of MAHs and non-MAHs. Here,

    H_o: Nutritional level / food security of MAHs and non-MAHs are the same or equal.

    H_1: Nutritional level / food security of MAHs and non-MAHs are significantly different or unequal from each other.

The difference in the two means is tested using the Student's t-test. Hence,

$$t_{cal} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\dfrac{\sigma_1^2}{n_1-1} + \dfrac{\sigma_2^2}{n_2-1}}}$$

Where,

x_1 = Mean of the first sample
x_2 = Mean of the second sample
σ_1 = Standard Deviation of the first sample
σ_2 = Standard Deviation of the second sample
n_1 = No. of units in the first sample
n_2 = No. of units in the second sample

And,

$$t_{\alpha\ d.f.} = \frac{\left(\dfrac{\sigma_1^2}{n_1-1} + \dfrac{\sigma_2^2}{n_2-1}\right)^2}{\dfrac{(\sigma_1^2)^2}{\dfrac{n_1-1}{n_1+1}} + \dfrac{(\sigma_2^2)^2}{\dfrac{n_2-1}{n_2+1}}} - 2$$

If $t_{cal} < t_{\alpha}$ then H_o is accepted, i.e. nutritional level / food security of MAHs and non-MAHs are the same or equal

But if $t_{cal} > t_{\alpha}$ then H_o is rejected and H_1 accepted, i.e. nutritional level / food security of MAHs and non-MAHs are significantly different or unequal

Hypotheses of the study –

  a. Dairying supplements the income and employment of rural farming households under mixed farming system.

  b. Dairying brings about equity in the distribution of income and generation of employment among rural farming households.

  c. Dairying enhances significantly the nutritional level of rural farming households, thereby increasing their food security.

Results & Discussion

1. Tabular analysis of characteristics of different categories of households

  (i) *Demographic Characteristics*
  Table 1 (a) represents some of the most important social characteristics of marginal and small milch animal holding households (MAHs) of Vaishali district. It shows that the average size of a marginal household is more than 5 whereas that of a small MAH is less than 5. This is because landless MAHs perceive that more the number of family members, more the family income, which is not true (Refer table 1 (a) & 2 (a) below).

Table 1 (a): Social Characteristics of MAH

Sl. No.	Characteristics	Marginal farmers (n_1 = 125)		Small farmers (n_2 = 25)	
		Mean	C.V.	Mean	C.V.
1	Size of Household (Persons per family)	5.39	33	4.74	40
2	Caste (SC=1, ST=2, OBC=3, Others=4)	3.06	19	3.17	12
3	Total Land holding (in acres)	0.86	68	4.13	47
4	Value of other fixed assets (Rs.)	61961	120	136239	100
5	Value of Movable assets (Rs.)	35889	68	91913	145
6	Value of Total Assets (Rs.)	468989	257	1098587	94
7	Value of Assets other than land (Rs.)	97793	86	228152	81
8	Total Milch Animals (no.)	1.80	63	2	43
9	Value of Milch Animals (Rs.)	17981	67	19030	63

The average number of milch animals reared by a marginal as well as a small MAH is about 2. It is also evident from table 1 (a) that the total assets holding increases with the land holding of a household, i.e., the value of assets held by a small MAH is more than that of a marginal MAH. It implies that land holding may result into wealth accumulation and disparity in income of the households.

If we compare the pooled MAH with pooled non-MAH, both the categories have an average size of household as 5. But they differ significantly in case of assets holding and milch animals reared. (Refer table 1 (b) below). An MAH holds a higher value of assets than a non-MAH. This is true for both, i.e., fixed as well as movable assets. For example, the average land holding by an MAH is 1.47 acres whereas the same in case of non-MAH is 0.69. This hints at the prospect of dairying as an enterprise that helps in capital formation and investments in the economy.

Table 1 (b): Comparative Analysis of Social Characteristics of MAH & Non-MAH

Sl. No.	Characteristics	Pooled MAH (N=150)		Pooled Non-MAH (n=50)	
		Mean	C.V.	Mean	C.V.
1	Size of Household (Persons per family)	5	34	6	31
2	Caste (SC=1, ST=2, OBC=3, Others=4)	3.08	18	2.85	32
3	Total Land holding (in acres)	1.38	110	0.91	154
4	Value of other fixed assets (Rs.)	73662	123	89444	112
5	Value of Movable assets (Rs.)	44715	135	24100	190
6	Value of Total Assets (Rs.)	568172	211	351100	127
7	Value of Assets other than land (Rs.)	118329	98	113544	112
8	Total Milch Animals (no.)	2	60	0	
9	Value of Milch Animals (Rs.)	18147	66	0	

(ii) Economic Characteristics

Table 2 (a) represents the most important economic characteristics, i.e., income and employment of marginal and small MAHs. It shows that the marginal MAHs derive a greater share of their income from dairying and daily wages (about 21 and 11 percent respectively) as compared to that by small farmers (about 18 and 0 percent respectively). On the other hand, the small farmers derive a higher proportion of their income from Agriculture (about 44 percent) as compared to the marginal farmers (about 37 percent). This indicates that the marginal farmers are more dependent and intensively involved in the dairying activities as compared to the small farmers, who are mostly engaged in agriculture, employing marginal farmers on their fields for daily labour. Hence, dairying provides livelihoods and sustenance to the marginal farmers more than it does to the small farmers.

Table 2 (a): Economic Characteristics of MAH

Sl. No.	Characteristics	Marginal farmers (n_2 = 125)		Small farmers (n_3 = 25)	
		Mean	C.V.	Mean	C.V.
A.					
1	Income from Agriculture	19163 (36.75)	283	23446 (43.78)	47
2	Income from Dairying	10748 (20.61)	62	9870 (18.43)	48
3	Income from Daily Wages	5574 (10.69)	190	0 (0.00)	
4	Income from Monthly Salary	8044 (15.43)	227	8609 (16.08)	217
5	Income from Business	2175 (4.17)	305	3407 (6.36)	253
6	Income from Other activities	6442 (12.35)	80	8217 (15.34)	72
7	**Total Income**	**52145 (100.00)**	**104**	**53548 (100.00)**	**49**

B.					
1	Employment from Agriculture	159 (21.40)	87	286 (35.88)	39
2	Employment from Dairying	206 (27.72)	35	199 (24.97)	34
3	Employment from Daily Wages	70 (9.42)	177	0 (0.00)	
4	Employment from Monthly Salary	96 (12.92)	167	71 (8.91)	200
5	Employment from Business	42 (5.65)	266	58 (7.28)	218
6	Employment from Other activities	171 (23.01)	80	183 (22.96)	71
7	**Total Employment**	**743 (100.00)**	**36**	**797 (100.00)**	**37**

Note: Figures in parentheses denote percentage to the respective column totals.

On considering the employment status of the households, the marginal farmers derive the greatest share of their employment from dairying (about 28 percent) followed by other activities (about 23 percent) and agriculture (about 21 percent). In comparison, the small farmers derive their maximum share of employment from agriculture (about 36 percent) followed by dairying (about 25 percent) and other activities (about 23 percent). Livestock therefore play an extremely critical role in supporting and sustaining livelihoods of a large number of poor and marginal farmers. Livestock are often the only livelihood option available to the landless as common property resources are being increasingly captured by individuals for private gain (Patel, 2004)

While comparing an MAH to a non-MAH, it was found that an MAH earns more from agriculture and dairying in both, absolute and proportional terms. An MAH earns about 38 percent of its income from agriculture and about 20 percent from dairying whereas a non-MAH earns most of its income from monthly salary (about 42 percent), daily wages (about 27 percent) and agriculture (about 18 percent). However, in totality, a non-MAH seems to earn a little more than an MAH. This is due to a few individuals in non-MAH are earning high monthly salary. But the distribution of income is more skewed among non-MAH than an MAH. This will be evident from the Lorenz curves in the next section.

In case of employment, an MAH obtains much of its employment from dairying (about 28 percent) and agriculture (about 25 percent), whereas a non-MAH obtains most of its employment from other activities like leased property, interest, contingent works, petty business and self employment vocations (about 31 percent), agriculture (about 22 percent), monthly salary (about 21 percent) and daily wages (about 18 percent). (Refer table 2 (b) below). This is chiefly due to a larger holding of land, other assets holding and dairying activities carried on by an MAH as compared to a non-MAH. Also, a significant employment gained by an MAH from dairying and other activities as compared to a non-MAH adds to the employment level of an MAH. It implies that dairying besides other activities, contributes significantly to the income and employment levels of a rural household. Thus by engaging in dairying, a household can gainfully employ its members as well as increase their level of employment.

Table 2 (b): Comparative Analysis of Economic Characteristics of MAH & Non-MAH

Sl. No.	Characteristics	Pooled MAH (N=150)		Pooled Non-MAH (n=50)	
		Mean	C.V.	Mean	C.V.
A.	**Household Income (in Rs. per annum)**				
1	Income from Agriculture	19837 (37.88)	252	9768 (18.13)	151
2	Income from Dairying	10610 (20.26)	60	0 (0.00)	
3	Income from Daily Wages	4696 (8.97)	211	14315 (26.57)	210
4	Income from Monthly Salary	8133 (15.53)	225	22593 (41.93)	164
5	Income from Business	2369 (4.52)	294	4318 (8.01)	345
6	Income from Other activities	6722 (12.84)	79	2889 (5.36)	134
7	**Total Income**	**52366 (100.00)**	**97**	**53883 (100.00)**	**78**
B.	**Household Employment (in Mandays per annum)**				
1	Employment from Agriculture	179 (24.77)	84	112 (21.54)	130
2	Employment from Dairying	204 (27.60)	50	0 (0.00)	
3	Employment from Daily Wages	59 (10.27)	177	95 (18.27)	121
4	Employment from Monthly Salary	92 (14.37)	171	109 (20.96)	137
5	Employment from Business	44 (7.33)	237	43 (8.27)	222
6	Employment from Other activities	179 (15.66)	92	161 (30.96)	146
7	**Total Employment**	**757 (100.00)**	**40**	**520 (100.00)**	**46**

Note: Figures in parentheses denote percentage to the respective column totals.

(iii) Consumption Pattern

Table 3 (a) represents the consumption pattern of the two categories of MAH, i.e. marginal and small farmers. It shows that marginal farmers spend a little less on food as compared to small farmers. This is mostly due to a lower income of the marginal farmers (if dairy income is excluded from the incomes of both the groups) as compared to that of small farmers since lower income decreases the purchasing power and hence accessibility of the former group to food. The poor accessibility and deprivation of the former group leads to their poor nutritional status.

Table 3 (a): Consumption Pattern of MAH

Rs.

Sl. No.	Characteristics	Marginal farmers (n₂ = 125)		Small farmers (n₃ = 25)	
		Mean	C.V.	Mean	C.V.
1	Cereals	9525 (31.56)	52	10463 (30.13)	46
2	Pulses	3556 (11.78)	68	3608 (10.39)	63
3	Vegetables	3187 (10.56)	44	2789 (8.03)	81
4	Milk & milk products	4707 (15.60)	62	6410 (18.46)	66
5	Meat & meat products	1395 (4.62)	92	1757 (5.06)	100
6	Oil	2252 (7.46)	46	2084 (6.00)	54
7	Salt & sugar	1028 (3.41)	50	1423 (4.10)	71
8	Spices	1089 (3.61)	59	860 (2.48)	68
9	Beverages	599 (1.98)	82	448 (1.29)	138
10	Wine	1400 (4.64)	40	0 (0.00)	
11	Others	1438 (4.76)	122	4880 (14.05)	86
12	**Total food items**	**30176 (100.00)**	**34**	**34722 (100.00)**	**41**

Note: Figures in parentheses denote percentage to the respective column totals.

But lower income is not the only cause of poor nutrition among marginal farmers. It is interesting to note here that the marginal farmers spend a significant proportion (about 5 percent) of their income on wine consumption which is not the case with small farmers. This may be due to a lower educational status of the marginal farmers as compared to small farmers. It was found that most of the marginal farmers were middle school pass whereas most of the small farmers were high school pass.

However, it is important to note that besides augmenting the income of marginal farmers, dairying activities also supplement their nutritional status to some extent. Therefore, the marginal farmers have to spend less on purchase of milk and milk products as compared to the small farmers [Refer Table 3(a) above].

As compared to a non-MAH, an MAH spends more on food although the income of a non-MAH seems to be more than an MAH. This is again due to some individuals in non-MAH who earn high monthly salaries but generally reside outside the village. (Refer Table 3 (b) below).

**Table 3 (b): Comparative Analysis of Consumption Pattern of MAH & Non-MAH**

Rs.

Sl. No.	Characteristics	Pooled MAH (N=150)		Pooled Non-MAH (n=50)	
		Mean	C.V.	Mean	C.V.
1	Cereals	9726 (37.34)	54	8062 (37.08)	35
2	Pulses	3385 (13.00)	71	2949 (13.56)	58
3	Vegetables	3115 (11.96)	52	2650 (12.19)	50
4	Milk & milk products	4741 (18.20)	71	3039 (13.98)	71
5	Meat & meat products	592 (2.27)	188	730 (3.36)	211
6	Oil	2113 (8.11)	55	1965 (9.04)	52
7	Salt & sugar	998 (3.83)	69	1194 (5.49)	221
8	Spices	738 (2.83)	93	686 (3.15)	100
9	Beverages	279 (1.07)	163	202 (0.93)	191
10	Wine	19 (0.07)	898	132 (0.61)	546
11	Others	341 (1.31)	372	137 (0.63)	323
12	**Total food items**	**26047 (100.00)**	**39**	**21744 (63.13)**	**35**

Note: Figures in parentheses denote percentage to the respective column totals.

2. Distributive effect of Dairying on the Income and Employment of Households

(i) Lorenz curve (LC): The distributive effect of dairying on income and employment of households was studied using Lorenz curves and Gini Concentration Ratio (GCR). Practically, the Lorenz curve shows the actual quantitative relationship between the percentage of population and percentage of total income / employment. Lorenz curve represents the inequality and on the basis of Lorenz curve, the Gini Concentration Ratio was calculated.

The area between the equity line and the curves shows the inequality in distribution of income or employment among the households. The more the area, the more is the inequality. It is observed in Figure 1 that on removing dairy income from the total income of the marginal farmers, the area between the equity line and the LC increases, thereby indicating an increase in the level of inequity. It means that dairying helps in the equitable distribution of income among the marginal farmers.

Fig 1: Income distribution - Marginal farmers
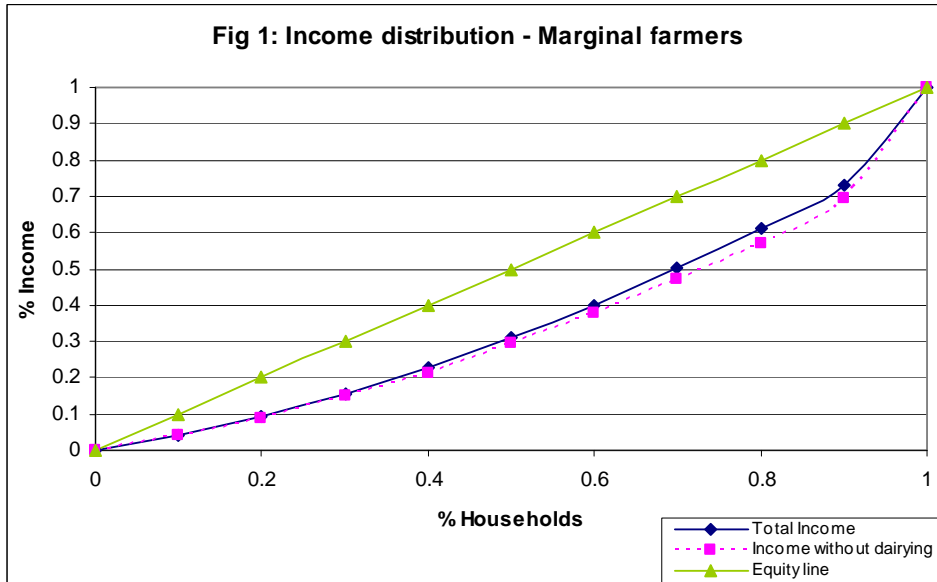
This trend was found to be even more prominent in case of employment distribution among the marginal farmers (Refer Figure 2 below). Hence, it can be fairly stated that dairying results in more equitable distribution of income and employment among the marginal and poor households.

Fig 2: Employment distribution - Marginal farmers
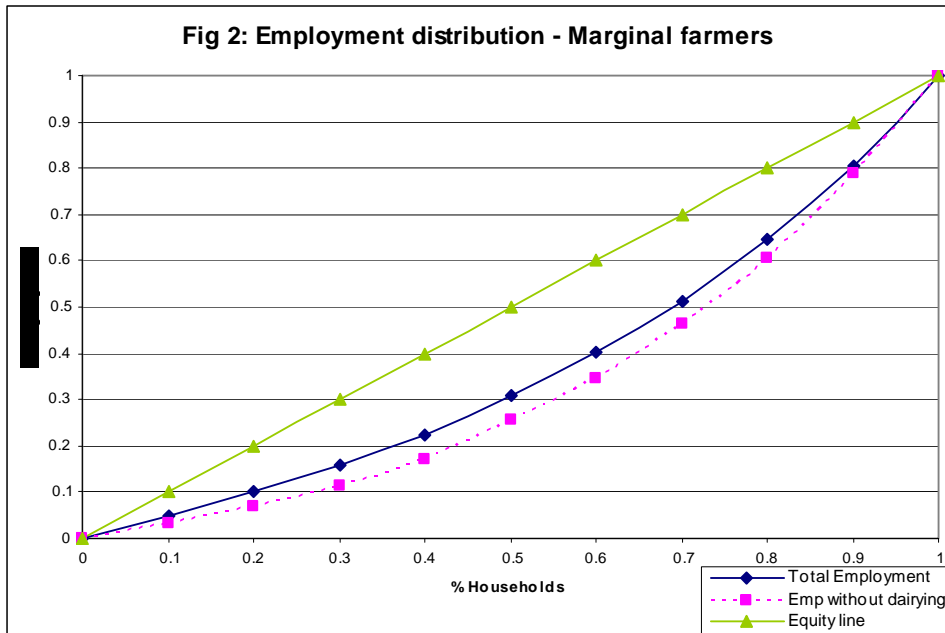
The same phenomenon was noticed in case of small farmers (Refer Figures 3 & 4 below). However, it was interesting to note that the dairying activities helped in equitable distribution of employment more than of income of the small farmers, as evidenced by the LC below.

Fig 3: Income distribution - Small farmers

Fig 4: Employment distribution - Small farmers
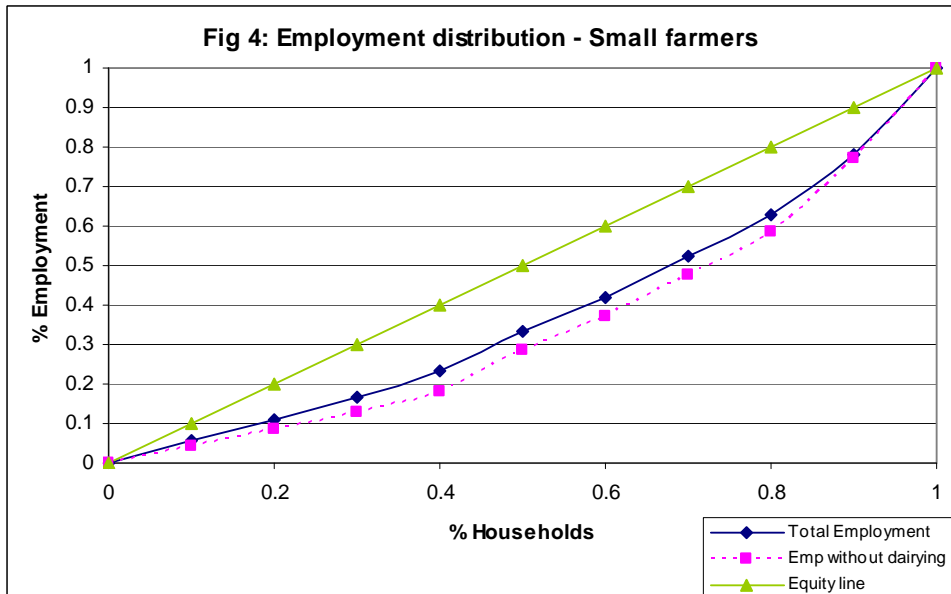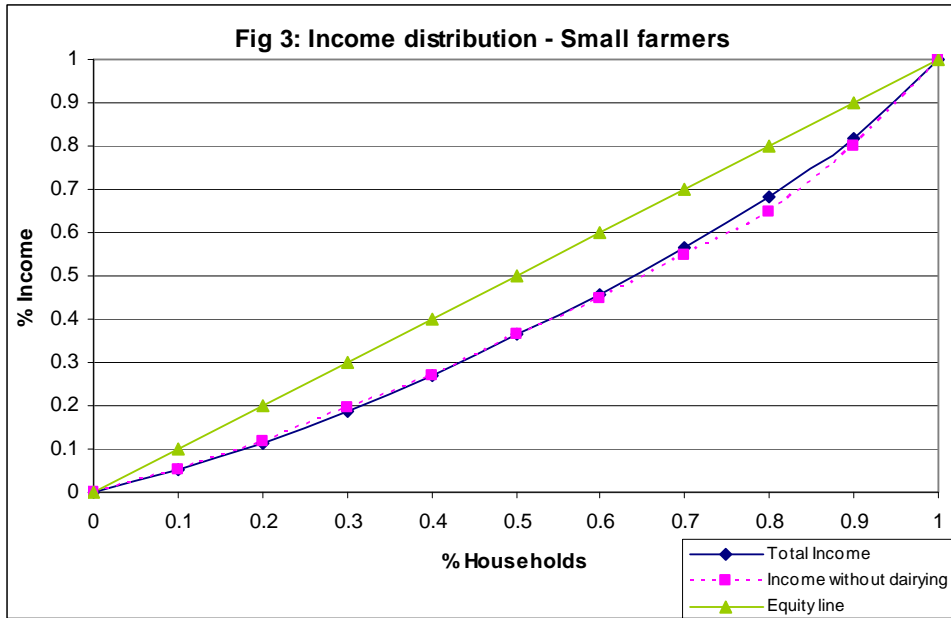
(ii) Gini Concentration Ratio (GCR): It can be defined as the ratio of the area between line of equality & Lorenz Curve to the total triangular area under the line of equality (Todaro, 1977). As mentioned in the methodology section, GCR varies from 0 to 1, and as it moves away from 0, the inequity in distribution increases.

Table 5 below shows that on removing dairy income from the total income of the farmers (both marginal as well as small), GCR increases, i.e. inequality in distribution increases. The same trend was noticed in case of employment of the households. On removing the dairy employment from the total employment of the households (both

marginal and small), GCR increases, thereby indicating an increase in the inequality in the distribution of employment among the households. Hence, dairying helps in more equitable distribution of income and employment among the rural households.

Table 5: Gini Concentration Ratio (GCR)_

Sl. No.	Particulars	LN a	a	b1	b2	R2	N	Beta	GCR
I.	*Income with dairying*								
1	Marginal farmers	-1.461	0.232	0.796	0.604	0.994	9.000	0.666	0.710
2	Small farmers	-1.711	0.181	0.839	0.810	0.992	9.000	0.592	0.535
II.	*Income without dairying*								
1	Marginal farmers	-1.323	0.266	0.847	0.579	0.996	9.000	0.666	0.823
2	Small farmers	-1.703	0.182	0.862	0.685	0.986	9.000	0.625	0.551
III.	*Employment with dairying*								
1	Marginal farmers	-1.220	0.295	1.051	1.071	0.998	9.000	0.470	0.819
2	Small farmers	-1.358	0.257	1.042	0.882	0.985	9.000	0.521	0.739
IV.	*Employment without dairying*								
1	Marginal farmers	-0.957	0.384	1.007	1.169	0.997	9.000	0.459	1.061
2	Small farmers	-1.021	0.360	1.006	1.065	0.983	9.000	0.483	1.008

3. Nutritional Status and Food Security

Food security is a situation "when all the people, at all the times, have physical and economic access to sufficient, safe and nutritious food and to meet their dietary needs and food preferences for an active and healthy life." (FAO, 1996) There are three dimensions underlying food security definition, i.e. food availability, access and utilization.

At the household level, the committee on world food security has defined the household food security as, "physical and economic access to adequate food for all household members without undue risk of losing such access."

As mentioned in the methodology section, due to the non-availability of data on height and weight of the respondents, the Aggregate Household Food Security Index (AHFSI) could not be estimated. Instead, the difference in the nutritional status / levels of different categories of households was analyzed using Difference of Means test. Using the food consumption data and food charts (Food Balance Sheets), the energy availability of the different categories of households was estimated, compared and tested. Its results are presented in Table 4 as follows:

Table 4: Energy level availability of different categories of Households

(Kcal / household / day)

Sl. No.	Particulars	MAH		Non-MAH		t_{cal}	$t_{\alpha(0.05)}$
		Mean	C.V.	Mean	C.V.		
1	Marginal farmers	8279	39	6507	42	3.60	1.658
2	Small farmers	10549	21	7029	47	2.03	2.015

Table 4 above shows that the energy levels of both the categories of MAH are higher than those of non-MAH groups. Also, the energy (nutritional) level of MAH groups are more stable than those of non-MAH groups, as evidenced by lower C.V. of the former

categories. This shows that the accessibility to food and its sustainability is more in case of MAH groups as compared to the non-MAH groups. Hence, the non-MAH groups are more vulnerable to food scarcity and insecurity.

The difference in nutritional level of MAH and non-MAH is significant in case of marginal farmers as compared to the small farmers (clearly evident by the results of t-test). Thus the marginal MAHs are significantly more food secure as compared to the marginal non-MAHs. It can thus be fairly concluded that dairying contributes significantly to the nutritional level and food security of marginal and poor farmers.

Conclusion and Policy implications

Dairying is an important part of the Indian agricultural economy. At the national level, about 17% of the total value of output from agriculture derives from this sector, placing Indian milk sector in the first place followed by rice (14.4%) and wheat (8.7%) in 1998-99 (CSO, 2001). From chronic shortages, India has now become the largest producer of milk in the world, with estimated production of about 81 million tons in 2001. Dairy enterprise is considered a "treasure" of the Indian economy, particularly for rural systems. It provides nutrition, draft animal power, organic manure, supplementary employment, cash income, and a 'cushion' for 'drought proofing' in India (Patel, 1993; Paroda, 1998).

The sector involves millions of resource-poor farmers, for whom animal ownership ensures critical livelihood, sustainable farming, and economic stability. Dairying in the recent decades has been considered a vital component in the diversification of Indian agriculture, where crop farming is beset with stagnating growth and low absorption of unskilled agricultural laborers. In order to alleviate the problem of unemployment/under-employment and to maintain domestic tranquility, diversification of crop production into non-crop enterprises like dairy farming is of vital importance (Pandey, 2000; Alagh, 2002).

At the macro-level, the gross domestic product (GDP) from livestock is estimated at about Rs. 98,421 crore (current prices), contributing about 22% to the agricultural gross domestic product (GDP) and about 5.5% to the national GDP (CSO, 2001). Among various livestock products, milk constitutes the major share (67%) in value of outputs from the livestock sector and is the single largest commodity contributing to the value of output from agriculture.

However, the contribution of dairying to income, employment and food security of rural farming households in India has not yet been empirically explored. Thus, this study was conceptualized and designed. The target area of the study was Vaishali district (a primarily rural district of Bihar) and the target population of 200 farmers (150 MAHs & 50 non-MAHs) was selected randomly from among 10 villages (having substantial population of MAHs) of the district.

The collected data pertaining chiefly to the demographic characteristics, income & employment status, assets holding, consumption pattern, savings and dairying business led to the following results:

1. Dairying contributes positively and significantly to the income and employment of rural farming households, especially the marginal and poor farmers, thereby providing them livelihoods and sustenance.

2. Dairying helps in equitable distribution of income and employment among the rural farming households, thereby reducing the disparity in holding of resources by the rural communities.

13

3. Dairying helps to boost the nutritional level and hence the food security of the rural farming households, especially the marginal and deprived sections of the rural society.

Thus, the policy implications of the study are as follows:

1. Promotion of dairying as a viable enterprise in the remote rural areas of the country can boost rural income and employment to a great extent. This can go a long way in removing poverty, unemployment and violence emanating from the rural areas of the country.

2. The target population of dairy promotion schemes should be primarily the marginal and poor farmers who are generally more dependent and more intensively involved in the business.

3. Dairy promotion among marginal and landless farmers would not only augument their sources of income and employment but also provide them security against drought, disease and hunger.

References

Patel A., 2004. Smallholder Dairying in India: Challenges Ahead at Workshop on Livestock and Livelihoods – Challenges and Opportunities for Asia in the Emerging Market Environment, 2004).

Todaro, M.P., 1997. Agricultural Transformation and Rural Development, Economic Development, 6th Edn. Addision Wesley Reading, Masschusetts, USA. 139-148, 295-339.

Thomsan, A. and M. Metz, 1997. Implication of Economic Policy for Food Security: A training manual, training material for Agricultural Planning, 40, FAO, Rome. PP-4-57.

FAO, 1996. Women and Sustainable Food Security, (http://www.fao.org)

APPENDIX I: Demographic Statistics of Vaishali district (Census, 2001)

Sl. No.	Particulars	Number
1	Number of households	412669
2	Total population of the district	2718421
(a)	Rural population	2531766
(b)	Urban population	186655
3 (a)	Proportion of SC population (%)	20.7
(b)	Proportion of ST population (%)	0.1
4	Sex ratio (Females per 1000 males)	920
5	Literacy rate (%)	50.50
6	Cultivators in actual work force (%)	31.0
7	Agricultural labourers (%)	41.6

APPENDIX II: Cattle Statistics of Vaishali district (Cattle Census, 2003)

Sl. No.	Particulars	Numbers
1	**Cross-bred Exotic Female**	61500
(a)	Under 2.5 years	23300
(b)	Cow	35018
(c)	Heifer	3182
2	**Indigenous Cow**	61428
(a)	Under 3 years	22887
(b)	Cow	36094
(c)	Heifer	2447
3	**Female Buffalo**	131395
(a)	Under 2.5 years	50430
(b)	Cow	76018
(c)	Heifer	4947

APPENDIX III: Milk Production Statistics of Vaishali district (Village Enumeration, NDDB, 2001)

Sl. No.	Particulars	Unit	Quantity
1	Total number of villages enumerated	Number	1280
2 (a)	Milch animal holding households	Number	144706
(b)	Milk producing households	Number	117174
(c)	Milch animal holding per household	Number	1.31
3	Milk production	Litres / day	458961
(a)	Cross-bred cow	Litres / day	90653
(b)	Local cow	Litres / day	86075
(c)	Buffalo	Litres / day	282233
4	Milk yield		
(a)	Cross-bred cow	Litres / day	3.46
(b)	Local cow	Litres / day	1.74
(c)	Buffalo	Litres / day	2.49
5 (a)	Milk surplus	Litres / day	220905
(b)	Per capita availability	ml / day	353
(c)	Per capita retention	ml / day	183
(d)	Per capita surplus	ml / day	170