Impact of dairy co-operatives on income and employment in rural Meghalaya

Rishikanta Singh Kh and A.K. Chauhan

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Abstract This paper studies the impact of dairy co-operatives on income and employment generation on the beneficiaries’ households. Primary data were collected from 100 Dairy Co-operative Society members and equal number of non-member households from East Khasi Hills, Ri-Bhoi, Jaintia Hills and West Garo Hills districts of Meghalaya state. Annually, member household earned an average net return of Rs. 18,515 from dairy farming which is almost double that of non-member which earned only Rs. 9,071. The Gini-concentration ratio for member and non-member group was worked out to be 0.58 and 0.68 respectively, indicating that incomes were more uniformly distributed in member group compared to non-member. Annually, dairy farming provided an average employment of 171.22 person days for member group as compared to 142.59 person days for non-member. On an average, member household spend 4.03 hours per day on dairy activities, where maximum time was spent on feeding of animals (1.30 hr). On the other hand, non-member household spend 3.38 hrs per day on dairy, where maximum time was also spent on feeding of animals (1.05 hr).

Keywords: Integrated dairy development project, income, employment, gini-concentration ratio, Meghalaya.

Introduction

Dairy is the largest contributor to the agriculture Gross Domestic Product (GDP) of the country. The market size of the dairy industry is Rs. 2.6 trillion in 2011 and is estimated to grow up to Rs. 3.7 trillion by 2015. Our country is credited to be world’s single largest producer and highest consumer of milk. Milk production has increased from 21.2 million tonnes in 1968-69 (Pre-Operation Flood Period) to about 132.4 million tonnes in 2012-13 (Dept. of Animal Husbandry, Dairying and Fisheries, GOI) and is growing at the rate of 4-5% per annum. The organized system of milk production and procurement through the 3-Tier dairy co-operative system plays a significant role in achieving the present status of dairying. During the year 2012-13, Dairy Cooperative Network in the country consisted of 1.56 lakh village level dairy co-operative societies with 15.12 million members, procuring 32.83 million kg of milk per day (NDDB). These co-operative are linked with the milk producers providing market for the milk collected at village level, processed and packed in plants and sold to the ultimate consumers.

Though the country is self-sufficient in milk production, there is a huge disparity in milk production among different states and regions. Hilly and backward regions of the country especially north east are deficit in milk production and Meghalaya state is one of them. During the year 2011-12, milk production of Meghalaya state was only 80 thousand tonnes and per capita availability is 74 gm /day, which is far below the national average of 290 gm /day (Basic Animal Husbandry Statistics, 2013). In order to develop dairying in Meghalaya state, Integrated Dairy Development Project was implemented in the year 1993-94. Of the seven districts in the state, the project covers four districts viz. East Khasi Hill, Ri-Bhoi District, Jaintia Hill and West Garo Hill. Under this programme, certain facilities like, subsidized concentrate feed, AI facilities, veterinary aids services and training for scientific care and management practices are being provided to dairy farmers through the Dairy Co-operative societies formed under this programme. Therefore, the present study is conducted in this direction.
Materials and Methods

Meghalaya state was selected purposively as it has the highest milk productivity of crossbred cow (8.96 kg/day) in North East and second highest in the country after Punjab (BAHS 2011) and also a number of dairy co-operatives were formed under the IDDP project. All the four districts viz. East Khasi Hills, Ri-Bhoi, Jaintia Hills and West Garo Hills in which IDDP was launched were selected for the study. The impact can best be evaluated by conducting survey before and after the launching of the project. But due to non-availability of data, the impact has been studied by cross-section data by taking the beneficiary and non-beneficiary households. Members were those dairy farmers who were beneficiaries of dairy co-operative societies (DCS) organized under IDDP. The non-beneficiaries were those who were not members of any DCSs. Multistage random sampling technique was used to select the state, districts, block, villages and sample households. One block from each district was selected at random. For selection of member's households, two dairy co-operative societies were randomly selected from each block. In all, eight DCSs were randomly selected. For selection of non-member's households, one control village (non project area) from each block having no dairy co-operative society was selected at random. These were Pynthorumkrhrah village, Nongstire village, Rongram village and Mihmyntou village selected from East Khasi Hills, Ri-Bhoi, West Garo Hill and Jaintia Hills district respectively.

Complete enumeration for all the selected DCSs and control villages was conducted. In all, there were 520 milk producing households. All the milk producers were classified into three categories viz. small (1 to 3 milch animals), medium (4 to 5 milch animals) and large (6 and above milch animals) using cumulative square root frequency method. Thereafter, a predetermined sample of 100 members and 100 non-members households was drawn according to probability proportional to the number of households in each category. This way, 46 dairy farmers in small category, 38 in medium category and 16 in large category were selected for member group. In the non-member group, 52 dairy farmers in small category, 35 in medium category and 13 in large category were selected. Primary data for the study were collected from each of the selected sample household during the year 2009-10 on pre-tested schedules by personal interview method. Secondary data required for the study were collected from Directorate of Animal Husbandry and Veterinary, Integrated Sample Survey, District Statistical Abstract and Dairy Development Office. The depreciation on cattle sheds and dairy equipments was worked out by using straight-line method considering their economic life. The rate of depreciation on milch crossbred was taken as 8 per cent, assuming productive life of 12 years for crossbred cow.

Methods: In order to work out income generation from dairy farming, the following concepts were used.

Gross Cost: It was obtained by adding the total fixed and variable costs involve in milk production.

Gross Income: It was worked out by adding the value of milk and imputed value of dung produced by milch animals in the sample household.

Net Income: It was computed by deducting gross cost from gross income.

Further, z and t-statistics were used to test the significant difference between the mean values of different economic variables for member and non-member groups across different herd size categories.

Lorenz curves were used to examine the inequalities in income distribution among the two household groups. Here, the cumulative percentage of income receiving household was plotted against the cumulative percentage of aggregate income in order to draw the Lorenz curve.

Gini-concentration ratio was calculated to measure the impact of the project on the income distribution among the two household groups. It is calculated as

\[ Gini\text{-Concentration Ratio (GCR)} = 1 - \sum_{i=1}^{n} p_i (Q_i + Q_{i-1}) \]

where,

- \( p_i \) = Proportion of households at the ith class interval
- \( Q_i \) = Cumulative proportionate income of ith class interval
- \( Q_{i-1} \) = Cumulative proportionate income of preceding class interval
- \( n \) = Number of class in the distribution

Employment Generation: Tabular analysis was used to study the employment generations. Total time spent in different activities related to dairying per day per household was converted into person days. For the present investigation, one person day equals eight working hours, one work day of women labour is taken as equivalent to 0.67 person day (3 women = 2 men). Similarly, child (both girl and boy) labour was considered equivalent to 0.5 person day (2 children = 1 person). Contribution of male, women and child in dairying was also worked out separately.

Results and Discussion

Composition of herd and milk production

The number of milch animals maintained by the dairy farmers directly affects the economy of the household. In the present study, it was found that crossbreds were the only dairy animal maintained by both members and non-members groups.
Category wise number of milch animals for the selected households was presented in Table 1. It was found that member group has an average herd size of 3.95 milch animals ranging from 2.39 in small to 7.75 milch animals in large categories. As compared to member, the non-member group had a smaller average herd size i.e. 3.64 milch animals ranging from 2.23 in small to 7.31 in large categories.

Taking into account the young stock and non-pregnant heifers, the total herd size was converted into standard animal units (SAU) using the conversion factors developed by Patel and Kumbhare (1980). It was found that, member group maintained on an average 6.57 SAU as against 5.74 SAU for non-member.

It was found that, milk productivity and production were higher in member group in all the herd size categories. Average milk productivity for member group was 6.96 litres as against 6.14 litres for non-members. Member households produce on an average 27.48 litres of milk per day as against 22.36 litres for non-member. Shukla et al. (1995) and Meena (2009) also reported higher milk production in the programme area/member households as compared to non-programme area/non-member households.

**Table 1** Number of milch crossbred cow across different herd size categories

<table>
<thead>
<tr>
<th>Category</th>
<th>Member</th>
<th>Non-Member</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Milch animal/Household</td>
<td>SAU/ Household</td>
</tr>
<tr>
<td>Small</td>
<td>2.39</td>
<td>4.04</td>
</tr>
<tr>
<td>Medium</td>
<td>4.24</td>
<td>7.18</td>
</tr>
<tr>
<td>Large</td>
<td>7.75</td>
<td>12.36</td>
</tr>
<tr>
<td>Total</td>
<td>3.95</td>
<td>6.57</td>
</tr>
</tbody>
</table>

**Table 2** Investment pattern in dairy across different herd size categories (Rs./ Household)

<table>
<thead>
<tr>
<th>Item</th>
<th>Member</th>
<th>Non-Member</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small</td>
<td>Medium</td>
</tr>
<tr>
<td>Milch Animal</td>
<td>70535</td>
<td>133232</td>
</tr>
<tr>
<td>Cattle shed &amp; stores</td>
<td>39696</td>
<td>59465</td>
</tr>
<tr>
<td>Dairy Equipments</td>
<td>2004</td>
<td>3505</td>
</tr>
<tr>
<td>Investment per Household</td>
<td>112235</td>
<td>196202</td>
</tr>
<tr>
<td>Investment per SAU</td>
<td>27781</td>
<td>27326</td>
</tr>
</tbody>
</table>

**Table 1** Number of milch crossbred cow across different herd size categories

**Table 2** Investment pattern in dairy across different herd size categories (Rs./ Household)

**Investment Pattern in Dairy**

The pattern of investment in scarce capital resources is an indicator of income generating capacity of the milk-producing households. Investment on dairy animals, cattle shed and stores and dairy equipments were worked out and presented in Table 2.

It was observed that member households had a higher investment in all the components of dairying viz. investment on milch animals, cattle shed and stores and dairy equipments. The overall average investment in dairy enterprise per member households was Rs. 1,75,260 as against Rs. 1,49,962 for non-member. Total investment per household increased with the increase in herd size categories in both the group. A comparison on the basis of standard animal unit revealed that on an average, member household invested Rs. 26,676 per SAU as against Rs. 26,126 per SAU for non-member group.

It was observed that there is significant difference in the investment made in milch animals (P<0.01) and investment per household (P<0.05). Similar findings were also reported by Shukla (1995) and Meena (2009).
Income Generation from Dairy

The magnitude of income generation by an enterprise reflects its economic soundness and viability. Besides, income is the final indicator through which impact of any development programme can be assessed. The gross income and net income from dairy enterprise were computed for different herd size categories for both household groups and is presented in Table 3. It was found that the overall annual gross income per milch animal for the beneficiary group was Rs. 2,01,265 which was much higher than that of non-beneficiary which recorded only Rs. 1,76,279. This may be mainly attributed to higher milk production as a result of greater care and management of dairy animals by the beneficiary households. Further, the co-operatives extended various technical inputs and health cover to the beneficiaries which might have led to greater milk production resulting into higher gross income.

Net income of member group was higher than non-member group in all the herd size categories. The overall annual average net income of member group was Rs. 18,515 per household which was more than double that of non-member which was only Rs. 9,071 per household. Net income and gross income follows an increasing trend along with the increase in herd size categories in both the groups. It was found that net income of the member households were significantly higher (P<0.01 and P<0.05) than that of non-member in all the household categories.

Income Distribution

Income distribution is an important indicator of socio-economic development. High income only to a few households and low income in many others leads to disparity in income leading to socio-economic imbalance. In order to study the income distribution Gini-concentration ratio of sample household was worked out and it was found to be 0.58 for member and 0.68 for non-member group (Table 4). Higher value of Gini-concentration ratio indicates greater in equalities.

In order to examine the inequalities in income distribution graphically Lorenz curve was drawn for both the groups. It was observed that the Lorenz curve of member group lies above the non-member and more closer to the Egalitarian line (Fig.1). This clearly indicates that incomes from dairying of member group were more equitably distributed as compared to non-member as supported by Gini-concentration ratio. This could be due to more stable milk production and income flow

Table 3  Income measures from dairy across different herd size categories (Rs./ Household /Annum)

<table>
<thead>
<tr>
<th>Category</th>
<th>Member</th>
<th></th>
<th></th>
<th>Non-Member</th>
<th></th>
<th></th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Gross Income</td>
<td>113453</td>
<td>106601</td>
<td>6852</td>
<td>103302</td>
<td>101264</td>
<td>2039</td>
</tr>
<tr>
<td></td>
<td>Gross Cost</td>
<td>106601</td>
<td>197923</td>
<td>19568</td>
<td>218479</td>
<td>204055</td>
<td>14424</td>
</tr>
<tr>
<td></td>
<td>Net Income</td>
<td>6852</td>
<td>19568</td>
<td>49544</td>
<td>354570</td>
<td>331784</td>
<td>22786</td>
</tr>
<tr>
<td>Small</td>
<td>Overall</td>
<td>201265</td>
<td>182750</td>
<td>18515</td>
<td>176279</td>
<td>167208</td>
<td>9071</td>
</tr>
</tbody>
</table>

** Significant at (P<0.01) and * Significant at (P<0.05) in a 2 tail test. # Z-test

Table 4  Distribution of household's income for member and non-member groups

<table>
<thead>
<tr>
<th>Income Range (Rs.)</th>
<th>% of Member</th>
<th>% of Non-member</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 100000</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>100000-150000</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td>150000-200000</td>
<td>20</td>
<td>11</td>
</tr>
<tr>
<td>200000-250000</td>
<td>19</td>
<td>15</td>
</tr>
<tr>
<td>250000-300000</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>300000-350000</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>350000-400000</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>400000-450000</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Above 4500000</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Gini-Concentration Ratio</td>
<td>0.58</td>
<td>0.68</td>
</tr>
</tbody>
</table>

** Significant at (P<0.01) and * Significant at (P<0.05) in a 2 tail test. # Z-test
from dairying of member group because of higher investment in dairy enterprise, good backward linkages for supply of dairy inputs, and veterinary services from the society. Non-member group on the other hand, faces various constraints in undertaking dairy enterprise which affect the level of milk production and thereby the flow of income. Similar findings were also reported in the study by Sharma and Singh (1994), Chandra (2002) and Meena (2009).

Employment Generation from Dairy farming

Labour is one of the important dairy inputs which accounts for about one-fifth of total cost of milk production. Human labour (family and hired labour) is required for various activities in dairy farming like feeding animals, cooking dana/concentrate, cleaning shed, health care management etc. Activity wise time spent in different dairy operations were analyzed and is presented in Table 5. On an average, member group dedicated 4.03 hours per day for dairy operations which is equivalent to 3.75 person hours. Among the different activities, maximum time was utilized in feeding animals (1.30 hour) followed by cleaning cattle shed (0.81 hour) and cooking dana (0.73 hour).

The non-member group, on the other hand, dedicated on an average 3.38 hours per day on dairy farming which is equivalent to 3.13 person hours. The maximum time was utilized in feeding animals (1.05 hours), followed by cleaning cattle shed (0.67 hours), and cooking dana (0.52 hour), respectively.

With a view to assess the extent of participation of men,
women and children in dairy farming, the data on family
labour employed per household during the year were
decomposed for different herd size categories and are
presented in Table 6. It was observed that average men,
women and child labour utilized per annum per household for
member group was 149.09, 18.74 and 3.39 person days,
respectively, accounting for 87.08, 10.95 and 1.98 % of total
labour employed. However, in case of non-member group, the
corresponding figures were 121.16, 18.94 and 2.49 person
days accounting for 84.97, 13.28 and 1.75 % of total labour
employed.

Overall, it was found that in both the group male member
participation in the different dairy activities was the highest
(87 and 85 %) followed by women (11 and 13%) and the least
by child accounting less than 2 % respectively.

Average labour utilization in dairy per household and SAU is
presented in Table 7. The trend in labour utilization per
household in dairy farming reveals that amount of labour
utilization increase with the increase in herd size in both the
groups. The overall average annual labour utilization per
household in dairy enterprise was 171.22 person days for
member group which ranges from 124.61 person days in small
herd size category to 280.25 person days in large category.
In case of non-member, it was 142.59 person days which
ranges from 108.07 in small herd size category to 231.78
person days in large category respectively. Similar results
were also reported by Sharma and Singh (1995), Kumar and
The labour utilization per household per annum in member
group was significantly (P<0.01 and P<0.05) higher than that
of non-member group in all herd size categories. Thus, it can
be concluded from above mentioned results that there was a
positive impact of the dairy co-operatives in providing
additional employment opportunities.

As regards, labour utilization per standard animal unit, it was
found that the average labour employed per standard animal
unit of member group were higher than that of non-member.
The overall labour use per standard animal unit per annum
for member group was 26.06 person days as compared to
24.84 person days for non-member. Labour utilization per
SAU in member group was significantly (P<0.05) higher than
that of non-member in all herd size categories except for small
category. The inter-category comparison on the labour
utilization per standard animal unit revealed that the labour
utilization decrease with the increase in the herd size in both
the groups.

Conclusions

The study shows that dairy co-operatives have brought
significant changes in dairy enterprise in the state. Higher
investment in dairy enterprise followed by maintaining better
quality crossbred animals by members leads to higher milk
production and thereby higher income. Further, the incomes
from dairying are more uniformly distributed among the
members of dairy co-operatives compared to non-members.
With good backward linkages, incentives and facilities
provided to DCS, members are able to maintain a greater herd
size with more care and management as compared to non-
members, thereby generating more employment. There is a
scope of increasing income and employment by creating more
dairy co-operative societies and extending this programme to
the remaining districts of the state.

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