



RESOURCE-USE EFFICIENCY IN MILK PRODUCTION WITH SPECIAL REFERENCE TO DIMUL IN NAGALAND

ABSTRACT

The study conducted in Dimapur district of Nagaland where data were collected during 2008-10, which covered six villages from two blocks having selected of 120 respondents out of which 60 were member producers of cooperative milk producers' societies and 60 non-member producers. The Dimapur District Cooperative Milk Producers' Union Ltd. (DIMUL) was registered in 1984 having an installed capacity of 10,000 litres per day, producing varieties of milk products. To analyze the data simple statistical tools were used. The resource use efficiency of most resources for all member farms were greater than non-member farms, found more than unity, indicating that production of milk could be increased by using more of those resources. Marginal Value Product (MVP) was found higher in co-operative members in comparison to the non-members. The overall cost-benefit ratio was found with (1: 1.855) on members whereas non-members (1:1.609). The maximum overall family income was generated from dairy for members with 50.85 % and non-members 47.76 %. Dairy farming was found to be the most important source of family income for members as well as non-members. Providing trainings of scientific know-how to the dairy farmers would certainly enhance milk production and productivity at individual dairy farmer level as well as prospects for future dairy venture.

Rokoneituo Nakhro¹

Assistant Professor
Department of Agricultural
Economics
Nagaland University, SASRD
Medziphema
Dimapur, Nagaland,
India

KEY WORDS: Milk production, input-output, overall, resource use efficiency, Dairy farming.

INTRODUCTION

The Dimapur District Cooperative Milk Producers' Union Ltd. (DIMUL) was registered with the Registrar of Co-operative Societies during May, 1984 with Kohima district as its area of operation. The Union was earlier known by the name Kohima District Cooperative Milk Producers' Union Ltd. However, the name had to be changed to Dimapur District Cooperative Milk Producers' Union Ltd. popularly known by the brand name DIMUL following the bifurcation of Kohima district into Kohima and Dimapur districts during the year 1997. Presently, the area of operation of DIMUL falls within Dimapur district.

It was promoted by the department of Veterinary & Animal Husbandry, Government of Nagaland since its inception, the Union has been striving to implement the Anand Pattern Dairy Cooperative Society activities with modification to suit the local conditions. The Union has so far organized a total of 51 Dairy Cooperative Societies (DCS) with membership of more than 2000 dairy farmers as on 31st March 2013. The Central Dairy Plant of the Union located at 7th Mile Model Village, Dimapur with an installed capacity of 10,000 litres per day, producing Toned Milk and few other fresh milk products such as Lassi, Misti Dahi, Peda and varieties of ice-cream.



MATERIALS AND METHODS

The study conducted in Dimapur district of Nagaland. Firstly, Dimapur district was selected purposively for DIMUL, secondly, two blocks namely Chumukedima and Medziphema were selected randomly, thirdly, three villages from each block were selected randomly, after that twenty farmers were selected from each village using stratified random sampling method, thus in all, 120 milk producers were selected and further categorized them into 4 groups viz; marginal member, marginal non-member, small member and small non-member groups, based on their land holdings. From different Village Milk Societies (VMS), the samples were selected for the study due to a good number of milk producers having other infrastructural facilities. To analyze the data simple statistical tools were used. The data were collected through pre-structured questionnaires during the year 2008-10 for the study.

RESULTS AND DISCUSSION**1. Milk Production on the sample farms:-**

The total milk production for the sample farms is given in Table 1. Findings show that the non-members have a higher overall annual total production of 43640.04 litres than the members which is 39650.55 litres. The marginal was found out to produce 14012.50 litres and the small farms with 65288.6 litres. The overall production per animal was found higher on the non-members 993.48 litres than the members with 686.595 litres. The overall production per animal per day was found to be higher in members with 3.125 litres than non-members 2.720 litres. And the overall production per farm per day was found higher in members with 5.1969 litres than non-members 3.9818 litres. The annual production per animal for marginal was 368.75 litres and 1004.44 litres for small farms, whereas the production per farm per day found out at 4.4345 litres for marginal farms and 5.9593 litres for small farms.

**Table 1: Milk Production on the sample farms
(Production in Litres)**

| S. No. | Particulars | Marginal | | Small | | Overall | |
|--------|-------------------------------|----------|------------|---------|------------|----------|------------|
| | | Member | Non-member | Member | Non-member | Member | Non-member |
| 1. | Annual Total Production | 14012.50 | 39615.1 | 65288.6 | 47664.98 | 39650.55 | 43640.04 |
| 2. | Annual Production per Animal | 368.75 | 1165.15 | 1004.44 | 821.81 | 686.595 | 993.48 |
| 3. | Production per Animal per day | 3.50 | 3.19 | 2.75 | 2.25 | 3.125 | 2.720 |
| 4. | Production per farm per day | 4.4345 | 3.6143 | 5.9593 | 4.3493 | 5.1969 | 3.9818 |

Field Survey: Nakhro, 2010

2. Resource use efficiency of various inputs:-

To evaluate how efficiently the dairy farmers have been using their resources, the marginal value product (MVP) of an input was compared with its respective factor cost. An optimal use of that factor was indicated as the ratio approached unity. The value of ratio greater than unity means that returns could be increased by using more of that resource and for value of ratio less than unity indicates improper use of that resource. The marginal value product of a particular resource represents the expected addition to the gross return caused by an addition of one unit of that resource, while other inputs are held constant.

The table 2.1 shows the resource use efficiency for the marginal farmers. The Marginal Value Product (MVP) ranges from Rs 8.04 to Rs 143.86 whereas the Factor Cost (FC) ranges from Rs 6.5 to Rs 116 for the marginal members. As for the marginal non-members the MVP ranges from Rs. 7.51 to Rs. 142.49 whereas for the FC it ranges from Rs. 6.75 to Rs. 115. The ratio of MVP: FC was found out to be highest in veterinary charges at 1.439 and lowest in concentrate feed at 1.237 for marginal members. As for the marginal non-members it was found highest under dry fodder at 1.252 and lowest under interest on farm building and implements at 1.097.

Table 2.1: Resource use efficiency of various inputs of marginal farmers

| Input factor | Geometric mean | MVP (Rs) | Factor Cost (FC) | MVP: FC |
|--|----------------|----------|------------------|---------|
| 1. MARGINAL MEMBER | | | | |
| Dry fodder (X ₁) | 37.46 | 23.56 | 18 | 1.309 |
| Green fodder (X ₂) | 72.43 | 11.34 | 8.75 | 1.296 |
| Concentrate (X ₃) | 171.1 | 8.04 | 6.5 | 1.237 |
| Human labour (X ₄) | 262.1 | 18.83 | 15 | 1.255 |
| Veterinary charges (X ₅) | 21 | 143.86 | 100 | 1.439 |
| Interest on working capital (X ₆) | 30.13 | 25.86 | 20 | 1.293 |
| Interest on farm building and implements (X ₇) | 4.87 | 152 | 116 | 1.310 |
| Miscellaneous (X ₈) | 10.85 | 10.85 | 8.5 | 1.276 |
| 2. MARGINAL NON-MEMBER | | | | |
| Dry fodder (X ₁) | 21.77 | 22.84 | 18.25 | 1.252 |
| Green fodder (X ₂) | 65.1 | 11.29 | 9.25 | 1.221 |
| Concentrate (X ₃) | 186.9 | 7.51 | 6.75 | 1.113 |
| Human labour (X ₄) | 360.5 | 17.97 | 15.75 | 1.141 |
| Veterinary charges (X ₅) | 20.75 | 142.49 | 110 | 1.295 |
| Interest on working capital (X ₆) | 31.29 | 23.99 | 20 | 1.200 |
| Interest on farm building and implements (X ₇) | 8.4 | 126.13 | 115 | 1.097 |
| Miscellaneous (X ₈) | 10.95 | 10.55 | 8.65 | 1.220 |

Field Survey: Nakhro, 2010

The Table 2.2 shows the resource use efficiency for the small farmers. The Marginal Value Product (MVP) ranges from Rs 7.91 to Rs 150.72 whereas the Factor Cost (FC) ranges from Rs 7 to Rs 21.85 for the small members. As for the small non-members the MVP ranges from Rs. 7.78 to Rs. 130.87 whereas for the FC it ranges from Rs. 7.5

to Rs. 120.5. The ratio of MVP: FC was found out to be highest in dry fodder at 1.370 and lowest in interest on farm building and implements at 1.128 for small members. As for the small non-members it was found highest under dry fodder at 1.279 and lowest under concentrate feed at 1.037.

Table 2.2: Resource use efficiency of various inputs of small farmers

| Input factor | Geometric mean | MVP (Rs) | Factor Cost (FC) | MVP: FC |
|--|----------------|----------|------------------|---------|
| 3. SMALL MEMBER | | | | |
| Dry fodder (X ₁) | 23.99 | 23.97 | 17.5 | 1.370 |
| Green fodder (X ₂) | 27.43 | 12.06 | 9.5 | 1.269 |
| Concentrate (X ₃) | 126.4 | 7.91 | 7 | 1.130 |
| Human labour (X ₄) | 624.6 | 18.31 | 16.25 | 1.127 |
| Veterinary charges (X ₅) | 17.34 | 150.72 | 120 | 1.256 |
| Interest on working capital (X ₆) | 30.13 | 26.67 | 21.85 | 1.221 |
| Interest on farm building and implements (X ₇) | 6.86 | 131.97 | 117 | 1.128 |
| Miscellaneous (X ₈) | 10.86 | 11.18 | 8.75 | 1.278 |
| 4. SMALL NON-MEMBER | | | | |
| Dry fodder (X ₁) | 48.56 | 23.02 | 18 | 1.279 |
| Green fodder (X ₂) | 78.33 | 11.24 | 10.05 | 1.118 |
| Concentrate (X ₃) | 183.3 | 7.78 | 7.5 | 1.037 |
| Human labour (X ₄) | 439.9 | 18.1 | 16.5 | 1.097 |
| Veterinary charges (X ₅) | 42.7 | 134 | 121 | 1.107 |
| Interest on working capital (X ₆) | 44.2 | 26.48 | 22.25 | 1.190 |
| Interest on farm building and implements (X ₇) | 27.43 | 130.87 | 120.5 | 1.086 |
| Miscellaneous (X ₈) | 29.83 | 10.77 | 8.95 | 1.203 |

Field Survey: Nakhro, 2010

The overall resource use efficiency for the sample farmers is given in Table 2.3. The Marginal Value Product (MVP) ranges from Rs. 8.85 to Rs. 217.39 whereas the Factor Cost (FC) ranges from Rs. 8.5 to Rs. 115 for the members. As for the non-members the MVP ranges from Rs. 8.73 to Rs. 153.6 whereas for the FC it ranges from Rs 7 to Rs 117. The ratio of MVP: FC was found out to be highest in dry fodder at 2.214 and lowest in interest on working capital at 1.277 for members. As for the non-members it was found highest under dry fodder at 2.078 and lowest under interest on working capital at 1.210.

The marginal value product (MVP) of resources is well utilized by the member farms in both the size of farms due to the fact that they received trainings of scientific know-how organised by the DIMUL. It is found that the Marginal Value Product (MVP) was more on co-operative members from dairy in comparison to the non-members. The study was also similar as reported by Sandeep *et al.* (2014) that the knowledge of best use of available resources for milk production is essential for making profit in dairy farming for member and non-member farms as well as its optimal and efficient use of owned resources.

Table 2.3: Resource use efficiency of various inputs of overall farmers

| Input factor | Geometric mean | MVP (Rs) | Factor Cost (FC) | MVP: FC |
|--|----------------|----------|------------------|---------|
| 5. OVERALL MEMBER | | | | |
| Dry fodder (X ₁) | 31.72 | 38.74 | 17.5 | 2.214 |
| Green fodder (X ₂) | 54.76 | 13.38 | 9.05 | 1.478 |
| Concentrate (X ₃) | 149.2 | 8.85 | 6.7 | 1.321 |
| Human labour (X ₄) | 518.6 | 23.31 | 15.65 | 1.489 |
| Veterinary charges (X ₅) | 21.07 | 161.6 | 108 | 1.496 |
| Interest on working capital (X ₆) | 29.88 | 26.18 | 20.5 | 1.277 |
| Interest on farm building and implements (X ₇) | 9.13 | 217.39 | 115 | 1.890 |
| Miscellaneous (X ₈) | 10.77 | 12.07 | 8.5 | 1.420 |
| 6. OVERALL NON-MEMBER | | | | |
| Dry fodder (X ₁) | 57.4 | 37.41 | 18 | 2.078 |
| Green fodder (X ₂) | 84.03 | 13.18 | 9.6 | 1.373 |
| Concentrate (X ₃) | 210 | 8.73 | 7 | 1.247 |
| Human labour (X ₄) | 495 | 22.34 | 16 | 1.396 |
| Veterinary charges (X ₅) | 35.77 | 153.6 | 115 | 1.336 |
| Interest on working capital (X ₆) | 37.98 | 25.41 | 21 | 1.210 |
| Interest on farm building and implements (X ₇) | 20.3 | 146.75 | 117 | 1.254 |
| Miscellaneous (X ₈) | 22.32 | 11.61 | 8.75 | 1.327 |

Field Survey: Nakhro, 2010

3 Input-Output Ratio on different farm size group:-

Table 3 reveals that the overall input-output ratio was maximum on member farms with 1: 1.855 and it was least on non-member farm 1: 1.609, signifying that it would provide the net return of Rs. 0.855 and Rs. 0.609 on member and non-member farm size group respectively. The input-output ratio was recorded maximum on marginal member farms among the different farm size group, indicating that against the investment of one rupee

by the dairy farmers, it would provide the net return of Rs. 0.94 against the investment, followed by small member farms providing the net return of Rs. 0.77, whereas among the non-members farm maximum net return was found on marginal farm with net return of Rs. 0.76 and it was found least on small non-member farms with net return of Rs. 0.47. The overall total cost of benefit-cost ratio was found maximum (1.855: 1) on member farm, followed by non-member farm (1.609: 1). The benefit-cost ratio was ranging maximum (1.94: 1) on marginal member farm to lowest share of 1.473: 1 on non-member small farms.



Table 3: Input-Output Ratio on different farm size group

| S. No. | Items | Marginal | | Small | | Overall | |
|--------|-----------------------------------|----------|------------|----------|------------|----------|------------|
| | | Member | Non-member | Member | Non-member | Member | Non-member |
| 1. | Number of Animals | 68 | 54 | 85 | 78 | 153 | 132 |
| 2. | Total Maintenance cost of Animals | 421040 | 384200 | 749450 | 708760 | 1170490 | 1092960 |
| 3. | Per Animal Maintenance cost | 11080 | 11300 | 11530 | 12220 | 11305 | 11760 |
| 4. | Per Animal Value of Milk Produced | 21500 | 19850 | 20450 | 18000 | 20975 | 18925 |
| 5. | Input-Output Ratio | 1: 1.940 | 1: 1.757 | 1: 1.774 | 1: 1.473 | 1: 1.855 | 1: 1.609 |

Field Survey: Nakhro, 2010

4. Extent of family income from various sources:-

Table 4 shows the annual family income from various sources of different size of farms. It is found that the highest family income is seen from members belonging to small farm with Rs. 45450 whereas the least is from marginal non-members with Rs. 36050. Marginal non-member farm has the highest income per worker with Rs. 31818.18 and the least from small farm members with Rs. 20973.70. Small member farm has the highest per capita income with Rs. 6125.34 while the least was from marginal member farm to be Rs. 5000. On the overall, maximum

income was generated from dairy in both cases of members and non-members with Rs. 20975 and Rs. 18925 respectively, whereas minimum income from others for members with Rs. 3100 and non-members Rs. 5000. This projected that both the members and non-members have received additional amount of income as windfall from the disposal of milk. The income of the cooperative members from dairy is more in comparison to the non-members due to various incentives provided by DIMUL to its members.

Table 4: Extent of family income from various sources of different size of farms
(Annual income in Rs.)

| S. No. | Income | Marginal | | Small | | Overall | |
|--------|--------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| | | Member | Non-member | Member | Non-member | Member | Non-member |
| 1. | Dairy | 21500 (58.03) | 19850 (55.06) | 20450 (44.99) | 18000 (41.67) | 20975 (50.85) | 18925 (47.76) |
| 2. | Crops | 8500 (22.94) | 8900 (24.69) | 12500 (27.50) | 11200 (25.93) | 10500 (25.49) | 10050 (25.36) |
| 3. | Service & Business | 5850 (15.79) | 4800 (13.32) | 7500 (16.50) | 6500 (15.05) | 6675 (16.18) | 5650 (14.26) |
| 4. | Others | 1200 (3.24) | 2500 (6.93) | 5000 (11.01) | 7500 (17.35) | 3100 (7.48) | 5000 (12.62) |
| | Per family | 37050 (100.00) | 36050 (100.00) | 45450 (100.00) | 43200 (100.00) | 41250 (100.00) | 39625 (100.00) |
| | Per worker | 29242.31 | 31818.18 | 20973.70 | 22348.68 | 24024.46 | 25848.01 |
| | Per capita | 5000.00 | 4718.59 | 6125.34 | 6041.96 | 5563.05 | 5322.36 |

Field Survey: Nakhro, 2010; Figures in bracket show percentage

CONCLUSIONS

The resource use efficiency of most resources for all member farms were greater than non-member farms, found more than unity, indicating that production of milk could be increased by using more of those resources. Marginal Value Product (MVP) was found more on co-operative members in comparison to the non-members. It may also be concluded that the overall benefit-cost ratio was higher on members with 1.855:1 as compared to non-members with 1.609:1. On the overall, maximum income was generated from dairy for both members and non-members with Rs. 20975 and Rs. 18925 respectively. This projected that both the members and non-members have received additional income as windfall from dairy farming. The income of the cooperative members from dairy is more in comparison to the non-members as DIMUL provided various incentives to its members. Providing trainings of scientific know-how to the dairy farmers would certainly enhance milk production and productivity at individual dairy farmer level as well as prospects for future dairy venture.

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