Research Note

Impact of Women Dairy Co-operative Societies on Income and Employment of Women in Begusarai District of Bihar

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Abstract

The study has analysed the impact of membership of women in dairy co-operative society on their income and employment. The study has been conducted in Begusarai district of Bihar by collecting data from 80 member and 80 non-member milk producing households which were stratified into small (<4), medium (5 & 6) and large (>6) herd size categories. Monthly income from both crossbred cows and buffaloes has been found to be more in WDCS members than non-members. The impact of season on income has also been found to be positive and significant, indicating higher income in winter than summer season. The average annual employment has been observed more for member households than non-member households. In terms of time, the maximum time was spent in bringing fodder from fields both in WDCS members and non-member households. The study has concluded that Women Dairy Co-operatives are instrumental in enhancing income and employment of women dairy farmers.

Key words: Income, employment, women dairy co-operatives, Bihar

JEL Classification: J16, Q12, Q13

Introduction

The women are largely employed in the agricultural sector and devote much of their time in doing agricultural operations, especially dairy farming. The dairy farming forms an important source of their livelihood. Despite spending most of their time on dairy farming, women don't enjoy the benefits of being employed. Hence, there is a need to look into this aspect and give the much needed impetus to income and employment conditions of women dairy farmers. To provide employment and income generating opportunities, Women Dairy Co-operative Societies (WDCS) were formed with exclusively women members. These cooperatives provide organised network of milk marketing along with crucial technical inputs like provision of artificial insemination, health care services and feed inputs.

This paper has attempted to find whether WDCSs are instrumental in increasing income and employment of a household. Generally, income of a household can be increased by either increasing milk production or reducing cost of milk production. Therefore, in the present study, the cost of milk production and returns among different herd-size categories for WDCS member and non-member households was estimated. Earlier studies carried out by Kumar and Sharma (1999), Singh and Sharma (2006) and Meena (2008) have indicated that the net monthly income of member households is more than that of non-member households. A comparison of employment in dairy farming in member and non-member households has

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also been done. The earlier studies carried out by Singh (1986), Shukla *et al.* (1995) and Meena (2008) have shown that employment generation is more for member households than non-member households. The hypothesis of the present study was that WCDSs significantly improve the income and employment opportunities for women dairy farmers.

Data and Methodology

The multistage sampling procedure was adapted for selection of state, milk union, district, block and villages. The state of Bihar was purposively selected as the state ranks ninth in the country in terms of milk production. In 2013-14, the milk production in the state was 7.2 million tonnes, which was 5.2 per cent of the national milk production (NDDB, 2014). Further, Deshratna Rajendra Prasad (D.R.) Milk Union, Barauni, was purposively selected from the six milk unions in Bihar Co-operative Milk Producers' Federation Ltd. (COMFED) as it had the highest milk procurement per day. From the 4 districts covered by the D.R. Milk Union, Begusarai was purposively selected as it had the highest number of Women Dairy Co-operative Societies (WDCS). In Begusarai district, 4 blocks, namely, Cheria Bariyarpur, Bachhwara, Bhagwanpur and Teghra, were purposively selected based on number of WDCS and from each block, two villages were randomly selected.

After complete enumeration of 8 selected villages with respect to milch animals, the households were categorized into small, medium and large herd-size holders using cumulative square root frequency method of stratification. From these 8 villages, a sample of 80 member households and 80 non-member households were randomly selected according to probability proportional to size. The number of small, medium and large herd category households selected was 50, 19 and 11, respectively for member group and 47, 20 and 13, respectively for non-members. Data were collected for two seasons, viz. summer and winter from these two groups using a semi-structured interview schedule. Multiple regression analysis was used to determine the impact of membership of co-operatives on the income from dairy farming.

Selection and Specification of Variables

In the study, the dependent variable was taken as gross income from dairying and the explanatory variables were education score of the women earner, age of respondent, number of dairy cattle, cost of green fodder fed per day, cost of dry fodder fed per day, cost of concentrate fed per day and value of labour per animal per day.

Educational Score of Women Earner — Since education plays an important role in decision-making and managerial skills, the education score of women earners of each household was considered a factor affecting the income from dairying. The scale prepared by Trivedi and Pareek (1963) was used, the weightage of which are as follows: Illiterate, 0; Read and write, 1; Primary, 2; Secondary, 3; High School, 4; Intermediate, 5; Graduation and above, 6.

The Model: The functional form was specified as Equation (1):

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7) \qquad \dots (1)$$

where,

Y = Gross income from dairying (₹/household/day),

X_1 = Education score of women earner,

X_2 = Age of respondent (years),

X_3 = Number of dairy cattle (No.),

X_4 = Cost on green fodder fed per day (₹),

X_5 = Cost on dry fodder fed per day (₹),

X_6 = Cost on concentrate fed per day (₹), and

X_7 = Cost on labour per animal per day (₹).

The pooled income functions, which included income from both member and non-member households for both summer and winter seasons, were also fitted using two dummy variables, one for membership and the other for season. The two dummy variables were introduced as follows: D_1 had value 1, if member, 0 otherwise; and D_2 had value 1, if winter, 0 otherwise.

Specification of Model

The choice of a specific functional form was based on the economic criteria i.e. sign and value of the estimated parameters while statistical criteria depended on the statistical significance of estimated parameters and co-efficient of multiple determination (R^2). Out of the four types of functional forms, viz. Cobb-Douglas, Linear and Semi log (both linear-log and log-linear), Cobb-Douglas form was found to be the best fit.

Employment Generation

Actual time spent by women in various operations of dairy farming was recorded for each household. The total time spent was converted into human-days by assuming 8 working hours for a day. The following conversion was used:

1 day of women labour =   0.67 man day

(3 women = 2 men)

The number of hours per day in different activities was calculated and aggregated to work out the utilization of women's time in dairy operations.

The membership of dairy co-operatives provides better employment and income opportunities to women. Tabular analysis was carried out to compute the income and employment generated from the dairy enterprise across different herd-size categories for both member and non-member groups.

Results and Discussion

Income of Dairy Women Members and Non-members

Table 1 depicts the monthly income of members and non-members dairy women in the study area.

The mean monthly net income was found to be more for members group (₹ 5,469) than non-members group (₹ 1,743) and the difference was statistically significant. Further, functional analysis was carried out to find whether co-operatives have an impact on the income of dairy women members. The income function was estimated separately for crossbred cow and buffalo. The Cobb-Douglas production function was found to be best fit for all the cases and hence, it was chosen for further economic analysis. The partial regression coefficients obtained of Cobb-Douglas production function represented the elasticity. The value of coefficient showed by what per cent the dependent variable would change if the explanatory variable changed by one per cent. The values of coefficients are given in the Table 2.

In income function for crossbred cows, 85.53 per cent of the total variations could be explained by the explanatory variables included in the function while that in case of buffaloes, it was 87.80 per cent. The variables number of dairy cattle, cost of dry fodder, cost of concentrate and cost of labour employed, were found to have a positive and significant impact on the gross income from crossbred cows. When the number of dairy cattle was increased by one per cent, the gross income from crossbred cows increased by 0.5145 per cent, however when the cost of dry fodder was increased by one per cent, the gross income from crossbred cows increased by 0.1494 per cent. Similarly, by increase of one per cent in cost of concentrate, the gross income from crossbred cows increased by 0.0679 per cent. The cost of labour employed if increased by one per cent, the gross income from crossbred cows increased by 0.1281 per cent.

Similarly, the variables like number of dairy cattle, cost of dry fodder, cost of concentrate, cost of labour employed were found to have a positive and significant impact on the gross income from buffaloes. When the number of dairy cattle was increased by one per cent, the gross income from buffaloes increased by 0.4512 per cent. When the cost of dry fodder increased by one per cent, the gross income from buffaloes increased by 0.2380 per cent. When the cost of concentrate was increased by one per cent the gross income from buffaloes increased by 0.1816 per cent. When the value

Table 1. Overall monthly income of members and non-memers across herd-size categories

(₹ /household/month)

Herd-size category	Member			Non-member			Mean difference inincome	't'-value
	Gross income	Gross cost	Net income	Gross income	Gross cost	Net income		
Small	21,512	17,078	4,434	14,574	13,819	754	3,679**	4.58 #
Medium	41,970	33,421	8,548	34,493	30,216	4,277	4,217**	4.96
Large	76,593	55,313	21,280	66,588	54,973	11,615	9,664**	3.19
Overall	33,374	27,904	5,469	26,657	24,913	1,743	3,726**	4.36 #

Note: **Significant (p<0.01) # Z-value

Table 2. Partial regression coefficients of income function for crossbred cows and buffaloes

Variable	Crossbred cows		Buffaloes	
	Regression coefficients	Standard error	Regression coefficients	Standard error
Constant (a)	5.7120**	0.2838	5.1421**	0.3562
Education score (X_1)	0.0021	0.0763	0.0201	0.0267
Age of the respondent (X_2)	-0.0046	0.0294	-0.0032	0.0966
Number of dairy cattle (X_3)	0.5145**	0.0244	0.4512**	0.0278
Cost of green fodder (X_4)	0.0359	0.0360	0.0615	0.0361
Cost of dry fodder (X_5)	0.1494**	0.0356	0.2380**	0.0281
Cost of concentrate (X_6)	0.0679*	0.0303	0.1816**	0.0385
Cost of labour employed (X_7)	0.1281**	0.0429	0.1838**	0.0255
D_1 (Membership)	0.2609**	0.0229	0.0559*	0.0266
D_2 (Season)	0.0786**	0.0238	0.0485*	0.0211
R-square	0.8553		0.8780	
Number of households	640		268	

Note: *significant ($p<0.05$) ** significant ($p<0.01$)

of labour employed was increased by one per cent the gross income from buffaloes increased by 0.1838 per cent.

For gross income from crossbred cows and buffaloes, the effect of education score and cost of green fodder was positive and non-significant and the effect of age was negative and non-significant. To find the impact of co-operatives, a dummy variable was used whose value was found to be positive and significant in both crossbred cows and buffaloes. Hence, it was inferred that co-operatives have a positive impact on gross income of women dairy farmers. The impact of season on gross income was also found by introducing a seasonal dummy into the function and its value was found positive and significant, indicating a higher gross income in winter season than in summer season.

Employment of Dairy Women Members and Non-members

Table 3 shows the average annual human-days of employment for member and non-member households. The average annual human-days of employment in dairy activities was more for member households (210.76 human-days) than non-member households (188.56 human-days). The difference between the mean human-days of employment for members and non-members was found to be statistically significant. Hence, it was inferred that WDCS helps in

increasing employment opportunities for the households.

The analysis of distribution of employment among men, women and children in a household revealed that employment for women was 13 per cent more for members. Table 4 depicts the average family labour-use in dairy farming for WDCS members and non-members. The average number of human-days of employment in a year for women in WDCS member households (91.65 human-days) was more than that of non-member households (81.14 human-days). The percentage contribution of women in family labour-use was found to be almost same for members (43.48 %) and non-members (43.03 %).

The analysis of family labour-use in terms of men, women and children in different activities of dairy enterprise was done and is shown in Table 5. A perusal of Table 5 revealed that maximum time was spent in bringing fodder from fields in both members (0.87 hours/day) and non-members (0.76 hours/day). This finding was in conformity with the earlier study done by Meena (2008). Women in the household spent their maximum time in making dairy products like curd, khoa, etc. in both member group (0.37 hours/day) and non-member group (0.38 hours/day). The time devoted for selling of milk was found to be higher for WDCS women members (0.30 hours/day) than non-members group (0.12 hours/day) as they had to take the milk

Table 3. Employment for member and non-member households in dairy activities across different herd-size categories

(human-days/annum/household)

Herd-size category	Members	Non-members	Mean difference	't'- value
Small (1-4)	162.19	143.27	18.79*	2.37#
Medium (5-6)	251.36	223.77	27.59**	3.63
Large (>6)	361.46	298.15	63.31**	4.87
Overall	210.76	188.56	22.20**	3.24#

Note: *significant (p<0.05) ** significant (p<0.01) # Z-value

Table 4. Family labour-use by member and non-member households across herd-size categories

(human-days/annum/household)

Herd-size category	Members				Non-members			
	Men	Women	Children	Total	Men	Women	Children	Total
Small(1-4)	84.35	69.41	8.43	162.19	75.11	58.23	9.93	143.27
	(52.01)	(42.79)	(5.19)	(100.00)	(52.42)	(40.64)	(6.93)	(100.00)
Medium(5-6)	120.89	114.23	16.24	251.36	106.95	99.45	17.37	223.77
	(48.09)	(45.44)	(6.46)	(100.00)	(47.79)	(44.44)	(7.76)	(100.00)
Large(>6)	188.26	153.78	19.42	361.46	140.87	135.83	21.45	298.15
	(52.08)	(42.54)	(5.37)	(100.00)	(47.24)	(45.55)	(7.19)	(100.00)
Overall	107.32	91.65	11.79	210.76	93.76	81.14	13.66	188.56
	(50.92)	(43.48)	(5.59)	(100.00)	(49.72)	(43.03)	(7.24)	(100.00)

Note: Figures within the parentheses indicate the percentage in respective totals

Table 5. Average labour-use in different activities in dairy enterprise for WDCS member and non-member households across herd-size categories

(hours/ day)

Operations	Members				Non-members			
	Men	Women	Children	Total	Men	Women	Children	Total
Bringing fodder	0.48	0.32	0.06	0.87	0.39	0.29	0.07	0.76
Chaff cutting	0.29	0.35	0.06	0.71	0.27	0.32	0.06	0.66
Feeding	0.27	0.33	0.06	0.67	0.21	0.25	0.07	0.54
Grazing	0.31	0.26	0.05	0.62	0.26	0.26	0.06	0.59
Giving water	0.14	0.19	0.06	0.40	0.09	0.17	0.05	0.31
Cleaning cattle shed/ animals	0.11	0.33	0.03	0.48	0.07	0.34	0.04	0.46
Health care	0.15	0.12	0.04	0.31	0.13	0.11	0.06	0.31
Milking	0.21	0.18	-	0.39	0.15	0.22	-	0.38
Making milk products	0.05	0.37	0.02	0.45	0.06	0.38	0.03	0.48
Selling milk	0.13	0.30	0.03	0.45	0.27	0.12	0.04	0.43
Miscellaneous works	0.18	0.21	0.07	0.45	0.11	0.15	0.09	0.35
Total time spent	2.34	3.00	0.51	5.85	2.05	2.65	0.60	5.31
Human hours	2.34	2.01	0.25	4.61	2.05	1.77	0.30	4.13

themselves to the milk collection centres. Children were found to be involved in all dairy activities to some extent, except for milking.

Conclusions

The study has analysed the impact of membership of women in dairy co-operative societies on their income and employment. Some meaningful results from the study are:

- The mean monthly net income was found to be significantly more for WDCS members than non-members.

- The regression coefficients of the variables number of dairy cattle, cost of dry fodder, cost of concentrate and cost of labour employed have shown a positive and significant impact on the gross income in both crossbred cows and buffaloes.

- The membership dummy (D_1) was positive and significant in both crossbred cows and buffaloes. Hence, it could be inferred that co-operatives have a positive and significant impact on gross income of women dairy farmers. The impact of season on income was also found to be positive and significant, indicating higher income in winter than summer season.

- The average annual human-days of employment was found to be more for WDCS member households than non-member households. The employment in a year for women in WDCS member households was more than that of non-member households.

- In terms of time, the maximum time was spent in bringing fodder from fields in both WDCS members and non-members. Women in the household spend their maximum time in making dairy products like curd, khoa, etc. in both WDCS member and non-member households. The time devoted for selling of milk was found to be higher for WDCS members group than non-member households.

The study has concluded that Women Dairy Co-operatives are instrumental in enhancing income and employment of women dairy farmers.

Acknowledgements

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