Constraints of Milk Production: A Study on Cooperative and Non-cooperative Dairy Farms in West Bengal

Debnarayan Sarker* and Bikash Kumar Ghosh

Centre for Economic Studies, Presidency College, Kolkata - 700 073, West Bengal

Abstract

The constraints that cooperative and non-cooperative dairy farms face in expanding milk production have been reported based on a field study on some cooperative and non-cooperative dairy farms in the state of West Bengal. The study has shown that non-cooperative farms face major constraints and high severity compared with cooperative farms in expanding milk production. Also important is that most of the severe or more severe constraints are infrastructural in nature. The study has suggested that for expanding milk production, the expansion of cooperative dairy farms other than non-cooperative dairy farms may overcome most of these difficulties.

Introduction

The dairy sub-sector occupies an important place in the agricultural economy of India as milk is the second largest agricultural commodity in contributing to GNP, next only to rice. Also important is the fact that in 1998 India surpassed the US to become the largest single milk producing country in the world. In 2005, Indian milk production represented 14.6 per cent of the world milk production, exceeding the combined production of the top five dairy countries in the EU–25 (Babcock, 2006). But, despite India being the largest milk producing country in the world and as compared with 1998-99 figures, its milk production having been increased by about 40 per cent in 2007-08, the per capita availability of milk is only 280 g/day, which is much below the world average figure. The per capita availability of milk is even different across Indian states; as for example, in West Bengal it is 128 g/day, which is much lower than all-India figure (NDDB, 2007-08). Despite impressive growth in milk production during the past three decades, productivity of dairy animals continues to remain very low and milk marketing system is primitive. Currently, more than 80 per cent of the milk produced in the country is marketed by the unorganized sector (private organizations) and less than 20 per cent is marketed by the organized sector (government or cooperative societies). But, both organized and unorganized sectors in the dairy industry of the country face a lot of constraints — infrastructural, technical, socio-psychological, economic and marketing — with high or low severity to expansion of milk production in the country. Therefore, a study of constraints in expansion of milk production faced by both cooperative and non-cooperative farms was considered essential. The present study has identified the constraints that cooperative and non-cooperative dairy farms face in expansion of milk production at the micro level in the state of West Bengal.

A few studies have explored the constraints of cooperative and private dairy plants in improving their efficiency in the Indian perspective (Chaudhary and Panwar, 2004 ; Rajendran and Mohanty, 2004 ; Nirmala and Muthuraman, 2009 ; Singh *et al*., 2007; Thorat and Kulkarni, 1994). Keeping this in view, the present study has suggested necessary policy measures for augmenting milk production and economic growth in dairy industry in the Indian context.

The growth of cooperative dairying in some states like Gujarat, Maharastra, Tamil Nadu and Karnataka

* Author for correspondence,
  Email: sarker_d_n@rediffmail.com

has brought significant economic betterment and well-being of the rural population, as compared with other states (Benni, 2005). The West Bengal was a late starter and West Bengal Co-operative Milk Producers' Federation Limited (WBCMPFL) was established in 1983 under the debut of Government of West Bengal following a three-tier structure of Anand pattern of milk cooperatives: WBCMPFL at the state level, District Milk Union (DMU) at the district level, and Primary Milk Producers' Co-operative Societies (PMPCS) at the village level. Also important is the fact that non-cooperative dairying or private dairying, which is the traditional form of dairying in West Bengal, has also been functioning along with recent expansion of cooperative dairying in West Bengal. The state of West Bengal occupied 12th position in milk production (in tonnes) by contributing only 3.90 per cent of total production in 2007-08. West Bengal had established 12678 organized district cooperative societies (cumulative) — 2.08 per cent of all-India figure — and has marketed 673 TLPD (3.56% of all-India figure) by incorporating 66000 farmers (about 0.5 % of India's figure) as their members in 2007-08 (NDDB, 2007-08).

Although no figure is available as to the number of farmers who are engaged in milk production across the state, an approximate number was discerned from the data of secondary sources. It was presumed that majority of workers engaged in farm employment under unorganized sector in the rural West Bengal, were also engaged in dairying. As per West Bengal Development Report (GoI, 2010; p.91), the number of workers engaged in farming under unorganized sector in West Bengal in the year 2007 was 119.57 lakh. If 50 per cent of them were engaged in the dairying sector, their number would be around 60 lakh. As per NDDB report (2007-08), only 66000 (about 1 % of total) were the members of the dairy cooperative societies. It implies that most of the dairy firms in rural West Bengal were still occupied under the private dairy enterprises. Also important is that West Bengal's share of milk production in Indian states has significantly decreased during recent years. In 1995-96, West Bengal's share of milk production was 5.1 per cent in Indian states (Pal, 2005:33), whereas it was only 3.90 per cent in 2007-08 (NDDB, 2007-08). Hence, a relevant issue is why West Bengal's share of milk production in Indian states has been decreasing over the recent years? To execute a rapid growth of dairy farms under milk

cooperatives, it is essential to identify the major constraints that both cooperative and non-cooperative dairy farms face in expanding milk production.

In this perspective, this study has explored the major constraints that both cooperative and non-cooperative dairy farms face in expanding milk production in the state of West Bengal. The underlying hypothesis is that the non-cooperative farms face major constraints and high severity compared with cooperative farms in expanding milk production.

Data Set and Methodology

The primary data were collected at the village level from the milk producer households under both co-operative and non co-operative dairy farms. In order to select sample from four PMPCSs, the following procedure was used.

Under the WBCMPFL, there are 14 DMUs. Out of these, two DMUs were selected: one having highest performance based on the simple arithmetic mean of daily average milk production (in kg) and daily average milk marketing (in kg) and the other, having the lowest of the same. For selecting two PMPCSs from each selected DMU, we selected one with highest performance and the other having lowest performance adopting the same procedure as for selecting two DMUs. The four PMPCSs selected for final survey were: Rukunpur-Balarampara Primary Milk Producers' Co-operative Society Ltd. (RPMPCS), Farashdanga Primary Milk Producers' Co-operative Society Ltd. (FPMPCS), Khar-Radhakrishnapur Primary Milk Producers' Co-operative Society Ltd. (KPMPCS), and Sonepur Primary Milk Producers' Co-operative Society Ltd. (SPMPCS). At the final level, 40 (forty) milk producer member households of each PMPCS were selected based on SRSWOR. To make a comparative study, an equal number (40) of non-cooperative milk producer households were also randomly selected (SRSWOR) based on the proximity in distance (in km) from each sampled PMPCS. Thus, the total number of milk producer households was 320. It is worth mentioning that while examining the comparative analysis within cooperative / non-cooperative dairy farms, both good and bad cooperative / non-cooperative dairy farms were selected on the basis of quantitative magnitude of milk production. The required primary data were collected from these 320 milk producer households with the help of specially designed schedule

of questionnaire through the survey method during the year 2007-08.

Various constraints being faced by milk producer households were categorized under five groups: infrastructural, economic, marketing, technical and socio-psychological. The important issues were included under 38 constraints under these 5 groups — infrastructural constraints (11), economic constraints (10), marketing constraints (6), technical constraints (5) and socio-psychological constraints (6). The following techniques were used to examine these constraints:

(i) Reliability Test of Data: A Likert-type scale (1932) was developed to assess the reliability of constraints. A Likert - type scale consists of a series of declarative statements. The subject is asked to indicate whether he agrees or disagrees with each statement. Primarily, it was started with five options: strongly agree, agree, undecided, disagree and strongly disagree, but finally the responses were obtained on three-point continuum, viz. on never, sometimes and always basis with the weights of 0, 1 and 2, respectively. The scale of this paper is consisted of 38 items.

One of the most popular reliability statistics in use today is Cronbach's alpha (Cronbach, 1951). Cronbach's alpha determines the internal consistency or average correlation of items in a survey instrument to gauge its reliability. Cronbach's α is a statistic and is commonly used as an estimator of the internal consistency reliability of a psychometric score for a sample of examinees. Cronbach's α is defined as

$$\alpha = \frac{N}{N-1}\left(1 - \frac{\sum_{i=1}^{N}\sigma_{Y_i}^2}{\sigma_X^2}\right)$$

where, *N* is the number of components (items or test lets), σ_X^2 is the variance of the observed total test scores for the current sample of persons, and $\sigma_{Y_i}^2$ is the variance of component *i* for the current sample of persons. Alpha coefficient ranges in value from 0 to 1 and may be used to describe the reliability of factors extracted from dichotomous (that is, questions with two possible answers) and/or multi-point formatted questionnaires or scales (i.e., rating scale: 1 = poor, 5 = excellent). The higher the score, the more reliable the generated scale is. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds have sometimes been used in the literature.

(ii) Test on Comparability of Constraints: Two types of tests have been used to make a comparative study of the constraints faced by cooperative and non-cooperative members.

(a) Test of Severity: Constraints faced by milk producer members were analysed according to severity of constraints based on the mean values of weights used in Likert-type scale as: 0 – 0.5 = Not severe, 0.5 – 1.0 = Less severe, 1.0 – 1.5 = Severe and 1.5 – 2.0 = Most severe. Data were analysed using SPSS 11.0. The mean and standard deviations of the constraints perceived by rural milk producers were used to find the severe problems (Meena *et al*., 2009).

(b) Rank Correlation Based on Percentage Analysis: To find constraints experienced by milk producer members under cooperative and non-cooperative farms, different tables for different types of constraints were prepared separately. Their responses regarding each constraint were recorded and presented with the help of percentage of responses and ranks. The rank order correlations were calculated according to the constraints that appeared between good cooperative (GC) and good non-cooperative (GNC), between bad cooperative (BC) and bad non-cooperative (BNC), and between overall cooperative (OC) and overall non-cooperative (ONC).

Results and Discussions

First, we examined whether the factor of constraints considered by us for the test of severity or the test of relationship between different pairs of dairy farms under study was reliable for such tests. The Cronbach's alpha coefficient of reliability was computed as 0.89, which indicated high reliability; Nunnaly (1978) and George and Mallery (2003) have indicated 0.7 as the acceptable reliability coefficient value.

Then, we assessed the nature and extent of relationship or association between three pairs of farms — good cooperative (GC) and good non-cooperative (GNC), bad cooperative (BC) and bad non-cooperative (BNC), and overall cooperative (OC) and overall non-cooperative (ONC) – based on each type of constraints — infrastructural constraints (IC; Table 1), economic constraints (EC; Table 2), marketing constraints (MC;

Table 1. Infrastructural constraints faced by milk producer members under cooperative or non-cooperative dairying in West Bengal: 2007-08

Infrastructural constraints	Good cooperative / good non-cooperative		Bad cooperative / bad non-cooperative		Overall cooperative / non-cooperative	
	% of respondents	Rank	% of respondents	Rank	% of respondents	Rank
a) Lack in Improved equipment	66.25 (72.50)	5 (6)	72.50 (81.25)	6 (5)	69.38 (76.88)	5 (5)
b) Irregular & inadequate supply of cattle feed	47.50 (45.0)	8 (10.5)	62.50 (65.0)	7 (8)	55.00 (55.0)	7 (8)
c) Unavailability of emergency veterinary services	73.75 (83.75)	3.5 (3.5)	82.50 (85.0)	2 (3)	78.13 (84.38)	4 (3.5)
d) Infrequent visit of veterinary staff	82.50 (83.75)	1 (3.5)	75.00 (85.0)	5 (3)	78.75 (84.38)	2.5 (3.5)
e) Unavailability of vaccines	43.75 (76.25)	9 (5)	31.25 (71.25)	10.5 (7)	37.50 (73.75)	10 (6)
f) Occasional availability of semen at the AI centres	23.75 (45.0)	11 (10.5)	31.25 (52.5)	10.5 (9)	27.5 (48.75)	11 (10.5)
g) Lack of training facilities	56.25 (86.25)	7 (1)	80.00 (88.75)	4 (1)	68.13 (87.50)	6 (1)
h) Unsuitability of the time of delivery of milk during winters due to bitter cold in early hours of the day	65.00 (53.75)	6 (8)	43.75 (48.75)	9 (10)	54.38 (51.25)	8 (9)
i) Unavailability of green fodder throughout the year	31.25 (50.0)	10 (9)	46.25 (47.50)	8 (11)	38.75 (48.75)	9 (10.5)
j) Low coverage milk yield of the milk animals	73.75 (85.0)	3.5 (2)	85.00 (85.0)	1 (3)	79.36 (85.0)	1 (2)
k) Unavailability of cattle feed and fodder seed on credit	76.25 (70.0)	2 (7)	81.25 (75.0)	3 (6)	78.75 (72.5)	2.5 (7)

Source: Field Survey, 2007-08.

$r_1 = 0.551$, Significant at 10 per cent level of significance. r_1 = Rank order correlation between good cooperative and good non-cooperative respondents

$r_2 = 0.802$, Significant at 1 per cent level of significance. r_2 = Rank order correlation between bad cooperative and bad non cooperative respondents

$r_{cn} = 0.689$, Significant at 5 per cent level of significance. r_{cn} = Rank order correlation between overall cooperative and overall non-cooperative respondents.

Table 3), technical constraints (TC; Table 4) and socio-psychological constraints (SC; Table 5) – faced by milk producer members.

Firstly, the nature of relationship between all pairs of farms for different types of constraints was positive, except for marketing constraints (the value of rank correlation is negative in Table 3). The negative relationship for marketing constraints might imply that opportunities of marketing are reversed between cooperative and non-cooperative farms. Secondly, as regards positive association between different pairs of farms was concerned, it could not be inferred from these results that a particular pair of farms received highest incidence of positive relationship for four types of constraints. Between GC and GNC, the extent of positive relationship for technical constraints was

highest and significant (Table 4); for infrastructural constraints (Table 1), though the positive relationship between GC and GNC was lowest, it (0.551) was significant at 10 per cent level. On the other hand, for socio-psychological constraints, BC and BNC received the highest positive relationship and their relationship was significant for all types of farms (Table 5). Thirdly, despite the fact that for the four types of constraints, the relationship between different pairs of farms was positive, the extent of positive relationship for economic constraints was very low and the relationship for all pairs of farms was statistically insignificant.

Our next issue was: which type of farm(s) face higher severity or less severity of constraints in augmenting milk production across cooperative and non-cooperative farms? The results of mean responses

Table 2. Economic constraints faced by milk producer members under cooperative or non-cooperative dairying in West Bengal: 2007-08

Economic constraints	Good cooperative / good non-cooperative		Bad cooperative / bad non-cooperative		Overall cooperative / non-cooperative	
	% of respondents	Rank	% of respondents	Rank	% of respondents	Rank
a) High cost of fodder seed	71.25 (61.25)	4 (7)	67.50 (68.75)	7 (6)	69.38 (65.0)	4.5 (6.5)
b) Delay in payment of milk	23.75 (80.0)	10 (2)	32.5 (85.0)	10 (2)	28.13 (82.5)	10 (2.5)
c) Low price of milk offered	72.50 (51.25)	3 (8)	80.00 (49.75)	2.5 (8)	76.25 (50.5)	3 (8)
d) High cost of cross-bred cow	81.25 (78.75)	1 (3)	80.00 (86.25)	2.5 (1)	80.63 (82.5)	1 (2.5)
e) High cost of veterinary medicines	68.75 (47.5)	5 (9)	70.00 (48.5)	6 (9)	69.38 (48.0)	4.5 (9)
f) High cost of cattle feed and mineral mixture	76.25 (82.5)	2 (1)	82.5 (83.75)	1 (3)	79.38 (83.13)	2 (1)
g) Low provision of loan in society or govt. for purchasing cattle	52.5 (76.25)	6 (4.5)	73.75 (77.5)	4 (4)	63.13 (76.88)	6 (4)
h) Low incentives or bonus for supplying milk	45.00 (76.25)	9 (4.5)	71.25 (75.0)	5 (5)	58.13 (75.63)	7 (5)
i) High charges of emergency veterinary services	51.25 (68.75)	7 (6)	60.00 (61.25)	8 (7)	55.63 (65.0)	8 (6.5)
j) High charges for cattle insurance	48.75 (45.0)	8 (10)	56.25 (34.75)	9 (10)	52.5 (39.88)	9 (10)

Source: Field Survey, 2007-08.
$r_1 = 0.109$, Not Significant. r_1 = Rank order correlation between good cooperative and good non-cooperative respondents
$r_2 = 0.316$, Not Significant. r_2 = Rank order correlation between bad cooperative and bad non-cooperative respondents
$r_{cn} = 0.266$, Not Significant. r_{cn} = Rank order correlation between overall cooperative and overall non-cooperative respondents.

Table 3. Marketing constraints faced by milk producer members under cooperative or non-cooperative dairying in West Bengal: 2007-08

Marketing constraints	Good cooperative / good non-cooperative		Bad cooperative / bad non-cooperative		Overall cooperative / non-cooperative	
	% of respondents	Rank	% of respondents	Rank	% of respondents	Rank
a) Irregular sell of milk	23.5 (83.75)	6 (1)	25.0 (86.25)	6 (1)	24.25 (85.0)	6 (1)
b) Lack of time for marketing	71.25 (60.0)	2 (4)	71.25 (51.25)	4 (5)	71.25 (55.63)	3 (4)
c) Less knowledge about marketing strategies	62.5 (73.75)	4 (3)	78.75 (80.0)	2 (3)	70.63 (76.88)	4 (3)
d) Low risk taking behavior	48.75 (36.25)	5 (6)	51.25 (45.0)	5 (6)	50.0 (40.63)	5 (6)
e) No or less provision for advance payment for milk by society or vendors	85.0 (46.25)	1 (5)	87.5 (53.75)	1 (4)	86.25 (50.0)	1 (5)
f) Inability to market for value added products	70.0 (80.0)	3 (2)	76.25 (81.25)	3 (2)	73.13 (80.63)	2 (2)

Source: Field Survey, 2007-08.
$r_1 = -0.371$, Not Significant. r_1 = Rank order correlation between good cooperative and good non- cooperative respondents
$r_2 = -0.086$, Not Significant. r_2 = Rank order correlation between bad cooperative and bad non- cooperative respondents
$r_{cn} = -0.257$, Not Significant. r_{cn} = Rank order correlation between overall cooperative and overall non- cooperative respondents.

(Table 6) and standard response of farms (Table 7) have examined this issue. Some basic results that appeared from the aggregate analysis were: (i) Unlike the results of mean responses of farms (Table 6), the difference between the values related to the extent of variability of response (Table 7) on the aggregate values of each constraint as well as overall values of constraints between all types of cooperative and non-cooperative farms were not far from unity, and so no perceptible difference could be suggested between

Table 4. Technical constraints faced by milk producer members under cooperative or non-cooperative dairying in West Bengal: 2007-08

Technical constraints	Good cooperative / good non-cooperative		Bad cooperative / bad non-cooperative		Overall cooperative / non-cooperative	
	% of respondents	Rank	% of respondents	Rank	% of respondents	Rank
a) Lack of technical guidance	75 (81.25)	1 (2)	82.5 (82.5)	1 (1)	78.75(81.88)	1(1)
b) Unavailability of high genetic merit bull	65.0 (70.0)	3 (3.5)	47.5 (52.5)	5 (4)	56.25(61.25)	3(4)
c) Poor conception rate through artificial insemination	48.75 (70.0)	4 (3.5)	50.0 (68.75)	4 (3)	49.38(69.38)	5(3)
d) Poor knowledge about feeding and health care	68.75 (82.5)	2 (1)	70.0 (80.0)	2 (20)	69.38(81.25)	2(2)
e) Lack of knowledge about cheap and scientific housing of animal	47.50 (48.75)	5 (5)	58.75 (45.0)	3 (5)	53.13(46.88)	4(5)

Source: Field Survey, 2007-08.

r_1 = 0.872, Significant at 10% level of significance. r_1 = Rank order correlation between good cooperative and good non-cooperative respondents

r_2 = 0.70, not significant. r_2 = Rank order correlation between bad cooperative and bad non-cooperative respondents

r_{cn} = 0.70 , not significant. r_{cn} = Rank order correlation between overall cooperative and overall non-cooperative respondents.

Table 5. Socio-psychological constraints faced by milk producer members under cooperative and non-coperative dairying in West Bengal: 2007-08

Socio-psychological constraints	Good cooperative / good non-cooperative		Bad cooperative / bad non-cooperative		Overall cooperative / non-cooperative	
	% of respondents	Rank	% of respondents	Rank	% of respondents	Rank
a) Lower socio-economic conditions	53.75 (82.50)	3 (1)	77.5 (80.0)	2 (3)	65.63 (81.25)	3.5 (1)
b) Lack of purchasing power	51.25 (76.25)	4 (3)	80.0 (83.75)	1 (1)	65.63 (80.0)	3.5 (3)
c) Lack of time due to busy in domestic / agricultural work	81.25 (80.0)	1 (2)	76.25 (81.25)	3 (2)	78.75 (80.63)	1 (2)
d) Lack of cooperation and coordination among members	70.0 (65.0)	2 (5)	70.0 (50.0)	4 (6)	70.0 (57.5)	2 (5)
e) Milk producers are meant for influential people	42.5 (67.5)	5 (4)	50.0 (76.25)	5 (4)	46.25 (71.88)	5 (4)
f) Milk of cross-bred cow has poor acceptability by family members	32.5 (40.0)	6 (6)	33.75 (52.5)	6 (5)	33.13 (46.25)	6 (6)

Source: Field Survey, 2007-08.

r_1 = 0.543, Not Significant. r_1 = Rank order correlation between good cooperative and good non-cooperative respondents

r_2 =0.771, Significant at 10% level of significance. r_2 = Rank order correlation between bad cooperative and bad non-cooperative respondents

r_{cn} =0.493, Not Significant. r_{cn} = Rank order correlation between overall cooperative and overall non-cooperative respondents.

them on the basis of the numerical values of standard deviation; (ii) The results of mean responses showed that GC farms had the lowest severity values for all categories of constraints under study, as expected, because the individual /aggregate mean values of IC, EC, ME, TE, SC and overall aggregate mean values of all constraints were the lowest and SD values of the same were lower than that of most other types of farms; (iii) On the contrary, the results of mean responses also show that the values of severity of constraints for each category of constraints individually or in aggregate as well as for overall aggregate values were the highest

Table 6. Mean responses of milk producer households under cooperative or non-cooperative dairying, perceived constraints

Constraints	Good cooperative mean responses (N=80)	Bad cooperative mean responses (N=80)	Good non-cooperative mean responses (N=80)	Bad non-cooperative mean responses (N=80)	Overall cooperative mean responses (N=160)	Overall non-cooperative mean responses (N=160)
Infrastructural Constraints (IC)						
1) Lack of improved equipments	.975	1.14	1.10	1.37	1.06	1.24
2) Irregular & inadequate supply of cattle feed	.612	.724	.662	.975	.668	.818
3) Unavailability of emergency veterinary services	1.21	1.23	1.59	1.68	1.22	1.64
4) Infrequent visit of veterinary staff	1.04	1.31	1.57	1.61	1.18	1.59
5) Unavailability of vaccines	.625	.400	.958	.862	.512	.910
6) Occasional availability of semen at the AI centre	.325	.425	.550	.662	.375	.606
7) Lack of training facilities	.825	1.22	1.44	1.46	1.02	1.45
8) Unsuitability of the time of delivery of milk during winters due to bitter cold in early hours of the day	.718	.737	.725	.787	.728	.756
9) Unavailability of green fodder throughout the year	.387	.450	.575	.562	.418	.569
10) Low average milk yield of the milk animals	1.20	1.31	1.38	1.59	1.26	1.49
11) Unavailability of cattle feed and fodder seed on credit	1.14	1.35	1.21	1.16	1.24	1.19
All (IC)	**.823**.	**.936**	**1.07**	**1.16**	**.880**	**1.12**
Economic Constraints (EC)						
1) High cost of fodder seed	562	.815	.762	1.08	.688	.921
2) Delay in payment of milk	.287	.350	1.65	1.70	.319	1.68
3) Low price of milk offered	.625	.813	.775	.662	.719	.718
4) High cost of cross-bred cow	1.27	1.40	1.56	1.46	1.33	1.51
5) High cost of veterinary medicines	.687	.775	.875	.825	.731	.850
6) High cost of cattle feed and mineral mixture	1.12	1.32	1.55	1.63	1.21	1.59
7) Low provision of loan in society or govt. for purchasing cattle	.712	1.16	1.12	1.56	.936	1.34
8) Low incentives or bonus for supplying milk	.310	.587	1.53	1.68	.449	1.61
9) High charges of emergency veterinary services	.661	.950	1.31	1.38	.806	1.34
10) High charges for cattle insurance	.712	.843	.765	.862	.778	.813
All (EC)	**.695**	**.901**	**1.19**	**1.28**	**.798**	**1.24**
Marketing Constraints (MC)						
1) Irregular sell of milk	.262	.300	1.55	1.67	.281	1.60
2) Lack of time for marketing	.862	.837	1.18	1.25	.849	1.22
3) Less knowledge about marketing strategies	.675	.838	.837	.950	.757	.894
4) Low risk taking behaviour	.887	.812	.950	.812	.849	.881
5) No or less provision for advance payment for milk by society or vendors	1.06	1.15	.980	.637	1.11	.808
6) Inability to market for value-added products	1.11	1.24	1.41	1.46	1.18	1.43
All (MC)	**.809**	**.863**	**1.15**	**1.13**	**.836**	**1.14**
Technical Constraints (TC)						
1) Lack of technical guidance	1.33	1.36	1.44	1.49	1.35	1.46
2) Unavailability of high genetic merit bull	.914	.800	.962	.950	.857	.956
3) Poor conception rate through artificial insemination	.625	.700	.825	.750	.662	.787
4) Poor knowledge about feeding and health care	.837	.888	.987	1.03	.862	1.01
5) Lack of knowledge about cheap and scientific housing of animal	.750	.863	.538	.625	.806	.581
All (TC)	**.891**	**.922**	**.950**	**.969**	**.907**	**.960**
Socio-Psychological Constraints(SC)						
1) Lower socio-economic conditions	.605	1.32	1.52	1.57	.962	1.55
2) Lack of purchasing power	.625	1.24	1.45	1.62	.933	1.54
3) Lack of time due to busy in domestic / agricultural work	1.55	1.60	1.67	1.59	1.58	1.63
4) Lack of cooperation and coordination among members	1.13	1.09	1.05	.879	1.11	.965
5) Milk producers are meant for influential people	.585	.623	.964	1.25	.608	1.11
6) Milk of cross-bred cow has poor acceptability by family members	.434	.409	.476	.425	.422	.451
All (SC)	**.821**	**1.05**	**1.19**	**1.22**	**.934**	**1.21**
Overall	**.808**	**.934**	**1.11**	**1.15**	**.871**	**1.14**

Source: Field Survey, 2007-08.

Table 7. Standard deviation of responses of milk producer households under cooperative or non-cooperative dairying, perceived constraints

Constraints	Good cooperative mean responses (N=80)	Bad cooperative mean responses (N=80)	Good non-cooperative mean responses (N=80)	Bad non-cooperative mean responses (N=80)	Overall cooperative mean responses (N=160)	Overall non-cooperative mean responses (N=160)
Infrastructural Constraints (IC)						
1) Lack of Improved equipment	.841	.823	.816	.785	.833	.814
2) Irregular & inadequate supply of cattle feed	.826	.795	.794	.826	.812	.823
3) Unavailability of emergency veterinary services	.706	.777	.761	.746	.740	.752
4) Infrequent visit of veterinary staff	.779	.851	.752	.746	.813	.749
5) Unavailability of vaccines	.785	.648	.694	.651	.727	.674
6) Occasional availability of semen at the AI centre	.652	.689	.673	.711	.671	.692
7) Lack of training facilities	.808	.746	.726	.682	.801	.703
8) Unsuitability of the time of delivery of milk during winters due to the bitter cold in early hours of the day	.773	.896	.763	.881	.838	.822
9) Unavailability of green fodder throughout the year.	.626	.879	.632	.875	.782	.767
10) Low average milk yield of the milk animals	.848	.738	.738	.738	.798	.735
11) Unavailability of cattle feed and fodder seed on credit	.852	.781	.881	.802	.815	.841
All (IC)	**.772**	**.784**	**.748**	**.767**	**.785**	**.761**
Economic Constraints (EC)						
1) High cost of fodder seed	.651	.802	.698	.811	.734	.766
2) Delay in payment of milk	.556	.710	.803	.746	.640	.774
3) Low price of milk offered	.770	.711	.841	.762	.740	.802
4) High cost of cross-bred cow	.762	.771	.802	.728	.765	.768
5) High cost of veterinary medicines	.787	.809	.670	.928	.797	.815
6) High cost of cattle feed and mineral mixture	.769	.753	.765	.748	.764	.754
7) Low provision of loan in society or govt. for purchasing cattle	.766	.818	.769	.807	.822	.789
8) Low incentives or bonus for supplying milk	.754	.779	.792	.803	.792	.795
9) High charges of emergency veterinary services	.830	.870	.821	.886	.853	.853
10) High charges for cattle insurance	.814	.880	.823	.839	.850	.831
All (EC)	**.734**	**.791**	**.780**	**.806**	**.773**	**.795**
Marketing Constraints (MC)						
1) Irregular sell of milk	.521	.560	.761	.729	.541	.745
2) Lack of time for marketing	.651	.787	.496	.665	.719	.580
3) Less knowledge about marketing strategies	.568	.583	.514	.593	.576	.554
4) Low risk taking behaviour	.955	.864	.966	.942	.929	.954
5) No or less provision for advance payment for milk by society or vendors	.707	.938	.720	.660	.823	.690
6) Inability to market for value-added products	.842	.767	.802	.762	.805	.782
All (MC)	**.698**	**.766**	**.680**	**.755**	**.732**	**.718**
Technical Constraints (TC)						
1) Lack of technical guidance	.856	.860	.793	.779	.856	.784
2) Unavailability of high genetic merit bull	.863	.905	.754	.695	.890	.7397
3) Poor conception rate through artificial insemination	.712	.786	.725	.666	.751	.699
4) Less knowledge about feeding and health care	.664	823	.778	.792	.677	.785
5) Lack of knowledge about cheap and scientific housing of animal	.864	.795	.594	.675	.843	.634
All (TC)	**.792**	**.834**	**.729**	**.721**	**.803**	**.728**
Socio-Psychological Constraints(SC)						
1) Lower socio-economic conditions	.576	.751	.660	.831	.665	.747
2) Lack of purchasing power	.675	.764	.823	.777	.722	.800
3) Lack of time due to busy in domestic / agricultural work	.779	.626	.796	.845	.703	.823
4) Lack of cooperation and coordination among members	.784	.828	.753	.684	.807	.719
5) Milk producers are meant for influential people	.846	.786	.698	.870	.816	.778
6) Milk of cross-bred cow has poor acceptability by family members	.554	.594	.632	.556	.576	.595
All (SC)	**.703**	**.725**	**.727**	**.761**	**.715**	**.745**
Overall	**.741**	**.780**	**.733**	**.763**	**.762**	**.749**

Source: Field Survey, 2007-08.

for BNC farms, the position of severity for GNC farms, BC farms and GC farms appeared in the decreasing order; (iv) The difference between the values of severity for BNC farms (which possessed highest severity) and GNC farms was not far from unity, which also appeared from the results of mean responses. Conversely, difference between the values of severity for GC farms and BC farms was far from unity; and (v) Although the mean values of severity of constraints for BC farms retained the second lowest position after GC farms, the difference between the average severity values for each type of constraints as well as overall aggregate values for GC and GNC/BNC farms or between BC and GNC/BNC farms was far from unity. The aggregate results suggested that the members of both GNC and BNC farms had to face much severity for all types of constraints compared with those of GC farms and BC farms. Hence, the related query was: which constraints were more problematic or severe in expanding milk production across cooperative and non-cooperative farms? The results have been presented in Table 6. The overall result on four types of farms – GC, BC, GNC and BNC – including both OC and ONC, revealed that out of 38 constraints interpreted in 5 types of constraints (IC, EC, ME, TE and SC), one constraint was most severe – lack of time due to busy in domestic/ agricultural constraints, and ten constraints were severe – six under IC, two under EC and one under TC. The results, however, showed that out of 11 most severe and severe constraints, about 54.5 per cent were infrastructural, 18.2 per cent were economic, about 9.1 per cent each were for marketing, technical and socio-psychological constraints. It might suggest that severity of infrastructure (IC) was much higher than other types of constraints for all the categories of farms.

As regards the break-up of the IC, out of 11 items of constraints, 4 constraints that appear in Table 6, were severe for members of GC farms; but for each of other type of farms (BC, GNC and BNC) the number of severe constraints was 6 .

Among 10 economic constraints, 2 were severe for the members of GC farms; 3 were severe for the member of BC farms; 6 (including 4 most severe) were severe for member of GNC farms; and 7 (including 4 most severe) were severe for members of BNC farms. Across 6 marketing constraints, 2 each were severe for the members of GC and BC farms; and 3 each

(including 1 most severe) were severe for the members of GNC and BNC farms. Among 5 technical constraints, 1 each was severe for the members of GC, BC and GNC farms, whereas 2 were severe for the members of BNC farms.

Among 6 socio-psychological constraints, 2 (one most severe) each were severe for GC and BC members; 3 were severe for BC farms; 4 (two most severe) were severe for GNC farms; and 4 (three most severe) were severe, for BNC farms.

The result of mean response (Table 6) revealed that on combining most severe and severe constraints, the number of severe constraints was: 11 for GC members; 16 for BC members, 20 for GNC members, and 22 for BNC members. Thus, non-cooperative farms face major constraints and high severity compared with cooperative farms in expanding milk production. Also, most of severe or more severe constraints were infrastructural in nature.

We also studied the causes that make both cooperative and non-cooperative farms face major constraints in expanding milk production and its implications. Regarding infrastructural constraints (IC), the 4 major constraints for all types of farms were: (i) unavailability of emergency veterinary services, (ii) infrequent visit of veterinary staff, (iii) unavailability of cattle feed and fodder seed on credit, and (iv) low average milk yield of the milk animals. The underlying causes behind the major infrastructural constraints faced by cooperative farms (GC and BC) were: First, in almost all cases the main employee of each cooperative society did not have any degree or diploma on veterinary medicine but he was acting as veterinary physician in the area we surveyed because a registered veterinary medical practitioner was hardly ready to live in those areas. This caused the main problems of unavailability and infrequent visit of emergency veterinary services from registered medical practitioners for GNC and BNC farms. Secondly, as most of the dairy cooperative societies themselves were faced with problems of the recovery of previous loans they provided to their attached cooperative farms, the former failed to supply the loan facility to the latter further for purchasing of cattle feed and fodder seed on credit, and this was one of the most important factors for low average milk yield of the milk animals across cooperative farms.

In addition to the aforesaid four major ICs, bad cooperative society and all types of non-cooperative dairy traders (GNC, BNC) faced two major IC constraints: lack of improved equipments, and lack of training facilities. First, lack of improved equipments was, mainly, due to non-provision of loan facility to the dairy farms. Second, for BC farms, the training facilities imparted to their attached farms was insignificant, mainly, due to financial problems, whereas, GC did not face such problems. However, such training facilities are not provided usually by the non-cooperative dairy traders (GNC, BNC).

Concerning the 10 economic constraints (EC), two were severe for members of GC; these were: high cost of cross-breed cow and high cost of cattle feed and mineral mixture. It was mainly due to financial problems faced by GC for their attached firms. The other types of dairy farms (BC, GNC and BNC) faced some additional constraints also. The economic constraints faced by BC for their attached farms were also due to financial problems. But, the financial constraints were more severe for the private dairy traders, because they usually do not provide loans to their attached farms for the severe financial constraints the latter face.

Regarding the 6 marketing constraints, 2 were severe for members of GC and BC farms; these were: inability to market value - added products, and no or little provision for the advance payment for milk by society. The former was due to lack of exercising proper management practices by the cooperative societies in favour of their attached farms. This required precise and detailed information of marketing facilities (milk collection, processing and distribution), which both GC and BC farms failed to provide with their attached farms. Added to it, as the society failed to make advance payment to their attached farms for purchasing their milk, because of the financial problems mentioned earlier, the said marketing problem was treated severe for those farms. Along with above severe marketing constraints, irregular sale of milk and lack of time for marketing were also severe marketing constraints for farms under the private dairy enterprises. It is worthwhile to mention that unlike GC and BC, GNC and BNC farms execute their business locally with very scant supply of milk, which is irregular. So, the marketing constraints were more severe for firms under GNC and BNC.

For technical constraints, lack of technical guidance was the severe constraint for members of all types of farms. It was because proper technical guidance to the dairy farms depended upon necessary and proper provision for them regarding input services such as balanced cattle feed, improved breeding , regular veterinary care and management, etc. which were lacking in almost all farms. The cooperative farms, in particular, were not aware of many of these hurdles. Added to it, they were not able to arrange for these facilities due to financial problems mentioned earlier. All these hurdles were very acute for the private dairy enterprises, because they do not usually provide direct loan facility to their attached farms.

For the 6 socio-psychological constraints, 2 were severe for the members of all types of farms; these were: lack of time due to busy in domestic / agricultural work and lack of cooperation and coordination among members. The first was because of the fact that earning from dairy farms was not the only source of income for the members of all types of farms. Dependence on income from cultivation of agricultural crops was the main hurdle for the first issue. The second issue was related to the lack of mutual cooperation among members of cooperative dairy farms. At the cooperative society level, the employment of additional man power for milk collection and transportation during busy season of agricultural year and the holding of regular meetings of the members of cooperative farms might reduce such hurdles. But such a problem was very acute for farms under the private enterprises (GNC, BNC), because along with the above two socio-psychological constraints, the constraint related to lower socio-economic conditions of members was also severe. To overcome these hurdles, it is necessary to provide direct loan facilities to the members, which private dairy entrepreneurs hardly execute: instead, as the influential people of locality the private entrepreneurs usually try to execute their private influence on their members.

Conclusions and Policy Implications

Although no general judgment has been discerned for all the five forms of constraints based on the nature and extent of relationship between different types of cooperative and non-cooperative dairy farms, the mean response has revealed that the non-cooperative farms face major constraints and high severity compared with cooperative dairy farms in expanding milk production.

Combining most severe and severe constraints together, 11 constraints have been found severe for Good Cooperative (GC) farms, 16 for Bad Cooperative (BC) farms, 20 for Good Non-cooperative (GNC) farms, and 22 for Bad Non-cooperative (BNC) farms out of 38 constraints under five forms of constraints. It implies that compared with the cooperative farms, non-cooperative dairy farms face major constraints in expanding milk production.

The study has highlighted the need of serious attention for policy prescriptions on two issues. First, what are the vital causes that lead both cooperative and non-cooperative dairy farms to face major constraints in expanding milk production? Second, if non-cooperative farms face major constraints and high severity compared with cooperative dairy farms in expanding milk production, how should stress be given to reduce the role of non-cooperative dairy farms and thereby to expand the role of cooperative dairy farms in expanding milk production in the West Bengal state in particular and for Indian context in general?

The study has revealed that financial problem is the most significant constraint faced by the cooperative farms. Since most of the dairy cooperative societies themselves are faced with the problem of recovery of loan they had provided to their attached cooperative farms, they are not able to provide loan facility to the latter; consequently, the latter face financial problems for all types of constraints. Among infrastructural constraints, unavailability and infrequent visit of veterinary medical practitioners is the main constraint. In the absence of a registered veterinary medical practitioner, the main employee of cooperative society, who does not have any degree or diploma in veterinary medicine, acts as a veterinary physician. Among marketing constraints, the lack of exercising proper management practices by cooperative societies in favour of their attached farms is the major constraint. Due to this they fail to provide precise and detailed information on marketing facilities (milk collection, processing and distribution) to their attached farms in time. For technical constraints, lack of technical guidance is severe for members of cooperative farms, because cooperative societies, in particular, are not aware of many of these hurdles. As regards the socio-psychological constraints, the lack of time due to busy in domestic / agricultural work and lack of cooperation and coordination among members are major constraints. The cooperative societies hardly employ additional man

power for milk collection and transportation during busy season of agricultural year and do not hold regular meetings of the members of cooperative farms.

All these problems have been found acute for non-cooperative farms also, because the private entrepreneurs usually neither provide any direct loan facility to their attached farms for the constraints they face nor they usually provide any physical or social service to them or execute purchase and supply of milk regularly. Therefore, to increase productivity of milk, it is necessary to provide proper input services such as high quality cross- breed of milk cows along with required amount of cattle feed, fodder and mineral mixture, veterinary care and management, etc. These require adequate institutional credit with low interest rate to purchase those inputs.

The study has revealed that to manage the financial problem two types of institutional credit should be provided simultaneously by the cooperatives. One, the recovery of previous loan should be made on long- term basis at a lower rate of interest. Two, adequate institutional credit at a low interest rate should be provided to the attached farms immediately for purchasing the necessary inputs like high quality cross-breed of milk cows along with required amount of cattle feed, fodder and mineral mixture , improved dairy equipments, etc. for expanding milk production. .

For managing infrastructural constraints, two types of policy implications are necessary. One: on short-term basis, proper medical training on veterinary medicine should be given to the main employee of each cooperative society who is acting as a veterinary physician without any degree or diploma on veterinary medicine. Two: on long-term basis, the dairy cooperative laws and regulations should be amended in such a form that registered veterinary medical practitioners will be obliged to practice in the rural areas.

To manage marketing constraints, cooperative societies should provide precise and detailed information on marketing facilities (milk collection, processing and distribution) to their attached farms in time, strengthen marketing infrastructure and exercise proper management practices through regular meetings with their attached farms. For managing technical constraints, special training facilities should be provided to the attached dairy farms at regular intervals immediately. To manage socio-psychological constraints, employment of additional man power for

milk collection and transportation during busy season of agricultural year and holding of regular meetings of the members of cooperative farms at the cooperative society level should be done.

Regarding the second issue, the study has observed that expansion of dairy cooperative farms other than non-cooperative farms may reduce the business of private dairy traders. Although it is not a short-term phenomenon, the expansion of dairy cooperative farms can be executed in various forms simultaneously. First, if the residence of a cooperative dairy farm is not near to the cooperative society, a sub-unit of such cooperative society should be established so that the former does not face any problem in the regular supply of milk to the concerned cooperative society. Second, dairy cooperative societies should be established in new areas where milk trading is executed by the private traders only. Third, like private dairy enterprises , cooperative dairy societies should not make irregular purchase and supply of milk ; rather they should ensure regular purchase and supply of fresh and pure milk to their consumers at reasonable price. In order to execute this programme both administrative and institutional support is extremely necessary. Therefore, the need of the hour for expansion of dairy cooperatives in both rural and urban areas, is to adopt both short- run and long- run producer–friendly policy prescriptions that are capable of managing all types of constraints faced by dairy farms in expanding milk production together with the expansion of new cooperatives in the areas where milk trading is executed by the private traders only.

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References

Babcock Institute Discussion Paper No.2006-2 (2006) *The Dairy Sector of India: A Country Study*, The Babcock Institute for International Dairy Research and Development, University of Wisconsin-Madison, USA.

Benni, B. S. (2005) *Dairy Co-operatives: Management and Practice*, Rawat Publications, New Delhi

Chaudhary, H. and Panwar, J.S. (2004) Dairy cooperative societies: Constraints of milk producer members, *The Indian Journal of Social Work*, **65**(2): 263-273.

Cronbach, L. J. (1951) Coefficient alpha and internal structure of tests. *Psychometrica,* **16**: 297-334.

Cronbach, Lee J. and. Shavelson, R.J (2004) My current thoughts on coefficient alpha and auccessor procedures. *Educational and Psychological Measurement*, **64**(3): 391-418.

George, D. and Mallary, P. (2003) *SPSS for Windows Step by Step: A Simple Guide and Reference*.11.0 update (4th ed.), Allyn & Bacon,Boston.

Likert, R. (1932) A technique for the measurement of attitudes, *Achieves of Psychology*, No. 140.

Meena M.S., Prasad, M. and Singh, Rajbir (2009) Constraints perceived by rural agro-processors in adopting modern post-harvest technologies, *Indian Research Journal of Extension Education,* **9** (1): 1-5.

NDDB (2007-08) *Annual Report 2001-02*, National Dairy Development Board, Anand, India.

Nirmala, B. and Muthuraman, P. (2009) Economic and constraint analysis of rice cultivation in Kaithal district of Haryana, *Indian Research Journal of Extension Education,* **9**(1): 1-4.

Nunnaly, J. (1978) *Psychometric Theory*. McGraw-Hill, New York.

Pal, P. (2005) Livestock products in India: Growth, composition and determinants, *Artha Beekshan*, **14**(1): 32-44.

Planning Commission (2010) *West Bengal Development Report*, Government of India, New Delhi.

Rajendran, K. and Mohanty, S. (2004) Dairy co-operatives and milk marketing in India: Constraints and opportunities, *Journal of Food Distribution Research*, **35**(2): 34-44.

Singh, R. (1993) A study of constraints in the functioning of milk producers co-operative societies in Western U.P. *Ph.D. Thesis* (Unpublished), National Dairy Research Institute, Karnal,

Singh, D.K.,Gautam, U.S. and Pandey, S.N. (2007) Constraints analysis of technological awareness of the farmers, *Indian Research Journal of Extension Education*, **7**(1): 60-63.

Thorat, D.R. and Kulkarni, B.R. (1994) Constraints faced by the dairy farmers in Maharashtra, *Journal of Extension Education*, **13**: 305-306.