



Socio-economic Characterisation and Dairy Production System Maintained by Women Milk Producer Cooperative Societies in Indian Sundarban Region

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ABSTRACT

The present study was undertaken to characterise socio economic pattern of WMPCS members and analyse small holder dairy production system including its constraints in the Indian Sundarban. A total of 160 respondents from six development blocks were interviewed with a pre tested questionnaire. 74.4 per cent of the farmers had age between 20-45 yr and 88 per cent of them were married, which reflects young and energetic attitude of the farmers. 46.9 per cent of the farmers had only primary level of education. 63.5 per cent of the WMPCS members belonged to low income group (Rs 2500/- – 5000/-), evidently, net income from sale of milk by WMPCS members was found to be significantly higher ($p < 0.05$) than that of informal dairy farmers. Herd size per household varied between 1.46 to 1.87 total livestock units (TLU); non-descript Indian zebu was the pre-dominant breed. 37.6 per cent respondents used artificial technique for breeding purpose. FEAST computer program was used to analyse feed resources of the area and it was found that the small holder dairy production system entirely depend upon grazing with little supplementation of concentrates. In the lean months of winters, residues of leguminous crops as well as mangrove leaves were used as fodders. Milk production of different cattle breeds varied significantly ($P < 0.01$) and milk yield from cross-bred Jersey was maximum (1652 l/lactation). Principal constraint was lack of green fodder production for dairy farming.

Key Words: FEAST, Sundarban, Milk production, Small holder, Dairy, Women Milk Producers' Cooperative Society.

INTRODUCTION

Sundarban region is a conglomerate of tropical mangrove islands bordering *Bay of Bengal*, and is a special ecological zone due to habitat of large numbers of threatened flora and fauna. Various researchers had observed that the area became increasingly vulnerable and unstable owing to serious threats from climate changes, population explosion, extreme poverty and lack of infrastructure (Danda *et al*, 2011 and FAO, 2011). Scope of crop based agriculture is also very limited due to salinity of soil in the area and thus local people principally depend upon animal husbandry and fishery based alternative livelihood systems.

Homestead dairy with indigenous zebu cattle is a common avenue for livelihood in the area. Recently, dairy cooperative societies formed and managed exclusively by village women has opened up vast possibilities of holistic development in the villages and women empowerment using homestead dairy as a tool. Present study was undertaken with the objective of characterising socio-economic status of the members of Women Milk Producers' Cooperative Societies (WMPCS) working under 'Sundarban Co-Operative Milk & Livestock Producers' Union Ltd (SMLU)' and analysing small holder dairy production systems maintained by WMPCS in Indian Sundarban region and their constraints.

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Table 1. Village wise distribution of respondents.

Sr. No.	Name of Block	Name of Village	Name of WMPCS	Number of Respondents
1	Mathurapur I	RamjibonPur	Ramkrishna WMPCS	20
2	Mathurapur II	Purbajata	Purbajata WMPCS	20
3	Namkhana	Fatikpur	FatikpurWMPCS	40
4	Kakdwip	14 number plot	RabindraWMPCS	20
		Gangadharpur	Radhakrishna WMPCS	20
5	Kulpi	Bajberia	Laxmipasa WMPCS	20
6	Basanti	Nafargunj	Nafarganj WMPCS	20

MATERIALS AND METHODS

Sampling procedure

The present study was conducted during March-July 2016 in eighteen 'Women Milk Producers' Cooperative Societies' (WMPCS) in selected areas of Sundarban region of West Bengal, India. Six development blocks namely Mathurapur-I, Mathurapur-II, Namkhana, Kakdwip, Kulpi and Basanti were selected purposively. A total of 160 respondents were chosen randomly from the 7 WMPCS for present survey (Table1).

Data Collection and Analysis

A semi structured and pre-tested interview schedule on socio-economic parameters and prevalent dairy production system, maintained by WMPCS members, was developed for the present survey. Data were collected by personal interview, compiled and tabulated. Milk production data were collected from secondary sources like record books of each WMPCS. All the data were statistically analysed (SPSS V.20) for construction of frequency table, paired t-test (for comparing two groups of observations) and one way ANOVA (for comparing more than two groups of observations).

Evaluation of existing feed and fodder resources for small holder dairy farming in the concerned region was done using FEAST (Feed Assessment Tool) software program developed by International Livestock Research Institute (Duncan *et al*, 2012). Quantitative and qualitative information required

on different aspects of feed and fodder resources for FEAST program were gathered by (i) a Focus Group Discussion with minimum 20 women farmers at each milk collection unit in the village and (ii) by face to face individual interviews.

Constraints of homestead dairy farming as perceived by women members of the milk cooperatives were analysed by *Henry Garret ranking*. In this technique, percentage position of ranks associated with small dairy farming was calculated using the following formula:

$$\text{Percentage position} = 100 (R_{ij} - 0.5) / N_j$$

Where, R_{ij} = Rank given for the i^{th} variable by j^{th} respondents and N_j = Number of variable ranked by j^{th} respondents.

Using Garrett table, the percentage position of each rank was converted into scores. For each constraint, scores of individual respondents were added and then divided by the number of respondents. The factors with highest mean value were considered to be the most important.

RESULTS AND DISCUSSION

Socio-economic characterisation of WMPCS members

Age

Age is an important factor that directly influences attitude of dairy farmers. WMPCS farmers according to their age were categorized

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Table 2. Socio-economic attributes of WMPCS members, n=160

Variable	Category	Frequency (f)	Percentage (%)
Age	<20 years	3	2
	20-45 years	119	74.4
	>45 years	38	23.6
Marital Status	Married	143	89.40
	Un-married	5	3.1
	Widow	8	5
	Separated	4	2.5
Level of education	Up to Class IV	75	46.9
	Class V-VIII	54	33.7
	Class IX - XII	29	18.1
	Above XII	2	1.3
Average land holding	Up to 0.5 acre	101	63.1
	More than 0.5 acre	29	18.1
	Only Home-stead land	30	18.8
Gross monthly income of household	< Rs.2500.00	30	18.75
	Rs.2500.00 - 5000.00	102	63.5
	>Rs.₹ 5000.00	28	44.8

into 3 groups, viz. < 20 yr, 20-45 yr, and > 45yr (Table 2). The study revealed that 74.4 per cent of respondents belong to age category of 20-45 yr. Similar results were obtained in a dairy production area in South Ethiopia (Yigrem *et al*, 2008). Results indicated that dairy farming was being operated by famers who were young, energetic and physically capable. Sharma (2016) also reported that the farmers in the age group of 20-30 yr were found to be more interested in acquiring trainings, demonstrations and exposure visits and acquired high level of knowledge as compared to the elder group of more than 40 years of age.

Marital status

WMPCS members were exclusively women and married (88 %) followed by widow (4 %), unmarried (3 %) and separated (2 %). This indicated that most of the members involved in dairy farming were responsible, caring individuals with good mothering ability which is required in maintaining a good managerial standard in dairy farming.

Level of education

Education plays an important role in overall progress of human life. It drives farmers to adopt and implement newer technologies more successfully. Our study categorized WMPCS members into four groups up to class IV, class IV-VIII, class IX-XII, and above class XII. Present study showed (Table 2) that majority of the women farmers (46.9 %) had an education label up to class IV (primary level) followed by class V to VIII (33.7%), class IX to XII (18.1%) and above XII (1.3%). The present research finding showed that one of the major limitations for growth of the WMPCS was lack of education. Therefore, through suitable education programs, the overall betterment of WMPCS members could be achieved.

Average land holding

For dairy farming, owning a land is an important factor for sustainability of the farming. Various surveys (Skunmun, 2000 and Mubiru *et al*, 2007) in Asia and Africa indicated that larger the farm land/

household more was the milk production. The data (Table 2) showed 63.1 per cent of dairy owners have land holding up to 0.5 acre, followed by more than 0.5 acre (18.1 %) and only residence compound (18.8 %). This fragmented and smaller land profile was typical to the area and demonstrated vulnerable situation of the small holder dairy farming of the region.

Gross monthly income of household

The study indicated that majority (63.5 %) of farm women belonged to low income group (Earning Rs.2500-5000/month) families and 18.75 per cent members belonged to less than Rs. 2500/month group (Table 2). This result reflected poor socio economic condition of people of Sundarban and was in consistent with the findings of Dumrya *et al* (2016).

Comparison of net monthly income from milk sale between WMPCS members and informal women dairy farmers

The study revealed that the net income from milk sale of WMPCS members was significantly ($P < 0.05$; paired t-test) high as compared to that of informal milk producers (Fig.1). Net income of WMPCS members from milk sale is on average Rs.1050/- month whereas the informal growers receive average price of Rs.865.82/-month. This indicated that formation of WMPCS had a direct role on income optimisation for dairy farmers. This comparison clearly gave evidence that support from district level milk union in terms of technical inputs, trainings etc. was very much helpful for WMPCS members to consolidate their profit margin.

Small Holder Dairy Production System under WMPCS

Herd Size per household and cattle breeds

Herd size refers the numbers of cattle per household and presented in Table 3. In this study three cattle breeds were documented namely local, cross bred Jersey (CBJ) and cross bred Gir (CBG). Herd size was expressed in Tropical Livestock Unit (TLU). When calculating Tropical Livestock

Units (TLU), following conversion factors were used (Staal *et al*, 1997) adult male cattle: 1.0, adult female cattle: 0.7, post weaner cattle: 0.5 (heifer), pre-weaners cattle: 0.2 (calf).

Highest (1.87 TLU) and lowest (1.46 TLU) herd size was observed respectively in Ramkrishna WMPCS (Mathurapur I block) and Fatikpur WMPCS (Namkhana block). Majority of dairy herds were small, typical to the concerned area. Chand *et al* (2015) opined that economic viability of small holder dairy farming decreases with small herd size. It was also evident that low productive non-descript (indigenous zebu) cows were predominant breeds in the area. Farmers prefer local breeds due to many positive attributes like better disease resistant capability, suitability in low input farming and low cost of maintenance. As a result, although facility for artificial insemination with better cattle genotype was available in the area, small farmers were reluctant to avail that facility. During the interview, it was also reported that repeated failures of AI techniques was a cause of frustration for the farmers.

Cattle breeding programme in the area

It was evident that natural pure breeding among indigenous zebu was common in the study area. Various stakeholders like WMPCS, state departments and non-government organisations were working for years to produce cross-bred genotypes by implementing cross breeding policy for better production. Attempts were being made to popularise cross breeding of indigenous cows with improved sires like Jersey, Sahiwal or Girbreed using artificial insemination (AI) techniques with frozen semen. Odend'hal (1988) described the poor impact of cattle crossbreeding program in West Bengal. Situation has not changed much; present study showed that only 37.6 per cent farmers adopt AI technology, while rest of the farmers prefer natural service with local bulls. AI service is mainly provided by private AI workers (55%), followed by government agencies (35%) and veterinary field assistants (10%).

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Table 3. Cattle Herd size in different WMPCS, n= 160.

Sampling area of Households	Herd Size in TLU (Mean± SE)			
	CBG	CBJ	Local	Total
Radhakrishna MPCS	0.24±0.125	0.145±0.006	1.335±0.213	1.72±0.21
Rabindra MPCS	0.14±0.064	0.185±0.07	1.39±0.222	1.715±0.24
Fatikpur MPCS	0.1±0.055	0.22±0.08	1.14±0.139	1.461±0.14
Ramkrishna WMPCS	0.16±0.054	0.14±0.071	1.57±0.221	1.87±0.205
Purbajata MPCS	0.05±0.03	0.24±0.102	1.185±0.176	1.48±0.190
Nafarganj WMPCS	0.05±0.03	0.285±0.081	1.325± 0.18	1.665±0.201
Laxmipasa WMPCS	0.19±0.117	0.24±0.077	1.115±0.166	1.545±0.179

Housing of cows

Present study noticed that three types of cattle housing namely cemented floor, partly cemented floor and earthen floor in the region. Majority (43%) of the farmers used earthen floor followed by semi partly cemented floor (39%) and cemented floor (18%) for keeping their animal. It was also observed that most of the cow shed had poor ventilation and lacked proper waste management practices.

Feed and Fodder availability

FEAST program revealed that grazing was the main source (36.81 %) of dry matter followed by crop residues (27.93 %) purchased feed (13.59 %), collected fodder (12.72 %) and cultivated fodder (8.95 %). Dairy cows get maximum feed during rainy season when there are plenty of greens. Typically large numbers of dairy cows are kept in grazing on a small pasture. This was in consistent with several earlier reports (Devendra, 2000 and Kasirye, 2003). In this system of feeding, cows consume grasses and weeds with little nutritive values. When greens became scanty in winter, straws of leguminous crops (e.g., *Lathyrus*) were used as animal feed. However, Paddy straw remains as the principal crop residue that is extensively used as dry fodder throughout the year. It was reported that in the lean season of winter months, farmers used even some mangrove leaves, particularly of *Avicennia sp.* as fodder. This finding was in consistent of Ghosh *et al* (2015). Common feed ingredients used for cattle ration were mainly wheat bran, sunflower cake, mustard cake and grass pea pods. Most of the time, a

concentrate mixture consisting of these ingredients is given to animals with paddy straw. It was observed that cultivation and production of green forage for animal feeding was only limited to some pockets only. Majority of farmers were not at all aware for fodder cultivation practices. Maize (var. *African tall*) was the principal fodder cultivated by some progressive farmers. It was evident, however, that there were no scientific feeding management programs among WMPCS members, which might be due to the fact that extension machinery is still very weak in the region.

Milk Production

Milk production of different breed differed significantly ($P < 0.01$; One way Anova). Among the three breeds, CBJ was the most productive (1652.25 l/lactation) followed by CBG (949.35 l/lactation) and indigenous zebu (414.82 l/lactation). Although CBJ appeared to be the most productive in this agro-climatic area, it was clear that production of CBJ was still far below from national average of 2400 l/lactation. This might be attributed to nutritional insufficiency of dairy cows as evidenced by acute shortage of greens in lean periods.

Constraints of small holder dairy farming

Henry Garret ranking analysis (Table 4) from 160 respondents showed that the primary constraint for small holder dairy farming was lack of green fodder cultivation, followed by lack of extension contacts, high price of cattle feed, distantly located veterinary hospital etc. Respondents reported non-availability

Table 4. Ranking of constraints in small holder dairy in India Sundarban, n=160.

Constraints	Total Score	Average	Rank
Lack of green fodder cultivation	13740	85.8	1
Lack of extension contacts	12380	73.3	2
High price of cattle feed	11500	71.8	3
Distantly located veterinary hospital	10800	67.5	4
Frequent failure of artificial insemination in cows	10180	63.6	5
High incidence of calf mortality	9900	61.8	6
Distantly located milk collection centres	9420	58.8	7

of quality fodder seeds in the region. Limited feed resource remained as a major constraint in small holder dairy farming in South Asia for many years as reported by several authors (Devendra, 2000). Present study revealed that they did not also have the adequate knowledge regarding cultivation practices of fodders. Further, it had been identified that farmers were more inclined to cultivation of cash crops than fodder. In this background it was observed that scanty fodder supplementation might lead to various metabolic and reproductive diseases and as a result warrant subsequent financial loss to farmers.

CONCLUSION

Present study identified a mixed crop-livestock system in Indian Sundarban region where homestead dairy farming is an integral part of livelihood. Analysis on socio-economic aspects of WMPCS members clearly showed that small dairy farmers still belonged to poor class with minimum exposure to modern dairy farming that needs to be addressed. For sustainable dairy farming in the concerned region, it was strongly recommended that- i) re-evaluation of present breeding policy with cross-breeding; phenotypic and genotypic characterisation of local zebu cattle should be started for using them in future breeding programs and, ii) promoting fodder maize cultivation in the region. If steps could be taken up by district milk union (SMLU) to frame a suitable strategy covering the above stated recommendations, small holder dairy farming in the region may witness a new dimension in near future.

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