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Transition of smallholder dairy farming system - a micro study in Tamil Nadu, India

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Abstract

Crop and dairy mixed farming is dominant form of milk production activities in India. It is an important livelihood options for the vulnerable sections namely landless, small and marginal farmer who forms major stakeholder in the smallholder dairy. Introduction of new policies facilitated private sector participation through vertical integration in dairy sector. The population growth, migration of rural to urban, increasing disposal income and changing consumer pattern were increasing the demand for various dairy products in the market. New policies and increasing demand were anticipated to provide opportunities and intensification in smallholder livestock production. *Expost facto* research design was adopted for understanding opportunities and intensification in smallholder dairying.

The study found that the emerging opportunities were not strong enough to retain the youth and increasing demand for dairy products pushing the "traditional crop-dairy integrated mode of dairying" to "moderate intensive farming" with replacement of milch animal stock, feed resources, mechanization and with minimal dependence of animal power traction.

Key words: *crop dairy interactions, intensification of dairying, mixed farming, participation of youth, smallholder dairy*

Introduction

In India dairying was of mixed farming with symbiotic relationship of crop and dairying. Mixed farming has enabling spread of risks and options of flexibility in dairy/crop activities in expectation of difficulties, opportunity and needs. This was predominant across small and marginal farmers who posses 59% of total bovines of the country (Rao and Birthal 2002). It plays a predominant role in combating poverty and empowering women. Livestock sector contributes 3.9 percent of the gross domestic product (GDP). Dairying accounts 66 percent the total livestock economy. In addition increasing urbanisation, availability of disposal incomes and changing food consumption pattern has enlarged the demand for various livestock origin foods including dairy products (Sharma 2007; Kumar et al 2011) and thus an energetic growing market has emerged. The projected demand for dairy products was estimated around 160 million tonnes per annum in 2020 (Delgado et al 1999).

From 1990s on wards the livestock sector was subjected to various reforms (Jothilakshmi et al 2011). The sub-sector dairy has been opened for private market players through introduction of Milk and Milk products order 1992 (MMPO). It helped private sector entry in procurement to marketing of milk that has been earlier monopoly of dairy co-operatives. This change has attracted private sector participation and over period of last 20 years private sector has evolved through vertical integration and over taken cooperatives in procurement in 2011-12. Above indicates a paradigmatic shift in dairying in procurement processing and marketing. The private sector participation and increasing demand for dairy products were anticipated to help with improved opportunities for smallholder livestock production (Delgado et.al. 2008; World Bank, 2009; Birthal and Negi 2012). The increasing demand was expect to push up intensification in smallholder livestock (Delgado et al 2001; Wright et al 2012). In this context of private sector participation and increasing demand for dairy products, this research attempts to understand the opportunities for dairy farmers and intensification in the smallholder dairying.

Materials and methods

Expost facto research design was adopted for the present study. The causative agents namely "Private sector participation" and 'increasing demand" effects on dairy farming were studied. For understanding the emerging opportunities in smallholder dairy the "participation of youth" was studied with an assumption that if satisfying opportunities exist, youth participation shall be predominant. The intensification process was analysed through milch animal's holding pattern and crop–land-dairy animal interactions at the farm household level in response to increasing market demands.

For the above purpose Salem district of Tamilnadu State, India was selected for the study that was leading with 0.442 million litres/day in the state and strong procurement agencies with cooperatives and private. Out of the 20 blocks in Salem district, two were selected based on the intensity of dairying and spread of above milk procurement firms. A total of 70 respondents were selected randomly for this study; data were collected through pretested interview schedule and analysed with relevant statistical tools.

Results and Discussion

Participation of youth in dairy farming

To understand the emerging opportunities for smallholders the youth participation was analysed. In all the farm "households" family labour has been engaged in day to day operations. In addition to family labour 5.5 percent of farming households' had used hired labour. Among the family farm women (Table.1) engaged in dairying, majority were belonged to middle to old aged. The average age of family farm women was 42.80 years. In family farm men majority were in the old age category. The average age of farm men was 46.19 years.

Table 1. Age of the farmers involved in dairy farming

Sl.No	Age group	Women	Men
1	Young age (0-35 years)	13 (27.6)	13 (25)
2	Middle age (36-45 years)	20 (42.5)	12 (23.1)
3	Old age (above 46 years)	14 (29.8)	27 (51.9)
Total		47 (100%)	52 (100%)

The result of this study was contrasting with findings of Nisha (1996) who reported that most farmers were young. On compare with past, this study indicates ageing of family labour and poor participation of youth in dairying. The work forces in smallholder dairy households were being absorbed for non farm sector such as realty, transport, textile and other service sectors in the study area. Ageing of family labour and poor participation of youth had reflected in adoption of drudgery reduction measures with farm mechanisation using fodder (brush) cutter, chaff cutter, milking machines and micro irrigation for fodder cultivation that had poor acceptance earlier in the study area.

The result of this study was similar to the findings of Ravikumar et.al (2007) and Jothilakshmi et.al. (2013) who reported that average age of livestock farmers were 43.5 years and less than 12 percent farmers were youth respectively. In line with above Jodhka (2012) and Mkhize (2013) also observed a trend of farming becoming part-time occupation and withdrawal of youth from agriculture. From this it may be inferred that poor participation of youths were more generalised across the country that also reflects in the study area. This can be attributed to emergence of non-formal rural sector such as construction, small scale manufacturing and service sector around Salem city and migration from rural to urban industrial clusters in search of livelihoods. Thus advantage of smallholder namely "availability of family labour" that makes it competitive (MCDermott et al 2010) was losing with the poor participation of youth and ageing of family labour.

In addition the researchers asked the respondents about the participation of their sons/daughters in dairying. Around 62 percent were encouraging their children to take up dairying, but only 50 percent of the youth were showing interests. When the willingness of youth in taking up dairying as an occupation was correlated, the correlation with herd and land size were weak and not significant (Table 2).
It seems invariably across the landholding and herd size, the youth showing poor interests. Researchers also observed "values" associated with dairying as occupation in the study area in decline phase. These resulted in increased difficulties for matrimonial arrangement for youth retained in dairy/livestock farming.

Table 2. Willingness of youth in taking up smallholder dairying

Bi point serial correlation for variables	r_{bp} Value	Degrees of freedom	t - value	P value (for two tailed test)
Herd size versus willingness for dairy farming	+ 0.13	68	1.11	0.27
Land size versus willingness for dairy farming	- 0.16	68	1.35	0.18

From this it may be summed up that in smallholder dairying ageing of existing labour force and poor participation of youth were noticed. Thus it may be interpreted as the opportunities arise from entry of private and increased demands were not strong enough to promote the interest and retain youth in dairying on comparing with non farm sector. In addition after 20 years, the family labour for running day-to-day activities of smallholder dairy shall be in shortage with ageing existing labour force (Currently average age of farm women 42 and men 46 years).

Dairy animal holding pattern

To understand the picture of animal holdings, the herd size at every household was compared with year 2001 and 2011. The respondents were asked to recollect dairy holdings in 2001 and compared with 2011 holdings. It was found that decline in buffalo and cross bred (white) cattle heads in 2011 (Table 3). The results were similar to the findings of the National sample survey organisation (GOI 2006) that found that the "*milk bovine"* (those were in lactation) per 100 households have declined from 54 to 36 from 1971-72 to 2002-03. But as per the state government report the productivity of the dairy animals has increased and annual compounded growth rate for milk production was 16.81 % in the period between years of 2000 to 2010 in the study area (Government of Tamil Nadu). This may be attributed to replacement of "cross bred cows with low blood level of European breeds such as Jersey or Holstein Frisian genetic make-up" to "cross bred cows with high blood level of European breeds such as Jersey or Holstein Frisian genetic make-up" through breeding programmes.

Table 3. Average Milch animal units across the various classes of farming community

Class	Milch Heads-Average Herd Size					
	Buffalo		White Cattle		Total Dairy animals	
	2001	2011	2001	2011	2001	2011
Landless	0	0	1.88	1.66	1.88	1.66
Marginal	0.72	0.08	4.40	3.52	5.12	3.6
Small	1	0.32	4.12	3.96	5.12	4.28

Large	0.54	0.18	15.63	7.63	16.18	7.81

Local / indigenous cattle has almost become scare in the study area from 2000 onwards. Even though average farm size has declined, the increase of milk production may be attributed to stock replacement with higher yielders and adoption of improved technologies. This confirms intensification process in smallholder dairying.

Land, crop and livestock interactions

Roughages as feeding materials for dairy animals

The feeding materials of dairy animals were broadly categorised as roughages and concentrates. Roughages include grazing materials from the lands, crop residues and cultivated fodder. In the study area most of the farmers across all classes of dairying community use the available grazing resources in their localities (Table 4). Major grazing sources were road sides, bunds of cultivated fields and harvested lands in the study area.

Table 4. Sources of roughages

	Sources of non concentrates feeding materials		
Landless	8 (88.9%)	NA	NA
Marginal	23 (92%)	7 (28%)	19 (76 %)
Small	21 (84%)	8 (32 %)	21(84 %)
Large	10 (90.9%)	7 (63.6 %)	9(81.8 %)
Total	**62 (88.6%)**	**22 (36.1%)**	**49 (80.3 %)**

Utilization of crop residues as feed material varies across the classes of farmers. In landless dairy farmers, the chances of using crop residues and forage were limited because of non possession of cultivable land (Here the researchers have not accounted the usage of purchased crop residue / forage by landless dairy farmers in the study). Limited usage of crop residue (36.1 percent) in animal feeding may be attributed to negative growth rate in cultivation of Groundnut, Paddy and Sorghum during the period 1967-68 to 2007-08 (Kannan and Sujata 2011) that forms major part of crop residue in animal feeding and replacing of above food-feed crops with cash crops such as maize, black gram, green gram, coconut, fruits and vegetable has increased in Tamilnadu (Velavan and Balaji 2012) whose crop residue has limited utility in feeding. This change has become a driving element for forage cultivation and its cultivation wide spread among farmers. Utilization of various crop residues (Table 5) ranged from 4 to 20 percent with paddy and sorghum straw were in higher side. But over all utilization were fewer that may be accounted to reasons discussed earlier.

Table 5. Utilization of crop residue among landholding dairy farming community

Class	Crop residues sourced out from their own fields			
	Groundnut straw	**Paddy straw**	**Maize straw**	**Sorghum straw**
Marginal	2 (22.2 %)	3 (33.3 %)	0 (0%)	6 (66.7 %)
Small	1 (4 %)	3 (12 %)	2 (8 %)	5 (20 %)
Large	0 (0 %)	5 (45.4 %)	1 (9.09 %)	3 (27.3 %)
Total	3 (4.3 %)	11(15.7 %)	3 (4.3 %)	14 (20 %)

In case of "cultivated fodder" the respondents were asked to recollect fodder cultivation in the year 2001 in their farm and it was compared that with 2011. The cultivation of Bajra X Napier grass had tremendously increased 10 fold in number of farmers adopting cultivation (Table 6). This was followed by fodder sorghum with fivefold increase. The adoption of leguminous (Hedge Lucerne) and tree (Subabul) fodder reported to be limited.

Table 6. Fodder cultivating practices among landholders (numbers in brackets are percentages)

Class	Number farmers cultivating fodder							
	Bajra Napier		**Fodder Sorghum**		**Hedge Lucerne**		**Soobabul**	
	2001	**2011**	**2001**	**2011**	**2001**	**2011**	**2001**	**2011**
Marginal	2 (8)	16 (64)	0 (0)	4 (16)	0 (0)	2 (8)	0 (0)	0 (0)
Small	1 (4)	13 (52)	4 (16)	13 (52)	0 (0)	2 (8)	0 (0)	2 (8)
Large	0 (0)	5 (45.4)	1 (9.1)	7 (63.6)	0 (0)	1 (9.09)	0 (0)	1 (9.1)
Total	3 (4.9)	34 (55.7)	5 (8.2)	24 (39.3)	0 (0)	5 (8.2)	0 (0)	3 (4.9)

From the Table 7 it was understood that the area under cultivation of forage had increased from 2001 to 2011 and cultivation of Bajra X Napier has increased 13 folds and fodder Sorghum has increased 1.3 folds. The herd size and land holding has a positive correlation (0.518 and 0.254 respectively) with area of fodder cultivation.

Table 7. Area under fodder cultivation among landholding dairy farming community

Class	Average area under fodder cultivation (hectares)							
	Bajra Napier		**Fodder Sorghum**		**Hedge Lucerne**		**Subabul**	
	2001	**2011**	**2001**	**2011**	**2001**	**2011**	**2001**	**2011**
Marginal	0.01	0.09	0	0.01	0	0	0	0
Small	0.01	0.08	0.07	0.06	0	0.01	0	0.01
Large	0	0.15	0.07	0.16	0	0.01	0	0.01
Average area	0.01	0.08	0.04	0.05	0	0.01	0	0.01

Thus increase of herd and land size had positive influence on fodder cultivation. This increase was in line with the observation of Melkania and Shukla (2002) who reported that Tamilnadu stands second with growth rate of 5.6 percent expansion in fodder area

against national average of 1.3 percent.

In the study area more dependence on grazing sources, cultivated fodder crops and limited dependence on crop residues were noticed. In addition the researchers observed the vegetable oil cakes and rice bran were available as by product from their farm for dairy animals earlier has diminished and now purchased from markets. These findings were suggestive of that, the process of intensification in dairying with higher inputs such as fodder crops and purchased feed inputs. Advantage of feeding crop residues was, it was produced near to dairy animals in mixed farming (Wright et al 2012) is fading away in the study area.

Animal power traction and manure utilization

Among the landholding dairy farmers in the study area (Table 8) minimum farmers own draft animals. This result reflects increasing mechanisation of farming and declining trend of utilization of animal power in agriculture.

Table 8. Animal power traction and manure utilization

Class	Utilization at farm level	
	Animal draft power utilization	Manure utilization
Marginal	02 (8 %)	24 (96 %)
Small	03 (12 %)	21 (87.5 %)
Large	01(9.09 %)	9 (81.8%)
Total	06 (16.7%)	54 (88.5%)

Ray et al (1996) and Valbuena et al (2011) reported similar trend of mechanisation and decreasing utility of draft animals in agriculture. In utilization of animal manure (Table 8)
88 percent land owning dairy farmers use animal dung as manure to their land. This may be accounted to low cost, ready and easy availability. Thus an overall reduction in usage of animal as draft power and utilization of cow dung as farm yard manure still predominant among the smallholding dairy farmers.

Conclusion

- The emerging weakness in smallholder dairy such as ageing labour force (paving way for a vacuum at the production side), changing cropping pattern and increasing of external inputs from outside of farm and on the market side, increasing demand for livestock products all together weakens the relationship among crop-land-livestock. The human labour was being replaced with machineries' such as fodder cutting / harvester, milking machine, improved housing and improved irrigation procedures. And crop residues are replaced with cultivated fodder and manufactured feeds. The productivity was being enhanced through improved biological technologies such as improved breeds, fodder crops and advanced feeding technologies to meet out the demand. Thus a transition of smallholder dairy from "crop –dairy mixed farming" to "moderately intensive dairy farming" was noticed. Thus in the context of private participation and increasing demand, withdrawal of youth and transitional phase of shifting from crop-dairy mixed system to moderate intensive systems of production were noticed. In this transitional scenario the sustainability of smallholder dairying in long run needs to be watched out when in Asia, 80 percent of the total increase in livestock produce comes from industrialised style of livestock production.

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References

Birthal P S and Negi D S 2012 Livestock for higher sustainable and inclusive agricultural growth. Economic Political Weekly Supplement 47 (26 & 27):89-99.

Delgado C, Rosegrant M, Steinfeld H, Ehui S and Courbis C 1999 Livestock to 2020: the next food revolution. Food, Agriculture and the Environment Discussion paper 28. IFPRI/FAO/ILRI , Washington, DC, USA.

Delgado C, Rosegrant M, Steinfeld H, Ehui S and Courbois C 2001 Livestock to 2020: the next food revolution. Outlook Agriculture (30):27–29.

Delgado C L, Narrod C A, Tiongco M M, Barros G S D C, Catelo M A, Costales A, Mehta R, Naranong V, Poapongsakorn N, Sharma V P and Zen S D 2008 Determinants and Implications of the Growing Scale of Livestock Farms in Four Fast-Growing Developing Countries. Food, Agriculture and the Environment Discussion paper 157. IFPRI/FAO/ILRI, Washington, DC, USA.

GOI (Government of India) 2006 Livestock ownership across operational land holding classes in India, 2002-03, Report No. 493(59/18.1/1). New Delhi: National sample survey organisation, Ministry of Statistics and Programme implementation.

Government of Tamilnadu, State Planning Commission Dairy Development Schemes. http://www.spc.tn.gov.in//app_reports.html

Jodhka 2012 Agrarian changes in the times of (Neo liberal) 'crises' –Revisiting attached labour in Haryana. Economic political weekly Supplement 47(26 & 27):5-13.

Jothilakshmi M Thirunavukkarasu D and Sudeepkumar N K 2011 Structural changes in livestock service delivery System: A case study of India. Asian Journal of Agricultural Research (5):98-108. **doi:** 10.3923/ajar.2011.98.108

Jothilakshmi M Thirunavukkarasu D and Sudeepkumar N K 2013 Exit of youths and feminization of smallholder livestock production–a field study in India (Online). Renewable Agriculture and Food Systems . doi:10.1017/S174217051300001X.

Kumar A Rai D C and Khyali Ram Choudhary 2011 Prospects and opportunities for exports of dairy products from India. Indian Journal of Animal Sciences 81(2):86-91.

Kannan E and Sujata S 2011 Analysis of Trends in India's Agricultural Growth. Working Paper, 276. The Institute for Social and Economic Change, Bangalore.

McDermott J J, Staal S J, Freeman H A, Hereero M and Van de Steeg J A 2010 Sustaining intensification of smallholder livestock systems in the tropics. Livestock Science 130(1-3):95-109.

Melkania N P and Shukla G P 2002 Status of forage breeding technologies in India. Proceedings of Technology options for sustainable livestock Production in India. pp. 154-163, 18-19 January, 2001. Hyderabad.

Mkhize H P B 2013 The stunted structural transformation of the Indian economy. Agriculture, Manufacturing and the Rural Non farm sector. Economic Political Weekly 48(26 & 27):5-12.

Nisha P R 1996 Role of farm women in dairy Co-operatives. Thesis M.V.Sc, Tamilnadu Veterinary and Animal Sciences University, Chennai, India.

Parthasarasthy Rao and Birthal P S 2002 Crop-Livestock Systems in India: Research and Policy Issues. Strategic Assessments and Development pathways for Agriculture in the Semi-Arid Tropics for Agriculture in the Semi-Arid Tropics.

Ravikumar S, Reddy K V R and Sudhakar Rao B 2007 Farmers' choice for cost recovery of veterinary services in different livestock holding systems- A case study of India.Livestock Research for Rural Development. Volume 19, Article #66. Retrieved February 26, 2014, from http://www.lrrd.org/lrrd19/5/kuma19066.htm

Ray A, Chand K P and Atteri B T 1996 Nature of changes in draught animal power in India: A state wise study. Agricultural situation in India (53):621-627.

Sharma V P 2007 Globalisation and Indian Diary Sector. Dairy India 2007. Dairy India yearbook, New Delhi. 55-60.

Valbuena D, Gerard B, Duncan A, Teufel N, Homann S and Bhatia M 2011 Trade-offs of crop residue use in smallholder mixed farming systems in Sub-Saharan Africa and South Asia. Proceedings of 5th World Congress on Conservation Agriculture and 3rd Farming Systems Design Conference. 26-29 September 2011. Australia.

Velavan C and Balaji P 2012 Crop diversification in Tamilnadu-A Temporal Analysis. Agricultural Situation in India 78(12):655-658.

Wright IA Tarawali S Blummel M Gerard B Teufel N Herrero M 2012 Integrating crops and livestock in subtropical agricultural systems. Journal of the Science of Food and Agriculture 92(5): 1010-1015.

World Bank 2009 Minding the stock: Bridging public policy to bear on livestock development. Report No. 44010-GLB. World Bank, Washington D.C.

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