

FACTORS DRIVING DISCONTINUANCE OF SMALLHOLDER DAIRY FARMING - EVIDENCE FROM TAMIL NADU, INDIA

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Abstract

Research background: There is limited understanding of reasons, promoting discontinuance especially from dairying activities farming in mixed farming systems where exit happens earlier than the complete exit from agriculture,

Purpose of the article: This study explores the households and farm associated economic factors that influence the farmer's intention to 'discontinue' from the smallholder dairy sector, in the changing context of increasing demand; poor participation of youth in agriculture; urbanisation and increasing role of non-farm sector in the Indian economy.

Methods: A total of 384 dairy households representing three different crop livestock systems were selected on a proportionate basis from the existing datasets of dairy households for the research. Descriptive and binominal logit regression was used for analysis of the data.

Findings, value added & novelty: The major findings are that more than half of households have an intention to discontinue or downsize their dairying operations and almost all are demotivating next generation to take up dairying. Moreover, in households with no crop activity, using high inputs and having low level of attitude towards dairying and in areas with poor markets are likely to discontinue. In the long run inadequate income from dairying, value system and developments in non-farm sector are driving discontinuance.

Keywords: Rural livelihood, Smallholder dairying, discontinue intention, future of farming

JEL codes: R58, Q120, Q180, Q130

INTRODUCTION

Smallholder dairy is an important livelihood option for the rural poor of third world countries. This sector engages about 150 million rural households which are mostly spread out in Asian and African countries (FAO, 2010). It has been playing a substantial role in generation of employment, improving household food security, reduction of rural poverty and meeting the market demand of milk and milk products. Out of 1.4 billion estimated people living under absolute poverty, nearly 43 per cent are associated with livestock based livelihoods. Apart from being in low income countries, two-third of the smallholder livestock keepers is women. Thus, policy makers and developmental agencies have been promoting smallholder dairying as one of the pathways to move out from rural poverty and to achieve United Nation sustainable development goal; especially for reduction of poverty the dairy profession has been identified as one of the tools. This smallholder dairying contributes substantial share to global milk production. The South Asian countries contribute nearly one-fourth of global milk production and major share of recent growth in global milk production is from India, Pakistan and China (FAO, 2010). These contributions are primarily from smallholder dairy farmers of the respective countries (Siddiky, 2017). Among the above countries, Indian share alone accounts 23 per cent of the global production, providing employment to 70 to 80 million rural households (around 50 to 60 per cent of rural households) and milk is the top most contributor to the national economy. Regrettably, the people associated with livestock / dairy in these countries are mostly marginalised sections of the rural society.

Indian dairy is mostly associated with the vulnerable rural section of the society and this section owns 59 per cent of total cattle of the country (Rao and Birthal, 2008: 39-78). The dairy sub-sector is witnessing the growth rate of about six per cent per annum and currently, India's estimated milk production is about 187.75 million metric tonnes of milk per year (Government of India [GoI], 2019). This is mostly from smallholder dairying activities. Indian dairy sector accounts for more than 66 per cent of the national livestock economy. At the market end, the consumer expenditure and demand for animal origin foods has increased during 1983 to 2004 (National sample survey organisation [NSSO] 2006: 66-69). The increasing urbanisation, changing consumer pattern and increased disposable income factors have created a vast market for animal protein such as meat, milk and eggs (Birthal and Negi, 2012). Within the animal origin-

food section, dairy products hold a dominant share. The demand for dairy products has been rapidly increasing (NSSO, 2006: 66-67; Kumar *et al.*, 2011). The projected demand for dairy products for the year 2030, is more than 300 million tonnes per annum. Similar to national trends, the Tamil Nadu stands as one of the top leading milk producing state with 20.60millionlitresper day. The state possesses about10.4 million cattle and buffalo population (GoTN, 2020) distributed approximately in 2.3 million households. Further on the state government has been promoting dairying as livelihood through distribution of one milch animal for 87444 households during the period 2011-12 to 2018-19 and in the year 2019-20 it was extended to 12000 farmers.

At the same time, withdrawal of rural population from agriculture within the state and country is widely observed. In the period between 1983 and 2005, population engaged in agriculture declined from 69 to 57 per cent (Sengupta, 2009: 110). For the first time in Indian history, an absolute reduction of the population engaged in agriculture was reported (Gandhi *et al.*, 2014). Further, the total rural population has also declined from 72 to 69 per cent between the period 2000 and 2011 (MoH 2011: 5). Similar to national trends, there is steep decline in participation of rural households in agriculture in Tamil Nadu. Currently 35 per cent state rural households are engaged in agriculture and / or allied activities and 48 per cent of the population is living in urban areas. This demands understanding on reasons for exit from agriculture based livelihoods.

LITERATURE REVIEW

Globally also a significant proportion of rural households in many parts of the world are quitting and/or minimising their role in smallholder agriculture and allied sectors based livelihoods (Sharma and Bhaduri 2007; Rae, 2008; Hazell, 2011; Bernhard *et al.*, 2013; Jodhka, 2014, Khanal, 2018andAhmad *et al.*, 2020). This event of quitting from agriculture has social and economic implications. The factors that are promoting discontinuance from agriculture / crop farming in third world countries (Singh *et al.*, 2009; Mollers and Fritzch 2010; Virraet *al.* 2010) and large scale dairying in industrialised countries (Rahelizatovo and Gillespie 1999; Bragg and Dalton 2004; Stokes 2006; Ferguson and Hassan 2013) have been widely studied and articulated well within the scientific community. But factors that influence the farmers to quit smallholder dairy farming within the crop-livestock mixed farming system have not been so well examined. Very few studies attempted to understand the above phenomena. In Bangladesh, Bernhard *et al.*, (2013) made attempts to understand the exit pattern and FAO (2010) provided general observation on exit of next generation from smallholder dairying. Apart from above, few micro studies indicate that, the proportion of households owning livestock has also declined in India (Athilakshmy *et al.*, 2013 and Jodhka, 2014). Thus, limited studies; changes in rural demography; urbanisation; increasing consumer demand and withdrawal trend of farmers from farming and ever-increasing milk production made us to study and understand the current status and the future course of smallholder dairy farming as livelihood choice in Tamil Nadu state of India. Furthermore, our study makes attempt to identify factors determining discontinuance.

DATA AND METHODS

Study area

Among various states of India, Tamil Nadu state was purposely selected on account of high urbanisation as compared to other states and its milk production. Nearing half (48.40 per cent) of the population lives in urban and it is most urbanising states of India. The agriculture accounts 13 per cent of the state Gross Domestic Product (GDP) and the remaining were contributed by manufacturing and service sector. Among the rural households, more than 3.24 million households are engaged in agriculture and allied sector activities including dairy farming. The dairy animals of state are predominately part of mixed farming systems. Tamil Nadu state has three Crop Livestock systems (CLS 5.3, CLS 1.0, and CLS 15.0) as per Rao and Birthal, (2008) comprising 30 prime agriculture districts. It has cattle population of 9.52 million and buffalo population 5.2 million (GoI, 2020). The average milk yield of bovines is around 5.60 litres per day (NDDB, 2014).

Sampling Techniques and Sample size

For this research, datasets of the research titled “Transition of smallholder dairy farming in mixed crop livestock farming system of Tamil Nadu” were used, which was carried out in Veterinary College and Research Institute, Namakkal, Tamil Nadu. A total of 384 dairy households representing three CLS on a proportionate basis were selected from the 410 smallholder dairy households survey conducted in Tamil Nadu state by the first author. The purpose of the above survey was to understand the role of farming system in the future of smallholder dairy farming. In this research above said secondary data was used.

Method of Data Collection

The above said datasets were collected through interview of dairy farmers using semi structured pre-tested interview schedule. The schedule was developed in English and translated to local vernacular language for easier administration. The collected data was triangulated using participatory methods, involving farmers, representatives of animal husbandry department and local governing authorities.

Econometric Model Specification: Binominal logit regression

Binary logistic regression was used to understand the factors influencing the probability of “discontinue” and “continue” dairying. In the logistic regression, if the farmer’s response was to discontinue or down size, the farms in next five years were coded as “one” and continue smallholder dairy farming with or without expansion as “zero”. The logit model is as follows:

$$\text{Discontinue intention} = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots + \beta_n x_n \text{-----Equation (1)}$$

$x_1, x_2, x_3, \dots, x_n$ represent independent variables

β_0 = constant

β_1, β_2 logistic regression coefficients (estimates)

Discontinue intention = 0, (discontinue \leq 0)

Discontinue intention = 1, (discontinue $>$ 0)

Bi-variate correlation between explanatory variables was estimated and variables having high correlation were identified. Highly correlated variables namely family income and non-farm income were excluded from the logistic regression analysis.

RESULTS AND DISCUSSION

Status quo of smallholder dairy farmers in Tamil Nadu

On average, a smallholder dairy farmer’s household owns 2.81 acres (113.71 ares) of land (Table 1). These households spent about 21 per cent of the available man-days in households outside the origin place (migrated out). These dairy farming households, on an average, had an annual income of INR. 230,380 (INR-Indian National Rupees. 1USD = approximately 75INR). Furthermore, 48 per cent of households had regular incomes from own petty business and / or regular wage works by engaging in non-farm sector. More than half (51.11 per cent of family income) of household income (an average of INR 117,800 per annum) was from non-farm sector. About two-third of the households were lower to middle rural class of the rural society. These households were located 13.86 km away from the nearest town. Nearly 70 per cent of the households had crop farming in addition to dairying.

Table 1 Definition and descriptive statistics of Household and Farm characteristics

Variables	Definition	Mean	Expected effect
Household characteristics			
Land	Actual number of acres of land owned by the farmers	2.81 (113.71 ares)	+/-
Migration intensity	Percentage of man-days migrant(s) staying outside the origin place	21.00	+/-
Status of income from non-farm	Household has at least one member working as wage worker or owns a business in non-farm sector and earns regular income 1; otherwise 0	0.48	+/-
Non-farm income	Refers to total non-farm income of the family (in INR)	117800	+
Family income	Total income of the family (in INR)	230380	+
Rural class	Lower 1; Lower middle 2; middle 3; upper middle 4; upper 5. (1 to 5 refers to weightage to rural class value)	2.98	+/-
Town distance	Distance from household to nearest town	13.63	+/-
Crop cultivation	Status of crop farming (No- 0 and Yes-1)	0.30	+/-
Farm characteristics			
Gender role	Predominantly women 1; otherwise 0	0.84	+/-
Experience	Total years of farmer’s experience in dairy farming	28.98	+/-
Involvement of old age group	Predominantly old aged people are engaged in dairying 1; otherwise 0	0.30	+/-
Attitude towards dairying	Farmer’s tendency to perceive, feel, behave or act towards dairy farming. Measured using scale developed by Kokate (1984). Maximum score was 16 (high degree of positive feelings towards dairying) and minimum score was 0 (referred high degree of negative feelings).	9.37	-
Input system for dairying	Relatively Low input system = 1; Moderate input system= 2 high input system=3 (1 to 3 refers to weightage to input system)	0.92	+/-
Fodder area	Area under fodder in cents	40 (16.2 ares)	+/-
Access to animal health services	1- Low; 2-Moderate; 3-High (1 to 3 refers to weightage given to level of access to animal health services)	1.73	-

Sale price of milk	Average price received for sale of one litre of milk in INR	21.94	-
Milk marketing opportunities	No marketing opportunity 0; only informal 1; co-operative sector / organised private dairies 2; Co-operative sector and organised private dairies 3. (0 to 3 refers to weightage given to marketing opportunities)	1.63	-
BC ratio	Benefit cost ratio of farms	1.58	-
Share of dairy income	Share of dairy income to total family income	24.08	+/-

The labour requirement for dairying activities was mostly met out through family members and on rare occasions through hired labour force. Household women played a predominant role in two-third (66.50 per cent) of the households in dairying related activities. At the same time, 30 per cent of the dairy farms were predominantly operated by old aged (above 46 years of age) and in these households' meagre participation of other age groups noticed. Added to above, one-fourth of the households had youth (less than 35 years of age) engaged in dairying with or without other age groups. The average age of the persons engaged in dairying was 46 years. Moreover, the farmers had an attitude score of 9.37 towards dairying (maximum possible score 16 refers to a high degree of positive feelings towards dairying and minimum possible score is 0 which refers to a high degree of negative feelings towards dairy profession).

More than one-fourth (26.82 per cent) of the households reared dairy animals in relatively high input system (animals are mostly stall fed with available feed resources having opportunity cost and / or also used commercial compounded feed). About 37 per cent households raised the animals through extensively grazing (Low input system) and remaining were under moderate input system. Added to the above, more than two fifth (42.70 per cent) of the households cultivated fodder and the average area under fodder were 40 cents (16.2 ares) of land among the surveyed households. Nearly two-third (63 per cent) of the farmers had moderate access to animal health services (subsidised services from public sector) in their locality. Similarly, 64 per cent of farmers had access to dispose the surplus milk to organised dairy processing industries (dairy co-operatives and private organised dairies). About 29 per cent of the farmers were disposing their surplus milk through informal marketing system (refers to a small business man who procures 100 to 200 litres per day and transports through motor bikes / cycles and either sell it directly to consumers or processing industries). Remaining farmers (about seven per cent) have limited marketing opportunity. The farmers received an average price of INR 21.94 per litre of milk. These farmers on an average, had benefit cost ratio 1:1.58 (excluding family labour cost) from dairying activities through sale of milk or milk products, manure and calves. The dairying contributed nearly one fourth (24.08 per cent) to total family income.

Discontinue intention of farmers and perceived trends of dairying

The study found that more than half (54.95 per cent) of the farmers are likely to discontinue or downsize the farm in the next five years and 45.05 per cent remainder are likely to continue the farming with or without expansion. Further, 94.30 per cent of the respondents were not willing to motivate the next generation for taking dairying as a profession. The researchers also collected the reasons for not willing to motivate next generation in dairying. Results from table 2 show that, insufficient income from dairying, poor respect to dairying profession in the society (Value system associated with dairying profession among the rural community) and the drudgery involved are the main reasons within the dairy farming sector that are pushing out the farmers from dairying. Employment of the next generation in the non-farm sector, future opportunities in non-farm sector and marriage associated migration of younger age women are the main reasons, which are pulling out the farmers' form dairying profession.

Table 2 Reasons for not willing to motivate next generation in dairying

Reasons for not willing to motivate next generation	Number of farmers (per cent)	n=362
Push factors		
Inadequate income from dairying	348 (90.63)	
Poor respect for dairy farmers among peer group / community	274 (71.35)	
Drudgery associated with smallholder dairying	109(28.39)	
Pull factors		
Next generation that is already employed in non-farm sector	150(39.06)	
Opportunity for job in non-farm sector	218(56.77)	
Migration of next generation due to marriage	13(3.39)	

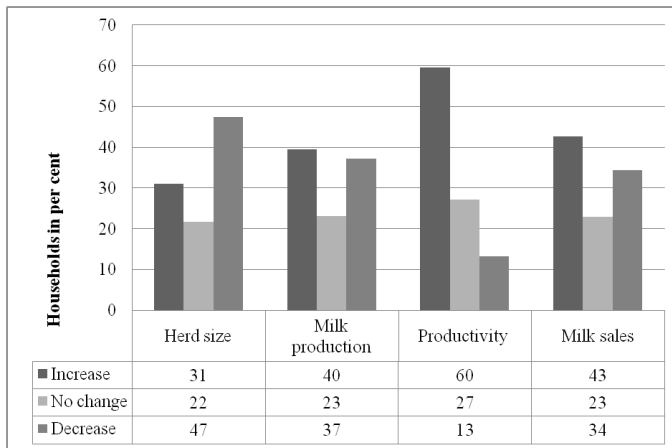


Figure 1 Perception of Trends on smallholder dairy household at household’s level in last 10 years (per cent of households)

Added to above, about nearly half (47 per cent) of the farmers reported that there has been a reduction of herd size in their farm in the last 10 years (Figure 1.), while 60 per cent of the farmers reported an increase in milk productivity of animals in the last ten years. In last one decade, two-fifth of farmer’s perceived increase in milk production in their farms, while 37 per cent of the farmers perceived the opposite.

Factors underlying the discontinue intention

The results of logistic regression are presented in table 3. The logistic estimates reveal that there was highly significant negative relationship between explanatory variables, namely the attitude towards dairying and the milk marketing opportunity with the dependent variable discontinue intention. This implies that increase in attitude towards dairying decrease the probability of discontinue from dairying in next five years. Similarly, if the milk marketing opportunity for the milk increases, then the farmers are likely to discontinue the farming decreases. Access to animal health services has a significant negative relationship with discontinue intention. Furthermore, the farmers with crop income are more likely to have less discontinuance intention from dairying. At the same time, as dairying moves from low to high inputs (example -usage of commercial feed) the discontinue intention increases, and assured income through monthly salary /own business had positive relationship at 10 per cent level of significance with discontinue intention.

Table 3 Estimated coefficients of logistic regression

(n=384)

S.No	Explanatory variables	Estimated coefficient	Standard error
1	Land	1.05	0.06
2	Migration intensity	0.41	0.75
3	Non-farm regular income (as wages or business)	1.71 [#]	0.33
4	Rural class	0.87	0.11
5	Town distance	1.02	0.01
6	Crop cultivation	0.60 [#]	0.30
7	Gender role	0.62	0.32
8	Experience	1.01	0.01
9	Involvement of old age group	0.72	0.28
10	Attitude towards dairy farming	0.86 ^{**}	0.04
11	Input system	1.65 ^{**}	0.19
12	Fodder area	1.00	0.00
13	Access to animal health services	0.63 [*]	0.23
14	Sale price of milk	0.98	0.02
15	Milk marketing opportunities	0.68 ^{**}	0.15
16	BC ratio	0.81	0.19
17	Share of dairy income	1.01	0.01
	Constant	18.08	0.91
Pseudo R²=0.22		Loglikelihood=459.976	

** Significant at 1 per cent level *-Significant at 5 per cent level #-Significant at 10 per cent level

The majority of the households had intention to discontinue or downsize the farm in next five years and nearly 47 per cent of them have reduced their herd size in last one decade. The findings are similar to the recent past micro studies where quitting from farming has been documented. Athilakshmy *et al.*, (2013) observed that about 20 per cent of the farmers had quit cattle rearing during the period 2005 and 2010. Likewise, Jodhka (2014) found that during the period 1988-89 to 2008-09 the number of rural households owning cattle declined from 90 to 58 per cent. Similar discontinue pattern from smallholder agriculture activities was noticed profoundly in third world countries (Headey *et al.*, 2010; Akter, 2011; Bernhard *et al.*, 2013 and Ali, 2018). Discontinuance of farmers and decline in absolute number of farms was also reported in industrialised dairy farming countries (Rahelizatovo and Gillespie 1999; Bragg and Dalton 2004; Stokes, 2006 and Ferguson and Hanson 2013).

At the same time, there is a 6.2 per cent annual growth rate of milk production in India and milk production has increased from 146.31 Million Metric Tonnes (MMT) to 209.96 MMT during the period 2014-15 to 2020-21 (GoI, 2022: 277). This may be attributed to replacing of indigenous cattle with high producing exotic/crossbreed animals (GoI 2015: 13 and 17). Specifically, during the period 1992 to 2012 the exotic/crossbreed cattle population has increased from 7 to 21 per cent and the absolute number has increased from 15 million to 40 million resulting in six per cent annual growth rate of milk. Moreover, an eight per cent decline of indigenous cattle population observed from the years 1992 to 2012. Hence, at the national level, an increase in the production of milk is also driven by an increase in productivity of animals rather than an increase in number of households engaged in dairying. During the period 1982 to 2012, the productivity of cattle increased from 1.9 to 3.9 kg/day and in buffalo productivity increased from 3.7 to 6.2 kg/ day. Further on per animal productivity increased from 1428 Kgs to 1777 Kgs per year from the period 2017-18 to 2019-20 (GoI, 2021). This is in concurrence with the perception of farmers on productivity in last one decade of this study. Thus, urbanisation and increasing consumer demand is driving intensification within the smallholder production system through technologies (Bitew *et al.*, 2013; Swain and Teufel 2013), resulting in continuous growth rate in milk production. So, an increase in milk production has occurred through the enhancement of productivity rather than through increase in households undertaking the dairying profession. On similar lines, Rahelizatovo and Gillespie (1999) and Bragg and Dalton (2004) reported decline in farm numbers and increased production in the industrialised context of dairying activities.

Similar to the past research (Borkaret *et al.* 2001; Rao and Birthal 2002; Chauhan *et al.*, 2006; Birthal and Negi 2012), this study found that smallholder dairy farmers have poor land resources who own about 58 per cent of the cattle population of India. Furthermore, parallel to the past studies (Reddy, 1999 and Lal *et al.*, 2002), the data indicated that majority of the households' women played major role in dairying. But, at the same time researcher observed that dairying is mostly an occupation of middle and old aged people and only in one-fourth of the households' youth participated in some dairying activities. This finding contradicts the past findings of Nisha (1996) and Devaki (1999). They found that majority of the farmers fell in the young age group (less than 35 years old). Furthermore, the findings of this study were also close to recent observations of researchers Ramkumar *et al.*, (2004), Rao *et al.*, (2007) and Thombre *et al.*, (2012). This study observed that the average age of farmers is 46 years. Thus, the existing farmers may continue dairying for next 10 to 15 years. Similar trend was also noticed in industrialised farming situation of United States during the 1980s and 1990s (Gale, 2002). The experience in dairying was calculated from the year of entry in dairying till the survey year. Three farmers (0.8 per cent) had a year of experience. This means that, prior to the year of survey; only three farmers had taken up dairying and gained an experience of one year. In the periods, prior to year 1970, 1971-1980, 1981-1990, 1991-2000, 2001-2010 and from 2011 onwards the percentage of farmers who took up dairying as profession are 16.20, 16.10, 24.70, 16.70, 14.80 and 11.5 per cent respectively. This indicates that in last three decades, there was a limited entry of newer farmers to the dairying profession. Further this study found that the farms with crop activity tend to continue dairying. Those farmers who had the opportunity to cultivate crop particularly food-feed crops ensured availability of crop residue feed material for animal feeding, making dairying to less depend upon external inputs.

In dairying, the feed is a major recurring cost and it accounts for 60 to 70 per cent of milk production cost. The households which are meeting out feed requirements from grazing resources (Low input system- extensive system of rearing) and crop residues are likely to continue dairying rather than the households that primarily depend on commercial feeds. Data revealed that the farmers under extensive system of rearing primarily grazed the animals on road side, bunds of cultivated field, fallow lands, common lands and used crop residues (minimal input system). Further, access to animal health services, minimises the loss from dairying and promotes continuation of dairy farming. Added on, opting commercial feeds likely to increase the cost of production and promotes discontinue intention. Thus dairy farmers with primarily low cost inputs (grazing and access to subsidised health services) and meeting shortage of feed occasionally (during drought or natural calamities) from other sources are expected to continue farming. But these farms with low input have advantages till the agriculture becomes intensive in transactions beyond the farming gate and the regional economy transforms with use of capital intensive technologies and hired labour (Hazell *et al.*, 2010).

Added to above, marketing opportunities for milk play a crucial role in discontinuing of farmers. Limited marketing avenues promote discontinue intention. About one-third of the farms, in their operational areas do not have any formal milk processing industries (Dairy co-operative and private processing industries). The Indian government facilitated the private dairy processing industries through legal regulation in 1992 and subsequent amendments. Thus, in general

marketing opportunities for milk have increased, but still the private industries have not yet spread out to less privileged areas of the country. From the observation of author, the private industries invest and prefer to operate where the dairy co-operatives have invested and have well established milk production eco-system. The co-operatives and the private dairies put together, handle 20 to 30 per cent in India and in the study area around 40 per cent, leaving the remaining milk in informal sector. Thus, dairy industry is in a transition phase from informal to formal sector.

The contribution of dairying to the household income has also increased compared to the past. This study found that there is more than one-fifth contribution from dairying to household income now as opposed to the four per cent contribution by livestock sector in 2002-03 and 12 per cent in 2012-13 (NSSO, 2014: 23). This might be due to enhanced productivity of animals and increasing market opportunities at the village level in the post liberalisation era. Added to above, NSSO (2006: 66-67) data suggests increased expenditure and also demand for milk and milk products. This may be due to increasing urbanisation and changing consumption pattern towards animal origin foods. All this has resulted in increased market demand and is reflected as an increased share of contribution to family income. But the share of dairying to family income has no influence on the discontinue intention. Similarly, the sale price of milk and benefit cost ratio also does not affect discontinue intention. This may be due to varying motives for rearing dairy animals. Only 44 per cent of farmers in the study area were rearing dairy animals primarily for additional income; while 33 per cent were for home consumption and remaining were rearing for other reasons.

At the same time, feelings (attitude towards dairying) associated with dairying have a highly significant negative relationship with discontinue intention. Low level of attitude promotes discontinue from dairying. Furthermore, the farmers reported value system associated with dairying as the reason for demotivating next generation. On similar lines Agarwal and Agarwal (2017) reported the social status associated with farming as one of the reasons for disliking farming. In industrialised dairy farming too, the value system towards dairying plays a determinant role in continuance of dairy farming (Ferguson and Hanson, 2013). The dairying is also not in a position to meet out the newer aspirations of the rural society. Researcher found that about three-fifth (59 per cent) of the households perceived dairying as a pathway to move out from poverty and only two-fifth (41 per cent) perceived it as an ideal instrument for socio-economic improvement. The researchers observed that youngsters associated with dairying are discriminated among the peer group and find difficulty in getting a life partner with in caste and even in some cases it leads to breakage of feudal norms in marriage.

Among dairying households, this study found that nearly two-third (58.60 per cent) of the families migrated out, with more than 21 per cent of the available man days of the families being spent in migrated areas. This finding is in concurrence with the observations of Deshingkar (2010) and Sato (2011) who reported similar trends of migration in the rural households of India. Even though the dairy farmers are with similar limited land holdings, as in the past, there are changes in the composition of household income. In this study, more than half (51 per cent) of the family income was contributed by non-farm sector. National Sample Survey Office NSSO:(2014) reported similar observation in the study area. In the year 2009, other than crop and livestock farming activities on an average contributed 32.1 per cent (Kumar *et al.*, 2011) and NSSO (2014: 21) reported a 40 per cent contribution to the family income in India. This indicates the growing importance of rural non-farm sector in India as well as in Tamil Nadu. Major sources of non-farm income in the study area were in construction, transport, retailing, textile and other sectors in the form of daily wages or income from petty business and in some cases in the form of monthly wages. Informal non-farm sector has been in the forefront in absorption of the labour force and promoting migration (Jahanmohan *et al.*, 2013) from the rural households. Thus, majority of rural section ends up with low paid wages of unorganised/informal sector or petty business where continuous employment and income is also a question mark (World Bank, 2010; Binswanger 2013). Even though there is inconsistency in non-farm sector employment and income, these income sources (from informal non-farm sector) had a (Table 3) positive influence on discontinue intention. Thus opportunities/employment in the non-farm sector and insufficient income from dairying were the reasons for demotivating the next generation to participate in dairying. Agarwal and Agarwal (2017) reported that non-farm income and non- profitability of agriculture are the reasons for disliking farming. Thus dairying households capitalise the current opportunities in non-farm sector and also foresee non-farm sector as a tool for income generation and as a ladder to move up social status.

Thus, farmers use non-farm income for stabilising the farming activity and continue dairying as safety net till the casual nature (informal) and low salary of non-farm sector ceases. This finding is in concurrence with the observations of Kimhi & Bollman (1999) and Goetz and Dermertin (2000). Thus, dairy farming families with income sources from informal non-farm is likely to continue till their next generation stabilises their livelihood in non-farm sector. In the long run when actively engaged person in dairying gets retired and non-farm sources stabilises then discontinue is likely to be more predominant. In addition to the above reasons, certain households may continue dairying with prime motive to meet out their household demand of milk rather than the market demands. In these cases, when options to access milk and milk products in the rural market improve, then chances of continuing smallholder milk production may decline.

In short term, the households which are having relatively high input dairying activity but with low level of attitude towards dairying, operating in poor marketing opportunity areas and having income from non-farm sector are likely to discontinue from dairying. While in the long run, inadequate income from dairying, value system associated with dairying and developments in the non-farm sector are limiting the entry of next generation. Thus, the factors that are responsible for discontinue from smallholder dairying in crop-livestock mixed farming are similar to the documented factors that are responsible for discontinue from agriculture and / or industrialised dairy farming except market opportunities. As per the observations of Hazell *et al.*, (2010), when selling shifts from farm gate and transactions

intensify beyond the farm gate then small farms have less advantage. But in this study the marketing opportunity is a determinant for continuing dairying in short term. This may be due to transition nature of the Indian economy. Currently the emerging limitations in production side on account of discontinue and increasing market demand is addressed through increasing productivity of animals within the smallholder production system. On long run on account of economic transformation and increasing demand of food commodities, the smallholder farmer's role will reduce and drive consolidation of farms (Hazell *et al.*, 2010). In future (after 10 to 15 years – when existing farmers reach 60 years of age from 45 to 50 years of age) smallholder dairying may not be a sole player in milk production. The emerging vacuum on the production side of the dairy value chain may be addressed by emerging specialised medium¹ and larger dairy farms (Shah and Dave, 2010) or through import from surplus countries².

CONCLUSION

With the limitations of geographical spread of the study, the authors conclude that external factors outside the dairy sector such as developments in non-farm sector, changing values in rural people and internal factors associated with dairying such as varying levels of market opportunities, feelings associated with dairying as occupation, insufficient income are driving the discontinue intention of farmers from dairying. Thus, smallholder dairy farmers under discontinue phase from production are increasing while alternative arrangements to meet the demand for milk are also emerging.

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