Adoption Behavior of Dairy Innovations by Small Farmers under Different Farming Systems in Assam

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ABSTRACT

Dairy farming is one of the important enterprises in India which supports agricultural development by providing gainful employment and steady income to the rural households. It has a symbiotic relation with the crop farming in terms of its providing draught power to agricultural operation and manures. The present study on adoption behaviour of small farmers in dairy innovation was conducted in Sonitpur district of Assam. A sample size of 45 small farmer respondents was selected from each of the three selected farming systems by using proportionate random sampling technique. The study showed that small farmers normally had low to medium levels of adoption of dairy farming practices in selected farming system i.e., 84.44 per cent in FS_1 and 82.22 per cent in FS_2 and FS_3, respectively. The study further indicated that except age, most of the variables under study such as education, extension contact, annual income, operational land holding, innovation proneness and decision making ability of the respondents had positively significant relationship with their extent of adoption of improved dairy farming practices under the selected farming systems.

Key words: *Farming system; Adoption behaviour; Innovation; Dairy;*

The country today could emerge as the largest producer of milk in the world with 92 million tonnes during 2003-2004 as compared to only 17 million tonnes during 1950-51 (*Mehta, 2004*). The increased production has also brought about a social change in the rural sector, which put reasonable earnings in the hands of the poorest of the families owning one or two cattle only. Since decades research workers are trying hard to develop continuous stream of dairy innovations, which are field tested and recommended for adoption by dairy farmers to make the enterprise more remunerative and profitable (*Sah and Chand, 2002*). Benefits of these innovations are derived only when the farmers in their local situations efficiently adopt it. However, past studies recognized that farmers do not normally adopt the entire package of practices recommended for a particular enterprise due to several factors arising out of the prevailing conditions like relative advantages of the innovation, both situational as well as cultural compatibility, complexity in nature of the practice as well as socio-economic and psychological characteristics of the farmers etc. While reviewing the

adoption research, *Loganandhan and Singh (2003)* reported that adoption behavior of farmers is influenced by their socio-economic characteristics such as education, land holding, social participation and communication skills etc. in organic farming practices. So, it is imperative to identify those driving factors which could help us in predicting their behaviour and future action. The study has been undertaken to study the extent of adoption of dairy innovations by small farmers under different farming systems and to determine the relationship and contributory influence of selected socio-economic and psychological characteristics of the respondents with and on their extent of adoption of dairy innovations under different farming systems.

METHODOLOGY

The present study was conducted in Sonitpur District of Assam which consists of 3 Agricultural Sub –Divisions. A total of 135 small farmer respondents (1-2ha) with 45 from each sub- division (15 respondents from each of 9 selected villages) were selected by using proportionate random sampling technique. In the present

study, 3 out of 25 identified farming systems were selected as the most common and important farming systems which the farmers mostly used to adopt in their farming situations in combination with paddy as primary sources of income in the study area and were considered for the present study in relation to extent of adoption of recommended practices of dairy farming. These three Farming Systems (FSs) were respectively

Paddy + Vegetable+ Dairy + Fishery (FS_1),

Paddy + Vegetable + Dairy + Poultry (FS_2)

Paddy+Dairy+Fishery+Poultry (FS_3).

Respondents in the present study were those small farmers who had been practicing either one of the selected three farming systems. Data collection from the selected respondents was made with the help of personal interview method by using pre-tested structured schedule.

Extent of adoption of recommended practices of dairy farming by the small farmers was studied by developing a test schedule. Weightage of the practices was decided by the judge's rating. Extent of adoption was measured as "Full adoption", "Partial adoption" and "No adoption" with scores as 2, 1 and 0, respectively. Final adoption scores of the respondents were attained by multiplying the weightage of a practice with the corresponding extent of adoption scores. On the basis of scores obtained, the respondents were classified into 3 categories by following the procedure as adopted by *Dasgupta (1989)*.

The study took into account 10 socio-economic and psychological variables. These were age, education, extension contact, annual income, operational land holding, economic motivation, innovation proneness, risk orientation, decision making ability and attitude towards farm diversification. Socio-Economic Status Scale-Rural (*Trivedi and Pareek, 1964*) was used to measure education. Chronological age of respondents was taken into account for age and for extension contact, annual income and operational land holding, respective schedules were developed.

Measurement scales developed by *Singha (1991)* were used for economic motivation, risk orientation and decision making ability with slight modification. Innovation proneness was tested by using Innovation Proneness Scale developed by *Moulik and Rao (1965)* while the variable- attitude towards farm diversification was measured with the help of the scale developed by *Anand Kumar et.al. (1997).*

RESULTS AND DISCUSSION

The distribution of respondents according to extent of adoption of dairy farming innovations under different farming systems is shown in Table 1.

The data presented in the table reveal that majority (46.66%) of the small farmer respondents had medium level of adoption of improved dairy farming practices. This was followed by low (37.78%) and high (15.56%) level in case of FS_1. As regards FS_2, it was also found that majority (46.66%) of the respondents was seen in medium level and respondents with 35.56 per cent and 17.78 per cent were found to have low and high extent of adoption respectively. Similar findings had also been reported in FS3 with percentage distribution of 51.11 per cent, 31.11 per cent and 17.78 per cent respondents were respectively found in medium, low and high extent of adoption of improved dairy farming practices. The adoption level of recommended practices by the small farmers related to dairy farming was found higher in case of FS_1, FS_2 as revealed by their corresponding mean values of 39.99 and 39.25 than that of FS_3 (35.58).

Table 1. Distribution of respondents according to their extent of adoption of Dairy farming practices under different farming systems

FS_1					N_1=45
Category	Score range	No.	%	Mean	S.D
Low	27-33	17	37.78	39.99	6.41
Medium	34-46	21	46.66		
High	47-53	7	15.56		
Total		45	100.00		
FS_2					N_2=45
Low	28-33	16	35.56	39.25	6.06
Medium	34-45	21	46.66		
High	46-53	8	17.78		
Total		45	100.00		
FS_3					N_3=45
Low	26-31	14	31.11	35.58	4.45
Medium	32-40	23	51.11		
High	41-44	8	17.78		
Total		45	100.00		

χ^2= 84.47** (at 0.01 level of probability)

Practice-wise distribution of respondents in different response categories according to adoption of improved dairy farming practices under different farming systems is shown in Table 2.

Breeding practice : It was seen from the table that respondents in general, had adopted the various breeding

Table 2. Frequency and percentage distribution of respondents according to their practice wise extent of adoption of dairy farming under different farming systems

Practice	Distribution of respondents											
	FS_1 (N_1=45)				FS_2 (N_2=45)				FS_3 (N_3=45)			
	FA	PA	NA	TA	FA	PA	NA	TA	FA	PA	NA	TA
Breeding	3	42	0	45	0	40	5	40	0	30	6	39
practice	(6.67)	(93.33)	(0.00)	(100.0)	(0.00)	(88.89)	(11.11)	(40.89)	(0.00)	(86.67)	(13.33)	(86.67)
Feeding	4	41	0	45	3	39	3	42	4)	41	0	45
	(8.89)	(91.11)	(0.00)	(100.0)	(6.67)	(86.67)	(6.67)	(93.33)	(8.89)	(91.11)	(0.00)	(100.0)
Management	0	41	4	41	2	41	2	43	0	36	9	36
	(0.00)	(91.11)	(8.89)	(91.11)	(4.44)	(91.11)	(4.44)	(95.56)	(0.00)	(80.00)	(20.00)	(80.00)
Health care	5	22	18	27	4	23	18	27	5	19	21	24
	(11.11)	(48.89)	(40.00)	(60.00)	(8.89)	(51.11)	(40.00)	(60.00)	(11.11)	(42.22)	(46.67)	(53.33)

(Figures in parentheses indicate percentage)

FA= Full Adoption,   PA= Partial Adoption,   NA= No Adoption,   TA= Total Adoption

practices of dairy farming which included selection of breeds, level of exotic inheritance, selection of bulls, culling of animals and management of dry and pregnant animals in all three farming systems the recommendations not withstanding as reported by 100.00 per cent, 88.89 per cent and 86.67 per cent respondents in FS_1, FS_2 and FS_3 respectively. Category wise, it was seen that none of the respondents were found to have full adoption of the recommendations of breeding Practices in case of FS_2 and FS_3 and only 6.67 per cent respondents in FS_1 were found to have full adoption of the recommendations of breeding practices in dairy farming. Others were observed partial adoption of the recommendations under the practice.

Feeding : As regard feeding practice of dairy farming, almost every respondent had followed the recommendations in partial in all farming systems. The feeding practices consisted of nature of feeding, feeds and fodder. Response category wise, it was seen that out of the total adopters, 91.11 per cent and 8.89 per cent in FS_3 partially and fully adopted the recommendations with respect to feeding of dairy animals.

Management : Regarding management practices of dairy farming, such as housing of animals, floor space, water, drainage facilities and ventilation, farmers normally could maintain them, which can be observed from their total adoption figures of 91.11 per cent, 95.56 per cent and 80.00 per cent in FS_1 FS_2 and FS_3, respectively. However, it is indicated that none of the respondents were found to adopt the full

recommendations of management practices of dairy farming in case of FS_1 and FS_3 and only 4.44% respondents could manage to adopt the full under FS_2 and remaining others had reported only partial adoption.

Health care: Over half of the small farmer respondents from each farming system had adopted the health care practices of dairy farming such as vaccination, deworming, grooming etc. The per centage distribution of which were successively 60.00 per cent, 60.00 per cent and 53.33 per cent, respectively. Of these, 11.11 per cent, 8.89 per cent and 11.11 per cent in FS_1 FS_2 and FS_3 respectively were found in full adoption. A close look at the table also indicates that in FS_1 and FS_2 40.00 per cent each and nearly half (46.67 per cent) of the respondents in FS_3 had not adopted at all the health care practices of dairy farming.

The results in brief indicated that small farmers, by and large, had adopted the recommended practices of dairy farming. However, in view of the complexity involved in the practices in terms of knowledge and skills coupled with poor economic conditions, they hardly could follow those practices with full recommendations.

Relationship of socio-economic and psychological characteristics of the respondents with their extent of adoption of dairy farming practices under different farming systems was presented in Table 3.

Table 3 showed that out of 10 independent variables under the study, five variables namely; education, extension contact, annual income, operational land holding of the farmers and innovation proneness were found significantly correlated with their extent of

Table 3. Simple correlation analysis of socio-economic and psychological characteristics of the respondents with their extent of adoption of dairy farming practices under different farming systems.

Independent variables	FS$_1$		FS$_2$		FS$_3$	
	'r' value	't' value	'r' value	't' value	'r' value	't' value
Age	0.215	1.379	0.286	1.797	-0.266	-1.682
Education	0.333	2.059*	0.326	2.021*	0.424	2.518*
Extension contact	0.333	2.059*	0.391	2.360*	0.347	2.134*
Annual income	0.361	2.208*	0.400	2.404*	0.384	2.325*
Operational land holding	0.393	2.370*	0.337	2.081*	0.371	2.259*
Economic motivation	0.370	2.254*	0.455*	2.655*	0.134	0.869
Innovation proneness	0.388	2.345*	0.366	2.233*	0.377	2.290*
Risk Orientation	-0.339	2.091*	0.413	2.466*	0.131	0.205
Decision making ability	0.313	1.947	0.330	2.043*	0.326	2.021*
Attitude towards farm diversification	-0.165	-1.067	0.284	1.786	0.410	2.452*

* Significant at 0.05 level of probability   ** Significant at 0.01 level of probability

adoption of dairy farming practices in all their three selected farming systems. Economic motivation and risk orientation were the two psychological characteristics which were found significantly correlated with the dependent variable of extent of adoption in FS$_1$ and FS$_2$ while the variable, decision making ability of the respondents was found significantly related with their extent of adoption of dairy farming practices in both FS$_1$ and FS$_2$. This indicated that higher the level of those characteristics such as education, extension contact, annual income, operational land holding and innovation proneness of the respondents more would be their level of adoption of dairy farming practices under the three

selected farming systems. While the characteristics like economic motivation and risk orientation in case of FS$_1$ and FS$_2$ and decision making ability in case of FS$_2$ and FS$_3$ could play significant role in the adoption level of dairy farming practices by the small farmers.

Multiple regression analysis of selected independent variables with their extent of adoption of dairy farming practices under different farming systems is given in Table 4. The multiple regression analysis was employed to determine the relative influence of each independent variable in explaining the variation in the dependent variable. Ten independent variables, namely; age, education, extension contact, annual income, operational

Table 4. Multiple regression analysis of selected independent variables of the respondents with their extent of adoption of dairy farming practices under different farming systems.

Independent variables	FS$_1$		FS$_2$		FS$_3$	
	'b' value	't' value	'b' value	'b' value	'r' value	'b' value
Age	0.865	1.703	0.763	1.029	1.135	1.214
Education	2.845	2.246*	3.627	2.495*	3.203	2.641*
Extension contact	3.779	2.308*	3.051	2.304*	2.930	2.473*
Annual income	4.008	3.229**	3.333	2.159*	2.506	2.204*
Operational land holding	5.932	3.497**	5.127	3.260**	3.042	2.881*
Economic motivation	4.476	3.043**	3.405	2.181*	0.154	0.707
Innovation proneness	3.507	2.149*	3.190	2.040*	3.177	2.893*
Risk Orientation	3.518	2.819*	2.313	2.359*	0.195	0.753
Decision making ability	0.939	1.501	2.529	2.573*	3.569	2.930
Attitude towards farm diversification	0.731	1.227	0.095	0.371	2.983	2.967*
R^2 (with 10 independent variables)	0.602		0.593		0.596	
'F' value	2.930**		2.852*		2.876*	

* Significant at 0.05 level of probability   ** Significant at 0.01 level of probability

land holding, economic motivation, innovation proneness, risk orientation, decision making ability and attitude towards farm diversification were included for the purpose of this study.

A perusal of the Table 4 revealed that five out of ten selected independent variables viz., education, extension contact, annual income, operational land holding and innovation proneness of the farmers had significant influence on extent of adoption of dairy farming practices in all farming systems as shown by their significant 't' values. Other significant variables such as economic motivation and risk orientation in both FS_1 and FS_2, and decision making ability and attitude towards farm diversification in FS_3 had also significant contribution towards extent adoption of the selected dairy farming practices by the small farmers. It can also be mentioned that other variables had also significant influence on extent of adoption under different farming systems as indicated by their significant "F" values (F=2.930** in FS_1, F=2.852* in FS_2 and F=2.876** in FS_3).

The coefficient of determination (R^2) with 10 independent variables were found to be 0.602, 0.593 and 0.596, respectively for FS_1, FS_2 and FS_3, which implies that all the ten independent variables fitted together in the regression model could explain about 60.20 per cent, 59.30 per cent and 59.60 per cent of the total variations in the extent of adoption of dairy farming practices in FS_1, FS_2 and FS_3, respectively.

CONCLUSION

The findings revealed poor level of adoption of improved dairy practices in the study area. Farmers in general, used to adopt recommended practices in partial with wide technological gap especially in those complex practices in nature. The dairy development agencies should try to convince the farmers about the potentiality and advantages of the recommended practices. The Government should take right steps to make available all required infra-structure coupled with adequate supply of technical inputs and services. The findings also showed that except age, most of the variables under study had significant impacts on farmers' extent of adoption of the recommended dairy farming practices under the selected farming systems. Therefore, the socio-economic and psychological variables substantially influencing the adoption of dairy innovations must be taken into consideration while accelerating the pace of adoption in the study area.

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