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Original Research

Knowledge Level & Adoption Practices in Livelihood Generation of Small Animal Owners in Various Agro-Climatic Zones of West Bengal

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Abstract

Small Animal is an important asset of livelihood generation among pro-poor stakeholders in various agro-climatic Zone of West Bengal, India. In the study, one district from each agro-climatic zone was purposively selected. Out of 1178 GPs, 05% of 1178, i. e.,61 GPs were selected and all villages under 61 GPs i. e. 524 no's of villages have been taken into consideration for this study. From each village two small livestock owners (sheep, goat & pig owners) i. e. 1048 no's of the sample population were selected. Data was collected through a pre-tested structured interview schedule and analyzed through various statistical methods. The study explored that, the majority of small animal owners were middle-aged, Male, married, Hindu, landless, middle-income group, and labor was the main occupation, not attended any skilled training and took self-decision for small animal farming in all zones. The majority had a medium level of adoption of improved A.H. practices in all Zones. Small animal farming should be encouraged for all types of people especially; Red Laterite, Hill, Terrain, and Coastal Zones are to be more emphasized for this farming.

Keywords: Adoption, Agro-climate, Knowledge, Livelihood, Small Animal, Farmers

Introduction

Small animal farming practice plays a pivotal role in livelihood security of small family farmers of rural India as well as in global rural scenario since time immemorial. Realizing the present-day challenge, like food and rural livelihood insecurity, Poverty, malnutrition, and environmental crisis, scientific orientation for empowering rural small animal-based family farmers through the knowledge-based adoption process and information-based rural advisory services are urgently needed under various agro-climatic zones of Eastern India (West Bengal). To formulate the required strategic approach for sustainable vis-à-vis profitable small animal farming practices and to define the role of the extension system for empowering these farming communities a vivid study was promulgated in selected small animal farmers of six Agro-climatic Zones in the Eastern region (West Bengal) of India.

Methodology

In the present study, one district from each agro-climatic zone of Eastern India *i. e.* West Bengal was purposively selected. Out of a total of 3360 Gram Panchayats (GP), 1178 GPs were selected purposively from six different districts of six different agro-climatic Zones. 5% of 1178, i. e., 61 GPs have been covered randomly. All the villages under 61 GPs have been taken into consideration for this study. Therefore, the total number of villages selected for the study was 524 nos. From each village, two small livestock owners (sheep, goat & pig owners) were selected randomly. In this way, 1048 nos. of small animal owners were selected randomly in 168 from Hill, 216 from Coastal, 136 from red laterite, 264 from New alluvial, 150 from Old alluvial and 114 from Terrain zone formed sample population. The field investigation was carried out with the help of the pre-tested structured interview schedule constructed for the study. Thirty-five (35) no's of independent variables were selected in which 14 no's of socio-economic, 02 no's Communication, 03 no's administrative and 16 no's socio-psychological variables applied to assess the adoption status of selected small animal owners of various Agro-climatic zone of W.B, India. The independent variables were measured with readily available scales and a few scales were also developed which were not available. Adoptions of selected improved Animal Husbandry practices were a dependent variable that was measured by the adoption index method (Das Gupta, 1968). As per the index, the adoption score is derived for how many years each of the practices adopted by the stakeholders are divided by the total nos. of practices considered for the farm as per Dasgupta, 1968). The collected data were computed and analyzed by various statistical methods i.e.–Mean ± SE, Coefficient of correlation, MWU test, Path Analysis, Factor Analysis, MDS Indexing, and Multiple Regression Analysis for better interpretation of the results.

Results and Discussion

Knowledge and Adoption level of selected sample small animal owners about improved farming Practices in various Agro-climatic zone of Eastern India (WB)

The Table revealed the level of knowledge & adoption of selected small animal owners about improved farming practices in various Agro-climatic zone of W.B., India. The fact of the table explored that knowledge level on advanced small animal farming practices, the majority (62-72%) of selected small animal owners have medium knowledge level on scientific farming practices in all 06 ACZ of West Bengal, India, whereas the only small section of selected owners has low & high level of knowledge about recommended practices. The findings revealed that adoption level on improved small animal farming practices, the majority (64-81%) of selected stakeholders have also medium adoption level on scientific farming practices in all 06 ACZ of W.B., whereas only a small part of selected owners has low & high adoption level about recommended practices. So, the findings of the study suggested that the majority of selected small animal entrepreneurs have medium knowledge and adoption level in improved farming practices in all Agro-climatic zone of West Bengal, which is very much indicative in relation to future animal Husbandry development strategy as well as planning of rural Eastern region of India.

Methodology of Knowledge & Adoption level: The knowledge and adoption indices were calculated for each sample respondent and then the agro-climatic zone wise Mean ± SD score of knowledge and adoption level was statistically analyzed through SPSS 16.0 software as low; Medium & high categories for better interpretation of the study.

Table 1: Knowledge& Adoption level of Small Animal owners regarding improved A.H. practices in various Agro-climatic zones (06) of W.B., India

Agro-climate zone	Level	Statistical parameter	Knowledge level	Adoption level
Burdwn (NAZ)	**Low**	< (Mean-SD)	14.00	12.00
	Medium	(Mean - SD) to (Mean+SD)	70.10	80.70
	High	> (Mean+SD)	15.90	7.30
Howrah (OAZ)	**Low**	< (Mean-SD)	16.10	19.60
	Medium	(Mean - SD) to (Mean + SD)	69.50	68.40
	High	< (Mean-SD)	14.40	12.00
Purulia (RLZ)	**Low**	< (Mean-SD)	11.40	16.70
	Medium	(Mean - SD) to (Mean + SD)	61.90	69.10
	High	< (Mean-SD)	26.70	14.20
Cooch-behar (TRZ)	**Low**	< (Mean-SD)	10.30	17.60
	Medium	(Mean - SD) to (Mean + SD)	72.00	70.00
	High	< (Mean-SD)	17.70	12.40
Darjeeling (HLZ)	**Low**	< (Mean-SD)	8.70	14.00
	Medium	(Mean - SD) to (Mean + SD)	68.50	76.30
	High	< (Mean-SD)	22.80	9.70
South 24 Pgs (CSZ)	**Low**	< (Mean-SD)	23.60	18.50
	Medium	(Mean - SD) to (Mean + SD)	63.30	64.50
	High	< (Mean-SD)	13.10	17.00

Zone-wise Comparison by Mean and Chi-Square (Kruskal Wallis) test of Selected Small Animal Farmers for Selected Variables Under Study

The table expressed that the mean value of small animal farmers under the New alluvial zone was significantly higher in relation to the adoption of Colostrum feeding, Burdizzo Castration, Urea-Straw feeding practices, and overall adoption practices. Whereas it was true under the old alluvial zone in terms of adoption of Vaccination practice. Similarly, the table expressed that the mean score of stakeholders under the red laterite zone was significantly higher in relation to the adoption of Deworming, Feeding of Green fodder & concentrate for small animal farmers. Simultaneously the mean value of entrepreneurs under the Coastal & Hill zone was significantly better in relation to the adoption of green fodder cultivation and AI practices.

The findings depicted above may be supported by previous research findings as follows. Sivnarayana et. al. (1995) and Goswami (2000) worked on the same characteristics and found more or less similar observations. Goswami (2007) found that education of livestock owners has got an impact on improved livestock farming practices. Singh (1982) and Nataraju & Channegowda (1984) established that mass media sources had a significant association with the adoption of improved farming practices. Roy (2006) and Goswami (2007) also observed that social participation had a significant association with the adoption of improved small animal practices.

The overall adoption score was calculated by adding the zone wise mean value of all adopted improved animal Husbandry practices and the adoption value of each improved practice is the zone wise mean adoption score, which was analyzed to reveal the adoption status of individual technology practices among the livestock owners in the functional area.

The analysis was done through Chi-square (Kruskal Wallis) test as a non-parametric test used to compare 03 or more independent groups of sample data as the distribution of the data is uneven and less than 30 no's, which is not qualified for independent parametric group ANOVA analysis in the present study.

Table 2: Adoption level of different selected improved Animal Husbandry Practices compared by Mean & Chi-Square (Kruskal Wallis) Test of Selected Small Animal Farmers in the Study

Different Zone of W.B.	Adop AI	Adop. Vacc	Adop. Dewor	Adop. GFC	Adop. GFF	Adop CF	Adop. Colost	Adop. Burdiz	Adop. Ustraw	Overall Adoption
Old AL Zone	0.52	3.33	3.37	0.00	2.59	2.31	2.53	2.75	0.00	1.94
New AL Zone	0.75	2.50	3.30	0.30	0.68	2.53	5.02	2.93	0.05	2.01
Terrain Zone	1.34	3.00	3.20	0.24	2.53	1.78	3.25	0.71	0.00	1.78
Hill Zone	1.75	2.30	2.53	0.10	0.87	1.24	3.41	0.73	0.00	1.44
Red Lat. Zone	1.35	2.66	3.42	0.30	3.73	2.55	2.70	0.98	0.05	1.97
Coastal Zone	0.94	3.05	3.26	0.70	2.90	1.54	1.85	0.18	0.00	1.60
Chi-Square	86.11	62.45	40.75	59.43	173.06	44.32	59.32	217.16	18.77	56.10
Sig.	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Relationship between Selected Independent Variable and adoption Index in IAHP of Small Animal Farmers in Various (06) Agro-Climatic Zones of W.B., India

A perusal of the Table-1 expressed that the adoption index of selected small animals' owners in the Old Alluvial Zone (OAZ) was positively and significantly correlated with variables like- Total Income, milk productivity, occupation, education of respondent, family education status, house type, mass media, personal Cosmo politeness, communication sources at 1% level, whereas with landholding and pathology center at 5% level of significance. The facts indicated that the adoption index of selected stakeholders in the New Alluvial Zone (NAZ) has a positive significant correlation with variables like religion, communication skills, marketing orientation at a 5% level, and social participation at a 1% level of significance. The table also revealed that the adoption index of selected respondents in the terrain zone was a positive significant correlation with variables such as milk productivity, occupation, education, family education status, and personal Cosmo politeness at a 1% level of significance.

The table depicted that the adoption index in IAHP of selected small animal owners in the Hill zone was positively and significantly correlated with the variables like knowledge of milk & milk products, personal Cosmo politeness, and localities at a 5% level and with communication source, mass media at 1% level of significance. In reverse, the variables like – house type, attitude in employment, income generation, and risk orientation at a 1% level followed by the variables like milk productivity at a 5% level of significance with adoption index in IAHP of selected small animal owners in Hill zone of W.B.

The table showed that the adoption index in IAHP of selected small animal owners in the red laterite Zone (RLZ) was positively and significantly correlated with family education status, at a 1% level, and with religion, education of respondents at a 5% level of significance. In reverse, the variable like- knowledge in green fodder cultivation was negatively and significantly correlated at a 1% level with knowledge in deworming, and economic motivation at a 5% level of significance in the RL zone of West Bengal.

The tabular findings finally explored that the composite adoption index of selected SA owners in the coastal zone was positively and significantly correlated with variables like- other income sources, total income, pathology center, milk productivity, occupation, education of respondent, family education status, landholding, farm power, personal Cosmo politeness, communication sources 1% level followed by personal localities, mass media, house type at 5% level of significance in the coastal zone of West Bengal, India.

The following previous observations will support the present study to get a better realization. Knowledge of small animal farmers was found positively correlated with the education level of the family as reported by *Hazarika (1983) and Chung (1986). Rao (1975), and Kherde et. al. (1978)* reported a non-relationship between herd size and the knowledge of the respondents. Sundararwami et. al. (1978) had made positive relationships with the utilization of mass media. *Singh (1982)* reported that age had no significant relationship with the adoption of improved dairy innovations. *Gupta (1978)* found no significant impact on income with the adoption of improved A.H. technology. *Sayeedi (1983) and Dana et. al.* (1998) found a significant relationship between family educational status and the adoption of dairy innovations. *Tripathi & Kunzru (1992), and Sharma (1994),* also worked on various independent variables relating to the relationship with the adoption of different A. H. Practices. *Teklewold et. al. (2006), Goswami (2007),* etc. also reported different observations on adoption behavior related to different variables as

supported by the present findings. *Daipuria et. al. (2001)* reported that age, education, house type, social participation, risk orientation, mass media, marketing orientation, knowledge, etc. were significantly associated with the adoption of improved A.H. practices.

Table 3: Relationship between Selected Independent & Adoption Index in IAHP Of Small Animal Farmers in Various Agro-climatic Zones of Eastern India (W.B.)

Variables	Burdwan Old Alluvial Zone	Howrah New Alluvial Zone	Cooch Bihar Terrain Zone	Darjeeling Hill Zone	Purulia Red Laterite Zone	S24Pgs Coastal Zone
Age	0.12	-0.029	0.046	0.151	-0.059	0.078
Income	0.054	**-0.195**	0.086	-0.026	-0.051	0.208
Other Income	0.073	-0.053	0.076	0.009	0.119	***0.186***
Total Income	***0.16***	-0.108	0.115	-0.008	0.059	***0.284***
Pathology Centre	**0.127**	-0.069	-0.008	0.001	0.074	***0.253***
Milk Productivity	***0.161***	-0.035	***0.298***	**-0.163**	0.058	***0.337***
Education	***0.224***	0.059	***0.46***	0.109	**0.17**	***0.351***
Family Education status	***0.409***	-0.066	***0.597***	-0.057	***0.336***	***0.588***
Farm _Size	0.037	0.113	0.086	0.079	-0.017	0.037
Land Holding	**0.145**	***-0.281***	0.088	-0.026	-0.064	***0.273***
House Type	***0.174***	0.00	0.099	***-0.202***	0.068	**0.154**
Farm Power	0.043	0.00	0.175	0.073	0.025	***0.296***
Material Possession	0.044	0.00	0.183	0.148	0.152	-0.01
Economic Motivation	0.012	0.00	***-0.263***	0.123	**-0.2**	0.04
Attitude in productivity	**-0.127**	0.00	-0.06	-0.004	-0.039	0.093
Knowledge in Artificial Insemination	-0.071	0.00	-0.02	0.051	-0.098	0.055
Knowledge in Vaccine	-0.081	0.00	-0.173	0.043	-0.08	***-0.227***
Knowledge in Deworming	-0.038	0.00	***-0.342***	-0.126	**-0.221**	***-0.225***
Knowledge in Green Fodder Cultivation	***-0.184***	0.00	***-0.344***	-0.085	***-0.313***	***-0.306***
Knowledge in Green Fodder Feeding	0.049	-0.12	-0.098	0.134	-0.007	***-0.164***
Knowledge in Concentrate Feeding	-0.028	0.047	**-0.221**	0.075	-0.127	***-0.189***
Knowledge in Colostrums feeding	-0.101	-0.041	-0.112	-0.066	0.05	***-0.327***
Knowledge in Goattery	-0.006	-0.055	-0.147	-0.114	-0.004	-0.062
Knowledge in Piggery	**-0.143**	0.015	-0.146	0.034	-0.132	***-0.184***
knowledge in Duckery	0.048	-0.04	-0.178	0.071	0.022	-0.01
Knowledge in Poultry	-0.015	0.081	0.009	0.037	-0.068	-0.019
Knowledge in Milk & MP	-0.059	0.068	-0.044	**0.182**	-0.039	-0.074
Attitude in Employment	-0.042	0.108	-0.108	***-0.218***	-0.004	**-0.138**
Attitude in Income Generation	**-0.154**	-0.01	-0.036	***-0.205***	-0.034	***-0.219***
Attitude in productivity	-0.035	0.166	-0.097	-0.001	-0.043	-0.064
Mass Media Communication	***0.231***	**0.196**	0.046	***0.222***	0.143	**0.148**
Personal Cosmopolite	***0.23***	-0.123	***0.315***	**0.179**	0.076	***0.181***
Personal Localite	0.085	0.026	-0.003	**0.182**	0.024	**0.17**
Communication source	***0.257***	0.007	0.166	***0.253***	0.109	***0.204***
Communication Skill	0.096	**0.185**	-0.182	0.136	0.154	***-0.145***
Marketing Orientation	0.034	**0.203**	-0.014	-0.01	-0.028	0.02
Risk Orientation	-0.025	0.159	***-0.302***	***-0.216***	-0.029	-0.132
Social Participation	0.064	***0.426***	0.037	0.051	-0.129	0.054

N.B. Bold values are *significant at 5% level & Bold and italics value are significant at 1% level.*

Stepwise Multiple Regression analysis between Selected Independent Variables and Adoption Index of Small Animal Farmers in all Zones of W. B.

The Table explored the linear relationship of selected independent and dependent variables of sample small animal farmers under all zones of Eastern India i. e. W.B. This table revealed that 28.00% of the variation in adoption index in IAHP of sample small animal owners was due to the combined influence of the selected independent variables under study. The regression model expressed that, the variables like family education status, mass media, marketing orientation, social participation, family size, education, knowledge in milk production, milk productivity, age, religion, and pathology center had positive and highly significant ($p<0.01$) but altitude towards productivity, material possession, and knowledge in concentrate feeding had positively and significantly ($P<0.05$) contributed towards the variability in adoption index in IAHP of selected small animal farmers. Similarly, the regression equation revealed that the variables such as altitude in income generation, knowledge in green fodder cultivation, family type, attitude in dairy farming, landholding, and attitude towards employment generation had negatively and highly significantly ($P<0.01$) contributed toward the variability in adoption index in IAHP of small animal farmers. While other studied variables were excluded as redundant.

Roy (2006) studied the adoption behavior of Kuroilar farmers in Sundarbans and found the same results. Tripathy and Jati (1971) suggested the significant association of family education with the adoption behavior of the farmers. Goswami (2000) found that mass media and personal cosmopolite had a positive and significant association with the improved A.H. practices in the saline belt.

Table 4: Stepwise Multiple Regression analysis between Some Selected Independent & Dependent Variables (Adoption Index) of small Animal Farmers in W.B., India

VARIABLES	Unstand. Coefficients		Stand. Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.949	0.398	--	4.902	0.000
Family Education Status	0.148	0.027	0.183	5.554	0.000
Attitude in Income	-0.055	0.007	-0.251	-8.234	0.000
Mass Media	0.061	0.010	0.224	6.427	0.000
Know in Green Fodder Cultivation	-0.028	0.004	-0.330	-7.418	0.000
Marketing Orientation	0.029	0.008	0.110	3.420	0.001
Family Type	-0.348	0.077	-0.142	-4.542	0.000
Social Participation	0.267	0.052	0.168	5.121	0.000
Family Size	0.259	0.073	0.114	3.554	0.000
Education	0.074	0.016	0.147	4.472	0.000
Know in Milk & MP	0.015	0.004	0.113	3.644	0.000
Attitude in SA farming	-0.041	0.012	-0.099	-3.489	0.001
Land Holding	-0.134	0.054	-0.082	-2.494	0.013
Attitude in Productivity	0.013	0.006	0.067	2.081	0.038
Milk Productivity	0.044	0.014	0.094	3.136	0.002
Attitude In Employment	-0.024	0.009	-0.075	-2.624	0.009
Age	0.077	0.028	0.076	2.711	0.007
Pathology Centre	0.161	0.066	0.081	2.455	0.014
Know. in Concentrate Feeding	0.022	0.011	0.084	2.055	0.040
Total Income	-0.084	0.036	-0.076	-2.358	0.019
Material Possession	0.067	0.032	0.066	2.113	0.035
Model Summary:					
R	R Square	Adjusted R Sq	SE (Est)		
0.524	0.275	0.260	0.820		

NOTE: * P> 0.05 level; ** P> 0.01 level; F entry Probability=0.05; F removal probability=0.10

Utilization of different information sources in the adoption of IAHP by selected small animal farmers in various agro-climatic zones of W.B., India

The Tabular findings depicted that maximum selected small animal owners in the Terrain zone (60.53%) utilize various mass media sources regarding the adoption of improved small animal farming practices, followed by the respondents of the New alluvial zone(55.68%), Old alluvial zone(52.67%), Red laterite zone(50.00%), coastal zone(43.46%), & Hill zone(42.85%) were utilize various mass media (Such as- Radio, TV, Newspaper, Poster, exhibition, etc.) as information sources regarding the adoption of improved small animal farming practices in rank wise descending order. Similarly, considering personal cosmopolite information sources utilization, a higher no of selected small animal owners in the new alluvial zone(61.36%) used personnel cosmopolite sources regarding the adoption of improved A.H. practices, whereas respondents of the Old alluvial zone(54.67%), Coastal zone(47.66%), Terrain zone(45.61%), Red laterite zone(43.38%) & Hill zone(43.52%) sequentially utilized several personal cosmopolite sources for the adoption of improved small animal farming practices. Concomitantly, the majority of selected small animal owners in the Hill zone (51.79%) utilized personnel local sources in the adoption of improved A.H. farming practices whereas the respondents of Red laterite zone(rank-II), Coastal zone (Rank-III), Old alluvial zone(rank-IV), Terrain zone(rank-V) & New alluvial zone(rank-VI) were chronologically utilized personal local channels as information sources for the adoption of improved small animal farming practices in the study area.

Table 5: Utilization of different information sources in adoption of IAHP by selected Small Animal farmers in various Agro Climatic Zones of W. B.

	Sources of Information		
Agro climatic Zones of W.B.	**Mass Media**	**Personal Cosmo politeness**	**Personal local**
Hill Zone(168) % & Rank	42.85(VI)	34.52(VI)	51.79(I)
Coastal Zone(214) % & Rank	43.46(V)	47.66(III)	51.40(III)
RL Zone(136) % & Rank	50.00(IV)	43.88(V)	51.47(II)
NA Zone(264) % & Rank	55.68(II)	61.36(I)	31.06(VI)
OA Zone(150) % & Rank	52.67(III)	54.67(II)	42.00(IV)
Terrain Zone(114) % & Rank	60.53(I)	45.61(IV)	40.35(V)

Conclusion

The research findings recommended that all communities, income groups, age groups, literacy, land, and livestock holding have to be considered for substantial empowerment and formulation of strategic planning of livestock development. Marketing orientation, Attitude towards livestock rearing, knowledge level about improved practices, the adoption rate of improved technologies, mass media exposure, social participation, personal Cosmo politeness, and localities are to be considered while planning for livestock development. The basic parameters are more or less the same in all six ACZs of the Eastern region of India for livestock development. Only the degree and magnitude of the parameters will vary depending upon different ACZ for all categories of farmers for which experts are to be consulted during planning. Small animal farming should be encouraged for all stakeholders in all ACZ with special emphasis on Red Laterite, Hill, Terrain, and Coastal Zones for this farming practices in the state of West Bengal, India.

Conflict of Interests

There is no conflict of interest.

Contribution of Authors

During the writing of the manuscript, all of the authors contributed equally. They read the final manuscript and gave it their approval for publishing.

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References

1. Chug, D. S. (1986). Suitability of dairy farming technology and factors affecting knowledge and adoption. M.Sc. Thesis submitted to the G. B. Pant University of Agriculture and Technology, Pantnagar.
2. Dana, S.S. Khandekar, N, Sharma, R. P. and Sinha, S. P. (1998). Factors affecting adoption of commercial poultry production technologies. *Indian Journal of animal Research,* 32(1) : 1-4.
3. Dasgupta, S. (1968). Relative predictability of five indices of adoption of recommended farm practices. *Sociologia Ruralis*, **8**: 1-21.
4. Daipuria, P. R. (2001) Knowledge and adoption of Agricultural Technologies in Maratha Wada. Indian *Research Journal of Extension Education,* 7(1) January, 2001.
5. Goswami, A. (2000). The Impact of Extension Education on the Social, Psychological and administrative behaviour of the livestock owners of the Sundarbans, West Bengal. Ph.D. thesis submitted to the University of Kalyani, West Bengal.
6. Goswami, M. (2007). A study on adoption behaviour of Kroiler poultry farmers in Murshidabad district of West Bengal. M.V.Sc. thesis submitted to West Bengal University. of Animal & fishery Sciences.
7. Gupta, C. L. (1978). A study of differential motives of dairy farmers of milk co-operative societies of ICDP, Karnal (Haryana) towards dairy innovations. Ph.D. Thesis submitted to PAU, Chandigarh.
8. Hazarika, P. (1983). A study of correlates of knowledge and adoption behaviour of the dairy farmers under I.C.D.P., Khanapara, Assam. M.Sc. Thesis, Kurukshetra University, Kurukshetra.
9. Kherde, R. L., Khera, J. K. and Rao, S.V.N.(1978). Study of effectiveness of milk and milk products training programme in the villages of Karnal. Annual Report, 1978, N.D. R. I., Karnal, Haryana.
10. Nataraju, M. S. and Channegowda, M. B. (1984). Differential adoption of improved dairy practices by small and marginal farmers and agricultural laborers. *Indian Journal of Extension Education*, 20(3&4): 63.
11. Prathap,D P and Ponnusamy K A (2006) Factors influencing the attitude of farmers of Tamilnadu, India towards rabbit farming. *Livestock Research for Rural Development*, 18(5).
12. Rao, S. V. N. and Kherde, R. L. (1975).Dairy Extension & Dairy Development. *Indian Dairyman*.**37** (9): 391-396.
13. Roy, R. (2006). Adoption behaviour of Kroiler poultry farmers in Sundarban of West Bengal. M. V. Sc. thesis submitted to W.B. University. of Animal & fishery Sciences.
14. Sayeedi, A. G. (1983). A study of knowledge, attitude and adoption of dairy farmers towards dairy scientific activities in Jammu District (J & K State). A dissertation, submitted to Kurukshetra University.
15. Sharma, R. K. (1994).Farmer's perceptions of constraints in Milk Marketing & Measures for dev. of Efficient Extn System for Milk Marketing in Rural Areas. *Indian Journal of Dairy Science*, **47**(8): 674-679.
16. Singh, J. N. (1982). A study of suitability of dairy farming innovations and factors associated with their adoption by cattle owners of ICDP, Gurgaon (Haryana). Ph.D. Thesis submitted to Kurukshetra University, Kurukshetra.
17. Sivanarayana, G. and Jayarama, Reddy, S. (1995). Constraints in the adoption of improved sheep and goat practices by the small and marginal farmers of diversified farming. *Indian Journal of Dairy Science*, **48**(4): 306-308.
18. Sundaraswami, B.; Rao, M. K. S. and Awatigar, M. B. (1978). Impact of T.V. on farmers' knowledge. *Indian Journal of Extension Education*, 39(1): 23-26.
19. Teklewold, H. Dadi, L. Yani, A. and Dana, N. (2006) Determinants of adoption of poultry technology: A double–hurdle approach. *Livestock Research for Rural Development*, 18(3).
20. Tripathi, H. and Kunzru, O. N. (1992). Differences in socio-personal and socio-psychological characteristics of rural women between member and non-member dairy co-operative systems. *Indian Dairyman*, **44**(10): 485-488.
21. Tripathi, S. L. and Jyoti, J. S. (1971). Socio-personal factors influencing the adoption of improved farm practices. *Allahabad Farmer*, **18**(5): 347-354.

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