CHAPTER V

DIFFUSION OF MODERN INNOVATIONS IN LIVESTOCK FARMING IN NORTH SIKKIM

Adoption of modern innovations in various economic enterprises is a phenomenon which has considerably helped boost the level of farm productivity. At the same time the farm income has also gone up many fold due to this technological break through in the production process. As far as agriculture and animal husbandry is concerned, application of modern technology is though a relatively recent phenomenon in india, but in many developed countries of the world,the same has revolutionised the production scenario thereby generating huge surpluses for a progressive market economy. As has been said earlier, animal husbandry or livestock rearing being an important economic sector and an integral part of indias' rural economy contributes significantly to our national income. However, the productivity of the country's millions of livestock has not been very satisfactory over the decades despite the fact that there has been a concerted effort in raising the productivity level of the animals by bringing in to its fold particularly in the rural country side. It is quite surprising to note that the receptivity to modern technology by the rural farmers is considerably low. This has largely been attributed to numerous social cultural and economic factors. Besides, Phisico-geographical factors also stand on the way of the diffusion of modern innovations in a spatial context. As spatial diffusion of modern innovation as a dimension of study is beyond the scope of the present exercise, it will be pertinent to highlight as to how socio-cultural factors have influenced the decision making process of the farmers to go in for modern technology in the study area. It is in this context that certain socio-cultural indicators such as the educational background of the farmers and the level

of their exposure to modern technology, sources of communication of knowledge about new innovations such as different electronic media like Radio & T.V., tradition of rearing livestock etc. have been decidedly taken in to consideration to know the level of receptivity of the farmers to new innovations at farm level. Therefore, with a view to understanding such socio-cultural status of the farmers at present and their attitude towards modern innovations in North Sikkim first hand informations have been collected during the household survey. The analysis of the data and information so procured are presented item-wise as follows:

5.1 Educational Background of the Farmers of North Sikkim.

Education is supposed to be the most important attribute for socio-economic change. Before going into the details of the diffussion in livestock farming in the region, it would be meaningful to throw light on the educational background of the farmers of North Sikkim. The following table illustrates the percentage share of the farmers areawise as far as their educational background is concerned.

Table 5.1

Educational Background and Occupation of the farmers of North Sikkim.

SI. NO.	PARTICULARS	ZONES						TOTAL	
		DRY HIGH ZONE		CONTINENTAL ZONE		SUB-TROPICAL ZONE		NORTH SIKKIM	
		NO	%	NO	%	NO	%	NO	%
1.	Literate.	00	00	93	38.75	293	52.60	386	46.67
2.	Illiterate.	30	100	147	61.25	264	47.40	441	53.33
3.	Farming.	30	100	180	75.00	445	79.89	655	79.20
4.	Service.	00	00	32	13.33	90	16.16	122	14.75
5.	Business.	00	00	28	11.67	50	6.05	50	6.05
6.	Family size								
	Per household	5.17	-	5.10	-	5.41	-	5.31	-

It will be seen from the Table 5.1 that in the Dry High zone out of 30 house holds surveyed all are found to be illeterates. In the continental zone out of 240 households surveyed 147 or 61.25 percent respondents who are heads of the households were illiterate and 38.75 percent were literate. Also in the same zone 75 percent respondents belong to the farming community where as 13.33 percent and 11.67 percent belong to service and business communities respectively. In the lower sub-tropical zone the total number of household surveyed is 557. Out of the 557 households in this zone 50 percent of respondents are literates and 50 percent illeterates. From the above household survey in the region, the farming community constitutes a staggering 79.89 percent of the total households followed by 16.16 percent in service and 3.95 percent in business and commerce. The above findings indicate that out of 827 farmers surveyed for the purpose as much as 46.67 percent are found to be literates and educated whereas more than 50% of the farmers are illiterates the percentage being 53.33 percent. As far as the occupational status of the households is concerned it is noticed that a substantial proportion of the rural households constitutes of farming community which accounts of 79.20 percent of the total households surveyed. The rest of the people are either serving in various government departments or are businessmen who account for 14.75 percent and 6.05 percent respectively. It can however be concluded that the educational status of the people of the rural households in North Sikkim is gradually improving and majority of them are farmers who appear to be educationally enlightened and are found receptive to new innovations particularly at their occupation level which is predominated by livestock farming.

5.2 Source of communication of Knowledge

In the present study as many as 240 households in the continental zones and 557 households in the sub-tropical humid zone were surveyed to ascertain their sources of information regarding modern livestock rearing. The farmers were accordingly asked to indicate whether they came to know about the modern technology in livestock farming through programmes of Krishi Darshan show in T.V. or through any other media. Similarly they were asked to indicate whether they have participated in calfrally or Livestock show etc. and if they did participate in such rallies whether it was found educative for them or not. The findings have been presented in Table 5.2. It has been observed that out of 797 households as much as 30 perecnt of farmers use radio as their main source of information for modern livestock rearing and only 12.55 percent watch T.V. for programmes on livestock rearing where as about 57.34 percent of the households neither listen to radio nor do they watch T.V. As many as 164 farmers accounting for 20.58 percent of the total respondents indicated that they have watched or heard of Krishi Darshan on radio and T.V. It is interesting to note that a substantial percentage of the farmers accounting for more than three quarters of the total respondents i.e. 79.42 percent do not have any opportunity to hear the Krishi Darshan programme in T.V. and radio and thus appear to be quite unaware of modern livestock rearing. It will be seen from table 5.2 that out of 797 households as many as 126 accounting for 16 percent of the farmers have attanded livestock show and from amongst them 109 farmers i.e. 86.51 percent found the show quite educative whereas as 17 farmers i.e. 13.49 percent did not find the show useful which could be attributed to their low educational standard or poor grasping of the scientific aspect of the programme.

Table 5.2

Source of communication of knowledge in north Sikkim

Sl. No.	Source of Information		Continental Zone		Sub-tropical Zone		Total North Sikkim	
			No.	%	No.	%	No.	%
1.	Radio		86	10.79	154	19.23	240	30.11
2.	T.V.		14	1.76	86	10.79	100	12.55
3.	Nither listen to Radio nor watch T.V.		140	17.57	317	39.77	457	57.34
4.	Aware of Krishi Darshan.	Yes	17	2.13	147	18.44	164	20.58
		No	223	27.98	410	51.44	633	79.44
5.	Participation in Livestock Show/Calf Rallies.	Yes	3	0.33	123	15.43	126	15.81
		No	237	29.74	434	54.45	671	84.19
6.	Whether found Livestock Educative	Yes	-	-	109	86.51	109	86.51
		No	3	2.38	14	11.11	17	13.49

From the foregoing discussion it could be concluded that though the main sources of information for modern livestock farming are the electronic media such as radio and T.V. in

North Sikkim, nevertheless these media are not very effective in propagating the message of modern technology and new innovations in these remote and isolated region of the country. It is quite evident from the above discussion that a large number of farmers are evidently unaware of programmes on modern livestock rearing and related aspects that are being covered on electronic media. It is also observed that a very few farmers attend to livestock extension programmes such as livestock shows of exotic high yielding varieties. As a matter of fact, there is a considerable information gap among the rural farmers about the modern innovations of livestock rearing. These may however be attributed to the fact that either the farmers are not properly motivated or they do not have financial viability to go in for T.V. sets or they are simply indifferent to programmes on agriculture and livestock on radio etc. or the region is not served with right infrastructural facilities for bridging the above communication gap amongst the farmers. All these need further research and investigation which will be of immense use for the postering particularly the planners and policy makers at both the State and the national levels. From the above findings it could also be inferred that even though a smaller proportion of the farmers listen to radio and still an insignificant share of them watch T.V. on modern livestock technology. In these hilly and remote areas of northern Sikkim, there is wider scope in livestock development in this region which could be achieved through a co-ordinated effort involving various agencies such as government, the non government organisations, the voluntary agencies and so on with the building up of adequate infrastructures etc.

5.3. Mobility of the farmers

Direct contact and self observation of the fruits of science and technology sometimes help in acquiring first hand informa-

tion and upto-date knowledge on recent advancement on various fields thereby leading to easy receptivity and acceptance to new ideas and introduction of modern innovations. As far as livestock farming is concerned visits of farmers to the centres of technology leads to the creation of awareness amongst them who would prepare themselves for adoption of this new technology in the process of diffusion of modern innovations at large.

Keeping the above fact in view it would be meaningful to throw light on the level of exposure of the farmers in terms of their frequency of visits and contact with advance farmers and mobility to relative advanced places in understanding the technological innovation in livestock farming. Unless the farmers have direct observation it will be difficult for them to accept the new techonology. With a view to understanding the level of exposure of the farmers concerning modern technology in livestock farming data and information were collected with the help of structure questionnaire schedules through direct interview with the farmers. From the data and the information gathered from the field survey the following picture emerged besides other nearby places of livestock development the farmers were put questions to indicate their number of visits to Gangtok which is an important centre for livestock production and other allied activities relating to modern livestock raising and training facilities and has a central veterinary hospital and a liquid nitrogen plant for the preservation of frozen semen (plate 16 & 17). Table 5.3 presents the number of visits of the farmers to Gangtok in a year.

Table - 5.3

Farmers of North Sikkim visiting Gangtok in a year.

SI. No.	Details No. of visit	No. of farmers	Cumulative Frequency	Percentage %	Cumulative percentage	Level of Exposure
1.	ZeroVisit.	24	24	3	3	Nil
2.	1-2 times.	308	332	38.65	41.65	Low
3.	3-6 times.	250	582	31.37	73.02	moderate
4.	7-12 times.	84	666	10.54	83.56	high
5.	Above 12 times.	131	797	16.44	100.00	Very high

From Table 5.3 it will be seen that as much as 97 percent of the farmers out of the total respondent recorded during the field survey visit Gangtok though the frequency of their visit varies from place to place. The rest of the farmers who constitute of as little as 3 percent of the total refrained from doing so.

A glance at Table 5.3 reveals that there are a very few farmers who do not have any exposusre to modern livestock farming as they do not pay any visit to the livestock production centres such as Gangtok concerning modern livestock farming. A substantial percentage of the farmers constituting of 38.6 percent of the total respondents are said to be having low exposure to new innovations in livestock farming. Similarly 31.37 percent of the farmers have moderate exposure to new innovations whose visit to Gangtok varies between atleast 3 to 6 times a year. It will be further seen from the above table that more than 10 percent of the farmers have fairly high exposure to modern technology in livestock farming varies between 7 to 12 times a year. It is interesting to note that an appreciable share of the farmers i.e. 16.44

Plate 16.
Liquid nitrogen plant at Gangtok (East Sikkim).

Plate 17.
Stockman with 2 litres liquid nitrogen container-ready for insemination.

percent seem to be highly exposed to modern livestock farming as evident from their frequency of visits to Gangtok regarding modern innovation in livestock farming.

5.4. Livestock Rearing Tradition

Duration of livestock rearing is an important criteria for successful adoption of modern cross breeding technology. The farmer must be familiar with the rearing of livestock otherwise his venture for adoption of new technology will fail.In order to have an understanding about the tradition of rearing of livestock in the region data an information were collected through structured questionaries during the household survey and frequency tables were prepared to classify households according to their period of rearing of livestock. The following table represents zonewise distribution of households according to period of rearing of livestock.

Table 5.4

Distribution of households according to period of rearing livestock.

Sl. No.	Duration of rearing livestock	Dry high Zone		Continental Zone		Sub-tropical Zone		Total	
		No.	%	No.	%	No.	%	No.	%
1.	Below 1 year	Nil	Nil	1	0.12	9	1.09	10	1.21
2.	1-2 years	Nil	Nil	9	1.09	52	6.29	61	7.38
3.	2-5 years	Nil	Nil	20	2.42	71	8.59	91	11.00
4.	5-10 years	Nil	Nil	41	4.96	103	12.46	144	17.41
5.	Above 10 years	30	3.63	164	19.83	320	38.69	514	62.15
6.	Not aware	Nil	-	5	0.61	2	0.24	7	0.85
	TOTAL	30	3.63	240	29.02	557	67.35	827	100.00

A glance at Table 5.4 reveals that all the farmers of Dry mountain zone i.e. Lhonak, Muguthang and Chho-Lhamo grazing grounds under dry high zone have been rearing livestock for over 10 years period even though they constitute only 3.63 percent of the total household. Similarly in the continental upper zone out of 240 households 164 households or 68.33 percent of the farmers have been rearing for over 10 years even though they form only 19.83 percent of the total household surveyed.

As far as the sub-tropical Humid Zone is concerned the number of farmers rearing livestock for the past 10 years is 320 out of 557 or 57.45 percent. However it constitutes only 38.69 percent out of the total household surveyed. From the above findings based on sample household survey it could be observed that a substantial share of farmers that account for as high as 62.15 percent of the respondents have been rearing livestock for over 10 years.

5.5. PREFERENCE FOR CROSS BREED LIVESTOCK

Cross breed of livestock have always been prefered for higher yield of milk, meat and wool vis a vis the local varieties. The department of Animal Husbandry and Veterinary Services of the Government of Sikkim have been emphasizing on the cross breeding of the local livestock with exotic cattle, sheep, goats of Jamunapari breed, exotic pigs like Saddle Back, Landrace, Yorkshire etc. and improved strains of poultry birds. In view of the economic significance of the cross breed animals it will be worthwhile to discuss the level of adoption of these livestock in the study area. Though there are different types of livestocks reared by the farmers, cattle is an important livestock in north sikkim and is found to be reared by almost all the livestock farmers in the region particularly the upper continental zone and

the humid sub-tropical zone. Therefore, cattle should be given main emphasis as it is widely reared as said above. The department of Animal Husbandry have started frozen semen technology by opening numbers net work of artificial insemination centres in this part of north Sikkim for quickening the process of cross breeding.

In order to know the rate of adoption of cross breed cows the farmers and the reasons of such preference a direct interview with the farmers was conducted and the data and informations were collected through structured questionaries the following picture emerges. The reasons of preference were divided into four points as follows. The first point was that the crossbred cows would give 100 percent more milk than local cows-followed by second and a third points which respectively referred to the facts that same cows would give 50 percent and 25 percent more milk than the local cows. As far as the fourth point is concerned the crossbred cows would give the same quantity of milk as the local cows.[28] The distribution of households according to the preference for different types of cattles along with the reasons that could be attributed to such preference has been given in Table 5.5. It will be seen from the Table 5.5 that a substantial share of the total number of farm households accounting for as high as 83 percent indicating their preference for croosbred cows. However as little as 17% of the farmers preferred for local cows only. In the upper continental zone a large number of farmers opted for Holstein Frisean the percentage being 76.67. About 30 percent of them opted for Jersey. In the lower sub-tropical zone 70 percent preferred Jersey cow and only 23 percent showed preference for Holstein Frisean cows.

28. Similar methodology was adopted in Kerala by George, P.S. and Nair, K.H. In (Livestock economy of Kerala, Trivandrum. 1990. p 137-167).

Table - 5.5

Distribution of house-holds according to preference of cattle and the reasons there of

Sl. No.	Zone and Revenue Blocks	No. of House-hold Surveyed	Local		Jersey		Hols.-Fri.		Cross-breeds' milk Production more than that of local						Cross-breeds' milk Production same as local	
									100 %		50 %		25 %			
			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
A. DRY HIGH ZONE																
1.	Lhonak	15	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
2.	Chho-Lhamo	15	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Total (A)		30	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
B. CONTINENTAL UPPER ZONE																
1.	LACHEN	122	7	6.36	92	13.98	23	76.67	25	20.49	61	50.00	29	23.77	0	0.00
2.	LACHUNG	118	12	10.91	106	16.11	0	0.00	4	3.39	93	78.81	9	7.63	0	0.00
Total (B)		240	13	17.27	198	30.09	23	79.31	29	12.08	154	64.17	38	15.83	0	0.00
C. SUB-TROPICAL HUMID ZONE																
1.	Chungthang	108	3	2.73	105	15.96	0	0.00	98	90.74	6	5.56	0	0.00	1	0.93
2.	Ship-ger	29	4	3.64	25	3.80	0	0.00	0	0.00	20	68.97	5	17.24	0	0.00
3.	Naga Namgor	20	0	0.00	20	3.04	0	0.00	0	0.00	13	65.00	7	35.00	0	0.00
4.	Pakshep	14	0	0.00	14	2.13	0	0.00	13	92.86	1	7.14	0	0.00	0	0.00
5.	Kazor	23	5	4.55	18	2.74	0	0.00	15	65.22	3	13.04	0	0.00	0	0.00
6.	Singhik	59	8	7.27	51	7.75	0	0.00	38	64.41	13	22.03	0	0.00	0	0.00
7.	Hee Gyathang	61	2	1.82	54	8.21	5	16.67	22	36.07	37	60.66	0	0.00	0	0.00
8.	Lingthen	49	20	18.18	28	4.26	1	3.33	27	55.10	1	2.04	1	2.04	0	0.00
9.	Gnon Sangdong	16	1	0.00	15	2.28	0	0.00	8	50.00	7	0.00	0	0.00	0	0.00
10.	Ramthang	19	18	16.36	1	0.15	0	0.00	1	5.26	0	0.00	0	0.00	0	0.00
11.	Kabi	83	19	17.27	64	9.73	0	0.00	29	34.94	24	28.92	9	10.84	2	2.41
12.	Tingda	32	9	8.18	23	3.50	0	0.00	0	0.00	15	46.88	7	21.88	1	3.13
13.	Mangan	44	2	1.82	42	6.38	0	0.00	8	18.18	24	54.55	10	22.73	0	0.00
Total (c)		557	91	82.73	460	69.91	6	20.69	259	46.50	164	29.62	39	7.00	4	0.72
Grand Total		797	110	100.00	658	100.00	29	100.00	288	34.82	318	38.57	77	9.31	4	0.48

As regards the reasons for preference for crossbred cows, 64 percent of the farmers of Lachung and Lachen however indicated that crossbred cows would give 50% more than the local cows. As much as 12 percent of the farmers indicated that crossbred cows would give 100 percent i.e. double the local varieties. About 16 percent of the farmers were of the view that these cows would yield only 25 percent more milk than the local cows. Strickingly over to the sub-tropical zone of the study area it is observed that an appreciable share of the farmers constituting 47 percent of the total number of farm households of this zone opted that the cross breed cows would give 100 percent more than the local cows. Only 30 percent of the farmers indicated that milk yield would be 50 percent more than the local cows. As low as 7 percent of the farmers were of the openion that the crossbred cows would yield only 25 percent more than the local varieties. Less than one percent of the farmers indicated that milk yield of the crossbreds cows are same as local cows. From the above analysis it could be infered that the farmers in the region have a general urge for the cross breed cows as most of the farmers go in for these varieties for receiving relatively higher yield as compared to the local varieties of cows (Plates 18,19,20 and 21).

5.6. Preference for Breeding Cows

Scientific breeding of livestock is a step ahead in the process of modern innovations in the field of livestock management and development worldwide. In view of favourable enverionmental conditions in North sikkim, there is great scope for breeding different kinds of livestock for higher yield. In regard to the preference of breeding of animal out of 797 households surveyed 206 i.e. 25.85 percent preferred for artificial insemination and 480 farmers or 60.23 percent

Plate 18. A Lepcha farmer with his prized Holstein Friesian cow at Lingthem village, Dzongu Block (North Sikkim).

Plate 19. A Tribal woman with her crossbred Holstein Friesian cow in North Sikkim.

Plate 20. A Bhutia woman with her Jersey female calves at Singhik in North Sikkim.

preferred for natural services. However, 111 households accounting to 13.93 percent neither preferred A.I. nor did they go in for natural service. Table 5.6 presents the preference for breeding of livestock zonewise. Plate 22 shows a well maintaind breeding bull (Jersey breed) at Rabum A.H. farm in North Sikkim.

Table - 5.6

Preference for Breeding facilities in North Sikkim

Sl. no. Preference	Continental zone		Sub-tropical zone		Total	
	No.	percent	No.	percent	No.	percent
1. Preference for A.I. facilities	29	3.64	177	22.20	206	25.85
2. Preference for Natural Service.	197	24.72	283	35.51	480	60.23
3. Neither prefer A.I. nor N.S.	14	1.76	97	12.17	111	13.93

5.7. Animal Health Care

Proper Animal Health care is an important component in maintaining exotic crossbred animals which are more susceptible to various diseases than the local livestock. In north Sikkim as crossbred animals are increasingly becoming popular outbreak of the different animal diseases has caused a serious concern for the livestock farmers and the government as well. As for instance it has been discovered that in north Sikkim with the postings of the Indian army in the extreme border areas an animal disease known as foot and mouth disease keeps on

Plate 21. A good Jersey herd at Singhik in North Sikkim.

occuring every year especially near the army slaughter points. The infected sheep and goats are procured by the army and are slaughtered in various slaughtering points in North Sikkim thereby spreading the diseases far and wide. In the past not a single farmer would take up vaccination and would rather go in for the Lama's holy water for cure. It took a lot of time and extension work to convience the farmers. But at present they have been properly motivated to go in for scientific health care offered by the concern department and this change is coming from within. Vaccination of animals thus has become a commmon phenomenon in the rural areas of the hill region. The farmers are becoming more receptive to new innovations and the rate of adoption of modern innovations seems to be increasing at a faster rate. Out of 797 households surveyed, 527 families i.e. 66.12 percent vaccinated their livestocks against various infectious diseases including foot and mouth disease. Table 5.7 presents livestock vaccinated against various diseases.

Table 5.7

No. of households vaccinating their livestock

Zones	No. of households vaccinating their livestock	No. of households not vaccinating their livestock.	Total
Continental Zones	166	74	240
Sub-tropical Zones	361	196	557
TOTAL	527	270	797
PERCENTAGE	66.12	33.88	100

A photograph of Mangan veterinary hospital along with veterinary officers and para-vets is shown in Plat 23.

Plate 22. Jersey Breeding Bull at Government Farm Rabum (North Sikkim).

Plate 23. Veterinary Hospital at Mangan (North Sikkim).