Divulging the Magnitude of Information Flow in Dairy Innovation System: An 'Actor Linkage Matrix' Perspective

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Abstract—*One study was conducted by using Actor Linkage Matrix (ALM) to analyse the information flow in the dairy innovation system. ICAR-National Dairy Research Institute (ICAR-NDRI) located at Karnal district of Haryana state plays a significant role in disseminating information to the dairy farmers. Data were collected for the study by using PRA techniques and direct interview method. Focus group discussion, key informants rating, matrix ranking, etc. as well as several secondary sources of information were gathered to prepare the Actor Linkage Matrix (ALM). The major actors found in the local Milk Production Innovation System in the Karnal district of Haryana were ICAR-National Dairy Research Institute , Regional Station of Lala Lajpat Rai University of Veterinary and Animal Sciences, Milk Vendor, Dairy Farmers, Sarpanch, Stockmen, Veterinary officers and Input Dealer. Dairy farmers got strong information support from Veterinary officers, Input Dealers and Stockmen. ICAR-NDRI also played significant role in disseminating information among the dairy farmers. From the result it was observed that all the dairy farmers took decision by self evaluation regarding 'Management of Dairy Animals' as well as for 'Purchase of Inputs for Dairy Farming'. In case of Information Need Assessment, with Weighted Mean Score (WMS) of 80.00 'Suitable Crossbred dairy animals' got the first rank in breeding aspect, with 82.22 WMS 'Formulation of ration' in nutrition and feeding aspect and with 83.33 WMS 'Care and management of milch animals' got the highest rank in 'General management' aspect of dairy farming.*

1. INTRODUCTION

The manner in which farmers take decision in the Agricultural Knowledge Information System (AKIS) is very important aspect to deliver the right information at the right time. Flow of information among several stakeholders in the system can decide on which innovation can be assimilated or rejected by the farming system. To understand the intricacies of structure of the system it is very important to analyse the linkage pattern among several actors or stakeholders in the system. In this regard, Freeman (1987) defined National Innovation System as, the network of institutions in the public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies. Thus, role of research institute along with their regional stations in the innovation system should be studied and also how fragmented institutional arrangements and communication affect innovation system should be examined to modify the research endeavour. The information requirements of farmers, the structure of the organizations involved in these activities are issues that need to be explored (Demiryurek et al., 2008) Role of actors in influencing decision making and its effect on Technology Administrative Task Environment (TATE) should be studied. In this study the Linkage Matrix of Information flow in Haryana was studied which would help in finding out the loopholes in the information flow. Findings can also help in research modification regarding Transfer of Technology of Improved Dairy Farming. Decision making pattern of Dairy farmers was identified.

2. RESEARCH METHODOLOGY

The data were collected from Karnal district of Haryana. Three villages namely Budhakhera, Subri and Kulwaheri were selected from the Karnal district where ICAR-National Dairy Research Institute was having significant effect in Local Milk Production Innovation System. From each village 10 farmers were selected who are actively involved in milk production activity. The actors from ICAR-NDRI, were identified by using PRA techniques. Focus group discussion, key informants rating, matrix ranking, etc. as well as several secondary sources of information were gathered to prepare the Actor Linkage Matrix (ALM). The collected data were validated by triangulation. A suitable interview schedule was developed to collect the responses from the dairy farmers. For measuring the information need and decision making structured interview schedule was used. Information need was measured by the following the schedule developed by Subash, S.(2009). To calculate the weighted means score three point continuum scale was used. The dimensions were most needed, needed, least needed with the assigned marks of 3,2 and 1 respectively. Then the response from all the farmers were collected and frequency of response of farmers were multiplied by the assigned weights i.e. 3,2 and 1 and arithmetic mean was calculated.

3. RESULTS AND DISCUSSION

Table No.1 is showing Actor Linkage Matrix which indicates the linkages among different actors. The actors of local milk production innovation system were – ICAR-NDRI, Regional Centre of Lala Lajpat Rai University of Veterinary and Animal Sciences (RS LUVAS), Milk Vendor, Dairy Farmers, Sarpanch, Stockmen, Veterinary Officers (VO), Input Dealer.

Table 1: Actor Linkage Matrix

	NDRI	RC LUVAS	Milk Vendor	Dairy Farmers	Sarpanch	Stockmen	VO	Input Dealer
NDRI	X	3	0	4	2	2	0	1
RC LUVAS	2	X	0	2	1	0	2	0
Milk Vendor	0	0	X	2	2	2	0	3
Dairy Farmers	4	1	2	X	3	3	3	3
Sarpanch	2	0	2	1	X	2	2	2
Stockmen	2	0	1	4	2	X	3	3
VO	0	2	0	4	2	3	X	2
Input Dealer	0	0	3	4	2	3	0	X

(Actors in the rows delivering information and actors in the columns receiving information)

From the Table 1 it can be seen that Dairy farmers from Karnal got strong type of information support from Veterinary Officer, Input dealer, Stockman and NDRI. In the Actor Linkage matrix row suggests delivering information whereas actors or stakeholders mentioned in the column were receiving information. Rogers (1995) emphasizes that the exchange of information (communication) and its diffusion take place within a social system. Thus, this type of analysis involving ALM can help to understand the linkage vis-a-vis information flow among different actors/ stakeholders. In the matrix dairy farmers were the most important stake holders as all the implementation of acquired information is mostly done by the dairy farmers. But it is evident from the matrix that, the linkage between ICAR-National Dairy Research Institute and other actors in the matrix is not that much strong. Maningas et al (2000) stated that, information within the hands of the farmers means empowerment through control over their resources and decision-making processes. Thus to strengthen indirect linage with the dairy farmers, linkage with actors like stockmen and input dealers may be enhanced by providing them formal training in ICAR-National Dairy Research Institute. Despite the attempt at technological innovation transfer, the wide gap between the levels of production which research contends is attainable and that which farmers achieve suggests a missing link (Oladele,1999). This missing link or gap can be filled by disseminating information to the right actors/stakeholders at right point of time.

3.1 Information Need Assessment Analysis of Dairy Farmers

Information need analysis in the field of 'Breeding and Reproduction' showed 'Suitable CB (Crossbred) dairy animals to their region' (80.00) got the highest rank, whereas, 'Castration of scrub bulls' got the lowest ranking with Weighted mean score of 58.89 (Table 2). The farmers of the selected locality were much more concerned with the higher milk yield and they were eager to know about the breeds which can give them more milk. These showed positive attitude of dairy farmers towards dairy farming though they were least aware about the menace of stray bulls as they didn't want to know about the castration of scrub bulls.

Table 2: Information Need Assessment of Dairy Farmers

		Weighted mean score	Rank
Breeding & Reproduction	Suitable CB dairy animals to their region	80.00	I
	High Yielding Breeds of cattle	76.67	II
	Selection of milch animal	73.33	III
	Pregnancy Diagnosis	71.11	IV
	Breeding heifer	70.00	V
	Detection of heat	66.67	VI
	Time of service	64.44	VII

	Artificial insemination	63.33	VIII
	Castration of scrub bulls	58.89	IX
Nutrition and feeding	Formulation of ration	82.22	I
	Complete feed for dairy animals	80.00	II
	Feeding schedule for milch animals	74.44	III
	Colostrum feeding to new born calf	72.22	IV
	Complete feed block	71.11	V
	Information on calf starter and milk replacer for young calves	66.67	VI
	Information on mineral mixture	64.44	VII
Fodder production and management	Round the year fodder production	80.00	I
	Variety of fodder crops	74.44	II
	Conservation of green fodder	68.89	III
	Making of Urea treated straw	58.89	IV
	Chaffing of fodder	47.78	V
General Management	Care and management of milch animals	83.33	I
	Care and management of pregnant animals	77.78	II
	Care and management new born calf	71.11	III
	Clean milk production practices	65.56	IV
	Housing and sanitation management	60.00	V
	Drying of animals	56.67	VI
	Manure and compost management	52.22	VII
	Record keeping	48.89	VIII
Health Care Management	Vaccination Schedule	77.78	I
	Disinfection of shed	74.44	II
	Knowledge and diagnosis of common diseases	66.67	III
	Isolation of sick animals	62.22	IV
	Deworming practices	57.78	V
	Control of external parasite	52.22	VI
	Disposal of dead animals	48.89	VII

Information need analysis in the field of 'Nutrition and feeding' showed that - 'Formulation of ration' (82.22) got the highest rank as the farmers were aware that correct amount of nutritious food can lead to high milk yield (Table 2). Information on mineral mixture got the lowest rank with weighted mean score of 64.44 as the farmers were aware about the positive results of mineral mixture in productive and reproductive performance of the dairy animals. Information need analysis in the field of 'General Management' showed that - 'Care and management of milch animals' got the highest rank with weighted mean score of 83.33. This trend is common in all the parts of India as farmers are aware that care of milking animals can give them more earning but 'record keeping' got the lowest rank under this category with weighted mean score of 48.89. This suggested that the farmers were not aware about the benefits of record keeping and to analyse the actual profit and loss of their dairy farm. In case of 'Health care management' farmers were keen to know about the vaccination schedule of their animals as they were aware that vaccination of animals can ensure better health of animals and it can assure less expenditure on medicines but they were not interested to know about the disposal of dead animals.

3.2 Decision making by the dairy farmers

Table 3: Method of Decision making

Decision making area	Method of Decision making	Frequency	Percentage
Related to Management of Dairy Animals	Self evaluation	30	100.00
	Discussion with spouse	15	50.00
	Discussion with other family members	14	46.67
	Discussion with relatives	10	33.33
	Discussion with friends	7	23.33
	Discussion with progressive farmers	7	23.33
	Consultation with local institutes	17	56.67
	Decision Making based on past experience	19	63.33

	Decision Making based on experience of other farmers	3	10.00
Related to Purchase of Inputs for Dairy Farming	Self evaluation	30	100.00
	Discussion with spouse	17	56.67
	Discussion with other family members	12	40.00
	Discussion with friends	5	16.67
	Discussion with progressive farmers	6	20.00
	Consultation with local institutes	14	46.67
	Decision Making based on past experience	29	96.67
	Decision Making based on experience of other farmers	5	16.67

It is evident from the table 3 that, in both the cases of decision making related to management of dairy animals and purchase of inputs for dairy farming was taken by the farmers after self evaluation though the decision making was influenced by the past experience. This can be seen from the table that, in the case of purchase of inputs for dairy farming 96.67 percent farmers relied on their past experience. Though, in case of decision making regarding 'Management of dairy animals' only 23.33 percent farmers made their decision after consulting progressive farmers. Similar trend was also seen in case of purchase of input, as only 20.00 percent of the farmers took their decision, after consulting progressive farmers. It may be due to the fact the farmers were sceptical about the suggestions given by the progressive farmers, though they somehow relied on local institution for making decision as 56.67 percent and 46.67 percent farmers took decision after consulting local institution in case of 'Management of dairy animals' and 'Purchase of inputs for dairy farming', respectively.

4. CONCLUSION

Different information regarding the advancement of dairy sciences is not directly reaching to the end user, i.e. farmers. The farmers who were having close linkage with reputed research institutes like ICAR- National dairy Research Institute are reaping the benefit of good amount of valid scientific information, but where there is no scope for interacting with this type of research institutes farmers are still lagging in terms of access of worthy information at right time. As the research institutes are only focussing of dairy farmers the other actors like stockmen or input suppliers were completely neglected by them. Thus a proper mechanism should be developed by reputed research institutes to reach these neglected actors in the system for disseminating information to more number of farmers through these actors. Scepticism among different farmer group can be annihilated by providing more and more interaction platforms like *melas* or other social gatherings where progressive farmers can showcase their success, which would in turn motivate other farmers to take dairy business in a more efficient way. Information need analysis is another important segment of dairy development in a village as this can help to understand the actual requirement of the farmers which can guide the extension institution to intervene in a more systematic way.

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