

**A REVIEW :**

Linkage among stakeholders in livestock sector - A technology adoption perspective

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SUMMARY : India is endowed, as the largest milk producer (165.4 million tons) with largest livestock population (512.05 million) in the World. Indian livestock farming embrace major share of smallholder dairy farmers and have a great potential for further improvement and is mandated to bring different stakeholders in dairy sector together, share knowledge and resources in order to engage in concerted action. One of the major challenges of the livestock sector is dissemination of technology, skills and quality services to farmers for improving productivity and quality of the produce, which need to be addressed. Various stakeholders from government, non-government and private sector are involved in livestock research and extension activities. But the major focus of all these stakeholders goes on animal health care activities and underscores livestock extension activities. Due to lack of proper linkage between these stakeholders, the research carried out in various institutions are not in accordance with the priority needs of dairy farmers and reduces the fitness of technology in field level. In order to tackle the present situation, it is essential to relook and reframe policies that assure effective linkages among researchers, extensionist, decision-makers and farmers, who have complementary expertise.

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BACKGROUND AND OBJECTIVES

India is endowed, as the largest milk producer (165.4 million tons) with largest livestock population (512.05 million) in the World (GOI, 2017). The per capita availability of milk in India has increased from 176 grams per day in 1990-91(Economic review, 2015) to 355 grams per day by 2016-17(GOI, 2017). But the average milk yield of Indian cattle is 1172 kg/animal, which is about half of the global average, 2200 kg/cow (FAOSTAT,

2014). Before focusing on improving productivity, we should ensure, whether there is enough effort to educate and train our livestock farmers.

Indian livestock sector has sufficient number of diverse actors with complementary expertise (Sulaiman, 2009) and are contributing their valuable service in fostering the livestock development in the country. However, a lot of scope exists to improve various dimensions of livestock development and this would necessitate synergy and

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convergence among the different livestock relevant organizations (Anonymous, 2011). For ensuring convergence, it is extremely important that all the stakeholders in livestock research and extension working for dairy and livestock development are conscious about their respective roles and maintain proper linkage among them.

Linkage:

The concept of linkage implies the communication and working relationships established between two or more organizations pursuing commonly shared objectives in order to have regular contacts and improved productivity (Mondal, 2014). Linkages are channels for the two-way flow of information, knowledge and resources among the stakeholders of a defined system (Aflakpui, 2007). As opined by Reddy (2006), linkages are categorized into three types *viz.*, production linkage, technology generation linkage and post production linkage. production linkage refers to maintenance of regular flow of information from its source to the clientele system through government and non-government agencies including input supply and services. Technology generation linkages entails the development of new technologies to meet the emerging problems faced by the clientele system as well as contingency measures to manage pest/disease outbreaks and natural calamities, while post production linkages are with marketing agencies both for domestic and export markets to fit the products and services to the consumer preferences and linkages with storage, transportation, packaging and agro-industries for value addition.

Linkage is also categorized as forward and backward linkage (Anonymous, 2013), forward linkage includes collective marketing, processing and market led agriculture production, while backward linkage refers to its input services like seeds, fertilizers, credit, insurance, knowledge and extension services.

Need for linkage:

Livestock sector has many actors in State and Central level *viz.*, ICAR Research Institutes, Veterinary Universities, National Dairy Development Board, Department of Animal Husbandry, Dairying and Fisheries, Dairy Co-operatives, Non-Governmental Organizations, Private Dairy plants, input supply agency etc. Rao *et al.* (1995) pointed out that researchers and extension

agencies are often unaware of farmers' priorities. This leads to development and promotion of technologies that are seldom relevant for farmers. Though so many technologies are developed and commercialized by the stakeholders, there is lack of direction while percolating to end users. Moreover, the changing needs and demands of end users *i.e.* farming community and entrepreneurial/dairy industry are not entirely met by technology generated under existing National Agricultural Research System (NARS) (Swaminathan, 2004). In order to avoid duplication of efforts and to ensure effective technology reach among farmers, all the actors involved in livestock sector should in harmony. Participation of key stakeholders reduces the risk of the development of inappropriate technologies and is more parsimonious (Chambers and Jiggins, 1987) and improves the fitness of technology among farming community. There is rampant scope to improve the present condition of farmers' information access through team efforts of different actors. Research and extension need to be in synergy, so as to motivate and encourage the farmers towards scientific dairy farming.

The roles and functions of each stakeholder should be clearly defined, so as to avoid conflicts and duplication of work/services. Performance of the Indian Agricultural Innovation System depends on two crucial aspects, its ability to bring in institutional change and the creation of effective mechanisms to co-ordinate its diverse actors. (Sulaiman, 2009). Because of the complexity of the existing social system, each stakeholder should be acquainted with their clientele group. It requires understanding local culture, group dynamics, social power relations, gender roles, communication patterns and motivates farmers towards the promising technologies (Suvedi and Kaplowitz, 2016).

Therefore, stakeholders at all levels - local, regional and national- are bound to have different perspectives on how to tackle farmers problems and challenges of the dairy sector and to improve productivity. In the globalized economic situations, cooperation and partnership are essential to address the problems to avoid duplication of efforts, to learn from each other's experience and achieve cost economy.

Importance of linkage:

Multi-stakeholder approach was proposed for use in agricultural research and development, as it was

successfully used in a few other sectors in some countries and reported a surge in productivity (Hemmati, 2012). Under this arrangement each stakeholders group carries out the task they do best based on their competencies, resource domain and mode of operation (Adekunle and Fatunbi, 2012). Agwu *et al.* (2008) equated innovation system approach in agriculture to an invisible orchestra characterized by coherence, harmony and synergy. It is an interactive learning process in which stakeholders in interactions with each other, play key roles in bringing new products and new processes into social and economic use.

Agricultural information is defined as the data for decision making and a resource that must be acquired and used to make an informed decision (Kaske, 2007). Timely information regarding improved technologies will boost the production and productivity of livestock farmers. Performance of farmers in terms of production and productivity can be improved with appropriate technology adoption in right time. In the last two decades, agricultural and dairy information has increased rapidly however the effective transfer of agricultural information/knowledge is still a big challenge (Kaur and Kaur, 2013).

Open information transfer system in combination with interaction among the stakeholders is necessary for improved agricultural information transfer system (Bouma, 2010). Strengthening the linkage between all the innovation actors is important to hasten the information/knowledge or technology transfer system and also to increase the effectiveness of the developed and disseminated technologies. Establishing efficient knowledge/information transfer system in agriculture would help to attain efficient operation of agricultural system (Carrascal *et al.*, 1995).

The overall agricultural system performance can be improved by having strong linkage between research, education, extension, farmer and other stakeholders (Van Crowder and Anderson, 1997) since it improves the efficiency of technology transfer and adoption. Agricultural information empowers farmers/farmer-based organizations to be conscious to select and adopt technologies in an informed way (Douthwaite *et al.*, 2001). Effective linkage among extension system, scientists/researchers farmers and other stakeholders improves their network, they become eager to upgrade themselves and to learn new things. It helps them to easily communicate with all the involved parties, to assess the service demand of farmers and look for solutions for the

problems on the spot. Adoption rate of the transferred technology and the impact, it brought on the users/farmers economy is the main measure of success of research and extension or technology. This calls for the agricultural innovation system, aimed at fostering inclusive networking among sets of heterogeneous actors (Klerx *et al.*, 2009) rather than following the linear information transfer system.

The main factors affecting the effective transfer of agricultural and dairy technological packages to the end-users are knowledge level of the information users, access to information of end users and readiness of farmers for adoption (Rasouliazar and Fealy, 2013). The effective linkages among research, extension and farmers is essential to formulate research problems in accordance with the priority needs of dairy farmers and the knowledge generated in different institutes should be transferred to the farmers.

The goal of agricultural linkage enclose generating and transferring agricultural technological packages to enhance productivity, reducing loss and improving the livelihoods of the beneficiaries in particular and the national economy in general (Ayalew *et al.*, 2013). The technologies can be in the form of information or knowledge. Poor linkages between different stakeholders impeded the development and transfer of technology appropriate for resource poor farmers. Involvement of all innovation actors in the information exchange, the use of farmers' indigenous knowledge and farming systems are crucial (Aflakpui, 2007) to enhance information transfer, technology adoption rate of farmers and make genuine decision on agricultural investment (Jabbar and Ahuja, 2015).

This emphasize the need and importance of catalyze stakeholder commitments to action and on-the-ground improvements through exchange and dissemination of knowledge and experience. Each stakeholder possesses unique and complementary strengths and should be best positioned to create fruitful results.

Changing needs of livestock farmers:

Trends in rearing livestock is changing and the great numbers of livestock are now kept by people without traditional background, calls for information on different aspects of livestock production and also causes distinct pressure on stakeholders to educate the dairy farmers. It is expected that farmers' education and extension contacts enable them to acquire, receive and decode new

information to evaluate benefits of alternative sources of economically useful information and to have earlier access to such information (Duraisamy, 1992 and Adekun and Akinyemi, 2003).

Earlier research studies indicate the gaps in updation of knowledge among clientele and the key players of information dissemination. Education of the dairy farmers, which is crucial in livestock development, was given low preference (Rao and Kherede, 1985). The extension management in Animal Husbandry is the weakest link in the whole process of technology transfer (Sen, 2002). The contribution in providing educational (extension) support for farmer capacity building is limited in practice. Similarly, there were no arrangements to assess the spread of extension messages, or to feed-back findings from the field to planners or researchers. (Chander *et al.*, 2010). The veterinary officers and para-vets of the State Animal Husbandry Department are the only functionaries who can effectively deliver livestock related information to the farmers but their main focus is on health care (Sulaiman and Van Den Ban, 2003). The activities relating to livestock extension are sporadic and spread over time and space and do not meet the requirements of a vast majority of farmers (Lehmann *et al.*, 1994). The problem is further compounded with the neglect of policy makers and by researchers towards livestock production extension (Morton and Matthewman, 1996 and GOI, 2002) since the animal health extension gets precedence over production extension in the country. These observations infer the need of a multi-disciplinary team of experts, in each block with all the key stakeholders and conduct hands on training, capacity building programmes, veterinary clinic and awareness campaigns in field level.

In order to facilitate improved returns from research, the mode of technology transfer needs to ensure that the livestock farmers reap the benefit of investment in livestock research. Involvement of multiple stakeholders guarantees continuous interaction and feedback between different actors at different stages of the interaction, which draws on the knowledge of relevant actors at each stage. This kind of platform can be enhanced by the use of information and communication technology including internet.

Change in perception about technologies:

Rathod and Chander (2015) pointed out that

perception of researchers and farmers on the appropriateness and usability of livestock technologies vary significantly. Technologies, which researchers perceive as important and have recommended for adoption, for which farmers have poor favourable opinion, which may be due to low aware or lack of proper extension services among farmers. This situation underscores the need for paying attention to the livestock extension activities in the country (Chander *et al.*, 2010). The rate of adoption of livestock-related technologies in smallholder crop-livestock systems worldwide is consistently low. Absence of an effective extension machinery and lack of access to institutional finance or inputs is a major constraint in improving productivity by adopting latest technologies (GOI, 2013).

Sulaiman and Hall (2002) indicated that over the last decade, there has been increasing realization of the importance of tasks such as community mobilization, conflict management, problem solving, education and human development and need for extension staff to acquire social skills to perform these tasks. There is sufficient evidence that frequency of extension contact and participation with extension agent are positively related to the knowledge and adoption of dairy technologies (Rao *et al.*, 1995). Rao *et al.* (2008) in his study on 'quality veterinary education for effective livestock service delivery' reported that the field veterinarians need to develop capacities in utilization of livestock byproducts, value addition, import and export of livestock products, entrepreneurship, sanitary and phytosanitary standards, addressing fodder crisis and super specialty in clinical subjects. Now-a-days the expectation and roles of livestock extension is changing and it is obvious that a single agency /institution can't answer the changing needs of the society. Thus, sharing information and joint planning (Rao, 2013) would benefit all the stakeholders and thereby contribute to the capacity of the system.

The effectiveness of extension will be influenced by various factors such as identifying location specific need among farmers, values and practices followed by farmers, perceived attributes of technologies as, relative advantage, compatibility, complexity, observability and trialability and cost-effectiveness of technologies. Timely, need based and focused information will help the stakeholders and farmers to take informed decisions.

Strengthening linkage among stakeholders:

The Honorable Prime Minister has given the vision of ‘doubling the farmer’s income by 2022’. Dairy sector has a key role to achieve this goal and the government has announced a number of innovative measures. As opined by Rao *et al.* (2013) extension should play a pivotal role in influencing policies rather than focusing only on technology dissemination, as it has a strong influence on technology dissemination. Development programmes should be framed with active consultation of the stakeholders with the end users. Programmes primarily need to be location specific and need based, to reap the intended benefits by the farmers. Extension programmes should focus on technology led growth. Each stakeholder involved in the process should be focused, interconnected with each other and have good technical knowhow with market and global orientation and support farmers to deal with climate and market risks.

Conclusion:

The stakeholders need to understand the role played by them in providing livestock extension services and ways for test down important programmes for extension services. The popular and successful extension programmes like ATMA, Farmer FIRST make extension system farmer focused and accountable. For successful transfer of new technologies, meticulous planning and strong linkage among different stakeholders is essential. Working in partnership will help different stakeholders in imparting scientific knowledge, learn more about the performance of the technology in field conditions themselves, and to make improvements of their own. The importance of these learning and modification processes will have a greater impact on the rate of adoption of recommended technologies. The need for co-ordination and linkage between different stakeholders in livestock research and development, the limitations and constraints in developing linkage and convergence at the ground level need to be identified. The way technologies disseminated should be reinvented, to ensure sustainable dairy and livestock development.

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