

Impact of technological interventions on buffalo based farming systems

V B DIXIT¹, A BHARADWAJ², R K SHARMA³ and R K SETHI⁴

Central Institute for Research on Buffaloes, Hisar, Haryana 125 001 India

Received: 6 December 2008; Accepted: 14 June 2009

ABSTRACT

The study was conducted in 4 adopted villages of the institute and 200 respondents constituted the study sample. The sample had 100 adopters and 100 non-adopters of different technological interventions. A new approach was followed to identify different farming systems on the basis of buffalo herd size and land holding size. By taking into account these 2 criteria simultaneously, 9 groups of farming system were identified. Out of 9, only 3 groups of farming systems were having orientation towards dairy with buffalo as main enterprise. Three new technological interventions, viz artificial insemination, area specific mineral mixture and balanced feeding were introduced and their impact was examined. The study indicated that adopters differed significantly with regard to their attitude, knowledge and adoption about these 3 innovations from non-adopters. The study also revealed that buffalo oriented farming systems differed significantly with regard to their attitude, knowledge and adoption about these interventions than other farming systems merged together.

Key words: Buffalo, Farming systems, Impact, Technological interventions

India has over 98 million buffaloes constituting about 50% of the total world population. Being a triple purpose animal providing milk, meat and draught, the contribution of buffaloes in country's economy is immense. Though buffaloes are less in numbers than cattle yet they currently produce about 56 million metric tonnes of milk, which is about 55% of the total milk produced in the country. Despite changes in consumption patterns the number of vegetarians is still very large and milk and milk products are the major source of good quality protein in their diets. Therefore, buffalo has paramount importance as a dairy animal in India.

Buffalo is an integral and often essential part of many mixed farming systems in Haryana (Taneja and BIRTHAL 2004). Farming system research recognizes that the household, crop and animal sub-systems are closely integrated and interdependent. The household provides land, labour, capital and management; crops provide food, feed and fuels; animals provide milk, meat, manure, draught power and capital to other sub-systems (Singh *et al.* 1995). Buffalo production sub-systems in particular need to be viewed from a farming systems' perspective due to their interdependency with other sub-systems. Therefore, it was considered imperative to adopt a farming system's approach to study the impact of technological interventions on different buffalo based farming systems in Haryana.

Present address: ¹Principal Scientist, ³Senior Scientist, ⁴Director.

MATERIALS AND METHODS

The Central Institute for Research on Buffaloes has been doing intensive extension work in 8 adopted villages. Thaska, Chikanwas Durjanpur and Juglan were adopted in Phase-I while Kheri, Dhiktana, Kirara and Jewra were added to this list in Phase-II. Juglan from phase-I and Dhiktana from phase-II were selected randomly for the study and 50 registered farmers (adopters) from each village were also selected randomly. A matching sample of 50 unregistered or non-adopters was also taken from each village. Thus, 50 adopted and 50 non-adopted farmers were selected from each village and 200 farmers constituted the study sample.

Attitude of farmers towards artificial insemination (AI), mineral mixture and balanced feeding was measured with the help of modified scales developed by Tyagi and Sohal (1979), Natraju and Chennegowda (1986) and Dixit and Narwal (1991). Similarly, to ascertain farmers' level of knowledge and adoption, tests developed by Pachauri (2005) were used. The scores for balanced feeding that farmers could attain ranged between 0 and 15 for the knowledge test and 0 and 10 for the adoption test. For another intervention, viz. mineral mixture, it ranged between 0 and 10 for knowledge and 0 and 8 for adoption.

RESULTS AND DISCUSSION

The study included 200 respondents selected for this study, and were classified on the basis of their number of animals

Table 1. Distribution of farmers in different farming systems

Nomenclature	Frequency		Percentage
	Adopters	Non adopters	
Small farmers and small buffalo owners	32	32	32
Small farmers and medium buffalo owners	18	20	19
Small farmers and large buffalo owners	6	5	5.5
Medium farmers and small buffalo owners	7	6	6.5
Medium farmers and medium buffalo owners	10	12	11
Medium farmers and large buffalo owners	7	5	6
Large farmers and small buffalo owners	5	4	4.5
Large farmers and medium buffalo owners	7	10	8.5
Large farmers and large buffalo owners	8	6	7.7
Total	100	100	100
Small farmers: 0-5 acres	Small buffalo owners: buffaloes (adult) 1-4		
Medium farmers: 6-10 acres	Medium buffalo owners: buffaloes (adult) 4-8		
Large farmers: > 10 acres	Large buffalo owners: buffaloes (adult) >8		
Small farmers included landless and marginal farmers also.			

and possession of land holdings. Swaminathan (1990) and Singh and Schiere (1995) reported that a farming system is composed of crops, animals besides other components. Therefore, these aspects were considered simultaneously in a matrix to identify different farming systems. Thus, on the basis of merging of rows and columns, which constituted farmers having different number of buffaloes and land

holding sizes, 9 farming systems having different traits were identified and nomenclature was given to them. It was further noticed that out of 9 only 3 groups of farming systems (large buffalo owners having more than 8 buffaloes) were having orientation towards dairy while the rest were designated as mixed farming systems (Table 1).

The Table 1 also indicated frequency of adopters and non adopters and it was seen that 20% farming systems had orientation towards dairy as they possessed more than 8 buffaloes. About one-third (32%) of the respondents were small farmers having just 1 to 4 buffaloes. Rests of the farmers were having 4 to 8 buffaloes. Nardone *et al.* (2003) reported that in Mediterranean area more than 50% animals were reared in small dairy farming systems. Similar findings emanated from Mexico also as Ortega *et al.* (2007) observed that majority of dairy farming systems were small in size.

Three innovations, viz. AI, mineral mixture and balanced feeding were disseminated by the institute in the adopted villages on a large scale. Since the inception of Field Progeny Testing (FPT) Programme in 1998 more than 9 000 artificial inseminations were done in these villages. Adopters of AI were the respondents who had registered their animals under FPT and had gone for AI at least once. To study the impact, attitude of respondents towards AI, their knowledge and adoption of the practice was examined. Therefore, an attempt was made to study the impact of AI on different farming systems and results are presented in Table 2. It is apparent from the Table that adopters' mean attitude (8.79), knowledge (13.17) and adoption (6.93) scores were higher than the non adopters. In order to find out significant difference on these dimensions z-test was applied. The Table indicated that z-values of 4.12 with regard to attitude, 6.13 of knowledge and 3.87 in adoption were significant. Thus, attitude, knowledge and adoption levels of adopters were significantly higher than the non adopters of AI. Similar findings were reported by Dixit and Narwal (1991). This was perhaps due to the reason that the institute worked extensively in the

Table 2. Impact of AI on different farming systems

Farming systems	Mean attitude score		Mean knowledge score		Mean adoption score	
	Adopters	Non adopters	Adopters	Non adopters	Adopters	Non adopters
1	8.86	6.64	11.12	10.08	6.41	6.12
2	7.54	7.12	12.16	10.91	6.39	6.13
3	9.86	8.16	12.94	11.02	6.86	6.23
4	7.12	6.32	11.45	11.01	6.14	6.31
5	8.16	7.16	12.48	11.06	6.62	6.43
6	9.94	8.02	13.02	11.71	7.61	6.47
7	8.16	7.12	12.41	11.32	6.95	6.49
8	8.29	7.16	13.09	11.45	6.88	6.66
9	9.96	7.67	14.02	11.86	7.86	6.86
Overall	8.79	7.32	13.17	11.54	6.93	6.38
z-values	4.12*		6.13*		3.87*	

*Significant at 5% level of significance.

Table 3. Impact of balance feeding on different farming systems

Farming systems	Mean attitude score		Mean knowledge score		Mean adoption score	
	Adopters	Non adopters	Adopters	Non adopters	Adopters	Non adopters
1						
1	12.00	10.81	9.61	8.61	6.41	6.12
2	12.74	11.61	9.62	8.43	6.43	6.23
3	12.96	11.96	9.94	8.91	6.47	6.33
4	12.86	11.41	10.14	8.47	6.49	6.21
5	13.62	12.81	10.12	8.68	6.62	6.44
6	14.31	13.61	10.43	8.90	6.73	6.52
7	12.84	10.84	10.46	8.71	6.86	6.24
8	14.03	14.02	11.02	8.96	6.68	6.34
9	14.61	14.61	11.45	8.94	6.91	6.66
Overall	13.83	12.16	10.98	8.87	6.83	6.41
z values	3.81*		6.43*		3.57*	

*Significant at 5% level of significance.

adopted villages under FPT programme and large numbers of AI done yielded desirable result with a conception rate of about 43%. Therefore, farmers were by and large convinced about the practice and they adopted AI.

Impact of balanced feeding was also examined on different farming systems and data pertaining to this aspect has been presented in Table 3. It is apparent from the table that adopters had significantly more favourable attitude (13.83) than non adopters (12.16). Adopters were registered farmers under FPT who received frequent advice of the scientists of the institute on balanced feeding. Similarly, knowledge of the adopters (10.98) was significantly higher than the non adopters (8.87). It was due to this reason that adopters regularly demonstrated the practice of balanced feeding. The study also revealed that the respondents differed significantly with regard to the adoption of balanced feeding. This was evident from the z-value of 3.57. The earlier study of feeding practices being followed in the adopted villages revealed that farmers were still using traditional practices (Dixit *et al.* 1998). However,

due to regular interactions between farmers and the scientists in adopted villages the need of balanced feeding was understood. Therefore, the practice of balanced feeding was put into use by the farmers in majority. It is due to this reason that they had better attitude, knowledge and adoption than the non adopters.

Practice of use of mineral mixture in the diet of buffaloes was also disseminated on a large scale in the adopted villages. Impact of this technological intervention on their attitude, knowledge and adoption was analysed and is shown in Table 4. Adopters' mean attitude (6.42), knowledge (9.01) and adoption (4.93) was significantly higher (Table 4) than the non adopters as indicated by the significant z-values of 3.61 and 5.69 and 3.47 in attitude, knowledge and adoption, respectively. Dixit *et al.* (2003) reported that majority of farmers were not using mineral mixture in the daily diets of animals. However, due to concerted extension efforts since then, large scale dissemination of mineral mixture started and the farmers regularly demonstrated the use of mineral

Table 4. Impact of mineral mixture on different farming systems

Farming systems	Mean attitude score		Mean knowledge score		Mean adoption score	
	Adopters	Non adopters	Adopters	Non adopters	Adopters	Non adopters
1	6.12	5.13	8.13	6.13	4.62	3.89
2	6.39	5.43	8.32	6.74	4.71	4.01
3	6.76	5.49	8.46	6.43	4.84	4.12
4	6.13	5.81	8.91	7.01	4.71	4.13
5	6.14	5.63	9.31	7.34	4.96	4.09
6	6.89	5.86	9.68	7.56	5.01	4.16
7	6.09	5.01	9.13	7.81	4.86	4.71
8	6.31	5.21	9.45	7.96	5.02	4.76
9	6.94	5.38	9.74	8.02	5.74	5.01
Overall	6.42	5.44	9.01	7.22	4.93	4.32
z values	3.61*		5.69*		3.47*	

*Significant at 5% level of significance.

mixture in the diets of their animals. Initially, mineral mixture was supplied free of cost but now a large chunk of adopted farmers are using this technological innovation.

The frequency of 3 dairy oriented farming systems as mentioned in Table 1 was 9, 17 and 14 for small, medium and large buffalo oriented farming systems. Thus, no statistical application was possible to draw any inference from these numbers. Therefore, all these buffalo based farming systems were merged to have single dairy oriented farming system. In order to find out difference in the attitude, knowledge and adoption level with regard to three technological interventions z-test was applied. The results revealed that dairy oriented farming systems differed significantly with regard to attitude, knowledge and adoption of buffalo husbandry practices as indicated by the z-values of 4.54, 5.13 and 3.86, respectively, than the other 6 remaining farming systems identified. It might be due to the reason that they valued these technological interventions better than their counter parts i.e. other 6 farming systems merged together.

It is extremely vital to identify different types of farming systems for speedy transfer of technology to the end users. The study indicated that dairy oriented farming systems appreciated more technologies like artificial insemination in buffaloes, mineral mixture supplementation and balanced feeding. Therefore, concerted extension efforts need to be made to popularize the new innovations in buffalo husbandry through dairy oriented farming systems.

REFERENCES

- Dixit V B, Bharadwaj A, Lal D and Saini A K. 2003. Existing feeding practices in buffaloes: A critical analysis. *Indian Buffalo Journal* **2**: 18–20.
- Dixit V B, Lal D, Sethi R K and Arora U. 1998 Assessment and refinement of traditional feeding system in Murrah buffaloes. *Indian Journal of Dairy Science* **51**: 177–81.
- Dixit V B and Narwal R S. 1991. Farmers' knowledge and reactions about artificial insemination in buffaloes. *Maharashtra Journal of Extension Education* **10**: 35–38.
- Nardone A, Djemali M and Guellouz M. 2003. Dairy farming systems: critical analysis and identification of the factors limiting their development in the Mediterranean area. *Proceedings of symposium on prospects for a sustainable dairy sector in Mediterranean*. Hemmamet, Tunisia, pp. 89–95.
- Natraju N S and Chennegowda N B. 1986. Some aspects about dairy innovations. *Dairy Guide* **8**: 41–49.
- Ortega E, Espinosa A, Bastida E and Martinez T. 2007. Small scale dairy farming in highlands of Mexico: Technical, economical and social aspects and their impact on poverty. *Experimental Agriculture* **43**: 241–56.
- Pachauri R A. 2004. 'A study of problems and prospects in adoption of animal husbandry practices with special reference to Murrah buffaloes in Haryana.' Ph.D. Thesis, Dr B R Ambedkar University, Agra.
- Singh K and Schiere J B. 1995. Livestock, crop residues, management and technological change. *Handbook for Straw Feeding Systems*. Indian Council of Agricultural Research, Krishi Bhavan, New Delhi, pp. 1–10.
- Swaminathan M S. 1990. Need for food security act. *The Hindu, Survey of Indian Agriculture*. Madras, India, pp. 8–15.
- Taneja V K and BIRTHAL P S. 2004. Role of buffalo in food security in Asia. *Proceeding of 4th Asian Buffalo Congress on Buffalo for Food Security and Rural Employment*. Vol. I, pp. 1–12, New Delhi.
- Tyagi K C and Sohal T S. 1979. Role of knowledge in dairy innovations. *Indian Journal of Extension Education* **16**: 16–24.