Indian J. Anim. Prod. Mgmt. Vol. 36 (1-2): 27-34, 2020

Farmers field school: An appropriate extension method for transfer of technologies and empowering dairy farmers: a case study from central Gujarat

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Received: 14.02.2020; Accepted: 15.04.2020

ABSTRACT

A study was conducted to assess the impact of Farmer Field School on transfer of technologies and empowering dairy farmers of Panchmahal district of central Gujarat, India. ICAR – KVK, Panchmahal established Farmer Field Schools (FFSs) at the village level for providing a platform for knowledge building and sharing agro-ecology where farmers of cluster villages meet, interact and find solutions about their problems locally. The present study was conducted on Farmer Field School for clean and quality milk production techniques at KVK, Panchmahal. The results of the study revealed the means of knowledge and adoption index 38.79 and 95.55 and 27.97 and 83.09 percent for pre and after FFS, respectively. The impact of FFS was found to be 55.94 percent over the existing knowledge and adoption by the trained respondents which were found to be substantial increase over the pre FFS respondents on various aspects of improved clean and quality milk production techniques after intervention of Krishi Vigyan Kendra, Panchmahal. The average milk yield of cow and buffaloes was recorded 10.49±0.41and 7.88±0.39 kg per day, respectively after technological interventions under Farmers Field School which was higher as compared to (8.11±0.57 and 6.37±0.49 kg per day) traditional dairy farming, respectively. The average increase in milk production of cow and buffaloes was recorded 33.12 and 27.32 percent, respectively after conducting FFS as compared to traditional system. Based on the study, it may be inferred that the Farmer Field School as a model was found the most appropriate extension tool for improving in clean and quality milk production which will not only be helpful in production of quality milk but also improve the socio-economic conditions of the farming community.

Key words: Adoption, Dairy farming, FFS, Impact, Knowledge, Respondents

Farmer Field School is a participatory and group-based extension method, serve as a platform for mutual learning among trainees and trainer to disseminate and tune the production technology in such a way that adoption rate becomes high. The field school offers farmers an opportunity to learn by doing, by being involved in experimentation, discussion and decision-making. Interactions, discussions and hands on training provide an opportunity to revive and sustain indigenous traditional knowledge while making improvements through improved technology. Farmer Field Schools approach was based on the fact that farmers learn optimally from field observation and experimentation. It is a long season training programme of farmers involving participatory activities, hands on analysis and decision making. The objective of the field schools is to give farmers an opportunity to learn and achieve greater control over the conditions they face daily in their fields. Farmers who participate in field schools learn how to reduce the cost of production in dairy inputs, improve management, enhance productivity and increase their incomes through improved technologies. From this initial base, farmers can move into other crops and diversify into other activities related to their agro-ecosystems.

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The ultimate aim of the field school is to improve farmers' knowledge and decision making abilities, so they can build up sustainable agricultural systems and enhance socio-economic conditions of their families and communities. A typical example of participatory extension method is the farmer field school (FFS) approach, now practiced in at least 78 countries[1]. Implementing a successful field school requires that those involved in its establishment and management have the right mind set (attitude change) to deal with the challenges and demands of the approach. The overall objectives of FFS are to bring farmers together to carry out collective and collaborative inquiry with the purpose of initiating community action and solving community problems[2]. Keeping the above facts in view, farmer field school was conducted on clean and quality milk production at KVK, Panchmahal with the following objectives:

1. To know the impact of FFS on knowledge and adoption level of clean and quality milk production techniques of dairy farmers.
2. To compare the production performance of dairy animals of scientific interventions of FFS trainees with traditional farmers practices.
3. Economic analysis and its comparison of scientific interventions of FFS with traditional farmers practices.

MATERIALS AND METHODS

ICAR – KVK, Panchmahal established Farmer Field Schools (FFSs) on different aspects animal husbandry at the village level to provide a platform for knowledge building and sharing on agro-ecology where farmers of cluster villages meet, interact and find solutions locally. The present study was conducted on Farmer Field School on clean and quality milk production techniques were planned at KVK, Panchmahal during 2018-19. Under this programme, 28 farm woman, reared dairy animals, were selected randomly from *Bediya* villages of Kalol taluka of Panchmahal district. The major constraints faced by the trainees in livestock farming were collected from the respondents and ranked accordingly. Based on the constraints prioritized, the Farmer Field Schools was planned to conduct. The FFS was conducted weekly in the farm, and teaching was associated with front line demonstration on dairy husbandry activities to learn the new technologies by "learning by doing". The group was sub-divided into four sub-groups with seven members in each to complete field observations such as data related to milk production and reproductive performance of the selected animals in both groups (Scientific interventions and conventional). Pre – evaluation test was conducted for each group on the selected FFS topic. The trainee's knowledge level was also assessed. In each class, group activity was assigned to them to learn the package of practices by themselves. The livestock farms were selected and the FLDs on the different improved technologies, where the operation skill is needed, were conducted. The classes were completed once the group accepts the results obtained from the demonstrations, generally 3-4 months. In between exposure visits/ field days were arranged to provide technological know-how to the farmers about new technologies by "Seeing is Believing" in different scientific managed dairy farms. Evaluation for FFS was conducted after one year with all trainees. The impact study on knowledge and adoption level of respondents was conducted on different managemental aspects of practices, viz., housing, feeding, health care, cleaning of animals before milking, cleaning of milking utensils, personal hygiene of milking person, milking techniques and post milking management was assessed. The information regarding knowledge were recorded on scale point of fully knowledge, considerable knowledge, least knowledge and no knowledge were analyzed with score value of 3, 2, 1 and 0, respectively and adoption rate was calculated with the scale point of fully adopted, partially adopted, ready to adopted and not adopted were analyzed with score value of 3, 2, 1 and 0, respectively. The knowledge and adoption level of the respondents was measured as suggested[3]. The data related to milk yield and fat percent was recorded from selected 20 animals (10 cows and 10 buffaloes) after scientific interventions such as feeding of balance ration, green fodder, supplementations of mineral mixture, common salt, *pashu chocolate* and timely deworming of dairy animal by FFS trainees

and 20 animals as control group (10 cows and 10 buffaloes) from non trainees of FFS with traditional farmers practices. The animals were selected nearly at the same lactation stage, body weight, milk yield and parity in both groups. A partial budget analysis measures was used in those items of expenditure and incomes. Therefore, the cost of roughage, concentrate, mineral mixture, common salt and *Pashu chocolate* have been considered. The cost of labour was not considered for calculation because it was same in both groups, as family members used to do the management of livestock. The costs of dry fodder, green fodder, concentrate mixture, common salt and *Pashu chocolate* was calculated on basis of market rate prevalent during the study period. Selling price of milk received by farmers during study period was calculated. The collected data were subjected to basic statistical analysis as per[4].

RESULTS AND DISCUSSION

The respondents have the affinity for animal component and traditional habit of rearing dairy animals like cow and buffalo. The results of the study revealed that the farmers field school (FFS) has highly influenced the knowledge and adoption level of respondents towards recommended improved clean and quality milk production practices in the study area.

Knowledge level of respondents

Analysis of data revealed that the average means knowledge index pre and after Farmer Field School was recorded 38.79 and 95.55 percent, respectively. The results of study revealed that 100 percent farm women had knowledge on the various improved clean and quality milk production practices namely, provision of ventilation in animal shed, cleaning of animal shed daily, use of bedding material in animal shed, mineral mixture feeding, common salt feeding, not to fed fusty fodder before milking, provide clean and fresh water to milking animal for drinking, vaccinate milking animals regularly, deworming of milking animals regularly, washing udder and teats before milking, examine udder, teats and milk regularly, use clean, dry and hygienic utensils for milking purpose, use separate utensils for milking of healthy and sick animal, milking by healthy person, washing hands with plain water before milking, protect milk from being exposed to coughing and sneezing, use in full hand milking techniques, before starting milking drop out few strips of milk from each teat, complete the milking within 6-7 minutes, three times milking in a day for high yielding animal, keep animal in standing position for 15 minute after milking, sieving of milk for removal of the dirt and transfer the milk to processing unit immediately after milking after FFS, whereas the corresponding knowledge level for the same practices for the respondents before FFS were 56.66, 53.67, 11.90, 34.52, 34.52, 22.61, 3.57, 45.24, 59.52, 30.95, 58.80, 64.29, 51.19, 28.57, 61.90, 61.90, 73.80, 13.10, 30.95, 30.95, 51.19, 3.57, 82.14 and 84.52 percent was recorded respectively. The overall 146.33 % increase in the knowledge on various aspects of improved clean and quality milk production practices after FFS organized by Krishi Vigyan Kendra, Panchmahal. More or less similar results were also reported[5,6,7,8,9,10&11].

Table 1. Knowledge and adoption indices of improved clean and quality milk production practices

S. No.	Clean and quality milk production practices	Knowledge Index (%)		Adoption Index (%)	
		Pre – FFS	After – FFS	Pre – FFS	After – FFS
1.	**Housing management**				
i	Ventilation in animal shed	56.66	100.00	23.80	72.33
ii	Proper space for each animal	21.33	96.43	14.28	70.00
iii	Clean animal shed daily	53.67	100.00	47.61	100.00
iv	Use of bedding material in animal shed	11.90	100.00	3.57	53.57
2.	**Feeding management of milking animals**				
i	Balance ration feeding	23.81	84.52	11.90	70.24
ii	Mineral mixture feeding	34.52	100.00	26.95	100.00

iii	Common salt feeding	22.61	100.00	19.05	100.00
iv	Formulation and preparation of balance ration	11.90	80.95	9.52	65.47
v	Not to feed fusty fodder before milking	3.57	100.00	02.57	100.00
vi	Provide clean and fresh water to milking animal for drinking	45.24	100.00	35.71	100.00
vii	Feeding chaffed green and dry fodder	28.57	94.05	7.14	59.52
3.	**Health Care of milking animal**				
i	Vaccinate milking animals regularly	59.52	100.00	48.81	89.29
ii	Deworming of milking animals regularly	30.95	100.00	13.10	94.05
iii	Dusting of milking animals regularly	49.86	92.80	45.24	89.29
4.	**Cleaning of animals before milking**				
i	Washing entire animal daily	36.90	92.86	11.90	70.95
ii	Wash udder and teats before milking	58.80	100.00	49.52	100.00
iii	Wipe udder and teats with dry cloth after udder washing	11.90	67.85	8.33	48.81
iv	Use of kmno4 in water for cleaning of udder and teats	4.76	62.14	2.38	20.23
v	Examine udder, teats and milk regularly	64.29	100.00	54.17	100.00
5.	**Cleaning of milking utensils**				
i	Use clean, dry and hygienic utensils for milking purpose	51.19	100.00	37.38	97.62
ii	Use separate utensils for milking of healthy and sick animal	28.57	100.00	26.19	94.05
iii	Use dome-shaped milking pots for milking	23.81	98.67	19.05	73.81
6.	**Personal hygiene of milking person**				
i	Milking by healthy person	61.90	100.00	40.47	86.90
ii	Trimming of nails regularly	64.29	97.62	51.19	97.62
iii	Washing hands with plain water before milking	61.90	100.00	51.95	94.05
iv	Cover head with cap or handkerchiefs at time of milking	26.19	80.95	11.90	70.95
v	Protect milk from being exposed to coughing & sneezing	73.80	100.00	65.47	100.00
7.	**Milking techniques**				
i	Full hand milking techniques	13.10	100.00	9.52	90.47
ii	Before starting milking drop out few strips of milk from each teat	30.95	100.00	27.38	90.48
iii	Complete milking within 6-7 minutes	30.95	100.00	30.95	96.42
iv	Milk three times a day for high yielding animal	51.19	100.00	9.52	37.38
8.	**Post milking management**				
i	Keep animal in standing position for 15 minute after milking	3.57	100.00	3.57	91.67
ii	Sieving of milk for removal of the dirt	82.14	100.00	61.90	100.00
iii	Transfer the milk to processing unit immediately after milking	84.52	100.00	69.04	100.00
	Mean Index	38.79	95.55	27.97	83.09

Adoption level of respondents

The results of present study revealed that the mean adoption index was found to be greater (83.09 %) for the benefited farmers after Farmer Field School as compared to the same farmers before Farmer Field School (27.97 percent). The farm women had adopted improved clean and quality milk production practices namely cleaning of animal shed daily, mineral mixture and common salt feeding, not to fed fusty fodder before milking, provide clean and fresh water to milking animal for drinking, washing udder and teats before milking, examine udder, teats and milk regularly, protect milk from being exposed to coughing & sneezing, sieving of milk for removal of the dirt and transfer the milk to processing unit immediately after milking (100 %) followed by use clean, dry and hygienic utensils for milking purpose, trimming of nails regularly (97.62 %); complete milking within 6-7 minutes (96.42 %); washing hands with plain water before milking deworming of milking animals regularly, use separate utensils for milking of healthy and sick animal (94.05 %); keep animal in standing position for 15 minute after milking (91.67 %); before starting milking drop out few strips of milk from each teat (90.48 %); full hand milking techniques (90.47 %); vaccinate and dusting of milking animals regularly (89.29 %); milking by healthy person (86.90 %); use dome-shaped milking pots for milking (73.81 %); ventilation in animal shed (72.33 %); cover head with cap or handkerchiefs at time of milking, washing entire animal daily (70.95 %); balance ration feeding (70.24 %); proper space for each animal (70.00 %); formulation and preparation of balance ration (65.47 %); feeding chaffed green and dry fodder (59.52 %); use of bedding material in animal shed (53.57 %); wipe udder and teats with dry cloth after udder washing (48.81 %); three times milking in a day for high yielding animal (37.38 %) and use of kmno4 in water for cleaning of udder and teats (20.23 %) after FFS. The overall 197.07 % increase in the adoption of various aspects of improved clean and quality milk production practices after FFS. Comparable results were also reported[5,7,9,10&11].

Impact of Farmers Field School on knowledge and adoption

The impact of FFS imparted by the KVK as a whole was computed as the sum total of the differences of both the indices namely, Mean Knowledge Index (MKI) and Mean Adoption Index (MAI) divided by two. The data presented in table 2 exposed that the mean knowledge index and mean adoption index were found to be 95.55 and 83.09 percent, respectively for the trained respondents after FFS, whereas the corresponding value before FFS was found to be 38.79 and 27.97 percent, respectively. Results of study clearly indicated that the trained respondents under FFS had greater knowledge and adoption levels as compared to the non-trained. The study also observed that the overall impact of field school dairy was found to be 55.94 percent over the existing knowledge and adoption by the trained respondents which were found to be substantial increase over the non-benefited respondents. Therefore it could be confirmed that there was a remarkable impact on those respondents with special references to of knowledge and adoption of improved clean and quality milk production practices who attended Farmer Field School.

Table 2. Impact of FFS on transferring knowledge and adoption of improved clean and quality milk production practices

S. No.	Particulars	Pre – FFS	After – FFS	Difference
1.	Mean Knowledge Index	38.79	95.55	56.76
2.	Mean Adoption Index	27.97	83.09	55.12
Total		**66.76**	**178.64**	**111.88**
3.	Percentage of Impact = $\frac{\text{Sum of differences of indices}}{\mathbf{2}}$ = $\frac{111.88}{2}$ = **55.94**			

Production performance of dairy animals

The complied data related to productive performance of dairy animals revealed that the average milk yield of cow and buffalo was recorded 10.49±0.41and 7.88±0.39 kg per day after technological interventions under farmers field school which was higher as compared to 8.11±0.57 and 6.37±0.49 kg per day, respectively in traditional system of dairy farming (Table 3). The average increase in milk production of cow and buffaloes was recorded 33.12 and 27.32 percent, respectively after technological intervention under FFS as compared to traditional system. The average milk fat % and lactometer reading of milk was also found to be higher after scientific interventions of FFS trainees as compared to the non trainees of FFS. The higher milk production of cows and buffaloes might be due to better management of housing, feeding like use of balance ration, feeding of Pashu chocolate, supplementation of mineral mixture and common salt and better health management practices adopted by the respondents after FFS. The data related to economic analysis of milk production from cow and buffaloes were revealed that the respondents applied scientific manner for dairy farming after FFS, recorded higher gross returns and net return with higher benefit ratio than traditional way of dairy farming system. Results also revealed the reduction in cost of milk production/ kg in cows and buffalo 36.59 and 32.22 percent, respectively due to technological interventions of FFS trainees as compared to the non trainees of FFS. [10,12,13,14,15,16,17] also reported that the productive performance of cattle depends heavily on the scientific dairy farming practices.

Table 3. Production performance and economics of dairy animals pre and post FFS

Parameters	Trainees of FFS		Non – trainees of FFS	
	Cattle	Buffalo	Cattle	Buffalo
Average milk yield per day (kg)	10.49±0.41	7.88±0.39	8.11±0.57	6.37±0.49
Lactometer reading	29.49±2.10	30.98±1.71	26.68±2.30	28.71±2.21
Fat%	4.10±0.23	6.76±0.19	3.67±0.16	6.36±0.11
Feeding cost/ kg of milk production (Rs.)	9.62	12.82	13.14	16.95
Gross return from sale of milk (Rs./ day)	367.15	354.60	283.85	286.65
Net return (Rs./ day)	266.15	253.60	175.85	178.65
B: C ratio	3.64	3.51	2.63	2.65

CONCLUSION

Based on the study it may be concluded that the overall improvement in the knowledge of the farm women with respect to adoption of the improved clean and quality milk production technologies would be possible through technological interventions under FFS, which had not only created awareness but also improved the knowledge and attitude of farm women in relation to scientific animal husbandry practices. The average milk yield of dairy animals was higher after technological interventions under Farmer Field School as compared to traditional system of dairy farming before FFS. Thus, FFS programme was found very effective tool in changing attitude, skill and knowledge by using recommended package of practices of clean and quality milk production. As FFS is based on the premise that the participating farmers become researchers who test various technological options available, during the process, they are able to decide what the best alternative for adoption in their particular circumstance. It is a participatory approach to disseminate, and fine tune the production technology in such a way that adoption rate becomes high. The farmer's field school offers farmers an opportunity of learning by doing, by being involved in experimentation, discussion and decision-making. This strengthens the role of farmers in the research extension – farmer chain. It also improves the sense of ownership of technological packages and new knowledge and skills. The FFS approach is a direct response to the needs of the farmers. FFS, if properly implemented,

enhances farmer to farmer extension of technologies and information. Farmer Field School as a model of the most appropriate methodology for validation and dissemination of agricultural technologies which can lead to people-oriented and sustainable agriculture in rural area which will not only improve the agricultural production but also improve the socio-economic conditions of the farming community.

ACKNOWLEDGEMENT

The author is grateful to Project Director, Agricultural Technology Management Agency, Panchmahal, for providing financial inputs.

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