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Impact of dairy trainings on productivity of herd, generation of income and employment

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ABSTRACT

The current study was conducted in Maharashtra to ascertain the impact of dairy farming trainings organized by selected three Krishi Vigyan Kendras on selected economically important parameters. Propensity score matching method was used to avoid selection bias and build a statistical comparison group of non-trainees comparable to trainees. The study revealed that there was no significant difference among trainees and non-trainees related to possession of dairy herd. However, study has shown that milk productivity, annual net income and annual employment generation among trainee and non-trainee dairy farmers were significantly different and comparatively higher among trainees than non-trainees, which indicates positive impact of training imparted by selected Krishi Vigyan Kendras in Maharashtra. Study further revealed that proportion of trainees who were deriving higher economic benefits from dairy farming in terms of productivity and income was quiet less. Hence, it is suggested that training organizing institutes should intensively plan more trainings of long duration ensuring larger and wider participation of population with follow up and post-training information support.

Keywords: Employment, Impact, Income, Milk productivity, Training

Dairying plays an important role in promoting rural welfare by generating income and employment. The manpower engaged in traditional farming need to develop their competency to enhance the adoption of scientific practices to raise income and employment by improving the productivity of dairy herd. The Krishi Vigyan Kendras (KVKs) established under frontline extension system of Indian Council of Agricultural Research organise the trainings to develop more skilled and educated work force. Overall endeavour of KVK are directed towards increasing productivity, income and employment through agricultural and allied activities.

During last five years, KVKs had organized on an average 53,000 training courses for average 15 lakh participating farmers, farm women and rural youths (DARE Annual reports for the various years). Each KVK trained about 100 persons annually on agri-preneurship (NILERD 2015). However, the Comptroller and Auditor General (CAG 2008) reported that 53% of the KVKs did not conduct impact assessment of trainings.

Keeping this in view and considering dairy farming as promising allied activity of the rural population, attempt was made to assess the impact of dairy farming training imparted by KVKs on milk productivity, net income and employment generation among the trainees.

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MATERIALS AND METHODS

The present *ex-post facto* study was conducted in Maharashtra, which has a large network of 45 KVKs spread across 36 districts. The reference period (2011 to 2013) was selected keeping in view that impact of any training takes at least a few years to be visible and as such assessment of very recent trainings imparted would probably not provide robust indicators of associated impact. Questionnaire was sent to 44 KVKs for collecting the information about number and duration of dairy farming trainings organized during the reference period. Only 10 KVKs responded by post and remaining KVKs were contacted either personally or telephonically to obtain the information. Through this pre-assessment, three KVKs (Sisa of Akola, Risod of Washim and Pal of Jalgaon) were selected for the study based on organising highest number of the long duration trainings (5 and more days). The list of trainees who attended trainings were obtained and 30 trainees who owned at least one dairy animal, were selected randomly from each KVK. Further, to generate the comparison group, three least intervened villages of each KVK were selected purposively and 30 non-trainee dairy farmers were also selected randomly from each village. Thus, the ultimate sample size for the study comprised 90 trainees and 270 non-trainees. Data were collected from the selected households on farm and farmer specific characteristics and impact parameters.

Analytical framework: Propensity score matching (PSM)

method was used to avoid selection bias and build a statistical comparison group of non-trainees comparable to trainees. The estimation procedure pertaining to impact assessment was conducted through two main steps. In the first step, the probability of participating in training was estimated through a formal logit regression model as given below:

$$Ln\ (P_i/1–P_i) = \alpha + \Sigma\beta_i X_i + \Sigma D_i + e_i$$

where the left-hand side represents the log of odds of participating in training and X is the vector of continuous independent variables and D is vector of dummy independent variables. Baseline covariates were selected as age, gender, category, marital status, family type, family size, child below the age 4 years, education and dairy farming experience. β_i's are the coefficients to be estimated which represent the change in the log of odds of participating in training in the model. A positive estimated coefficient implies an increase in the likelihood that a respondent will be a trainee.

In the second step, a matching method was selected for using in match treatment and control group. Matching constructs is an artificial comparison group by identifying for every possible observation under treatment of a control observation (or set of control observations) that has the most similar characteristics possible. In PSM, the individual from the comparison group is chosen as a matching partner for a treated individual that is closest in terms of propensity score (Caliendo and Kopeinig 2008). Statistical Package for the Social Sciences (SPSS) and it's add-on PSM tool were used to find closest matches with trainees by applying logistic regression and maximum caliper distance 0.11 and below to obtain exact 10 non-trainees from each village. A caliper is a maximum distance that two units can be apart from each other on their estimated propensity scores. Defining a small caliper will usually result in better balance at the expense of finding fewer units (Thoemmes 2012). When using caliper matching there is no uniform agreement upon definition of what constitutes a maximal acceptable distance (Austin 2011).

Dairy herd size ascertained using procedure laid by National Accounts Statistics (1960), Central Statistical Organization, New Delhi by converting actual number of cattle and buffalo into cattle equivalent scores. The milk yield index was computed on the basis of formula suggested by Yang (1980). According to him, milk yield index represents the yield of all dairy animals on a dairy farm of respondent compared with the average milk yield of the region. Annual net income from dairy farming in rupees was determined by subtracting the cost of milk production from the gross returns. The returns from milk production was obtained as the product of market price of milk and the annual milk yield per farm. The cost of milk production comprised of summated costs of inputs like fodder, concentrate, veterinary and miscellaneous expenditures and labour charges in the study area. Employment in dairy farming was determined based upon involvement of the family and hired labour in all the major activities of dairy farming in terms of minutes per day. Time spent in terms of minutes was converted in man days. Finally 90 non-trainees matched with 90 trainees - equally divided across all three KVKs - were considered in the study and data were classified by using cumulative square root frequency method and analysed by using mean, frequency, percentage and independent sample 't' test.

RESULTS AND DISCUSSION

The results of logit regression analysis that was fitted to ascertain the factors influencing the likelihood of being a trainee is given in Table 1. Gender, marital status ($P \leq 0.05$), age, category, family type and experience in dairy farming ($P \leq 0.01$ or 0.001) exerted significant influence on likelihood of being a trainee before matching propensity scores among trainees and non-trainees. After nearest neighbour matching using caliper distance, all the covariates exhibited non-significant influence on probability of participating in training. Propensity score matching method with selected covariates among trainees and non-trainees revealed non-significant difference on all these selected covariates, which indicates that all covariates are sufficiently matched.

Dairy herd size: The majority of dairy trainees (42.22%)

Table 1. Logistic regression before and after matching trainees and non-trainees on selected covariates

Covariate	Before matching trainees (n=90) and non-trainees (n =270)				After matching trainees (n =90) and non-trainees (n =90)			
	'b'	S.E.	Wald	Sig.	'b'	S.E.	Wald	Sig.
Age	0.070	0.025	7.949	0.005	-0.018	0.027	0.451	0.502
Gender	–2.237	0.988	5.127	0.024	-0.121	1.081	0.013	0.911
Marital status	1.221	0.564	4.693	0.030	-0.592	0.754	0.616	0.432
Category	-0.907	0.212	18.252	0.000	-0.306	0.254	1.449	0.229
Family type	1.150	0.388	8.769	0.003	-0.006	0.455	0.000	0.990
Family size	-0.099	0.098	1.025	0.311	-0.111	0.114	0.944	0.331
Child below 4 years of age	0.149	0.227	0.429	0.512	0.133	0.262	0.259	0.611
Education level	0.240	0.125	3.671	0.055	-0.167	0.144	1.349	0.246
Experience in dairy farming	-0.102	0.027	13.878	0.000	-0.007	0.028	0.058	0.809
Constant	0.274	2.494	0.012	0.913	3.931	2.992	1.727	0.189

and non-trainees (53.33%) had lower medium size (4.00 to 8.00 cattle equivalent) of dairy herd of cattle and buffaloes. Only 4.44% of trainees possessed large dairy herd. Average dairy herd size of trainees was little better (8.68) than non-trainees. However, statistically there were no significant difference found among trainees and non-trainees with respect to the possession of dairy animals. It might be the reason that except few participants (4.45%), others may be neglected to increase size of existing dairy herd and maximal emphasized over enhancement in available animals' productivity using acquired knowledge and skill through trainings. The result is in line with findings of Lal (2004), Murai (2009), Kumar *et al.* (2012), Patel *et al.* (2013) and Anand M (2016).

Impact of training

Milk productivity: Most of the 'pooled' respondents had medium level of milk productivity (Table 2). More than double the proportion of trainees in comparison to non-trainees, belonged to high milk productivity index category. Difference between the mean milk yield indices across the dairy trainee (103) and non-trainee (93) was significant (P≤0.05) implying that yield differential might be due to the training intervention which might have enhanced their knowledge level and upgraded their skill in dairying. These findings are in conformity with that of Lal *et al*. 2009, Patel *et al*. 2015 and NILERD 2015. Findings clearly support the claim of trainings' impact over milk productivity, even though both groups do not differ in possession of dairy animals.

Table 2. Distribution of respondents according to milk productivity index

Milk productivity index	Trainees (n=90)	Non-trainees (n=90)	Pooled (N=180)
Low (29.51 to 69.38)	14 (15.56)	11 (12.22)	25 (13.89)
Medium (69.38 to 126.95)	56 (62.22)	70 (77.78)	126 (70.00)
High (126.95 to 201.26)	20 (22.22)	9 (10.00)	29 (16.11)
Mean±S.E.	102.92±3.24	93.40±2.74	98.16±2.15

Calculated "t" value=2.244.

Annual net income: Majority of the trainees and non-trainees had low level of net annual income (< ₹ 20,000 per annum) and about one-fourth 'pooled' respondents had earned net annual income in the range of ₹ 20,000 to ₹ 50,000 from dairy farming (Table 3). Relatively more number of trainees (14.44%) had high (above ₹ 2 lakh) level of net annual income from dairy farming as compared to non-trainees (3.33%). Calculated 't' value was significant (P<0.05), indicating that there was difference in trainees and non-trainees in terms of their average net annual income. Trainees having significantly higher average net annual income implies that it might be due to their better awareness, knowledge, skill and adoption of scientific dairy practices. Further, it might be due to the fact that few trainees managed large dairy herd and doing farming as an intensive commercial activity. Similar findings were reported by Lal *et al.* 2009, Murai 2009, Kumar *et al.* 2012 and Gautam *et al.* 2014.

Annual employment generation: High level of employment was generated by greater proportion of trainees as compared to non-trainees (Table 3). Those few trainees possessing large dairy herd, doing farming as more commercial activity, subsequently needs more working heads to handle labour intensive varied management activities of dairy farm, which might be the reason to employ more number of family or hired labours and have difference in employment generation among both groups. However, more than 86% of trainees and 93% of non-trainees fell in medium to low level of employment generation category. Difference in the mean values of employment generated between the two groups revealed that trainee farmers have generated significantly (P≤0.05) more employment than their non-trainee counterparts. The results are in consonance with the findings of Lal *et al*. 2009 and Kumar *et al*. 2012.

It can be concluded that training intervention in dairy in the study area has had significant and positive influence on important economic parameters, viz. productivity, net income and employment generation, even though both groups did not significantly differ in possession of dairy animals. This economic impact among trained dairy farmers might be due to the knowledge and skill gain through training and subsequent utilization in dairy farming. The dynamic combination of productivity, income and employment generation through dairy farming has the potential of socio-economic transformation of rural people.

Table 3. Distribution of respondents according to their level of net annual income and employment generation in dairy farming

Category	Trainees (n=90)	Non-trainees (n=90)	Pooled (N=80)
Net annual income from dairy farming (₹)			
Low (Below ₹ 20,000)	31 (34.45)	46 (51.11)	77 (42.78)
Lower medium (₹ 20,000 to ₹ 50,000)	24 (26.67)	23 (25.56)	47 (26.11)
Medium (₹ 50,000 to ₹ 90,000)	19 (21.11)	9 (10.00)	28 (15.55)
Upper medium (₹ 90,000 to ₹ 2,00,000)	3 (3.33)	9 (10.00)	12 (6.67)
High (Above ₹ 2,00,000)	13 (14.44)	3 (3.33)	16 (8.89)
Mean±S.E.	89820.00± 19695.87	40655.56± 5807.34	65237.78± 10401.93
Annual employment generation (man-days/annum)			
Low (148.91 to 189.62)	4 (4.44)	4 (4.44)	8 (4.44)
Medium (189.62 to 403.01)	73 (81.11)	80 (88.89)	153 (85.00)
High (403.01 to 1068.98)	13 (14.45)	6 (6.67)	19 (10.56)
Mean±S.E.	316.13± 13.59	276.51± 7.80	296.32± 7.95

Calculated "t"=2.394* (net annual income) and 2.528* (annual employment generation).

The findings clearly indicate that the frontline extension system of ICAR, i.e. KVK in the study area are realising the objectives of training in terms of achieving desired impact in dairy farming. However, very few proportions of trainees were deriving better economic benefits from dairy farming. Hence, it is suggested that training organizing institutions should plan long duration trainings ensuring, larger and wider participation for improving livestock productivity, income and employment generation in dairy farming. Training institutions should consistently provide information support to trainees and take follow up after they return home.

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