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FROM EDITOR'S DESK

It is indeed a matter of immense pleasure for me to put forward before you the current issue of IJEE & RD for the year 2023. In the present issue some 29 research papers on areas pertaining to significant contemporary issues of rural development and agricultural extension are included. The research papers related to Agriculture, Community Science, Management, Dairy and Animal Husbandry, and Rural Development in general forms the major content of this volume. I am highly grateful to the Editorial board and Executive Editor Prof. Dhriti Solanki for their untiring and painstaking efforts in bringing out this issue in time. Prof. F.L. Sharma on Editorial Board deserves special thanks for his commendable work and shouldering the responsibility of bringing this task to reality even after his retirement. He has always been instrumental in pooling efforts of editorial board members to complete the work in time keeping in view the non-impact points of NAAS. We appreciate the continuous cooperation extended by the President of the society Prof. P.N. Kalla and Vice-presidents Prof. Archana Raj Singh & Prof. B.S. Bhimawat for their guidance and help in this regard. We are grateful to Prof. N.K. Panjabi, Secretary of the society for his continuous cooperation and free hand in completing the task well in time, financial resources are never been limiting factor for the good cause of society's development. The contributors of research papers are precious and highly valued members of the society. We are heartily thankful to them for their trust in the society and sharing their research work through this platform. We expect the similar type of cooperation from the members in future too. We assure the contributors and members to come up to their expectations in the years to come. We are grateful to Dr. S.S. Sisodia, Professor & Head, Department of Extension Education, RCA for his cooperation, providing space and resources for anywork related to RSEE. Thanks are also due to Prof. Rajshree Upadhyay, Dept. of EECM, College of Community and Applied Sciences for her cooperation and concern in all matters related to this journal. Last but not the least Image Print Media deserves special appreciation and thanks for printing the journal in time.

Best regards

S.K. Sharma
Chief Editor



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PERCEPTION OF TEACHERS ABOUT ONLINE EDUCATION DURING COVID-19 IN KERALA AGRICULTURAL UNIVERSITY

Ashitha A. R.* and Bindu Podikunju**

ABSTRACT

A study was conducted in the four colleges of Kerala Agricultural University viz, COA, Vellayani; COA, Vellanikkara; COA, Padannakkad and COA, Ambalavayal to assess the perception of teachers about online education during COVID-19 and identify the factors affecting teachers' perception. A sample of 40 teachers were selected from the four colleges under consideration by simple random sampling. The results of the study revealed that majority of the teachers (60%) had positive perception about online education during COVID-19. Based on the result of chi square test, profile characteristics of teachers such as gender, age, prior online experience, training received and continuance intention had significant association with perception about online education.

INTRODUCTION

The COVID-19 pandemic has prompted school and university closures around the world. According to UNESCO (2021), about 1.5 billion students around the globe were affected by this. The closure of COVID-19 related educational institutions in India affected over 320 million students' learning (Senapathy and Falt, 2020). Because it is not possible to attend classes in person on campuses under the current COVID-19 framework, online learning has emerged as a viable alternative (Jain and Lamba, 2021). In Kerala Agricultural University (KAU), teaching, research, and extension operations had shifted to digital platforms throughout the lockdown. Moodle learning management system (<http://moodle.celkau.in/>), which is operated by the University's Center for e-Learning, was utilised by all of the University's constituent institutions to deliver online classes during COVID-19. Although the online teaching and learning technique used during COVID-19 provided a number of benefits to both students and academic staff, a number of factors need to be taken into account before its implementation. As well as the student's perspective, the teacher's perspective is equally relevant because if teachers are dissatisfied and do not find the online mode satisfactory, then

the educational base itself is compromised (Nambiar, 2020). Thus, the present study was conducted at Kerala Agricultural University with the objective to study the perception of KAU teachers about online education during COVID-19 and also to identify the factors affecting teachers' perception.

RESEARCH METHODOLOGY

The study used Ex-post facto research design as the phenomenon under study had already occurred. The study was conducted in four colleges under Kerala Agricultural University viz., College of Agriculture, Vellayani; College of Agriculture, Vellanikkara; College of Agriculture, Padannakkad and College of Agriculture, Ambalavayal. 10 teachers were chosen at random from each selected college under KAU. As a result, 40 teachers were selected from the four colleges under consideration. The data were collected through a well-structured questionnaire that was administered through online as well as offline methods. Perception of teachers in KAU about online education during COVID-19 was the dependent variable for the study. Teachers' perception was investigated in terms of two components: Perceived Ease of Use and Perceived Usefulness. A five point continuum Likert scale developed by Anusha (2019) was used for the measurement of perception of teachers with slight

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modifications. Profile characteristics of teachers such as gender, age, teaching experience, prior online experience, training received, use of digital technology, quality of internet connection and continuance intention were selected as the independent variables of the study through extensive review of literature and judges rating. A chi square test was conducted in order to determine the relationship between perception of teachers and various profile characteristics. Responses to the survey were analysed and results were interpreted based on the objectives of the study.

RESULTS AND DISCUSSION

1. Perception of teachers about online education during COVID-19

Teachers' perception was investigated in terms of two components: Perceived Ease of Use (PEOU) and Perceived Usefulness (PU). Perceived ease-of-use, according to Davis *et al.* (1989), is the degree to which a person perceives using a specific technology to be free of effort. There were seven statements used to measure the perceived ease of use comprising of both positive and negative statements. On the basis of scores, the respondents were categorized as having positive and negative PEOU. From table 1, it is evident that majority of the teachers (67.5%) had positive PEOU, whereas 32.5 per cent had negative PEOU for online education.

Table 1: Distribution of teachers based on their PEOU

N= 40			
S.No.	PEOU	f	%
1	Positive (>3)	27	67.5
2	Negative (<3)	13	32.5

The average mean score for Perceived Ease of Use was 3.30, showing that instructors had a positive perception of the ease of use of online teaching. Perhaps this result can be attributed to the superior convenience and flexibility of the online education system. In comparison to traditional learning, online learning allows for enhanced scheduling flexibility

based on the comfort and availability of teachers and students. These results are in line with findings of Anusha (2019) and Hussain *et al.* (2020).

Perceived Usefulness (PU) refers to the extent to which teachers believed that the online education they attended during COVID-19 was beneficial to their academic performance. A total of 18 statements were used to measure the perceived usefulness of online teaching and based on their overall PU score, teachers were categorized as having a positive or negative PU.

Table 2: Distribution of teachers based on their PU

N= 40			
S.No.	PU	f	%
1	Positive (>3)	15	37.50
2	Negative (<3)	25	62.50

Table 2 shows that majority of the teachers (62.5%) had negative PU, while 37.5 per cent of them had positive PU for online education. The average mean score for perceived usefulness was 2.92, indicating that teachers had a negative perception of the usefulness of online education. This may be due to the fact that teachers believe that students are not motivated enough to learn online as well as the fact that they are not involved as much in the class as they could be.

The average mean score for Perceived Ease of Use and Perceived Usefulness of teachers was used to compute the perception mean score for teachers. The overall mean score for teachers' perceptions of online education during COVID-19 was 3.11. It implies that teachers had a slightly positive perception of online education and were willing to include online components in their teaching activities. The perusal of table 3 reveal that majority of the teachers (60%) had positive perception while 40 per cent had negative perception towards online education during COVID-19. The findings are consistent with Giovannella *et al.* (2020) and Rahayu and Wirza (2020).

Table 3: Distribution of teachers based on their perception about online education

N= 40

S.No.	Perception	f	%
1	Positive (>3)	24	60
2	Negative (<3)	16	40

2. Factors affecting perception of teachers about online education

Table 4 reveals that profile characteristics of teachers such as gender, age, prior online experience, training received and continuance intention had significant association with perception about online education. Gender and teachers' perceptions about online education were associated at 0.01 level of significance. According to the findings of previous studies (Zalat *et al.*, 2021), because of mental exhaustion, stress, and difficulty with job and family, women have negative disparities in online education. Age had a significant association with teachers' perceptions about online education at the 0.05 level of significance. Due to the high risk of COVID-19 infection among older individuals, they may prefer distance education to avoid exposure to the disease. Prior online experience had

Table 4: Factors affecting perception of teachers

N=40

S. No.	Independent variable	Chi square value	P value
1	Gender	9.689**	0.002
2	Age	5.625*	0.018
3	Teaching experience	1.172	0.279
4	Prior online experience	5.625*	0.017
5	Training	5.293*	0.021
6	Use of digital technology	0.026	0.871
7	Internet accessibility	1.111	0.292
8	Continuance intention	8.087**	0.004

**Significant at 0.01 level

*Significant at 0.05 level

a significant association with teachers' perception about online education at 0.05 level of significance. It makes sense that educators with experience of digital learning would view it favourably. Teachers' perception of online education was significantly correlated with the training they had received at the 0.05 level of significance. Expertise in the apps they use will come through training, which will improve the teachers' understanding of technology. Continuance intention had a significant association with teachers' perceptions about online education at 0.01 level of significance. It would be logical to anticipate that teachers who want to continue teaching online now have a positive view of this method of instruction.

CONCLUSION

From this study, it can be concluded that the teachers had a positive perception about online education during COVID-19. Also, they expressed an interest in incorporating digital components into academic activities. The chi square analysis indicated that the profile characteristics of teachers such as gender, age, prior online experience, training received and continuance intention had significant associations with perceptions about online education. In the process of formulating a curriculum structure for online education, these factors should be taken into account.

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EFFECTIVENESS OF LIVESTOCK INTERVENTIONS UNDER FARMER FIRST PROGRAMME AMONG THE FARMERS OF JODHPUR DISTRICT IN RAJASTHAN

Mahendra Kumar*, Ishwar Singh, P.P. Rohilla*** and Nishu Kanwar Bhati******

ABSTRACT

The project entitled "Technology Integration for Doubling Farm Income through Participatory Research and Extension Approaches in Jodhpur District of Rajasthan" under Farmer FIRST Programme (FFP) has been implementing in Jodhpur District of Rajasthan since 2016. In the present programme, there are five modules which had been implemented and studied under the project are; Crop-based module, Horticulture based module, Animal based module, Natural Resource Management (NRM) module and Integrated Farming System (IFS) module. As per the observations of researchers, so far, no such study has been undertaken by any researcher regarding the effectiveness of animal based Integrated Farming system (AHIFS) model implemented under Farmer FIRST Programme. Thus, the present study aimed to study the effectiveness of livestock-based interventions (Integrated Farming system model) among the farmers of Jodhpur District in Rajasthan.

INTRODUCTION

Rajasthan is the largest state in the country with a land area of 32 million hectares, which comprises 10.4% geographical area of the country. It has ten agro-climatic zones and about 13.27% of total cultivable area of country. This State has traditionally been known as the desert State as two-third of its total land mass cover is under the Thar Desert. The majority of the people lives in rural areas and economy is basically agrarian in nature. Agriculture contributes relatively more to State of Rajasthan with 25% of economy against 16.5% of national GDP.

The climate of the State varies from extremely arid in the west (180 mm of annual precipitation in Jaisalmer) to humid sub-tropical (1022 mm of annual precipitation at Jhalawar) in the southeast part. The State is predominantly arid and semi-arid. Agriculture production is mainly dependent upon the rainfall. The temperature ranges from 2-10° Celsius during winters to 40-49° Celsius during summers. The State mainly depends on agricultural prospects, its growth and development in ensuing

livelihood security. Approximately 70 per cent of the total population of the State is engaged directly or indirectly in agriculture. Livestock in the arid and semi-arid is the mainstay of rural people. The State generates significant revenue from industry, mines and tourism. However, out of 249 blocks in the State, only 31 blocks are in safe category as far as ground water level is concerned. The State has only 1.16% of average surface water of the total water resources in the country.

The Agriculture University, Jodhpur has jurisdiction area of Jodhpur, Barmer, Pali, Sirohi, Jalore and Nagaur districts of Rajasthan with great variability in soil, water along with rainfall ranging from 100 to 600 mm per year. In the jurisdiction of this University, Pearl Millet, Sesame, Fennel, Dill, Fenugreek, Castor, Green Gram, Moth Bean, Chili, Onion, Cumin, Isabgol, Henna, Senna, Ker, Kumat, Ashwagandha and Aloe vera predominantly belong to this region. Livestock based farming system predominantly exists which includes indigenous breed of cattle and fodder crops.

Jodhpur is one of the largest districts of

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Rajasthan which is centrally situated in western region of the State; having geographical area of 22850 sq. Km. It has population of 36.85 lacs as per 2011 census. The district stretches between 26° 0' and 27° 37' at North Latitude and between 72° 55' and 73° 52' at East Longitude. This district is situated at the height between 250-300 meters above sea level.

Arid western plan zone-I of Rajasthan State has cultivated area of 27m ha which is 53% of the Geographical area. Sand dunes and desert soils occupy major area in the zone. There are arid sols soils loamy fine to coarse and calcareous at places. Rainfall in the zone ranges from 200 mm in the west to about 370 mm in the east and occurrence of drought is not unusual feature. Phalodi, Shergarh, Osian tehsils of the Jodhpur comes under jurisdiction of agro climatic zone Ia. Pearl millet is the predominant crop of the zone followed by cluster bean and moth bean. Sesame and green gram are other important oilseed and pulse crops, respectively. Only 7 percent crop area is under irrigation. Cumin, Rapeseed, Mustard, Wheat and Isabgol are major crops grown in Rabi season.

The region is mostly inhabited by the Scheduled Caste (16.49%) and other weaker sections of the society. Out the total population, 65.7 percent are rural and 58.48 are literate. About 75-80 percent people are engaged in agriculture and agriculture related enterprises.

Concept of Farmer First and Technology Integration : In order to overcome this problem, the concept of technology integration was conceptualized that can be used in farm production system. It is a function which can only relate the research and technology development efforts to extension. In this function utmost importance has been given to farmer's need, resources and local environment. Farmer is treated as an active partner with the researchers both at the decision-making and implementation stages in technology assessment and refinements for generation and dissemination of appropriate technologies.

RESEARCH METHODOLOGY

The present study was conducted in Jodhpur district of Rajasthan. All the farmers selected for the study were of Jodhpur district. As programme was implemented in Jodhpur district, this district was selected purposely for the present study. Agriculture University, Jodhpur implemented this project in three villages namely; Manai (Mandor), Balarwa and Binjwaria (Tinwari). In FFP programme; total 104 farmers participated and thus all the 104 farmers were purposely selected for the study. Face- to-face interview technique was implemented for collecting the data. The interview was conducted in Hindi as well as in local dialect as and when required. Frequency distribution and MPS were worked for arriving at findings.

RESULTS AND DISCUSSION

Categorization of farmers on the basis of their level of adoption about animal husbandry based IFS interventions

Data depicted in Table-1 reveal that the adoption level of animal husbandry based interventions introduced under FFP was reflected high among 79 (75.96 per cent) beneficiaries, 22 (21.15 per cent) farmers had moderate level of adoption. Furthermore, data clearly show that of total beneficiaries, 101 (97.11 per cent) expressed moderate to high level of adoption about significant interventions advocated to them, because these farmers belonged to high to moderate level of adoption categories in combination.

Table 1: Farmers categorization on the basis of adoption level about animal husbandry based IFS intervention

n=104			
S. No.	Level of adoption	f	%
1	Low (< 30 per cent score)	3	2.89
2	Moderate (30-50 per cent score)	22	21.15
3	High (> 50 per cent score)	79	75.96
Total		104	100

The current results are well supported by Kumar *et al.* (2001), Rakshe *et al.* (1998), Pareek (1999), Verranna (2000), Maity and Sidhu (2001) and Jitarwal (2003). At the same time, the present results are in contradiction with the findings of Intodia (2001).

Aspects wise prioritization of animal husbandry based IFS technologies among the farmers for adoption

After categorization of respondents as per their level of adoption regarding animal husbandry based interventions, detailed view of status of adoption among the farmers was also computed through calculating the MPS acquired about each of the 11 interventions defined therein and ranking them.

Analysis of data given in Table 2 reveal that first priority among the farmers goes to adoption of Sirohi buck for breed improvement (ranked first with MPS 77.88) followed by Artificial insemination, Pratap Dhan breed of poultry, Avishan breed of sheep, Fodder seeds and construction of mangers with their respective ranks 2,3,4,5,6 and MPS 75.00, 71.92, 64.61, 56.92 and 56.34, respectively.

Table 2: Prioritization of animal husbandry based IFS technologies among the farmers for adoption

n=104			
S. No.	Intervention	MPS	Rank
1	Artificial Insemination	75.00	2
2	Avishan breed of sheep	64.61	4
3	Sirohi buck for breed improvement	77.88	1
4	Pratapdhan breed of poultry	71.92	3
5	Construction of mangers	56.34	6
6	Fodder seeds	56.92	5
7	Chaff cutters	49.03	7
8	Mineral bricks	48.07	8
9	Mineral mixture	45.19	9
10	Biogas plants	26.92	10
11	Solar tunnel dryers	23.84	11

MPS = Mean per cent score

Least adoption level was recorded for the interventions of "Solar tunnel dryers", "biogas plants" and "mineral mixture", which were ranked 11, 10 and 9 with their respective MPS 23.84, 26.92 and 45.19. In view of data (Table 2), it might be concluded that the level of adoption about animal husbandry based IFS interventions (AHIFS), particularly of Sirohi buck for breed improvement, Artificial insemination (A.I.), Pratapdhan breed of poultry, Fodder seeds and construction of mangers were adopted at higher priorities in the hierarchy of 11 AHIFS. These 6 interventions are directly related to the fastest improvements in the livestock. Therefore, the farmers expressed substantial and satisfactory adoption about these first 6 interventions.

Past studies of those of Intodia (2001), Rao (2002) and Gujar *et al.* (2008) are also by and large at par with the findings of present investigation. In accordance with the findings, it is inferred that most of the FFP beneficiaries belonged to high and moderate level of adoption categories. Sirohi buck, Pratapdhan breed and Avishan breed of sheep were the most orderly preferred interventions of livestock to be adopted by the beneficiaries for higher returns from livestock. Solar tunnel dryers and biogas plants, both were observed to be adopted at the lowest level among the FFP farmers of Jodhpur district; reason being, these may be perceived to be complicated and costlier by the farmers covered under FFP.

It could be recommended on the basis of the findings that the follow up action by the FFP project personnel must be taken, so as to ensure the continued adoption of livestock interventions by the farmers of the study area. Looking to the perceived effectiveness, it is also recommended and suggested that the present module (AH based IFS interventions) must be replicated elsewhere in the country, where similar climatic and demography conditions prevail.

The findings further indicated to recommend that the FFP, with special reference to animal husbandry-based IFS technologies in Jodhpur district of

Rajasthan must be extended for further period, that could bring about spectacular results in the Doubling Farmers Income in the study area in particular and in the country as a whole. Recommendations, based on the findings are also made to further strengthen and enhance the adoption level of the livestock farmers in relation to balanced feeding for proper health management including mineral mixture, mineral bricks, azolla feeding and use of chaff cutters.

CONCLUSION

It might be concluded that the adoption level of the farmers with regards to these very important aspects of livestock production ranged between 56.92 to 77.00 per cent, hence the FFP in the area had been proved to be very effective in terms of making livestock farmers to adopt latest Animal Husbandry Based Integrated Farming System in arid region of Western Rajasthan.

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CONSTRAINTS FACED BY THE SHG MEMBERS IN FUNCTIONING OF THE SHGs IN SAURASHTRA REGION OF GUJARAT

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ABSTRACT

The self-help group (SHG) approach is a new paradigm into the field of rural development which main objectives are to increase the well-being of the poor people, provide access to resources and credit, increase self-confidence, self-esteem and increase their creditability in all aspects of lives. The lack of information regarding online purchasing and selling system was the most severe constraint encountered by the majority of the SHG members. Besides, transportation facilities are not adequate was severe constraint experienced by the SHG members. The problems like lack of information about demand of consumers, contradiction in decision taking among the SHG members, family issues and personal problems, lack of cooperation among all women members were less severe problems faced by the SHG members.

INTRODUCTION

Self-Help Group is a small voluntary association of poor people preferably the same socio-economic back drop. The micro- credit given to them to start enterprises and it can be for all women group and all men group. However, it has been the experience that women's groups perform better in all the important activities of SHGs. SHG is a medium for the development of saving habit among the women.

Self-Help Groups are informal associations of people who choose to come together to find ways to improve their living conditions. They help to build social capital among the poor, especially women.

The most important functions of a Self-Help Groups are (a) to encourage and motivate its members to save (b) to persuade them to make a collective plan for generation of additional income (c) to act as a conduit for formal banking services to reach them. Such groups work as a collective guarantee system for members who propose to borrow from organized sources. Consequently, Self-Help Groups have emerged as the most effective mechanism for delivery of micro-finance services to the poor. The range of financial services

may include products such as deposits, loans, money transfer and insurance. (Anon., 2017b).

Guiding principles for formation of the SHG

1. Effort is built on mutual trust and mutual support.
2. Every individual is equal and responsible.
3. Every individual is committed to the cause of the group.
4. Decision is based on the principles of consensus.
5. The belief and commitment by an individual that through the group their standard of living will improve.
6. Savings is the foundation on which to build the group for collective action.

Some characteristics features of the SHG

- a. The SHG is generally an economically homogeneous group formed through a process of self-selection based upon the affinity of its members.
- b. Most of the SHGs are women's groups with membership ranging between 10 and 20.
- c. SHGs have well-defined rules and regulation,

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hold regular meetings and maintain records and savings and credit discipline.

- d. SHGs are self-managed institutions characterized by participatory and collective decision making.

RESEARCH METHODOLOGY

180 SHG women members were selected from 18 villages of the 6 talukas of Junagadh and Rajkot districts of Saurashtra region by employing multistage sampling technique. An interview schedule was developed in accordance with the objectives of the study and it was pre tested and translated into Gujarati. The data of this study were collected with the help of structural interview schedule. The collected data were classified, tabulated, analyzed and interpreted in order to make the findings meaningful. The statistical measures such as percentage, mean, mean per cent score, standard deviation, correlation co-efficient and Z test were used in the study.

RESULTS & DISCUSSION

Women in SHG were challenged in diverse ways. The groups identified numerous challenges and hurdles which make their activities difficult. The causes of the problems may arise from within the family or their own organization (SHG) or emanate from out of the external environment and their community. An inventory of 20 statements that affect the performance of SHGs and become obstacles in effective functioning of the SHG was used to measure the constraints level. Respondents were asked to give their response on four point continuum most severe, severe, less severe and not at all.

It is evident from the data incorporated in Table 1 that the lack of information regarding online purchasing and selling system was the most severe constraint encountered by the majority of the SHG members and was ranked first by the SHG woman members. Besides, transportation facility are not adequate was severe constraint perceived by the SHG members and was ranked second by the respondents. The next most important constraint faced by the SHG members was sometime marketing is difficult which was ranked third by the

SHG woman members. Non availability of the raw material was another serious constraint was ranked fourth by the respondents followed by lack of information about new occupation suitable to their socio-economic condition was ranked fifth by the SHG members.

Table 1 further show that problem in getting loan and inadequate information about loan repayment and interest rate were also another serious constraints faced by the SHG members and was ranked sixth and seventh by the respondents, respectively. While, problem of lack of machinery and equipments was also ranked seventh by the respondents.

Whereas, the other constraints in descending order of their magnitude was related to unaware about the rules and regulation of the bank, communication problem with bankers were ranked eighth and ninth by the SHG members.

Moreover, competition for selling the products in market is very high, lack of information about market opportunities and lack of perfection in management part, lack of time because of other social responsibilities, opening the account in bank is tedious job and the next important problem was not getting training on management of SHG were ranked 10th, 11th, 12th, 13th and 14th by the respondents.

The constraints like lack of information about demand of consumers, contradiction in decision taking among the SHG members, family issues and personal problems, lack of cooperation among all women members were less severe problems faced by SHG women members and were ranked 15th, 16th, 17th and 18th, respectively.

CONCLUSION

It can be concluded that that lack of information regarding online purchasing and selling system and problem of the transportation facility were the most severe constraints faced by the SHG woman members. The probable reason might be that respondents were not well acquainted to online system and it might be difficult for them and because

Table 1 : Constraints faced by the SHG woman members

		(n = 180)		
Sr. No.	Constraints	Score	MPS	Rank
1	Problem in getting loan	349	64.62	VI
2	Inadequate information about loan repayment and interest rate	348	64.44	VII
3	Lack of information about demand of consumers	177	32.77	XV
4	Family issues and personal problems	99	18.33	XVII
5	Lack of information about market opportunities	284	52.59	XI
6	Not getting training on management of SHG	184	34.07	XIV
7	Communication problem with bankers	315	58.33	IX
8	Lack of cooperation among all women members	84	15.55	XVIII
9	Lack of time because of other social responsibilities	263	48.70	XII
10	Non availability of the raw material	387	71.66	IV
11	Lack of information regarding online purchasing and selling system	510	94.44	I
12	Transportation facilities are not adequate	490	90.74	II
13	Sometime marketing is difficult work	429	79.44	III
14	Lack of information about new occupation suitable to their socio economic condition	383	70.92	V
15	Unaware about the rules and regulation of the bank	341	63.14	VIII
16	Lack of perfection in management part	284	52.59	XI
17	Contradiction in decision taking among the SHG members	117	21.66	XVI
18	Opening the account in bank is tedious for us	214	39.62	XIII
19	Lack of machinery and equipments	348	64.44	VII
20	Competition for selling the products in market is very high	297	55.00	X
Total		5897		

MPS = Mean per cent score

of the lack of resources for purchasing the vehicle for transportation require heavy investment.

This finding is in line with the findings of Parmar (2014) and contradict with the finding of Minimol and Makesh (2012).

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FUNDAMENTAL EMPLOYABILITY APTITUDE AMONG THE POSTGRADUATE AGRICULTURE SCHOLARS

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ABSTRACT

Fundamental employability aptitude refers to the ability or propensity of the postgraduate scholars to gain and maintain employment. Fundamental employability aptitude has been considered as one of the most important components of employability in this study. The study was carried out selecting a random sample of 180 postgraduate scholars studying in M.Sc. (Agri.) at Agriculture Universities in Rajasthan. Study revealed that the overall distribution of fundamental employability aptitude showed that 68.89 per cent of the postgraduate scholars had medium level of fundamental employability aptitude, followed by 16.11 per cent and 15.00 per cent with low and high level of fundamental employability aptitude, respectively.

INTRODUCTION

In today's highly competitive job market, possessing fundamental employability aptitude is crucial for postgraduate students aiming to succeed in their careers. While acquiring specialized knowledge and technical skills is important, employers increasingly value a range of employability skills that go beyond academic qualifications. These skills encompass a combination of personal qualities, attitudes, and abilities that enable individuals to adapt, excel, and thrive in various work environments. Fundamental employability aptitude refers to a set of core skills and attributes that are essential for success in the workplace. It encompasses both hard and soft skills that enable individuals to effectively navigate the professional landscape, interact with colleagues and clients, solve problems, and contribute meaningfully to organizational objectives. Recognizing the significance of these aptitudes, educational institutions and employers are placing greater emphasis on developing and assessing them among postgraduate students. Postgraduate students with well-developed fundamental employability aptitude are more likely to secure employment and thrive in their chosen careers. Employers value candidates who can not only demonstrate technical expertise but also possess the ability to think critically,

communicate effectively, and adapt to new situations. These skills enable individuals to contribute meaningfully to organizational goals, navigate complex workplace dynamics, and seize opportunities for professional growth.

RESEARCH METHODOLOGY

An Ex-post-facto research design was used in the present study. The present study was conducted in Rajasthan which literally means "Land of kings". In Rajasthan agriculture institution was started in the year of independence, July 1947. At present Rajasthan state comprises of five Agricultural Universities, out of which three Agricultural Universities namely Swami Keshwanad Rajasthan Agriculture University, Bikaner, Maharana Pratap University of Agriculture and Technology, Udaipur & Sri Karan Narendra Agriculture University, Jobner were selected on the basis of post graduate programmes (M.Sc. in Agriculture) are running for more than 20 years in various disciplines. From the list so prepared, 60 post graduate scholars were selected from each identified college with the help of random selection technique. Thus, a total of 180 post graduate students were included in the sample of study.

RESULTS AND DISCUSSION

To understand the role of fundamental

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employability aptitude on the overall employability of the postgraduate scholars, data were collected and the results are presented in subsequent tables.

1. Distribution of respondents on the basis of fundamental employability aptitude

The respondents were classified into three groups on the basis of fundamental employability aptitude by applying mean and standard deviation and results are given in Table 1.

It is obvious from Table 1 that majority (70.00 %) of the postgraduate scholars had medium level of fundamental employability aptitude in SKNAU, Jobner. Postgraduate scholars of MPUAT, Udaipur shows that 16.67 per cent had high level of fundamental employability aptitude, while 20.00 per cent of the postgraduate scholars of SKRAU, Bikaner had low level of fundamental employability aptitude. The overall distribution of fundamental employability aptitude shows that 68.89 per cent of the postgraduate scholars had medium level of fundamental employability aptitude, followed by 16.11 per cent and 15.00 per cent with low and high level of fundamental employability aptitude, respectively. The results are in conformity with the results expressed by Omede and Kanani (2015), who found that slightly less than two-third (60.00%) of the postgraduate scholars had above average level of fundamental employability aptitude, followed by 23.33% and 16.67% with average and high level of fundamental employability aptitude and also

similar findings with the findings of Devi *et al.* (2019), Sasidharan and Chauhan (2015) and Prasanna *et al.* (2022).

2. Aspect wise fundamental employability aptitude of postgraduate scholars

To find out the fundamental employability aptitude of postgraduate scholars about higher agriculture education, total ten statements were considered, For this, the Mean Percent Score (MPS) for each statement was calculated and ranked accordingly. The results are presented in Table 2.

A perusal of data presented in Table 2 reveals that most of the postgraduate scholars strongly agreed with the fact that "I can work confidently in a group" with 86.55 per cent and it was ranked first by the respondents. This was followed by the statements namely "I am able to assess complex information", "I am able to challenge views expressed by others if they are wrong", "I often influence people to my views", "I find it easy to express my views when speaking" and "People tend to look to me for leadership" with 86.22, 83.99, 82.77, 82.33 and 81.77 per cent and ranked second, third, fourth, fifth, and sixth, respectively by the postgraduate scholars.

The data presented in Table 2 further show that majority of the postgraduate scholars agreed with the statements "I am able to discuss current issues", "I am able to motivate and direct others", "I have a

Table 1: Distribution of postgraduate scholars according to their fundamental employability aptitude

n=180									
S. No.	Level of fundamental employability aptitude	MPUAT Udaipur		SKNAU Jobner		SKRAU Bikaner		Total	
		f	%	f	%	f	%	f	%
1.	Low	9	15.00	7	11.66	12	20.00	29	16.11
2.	Medium	41	68.33	42	70.00	40	66.67	124	68.89
3.	High	10	16.67	11	18.34	8	13.33	27	15.00
	Total	60	100	60	100	60	100	180	100

f= frequency, %= per cent

Table 2: Aspect wise fundamental employability aptitude among the respondents**n=180**

S. No.	Aspects of fundamental employability aptitude	MPUAT Udaipur		SKNAU Jobner		SKRAU Bikaner		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1	I find it easy to express myself in writing	78.00	9	72.66	10	74.33	10	74.99	10
2	I am able to motivate and direct others	79.33	8	74.33	9	80.33	8	77.99	8
3	I have a methodical approach to do tasks	76.66	10	79.00	8	75.00	9	76.88	9
4	I am able to assess complex information	88.00	1	87.00	1	83.66	3	86.22	2
5	I find it easy to express my views when speaking	84.33	3	80.33	6	82.33	5	82.33	5
6	I am able to discuss current issues	81.33	7	82.00	5	81.66	6	81.66	7
7	People tend to look to me for leadership	84.00	4	80.00	7	81.33	7	81.77	6
8	I can work confidently in a group	86.33	2	85.66	2	87.66	1	86.55	1
9	I am able to challenge views expressed by others if they are wrong	83.33	5	84.00	3	84.66	2	83.99	3
10	I often influence people to my views	82	6	83.66	4	82.66	4	82.77	4

MPS= Mean Percent Score

methodical approach to do tasks" and "I find it easy to express myself in writing" with extent of 81.66, 77.99, 76.88 and 74.99 per cent and ranked seventh, eighth, ninth, tenth, respectively.

3. Comparison of fundamental employability aptitude among the postgraduate scholars of selected agriculture universities

To find out the variation or similarity in the fundamental employability aptitude of the postgraduate scholars, Analysis of Variance-Oneway test was carried out and results were presented in the Table 3.

NH₀₁: There is no significant difference among the postgraduate scholars of three universities with respect to their fundamental employability aptitude.

RH₁: There is a significant difference among the postgraduate scholars of three universities with

respect to their fundamental employability aptitude.

Data presented in Table 3 show that calculated F value was 2.84 found to be less than the tabulated value which is statistically non-significant at 5 per cent level of significance. Thus, the null hypothesis (NH₀₂) "there is no significant difference among the postgraduate scholars of three universities with respect to their fundamental employability aptitude" was accepted and research hypothesis (RH₁) was rejected. It referred that three categories of respondents had more or less similar fundamental employability aptitude. The probable reason for similar nature of postgraduate scholars of selected universities. The present findings are supported the view expressed by Mishra and Sharma (2020) who indicated that there is no significant difference among the postgraduate scholars with respect to their attitude towards e-resources.

Table 3: Comparison of fundamental employability aptitude among the postgraduate scholars

Source of Variation	SS	df	MS	F value	F critical value
Between Group	92.87778	2	46.43889	2.84 ^{NS}	3.047
Within Group	2887.367	177	16.31281		
Total	2980.244	179			

NS: Non-Significant

CONCLUSION

The present study was examining fundamental employability aptitude among the postgraduate scholars. It concluded that fundamental employability aptitude is a vital component of postgraduate education. Developing a well-rounded skill set that combines both hard and soft skills equips students with the necessary tools to succeed in the competitive job market. By recognizing the importance of these aptitudes and actively cultivating them, postgraduate students can enhance their employability prospects and position themselves for long-term success in their careers. The reason for large majority (68.89 %) of respondents with medium level of fundamental employability aptitude might be the self-motivation of the scholars as well as the efforts from the part of the institution to develop their aptitude. It was observed during the investigation that many of the postgraduate scholars are determined to success in life and really working hard towards achieving his/her goals.

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PERCEIVED ATTRIBUTES IN SELECTION OF RICE VARIETIES BY RICE GROWERS OF ASSAM

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ABSTRACT

The present study was undertaken to study the perceived attributes in the selection of rice varieties by the farmers under different Agro-Ecological Situations (AESs) and identify the problems faced by the farmers in cultivating the HYVs of rice. From the major blocks of each four AES of Jorhat district, one rice growing village was selected randomly with a total of thirty rice growers from each village making a final sample of 120 respondents. The respondents were interviewed with the help of structured schedule. The results revealed that the various attributes that were considered before selecting a rice variety were almost similar in all the AES like resistance to major pest and diseases, high yields etc. Only a few attributes were perceived to differ in the selected AESs. Therefore, it is necessary to develop more specific varieties of rice which include those characteristics desired by the farmers of different agro-ecological situations. The problems in cultivating HYV rice included high cost of labour, lack of conviction in the new technology and high cost of seeds etc. To overcome the problems, it is suggested to make the inputs available to the farmers at the time of requirement and at subsidy rates. Branches of agro-input dealers may be opened in the villages for easy availability and the frequency of contact between the extension agents and the farmers should be made regular which may help in minimizing most of the problems that the farmers are facing in cultivating the HYVs of rice.

INTRODUCTION

India is one of the world's largest producers of rice, accounting for 20% of all world rice production. It is considered as one of the predominant crop and staple food of the people of the eastern and southern parts of the country. Assam occupies a special place in rice production. Farmers of the state cultivate rice in three seasons *viz.*, winter (sali), autumn (ahu) and summer (boro). It is cultivated in the state under different agro-ecological situations.

Assam Agricultural University is putting its effort into conducting researches to provide its best rice cultivars to the farmers. The University has developed many locations specific technologies and released several noteworthy high yielding varieties of rice. Every year a huge budget is earmarked and spent on research to develop improved varieties of rice. But all these varieties have not been able to grab the attention of the farmers which is a matter of concern for the concerned authorities.

Keeping the above facts in view, the present study was designed to study the perceived attributes in selection of rice varieties by the farmers under different Agro-Ecological Situations (AESs) and identify the problems faced by the farmers in cultivating the HYVs of rice.

RESEARCH METHODOLOGY

The present study was conducted in the Jorhat district of Assam during the year 2020-22. Out of the six AESs in the district, only four AES (Humid Alluvial Flood Prone, Char Area, Humid Alluvial Flood Free and High Land) were included in the study as rice is the predominant crop in these situations. Moreover, it was known from secondary sources and in consultation with State Departments that the farmers of these AESs grow both indigenous and HYV rice. From the major blocks of each AES, one rice-growing village was selected randomly with a total of 4 villages. Thirty rice growers from each village under each AES were selected randomly with a final sample of 120 (N=120) respondents. The

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main tool used for collecting data from the respondents was a structured Schedule. The respondents were interviewed about the characteristics/attributes which they considered while selecting a rice variety and the problems they faced while cultivating these HYV rice. The collected data were properly tabulated and analyzed by following proper statistical techniques i.e., frequency distribution, percentage and rank.

RESULTS AND DISCUSSION

Perceived attributes in selection of rice varieties under different AES of Jorhat district.

AES I: It is clearly indicated in Table 1 that the farmers considered "high yield" and "pest and disease resistance" (100%) to be the most important

attributes. This might be due to the loss incurred as a result of heavy infestation of the pests and diseases that deteriorated the yield effects. The same results have been found in the research study of Jin *et al.* (2020). On the other hand, 90.00 per cent of the respondents reveal that they selected a variety which gave "high market value", 80.00 per cent of them mentioned about "maximum tillering ability" as an important attribute which was followed by "fertilizer efficient" (76.67%), "flood tolerance" (21.00%), the "right growth duration" (60.00%), "standing capacity" (53.33%), "less milling loss" (50.00%), "longer storage capacity" (46.64%), "less labour requirement" (36.67%), "yield stability" (26.67%) and "good grain quality" (20.00%).

AES II: Similarly, in AES II, it was depicted

Table 1. Distribution of the respondents according to the perceived attributes to select a rice variety in AES-I, II, III & IV

(N=120)

ATTRIBUTES	AES-I		AES-II		AES-III		AES-IV	
	Frequenc y & %	Ran k	Frequenc y & %	Ran k	Frequenc y & %	Ran k	Frequenc y & %	Ran k
Resistance/toleranc e to major pest and diseases	30 (100.00)	I	30 (100.00)	I	28 (93.33)	II	30 (100.00)	I
High yield	30 (100.00)	I	30 (100.00)	I	30 (100.00)	I	30 (100.00)	I
High market value	27 (90.00)	II	30 (100.00)	I	26 (86.67)	III	28 (93.33)	II
Maximum tillering ability	24 (80.00)	III	16 (53.33)	VI	13 (43.33)	VII	17 (56.67)	VI
Fertilizer efficient	23 (76.67)	IV	12 (40.00)	VII	21 (70.00)	IV	24 (80.00)	III
Flood tolerance	21 (70.00)	V	18 (60.00)	IV	13 (43.33)	VII	14 (46.67)	VII
Right growth duration	18 (60.00)	VI	17 (56.67)	V	17 (56.67)	V	21 (70.00)	IV
Good Standing capacity	16 (53.33)	VII	27 (90.00)	II	28 (93.33)	II	28 (93.33)	II
Less milling loss	15 (50.00)	VIII	12 (40.00)	VII	15 (50.00)	VI	18 (60.00)	V
Longer storage capacity	14 (46.67)	IX	21 (70.00)	III	11 (36.67)	VIII	11 (36.67)	VIII
Less labour requirement	11 (36.67)	X	17 (56.67)	V	8 (26.67)	IX	18 (60.00)	VI
Yield stability	8 (26.67)	XI	21 (70.00)	III	6 (20.00)	X	6 (20.00)	IX
Good grain quality	6 (20.00)	XII	11 (36.67)	VIII	30 (100.00)	I	30 (100.00)	I

from Table 1 that all the respondents (100.00%) considered "yield", "high market price" and "resistance/ tolerance to major pests and diseases" to be the important characteristics which they considered while selecting any rice variety. These results are in line with the results of Sharma (2017). High yield and high market value had a direct relationship to profit whereas, to incur minimum loss due to the attack of pests and diseases, the farmers considered resistance/ tolerance to major pests and diseases to be an important attribute of the crop. Apart from these, 90.00 per cent revealed "Good standing capacity" as an important attribute followed by "longer storage capacity and yield stability" (70.00%), "flood tolerance" (60.00%), "right growth duration and less labour requirement" (56.67%), "maximum tillering" (53.33%) followed by "less milling loss and fertilizer efficient" (40.00%) and lastly "Good grain quality" as revealed by 36.67 per cent of respondents.

AES III: The findings related to the attributes considered by the respondents of AES III are mentioned in Table 1. It was clear from the table that all the respondents i.e., 100.00 per cent of them considered "High yield and good grain quality" as a necessary attribute which was followed by "resistance/tolerance to major pests and diseases and good standing capacity" (93.33%), "high market value" (86.67%), "fertilizer efficient" (70.00 %), "right growth duration" as mentioned by 56.67 per cent respondents followed by "less milling loss" (50.00%), "maximum tillering ability and flood tolerance" (43.33%) which is followed by "longer storage capacity" (36.67 %) than "less labour requirement" (26.67 %) and lastly "yield stability" as mentioned by 20.00 per cent of respondents. "Yield" was considered to be the most important attribute by the farmers so that it could be used for consumption as well for selling purposes. The farmers obtained profit by selling the marketable surplus.

AES IV: The respondents of AES IV mentioned a few attributes which they considered while selecting any rice variety as mentioned in Table 1. According to the findings, 100.00 per cent of the

respondents revealed 'high yield', "resistance to pests and diseases" and 'Good grain quality' considered to be important attributes by them. 93.33 per cent of the respondents mentioned the "market price" of the produce to be an important attribute which was followed by "fertilizer efficiency" (80.00%), "the right growth duration" (70.00%), "taste" (63.33%), "maximum tillering ability" (56.67 %), and lastly "tolerant to stress and logging" (46.67%).

Problems faced by the farmers in cultivating HYVs of rice

By interviewing the respondents, it was identified that there were many problems that were considered to be the reason behind the less use of HYVs by the respondents than that of the traditional varieties. The problems which have been presented in Table 2 were studied under the following sub-heads i.e., Socio-economic problems, Technological problems, Institutional problems and Bio-physical problems.

a. Socio-economic problems: The first important socio-economic problem expressed by the majority of the respondents (95.83%) was the 'high cost of labour'. Most of the respondents expressed that the agricultural labourers were demanding higher wages irrespective of the nature of work. This might be due to the migration of agricultural labourers to other places for employment and earning higher wages as compared to the income earned from farming. Therefore, the local people should be motivated to grow more HYVs so as to earn a higher income. Involvement of the family members in farming may reduce the labour cost to some extent. 'More input requirement' was reported to be one of the major problems that the respondents (85.83%) faced in cultivating the HYVs. The traditional varieties required less input such as fertilizers, pesticides, weedicides etc. and hence the cost of cultivation involved less whereas, it was reversed in case of HYVs. 'High cost of inputs' was a problem mentioned by 81.67% of the respondents. This might be due to the rise in the price of seeds, fungicides, pesticides, and chemical fertilizers every year. But at the same time, price of agricultural produce had not increased proportionately. 'Non-availability of trained labour

Table 2. Distribution of respondents according to the problems faced while cultivating HYVs (N=120)

Sl.No.	Problems	Frequency	Percentage	Rank
A	Socio-Economic aspects			
1	High cost of labour	115	95.83	I
2	More input requirement	103	85.83	II
3	High cost of inputs	98	81.67	III
4	Non- availability of trained labour on time	76	63.33	IV
5	Non- availability of credit facilities	63	52.50	V
6	Lack of reasonable support price	56	46.66	VI
7	Lack of subsidy for inputs	35	29.17	VII
B	Technological aspects			
1	Lack of conviction in the new technology	78	65.00	I
2	Lack of awareness about scientific technologies	58	48.33	II
3	Non-availability of desired technology	41	34.17	III
4	Lack of irrigation facility	32	26.67	IV
C	Institutional problems			
1	Weak extension activities at the village level	109	90.83	I
2	Unawareness of supplies and services offered by the government	99	82.50	II
3	Insufficient training programmes	89	74.17	III
4	Lack of regulated market	72	60.00	IV
5	Lack of proper communication system	61	50.83	V
6	Lack of transport facilities	43	35.83	VI
7	Poor market linkage	40	33.33	VII
d	Biophysical constraints			
1	High cost of seeds of high yielding varieties	98	81.67	I
2	The complexity of new practices	95	79.17	II
3	Non-availability of suitable high yielding varieties	88	73.33	III
4	Heavy pest and disease incidence	64	53.33	IV
5	Occurrence of heavy weed growth	52	43.33	V

in time' was revealed as the problem by 63.33 per cent of the respondents. In the study area, most of the respondents reported that the available farm labourers were not properly trained as most of the cultivation practices in HYVs of rice were skill oriented. 'Non-availability of credit facilities' was mentioned to be one of the major problems by 52.50 per cent of the respondents. As the inputs

were costly in terms of HYVs, the farmers had to face difficulties in obtaining the inputs. 'Lack of reasonable support price' was the problem reported by 46.66 per cent of the respondents. Some of the respondents felt that the cost of crop production has been increasing every year. This might be due to the increased labour charges and input costs. But the minimum support price did not augment every

year. 'Lack of subsidy for inputs' was one of the major problems faced by the respondents (29.17 %). Therefore, the concerned authorities may try to solve the matter by ensuring subsidies to the farmers so that a greater number of HYVs were adopted by them. These findings are in conformity with the results of Abdullah *et al.* (2013), Bhan (1990), Lakshminarayan *et al.*, (2011), Sawant *et al.*, (2019) and Sharma *et al.*, (2017).

b. Technological problems: The first and foremost technological problem expressed by 65.00 per cent of the respondents was 'lack of conviction in the new technology'. The technologies like seed treatment, weedicide application, and pest and disease management might lead to increased cost of cultivation and risk, especially among the small and marginal farmers thereby reducing the net income of the farmers. 'Lack of awareness about scientific technologies' was expressed as a problem by 48.33 per cent of the respondents. Some of the respondents in the study area were not interested to cultivate HYVs in their fields due to a lack of awareness about the benefits of those varieties. This may be due to poor extension contact and a lack of proper training in this area. 'Non-availability of desired technology' was reported as a constraint by nearly 34.17 per cent of the respondents in their paddy cultivation. The recommended rice production technologies may not be suitable for all regions. The recommendations of the State Department of Agriculture for obtaining higher yields may not be relevant to the existing field conditions. Moreover, the soil and climate factors also vary from region to region. So, the farmers might stick to traditional varieties. 'Non-availability of irrigation facilities' was considered to be a problem by 26.67 per cent of the respondents. According to them, at the time of stress they face lots of difficulties to retain crop growth due to the lack of irrigation facilities in their fields. The same results have been found by Sall *et al.* (2000) and Kumar *et al.* (2019).

c. Institutional problems: 'Weak extension activities at village level' was reported as the foremost problem (90.83%) under the institutional problems by the respondents. The possible reason may be

due to the lack of sufficient extension functionaries to act as facilitators for farmer-to-farmer communication to disseminate the importance of high yielding varieties. 'Lack of awareness of supplies and services offered by the Government' was one of the problems expressed by 82.50 per cent of the respondents. The respondents reported that the concerned authorities were not taking adequate efforts to create awareness among various sections of the respondents regarding the benefits offered by the Government to boost agricultural production at the farm level. Many respondents (74.17%) revealed that 'Insufficient training programme' as the problem. Most of the respondents did not know the actual potentiality and utility of the recommended rice varieties and the practices due to the lack of training programmes. 'Lack of regulated market' was identified as a problem by 60.00 per cent of the respondents. Therefore, the farmers sold out their produce at a very low price which is undesirable. Proper functioning of regulated markets might help the farmers to disburse their produce at a desirable price. 'Lack of proper communication system' was reported as problem by 50.83 per cent of the respondents. Due to the inadequacy of agricultural programs in radio and television, print media, farm and home visit etc., the respondents may not be aware of the HYVs and their benefits. Hence, if such kind of programmes could be arranged and a greater number of extension contacts were made then the farmers would be benefited. 35.83 per cent of the respondents mentioned that 'Lack of transport facilities' was one of the problems which they` faced. 'Poor market linkage' (33.33%) was one of the problems which the respondents had to face while disbursement of their final produce. According to them, the farm produce was sold out for a low price at the nearby market due to poor market linkage. This might be solved by linking the farmers to the distant markets. The same results have been found by Mohammed (2011) and Manhas (2018).

d. Bio-physical problems: The first and foremost bio-physical problem experienced by the respondents was 'High cost of high yielding varieties' which was reported by 81.67% of the respondents.

This might be due to the high production cost of the seeds. 'Complexity of new practices' was ranked as the second important problem reported by 79.17 per cent of the respondents. Most of the respondents revealed that the adoption of new practices would require specialized skills and trained labour. 'Non - availability of suitable high-yielding varieties' was expressed as a problem by 73.33 per cent of the respondents. During the data collection, most of the respondents reported that the seeds of high yielding varieties were not available in time either in the nearby markets or in agricultural offices. 'Heavy pest and disease incidence' was mentioned as a problem by 53.33 per cent of the respondents. It was reported that the HYVs which they cultivated in their fields were more infested by pests and diseases. Therefore, these varieties were cultivated in a low scale by the farmers. Similarly, as revealed by 43.33 per cent of the respondents that the HYVs were highly affected due to 'weed growth'. The yield of the crop reduces due to the occurrence of weeds whereas, the traditional varieties were less affected by such incidence.

CONCLUSION

The various attributes in selecting a rice variety were almost similar in all the AESs where few attributes differed among the AES. Therefore, it is necessary to develop more specific varieties of rice which includes those characteristics as desired by the farmers. To overcome the problems related to the cultivation of HYVs of rice, it is suggested to make available the inputs at subsidized rates to the farmers at the time of requirement. They may be made aware of improved rice varieties and benefits of growing these varieties. Proper training may be imparted regarding the scientific cultivation practices of rice.

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SOCIO-ECONOMIC UPLIFTMENT OF ORCHARD OWNERS THROUGH ADOPTION OF MANDARIN PRODUCTION TECHNOLOGY

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ABSTRACT

In Rajasthan, citrus is the leading fruit crop. In some part of Rajasthan such as Jhalawar, Kota and Shri Ganganagar district Mandarin orange specialty cultivar Nagpuri is quite important and produced commercially at large scale. With this point of view the present study was conducted in Jhalawar district of Rajasthan. Results revealed that majority of the mandarin growers had median level of adoption about recommended practices of mandarin cultivation. The high extent of adoption has significantly contributed in the upliftment of socio-economic condition of the mandarin growers.

INTRODUCTION

Improved production technology has revolutionised the fruit growing and India has acquired a reputed position in the field of fruit production. Fruit production of our country is 107.24 million tonnes during 2021-22. Fruits are of great importance in the field of human nutrition. Citrus is one of the most important fruit crops in India. Common citrus fruits are mandarin, sweet orange and lime in the country. India also earns foreign exchange by exporting oranges to Iran, Bahrain, Singapore etc.

In Rajasthan, citrus is the leading fruit crop. In some part of Rajasthan such as Jhalawar, Kota and In Sri Ganganagar districts, mandarin orange specialty cultivar Nagpuri is quite important and produced commercially at large scale. Mandarin is the most important fruit among the various types of citrus from both area and production point of view, as the area under mandarin alone in Rajasthan is 1087 hectares and production is 5765 metric tonnes. With the population explosion during recent years, the increasing demand of fruits clearly indicate that there is an urgent need to boost up the production of mandarin fruit to cater the demands of growing population. The increase in production largely depends upon the adoption of improved production technology of mandarin by the farmers. There are written evidences that adoption of mandarin technology has contributed significantly

in the social and economic uplift of the orchard owners in the study area. Therefore, it was high time to find out the extent to which the improved production technology is adopted and to assess the socio-economic upliftment of the orchard owners. Thus, the study was undertaken with following specific objectives:

1. To study the extent of adoption of improved practices of mandarin cultivation by the orchard owners.
2. To assess the socio-economic status of the respondents under study area.

METHODOLOGY

The present study was undertaken in purposely selected Jhalawar district of Rajasthan, considering highest area under mandarin cultivation. Sunel panchayat samiti of the district was further identified based on maximum area under this fruit crop among all the other panchayat samities. Further, two village panchayats with maximum area under mandarin fruit were selected and three villages with maximum area under mandarin from each identified village panchayat were taken. Thus, in all six villages were included in the investigation. For selection of respondents, ten mandarin growers and ten non-mandarin growers from each identified village were drawn by random sampling technique. Thus, in all 60 mandarin growers and 60 non-mandarin growers were taken for the study. The data were collected

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by a well-structured interview schedule by employing a personal interview technique.

RESULTS AND DISCUSSIONS

To measure the extent of adoption of mandarin production technology, an adoption scale was developed for the study purpose. This schedule consisted of statements on varieties, propagation, planting, cultural practices, plant protection and harvesting & marketing of mandarin fruit. The required information was collected from respondents through structured schedule. Thereafter, collected information were analysed.

The mandarin growers were grouped into three categories based on the level of adoption of technology i.e. low, medium and high.

Table 1: Distribution of orchard owners according to their level of adoption of the recommended mandarin production technology

S. Categories No.	Frequencies	Percentage
1 Low (0 to 42)	12	20.00
2 Medium (43 to 45)	43	71.67
3 High (above 45)	05	8.33
Total	60	100.00

The data in Table 1 reveal that nearly three fourth of the respondents had medium level of adoption of recommended mandarin production technology. This was followed by 20 per cent mandarin growers with low extent of adoption, whereas, only 8.33 per cent orchard owners could be placed in high adoption category. It is interesting to note that 80 per cent mandarin growers were found in the category of medium to high level of adoption of mandarin production technology in the study area.

To find out the extent of adoption, mean per cent score of each major practice was calculated. Thereafter, the adoption gap was calculated under each major practice of mandarin cultivation.

Table 2: Adoption gap of mandarin production technology among the orchard owners

S. Practice No.	MPS	Adoption Gap
1 Improved varieties	100.00	0.0
2 Propagation	64.44	35.56
3 Planting	88.14	11.86
4 Cultural Practices	96.94	03.06
5 Plant Protection Measures	77.77	22.23
6 Harvesting & Marketing	91.81	08.19

MPS = Mean Per cent Score

A close observation of the data presented in Table 2 show that mandarin growers had maximum adoption gap (35.56%) in propagation practice. This was followed by plant protection measures (22.23%). The data further indicate that minimum adoption gap was reported in case of use of improved varieties among respondents. The full use of recommended mandarin varieties may be because of the reason that almost all the orchard owners in the study area have sown "Nagpuri" variety of mandarin in their orchards. This has been observed that all the owners are procuring the planting material from Nagpur itself. As and when the new orchards are established this has become the practice to procure the readymade planting material from Nagpur (Native place) itself. Hence, the results are quite obvious.

A negligible adoption gap in cultural practices may be due to the simplicity in performing these practices. An illiterate and unskilled orchard owners can perform them without any difficulty. This might have resulted in the higher adoption leading to minimum adoption gap in the practice.

Table further show that a higher adoption gap 35.56% in propagation practice and 20.23 per cent in plant protection measures was reported. It has been observed that the orchard owners do not prepare the planting material at their own and have the tendency to procure the planting material a fresh

Table 3: Distribution of respondents according to their socio- economic status

S.No.	Categories of socio-economic status	Mandarin growers		Non-mandarin growers	
		F	%	F	%
1.	High (Above 105)	10	31.67	0	0.0
2.	Medium (56 to 104)	41	68.33	40	66.66
3.	Low (0 to 55)	0	0.00	20	33.34
		60	100.00	60	100.00

F - Frequencies

from its native place. They never propagate mandarin for orcharding. This may be the probable reason for significant gap in the practice. The poor knowledge in plant protection measures might have resulted in to poor adoption leading to a considerable gap in this practice.

To find out the extent of socio-economic upliftment of orcharding families on account of adoption of mandarin technology, the data collected from mandarin growers and non- mandarin growers were analysed and are presented in the following table.

The data in the Table 3 reveal that a majority (68.33%) of the mandarin growers were having medium socio-economic status followed by 31.67 per cent having high socio-economic status. It is interesting to note that none of respondents was reported to be from low socio- economic status. In case of non-mandarin growers, 66.66 per cent respondents possessed medium level of socio-economic status followed by 33.33 per cent with low socio-economic status and zero per cent having high socio economic status in the study area.

A fairly good percentage (31.67%) of respondents from mandarin growing category were found with a high socio-economic status whereas, remarkably high percentage (68.33%) from the same category of respondents were placed in medium category of socio-economic status. Contrary to this, from among the non -mandarin grower's category, none was found with high socio-economic status where as 33.64 per cent

respondents were found to be from low socio-economic status category. A higher socio-economic condition of mandarin growers is quite obvious. Mandarin orchards might have contributed positively to the upliftment of socio-economic status of the orcharding families. On the other hand, the non-mandarin growers were deprived of the socio-economic benefits and as such might have reflected in their poor socio-economic status.

CONCLUSION

Findings leads to conclusion that majority of the mandarin growers (80%) had medium to high level to adoption of mandarin production technology in the study area. The study further shows that 100 per cent adoption of improved varieties of mandarin was reported among the orchard owners. This was followed by cultural practices, harvesting & marketing, planting, plant protection measures and propagation with 96.44, 91.88, 88.14, 77.77 and 64.44 per cent adoption, respectively. With the result at hand it can be concluded that extent of adoption in all the practices was more than 64 per cent and this has significantly contributed in the social as well as economic upliftment of orchard owners in Jhalawar district of Rajasthan.

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ATTITUDE OF WOMEN ABOUT KITCHEN GARDENING

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ABSTRACT

A kitchen garden has numerous definitions. It is more common French term; these gardens are meant to supply the household with some vegetables, fruits or herbs. Many of the rural families used to grow vegetables in their backyards for their household consumption. But still they lack in adequate consumption of vitamins and minerals because of unorganized cultivation of vegetables. Keeping in view the importance of vegetables in daily diets and its low availability, the study has been conducted on attitude towards kitchen gardening. A total of 100 respondents were selected for the study. The exploratory design was adopted. For measuring the knowledge of women towards kitchen gardening, the test developed by the department of agricultural extension and communication were used. Data were collected through personal interviews using the pre-tested structured interview schedule. The results of the study stated that nearly two-fifth (39.00 per cent) of the respondents had medium level of knowledge about kitchen gardening.

INTRODUCTION

A kitchen garden has numerous definitions. It is more common French term; these gardens are meant to supply the household with some vegetables, fruits or herbs. When hearing the term "kitchen garden" it is easy to visualize a shelf full of little flowerpots containing a few herbs. This can include vegetables, fruits, berries, herbs and flowers. Kitchen gardens can be grown in the empty space available at the backyard of the house or a group of women can come together, identify a common place or land and grow desired vegetables, fruits, cereals, etc., that can benefit the women and community as a whole. There are many social benefits that have emerged from kitchen gardening practices; better health and nutrition, increased income, employment, food security within the household, and community social life. Households and small communities take advantage of vacant land and contribute not only to their household food needs but also the needs of their resident city.

There are many social benefits that have emerged from kitchen gardening practices, better health and nutrition, increased income, employment, food security within the household, and enhance in

community social life. Apart from having a good amount of production of vegetables at national level, the per capita availability in diet is quite low in our country. The daily requirement of vegetable is around 300 gms as per ICMR but the availability is very low. Many of the rural families used to grow vegetables in their backyards for their household consumption. But still they lack in adequate consumption of vitamins and minerals because of unorganized cultivation of vegetables. Keeping in view the importance of vegetables in daily diets and its low availability, the study has been conducted on the following objectives:

Objectives

1. To assess the knowledge level of women about kitchen gardening
2. To find out the constraints being faced by the women in kitchen gardening

RESEARCH METHODOLOGY

The study was conducted in Anand district of middle Gujarat. The Anand district comprises eight talukas, out of which one taluka Anand was selected on the basis higher area under vegetable cultivation. Subsequently, ten villages from selected taluka were randomly identified. Using random sampling

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technique, equal number of respondents i.e., ten respondents from each village were selected. A total of 100 respondents were selected for the study. The exploratory research design was adopted. To assess the knowledge level of women towards kitchen gardening, knowledge test developed by department of agricultural extension and communication were used. Data was collected through personal interviews using the pretested structured interview schedule to bring out both qualitative and quantitative data.

RESULTS AND DISCUSSION

Knowledge level of women towards kitchen gardening

Data presented in Table 1 indicate that nearly two-fifth (39.00 per cent) of the respondents had medium level of knowledge about kitchen gardening followed by low (25.00 per cent), high (19.00 per cent), very high (9.00 per cent) and very low (8.00 per cent) regarding kitchen gardening. The result discloses that majority of respondents had low to high technical knowledge towards kitchen gardening. The finding is line with the finding of Deepalakshmi (2019) and Alpana *et al.* (2018).

Table 1: Distribution of overall Knowledge level of women towards kitchen gardening (n=100)

S. No.	Category	Frequency	Per cent
1	Very low (up to 9 score)	08	8.00
2	Low (10 to 18 score)	25	25.00
3	Medium (19 to 27 score)	39	39.00
4	High (28 to 36 score)	19	19.00
5	Very high (37 to 45 score)	09	9.00

A look into Table 2 it is clear that nearly half (61.00 per cent) of the respondents were have knowledge towards the statement 'Benefit/s of bottle gourd juice'. However, it was seen that only 1.00 per cent of respondents have the knowledge

towards the statement "Awareness of Light-trap is used for insect control in kitchen garden".

Table 2 also point out that nearly half (59.00 per cent) of the respondents had the knowledge about the statement "carrot and fenugreek are grown through seeds followed by "soil preparation for kitchen garden' (58.00 per cent) and knowledge of sowing time of vegetables in monsoon season (58.00 per cent). However, it was observed that only 2.00 per cent of the respondents have the knowledge of "Buried the disease infected material in the pit" followed "Awareness of light-trap is used for insect control in kitchen garden (1.00 per cent)" and "Chemical pest control method in kitchen garden (12.00 per cent)". The results clearly indicate that respondents have knowledge about the general package of practices of vegetables.

Constraints faced by the women in kitchen gardening

From the Table 3, it is seen that constraints related to kitchen gardening were 'Lesser availability of quality seed in small packets' and 'Lesser availability of pesticide in small packets' (ranked 1st) followed by 'High poultry and monkey menace (ranked 2nd)', 'Lack of knowledge about nutritional aspect of vegetables' 'Fear of farm produce robbery' (ranked 3rd), Problem in surplus small quantity produce selling (ranked 4th).

Table 3 also indicate that the statement "Low involvement of housewife in cultivation practices (ranked 5th) followed by 'Lesser priority to garden than farm activities' 'Problem of proper protection of local goat and cattle grazing' (ranked 6th), Lack of knowledge of recommended varieties (ranked 7th), Lack of knowledge of recommended seed rates (ranked 8th), Lack of knowledge of recommended sowing time (ranked 9th), Lack of knowledge of package of practices (ranked 10th), Lack of knowledge about seed treatment (ranked 11th), Lack of knowledge about pest and disease (ranked 12th), Lack of interest in agriculture (ranked 13th) and Lack of availability of FYM (ranked 14th). The finding is line with the finding of Jhajharia *et al.* (2022)

Table 2: Distribution of statement wise knowledge level of women towards kitchen gardening (n=100)

S. No.	Items of knowledge	Correct answer (Frequency)	Per Cent
1	Most suitable crop for kitchen garden according to soil	58	58.00
2	Soil preparation	45	45.00
3	Sowing time of monsoon season vegetables	51	51.00
4	Sowing time of winter season vegetables	48	48.00
5	Sowing time of summer season vegetables	58	58.00
6	Vegetables grown in winter season	54	54.00
7	Vegetables grown in summer season	51	51.00
8	Vegetables grown as perennials	54	54.00
9	Insect/s appear/s in tomato	44	44.00
10	Insect/s appear/s in chilli	51	51.00
11	Insect/s appear/s in the vine's vegetable	58	58.00
12	Varieties of okra	31	31.00
13	Varieties of cluster bean	58	58.00
14	Early varieties of cauliflower	35	35.00
15	Vegetables grown round the year	47	47.00
16	Vegetable grown through seeds	55	55.00
17	Vegetable grown through part of plant	53	53.00
18	Nutrients provide by Cucumber, Chilli, Bottle-gourd & Tomato	34	34.00
19	Source vitamin C	50	50.00
20	Source of phosphorous	44	44.00
21	Place of compost for kitchen garden	29	29.00
22	Variety of chilli	45	45.00
23	Variety of brinjal	26	26.00
24	Fruit crops which can grow in kitchen garden	51	51.00
25	Vermi-compost	54	54.00
26	Benefit/s of carrot juice	48	48.00
27	Benefit/s of bottle gourd juice	61	61.00
28	Benefit/s of onion juice	49	49.00
29	Benefit/s of juices of spinach, amaranths, fenugreek and radish	61	61.00
30	Vegetable/s, which are avoided with milk	48	48.00
31	Bitter guard grown through seeds	47	47.00
32	Carrot and fenugreek are grown through seeds	59	59.00
33	Okra, cluster bean and cowpea grown through seeds	47	47.00
34	Tomato cabbage and chilli are grown through seedlings	56	56.00
35	Spacing between two rows and plants of different vegetable crops	23	23.00
36	Vines which are grown in kitchen garden such as bitter-gourd, cucumber, pointed-gourd, scarlet-gourd	57	57.00
37	Buried the disease infected material in the pit	02	02.00
38	Awareness of pheromone trap for insect control which is beneficial for human health	24	24.00
39	Ladybird beetle is beneficial for insect control	46	46.00
40	Trichoderma is useful parasite for kitchen garden	28	28.00
41	Neem-based pesticides is beneficial for human health	47	47.00
42	Awareness of light-trap is used for insect control in kitchen garden	01	01.00
43	Sunlight is most important for plant growth	61	61.00
44	Weed control in kitchen garden	47	47.00
45	Chemical pest control method in kitchen garden	12	12.00

Suggestions to overcome from the constraints faced by the women in kitchen gardening

Table 4 indicate that out of the eight suggestions given by respondents, 'availability of small packing of quality seeds' was ranked first followed by 'demonstration on kitchen gardening was ranked

second, 'Create interest in kitchen garden than other activities' was ranked third as they may get benefit to grow kitchen garden.

The respondents gave ranked the 'availability of proper tool kits for kitchen gardening' as the fourth suggestion. The fifth rank was given to training programme related to pest and insect identification

Table 3: Constraints being faced by the women in kitchen gardening

(n=100)

Sr.No.	Constraints	Mean Score	Rank
1	Lesser availability of quality seed in small packets	0.82	1
2	Lesser availability of pesticide in small packets	0.82	1
3	High poultry and monkey menace	0.78	2
4	Lack of knowledge about nutritional aspect of vegetables	0.76	3
5	Fear of farm produce robbery	0.76	3
6	Problem in surplus small quantity produce selling	0.61	4
7	Low involvement of housewife in cultivation practices	0.56	5
8	Lesser priority to garden than farm activities	0.52	6
9	Problem of proper protection of local goat and cattle grazing	0.52	6
10	Lack of knowledge of recommended varieties	0.51	7
11	Lack of knowledge of recommended seed rates	0.50	8
12	Lack of knowledge of recommended sowing time	0.49	9
13	Lack of knowledge of package of practices	0.49	10
14	Lack of knowledge about seed treatment	0.41	11
15	Lack of knowledge about pest and disease	0.39	12
16	Lack of interest in agriculture	0.38	13
17	Lack of availability of FYM	0.34	14

Table 4: Suggestions to overcome from the constraints faced by the women in kitchen gardening
(n=100)

Sr.No	Suggestions	Mean score	Rank
1	Availability of small packing of quality seeds	0.74	I
2	Demonstration on kitchen gardening	0.72	II
3	Create interest in kitchen garden than other activities	0.62	III
4	Availability of proper tool kits for kitchen gardening	0.55	IV
5	Training programme related to pest and insect identification and control	0.52	V
6	Availability of pesticide in small packing	0.49	VI
7	Provision of awareness programme about improved varieties and seed rate	0.48	VII
8	Capacity building programmes for scientific and efficient management of kitchen gardening	0.39	VIII

and control. The other suggestions were like; 'availability of pesticide in small packing', 'provision of awareness programme about improved varieties and seed rate' and 'capacity building programmes for scientific and efficient management of kitchen gardening'.

CONCLUSION

Nutrition is considered critical for women. Nutrition is an input into development especially economic development and its neglect would adversely impact on health, cognitive development. The observations indicate that the majority of respondents had low to high technical knowledge towards kitchen gardening and majority of the respondents had positive to highly positive attitude towards kitchen gardening. Knowledge regarding cultivation is very important. Many people start their garden without certain basic knowledge. Government should come forward to educate urban women regarding organic kitchen garden through newspapers, magazines, social media *etc.* in order to provide solution to overcome these problems. Therefore, the knowledge of women increases regarding kitchen gardening that helped to improve the food and nutritional security.

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AN ECONOMIC ANALYSIS OF MILK PRODUCTION OF BUFFALO AND COW IN SOUTHERN RAJASTHAN

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ABSTRACT

The present study was conducted in Rajasthan during the year 2018-19. An attempt has been made in this investigation to work out the cost and returns from milk production across different milch species of animal viz., local cow, crossbreed cow and buffalo. The study covered 160 dairy households from Bhilwara and Chittorgarh districts. The results of the study revealed that the small herd size category (standard animal units) contributes 66.25 per cent of total households followed by medium (20.63 per cent) and large (13.12 per cent) categories in the study area. The overall cost of milk production was found lowest for crossbred (Rs. 21.66/lit.), followed by buffalo (Rs. 27.80/lit.) and local cow (Rs. 30.99/lit.). Feed cost was higher for buffalo (55.29 %) followed by local cow (54.59 %) and crossbreed cow (52.01 %). However, the expense was higher in case of crossbreed cow (24.37%) followed by local cow (24.26 %) and buffalo (23.82 %) and decreased with the increase in size of herd. The overall of cost of milk production was lowest for crossbred cow (Rs. 21.66/lit.), followed by indigenous cow (Rs. 30.99/lit.) and buffalo (Rs. 27.80/lit.).

INTRODUCTION

Livestock farming in Rajasthan state is closely interwoven with agriculture and plays an important role in determining the rural economy by providing gainful employment to small and marginal farmers, agriculture laborers, farm women and other deprived groups. Rajasthan is the second largest milk producing state (with share of 12.61 per cent to total milk production of India) in the country where per capita per day availability of milk was 785 grams (NDDB, 2016-17). Rajasthan is the only state in India where the local breeds of animal are abundantly available. The buffaloes and cows are the primary sources of milk. Few outstanding research work on the economics of milk production has been conducted earlier by the different researchers such as Bairwa (2004), Singh (2005), Meena *et al.* (2010), Chand and Sirohi (2012) in Rajasthan while Singh *et al.* (1994) and Shiyani and Singh (1995), Kalra *et al.* (1995), Singh and Agrawal (2007), Bardhan and Sharma (2012), Sunil *et al.* (2016) and Chand *et al.* (2017) studied economics of milk production at different part of the country. But economics of milk production differs from region to region and district to district,

animal to animal and year to year. Production cost, at given level of prices, plays an important role in portraying economic viability of a dairy enterprise. It is a critical economic indicator for milk producers, consumers and policy makers in order to provide an effective linkage between the milk producers and consumers for fixing the price of milk rationally. Generally, a milk producer can increase his daily income in two ways either by increasing the milk production or by reducing cost of milk production. Cost of milk production often becomes a policy issue, when milk producers complain that the price of milk they are getting does not cover cost of milk production. In view of the overwhelming importance of the milk production in devising the rural economy of Rajasthan, the present investigation was carried out and an attempt has been made to work out the cost and returns from milk production.

RESEARCH METHODOLOGY

The study pertains to the state of Rajasthan. The Bhilwara and Chittorgarh districts were selected purposively from Rajasthan on the basis of highest milk production in southern Rajasthan. From each selected district, four tehsils were selected randomly. From each tehsil, one village was selected randomly.

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Thus, Aashind, Jahajpur, Bijoliya and Mandal tehsils from Bhilwara district and Gangrar, Rashmi, Kapasan, Chittorgarh tehsils from Chittorgarh district were selected randomly. The village Govindpura, Bheempura, Ummedpura and Mandal from Bhilwara district and Kharkhanda, Rood, Kashmor and Singhpur from Chittorgarh district were selected randomly. Total four tehsils and four villages of two selected districts were taken in sample. The final sampling unit was dairy household. From each selected village, 20 dairy households having at least one lactating animal were selected randomly. Thus, a total of 160 dairy households were randomly selected for the present study. The study was based on primary data which were collected with the help of well-structured pre-tested schedule by personal interview method. This study was conducted during the year 2018-19. Certain expenses were incurred by the farmers for the entire herd on the farm. Fixed assets like cattle shed; other fixed equipments and miscellaneous items are jointly used for animals of all age groups of either sex. Hence, the total expenses of a household on the joint cost items; depreciation and interest on fixed assets (other than value of milch animal that is animal specific), human labour, miscellaneous cost were apportioned on the basis of standard animal units (SAUs) as suggested by Kumbhare *et al.* (1983). The depreciation on milch local cows, crossbred cows and buffaloes were calculated by straight line method and rates of deprecation were considered as 12, 8 and 10 per cent, respectively, assuming a productive life of 8 years for local cows, 12 years for crossbred cows and 10 years for buffaloes. The depreciation for other fixed assets was taken based on the appropriate assumptions regarding their useful economic life.

The overall maintenance cost of milk production is an aggregate of expenditure incurred on the fixed and variable items. Net cost was obtained by subtracting the imputed value of dung from the gross cost. The net cost of maintenance per milch animal per day was divided by the respective average milk yield per milch animal per day to arrive at per litre cost of milk production. Various cost concepts and

income measures were employed given as under. Returns from milk production: The gross returns considered to take into account two items i.e. milk and dung. The sale of calves and/or adult animals was not taking into account in calculation of return. The following cost concepts and income measures were computed.

Cost A = Expenditure on feeds and fodders (+)
 Veterinary expenditure (+) Expenses on hired human labour (+) Miscellaneous expenditure (+)
 Depreciation on fixed assets

Cost B = Cost A (+) Interest on fixed capital

Cost C = Cost B (+) Imputed value of family labour

Gross Income = (Quantity of milk × Prevailing price of milk + Quantity of dung × Price of dung)

Farm business income = Gross Income - Cost A

Family labour income = Gross Income - Cost B

Net income = Gross Income - Cost C

RESULTS AND DISCUSSION

The herd strength and the number of milch animals in the household directly affect the economy of the milk producers. Different breeds, species and types of animals were maintained in various households. There was no draught animal due to the adoption of farm mechanization. It is clear that milk producer households were having more buffalo as compared to crossbred cow and local cow in livestock resource.

The ultimate objective of any dairy development programme is to attain increased income level of the milk producers through higher average milk yield of milch animals. It is evident from the table that the average milk yield per day per animal was highest for crossbred cows (7.19 litres) followed by buffaloes (5.44 litres) and local cows (4.06 litres). The state average milk yield was 7.78 litres for crossbred cows, 4.75 litres for buffaloes and 3.44 for local cows (Government of Rajasthan, Directorate of Animal Husbandry, Jaipur). The productivity of buffaloes and local cows in study area was higher as compared to state average milk yield, while it was lower in case of crossbred cows.

Table 1. Average cost of milk production for districts.

		(Rs./Lit.)
Category/ Season		Overall
Local Cow		
Small		32.09
Medium		30.60
Large		30.30
Overall		30.99
Crossbreed Cow		
Small		22.16
Medium		21.45
Large		21.37
Overall		21.66
Buffalo		
Small		29.02
Medium		27.64
Large		26.74
Overall		27.80

Table 2. Average net maintenance cost for milch animals across herd size categories

		(Rs./milch animal/day)		
S.No.	Components/ Categories	Local Cow Overall	Cross Breed Overall	Buffalo Overall
1	Total fixed cost	25.58 (18.01)	34.70 (19.89)	30.68 (17.43)
I	Deprecation on fixed assets	9.78 (6.89)	12.81 (7.34)	10.95 (6.22)
II	Interest on fixed assets	15.79 (11.12)	21.89 (12.55)	19.74 (11.21)
2	Total variable cost	116.46 (81.99)	139.73 (80.11)	145.34 (82.57)
I	Feed cost	77.53 (54.59)	90.72 (52.01)	97.68 (55.49)
II	Labour cost (Family labour)	34.46 (24.26)	42.51 (24.37)	41.92 (23.82)
III	Vet. & Misc. Exp	4.47 (3.14)	6.50 (3.72)	5.73 (3.26)
3	Gross cost (1+2)	142.03 (100)	174.43 (100)	176.02 (100)
4	Imputed value of dung	16.13	18.75	24.94
5	Net cost (3-4)	125.90	155.68	151.09
6	Average milk yield (lit)	4.06	7.19	5.44
7	Net cost of milk production/lit (5/6)	30.99	21.66	27.80

In order to understand milk production from its economic perspective, it is essential to study the costs, be it implicit or explicit that goes into its production. The analysis of cost of milk production across the milch species forms an important aspect in bovine husbandry. The comparative analysis of overall average daily maintenance cost for milch animals is presented in Table 2. A perusal of the data reveal that the overall average per day net maintenance cost per milch animal was found to be Rs. 151.09 for buffalo, Rs. 155.68 for crossbred cow and Rs. 125.90 for local cow. The results of study revealed that net maintenance cost was higher in crossbred cows followed by buffaloes and local cows. These results are in line with the findings observed by Sirohi *et al.* (2007), Lal and Chandel, (2016), Sonawane (2016), Sunil *et al.* (2016), Chand *et al.* (2017) and Meena *et al.* (2019) while Bairwa (2004) found higher maintenance cost in buffaloes followed by crossbred cows and local cows. The component wise analysis of maintenance cost indicated that fixed and variable costs accounted for 17.43 and 82.57 per cent in case of buffaloes, 19.89 and 80.11 per cent in case of crossbred cows, and 18.01 and 81.99 per cent in case of local cows, respectively of gross cost. Sharma and Singh (1994) and Kalra *et al.* (1995) also observed the share of variable and fixed cost to be approximately 85 and 15 per cent of gross cost respectively. The component wise break-up of variable cost component indicated that the feed cost accounted for 55.49 per cent of gross cost for buffaloes, 52.01 per cent for crossbred cows and 54.59 per cent for local cow. Singh *et al.* (1994) and Shiyani and Singh (1995) also observed that feed cost accounted for 55 to 70 per cent of the gross cost in the case of buffaloes. The share of labour cost in gross cost was found to be almost similar at 23.82 per cent for buffaloes, 24.37 per cent for crossbred cows and 24.26 per cent for local cows. Thus, it can be concluded from the study, by keeping maintenance cost in view, that rearing of crossbred cows was costly as compared to buffaloes and local cows. Cost of milk production per unit is an important indicator of efficiency of milk production. A major issue in fixation of milk

prices is whether, the milk price should be fixed on the basis of total cost of milk production, which entails the value of family labour computed at the on-going wage rates for permanent farm labour or only for the paid out costs, which naturally excludes a major chunk of unpaid costs. Under these circumstances, an attempt has been made in this study to compute maintenance cost of milk production inclusive and exclusive of family labour and fixed cost. A comparative analysis of maintenance cost, per litre cost of milk production and various income measures for buffaloes and cows have been presented in Table 1&2. A perusal of the data revealed that the overall average Cost-A, Cost-B and Cost-C per milch animal per day for buffalo milk production were observed to Rs. 114.36, Rs. 134.10 and Rs. 176.02 while corresponding costs were Rs. 91.28, Rs. 113.17 and Rs. 174.43 for crossbred cow and Rs. 91.78, Rs. 126.24 and Rs. 135.85 for local cow. On an average, the per litre cost of milk production for buffaloes, crossbred cows and local cows was Rs. 27.80, Rs. 21.66 and Rs. 30.99, respectively. Thus, it can be concluded from this study that the per litre cost of milk production was higher in case of local cows followed by buffaloes and crossbred cows. This finding is in line with the observation of Kalra *et al.* (1995). Thus, the results clearly indicate that by keeping net income in view, that buffalo keeping was more profitable than crossbred cow and local cow.

CONCLUSION

It may be concluded from the study that the total fixed cost of milk production of milch animals varied from 17.43 per cent in buffaloes to 19.89 per cent in crossbred cows. Per animal per day feeding cost ranged from 52.01 per cent in crossbred cow to 55.49 per cent in buffalo of the total cost for dairy animals. The feed and fodders accounted for a major part of the total cost followed by human labour. The per litre cost of local cow milk was high as compared to buffalo and crossbred cows due to lower milk yield of local cows. The cost of milk production and income measures obtained in the present study revealed that buffalo milk production

was relatively more profitable than crossbred cow in the study area while rearing of local cow was not profitable in study area. Thus, sound economic logic exists for persuading dairy households to continue buffalo as well as crossbred cow rearing to enhance their income from milk production and there is need for improvement in the local non-descript/indigenous cows to increase milk productivity. The local cows are more adaptive to climate change. Therefore, instead of ignoring local cow they may be upgraded to recognized indigenous breed and further genetic improvement is required for economic traits.

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PERCEIVED BENEFITS OF SOCIAL MEDIA TOOLS USED IN SHARING FARM INFORMATION

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ABSTRACT

The study was conducted in the Kota division of Rajasthan during 2021-22 to explore the perceived benefits of social media tools used in sharing farm information. The data were collected from 140 randomly selected progressive farmers who were using social media. Study revealed that the keeping in touch with extension workers/ scientists, sharing or capturing information, and socializing with relatives /contact were major purposes specially for the farming community on social media sites. Findings further depicted that the useful in referring to queries, through discussions and doubts get clarified, the opportunity of continuous learning and connection to scientific information, diverse information received in multiple forms (texts, pictures, photos, booklets, audio-visuals word documents), helps in networking and motivated in agriculture and it is easy to receive and seek information were the most important perceived benefits of social media used in farming. It can be concluded that social media is a very useful tool in sharing agricultural information and it saves the time and cost of the farmers for getting and sharing information.

INTRODUCTION

In any field of development, information is power, and information & communication technologies in recent times have brought this power to the fingertips of the people through its recent addition - social media. Social media has great potential to be used as a tool of communication and networking for the benefit of the farming community. Social media has completely changed the topography of personal communication and taken on the world of professional communication as well. Aided by mobile phones, social media is spreading fast across the world. Today's world is the world of 'Social Media' and various social media tools such as Facebook, Twitter, YouTube, LinkedIn, WhatsApp, Research gate, etc. are becoming greater ways of sharing agricultural information.

According to Merriam-Webster (2020), social media refers to different kinds of electronic communication including social networking websites through which their users can form online communities for sharing ideas, messages, information, and videos. The basic philosophy of social media is the democratization of information,

communication, and knowledge management (Saravanan *et al.* 2015). Social media refers to the user-generated information, opinion, video, audio, and multimedia that shared and discussed over digital networks (Andres and Woodard, 2013). It gives farmers a voice and an opportunity to directly connect with their customers, which can help in direct marketing and increased profits alongside facilitating mass-personal communication (Carr and Hayes, 2015).

Social media has emerged as a highly powerful tool in facilitating online social interactions and has shown tremendous potential in facilitating information exchange among individuals. Excessive growth of contemporary social media tools has primarily affected the characteristics of social relations and human psychology. Various social media platforms such as social networking sites (Facebook, Google+); micro-blogs (Twitter, Instagram); content communities (YouTube, Flickr, Tumblr), forums (Google hangout); socially-integrated messaging platforms (WhatsApp, Snapchat, Facebook messenger, Telegram); and professional networking platforms (ResearchGate, LinkedIn, Academia.edu) have emerged over the

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past two decades. Facebook, Twitter, and YouTube were used to benefits of livestock, farming, and agricultural business by the communities and they provide a quick and responsive network for people involved in agriculture to gather and exchange information by the agricultural community (Meena *et al.* 2013). WhatsApp has proved to be the potential to construct knowledge (Nain *et al.*, 2018). The recent developments in social media have paved a way for connecting more number of farmers and sharing farm information. Thus, the present study was conducted in Kota division of Rajasthan to explore the purposes and benefits of social media as perceived by the farmers.

RESEARCH METHODOLOGY

The study was conducted in the Kota division of Rajasthan during 2021-22. Kota division was selected purposively because it is the agri-dominant region with ample high yielding varieties, rich black fertile alluvial soils, strong irrigation, advanced farming practices adopted by the farmers, and productivity higher than the average yield of the state and in some cases, higher than the average yield of the country. One Panchayat Samiti from each district namely; Ladpura (Kota), Anta (Baran), Bundi, and Jhalrapatan (Jhalawar) was purposively selected wherein; Krishi Vigyan Kendra's (KVKs-Farm Science Centres) are located. A list of KVK progressive farmers who are using social media was prepared in consultation with officials of respective KVKs. Subsequently, an equal number thirty five progressive farmers from each selected Panchayat Samiti were randomly selected. The data were collected from 140 randomly selected progressive farmers. For this purpose a semi-structured interview schedule was developed and data were processed, tabulated, and analyzed.

RESULTS AND DISCUSSION

Purpose of social media tools used by the farmers

Table 1 reveals that the over whelming majority of the respondents (77.14%) used social media most importantly for purpose of keeping in touch

with extension workers/ scientists and less importantly about 82.14 per cent of the farmers used social media for marketing/sale product. It was also clearly indicated that the majority 73.57 per cent of the respondents used social media most importantly for sharing or capturing information, about half of the respondents 49.29 per cent used social media for socialization with relatives/contact, and 47.86 per cent for occupational networking. Keeping in touch with extension workers/scientists (M.S. 2.72) was the main purpose of social media tools by the farmers and assigned I rank. It was followed by sharing or capturing information (M.S. 2.57), socialization with relatives /contact (M.S. 2.37), occupational networking (M.S. 2.11), marketing/sale product (M.S. 1.24), and II, III, IV and V rank were assigned respectively. Keeping in touch with extension workers/scientists, sharing or capturing information and socialization with relatives /contact were major purposes for farming communities on social media sites in the study area. The findings are in congruence with that of Chowdhury *et al.* (2013), Irungu *et al.* (2015), Suchiradipta and Saravanan (2016), and Khan and Du (2017).

Benefits of social media as perceived by the farmers

The benefits of social media as perceived by the farmers in the present study have been presented in the Table 2. Rank Based Quotient (RBQ) methodology was used to assess various benefits perceived by respondents in utilizing social media in farming. The calculated RBQ (%) values ranged from 48.87 % to 85.36%.

It was understood that the benefits of social media perceived by the farmers and were arranged in the ascending ranking as follows, useful in referring to queries (I), through discussions, doubts get clarified (II), the opportunity of continuous learning and connected to scientific information (III), diverse information received in multiple forms (texts, picture, photo, booklets, audio-visuals word document) (IV), it helps in networking and motivated in agriculture (V) and it is easy to receive and seek

Table 1: Purpose of social media tools used by the respondents

(n= 140)

S.No.	Purpose of social media	Most Important	Important	Less Important	Mean Score	Rank
1.	Keeping in touch with extension worker/ scientists	108 (77.14%)	26 (18.57%)	06 (4.29%)	2.72	I
2.	Sharing or capturing information	103 (73.57%)	14 (10.00%)	23 (16.43%)	2.57	II
3.	Socialization with relatives /contact	69 (49.29%)	55 (39.29%)	16 (11.42%)	2.37	III
4.	Occupational networking	67 (47.86%)	24 (17.14%)	49 (35.00%)	2.11	IV
5.	Marketing/sale product	05 (3.57%)	20 (14.29%)	115 (82.14%)	1.24	V

Table: 2 Benefits of social media as perceived by the respondents

S.No	Perceived benefits of social media	I	II	III	IV	V	VI	RBQ	Rank
1	Useful in referring to queries.	96	35	05	02	02	-	85.36	I
2	Through discussions, doubts get clarified.	30	75	15	14	05	01	82.88	II
3	Opportunity of continuous learning and connected to scientific information.	31	29	61	12	05	02	71.42	III
4	information received in multiple forms (texts, picture, photo, booklets, audio-visuals word document)	14	10	09	88	19	-	64.11	IV
5	It helps in networking and motivated in agriculture.	-	-	01	01	28	110	57.18	V
6	It is easy to receive and seek information.	05	06	11	07	70	41	48.87	VI

information (VI). The most important perceived benefit based on RBQ value (85.36%) was useful in referring to queries (I). This might be reason that a substantial number of queries were very general such as how to prepare organic manure, where can I procure mustard seeds, contact details of input dealers, (seeds, biofertilizers, feed additives), and others pertained to disease and health management of vegetables, fruits, and animals.

The second most important perceived benefit RBQ value (82.88%) was through discussions, doubts get clarified (II). It might be due to the fact that many of the doubts that were asked by the farmers were regarding the plant protection aspects

and the discussions were mainly on the plant protection and then marketing channels. The third most important perceived benefit (RBQ =71.42%) was an opportunity for continuous learning and connection to scientific information (III). Social media created much awareness regarding agriculture and its allied sectors, and farmers learn about new technologies and practicing at a trial level. The fourth important perceived benefit as per RBQ value (64.11%) was diverse information received in multiple forms (texts, pictures, photos, booklets, audio-visuals word documents). Farmers were delighted to receive the information in the form of text, photos, audio, audio-visuals, etc., it was very

easy to understand and share the information through various forms.

The fifth important perceived benefit (RBQ=57.18%) was it helps in networking and motivating agriculture. Social media creates new friends and contacts, which in turn creates a network of platforms where the farmers get wide and vivid information regarding agriculture from various parts and distinct areas of the state or country. The sixth important perceived benefit (RBQ=48.87%) was it is easy to receive and seek information. Social media had reduced the information searching and receiving time than the normal other modes of information gathering. The findings are in congruence with that of Thakur and Chander (2018).

CONCLUSION

Social media networks have no doubt affected the lives of rural people. As far as farming is concerned, these have provided many opportunities to the farmers. Social media are electronic communication tools that allow users to interact, create, share, retrieve, and exchange information and ideas in any form that can be discussed, archived, and used by virtual communication and networks. It can be concluded that the useful in referring to queries followed by through discussions, doubts get clarified, the opportunity of continuous learning and connection to scientific information, diverse information received in multiple forms (texts, pictures, photos, booklets, audio-visuals word documents), it helps in networking and motivated in agriculture and it is easy to receive and seek information, respectively were the most important perceived benefits of social media used in farming. It can also be concluded that social media is a very useful tool in sharing agricultural information and it saves the time and cost of the farmers for getting and sharing information.

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REDUCTION OF DRUDGERY IN FARM OPERATIONS THROUGH IMPROVED TOOLS

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ABSTRACT

One hundred fifty farm women of adopted villages under FFP (Farmer First Project) were selected. Improved drudgery tools were demonstrated viz; improved serrated sickle, improved hand hoe and improved garden rack so as to mitigate drudgery in regular farm operations. The improved tools were proven better in performance in terms of field capacity, time of operation, weeding index and time saving in all the demonstrated tools. Results indicated that improved garden rack showed better performance with less time of operation (49 hr/ha); higher time saving (6 hr) compared to traditional rack. Respondents reported lesser perceived exertion and lower postural discomfort.

INTRODUCTION

Farming is recognized as one of the drudgery prone occupation of unorganized sector where majority of the women labour is engaged for completing most of the farm operation. Due to small and marginal land holding mechanisation is not possible in most of the States. Women as agricultural labourers, participate in several activities such as seeding, transplanting, weeding, thinning, harvesting, processing, selling, winnowing, storing, looking after animals, nutri gardening etc. There are several occupational health hazards to farm workers, low income generation and poor agriculture production due to utilization of available traditional agricultural method which are time consuming, high energy usage resulting in poor efficiency of agricultural labourer.

Drudgery is generally conceived as physical and mental strain, agony, monotony and hardship experienced by human beings. Due to illiteracy, malnutrition and unavailability of the good quality tools, agricultural labourers are forced to use traditional hand made tools having poor efficiency. Modern machine made tools made of good quality metals and finish can reduce drudgery with higher work efficiency with no health issues. Many ICAR Institutes, State Agricultural Universities and other institutions have taken lead in developing and redefining equipments that are suitable for farm

women. But still there is a gap in reaching these technologies to the targeted groups and areas.

RESEARCH METHODOLOGY

Area Selected for the Study

The study was conducted in Jodhpur District of Rajasthan. Eighty per cent cultivable land is rain-fed and 11% land is irrigated in the district. It receives rainfall of 300 mm/annum mostly in monsoon months. Precipitation is rather variable. There are on an average 70 rainy days in a year and 75 days rainfall is below 2.5 mm. On 35 rainy days evaporation level is more than 2.5 mm per day. The climate ranges from dry arid to semi-arid.

Selection of Village

Three Villages namely of Manai, Binjwadia, Balarwa of Jodhpur district were selected under Farmers FIRST Programme, comprising of 3137 households out of which 1000 households were covered by this programme. About 46 per cent (7152) women farmers in these selected villages out of which one hundred fifty farm women selected for study purpose.

RESULTS AND DISCUSSION

Serrated sickle, a light weighed garden rake and improved low weight hand hoe are important tools used for hoeing, weeding, harvesting of crops, cutting of fodder grasses, green fodders and hay. These

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Table 1 .Comparitive study between normal sickle and improved serrated sickle

Parameters	Normal sickle (Av.)	Improved serrated sickle (Av.)	Total no. of demo.
1. Body weight (kg)	52	52	50
2. Height (cm)	166	166	
3. Time of operation (hr/ha)	25	20	
4. Effective field capacity (ha/hr)	0.04	0.05	
5. Cost of operation (hr/ha)	925	740	
6. Weight of the sickle (kg/m ²)	0.260	0.245	
7. Body Mass Index (kg/m ²)	20.72	20.72	

Table 2. Comparitive study between normal hand hoe and improved hand hoe

Parameters	Normal hand hoe (Av.)	Improved hand hoe (Av.)	Total no. of demo.
1. Body weight (kg)	58	58	50
2. Height (cm)	168	168	
3. Weight of hand hoe (kg)	1.5	0.9	
4. Body Mass Index (Kg/m ²)	20.56	20.56	

Table 3. Performance of improved hand hoe

Parameters	Normal hand hoe (Av.)	Improved hand hoe (Av.)
Moisture content of soil (%)	56	56
Effective field capacity (ha/hr)	0.025	0.028
Time of operation (hr/ha)	40	35
No. of weeds before weeding/m ²	73	77
No. of weeds after weeding/m ²	7	2
Weeding index (%)	0.90	0.97
Cost of operation (Rs./ha)	31	32
Time saving (hr.)	0	5
Speed km/hr	8	10

Weeding index = $w1 - w2/w1$, Where, W1 = Number of weeds before weeding W2 = Number of weeds after weeding, Area of weeding land 1 ha

improved tools were demonstrated to show their efficiency as they are light in weight with high efficiency and can be used more effectively. These tools reduced drudgery to very good extent due to high efficiency as compared to local tools.

Uptake, benefits and spread

With all parameters constraint there has been visible difference of 5 hour/hactare in average time of

operations in case of improved sickle (Table 2). This intervention has reduced the cost of operations from 925 hr/ha to 740 hr/ha. The improved sickle is even lighter in weight compared to normal sickle which has helped in lower physical exertion as reported by the respondents.

Performance of hand hoe

Under similar conditions improved hand hoe used

Table 4. Comparison of improved with traditional Garden Rack

Parameters Rack (Av.)	Traditional Garden Rack (Av.)	Improved Garden of demos	Total no.
Body weight (kg)	57	57	50
Height (cm)	167	167	
Weight (kg)	2.1	1.6	
Body Mass Index (Kg/m ²)	20.50	20.50	

Table 5. Performance of improved Garden Rack

Parameters	Traditional rack (Av.)	Improved Garden Rack (Av.)
Moisture content of soil (%)	55	55
Effective field capacity (ha/hr)	0.018	0.020
Time of operation (hr/ha)	55	49
Cost of operation (Rs/ha)	29	31
Time saving (hr)	-	6
Speed km/hr	8	10

for weeding operation has higher weeding index (0.97 %) compared to normal hand hoe with time saving of average 5 hours (Table 3). The musculo-skeletal problems were evaluated by asking the respondents as to where they felt pain in their body after weeding with traditional and improved technology. With traditional tool, in strenuous posture causes severe pain in shoulders, mid back, hands and knees. The women perceived the task as heavy. On the contrary, using improved weeding tool induced moderate to light discomfort/pain in shoulders, hands and arms.

Data presented in Table 5 depict that improved garden rack showed better performance with less time of operation (49 hr/ha); higher time saving (6 hr) compared to traditional rack. Respondents reported lesser perceived exertion and lower postural discomfort.

CONCLUSION

With the use of these improved technologies, the farm women reported reduced work load, reduced perceived exertion and increase in work output. These technologies were found useful in terms of saving time, human effort, increasing work capacity

and productivity and economic benefit. It was found to be compatible, easy to handle and applicable in field situations.

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INCREASING THE PRODUCTIVITY AND PROFITABILITY OF PEARL MILLET THROUGH FRONTLINE DEMONSTRATION IN DRYLAND AREAS OF RAJASTHAN

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ABSTRACT

The present study was carried out to evaluate the performance of improved variety with scientific package of practices on productivity and profitability of pearl millet. Frontline demonstrations were conducted during Kharif, 2018 to 2021 in total of 40 ha area with 100 demonstrations by evaluating the performance of MPMH-17 variety with improved package and practices. Under demonstration the grain yield of pearl millet was increased by 16.42-23.40 per cent over farmer's practice. The extension gap, technology gap and technology index were calculated as 2.00-5.03 q/ha, 1.47-16.20q/ha and 5.25-57.86 per cent, respectively. For obtaining profitable yield of pearl millet farmers should apply recommended dose of fertilizers, used improved hybrid seed, integrated weed management, water management and insect-pest management. Conducting of frontline demonstrations on farmers field also help to identify the constraints and potential of the pearl millet in that specific area in realizing the food security as well as it helps in improving the economic and social status.

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L) R. Emend Stuntz] is one of the most important among the nutritious coarse grain cereal crops. It contributes significantly to food and nutritional security of the rural and urban poor people in the dry tracts of the country and its grain has very high nutritive value for human consumption and livestock. It is a most drought and heat tolerant short duration rainfed crop, grown in the arid and semi-arid regions of the world (Bhagavatula *et al.* 2013). It has the highest water use efficiency under drought stress conditions. It is the only major crop that has high levels of tolerance to both acid and saline soils. It can be cultivated even in the most sandy infertile soils and droughty environments where no other cereal crop can survive.

In the country, Rajasthan is the leading state in area (4.31 mha) as well as production (5.77 mt) of

pearl millet with 1337 kg/ha productivity (Commissionerate of agriculture, Rajasthan-Jaipur, 2020-21). It cultivated by the economically poor farmers using either no improved production technology or using it at suboptimal levels. There is ample scope for further improvement of production and productivity of pearl millet for raising the income level of the farming community of the Rajasthan. Yield loss under real farming condition can be attributed to several biotic and abiotic factors. There is possibility to enhance pearl millet productivity by adoption of improved production technology of pearl millet cultivation. A rapid increase in pearl millet yield was possible because of the introduction of hybrids in all the regions (Kumara *et al.*, 2016). With an object to combat the cause of yield erosion and dissemination of recommended technology through front line demonstration was successfully attempted.

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RESEARCH METHODOLOGY

The present study was carried out in the Nagaur district which is located on the North-western part of Rajasthan state and lies at 27°20'N latitude and 73°74' E longitude with an altitude of 302 m above the mean sea level. Frontline demonstrations (FLD) were conducted during kharif, 2018 to 2021 with evaluation the performance of MPMH-17, variety of pearl millet in Maulasar block of the district. In this study, 100 farmers were selected from aforesaid block during consecutive years under frontline demonstration of pearl millet. Soils in the demonstrated area were sandy loam in texture with pH ranges between 7.3 to 8.7 and EC 0.33 to 0.64. Total rainfall during Kharif 2018, 2019, 2020 and 2021 was 421, 743, 492 and 475 mm, respectively, however during 2018 distribution was not good as most of rainfall occurred in July month and during later part of the crop it was insufficient rainfall. In 2021 the onset of monsoon was late (in August) and continuous rainfall during crop maturity stage affecting crop yield and quality. All the technological interventions were taken as per prescribed package and practices for improved variety of pearl millet crop (Table 1). The grain yield, gap analysis, cost of cultivation, net returns and additional return parameters were recorded (Table 2 and 3).

Assessment of gap in adoption of recommended technology before laying out the frontline demonstrations (FLD's) through personal discussion with selected farmers. The training was organized for selection of farmers and skill development about detailed technological intervention with improved package and practice for successful pearl millet cultivation. Scientists visited regularly frontline demonstration fields and farmer's fields also. The feedback information from the farmers was also recorded for further improvement in research and extension programmes. The extension activities i.e. training, scientist's visits and field days were organized at the frontline demonstrations sites. The basic information were recorded from the farmer's field and analyzed to comparative performance of frontline demonstrations and farmer's practice. Different parameters were calculated to find out technology gaps (Yadav *et al.*, 2004).

Extension gap = Demonstrated yield- farmer's practice yield

Technology gap = Potential yield- Demonstration yield

Additional return = Demonstration return- farmer's practice return

Table 1. Detail of package and practices for pearl millet cultivation

S. No.	Technological intervention	Farmer's practice	Recommended Practice (FLD's)
1.	Variety	Proagro, Nirmal	MPMH-17, MPMH-21, RHB-177, RHB-173
2.	Seed rate (kg ha ⁻¹)	5-6	4-5
3.	Seed treatment	Carbendazim 50 WP @ 2g kg ⁻¹	Carbendazim 50 WP @ 2g kg ⁻¹ seed, Imidacloprid 70 WS @ 5g kg ⁻¹ seed & NPK liquid consortia 5-10 ml kg ⁻¹ seed
4.	Soil treatment	No Application	Quinalphos 25 kg ha ⁻¹
5.	Spacing	Un uniform plant population	45-60 x 15 cm
6.	Time of Sowing	1-30 July	15 June- 15 July
7.	Nutrient management	60 kg DAP at sowing time & 30 kg urea at 1 month DAS	60 kg N & 30-40 kg P ₂ O ₅ . Full dose of P & half dose of N at sowing time and half dose of N at 1 month DAS.
8.	Weed management	Hand weeding at 25-30 DAS	Atrazine 500 g a.i. ha ⁻¹ at 1-2 DAS and hand weeding 30 DAS
9.	Plant protection measures	Use of Monocrotophos 1 litre/ha	Spray of Imidacloprid @ 0.5ml/litre of water for white grub and one spray of Mancozeb 2g/litre of water for green ear & ergot disease control

Technology index =

$$\frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

RESULTS AND DISCUSSION

Grain Yield

During the period of study, it was observed that front line demonstrations of improved technologies increased productivity over respective farmer's practices (local check) (Table-2). The improved technologies recorded higher yield of pearl millet 15.5, 26.5, 18.1 and 11.8 q ha⁻¹ as compared to farmer's practices 13.3, 21.5, 15.3 and 9.8 q ha⁻¹ during 2018 to 2021, respectively. These results in accordance with the findings of Kumar *et al.* (2010) and Parmar *et al.*, (2016). The yield was reduced during succeeding years because of late onset of monsoon and erratic rains in this region.

Technology & extension gap and technology index

The technology gap (1.47-16.20 q/ha) observed may be attributed to the dissimilarity in the soil fertility status and weather conditions (low rainfall with

erratic distribution). Hence, variety wise location specific recommendation appears to be necessary to minimize the technology gap for yield level in different situations. The extension gaps (2.00-5.03 q/ha) emphasized the need to train the farmers for the adoption of improved agricultural production technologies. The data (Table 2) show that minimum technology index (5.25%) was observed in the year Kharif 2019 whereas, maximum 57.86% in the year 2021, it may be due to uneven weather conditions in the area during 2021. The lower values of technology index showed the more feasibility of the involved technology at the farmer's fields.

Economics

The economic analysis of the data during Kharif, 2018 to 2021 were revealed that pearl millet under front line demonstrations recorded net returns (Rs. 35647, 64994, 48669 & 28070 ha⁻¹) and B:C ratio (2.52, 3.62, 2.91 & 2.11) as compared to the local check where farmers got net returns and B:C ratio of Rs. 30362, 51860, 44495 & 25500 ha⁻¹ and 2.37, 3.19, 2.85 & 2.05, respectively. The findings of the present study are in line with the findings of Parmar *et al.*, (2016).

Table 2. Yield performance, technology gap, extension gap and technology Index of pearl millet under Farmers' Practice and Front Line Demonstration

CFLD conducted year	Crop	Variety	No. of Demonstrations	CFLD Area (ha)	Yield (q/ha)			% increased yield over local check	Technology gap (q/ha)	Extension gap (q/ha)	Technology Index (%)
					Potential of variety	Demonstrated plot	Local Check plot				
2018	Pearlmillet	MPMH-17	25	10	28	15.5	13.3	16.42	12.52	2.18	44.70
2019	Pearlmillet	MPMH-17	25	10	28	26.5	21.5	23.40	1.47	5.03	5.25
2020	Pearlmillet	MPMH-17	25	10	28	18.1	15.3	18.46	9.88	2.82	35.27
2021	Pearlmillet	MPMH-17	25	10	28	11.8	9.8	20.41	16.20	2.00	57.86
Average			50	20	28	17.98	14.98	19.67	10.02	3.01	35.77

Table 3. Economics of pearl millet under frontline demonstrations

Conducted year	Cost of cultivation (Rs/ha)		Gross return (Rs/ha)		Net Return (Rs/ha)		Additional return (Rs/ha)	BC Ratio	
	Demonstrated plot	Local Check plot	Demonstrated plot	Local Check plot	Demonstrated plot	Local Check plot		Demonstrated plot	Local Check plot
2018	23496	22296	59143	52658	35647	30362	5285	2.52	2.37
2019	24764	23700	89758	75560	64994	51860	13134	3.62	3.19
2020	25560	24000	74229	68495	48669	44495	4174	2.91	2.85
2021	25348	24200	53418	49700	28070	25500	2570	2.11	2.05
Average	24792	23549	69137	61603	44345	38054	6291	2.79	2.61

CONCLUSION

From the above findings it can be concluded that front line demonstration have shown the use of better inputs like improved variety, seed & soil treatment, timely sowing, thinning & weeding, balanced use of fertilizer and pest and disease management may result in higher production of pearl millet. In demonstration plot improved production technology of pearl millet performs better than control plot. Presently 16.42-23.40 per cent increase in yield reveals that if farmers adopt the demonstrated technologies, they will fetch Rs. 2570-13134/ha as net returns in addition to they are getting now in traditional practices and will improve their livelihood. The productivity gain under FLD over farmer's practices created awareness and motivated the other farmers to adopt improved production technology of the pearl millet.

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IMPACT OF FRONTLINE DEMONSTRATIONS ON FOLIAR APPLICATION OF 'SAMPOORNA KAU MULTIMIX' IN VEGETABLE COWPEA

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ABSTRACT

Vegetable cowpea is one of the most important and widely cultivated vegetable crop of Kollam district, due to its better market price and consumer preference, but its productivity is now at risk due to increased soil acidity, soil nutrient toxicities and deficiencies. Krishi Vigyan Kendra, Kollam conducted 30 demonstrations on foliar application of the multi nutrient mixture 'Sampoorna KAU multi mix' in the agro ecological zone of midland laterite during 2018-19 and 2019-20. A total of 30 progressive farmers from purposely selected agroecological zone mid land laterite which covers the major vegetable growing areas of Kollam district in consultation with State Department of Agriculture and Farmers' Welfare, Kollam. Socio-economic characteristics of the selected farmers, their knowledge on plant nutrition and extent of adoption of scientific vegetable cultivation with special reference to nutrient management were studied. Then initial assessment of soil nutrient status from the participating farmers' plot was done. A local check (farmer's practice) was also included as control for comparison. The results on yield and economics of demonstration plots were compared with that of check plots. Technology gap, extension gap and technology index were calculated. The results of the study revealed that majority of the farmers had medium level of knowledge on plant nutrition especially secondary and micro-nutrients and its deficiencies. With respect to adoption of scientific production technologies of KAU POP (Kerala Agricultural University Package of Practices), there was a gap in the case of soil test based liming, nutrient management especially use of multi nutrient mixtures. Level of adoption among participating farmers increased after frontline demonstration in 2020-21. The results revealed that foliar application of Sampoorna KAU multimix significantly enhanced the yield compared to local check from 13.3 to 16.99 t/ha and 12.56 to 15.37t/ha with an yield increase of 27.74 per cent and 22.37 per cent during 2018-19 and 2019-20, respectively. The pooled yield obtained from demonstration and control plot were 15.14t/ha and 13.96 t/ha, respectively. The technology demonstrated was economically viable as evidenced from the enhanced benefit cost ratio from demonstration plots (1.51) compared to check plot (1.24). The mean technology gap, extension gap and technology index were 8.82t/ha, 3.25 t/ha and 35.28 per cent, respectively. The results indicated that the frontline demonstration was effective in terms of the adoption of technology which ultimately resulted in the enhanced yield and income of farmers.

INTRODUCTION

Vegetable cowpea, (*Vigna unguiculata* var. *sesquipedalis* (L.) Verdcourt) is one of the most preferred vegetable crops of Kollam district due to its better market price and consumer preference. Apart from this economic advantage, this crop also enriches the soil fertility by fixing atmospheric nitrogen. Even though the Kendra has popularized

many high yielding varieties of vegetable cowpea in the district, Vellayani Jyothika is the commonly used variety with a potential yield of about 18 t/ha. Usually the farmers receive only a yield of about 10-11 t/ha due to many soil related constraints like high acidity, toxicities of Fe, Mn, Al and P deficiencies of Ca, Mg, and B and pests and diseases incidence. Sometimes adverse climatic conditions also limit the

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yield. Recent soil health assessment has also indicated that many parts of Kollam district especially mid land laterite zone is facing a multitude of soil related problems viz. soil acidity, nutrient deficiencies and toxicities which might have led to an extensive yield gap between potential yield and actual yield of cowpea under real farming situations of Kollam district.

Frontline demonstrations play a greater role in disseminating the improved technologies among farmers and thereby its adoption. To create awareness about the balanced use of fertilizers for proper plant nutrition and importance of scientific production technologies including the foliar use of multi nutrient mixtures containing secondary and micro nutrients, KVK Kollam had undertaken a frontline demonstration on the foliar application of Sampoorna KAU multimix in vegetable cowpea in the agro-ecological zone which constitute the midland laterite soils in 30 farmers' fields during 2018-19 and 2019-20 for enhancing the productivity of vegetable cowpea.

RESEARCH METHODOLOGY

A FLD on foliar application of sampoorna KAU multimix was conducted by Krishi Vigyan Kendra, Kollam for two consecutive years i.e., 2018-19 to 2019-20 in the agro-ecological zone midland laterite that covers 47023 ha (18.9%) in Kollam district. The study was carried out in the farmers' fields of Veliyam, Kareepra, Mylom and Kulakkada panchayaths of Kollam district in Kerala with the active participation of farmers. A total of 30 progressive farmers from purposively selected agro-ecological zone mid land laterite which covers the major vegetable growing areas of Kollam district in consultation with State Department of Agriculture and farmers' Welfare, Kollam. The selection of site, farmer beneficiary lay out of demonstrations etc were followed as suggested by Choudhary (1999). Before the implementation of Frontline Demonstrations, socio-economic characteristics of the selected farmers, their knowledge on plant nutrition and extent of adoption of KAU POP were studied before the start of the demonstration. The

knowledge level of the farmers was estimated by providing a questionnaire containing 10 statements on soil testing and plant nutrition. The score obtained for different statements was summed up. Based on total score obtained, farmers were categorized into three categories low, medium and high level of knowledge. The same farmers were interviewed with the help of an interview schedule which consisted of questions related to their socio economic characteristics and 10 statements with respect to scientific production technologies (Table 1). For assessing the existing soil nutrient status of the field, soil samples were collected from the selected farmers' field and analysed for pH, EC, Organic C, available P, available K, Fe, Mn, Zn, Cu and B and the result of initial soil sample analysis were given in the Table 2. The technology demonstrated was foliar application of Sampoorna KAU multimix for vegetable cowpea using the variety Vellayani Jyothika @5g/L at 30, 45 and 60 days after sowing. All other cultural operations were conducted according to package of practices recommendations of Kerala Agricultural University (Crops, 2016). The variety Vellayani Jyothika is the most popular variety in Kollam district with an average yield of 10-11 t/ha under real farming situation. The potential yield of the variety is 18-20t/ha. The plot size was 2.5 cents and season was Rabi 2018 and rabi 2019. A control plot was also maintained as local check where farmer's practices were carried out to compare with demonstration plots. The different cultural operations carried out in the demonstration plots and farmers practices were compared. Pre sowing season trainings was organized for selected farmers on the scientific cultivation of crop, soil test based nutrient management, foliar application of nutrient mixtures and soil health management. Method demonstrations were also done in the farmer field to familiarize the foliar feeding technology. The scientists from KVK monitored the plots regularly. Crop yield was recorded from demonstration plots and check plots at the time of harvest and analysed by using simple statistical tools (Pratheesh *et al.*, 2020). Pooled analysis of yield was also carried out for two

seasons. The technology gap, extension gap and technology index (Samui *et al.*, 2000) were calculated using the following formula given below.

Extension gap = Demonstration yield - local check yield

Technology gap = Potential yield - Demonstration yield

Technology index =

$$\frac{\text{Potential yield} - \text{Demonstration yield}}{\text{Potential yield}} \times 100$$

The economics of cultivation was found by calculating net return (Rs/ha) and benefit cost ratio. One year after the completion of FLD the extend of continuous adoption of KAU POP by the partner farmers were assessed *i.e.*, during the year 2020-21 by administering the same statements. The data was analyzed statistically.

RESULTS AND DISCUSSION

Socio economic profile of farmers

The data with respect to various socio economic characteristics of selected farmers is given in table 1.

The perusal of Table 1 shows that 66.67% vegetable farmers selected belonged to old age group, while only 3.33% of farmers were categorized into youngster. With respect to educational status, majority of the selected farmers had primary education (40%) followed by above 10th education (33.33%). More than half (53.33%) of the selected farmers were predominantly from rural back ground and agriculture was their main occupation. With respect to land holding size, 86.67% of farmer were marginal land holders with a land holding of <1 ha. Regarding annual income it was seen that 50% of farmers belonged to low level of income, while 40% belonged to medium income. Most of the farmers were having a family size comprising <5 member (56.67%) and family type was nuclear family (70%). Though all were vegetable growing farmers; 50% of them have animal component also. It is also observed that 50% of the farmer have no source of irrigation as they depended on rainfall, while 40% of farmers had

ponds for irrigation. Sixty three per cent (63.33%) of the farmers opined that labour was available to some extent, while 26.67% opined that it was abundantly available. Majority (63.33%) of farmers depended on Krishi Bhavans for agricultural information. Most of them (76.67%) had high experience in vegetable farming, while 23.33% had 2-5 years' experience.

Knowledge level of Vegetable farmers on plant nutrition before the implementation of frontline demonstration

The perusal of Table 2 shows that majority (86.67%) respondents had medium level of knowledge because all farmers are progressive farmers of respective panchayaths. Only 13.33 % of farmers were with high knowledge level. All farmers were aware about the soil testing and use of dolomite as liming material. Most of the farmers had little knowledge in nutrient deficiency symptoms, micro nutrients containing fertilizers and foliar application of fertilizers especially secondary and micro nutrients. This indicated the need of popularising the technologies like soil testing, soil test-based lime application, nutrient deficiency symptoms, use of multi nutrient mix through implementing frontline demonstrations as FLD is a good extension tool to demonstrate new agricultural technologies among farmers (Chaudhary, 1999).

Assessment of existing Nutrient status of selected famers' plots

The results of the soil sample analysis *viz.*, pH, EC, Organic C, available P, available K, Fe, Mn, Zn, Cu and B were presented in Table 3. Soil acidity is the main concern of this agro-ecological zone of Kollam district, 86.67per cent of soil samples tested were extremely acidic to very strongly acidic in nature (pH <5.5). Among these 43.3 per cent of soil samples were extremely acidic and its pH ranged between 3.5 to 4.5. The primary cause for the development of strongly acidic condition in the soils of the district is heavy use of fertilizers, without proper application of lime to neutralize the acidity generated. Application of liming materials based on soil test value is essential to improve crop

Table 1. Socio economic profile of selected vegetable farmers**(n=30)**

S.No.	Profile characters	Category	Frequency	Percentage
1	Age	Young (<35 years)	1	3.33
		Middle (35-50 years)	9	30.00
		Old (> 50 years)	20	66.67
2	Education	Illeterate	3	10.00
		Upto primary	12	40.00
		10 th	5	16.67
		12 th	10	33.33
		Degree	0	0.00
3	Occupation	Agriculture	16	53.33
		Service	10	33.33
		Business	4	13.33
4	Land holding	Marginal	26	86.67
		Small	4	13.33
		Big	0	0.00
5	Annual income	Low (< Rs. 20000)	15	50.00
		Medium (Rs. 20000-40000)	12	40.00
		High (> Rs. 40000)	3	10.00
7	Family size	Small (<5 members)	17	56.67
		Medium (5-8 members)	13	43.33
		Big (> 8 members)	0	0.00
8	Family Type	Joint	9	30.00
		Nuclear	21	70.00
9	Type of farmers	Crop alone	14	46.67
		Crop+animal	16	53.33
10	Availability of irrigation	Pipe	15	50.00
		Pond	12	40.00
		Well	6	20.00
		Pipe	1	3.33
		Canal	1	3.33
11	Availability of labour	Abundant	8	26.67
		Available to some extent	19	63.33
		Not available	5	16.67
12	Irrigation method	Direct	30	100.00
13	Agricultural information	Krishi Bhavan	19	63.33
		VFPCCK	10	33.33
		Newspaper	2	6.67
14	Experience in Vegetable cultivation	Low (< 3years)	0	0
		Medium (3-5 years)	7	23.33
		High (>5 years)	23	76.67

Table 2: Knowledge level of selected vegetable farmers on plant nutrition before (2018-19) the implementation of the frontline demonstration

(n=30)

Sl No	Category of Knowledge level	Number of farmers	% of farmers	Mean	SD
1	Low	0	0	14.5	2.013
2	Medium	26	86.67		
3	High	4	13.33		

Table 3: Assessment of existing soil fertility status of the partner farmers

(n=30)

S.No.	Parameters	Classification	Farmers plot		Range
			Frequency	Percent	
1	pH	Ultra acid (<3.5)	0	-	3.8-6.83
		Extremely Acidic (3.5-4.5)	11	36.67	
		Very strongly acidic (4.5-5)	8	26.67	
		Strongly acidic (5-5.5)	1	3.33	
		Moderately acidic (5.5-6)	5	16.67	
		Slightly acidic (6.0-6.5)	5	16.67	
2	Organic Carbon (%)	Low (0.0-0.5)	11	36.67	0.64-1.19
		Medium (0.51-1.5)	16	53.33	
		High (1.51-2.5)	3	10	
3	Available Phosphorus (kg/ha)	Low (0.0-10)	0	-	13.6-33
		Medium (10.1-24)	5	16.67	
		High (24.1-34.5)	25	83.33	
4	Available Potassium (kg/ha)	Low (0-115)	18	60	80-240
		Medium (116-275)	12	40	
		High (276-395)	0	-	
5	Calcium (ppm)	Low (<300)	18	60	195.2-392.5
		Adequate (>300)	12	40	
6	Magnesium (ppm)	Low (<120)	30	100	39.4-108.2
		Adequate (>120)	0	-	
7	Sulphur (ppm)	Low (<5)	0	-	21.4-34.2
		Adequate (>5)	30	100	
8	Boron (ppm)	Low (<0.5)	28	93.33	0.12-0.56
		Adequate (>0.5)	2	6.67	
9	Iron (ppm)	Low (<5)	0	-	86.6-112.5
		Adequate (>5)	30	100	
10	Manganese (ppm)	Low (<1)	0	-	24.5-35.6
		Adequate (>1)	30	100	
11	Copper (ppm)	Low (<1)	14	46.67	0.6-2.3
		Adequate (>1)	16	53.67	
12	Zinc (ppm)	Low (<1)	12	40	0.24-1.6
		Adequate (>1)	18	60	

productivity (Nair *et al.*, 2013). Hence application liming material was done according to the soil test (pH) value in demonstrated plots.

Organic carbon status of the soils of demonstration plots in this agro ecological zone was found to be low in 36.67 % of soils and medium in 53.35 % of soil samples tested. Available phosphorus is medium in 16.67 per cent of soil samples tested. Excess levels of phosphorus were seen in 83.33 per cent of samples tested which might be due to the continuous application of phosphatic fertilizers. Hence, soil test based application of phosphorus fertilizers was followed in demonstration plots which helped the farmers to reduce the quantity of P fertilizers and thereby reduced the cost of cultivation. The available potassium in soil was medium in 40 per cent of soil samples tested and potassium deficiency was noticed in 60 per cent of soil samples analysed which might be due to fixation of K and loss of K from soil.

Among the secondary nutrients tested, calcium (<120ppm) was deficient in 60 per cent of the soil samples and magnesium was deficient in all the samples tested. Among the micronutrients, boron, zinc and copper were deficient in 93.33, 46.67 and 40 per cent of soil samples, respectively. In order to meet these deficient nutrients *viz.* Mg, B, Cu and Zn multi nutrient mixtures Sampoorna KAU Multimix was recommended as foliar spray and the Kendra supplied it. Through continuous monitoring and field visits the application of multinutrient was assured by the KVK scientists.

Yield, yield gap, extension gap, technology gap and technology index from the plots under Frontline demonstration on foliar application of Sampoorna KAU Multimix

The results of the two year data clearly indicates that the demonstrated technology significantly out yielded farmers practice or local check. Mean yield recorded in the demonstration plots was 16.99 t/ha and 15.37 t/ha during 2018-19 and 2019-20, respectively. There was yield increased of 27.74 and 22.37 per cent over check during both years. Pooled analysis of yield data over the years show

that there was significant increase in demonstration plots *i.e.* 15.14 t/ha which may be due to the adoption of new technology *i.e.*, foliar application of sampoorna KAU multimix and adoption of soil test based nutrient management (for nitrogen, phosphorous and potassium). The multimix Sampoorna contained many essential nutrients *viz.*, zinc, boron, copper, iron, manganese, molybdenum, potassium, magnesium, nitrogen and sulphur which might have helped the plants to absorb the nutrients quickly as it was given as foliar application (Thulasi *et al.*, 2016).

The technology gap is the difference between potential yield and actual yield of demonstration plots which was 8.01t/ha and 9.63 t/ha during 2018-19 and 2019-20, respectively. The pooled technology gap over the year was 8.82 t/ha. This gap might be due to the local climatic conditions or vagaries of weather condition of the area. The extension gap observed during 2018-19 and 2019-20 was 3.69 and 2.81 t/ha, respectively. Mean extension gap calculated was 3.25 t/ha which emphasized the need to educate the farmers especially in the adoption of technologies. The feasibility of the technology at farmers' field was understood from technology index that obtained from the present study it was 32.04 per cent and 38.52 per cent during 2018-19 and 2019-20. The lower value of technology index showed high feasibility of the technology. On an average, technology index observed was 35.28% under this FLD which shows the efficacy of good performance of technology intervention. Similar findings were earlier reported by Kirar *et al.* (2006) and Singh *et al.* (2012).

Economics

The data on economics is given in Table 4. The adoption of new technology in the demonstration plots gave high net return per ha of Rs.1,56,700/- and Rs 1,69,000/- during 2018-19 and 2019-20, respectively as compared to local check (Rs. 51,660/- and Rs 82,900/- respectively). The benefit cost ratio of cowpea cultivation in the demonstration plots were 1.44 and 1.57 during 2018-19 and

2019-2020, respectively as compared to local check (1.15 and 1.33 for the year 2018-2019 and 2019-2020, respectively). This was due to the high yield obtained through the adoption of technologies compared to local check. Similar results through the adoption of scientific technologies were earlier reported by Mahele *et al.* (2016) and Sawardekas *et al.* (2003).

Extend of adoption of technologies before and after the implementation of the programme

The data on adoption level of KAU POP in Vegetable cowpea before and after FLD is given in Table 5. The adoption of scientific production technologies of vegetable cowpea with special emphasis on soil nutrient management before and after implementation of FLD was assessed. Ten statements on technologies with respect to the cultivation of vegetable cowpea were administered to farmers after one year of implementation of the programme and their views were recorded. The data were subjected to statistical analysis (mean, standard deviation and percentage were calculated)

The results indicated that during 2018-19, 60 per cent of the farmers had medium level of adoption, while 16.67 per cent of farmers had high level of adoption and 23.33 per cent of farmers had low level of adoption with a mean adoption level of 15.167%. Hence, there was a huge scope of popularising scientific cowpea production technologies of KAU for increasing adoption. Hence, the Kendra had implemented the FLD on foliar application of Sampoorana KAU Multimix and trainings on scientific production technologies continuously for 2 years. After the successful completion of FLD the farmers were advised to continue the same package of practices. During the year 2020-21, the same statements were given to the farmers with respect to estimate the adoption of technologies. During 2020-21, sixty three per cent of farmers had medium level of adoption and 26 per cent of farmers had high level of adoption. The number of farmers who were adopting the technologies had increased as seen from the data where farmers with low level of adoption had decreased to 10 per cent with mean adoption score

Table 4: Technology gap, extension gap, technology index and economics of vegetable cowpea under FLD on foliar application of Sampoorana KAU multimix

Year	Technology gap (t/ha)	Extension gap (t/ha)	Technology index (%)	Economics			
				Net return (Rs/ha)		BCR	
				Demo plot	Check plot	Demo plot	Check plot
2017-18	8.01	3.69	32.04	156700	51660	1.44	1.15
2018-19	9.63	2.81	38.52	169000	82900	1.57	1.33
Mean	8.82	3.25	35.28	162850	67280	1.51	1.24

Table 5. Distribution of farmers according to adoption level of KAU POP in Vegetable cowpea before and after FLD

(n=30)

S. No.	Level of adoption	2018-19				2020-2021			
		Number of farmers	% of farmers	Mean	SD	Number of farmers	% of farmers	Mean	SD
1	Low	7	23.33	15.167	1.949	3	10	18.233	1.478
2	Medium	18	60.00			19	63		
3	High	5	16.67			8	26		

of 18.233. This was achieved through the implementation of FLD and further follow up visits and training.

CONCLUSION

From the present study it can be concluded that the technology demonstrated gave promising results in terms of yield, gap, and technology index. Consequently net return and BCR were also enhanced due to the increase in yield. The frontline demonstration also helped to create the awareness on emerging soil nutrient problems like deficiencies and toxicities of nutrients through the indiscriminate use of fertilizers. The demonstrations helped them to enhance the knowledge on plant nutrition and adoption of use of secondary and micro nutrients and foliar application of nutrients. Hence the farmers were made aware on the importance of soil testing, soil test based nutrient application and foliar application of nutrient mixture. The technology demonstrated has a great potential for increasing the productivity of vegetable cowpea in the district.

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INFORMATION SOURCE UTILIZATION BEHAVIOR OF TRAINEES OF DAESI PROGRAMME

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ABSTRACT

Diploma in Agricultural Extension Services for Input Dealers' (DAESI) was launched as a one year diploma programme by National Institute of Agricultural Extension Management, (MANAGE) Hyderabad, with course fees of Rs 20,000 to the input dealers. The programme is aimed to transform input dealers to the para-extension professionals via providing technical information, taking practical classes, studying location-specific problems etc. The objective of the study was to study the socio-economic profile of the input dealers participating in DAESI programme. The study was conducted on 120 input dealers from three different types of National Training Institutes (NTIs), organizing DAESI training programme including KVK, Tabiji, Ajmer, ARS, Navgoan, Alwar and SIAM, Jaipur. The results revealed that majority of the input dealers (37.50 per cent) belonged to middle age group, most of the input dealers (31.66 per cent) were graduates, majority of the input dealers (52.50 per cent) belonged to the middle income group, majority of the input dealers (57.50 per cent) have less than 10 years of experience as input dealer, majority of the input dealers (32.50 per cent) were selling multiple inputs like seeds, fertilizers, insecticides and pesticides and majority of input dealers (55.83 per cent) were getting the information from input distributing companies.

INTRODUCTION

Agriculture is the primary source of livelihood for about 58 per cent of India's population. The share of Gross Value Added (GVA) by agriculture and allied sector in total economy (%) at current prices is 18.3 for the year 2022-23. (Ministry of Agriculture & Farmers Welfare, www.pib.gov.in)

The agriculture sector in India is expected to generate better momentum in the next few years due to increased investments in agricultural infrastructure such as irrigation facilities, warehousing and cold storage. Now, India has moved to subsistence farming i.e. farmers grow food crops to feed themselves and their families. India is expected to achieve the ambitious goal of doubling farm income by 2022. The two important factors for the development of Agriculture are, research and extension (India Brand Equity Foundation, 2019). In India, the task of transfer of technology is being performed mainly by the Agriculture supervisors of the Department of Agriculture and Cooperation & Farmers' Welfare (DAC & FW), at the grass root

level, Subject matter specialists of the Krishi Vigyan Kendras and other extension functionaries of the NGOs.

Besides extension workers, agri-input dealers are the potential local sources of information having high credibility among the farmers. They are playing tremendous role in reaching the farmers by performing dual role of providing agri-inputs as well as technological back up to the farmers informally. They are the chief source of farm information to the farming community with utmost credibility. Besides the supply of inputs and credit, their role in transfer of agricultural technology is notable and acclaimed by the farmers for their accessibility and adorability. In spite of not having formal agricultural education, their words are very much appealing to the farmers resulting in development of strong linkage to meet their agri-input demands. They are the connecting bridges between researchers, extension functionaries, input agencies and farming community, their role is more significant in meeting the demands of the farmers.

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As per Shekara (2001) the inability of the public extension to reach all the farmers, all the time, regarding all problems has created the gap, which is gradually filled by private extension. By taking the public and private extension as the two sides of the same coin, if we aim to serve the unlimited client farmers through different ways, then only the true development of the farmers will be possible. So it is necessary that both private and public extension system should understand each other and work together as one unit. Such efforts are underway to proactively integrate private sector companies, farmers' organizations, agri-preneurs, NGOs, cooperatives and other agencies in the non-governmental sector including practicing input dealers into the extension delivery mechanism.

However, majority of these dealers do not have any formal Agricultural education that's why they need to be trained in order to build their technical competency in agriculture and to facilitate them to serve the farmers better and to act as para-extension professionals. Considering the importance of the training to the input dealers one such initiative, popularly known as the DAESI was undertaken. MANAGE has launched DAESI programme which aims to provide relevant and location- specific agricultural education to the input dealers. The programme is spread over a period of 48 weeks, with 40 classroom sessions and 08 field visits to various institutions and farmers' fields. Each batch comprises of 40 input dealers.

RESEARCH METHODOLOGY

The present study was conducted in the NTIs under the jurisdiction of Sri Karan Narendra Agriculture University, Jobner, District Jaipur (Rajasthan) that includes 8 Districts i.e. Jaipur, Sikar, Alwar, Dausa, Tonk, Ajmer, Bhartpur and Dholpur, which are organizing DAESI programme during 2019 to 2020. Three NTIs namely State Institute of Agriculture and Management (SIAM), Jaipur 2nd batch, Krishi Vigyan Kendra (KVK) Tabiji, Ajmer and Agricultural Research Station (ARS) Navgaon, Alwar were selected randomly for the present study, in order to have a

wider representation. All the 40 input dealers from three selected NTIs were included in the study, thus making a total of 120 respondents.

In order to study the socio- economic profile of the input dealers participating in DAESI programme, a questionnaire was prepared related to the personal information of the respondents i.e. their age, education, experience as input dealer, annual income and the type of inputs sold by them and sources of information used by them for obtaining information about the agricultural inputs.

RESULTS AND DISCUSSION

Before conducting any study, it is necessary to have some basic information about the respondents. Thus, the personal information about the input dealers participating in DAESI programme viz., age, education, experience as input dealers and annual income were collected and results have been presented in Table 1.

The data in Table 1 show that majority of the input dealers (37.50 per cent) belonged to middle age group. Further 31.66 per cent and 30.83 per cent of the input dealers were found in young and old age group, respectively.

Also, most of the input dealers (31.66 per cent) were graduates. However, 26.66 per cent belonged to secondary and 27.50 per cent belonged to higher secondary passed group. Only 14.16 per cent of the input dealers were educated up to the level of post graduation and above.

The data reveal that majority of the input dealers (52.50 per cent) belonged to the middle income group followed by the high income group (32.50 per cent). Only 15.00 per cent of input dealers belonged to the low income group, during the year under report.

Data further reveal that majority of the input dealers (57.50 per cent) have less than 10 years of experience as input dealer. However, 31.66 per cent of input dealers were having experience of 10 to 20 years followed by 10.83 per cent with experience of more than 20 years.

Table 1: Socio- economic profile of input dealers participating in DAESI programme

S. No.	Particulars under socio- economic profile	NTIs			Total n=120
		KVK, Ajmer n ₁ =40	ZRS, Alwar n ₂ = 40	SIAM, Jaipur n ₃ =40	
A	Age				
1	Young (20 to 30 yrs.)	11 (27.50)	8 (20.00)	19 (47.50)	38 (31.66)
2	Middle Age (30 to 40 yrs.)	16 (40.00)	18 (45.00)	11 (27.50)	45 (37.50)
3	Old Age (> 40 yrs.)	13 (32.50)	14 (35.00)	10 (25.00)	37 (30.83)
B	Education				
1.	Secondary	7 (17.50)	10 (25.00)	15 (37.50)	32 (26.66)
2.	Higher secondary	14 (35.00)	11 (27.50)	8 (20.00)	33 (27.50)
3.	Graduate	15 (37.50)	13 (32.50)	10 (25.00)	38 (31.66)
4.	Post graduate and above	4 (10.00)	6 (15.00)	7 (17.50)	17 (14.16)
C	Annual Income (Rs.)				
1.	Low (< Rs. 1,00000)	10 (25.00)	5 (12.50)	3 (7.50)	18 (15.00)
2.	Middle (From Rs. 1,00000 to Rs. 2,00000)	22 (55.00)	19 (47.50)	22 (55.00)	63 (52.50)
3.	High (> Rs. 2,00000)	8 (20.00)	16 (40.00)	15 (37.50)	39 (32.50)
D	Experience as input dealer				
1.	Less than 10 years	23 (57.50)	20 (50.00)	26 (65.00)	69 (57.50)
2.	10-20 years	13 (32.50)	14 (35.00)	11 (27.50)	38 (31.66)
3.	More than 20 years	4 (10.00)	6 (15.00)	3 (7.50)	13 (10.83)

(Figures in the parentheses indicate percentage)

Sources of information used by the input dealers

The results are presented in the Table 2. Perusal

of the data in table 2 reveal that majority of input dealers (55.83 per cent) were getting the information from input distributing companies followed by input

Table 2: Distribution of the input dealers according to the sources of information used by them

S. No.	Sources of information	NTIs												Overall (n=120)		
		KVK, Ajmer (n ₁ =40)			ZRS, Alwar (n ₂ =40)			SIAM, Jaipur (n ₃ =40)								
		Most Often	Some-times	Never	Most Often	Some-times	Never	Most Often	Some-times	Never	Most often	Some-times	Never			
1.	Manufacturing Company	17 (42.50)	10 (25.00)	13 (32.50)	17 (42.50)	17 (42.50)	6 (15.00)	19 (47.50)	10 (25.00)	11 (27.50)	53 (44.16)	37 (30.83)	30 (25.00)			
2.	Distributers of the Company	19 (47.50)	12 (30.00)	9 (22.50)	25 (62.50)	10 (25.00)	5 (12.50)	23 (57.50)	9 (22.50)	8 (20.00)	67 (55.83)	31 (25.83)	22 (18.33)			
3.	Printed literature provided with input	10 (25.00)	13 (32.50)	17 (42.50)	20 (50.00)	14 (35.00)	6 (15.00)	12 (30.00)	8 (20.00)	20 (50.00)	42 (35.00)	35 (29.16)	43 (35.83)			
4.	Agriculture Supervisors	22 (55.00)	7 (17.50)	11 (27.50)	19 (47.50)	18 (45.00)	3 (7.50)	11 (27.50)	11 (27.50)	18 (45.00)	52 (43.33)	36 (30.00)	32 (26.66)			
5.	AAOs of Dept. of Agriculture	18 (45.00)	11 (27.50)	11 (27.50)	21 (52.50)	15 (37.50)	4 (10.00)	8 (20.00)	16 (40.00)	16 (40.00)	47 (39.16)	42 (35.00)	31 (25.83)			
6.	SMSs of KVKs/ Scientists of SAUs	18 (45.00)	11 (27.50)	11 (27.50)	16 (40.00)	16 (40.00)	8 (20.00)	4 (10.00)	16 (40.00)	20 (50.00)	38 (31.66)	43 (35.83)	39 (32.5)			
7.	Neighboring input dealers	9 (22.50)	12 (30.00)	19 (47.50)	11 (27.50)	20 (50.00)	9 (22.50)	8 (20.00)	15 (37.50)	17 (42.50)	28 (23.33)	47 (39.16)	45 (37.50)			
8.	Advertisement in the News papers	11 (27.50)	16 (40.00)	13 (32.50)	14 (35.00)	20 (50.00)	6 (15.00)	12 (30.00)	8 (20.00)	20 (50.00)	37 (30.83)	44 (36.66)	39 (32.50)			
9.	Agricultural publications	13 (32.50)	15 (37.50)	12 (30.00)	11 (27.50)	18 (45.00)	11 (27.50)	14 (35.00)	13 (32.50)	13 (32.50)	38 (31.66)	46 (38.33)	36 (30.00)			
10.	Advertisement in TV/ radio	11 (27.50)	15 (37.50)	14 (35.00)	10 (25.00)	19 (47.50)	11 (27.50)	7 (17.50)	16 (40.00)	17 (42.50)	28 (23.33)	50 (41.66)	42 (35.00)			
11.	Websites/ Portals	11 (27.50)	12 (30.00)	17 (42.50)	10 (25.00)	19 (47.50)	11 (27.50)	6 (15.00)	12 (30.00)	22 (55.00)	27 (22.50)	43 (35.83)	50 (41.66)			

(Figures in the parentheses indicate percentage)

manufacturing companies (44.16 per cent) and Agriculture supervisors (43.33 per cent). However 41.66 per cent of them were also using advertisements in TV/ radio sometimes, followed by the Agricultural publications (38.33 per cent). It is discouraging to note that even in the era of ICT, majority of them (41.66 per cent) have never used websites/ portals. This may be because they are educated up to graduation only and might not know the use of websites/ portals. Also nearly 50.00 per cent of the input dealers were never consulting the SMSs of KVKs/ Scientists of SAUs, Printed literature provided with the input, advertisement in the News papers and Websites/ Portals (55.00 per cent).

Types of Agri- inputs sold by the input dealers

The results are presented in table 3.

Perusal of the data in table 3 reveal that majority of the input dealers (32.50 per cent) were selling multiple inputs like seeds, fertilizers, insecticides and pesticides followed by (30.00 per cent) who were selling seed, fertilizer, insecticide, pesticides and farm implements. Only a meagre number of the input dealers were selling any single input like only seed or fertilizer, or insecticide or pesticides or farm implements.

It is further important to note that 15.00 per cent of the input dealers in present study were not selling any input as they have not opened their shops so far. In fact, DAESI programme is open for those individuals also who are interested in opening a new

Table 3: Distribution of the input dealers according to various agricultural inputs sold by them

S. No.	Types of Agri- inputs	NTIs			Total (n=120)
		KVK, Ajmer (n ₁ =40)	ZRS, Alwar (n ₂ =40)	SIAM, Jaipur (n ₃ =40)	
1.	Only Seeds	1 (2.50)	1 (2.50)	1 (2.50)	3 (2.50)
2.	Only Fertilizers	3 (7.50)	0	0	3 (2.50)
3.	Only Farm implements	1 (2.50)	0	0	1 (0.83)
4.	Seed and fertilizer	4 (10.00)	0	1 (2.50)	5 (4.16)
5.	Seed , insecticide and pesticides	0	5 (12.50)	2 (5.00)	7 (5.83)
6.	Seed and farm implements	0	0	2 (5.00)	2 (1.66)
7.	Fertilizers, insecticide and pesticides	1 (2.50)	0	1 (2.50)	2 (1.66)
8.	Seed , fertilizes, insecticide and pesticides	7 (17.50)	16 (40.00)	16 (40.00)	39 (32.50)
9.	Seed, insecticide, pesticides and farm implements	1 (2.50)	2 (5.00)	1 (2.50)	4 (3.33)
10.	Seed, fertilizer, insecticide, pesticides and farm implements	13 (32.50)	14 (35.00)	9 (22.50)	36 (30.00)
11.	None	9 (22.50)	2 (5.00)	7 (17.50)	18 (15.00)

(Figures in the parentheses indicate percentage)

shop of Agriculture inputs. Before that, it is mandatory for them to undertake this training.

CONCLUSION

The results have shown that majority of the respondents (37.50 per cent) belonged to middle age group, 31.66 per cent were graduates, 52.50 per cent belonged to the middle income group and 57.50 per cent had less than 10 years of experience as input dealers. Further, most of the respondents (32.50 per cent) were selling multiple inputs i.e. seeds, fertilizers, insecticides and pesticides and majority of the input dealers (55.83 per cent) were getting the information from input distributing companies.

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PERCIEVED BENEFITS OF VOCATIONAL TRAINING AMONG TRAINEES OF KRISHI VIGYAN KENDRA

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ABSTRACT

Vocational Training Programme plays a positive role for the empowerment of women. KVK imparts various need based and skill oriented vocational trainings to create the income for women. The present investigation was carried out to determine the perception of the trainees towards benefits of Vocational Training extended through Krishi Vigyan Kendra (KVK) working in Kerala state. The total sample comprised 300 women trainees who were selected by using simple random sampling; and data were gathered by personally interviewing to elicit the requisite information. The findings indicated that a larger proportion (69.3. %) of the respondents perceived that training programmes of KVK was beneficial and were satisfied.

INTRODUCTION

Vocational trainings are the important tool to prepare respondents for job that are based on manual or practical activities traditionally non-academic and totally related to a specific trade, occupation or vocation. Rural women contributes substantially in the physical aspects of farming, livestock management, post-harvest and allied activities. Income generating activities are the important tool for empowerment of rural women. The government and non-government agencies have started numerous programmes for motivation and training of farmers, farmwomen and rural youth. Krishi Vigyan Kendra established by ICAR, New Delhi at district level conducts many training programmes exclusively for rural women with the aim to make them competent in performing various activities related to agricultural sciences. According to Ajarwat and Kumar (2012), KVK is capable of making significant changes in the socio-economic status as well as the level of knowledge among different classes of trainees.. Effective training requires a clear picture of how the trainees use information and technology after training and the satisfaction and benefits they perceive after the training. Keeping this in view, the present study was made to find out the perceived benefits of training among women who attended vocational training

programme in agrienterprises in KVK.

RESEARCH METHODOLOGY

In the present research ,ex-post facto research design was used. Among the 14 KVKs working in the Kerala state, two KVK hosted by State Agricultural University active in vocational training for the past five years were chosen purposely for the study. Respondents comprised a randomly selected 300 women who had undergone fruit and vegetable preservation training from the KVKs were selected. The data were collected through the personal interview using a structured ,pretested interview schedule , group discussion, observation during field visit. The data were tabulated, analysed and presented with the help of frequency and percentage. The data on perceived benefits of training were collected by assigning a three point scale. The benefits were presented as 12 simple statements .The respondents were asked to rate them in a three point continuum ranging from 'agree', 'agree to some extent,, 'do not agree'. The scores assigned were 3,2, and 1, respectively. On the basis of obtained score the perception index was worked out with the help of formula given as

Perception index =

$$\frac{\text{Actual obtained perception score of respondent}}{\text{Maximum obtainable perception score}} \times 100$$

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RESULTS AND DISCUSSION

The degree of satisfaction about the vocational training attended is depicted in Table 1. The data reveal that majority of beneficiary trainees (69%) were moderately satisfied and 14% had high satisfaction regarding training attended. On the contrary 16 % had low level of satisfaction in the training attended. This may be due to the fact that trainees received qualitative benefit from attending the training. Similar results were reported by Verma (2017) and Sarnaik *et al.* (2020) that a larger proportion of the respondents perceived that extension service of KVK was 'useful'.

Table 1. Distribution of respondents based on degree of satisfaction about training attended

	Frequency	Percentage
Low	48	16
Medium	208	69.3
High	44	14.7
Total	300	100

As depicted in Table 2 the perceived benefits of attending training is ranked by trainees in the following descending order. Local resources were exploited, money saved by using the products for

house old purpose got the highest benefit score. It was followed by aspects like got more knowledge, helped to clear wrong practices, prevent food losses, use family labor effectively, Increase in self confidence, got employment at home, influence to indirect employment generation, unemployment or under employment problem solved, followed by income increased and useful in official work ranked lower in the trainees perception of benefits.

The result is similar to the study report of Pradhan *et al.* (2016) who reported that after adopting the agri-enterprises the farm women got self-confidence which is highly essential for any development or empowerment. Benefits acquired were more of qualitative nature. Trained women who had expressed gain in knowledge, however, had achieved only partial adoption.

CONCLUSION

The various need based and skill oriented vocational training programmes imparted by KVK helped in capacity building of rural women by creating awareness, increasing the knowledge about innovative technologies and in the empowerment of rural women. It can be summarized from the results that there is sufficient scope to make the training,

Table 2. Percieved Benefits of training by trainees

Sl.No.	Percieved benefits derived from training	Perception Index	Rank
1	Local resources exploited	82	I
2	Money saved by using the products for household purpose	79	II
3	Knowledge Gain	69	III
4	Helped to clear wrong practices	69	IV
5	Prevent food losses	64	V
6	Use Family labour effectively	60	VI
7	Increase in self confidence	42	VII
8	Got employment in home	29	VIII
9	Influence to indirect employment generation	28	IX
10	Reduce unemployment	15	X
11	Improved economic condition	11	XI
12	Useful in official work	4	XII

need based and interesting to beneficiaries. Though the objective of imparting vocational training is to help trainees to start a small enterprise and improve their economic condition it was found that employment and economic aspects were not benefitted by training. It is thus clear that vocational training concentrating on skill development aspect alone is not enough. There is need to link training with developing entrepreneurial traits in women.

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PERCEPTION OF FARMERS TOWARDS AGRICULTURAL FINANCE PROVIDED BY INSTITUTIONAL SOURCES IN UDAIPUR DISTRICT OF RAJASTHAN

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ABSTRACT

This research paper explores the significance of agricultural finance in India's economy, with a specific focus on the Udaipur district. Despite government initiatives and the presence of financial institutions, farmers in the region still encounter challenges when it comes to accessing credit. Through personal interviews conducted with 120 farmers, this study evaluates their satisfaction levels regarding different aspects of the credit scheme and loan procedures. The findings revealed that farmers display high levels of satisfaction with the loan terms under the scheme (MPS: 64.17) and the collateral requirement for the loan (MPS: 64.00). However, they expressed dissatisfaction with the rate of interest charged (MPS: 52.33) and enclosures to be furnished along with the application format (MPS: 54.33).

INTRODUCTION

Agricultural finance is crucial for the growth and development of India's agricultural sector, which plays a significant role in the country's economy. Farmers face challenges such as poor infrastructure, low productivity, and inadequate access to credit. Access to finance enables smallholder farmers to invest in their farms, purchase inputs, and adopt modern farming techniques. It also helps them manage risks, access crop insurance, and engage in contract farming. Institutional sources of finance have become increasingly popular in recent years due to their more affordable interest rates and flexible repayment options. In India, the National Bank for Agriculture and Rural Development (NABARD) provides credit facilities to farmers through various channels such as regional rural banks, cooperative banks, and commercial banks. The government has also launched several schemes to provide credit to farmers, such as the Kisan Credit Card Scheme, which allows farmers to access credit through a simple and hassle-free process. Apart from these institutional sources,

farmers can also access credit through self-help groups (SHGs), which are groups of individuals who pool their resources to provide credit to each other. Additionally, there are several microfinance institutions (MFIs) that provide credit to farmers, especially those who do not have access to institutional sources. Despite the government's efforts to promote institutional finance and the presence of institutions such as banks and cooperatives, many farmers still face difficulties in accessing credit. Lack of collateral, high interest rates, complex administrative processes, and low financial literacy hinder farmers' access to credit. While institutional sources offer advantages, addressing these challenges is crucial to ensure farmers' access to credit and promote sustainable agricultural growth.

RESEARCH METHODOLOGY

The study was conducted in Udaipur district of Southern Rajasthan which has relatively higher number of agricultural loan borrowers than all other districts under MPUAT jurisdiction. The study focused on two blocks, Mavli and Salumber,

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chosen based on the highest number of agricultural loan borrowers. Four institutional credit agency, namely SBI, ICICI, RMGB and UCCB were selected from each block based on the maximum number of branches. Randomly, 15 agricultural loan borrowers were chosen from each selected credit agency in each block, resulting in a total of 120 respondents (60 from Salumber and 60 from Mavli) included in the study sample. Data were collected through pre structured interview schedule. Thereafter, data were analyzed and results were interpreted.

RESULTS AND DISCUSION

(1) Perception towards available schemes

The results in Table 1 revealed that the "Term of loan under the scheme" held the top most rank with an overall MPS of 64.17. Further analysis shows that UCCB and ICICI were ranked second and third, respectively, for this aspect in their respective categories with the same MPS of 70.00, indicating that these two institutions offered loans with longer terms than SBI and RMGB, which were ranked fourth and fifth respectively, in their respective categories with MPS of 60.67 and 56.00.

The "Eligibility criteria to qualify for the scheme" obtained the second rank with an overall MPS of 64.00. Further analysis shows that UCCB and RMGB both were ranked first for this aspect in their respective categories with MPS of 72.67 and 61.33, respectively. Conversely, ICICI and SBI were ranked fifth and seventh, respectively, in their respective categories with MPS of 66.67 and 53.33.

The "flexibility of repayment schedules" secured the third rank in the study with an overall MPS of 60.50. Further analysis showed that SBI and UCCB stood out as the top performers for this aspect and were ranked third in their respective categories with MPS of 64.67 and 61.33, respectively. ICICI also performed well in this aspect, ranking fourth in its category with an MPS of 68.00. On the other hand, RMGB ranked lower in this aspect, at ninth place in its category with an MPS of 48.00.

The "Repayment period offered by the scheme"

secured the fourth rank in the study with an overall MPS of 59.50. Further analysis shows that ICICI and UCCB were ranked second and third, respectively, for this aspect in their respective categories with MPS of 70.67 and 61.33, indicating that respondents of these institutions perceived them to offer a longer repayment period for their loans compared to RMGB and SBI, which were ranked sixth and eighth, respectively, in their respective categories with MPS of 54.67 and 51.33.

The "level of clarity and comprehensibility of the terms and conditions associated with the scheme" secured the fifth rank with an overall MPS of 58.67. When examining the individual rankings of institutions in this category, it was seen that SBI achieved the highest MPS of 70.00 and secured the second rank in its category. UCCB was ranked fifth in its category with an MPS of 58.00. On the other hand, ICICI and RMGB received lower MPS of 56.00 and 50.67, respectively, and were ranked eighth for this aspect in their respective categories.

The "loan amount offered" secured the sixth rank with an overall MPS of 58.17. ICICI appeared to be the most attractive to borrowers in this aspect, with the highest MPS of 74.00. On the other hand, RMGB secured the fourth rank in its category with an MPS of 58.00. Interestingly, UCCB and SBI rank lower in their respective categories, with MPS of 56.00 and 44.67, respectively.

The "Diversity of available schemes to meet the financial needs of borrowers" secured the seventh rank with an overall MPS of 57.83. Further analysis showed that SBI secured the top rank for this aspect in its category with an MPS of 76.00. ICICI obtained the sixth rank in its category with an MPS of 64.67, which was still considerably higher than the ranks of RMGB and UCCB, positioned at the tenth position in their respective categories with MPS of 46.00 and 44.67, respectively.

The "flexibility of loan schemes to accommodate the changing needs of borrowers" secured the eighth rank with an overall MPS of 56.33. In this aspect, RMGB stood out with a high MPS of 60.67 and was ranked second in its category. On the other

hand, SBI ranked ninth for this aspect in its category with an MPS of 50.67. Interestingly, ICICI and UCCB were both ranked seventh in their respective categories with MPS of 60.67 and 53.33, respectively.

The "Insurance facility provided under the loan scheme" secured the ninth rank with an overall MPS of 55.33. However, RMGB and SBI seemed to have performed better in this aspect, with MPS of 59.33 and 58.00, respectively, and were ranked third and fifth in their respective categories. On the other hand, ICICI and UCCB had relatively lower MPS of 51.33 and 54.67, respectively, and were ranked eighth and ninth for this aspect in their respective categories.

The "Rate of interest charged" received the lowest rank among all aspects, with an overall MPS of 52.33. Interestingly, all the selected banks appeared to perform similarly in this aspect, with none of them achieving a high MPS. ICICI and UCCB were ranked the lowest in their respective categories, with MPS of 50.67 and 51.33, respectively. SBI and RMGB performed slightly better, ranking sixth and seventh in their respective categories with MPS of 56.00 and 51.33, respectively. This suggested that borrowers may not have perceived significant differences in interest rates among these institutions.

(2) Perception towards loan procedures

The results in Table 2 reveal that the "Collateral requirement for the loan" held the top most rank with an overall MPS of 64.00. Further analysis shows that UCCB and RMGB were ranked first and third, respectively, in their respective categories with MPS of 74.67 and 63.33. SBI was ranked fourth in its category with an MPS of 62.00, suggesting that it was still considered by borrowers as having a reasonable collateral requirement. However, ICICI was ranked seventh in its category with an MPS of 56.00, indicating that borrowers may have perceived it as having a higher collateral requirement compared to the other institutions.

The "Language used in the application" obtained the second rank with an overall MPS of 63.33,

indicating that borrowers reported being relatively satisfied with this aspect. Among the banks analyzed, RMGB appeared to be the top performer for this aspect in its category, with an MPS of 65.33, indicating that they likely used clear and concise language in their loan applications. UCCB and SBI were tied for the second rank in their respective categories, with MPS of 72.67 and 64.67, respectively. This suggested that they also placed a high priority on using language that was easy to understand in their loan application process. On the other hand, ICICI was ranked eighth in its category with an MPS of 50.67, which indicated that their loan application language may have been unclear or difficult to comprehend.

The "Procedure for sanctioning of loan" secured the third rank in the study with an overall MPS of 63.17. Further analysis shows that ICICI and RMGB scored the highest and secured the third and fourth rank, respectively, in their respective categories with an MPS of 70.00 and 60.67. This indicated that these institutions had efficient loan sanctioning procedures that were appreciated by borrowers. On the other hand, UCCB and SBI were ranked fifth and sixth, respectively, in their respective categories with MPS of 62.00 and 60.00. This implied that their loan sanctioning procedures may not have been as efficient as the top-ranked institutions.

The "Fairness and integrity of the loan procedures" secured the fourth rank in the study with an overall MPS of 61.50. Further analysis shows that SBI was ranked third for this aspect in its category with an MPS of 63.33, indicating that its loan procedures were perceived to be relatively fair and transparent by borrowers. ICICI and RMGB were ranked fourth in its category with MPS of 66.67 and 65.33, respectively, suggesting that borrowers had a slightly less favorable perception of their loan procedures in terms of fairness and integrity compared to SBI. RMGB was ranked the lowest at ninth in its category with an MPS of 50.67, indicating that its loan procedures were perceived to be the least fair and transparent among the surveyed institutions.

The "Loan processing charges" secured the fifth rank in the study with an overall MPS of 61.17, indicating that borrowers expressed a moderate level of satisfaction with this particular aspect. Further analysis shows that SBI secured the top rank in its category with MPS of 65.33, indicating that borrowers perceived its loan processing charges to be reasonable and fair. RMGB and UCCB were ranked second and third, respectively, in their categories with MPS of 64.67 and 70.00. This suggested that these banks also offered reasonable loan processing charges. ICICI was ranked lowest at ninth in its category with MPS of 44.67, indicating that borrowers perceived its loan processing charges to be relatively high or unfair compared to other institutions.

The "Details demanded in the application format" secured the sixth rank with an overall MPS of 58.33, indicating that borrowers reported being relatively less satisfied with this aspect. Among the institutions, ICICI and RMGB performed better than the other institutions, ranking fifth in their respective categories with MPS of 63.33 and 59.33, respectively, indicating a moderate level of satisfaction among their borrowers. On the other hand, UCCB and SBI were ranked sixth and seventh, respectively, in their respective categories with MPS of 51.33 and 59.33, indicating dissatisfaction among their borrowers regarding the details demanded in the application format.

The "Gap between sanctioned amount and applied amount" secured the seventh rank with an overall MPS of 58.33, indicating that borrowers reported relatively lower levels of satisfaction with this aspect. Upon further analysis, it was evident that ICICI outperformed the other institutions in satisfying borrowers in this aspect, with a high MPS of 74.00 and a second-place ranking in its category. Conversely, RMGB and UCCB ranked much lower at the eighth position in their respective categories, with MPS of 51.33 and 46.00, respectively. This implied that these banks needed to make improvements in this area to meet their borrowers' expectations. SBI fell in the middle, ranking fifth in its category with an MPS of 60.67, suggesting a

moderate level of satisfaction among its borrowers regarding this factor.

The "Time gap between submission and sanctioning of loan" received a relatively low ranking at the eighth position with an overall MPS of 55.50, indicating that borrowers were not satisfied with the time it took for their loan applications to be processed and approved. Further analysis showed that ICICI was the top performer in this area, ranking first in its category with an MPS of 74.67, indicating a higher level of satisfaction among its borrowers. RMGB was ranked seventh in its category with an MPS of 56.00, suggesting a need for improvement in this area to better meet the expectations of its borrowers. On the other hand, SBI and UCCB were ranked at the bottom in their respective categories with the same MPS of 44.67, indicating the highest level of dissatisfaction among their borrowers regarding the time gap between loan submission and sanctioning.

The "Enclosures to be furnished along with the application format" received the lowest rank among all aspects, with an overall MPS of 54.33, indicating the highest level of dissatisfaction among borrowers in this area. However, further analysis reveals that ICICI and RMGB performed better than the other institutions, ranking sixth in their respective categories with MPS of 60.67 and 58.00, respectively, indicating a moderate level of satisfaction among their borrowers. UCCB and SBI were ranked at seventh and eighth, respectively, in their respective categories with MPS of 48.00 and 50.67, indicating the lowest level of satisfaction among their borrowers.

CONCLUSIONS

The results of the study provide valuable insights into borrower's perceptions towards available loan schemes and loan procedures. The analysis revealed that the term of the loan under the scheme, eligibility criteria, and flexibility of repayment schedules are key factors influencing borrower's perception of loan schemes. Additionally, the collateral requirement, language used in the application and loan sanctioning procedures are crucial aspects affecting borrower's

Table 1: Distribution of respondents according to their perception towards available schemes

S.No.	Statements	SBI (n ₁ = 30)		ICICI (n ₂ = 30)		RMGB (n ₃ = 30)		UCCB (n ₄ = 30)		Total (n = 120)	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1.	Diversity of available schemes to meet the financial needs of borrowers	76.00	1	64.67	6	46.00	10	44.67	10	57.83	7
2.	The level of clarity and comprehensibility of the terms and conditions associated with the scheme	70.00	2	56.00	8	50.67	8	58.00	5	58.67	5
3.	Eligibility criteria to qualify for the scheme	53.33	7	66.67	5	61.33	1	72.67	1	64.00	2
4.	The loan amount offered	44.67	10	74.00	1	58.00	4	56.00	6	58.17	6
5.	The rate of interest charged	56.00	6	51.33	10	51.33	7	50.67	9	52.33	10
6.	The term of loan under the scheme	60.67	4	70.00	3	56.00	5	70.00	2	64.17	1
7.	The repayment period offered by the scheme	51.33	8	70.67	2	54.67	6	61.33	3	59.50	4
8.	The flexibility of repayment schedule	64.67	3	68.00	4	48.00	9	61.33	3	60.50	3
9.	The insurance facility provided under the scheme	58.00	5	54.67	9	59.33	3	51.33	8	55.83	9
10.	The flexibility of schemes to accommodate the changing needs of borrowers	50.67	9	60.67	7	60.67	2	53.33	7	56.33	8

MPS=Mean Per cent Score

Table 2: Distribution of respondents according to their perception towards loan procedures

S.No.	Statements	SBI (n ₁ = 30)		ICICI (n ₂ = 30)		RMGB (n ₃ = 30)		UCCB (n ₄ = 30)		Total (n = 120)	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1.	Language used in the application	64.67	2	50.67	8	65.33	1	72.67	2	63.33	2
2.	Details demanded in the application format	59.33	7	63.33	5	59.33	5	51.33	6	58.33	6
3.	Enclosures to be furnished along with the application format	50.67	8	60.67	6	58.00	6	48.00	7	54.33	9
4.	Collateral requirement for the loan	62.00	4	56.00	7	63.33	3	74.67	1	64.00	1
5.	Procedure for sanctioning of loan	60.00	6	70.00	3	60.67	4	62.00	5	63.17	3
6.	Loan processing charges	65.33	1	44.67	9	64.67	2	70.00	3	61.17	5
7.	Time gap between submission and sanctioning of loan	46.67	9	74.67	1	56.00	7	44.67	9	55.50	8
8.	Gap between sanctioned amount and applied amount	60.67	5	74.00	2	51.33	8	46.00	8	58.00	7
9.	Fairness and integrity of the loan procedures	63.33	3	66.67	4	50.67	9	65.33	4	61.50	4

MPS=Mean Per cent Score

perception of loan procedures. SBI and UCCB stood out as strong performers in multiple aspects, while ICICI and RMGB showed mixed results. However, there is room for improvement in areas such as the rate of interest charged, time gap between submission and sanctioning of the loan and enclosures to be furnished along with the application format. Future research should focus on investigating ways to enhance these aspects to better meet borrower's expectations and improve overall satisfaction with loan schemes and procedures.

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SUSTAINABILITY OF DAIRY BREEDING PRACTICES IN HUMID SOUTHERN PLAIN IVb ZONE, RAJASTHAN

Suraj Choudhary* and Hari Singh**

ABSTRACT

The breeding practices followed by the farmers affect the genetic potential of the animals and hence, have long-run implications for sustainability of dairy farming. With the use of low quality germplasm, the productive breeds are getting progressively diluted and face degeneration. Such a loss of animal genetic diversity puts in jeopardy the sustainability of animal husbandry and the ability of the sector to respond to the changing environmental conditions. The present study therefore examines the sustainability of dairy breeding practices followed by farmers in humid southern plain IV b zone of Rajasthan based on primary data collected from 160 sample households of the zone. A composite index on 100 point scale was developed based on standardized scores assigned to each breeding practices as per their implications on sustainability. Results of the study showed that the livestock breeding practice was low sustainable in the zone as the average value of index was only 50 on the scale. The sustainability was comparatively higher on large farmers (value of index 53.36) as compared to small farmers (value of index 48.42). Results of the study further showed that the livestock breeding practice was low sustainable in the zone. The breeding infrastructural facilities were poor in the study area. Study suggests for strengthening infrastructural facilities, extension facilities, vocational trainings particularly for farm women, *etc.* for improving the sustainability of breeding practices in the zone.

INTRODUCTION

Livestock is an economic enterprise and can also be considered as a "survival enterprise" for millions of herds people in India, especially in the arid and semi- arid Rajasthan. It is the major component of agriculture in arid region while in other agro-climatic zones it is next to agriculture. The dominant role of livestock in the agrarian economy of Rajasthan is evident from the fact that the contribution of livestock sector is much higher in the state as compared to other parts of country. The contribution of livestock in value of output from agriculture at current prices in the state during 2008-09 was 36.84 per cent while the corresponding figure at all India level was 26.87 per cent (CSO, 2011). The contribution of livestock in household income in arid and semi-arid region of Rajasthan some time goes up to 60-65 per cent in situation of drought and famine (GoR, 2007). Dairy is the major component of livestock in the state. The value of milk group alone was to the tune of Rs 89708 thousand crore in 2017-18, which was much higher than the value

of output from total oilseeds (Rs. 1184440 lakh), the second largest contributor to agriculture (CSO, 2011).

The livelihood contribution of livestock has been well acknowledged. But there are a number of sustainability issues in livestock production in the country in general and in Rajasthan state in particular. The traditional package of practices for breeding, feeding, housing, management and health usually followed by farmers for rearing dairy animals, particularly of high production potentials do not result in further enhancing and sustaining the productivity of animals. There are several gaps/ constraints, which may affect the production of indigenous and crossbred cattle and buffaloes, and make them unsustainable in the long run. The breeding practices followed by the farmers affect the genetic potential of the animals and hence, have long-run implications for sustainability of dairy farming (Joshi, 2004; Joshi and Chakravarty, 2004).

With the use of low quality germplasm, the

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productive breeds are getting progressively diluted and face degeneration. In recent years, several breeds have been reduced in number due to neglect and lack of concentrated breeding efforts. Such a loss of animal genetic diversity puts in jeopardy the sustainability of animal agriculture and the ability of the sector to respond to changing environmental conditions. Good breeding practices are therefore, essential pre-requisite for bringing genetic improvement of animals and thereby improving the productivity and sustainability of animals. With this background, the present study was undertaken to assess the sustainability of dairy breeding practices in semi-arid eastern plain zone of Rajasthan.

RESEARCH METHODOLOGY

The study was entirely based on primary data collected from Humid southern plain zone of Rajasthan. From the selected zone 160 households were selected. The data were collected for the year 2018- 19 (March 2018 to February 2019) by conventional survey method on a well structured and pre-tested schedule through personal interview from selected households.

To examine whether the breeding practices in the study area are congenial from sustainability angle, some pre-decided questions were asked to dairy farmers regarding to breeding practices followed by them. For instance, in case of natural service whether selected or scrub was used, in case of A.I. whether service of trained person is taken or not, etc. These practices were scored according to their implications for sustainability - the lower score for worst practice. Raw scores were converted into standard scores. Standard scores were converted by converting raw scores into 'z' score and then 'X' scores. The formula used to transform raw scores into 'z' scores entails subtracting the mean from the raw score and dividing by the standard deviation.

$$Z = \frac{X - M}{SD}$$

While z scores are relatively simple to use, they do have some computational disadvantages. Because a z score can be equal to 0 or can be

negative, certain types of data manipulation become awkward. For these reasons, as well as others, alternative standard score systems have been developed to linearly transform z scores (as well as raw scores) to a scale that does not contain negative numbers. Such systems are all "standardized" to the extent that both the mean and the standard deviation of the new scale have been arbitrarily set. The general formula for linearly converting a z score to a standardized score (X') is expressed as follows:

$$X' = SD(z) + M$$

Where: X' (called X prime) is the new standard score, and M and SD are the values of the mean and standard deviation, respectively, of the new distribution. Finally, the Sustainable Dairy Breeding Index (SDBI) on 100-point scale was calculated from these standard scores by assigning equal weight to each breeding practice.

RESULTS AND DISCUSSION

The dairy farmers were interviewed to assess the breeding practices followed by them and the results are presented in Tables 1 and 2. It was found that only Artificial Insemination (AI) method of mating was practiced for indigenous cow, whereas, for buffalo, natural services were usually resorted to. In case of local cow, both natural services and AI were practiced but the rate of adoption of AI was low (43.75%). The use of AI was more on large herds than small and medium. The system of mating was indiscriminate (unplanned) on around half of the households for cows and it was as 53.33 per cent on small category. Nearly 1/3rd of the farmers were using the scrub bull, i.e., no specific breed characteristics, for natural services and their percentage was as 33.34 per cent on small households (Table 1). The percentage of farmers using scrub bull was highest on small category (33.34%) and the lowest on large category (8.45%).

The male calves were generally sold before one year of age due to low demand of draft power animals. Though, the rate of castration of male calves was high (79%), the methods of castration were not scientific in the study area. Majority of farmers are not going for pregnancy diagnosis. The problem

Table 1. Percentage distribution of households based on adoption of selected breeding practices

(1.) Breeding Practices		Small	Medium	Large	Overall
(A) Method of services					
Cow	Natural	46.25	41.23	39.33	43.75
	AI	53.75	58.77	60.67	56.25
Buffalo	Natural	69.50	66.11	65.80	66.88
	AI	30.50	33.89	34.20	33.12
(B) System of matting					
Cow	Indiscriminate	53.33	31.23	18.67	43.25
	Planned	46.67	68.77	81.33	56.25
Buffalo	Indiscriminate	28.89	5.33	2.19	20.63
	Planned	71.11	94.67	97.81	79.37
(C) Phenotype of bull used for natural services					
	Scrub bull	33.34	16.33	8.45	26.25
	Specific breed bull	66.36	83.67	91.55	73.75

Table 2. Other breeding practices followed by farmers

Breeding Practices	Description
Castration of male calves	21.43 % non adopters
Scientific Method of castration Pregnancy diagnosis done	63.64 % non adopters, 77.50 % non adopters
Source of AI	66.67 Private
Gap between heat detection and insemination	35.83 before 12 hours
Case of repeat breeding	14.17
Case of Abortion	5.83

of repeat breeding was observed in about 14 per cent of households in either one or two animals in a year (Table 2). There were 6 per cent of households in which the cases of abortion of animals was found and in most of them in later part of pregnancy (>6 months), which was very dangerous. Dairy activities in the zone were largely performed by farm women and they were not aware about the improved practices which may be the major reason behind non-scientific breeding practices.

Besides these, the breeding infrastructural facilities were poor in the sample villages. Out of the four villages, the AI centre, trained inseminator, quality semen, veterinary doctor and village panchayat bull was available in only one village and for three villages, these facilities were available about 2 to 4 km away from villages (Table 3). There was no availability of liquid nitrogen cans and medicines in any village. The village panchayat bull available in

only one village was non descriptive in case of cow and of Murrah breed for buffalo. The secondary data also supports these results. The number of veterinary institutions per 10000 of livestock population in Rajasthan is 0.69, while, the all India average is 1.00 (GoI, 2012).

Table 3. Availability of livestock infrastructure facilities villages

Livestock infrastructure facilities	1/4
AI center	1/4
Trained inseminator	1/4
Liquid Nitrogen Cans	1/4
Quality semen	0
Availability of doctor	1/4
Availability of Medicine	1/4
Availability of Bull	0
Breed of Panchayat bull	0

Table 4: Sustainable Dairy Breeding Index in Humid southern plain IV B zone, Rajasthan

Heard size	Value of index		
	Maximum	Minimum	Mean
Small	33.79	63.06	48.42
Medium	38.55	67.07	52.81
Large	40.32	66.40	53.36
Overall	33.79	68.07	50.93

The value of index aggregated from these practices across different herd size categories based on their implication for sustainability is presented in Table 4. Table shows that the average value of index was only around 50 and ranged from 48.42 on small category of households to 53.36 on large category (Table 4). The inter-household variability was the highest on small herds ranged from 33.79 to 63.06 and the lowest on large herds ranging from 40.32 to 66.40. Though the study area was different, similar results were also observed by Yadav (2005) in his comparative study of Bihar and Haryana. A similar study carried out in Lower Gangetic Plain zone of India by Chakravarti (2006) found artificial insemination moderately sustainable.

CONCLUSION

It is concluded that the breeding practices followed by farmers in the study area are not of scientific nature to be sustainable in the longer run. The breeding practices on smaller herds which accounts majority of dairy farmers was found to be less sustainable as compared to larger herds. Inadequate availability of efficient support services was one of the major factors affecting the sustainability and hence policy needs to be focused on development of livestock infrastructural facilities in public private partnership mode. Lack of extension service and awareness about improved practices was also an important determinant of

sustainability of breeding practices. Therefore, extension system needs to be strengthened and there is a need to create the awareness about improved breeding practices.

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PROBLEMS PERCEIVED BY DAIRY FARMERS IN ADOPTION OF ANIMAL HUSBANDRY PRACTICES IN BHILWARA DISTRICT OF RAJASTHAN

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ABSTRACT

The present investigation was conducted in Suwana and Shahpura block of Bhilwara districts of Rajasthan. A sample of fifty farmers each block from the districts was collected by employing purposive sampling. The data were collected by using structured interview schedule through interview method. Lack of knowledge about lumpy skin and common diseases and their preventive measures (MPS 89.32) and about preparation of lowcost balanced concentrate mixture at home (MPS 72.38) were expressed as the most severe constraints by the dairy farmers which were placed at I and II ranks, respectively. The other prominent constraints were lack of improved bulls for breeding in the village, lack of knowledge about sanitation and hygiene practices (MPS 64.35) and ignorance about Govt. facilities (MPS 59.25). Findings indicated that efforts should be made to solve these problems so as to increase the adoption of animal husbandry practices.

INTRODUCTION

Livestock acts as a supplementary source of income to agriculture and helps in counteracting the income loss due to crop failure. It acts as a continuous source of income to farmers and reduces seasonality in livelihood patterns of the rural poor. India ranks first in the world with annual milk production of 202.5 million tones. Most of the milk is produced from the animals reared by small and marginal farmers and landless labourers. The average per capita availability of milk is 427 g/d in India and 1150 g/d in Rajasthan in 2022. Despite India's first rank in world milk production, the average productivity of crossbred cattle, buffaloes and indigenous cattle is 6.87, 4.57 and 2.14 kg of milk per day per animal, respectively. This is much lower as compared to the developed countries. The probable reasons for lower productivity are poor germplasm for milk production, inadequate feed and fodder resources as well as inadequate healthcare facilities. Most of the farmers are not aware of scientific animal management practices and adoption of improved dairy practices is prerequisite for development of dairy industry. The importance of

animal husbandry lies not only in production of milk and milk products but the fact it brings about significant change in socio economic structure of rural economy. Problems imply the difficulties faced by dairy farmers while adopting animal husbandry practices in their dairy enterprise (Patil *et al.*, 2009). If these problems are identified, it would be helpful to bridge the gap in the adoption of animal husbandry practices by dairy farmers (Rathod *et al.*, 2014). Hence, this study was conducted to know the problems perceived by dairy farmers in the adoption of scientific animal husbandry practices.

MATERIALS AND METHODS

The present investigation was conducted in Suwana and Shahpura blocks of Bhilwara districts of Rajasthan in the year 2021-22. Ex-post facto research design was used. Out of five villages in Suwana block and five villages of Shahpura in Bhilwara District were selected on the basis of maximum number of dairy farmers in village milk cooperative society. Subsequently from each selected village, ten random dairy farmers from randomly selected in five villages from each block of Bhilwara district. Total 100 dairy farmers were

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Table 1. Problems perceived by dairy farmers in adoption of selected animal husbandry practices

S.No.	Constraint	MPS	Rank
1	Lack of knowledge about lumpy skin and common diseases and their preventive measures	89.32	I
2	Lack of knowledge about preparation of low cost balanced concentrate mixture at home	72.38	II
3	Lack of improved bulls for breeding in the village	64.35	III
4	Lack of knowledge about sanitation and hygiene practices	61.50	IV
5	Ignorance about Govt. facilities	59.25	V
6	High cost of dry fodder	57.68	VI
7	Lack of awareness in marketing strategy	55.24	VII
8	High cost of feed	54.14	VIII
9	Complicated procedure to get the loan from banks	50.14	IX
10	Inadequate knowledge about pedigree enquiry	42.76	X
11	Incorrect estimation of fat and SNF and procurement of milk	36.51	XI
12	Lack of knowledge about deworming schedule and practices	30.85	XII
13	Distance to the milk societies	18.65	XIII

selected for the study from Bhilwara of Rajasthan

Problems were analysed as those factors which hindered the successful adoption of animal husbandry practices as perceived by the dairy farmers. The finalized interview schedule was administered and the respondents were asked to mention the constraints. The problems perceived by the dairy farmers were collected through personal interview using structured schedule. Each respondent was asked to rank the problems in four-point continuum i.e., most severe, severe, least severe and not a constraint. The scores 3, 2, 1 and 0 were assigned respectively. For each problem, frequency of the response was multiplied with its respective score and is added up to get total score of that particular problem. The obtained score of each problem was divided with the total score and is multiplied with 100 to get the 'Mean Percentage Score' (MPS). The problems were ranked based on the mean percentage score obtained.

RESULTS AND DISCUSSION

A perusal of data (Table 1) reveal that lack of knowledge about lumpy skin and common diseases and their preventive measures (MPS 89.32)" and lack of knowledge about preparation of low cost balanced concentrate mixture at home (MSP72.38) were expressed as the most severe constraints by

the dairy farmers which were placed at I and II ranks, respectively. These findings were in line with the findings of Patil *et al.*, (2009), Bhattu *et al.*, (2014) and Sharma (2015). The realization of this problem might be because the dairy farmers had not been aware to the recommended management practices of animal husbandry. Lack of improved bulls for breeding in the village, lack of knowledge about sanitation and hygiene practices were ranked III and IV, respectively. This was in line with the findings of Chritian *et al.*, (2015), Singh *et al.*, (2015), Anjali and Senthilkumar (2020) and Yadav *et al.*, (2009). They reported that lack of facilities for artificial insemination in time and knowledge about health care were the major constraints. Ignorance of Govt. Facilities and lack of knowledge about deworming schedule and practices were the other important problems perceived by the dairy farmers. The other constraints faced by them were lack of awareness in marketing strategy, high cost of feed, complicated procedure to get the loan from banks, inadequate knowledge about pedigree enquiry and incorrect estimation of fat and SNF and procurement of milk. Besides, distance to the milk societies (MPS 18.65) and high cost of dry fodder (MPS 57.68) were less severe bottlenecks faced by the dairy farmers which were assigned ranks XIII and XII, respectively.

CONCLUSION

It may be concluded that lack of knowledge about common diseases and their preventive measures and about preparation of low cost balanced concentrate mixture at home were perceived as serious constraints by the dairy farmers. Whereas, distance to the milk societies and Lack of knowledge about deworming schedule and practices were perceived as less serious constraints. The reasons might be that the dairy farmers had not been aware to the recommended management practices of animal husbandry.

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A SCALE TO MEASURE ADOPTION OF ECO-FRIENDLY MANAGEMENT PRACTICES OF MANGO

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ABSTRACT

Need based adoption scale was developed with objective to determine the adoption of eco-friendly management practices of mango. The steps followed in construction and standardization of scale by using relevancy test which include relevancy percentage - RP (%), relevancy weightage- RW and mean relevancy score -MRS. Out of 237 practices 90 practices were retained in this test. The adoption scale constructed in the present study can be used by future researchers in conducting impact and evaluation studies on eco-friendly management practices/ technologies of mango and related crops.

INTRODUCTION

Eco-friendly management practices are the organic in nature. It does not cause any damage to air, water and soil, safe to human beings and are free from causing environmental pollution. This technological practices are dynamic because they differ considerably from region to region depending on soil type, rainfall, topography etc and are often modified by the local farmers.

The technique used by rural people if well documented can make an important contribution to development. Documentary help in search for solution to many problems and also help to reduce the erosion of traditional technology. It can be moulded with scientific knowledge to boost productivity and living standards. These technologies are easily diffused and adopted by the mango growers as those were development by them through continuous experience.

Need based and location specific eco-friendly management practices and their full use at client system is vital for maximization of agricultural production. Still there is exists a wide gap between the technology available at the research station and its adoption at the farmers level. Keeping this in view the need based adoption scale was developed with following objective.

1. To develop a scale to measure adoption of eco-friendly management practices of mango.

RESEARCH METHODOLOGY

A scale was developed to measure the adoption of eco-friendly management practices of mango. The steps followed in construction and standardization of scale by using relevancy test are detailed below:

Item collection

For this purpose, eco-friendly management practices of mango were collected from various sources. These practices were again divided into 21 major aspects viz., variety selection, soil and climate, lay out & planting, after care and intercultural operations, irrigation, intercropping, manures and fertilizers application, flowering and fruit set, plant protection measures, physiological disorder, nutritional deficiency, threat from monkey and other wild animals, harvesting, washing, drying of fruits, grading, post-harvest management, packaging, storage and transportation. Thus a total of 237 practices were collected total 21 major aspects identified earlier.

Item selection

The list of 237 practices under major aspects was sent to 110 judges by mail, hand and post. The

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judges were experts from the Departments of Horticulture, Extension Education, Plant Pathology, Entomology, Soil science, Plant Physiology in the State Agricultural Universities (SAUs), Krishi Vigyan Kendras, Indian Council of Agricultural Research (ICAR) institutes and progressive mango growers.

They were requested to check each practice carefully for its being indicative of eco-friendly management practices and rate each item on three point continuum namely, 'more relevant', 'somewhat relevant' and 'not relevant,' with the score of three, two and one, respectively. Seventy judges returned the rated list of items completed in all respects. Based on responses of these judges, 237 items were kept for scoring and analysis. Apart from the criterion of the relevancy of particular item, its feasibility, simplicity and scoring were also considered for its selection.

Relevancy test (RT)

From the data so gathered, relevancy percentage, relevancy weightages and mean relevancy score, were worked out for all the 237 items, individually.

Relevancy percentage (RP)

Relevancy percentage (RP) was worked out by summing up the scores of 'more relevant', 'somewhat relevant' and 'not relevant' responses and later converting it into percentage. Following formula was used for the purpose.

$$RP = \frac{\text{More relevant responses} \times 3 + \text{Somewhat relevant responses} \times 2 + \text{Not relevant responses} \times 1}{210(\text{i.e. maximum possible score } 70 \times 3)} \times 100$$

Relevancy weightage (RW)

Relevancy weightage (RW) was obtained by the following standard formula.

$$RP = \frac{\text{More relevant responses} \times 3 + \text{Somewhat relevant responses} \times 2 + \text{Not relevant responses} \times 1}{210(\text{i.e. maximum possible score } 70 \times 3)}$$

Mean relevancy score (MRS)

The mean relevancy score (MRS) was obtained by the following standard formula.

$$MRP = \frac{\text{More relevant responses} \times 3 + \text{Somewhat relevant responses} \times 2 + \text{Not relevant responses} \times 1}{\text{Number of judges i.e. (70)}}$$

Using these three criteria, the items were screened for their relevancy. Accordingly, items having relevancy percentage of more than 66.00 per cent, relevancy weightage of more than 0.66 and mean relevancy score of more than 2 were considered for final selection, following the procedure followed by Kadam (2006) and Kesarkar (2010). Thus, 90 items were finally selected for the study by this process. The major dimensions along with number of items identified and retained under each of them are given below table 1.

Content validity

The validity of the scale determines how well the contents of the scale represented the subject matter under the study. As all the possible items covering the eco-friendly management practices were selected in consultation with experts, the answer and suggestions were incorporated, thus the present scale satisfied the content validity.

Reliability of the developed scale

Reliability refers to the extent to which the repeated measurement produces the same results. The reliability of the developed scale was determined by test-retest method. The responses were obtained from 30 mango growers. The second administration was done after two weeks from the date of first administration. Pearson's product moment coefficient of correlation for two sets of data was 0.82. It indicated that the test was reliable.

RESULT AND DISCUSSION

The results are presented in Table 1 and Table 2.

Table 1. Number of practices identified and retained

S.No.	Major practices	Total number of practices identified	Total number of practices retained
1.	Variety selection	2	-
2.	Soil and climate	11	3
3.	Lay out and planting	7	3
4.	After care and intercultural operations	21	8
5.	Irrigation	4	2
6.	Intercropping	5	2
7.	Manures and fertilizer application	39	9
8.	Flowering and fruit set	7	-
9.	Plant protection - Insect	47	15
10.	Plant protection - Diseases	33	11
11.	Physiological disorder	8	4
12.	Nutritional deficiency	10	3
13.	Threat of monkey and other wild animal	4	-
14.	Harvesting	10	7
15.	Washing	4	1
16.	Drying of fruits	1	1
17.	Grading	1	1
18.	Post-harvest management	5	3
19.	Packaging	10	9
20.	Storage	2	2
21.	Transportation	6	6
Total		237	90

Table 2. Final scale of adoption of eco-friendly management practices of mango

S. No.	Eco friendly Management Practices of Mango	Relevancy		
		RP (%)	RW	MRS
A. Soil and climate				
1.	Soil should have pH between 5.5 to 7.5.	79.50	0.79	2.49
2.	Gentle slope is provided to facilitate proper drainage.	80.04	0.80	2.51
3.	Soil should be tested for nutrient balance.	71.43	0.71	2.54
B. Lay out and Planting				
1.	Planting of grafts at 10 × 10 m.	90.96	0.90	2.73
2.	Filling pit (1×1×1m) with 20 kg. cow dung or compost or organic fertilizer.	73.33	0.73	2.60
3.	Planting of 10-15 % other varieties of mango in Alphonso orchard.	77.19	0.77	2.65
C. After care and intercultural operations				
1.	Applying Bordeaux paste to young plants to its base for protection of pest and disease.	70.00	0.70	2.07
2.	Prompt removal of sprouts from root stock to protect the new growth as and when occurs.	66.19	0.66	2.79
3.	Removal of flowering inflorescence during first four years.	71.43	0.71	2.54
4.	Incorporation of crop residues.	89.05	0.89	2.67
5.	Use of mulches like dry grass, paddy straw or black polythene to maintain moisture and to control weed.	89.05	0.89	2.51
6.	Two Ploughings between the interspaces. First at the beginning and second at the end of the monsoon to keep the orchard weed free and facilitate rain water percolation.	70.38	0.72	2.07
7.	Mount prepared around the trunk for mechanical support, fertilizer application and to give the water stress.	73.33	0.73	2.2
8.	For flowering and fruit set, 3-6 sprays at weekly interval of cow urine 55 % concentration when fruit is in marble size.	73.33	0.73	2.2
D. Irrigation and Intercropping				
1.	Irrigate the one year plant once in week in winter and twice in summer season. Two year plant once in fortnight in winter and twice in summer. Three year plant once in month in winter and twice in summer.	94.76	0.94	2.84
2.	Stopping of irrigation before flowering period (two months before) and encourage flower bud formation.	79.05	0.79	2.57
3.	Intercrops like turmeric (<i>Curcuma longa</i>) and tapioca (<i>Manihot esculenta</i>) in Kharif and vegetable like Radish (<i>Raphanus sativus</i>), Ridge gourd (<i>Luffa acutangula</i>), Bitter gourd (<i>Momordica charantia</i>), Tomato (<i>Lycopersicon esculantum</i>), Wali (<i>Vigna unguiculata</i>), Brinjal (<i>Solanum melongena</i>) may be taken at initial stage.	76.67	0.77	2.3
4.	Intercropping of tuber crops as per season.	78.57	0.79	2.36

E. Manures and Fertilizer application.			
1.	Application of manures and fertilizers should be done on onset of monsoon.	81.43	0.81 2.64
2.	Application should be done by ring method as per size of tree.	96.67	0.96 2.9
3.	Removal of weeds before applying manures and fertilizer.	94.76	0.94 2.84
4.	Application should be done when rainfall is low.	95.24	0.95 2.86
5.	Application F.Y.M./ vermicompost/ well decomposed compost/ fish meal/ bone meal/sheep meal/ poultry litter/ vermiwash	83.33	0.83 2.5
6.	Application of Glyricidia (Glyricidia sepium) as green manure.	85.24	0.85 2.76
7.	First five year Dhaincha (Sesbania aculata) and Sun hemp (Crotolaria juncea) raised as rainfed crop and ploughed in situ as organic nutrient supplement.(green manuring).	75.71	0.75 2.3
8.	Recycling of litter which is in the orchard itself save 10 % in nutrients.	71.90	0.71 2.26
9.	Use of Karanj (Pongamia pinnata), Kuda (Holarrhena pubescens), Subabhoole (Leucaena latisiliqua), Nivadung (Euphorbia ligularia), Ukshi (Calycopteris floribunda), Ranmodi (Eupatorium odoratum) etc. as bio fertilizers.	82.86	0.82 2.49
F. Plant Protection Measure			
F.1 Insect pest			
1.	Maintain the population of natural predators in the orchard e.g. spiders, birds, red ants etc.	68.57	0.68 2.54
2.	Use of bio rational pesticides which are approved for certified organic production and have minimum impact on beneficial insect and the environment.	69.05	0.69 2.57
3.	Application of cow dung paste on cuted portion of tree as a preventive measure.	73.33	0.73 2.2
4.	Prune overcrowded, overlapping branches after rainy season for control of mango hopper, leaf webber.	84.76	0.84 2.74
5.	Conservation of bio-control agents like predators like Mallada boninensis, Chrysopa lacciperda, egg parasites Polynema spp., Gonatocerus sp., Tetrastichu sp. and fungus Verticillium lecanii for control of mango hoppers.	68.57	0.68 2.36
6.	Spraying of 0.2 % Nimbacidin or Azadirachtin 3000ppm @ 2ml / lit water at initial stage of mango hopper population.	78.00	0.78 2.64
7.	Spraying with neem seed kernel extract (5 %) at bud burst stage for control of mango hopper.	74.76	0.74 2.34
8.	Deep ploughing in October -November for control of inflorescence / leaf / twigs midge, fruit fly.	76.67	0.77 2.3
9.	Use of Rakshak trap containing Methyl Eugenol during fruiting period (10 traps/ ha.) for control of fruit fly.	83.81	0.83 2.61
10.	Cover the fruit with butter paper bag (6-8 cm).	80.00	0.80 2.40
11.	Collection of egg, leaf webber, galls with nymphs, pupae, grubs, leftover seed (stone), fallen fruits, dead woods, mud galleries and destroy to keep orchard clean and healthy as a preventive measures.	87.62	0.87 2.63

12.	Remove the larvae and clean hole and then insert cotton wool soaked in kerosene/ petrol in each hole and plug them with mud for control of stem borer.	75.29	0.75	2.36
13.	Infected shoots should be clipped off and destroyed for control of shoot borer.	87.62	0.87	2.63
14.	Collection and destruction of infested and fallen fruits at weekly interval till harvest of fruit.	92.38	0.92	2.77
15.	Nests should be removed and destroyed mechanically by web cutting device for control of excess red ant.	75.71	0.76	2.27

F.2 Diseases

1.	Remove left over retches of inflorescences to reduce primary inoculum load of harbouring the pathogen for control of powdery mildew.	66.76	0.66	2.24
2.	Pre and post management of spraying of 1 % Bordeaux mixture to avoid the diseases spread.	70.00	0.70	2.5
3.	Scion wood selected for propagation should be free from infection for control of die back.	89.52	0.89	2.69
4.	Removal of infested part and pastened with Bordeaux paste or cow dung paste.	76.19	0.76	2.29
5.	Cut the affected branches and apply Bordeaux paste for pink disease.	84.76	0.85	2.54
6.	Grafting should be done at a proper stage when stem is red-brown in colour.	90.48	0.90	2.71
7.	Select healthy matured scion stick of proper girth (pencil size).	92.38	0.92	2.78
8.	Use well drained soil and FYM in 3:1 proportion as a potting mixture.	92.38	0.92	2.77
9.	Provide six punched holes at the base of plastic bag for proper drainage.	89.52	0.89	2.69
10.	Use of Amar loranthus cutter to remove the loranthus and destroy.	76.70	0.76	2.41
11.	Application of cashew oil where from loranthus is scrubbed.	78.57	0.78	2.36

G. Physiological disorder and Nutritional Deficiency

1.	Planting mango orchard in north-south direction and 5-6 km away from the brick kilns reduce the incidence for control of black tip.	71.43	0.71	2.44
2.	Avoid spraying insecticide and pesticides during flower opening for control of fruit clustering.	84.76	0.84	2.54
3.	Population of pollinators should be kept more during flowering season for control of fruit clustering.	89.53	0.90	2.69
4.	Pollinating cultivars should be planted in the orchard for control of fruit clustering.	69.52	0.69	2.39
5.	Dropped leaves should be incorporated along with manures to enrich the soil health and fertility for potassium deficiencies.	85.24	0.85	2.56
6.	Raise Diancha (<i>Sesbania aculata</i>) as green manures at onset of monsoon in the interspaces of the orchard during tree bearing yrs. and to remove to avoid the salt injury (toxicity).	66.68	0.66	2.3

7.	FYM and compost application in adequate quality every year.	86.19	0.86	2.69
H. Harvesting, washing, drying and grading				
1.	Harvest the fruit at 85 % maturity.	94.29	0.94	2.83
2.	Harvest the fruit with hand or 'Nutan' mango harvester before 10 AM and after 4 PM.	93.33	0.93	2.80
3.	Harvesting individual fruit with 4-5 cm long fruit stalk intact at plucking time.	93.33	0.93	2.80
4.	Harvested fruits should be kept in shade to avoid direct exposure to sunlight and also should not kept on warm ground.	96.67	0.96	2.9
5.	Avoid contact of fruit with soil to avoid microorganism which enter from soil through stalk.	95.24	50.96	2.86
6.	Tree should be pruned after harvest.	70.71	0.70	2.27
7.	Remove the left over ratches or put dry leaf between these fruits to avoid the brushing injury.	73.33	0.73	2.5
8.	Wash the fruit with clean and cool water properly to remove the latex strains, spray residues, sooty moulds, etc.	69.05	0.69	2.47
9.	Wipe water with dry muslin cloth and dry under the fan or fresh air.	81.43	0.81	2.54
10.	Grade the fruits according to size and weight.	92.86	0.92	2.79
I. Post-Harvest Management				
1.	Hot water treatment should be given at 48-52 0C for 5-10 minutes to control fruit fly, anthracnose, stem end rot and black oil.	69.05	0.69	2.4
2.	Vapour heat treatment (VHT) given to fruit to control fruit fly. (46-49 0 C for 20-30 minutes)	68.95	0.68	2.43
3.	Pre cool mango fruits at 13-15 0 C temperature before storage.	72.85	0.72	2.39
J. Packaging				
1.	Use of wooden boxes or full telescopic self-locking fiber-board cartoon with 0.5 % ventilation of surface area.	86.67	0.86	2.4
2.	Selection of fruits with uniform size and colour for packaging in boxes.	86.19	0.86	2.45
3.	Use of paddy straw as packaging material.	90.48	0.90	2.71
4.	Wrap the individual fruit with tissue or news-paper to avoid brushing with straw.	72.86	0.72	2.39
5.	Mango should be packed with stem and facing downward or slightly on one side rather than directly on the base.	82.38	0.82	2.47
6.	Use of CFB boxes for packaging of fruits.	72.86	0.72	2.59
7.	Boxes should be kept in shade.	93.33	0.93	2.8
8.	To reduce the transpiration, respiration and ripening in storage and transport, use polythene films / bags.	76.19	0.76	2.29
9.	Writing producer's name, address, pin code, date of packing, number of fruits, variety etc. on the box.	92.86	0.92	2.79

K. Storage and transportation

1.	Store the fruit on 20 cm paddy straw layer with paper wrapping.	93.33	0.93	2.8
2.	Separate ripe fruit from unripe fruits either in the container or storage room.	71.90	0.71	2.66
3.	Transportation of fruits should be done at night hrs.	95.24	0.95	2.86
4.	Use of plastic crates to reduce handling losses of fruits while harvesting and transport.	93.33	0.93	2.8
5.	Do not throw the packages during loading and unloading.	87.14	0.87	2.78
6.	Arrange the boxes in the truck to allow the proper air circulation.	88.77	0.88	2.68
7.	Transport cold stored fruits in a reefer van.	79.05	0.79	2.57
8.	Practice sanitation and cleanliness at all times in transport, storage areas, containers and market stalls.	94.76	0.94	2.86

RP (%) - Relevancy percentage, RW - relevancy weightage, MRS- mean relevancy score

From Table 1 it is seen that out of 237 eco-friendly practices 90 practices were retained to measure the adoption of eco friendly Mgt. practices.

In Table 2 final scale of adoption of eco- friendly management practices of mango presented by using relevancy test. The result is presented with relevancy percentage, relevancy weightage and mean relevancy score is as below.

The Table 2 show the relevancy percentage - RP(%), relevancy weightage- RW, mean relevancy score -MRS of all the selected 90 items.

CONCLUSIONS

The know effective adoption of eco-friendly management practices mango, a scale to measure the adoption of eco- friendly management practices of mango has been presented in this paper. The adoption scale constructed in the present study can

be used by future researchers in conducting impact and evaluation studies on eco-friendly management practices/ technologies of mango and related crops.

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ECONOMIC OF PRATAPDHAN POULTRY UNDER BACKYARD SYSTEM REARING IN BHILWARA DISTRICT OF RAJASTHAN

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ABSTRACT

A study was conducted on pratapdhan birds under backyard poultry rearing in Bhilwara district of Rajasthan. During the study two block selected in which five villages of each block selected randomly. Ten backyard poultry farmers randomly selected in each village out of 100 respondents. Pratapdhan chicks provided by Krishi Vigyan Kendra under ATMA, Bhilwara to the respondents for economic point of view. 20 chicks provided to each respondent. Majority of respondents belonged to general caste (46 %) Rajput only. Mixed agriculture and animal husbandry were the main occupation of majority (56%) of the poultry rearing. The average body weight at 12 and 20 weeks of age was 1120.32 + 34.30 and 1702.28 + 37.30 g in males & females, respectively and after considering the mortality the average economic gain was found to be Rs. 801.26. It is concluded that pratapdhan chicks is definitely increased family income and nutrition level of rural poor.

INTRODUCTION

The rural poultry farming in villages, which is the primary source of animal protein and supplementary income for more than 50 per cent of the population of this country. Poultry farming small number in under traditional backyard poultry or free range or semi -intensive system. The adequate scope for development of backyard poultry in the rural and tribal areas, which is turn, can contribute substantially to raise the overall per capita availability of egg and meat as well as employment to rural women or youth. Abundant availability of natural food base such as domestic waste, pulse, cereal grains, grain by products, insects, warms, green grass etc. is boon to backyard poultry in all part of this region. The system of bird keeping varies from place to place and caste to caste. The most popular developed pratapdhan chicks used in backyard poultry. The Rajasthan has less than 2 per cent poultry as well as egg production of the country. Pratapdhan is a dual purpose chicken variety to cater to the needs of rural poultry keepers of Rajasthan. It was developed as part of AICRP on Poultry Breeding by MPUAT, Udaipur. It resembles

local birds of Rajasthan. Attractive multicolour feather pattern, as rural people like coloured birds from aesthetic point of view and better looking. Because of colour plumage birds have camouflagic characters to protect themselves from predators. Birds have longer shank length which helps in self protection from predators in backyard areas and has capacity to survive on low plane of nutrition (low and negligible input) and harsh climatic conditions. It lays brown eggs weighing around 50 g and has broody characteristic to some extent. It has fast growth rate with average adult body weight at 20 weeks of age ranged from 1478 to 3020 g in males and 1283 to 2736 g in females. The age at sexual maturity was 170 days. Pratapdhan produces 161 eggs annually, which is 274% higher than local native (43 eggs).

Hence, the rural poultry farming has good potential in the state especially in the rural areas to improve the socio-economic condition and overcoming protein deficiency. So, that the present study has been undertaken pratapdhan chicks under backyard poultry rearing in Bhilwara district of Rajasthan.

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RESEARCH METHODOLOGY

The present study was carried out by the Krishi Vigyan Kendra, Bhilwara district of Rajasthan. For this purpose Mandal and suwana block were selected for backyard poultry distribution under ATMA, Bhilwara during the year 2014-2015. Five villages from each two block were selected randomly making it a total of ten villages, and from each selected village, ten families rearing poultry were selected randomly making a total of 100 respondents for the study. Data were collected with the help of a semi structured interview schedule and through observation. Data so collected, tabulated and analysed as per standard statistical procedures of Snedecor and Cochran (1994). Pratapdhan poultry was developed by AICRP on poultry breeding at poultry farm, Maharana Pratap

University of agriculture and technology, Udaipur, Rajasthan.

RESULTS AND DISCUSSION

The study shows that in all 42 per cent family heads were illiterate while among the literate family head 55.17 per cent had educational level of primary, 27.58 per cent secondary, 13.79 per cent graduate and 3.44 per cent post graduate (Table 1). Under present situation, for popularization of the backyard poultry there is a need for making more efforts to motivate for adoption of new technologies. In Rajasthan there are religious restrictions to rear particular species of livestock. Perusal of Table 1 showed that majority of rural poultry owners 89 per cent belonged to hindu religion and remaining 11 per cent belong to Muslim. According to caste

Table1: Socio- economic parameters of respondents

Parameters	N	Frequency
Educational status of family head		
Illiterate	42	42.00
Literate	58	58.00
(I) Primary	32	55.17
(II) Secondary	16	27.58
(III) Graduate	8	13.79
(IV) Post-graduate	2	3.44
Religion		
Hindu	89	89.00
Muslim	11	11.00
Caste		
ST	13	13.00
SC	21	21.00
OBC	20	20.00
General	46	46.00
Type of residence		
Kaccha	38	38.00
Pucca	32	32.00
Mixed	30	30.00
Main Occupation		
Service	8	8.00
Agriculture	22	22.00
Animal husbandry	14	14.00
Agriculture + Animal Husbandry	56	56.00

indicate the majority of respondents belong to Rajput and only general caste (46 %), followed by SC (21%), OBC (20%) and ST (13 %).

Majority (38%) of poultry rearers had kaccha house followed by pucca (32%) and mixed (30%). Mixed agriculture and animal husbandry are the main occupation of majority of the poultry rearing farmers (56%). In almost all the cases, the families had more than one occupation for their source of income. The result got supported by various researchers namely Mandal *et al.* (2006) and Rahman *et al.* (2002).

Data indicates the production performance of the pratapdhan birds reared by farmers. The average body weight at 12 and 20 weeks of age were 1216.62+41.68 and 2110.60 + 40.36 in males and 1120.32 +34.30 and 1702.28 + 37.30 g in females, respectively. The average weight of the birds at marketing 2.0 to 2.25 kg and average egg laid/bird/ year were 148 eggs, respectively.

In perusal of Table 2, it was found that the average economic gain per bird was Rs. 921.07. After considering the mortality the average economic

Table2: Economic of backyard poultry farming (average cost of production per bird)

S.No.	Particulars	Average expenditure (Rs.)	Particulars	Average Income (Rs.)
	Input		Output	
1.	Cost of Pratapdhan chicks	75	Sale of per bird female	300
2.	Cost of labour	437.43	Sale of per bird male	500
3.	Feeding cost	346.5	Egg produced per bird per year (148 eggs @Rs.10/egg)	1480
4.	Treatment cost	10	Mortality rate	10%
5.	Housing cost	20	Production cost per bird	888.93
6.	Total cost	888.93	Total output per bird	1780
			Economic gain per bird	891.07
			Average bird per household	20 no.
			Mortality (20X10x1/100)	02 no.
			Total numbers of bird per household, after considering mortality	18 no.
			Sale price for 18 numbers of birds (18 X 300)	5400
			Income from egg production for 18 number of birds (18X148) @Rs.10/eggs	2664 Eggs 26640
			Economic gain for 18 bird (32040-16000.74)	16039.26
			Economic gain per bird after considering mortality (16039.26/20)	801.96
			Final economic gain per bird per year	801.26

*Labour RS. 2500/month and Concentrate @Rs. 22/kg

gain was found to be Rs. 828.26. It was found that many constraints were reported by the respondents regarding their backyard poultry farming. High input cost (78%) and high incidence of disease (88%) were of the major constraints reported by the respondents. Gawanda *et al.* (2007) and Mapiye and Sibanda (2005) also reported that diseases and chick's mortality as major constraint in village poultry production.

CONCLUSION

It is concluded that Pratapdhan backyard poultry played a significant role in increase income and nutrition level of rural livelihood under free range semi-intensive system. Therefore, the focus should be on providing necessary advance training programmes to scientific management practices to the farmers regarding poultry farming and availability of superior germplasm for rearing in the backyard system. Final economic gain of pratapdhan per bird per year was Rs. 801.26/-

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SUGGESTIONS OF STUDENTS TOWARDS THE RURAL AWARENESS WORK EXPERIENCE PROGRAMME

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ABSTRACT

The present study was undertaken with the objective of seeking the suggestions offered by the respondents for the effective implementation of the Rural Awareness Work Experience program at Agriculture University, Jodhpur. The most common suggestions that were offered by the RAWE respondents were: the farmer who has more than two crops in a particular season should be allotted to the students; the allotted farmers should be innovative so that students can get a better understanding; the students should stay with the farmer near the farmer's house instead of KVK; more exposure to the transfer of technology program is required; more collaboration with line departments; and increasing the time duration of RAWE for a better understanding of rural life. It was concluded that efforts should be made by the whole RAWE team regarding proper allotment of farmers, providing proper orientation classes to the students.

INTRODUCTION

Agricultural education is important equipment in ensuring increased agricultural productivity, sustainability, environmental and ecological security, profitability, job security, and equity. Agricultural students must have practical knowledge of agriculture along with theoretical knowledge. In its curriculum, the RAWE programme was originally implemented in 1980-81 at the Andhra Pradesh Agricultural University, Hyderabad. This happened shortly after the Randhawa Committee's recommendations.

The RAWE programme has been renamed by ICAR through the "Rural Entrepreneurship Awareness Development Yojana" as per necessity, of course, and was introduced by the Honourable Prime Minister on July 25, 2015. Further The Indian Council of Agricultural Research (ICAR) launched a new initiative, the Student READY programme with the aim of reorienting undergraduates in agriculture and related fields towards securing employability and to foster entrepreneurs who can approach knowledge-intensive agriculture by articulating knowledge, skill, ability, and experiences. The programme's goal is to give rural entrepreneurs awareness and practical experience in the situation

of rural agriculture and inculcate consciousness in undergraduate students related to practical agriculture and other sciences.

It included a general introduction and on-campus instruction from various faculty members, followed by a village attachment or unit attachment in a University, College, KVK, or research station. It is necessary to know whether the students who have undergone practical experience during RAWE are benefiting or not from the program. If not, then problems should be identified and remedial measures taken by the concerned authorities. The findings will enable us to know whether there is any need for restructuring the RAWE programme or not. Randhawa Committee (1992), which suggested the Rural Agricultural Work Experience (RAWE) programme to communicate quality, practical, and production-oriented education for agriculture degree programmes. With the growing importance of the RAWE programme in mind, an attempt has been made to seek suggestions from RAWE students for better improvement of the programme.

RESEARCH METHODOLOGY

Agriculture University, Jodhpur was selected for the study during the years 2022-2023 because

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Agriculture University, Jodhpur, is a developing institute in the field of Agriculture in Rajasthan and serves in the six districts of western Rajasthan, i.e., Pali, Jodhpur, Sirohi, Barmer, Jalore, and Nagaur, and this type of research work has not been conducted so far in the Agriculture University, Jodhpur. Under Agriculture University, Jodhpur, three colleges were selected, namely, the College of Agriculture, Jodhpur, the College of Agriculture, Sumerpur, and the College of Agriculture, Nagaur, because they were hosting the B.Sc. final year, while other colleges were still in the planning stage of their establishment in the session of 2022-23 with a sample size of 165. The data related to suggestions offered by RAWE students for improvement of the RAWE programme was collected through an open-ended questionnaire. The data was analyzed using frequency and percentage, and according to percentage rank was given to each statement.

RESULTS AND DISCUSSION

The suggestions offered by the respondents to

percent

the Rural Awareness Work Experience programme are presented in Table 1.

It is revealed from Table 1 that all respondents suggested that the farmer who has more than two crops in a particular season should be allotted to the students; 93.94 per cent of respondents suggested that allotted farmers should be innovative so that students can get a better understanding; and 84.85 per cent of students suggested that the respondents should stay with the farmer near the farmer's house instead of KVK and got 1st, 2nd, and 3rd rank, respectively. Another suggestion was that 78.79 per cent of respondents expressed that more exposure to the transfer of technology programme is required and more collaboration with line departments, which is ranked 4th. It was closely followed by; more than half (69.70%) of respondents suggesting that the time duration of RAWE should be increased for better understanding of rural life (5th rank, 63.64 per cent of respondents suggesting that ambition among respondents for

Table 1: Suggestions offered by the respondents (multiple responses)

S. No.	Suggestions offered by students	Frequency	Percent	Rank
1.	The students should stay with the farmer near the farmer's house instead of KVK.	140	84.85	III
2.	Accommodation facilities should be better.	80	48.48	IX
3.	The farmer who has more than 2 crops in a particular season should be allotted to the students.	165	100.00	I
4.	Allotted farmers should be innovative so that students can get a better understanding.	155	93.94	II
5.	More exposure to the transfer of technology programs is required, as is more collaboration with line departments.	130	78.79	IV
6.	Increase the duration of RAWE for a better understanding of rural life.	115	69.70	V
7.	The staff of KVK should get more involved with students while performing certain tasks.	90	54.54	VII
8.	Monitoring should be done on a regular basis to avoid mismanagement.	70	42.42	X
9.	Ambition among students for gaining practical knowledge should be created through proper orientation classes.	105	63.64	VI
10.	A proper demonstration and field day should be organized for the students with farmers.	85	51.51	VIII

gaining practical knowledge should be created through proper orientation classes (6th rank). Data further shows that almost half of the respondents (54.54%) suggested that staff of KVK should be more involved with students while performing certain tasks and got 7th rank, followed by 51.51 per cent of respondents suggesting that proper demonstration and field day should be organized for the students with farmers with 8th rank. About 48.48 per cent of respondents suggested that accommodation facilities should be better, and 42.42 per cent of respondents suggested that monitoring should be done on a regular basis to avoid mismanagement.

It was concluded that more emphasis should be given to the allotment of innovative farmers to the RAWEP students and to the farmer who has more than two crops in a particular season. There should be proper orientation classes for getting information related to the RAWEP programme, more transfer of technology programme should be conducted at KVK. It was also concluded that, as demonstration is a mandate of KVK, the demonstration and field day should be organized for respondents with innovative farmers to gain more knowledge about rural situations.

Therefore, the academic staff, university, and 5th Dean Committee should consider these suggestions and take the required actions to make the necessary corrections.

The findings are supported by the results of Sharma (2018), Khatri *et al.* (2023), Mahadik *et al.* (2011), and Sanjiv & Gowda (2013).

CONCLUSION

The Rural Awareness Work Experience

programme aims to provide hands-on, high-quality, practical, and opportunity seeking education to the agricultural degree programme. Keeping these in mind, before the beginning of the RAWEP programme and allocating a village to the RAWEP students, colleges and the Student READY programme committee must ensure that farmers should have more than two crops in a particular season, there should be more exposure to the transfer of technology programmes and more collaboration with line departments. Proper demonstrations and field days with farmers should be organized by the KVK members, and the allotted farmers should be innovative in nature. Student's stay facilities should be nearer to the allotted farmer.

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CONSTRAINTS IN ADOPTION OF ORGANIC FARMING PRACTICES BY THE BENEFICIARY FARMERS OF PKVY IN SOUTHERN RAJASHTAN

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ABSTRACT

An Ex-post-facto research design was used in the present study. The present study was concluded in southern Rajasthan. At present southern Rajasthan comprises of seven districts namely Udaipur, Dungarpur, Banswara, Chittorgarh, Pratapgarh, Bhilwara and Rajsamand. Out of these, three districts viz., Udaipur, Dungarpur and Banswara were selected on the basis of maximum number of PKVY beneficiaries. Two panchayat samities from each identified district were selected for study on the basis of maximum number of farmers were benefited through Paramparagat Krishi Vikas Yojana. Therefore, a total of six panchayat samities were taken for the study. From each selected panchayat samiti two beneficiary villages and one non-beneficiary village was randomly selected. Thus, a total 12 beneficiary villages and 6 non-beneficiary villages were selected for the study. 15 farmers were selected randomly from each identified village. Thus, a total of 180 beneficiary farmers and 90 non-beneficiary farmers were selected for the present investigation. It revealed that 52.78 per cent beneficiary farmers faced medium level of constraints in adoption of organic farming technology. It was followed by 34.44 per cent and 12.78 per cent respondents were found in low and high level constraints category, respectively. It showed that "More labour required in organic farming", "More care required in organic farming", "Training is not provided in an effective manner" by the government officials and "Marketing facilities are not provided nearby the village" were important constraints expressed by the beneficiary farmers in adoption of organic farming practices.

INTRODUCTION

The Paramparagat Krishi Vikas Yojana (PKVY), an initiative to promote organic farming in the country was launched in 2015. It is an extended component of Soil Health Management (SHM) under the Centrally Sponsored Scheme (CSS), National Mission on Sustainable Agriculture (NMSA). Paramparagat Krishi Vikas Yojana aims at supporting and promoting organic farming, in turn resulting in improvement of soil health. The scheme promotes Participatory Guarantee System (PGS) for India (PGS- India) which form of organic certification that is built on mutual trust, locally relevant and mandates the involvement of producers

and consumers in the process of certification. PGS - India operates outside the framework of "Third Party Certification". Funding pattern under the scheme is in the ratio of 60:40 by the Central and State Governments, respectively. In case of North Eastern and Himalayan States, Central Assistance is provided in the ratio of 90:10 (Centre: State) and for Union Territories, the assistance is 100 per cent. The Scheme was targeted to form 10,000 clusters of 20 ha each and bring nearly two lakh hectares of agricultural area under organic farming.

RESEARCH METHODOLOGY

The present study was conducted in southern Rajasthan with a total of 180 respondents selected

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from three districts namely, Udaipur, Dungarpur and Banswara out of two panchayat samities and two villages selected from each district. 15 respondents were selected from each village. To identify the constraints, a schedule was prepared with the help of agriculture experts. Data were collected with the help of interview schedule. Face to face interview technique was used for collection of information from respondents.

RESULTS AND DISCUSSION

This paper deals with the problems (constraints) faced by the beneficiary farmers. According to the Cambridge dictionary problems constraints means "something that controls what you with in particular limits." In this context, a suitable scale was developed to measure the constraints faced by the beneficiary farmers in adoption of organic farming practices. For each constraint, mean per cent score was calculated and ranked accordingly. The results of the same have been presented in subsequent tables.

Level of constraints of beneficiaries in adoption of organic farming practices

To get an overview of the level of constraints, the beneficiary farmers were categorized in to three strata *i.e.* low, medium and high level of constraints.

Data incorporated in Table 1 reveal that 52.78 per cent beneficiary farmers faced medium level of constraints in adoption of organic farming technology. It was followed by 34.44 per cent and 12.78 per cent respondents were found in low and high level constraints category, respectively.

In Udaipur district highest number of respondents (56.67 %) were found in the medium constraint category. Whereas, 38.33 and 05.00 per cent farmers had low and high level of constraints, respectively. In Dungarpur district highest number of farmers (50.00 %) were found in low level category. It was followed by the 35.00 and 15.00 per cent respondents possessed medium and high level of constraints, respectively. Similarly, in Banswara district 66.67 per cent farmers were in medium category. It was followed by the 18.33 and 15.00 per cent were in high and low level of constraints category, respectively.

The present findings are similar with the findings of Kumari and Sharma (2017) who concluded that 61.25 per cent beneficiary respondents faced medium level of constraints in adoption of recommended wheat and maize crop interventions. Whereas, 25.00 per cent wheat growers were observed to be in high constraints group and only 13.75 per cent respondents perceived low level of constraints in recommended wheat and maize crop interventions.

Aspect wise constraints perceived by the beneficiary farmers

All the constraints expressed by the beneficiary respondents were grouped into financial, management, training and marketing category. To know the extent of constraints faced by the farmers the mean per cent scores (MPS) were calculated for each constraint and then ranked accordingly. The results are given under different heading as given

Table 1: Level of constraints of beneficiaries in adoption of recommended practices of organic farming

n= 180

S.No.	Level of constraints	Udaipur		Dungarpur		Banswara		Total	
		F	%	f	%	f	%	f	%
1	Low (Upto 49.19 score)	23	38.33	30	50.00	9	15.00	62	34.44
2	Medium (49.20 to 53.74 score)	34	56.67	21	35.00	40	66.67	95	52.78
3	High (Above 53.74 score)	3	5.00	9	15.00	11	18.33	23	12.78
Total		60	100	60	100	60	100	180	100.00

f= Frequency, %= Per cent

below:

4.6.3.1 Financial constraints

A perusal of data presented in Table 2 show that "More labour required in organic farming" was the most important constraint perceived by the farmers with MPS 97.41 and ranked first. It was followed by "Organic manures are expensive", "Seeds for organic farming are costly", "Insect pest management is very expensive in organic farming" and "Weed management is costly in organic farming" with the extent of 93.89, 93.52, 93.15 and 84.08 per cent. These aspects were ranked 2nd, 3rd, 4th and 5th, respectively in the hierarchy of financial constraints faced by the beneficiary farmers.

Further analysis of Table shows that extent of financial constraints in Udaipur district was found from 87.78 to 95.56 per cent for beneficiary farmers. Similarly, in Dungarpur district it was noted from 81.67 to 95.56 per cent in all the aspects of financial constraints. Whereas, in case of Banswara district the extent of constraints for beneficiary farmers was found from 82.78 to 97.78 per cent in all financial constraints.

The present findings are supported with the findings of Soni *et al.* (2012) who observed the

major constraints faced by farmers in organic farming practices that high cost of inputs, difficult methods for preparation, lack of input and raw materials, poor financial condition, non-availability of loans in time.

Management constraints

The data presented in Table 3 show that "More care required in organic farming" was expressed as most important constraint by the farmers with MPS 95.93 and ranked 1st. The next important constraints were "Insect pest management is very difficult in organic farming" Weed management is difficult in organic farming", "Intercultural operation are very difficult in organic farming" and "More irrigation required in organic farming". The MPS of these constraints were 95.19, 94.26, 89.45 and 56.85, which were ranked 2nd, 3rd, 4th and 5th, respectively. It was realized that more care and management is required for successful cultivation of crops through organic farming.

Further analysis of Table shows that extent of management constraints in Udaipur district was expressed from 52.78 to 97.22 MPS for beneficiary farmers. Similarly, in Dungarpur district it was found from 61.67 to 95.00 MPS for beneficiary farmers.

Table 2: Financial constraints perceived by the beneficiaries in adoption of organic farming practices

n= 180

S. No.	Financial constraints	Udaipur district		Dungarpur district		Banswara district		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1	More labour required in organic farming	95.00	2	99.44	3	97.78	1	97.41	1
2	Organic manures are expensive	95.56	1	95.00	2	91.11	3	93.89	2
3	Insect pest management is very expensive in organic farming	89.44	3	95.56	1	94.44	2	93.15	4
4	Weed management is costly in organic farming	87.78	4	81.67	5	82.78	5	84.08	5
5	Seeds for organic farming are costly	83.89	5	98.89	4	97.78	4	93.52	3

MPS= Mean Per cent Score

Table 3: Management constraints perceived by the beneficiary farmers**n=180**

S. No.	Management constraints	Udaipur district		Dungarpur district		Banswara district		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1	More care required in organic farming	95.56	3	95.00	1	97.22	1	95.93	1
2	Insect pest management is very difficult in organic farming	97.22	1	92.78	3	95.56	2	95.19	2
3	Weed management is difficult in organic farming	96.67	2	93.33	2	92.78	3	94.26	3
4	More irrigation required in organic farming	52.78	5	61.67	5	56.11	5	56.85	5
5	Intercultural operation are very difficult in organic farming	90.56	4	87.78	4	90.00	4	89.45	4

MPS= Mean Per cent Score

Whereas, in case of Banswara district the extent of constraints for beneficiary farmers was found from 56.11 to 97.22 MPS.

Present findings were also supported with the findings of Savitha (2009) who opined that stakeholders are not aware of certification norms; that 94.00 per cent of certification of organic farm was based on documentation, 88.00 per cent of them were illiterate, 88.00 per cent expressed need of a strict quality control system, while 84.00 per cent stated that cost of certification was not affordable for small farmers.

Training constraints

Table 4 clearly show that "Training is not provided in an effective manner" by the government officials was the top most constraint realized by the beneficiary farmers with MPS 87.41 and ranked first. It was followed by "Training related to organic certification is not significant", "More expertise required for training in organic farming", "Training is not provided on time" and "Area specific training for organic farming is not provided" with MPS 87.04, 80.37, 79.26 and 77.59, which were ranked 2nd, 3rd, 4th, and 5th, respectively.

Further analysis of Table shows that extent of training constraints in Udaipur district was found from 76.11 to 86.11 MPS for beneficiary farmers. Similarly, In Dungarpur district it was found from 78.89 to 87.78 MPS, whereas, in case of Banswara district the extent of constraints for beneficiary farmers was found from 77.78 to 90.56 MPS.

The main theme of Paramparagat Krishi Vikas Yojana is promotion of organic farming through adoption of organic village by cluster approach and PDS certification. Training is such an input through which we can train the farmers for mobilization of their natural resources for organic farming. Therefore, implementation agency of PKVY should give more emphasis on training part through trained experts in organic farming.

The findings were also supported by the findings of Jangid et al. (2012) who revealed that constraints faced by organic and conventional farmers were inadequate availability of inputs like vermin-compost, bio-fertilizers and organic manures, lack of skill about improved methods of composting, lack of awareness about the concentration, time and method of bio-fertilizers application, lack of knowledge of field functionaries about organic farming and lack

of proper training about organic farming practices.

Marketing constraints

Data presented in Table 5 reveal that "Marketing facilities are not provided nearby the village" was perceived as most important constraint with MPS 94.26 and ranked 1st by the respondents. The next important constraints were "Organic certification process is very difficult", "Higher transportation cost results in less profit", "Grading of the produce is required before marketing" and "Price of organic product is not highly remunerative" with the extent of 92.78, 89.45, 74.82 and 56.48 per cent and ranked 2nd, 3rd, 4th, and 5th, respectively. Marketing of organic produce requires a good knowledge of the various products, the market and targeted audience. Farmers should know the aspects such as labelling, packaging and transport as well as retailing arrangements for marketing of the produce properly.

Further analysis of Table shows that extent of marketing constraints in Udaipur district was found from 45.56 to 94.44 MPS for beneficiary farmers. Likewise, in Dungarpur district it was realized from 64.44 to 91.67 MPS for beneficiary farmers. Whereas, in case of Banswara district the extent of

marketing constraints for beneficiary farmers was found from 59.44 to 97.78 MPS in the study area.

This study also supported by the Phukan et al. (2017) who concluded that among the various constraints, lack of proper local market yard facilities was perceived as the most serious constraint (severity 92.5%). It was also evident from the study that lack of wholesale market (severity 81.6%) was quoted as the second serious constraint.

Extent of overall constraints perceived by the Beneficiaries in adoption of organic farming practices

The data presented in Table 6 show that financial constraints were perceived at top by the beneficiary farmers with MPS 93.74 and ranked first. It was followed by Management constraints, Training constraints and Marketing constraints with the extent of 86.33, 82.30 and 81.55 MPS and ranked 2nd, 3rd and 4th, respectively.

Further analysis of Table clearly shows that extent of constraints in Udaipur district was found from 79.33 to 94.33 MPS for beneficiary farmers in financial aspects. Similarly, in Dungarpur district it

Table 4: Training constraints perceived by the beneficiaries in adoption of PKVY practices

n=180

S. No.	Training constraints	Udaipur		Dungarpur		Banswara		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1	Training is not provided in an effective manner	83.89	2	87.78	1	90.56	1	87.41	1
2	Training is not provided on time	78.89	4	79.44	4	79.44	4	79.26	4
3	More expertise required for training in organic farming	80.00	3	81.11	3	80.00	3	80.37	3
4	Area specific training for organic farming is not provided	76.11	5	78.89	5	77.78	5	77.59	5
5	Training related to organic certification is not significant	86.11	1	87.22	2	87.78	2	87.04	2

MPS= Mean Per cent Score

Table 5: Marketing constraints perceived by the beneficiary farmers**n= 180**

S. No.	Marketing constraints	Udaipur		Dungarpur		Banswara		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1	Organic certification process is very difficult	94.44	1	90.00	3	93.89	2	92.78	2
2	Marketing facilities are not provided nearby the village	93.33	2	91.67	1	97.78	1	94.26	1
3	Price of organic product is not highly remunerative	45.56	5	64.44	5	59.44	5	56.48	5
4	Grading of the produce is required before marketing	75.56	4	75.56	4	73.33	4	74.82	4
5	Higher transportation cost results in less profit	87.78	3	90.56	2	90.00	3	89.45	3

MPS= Mean Per cent Score

Table 6: Extent of constraints perceived by the beneficiaries in adoption of PKVY practices**n=180**

S. No.	Major Aspects of constraints	Udaipur district		Dungarpur district		Banswara district		Total	
		MPS	Rank	MPS	Rank	MPS	Rank	MPS	Rank
1	Financial Constraints	94.33	1	94.11	1	92.78	1	93.74	1
2	Management constraints	86.56	2	86.11	2	86.33	2	86.33	2
3	Training constraints	81.00	3	82.89	3	83.00	3	82.30	3
4	Marketing constraints	79.33	4	82.44	4	82.89	4	81.55	4

MPS= Mean Per cent Score

was noted from 82.44 to 94.11 MPS for beneficiary farmers. Whereas, in case of Banswara district the extent of financial constraints for beneficiary farmers was observed from 82.89 to 92.78 MPS in all aspects of constraints in adoption of organic farming practices.

It can be concluded from the above results that limited funds and resources may hinder the farmers from making the initial investments required for adopting organic farming practices, including purchasing organic inputs and implementing eco-friendly technologies.

The present findings are similar with the findings

of Kumari and Sharma (2017) who concluded that 61.25 per cent beneficiary respondents faced medium level of constraints in adoption of recommended wheat and maize crop interventions. Whereas, 25.00 per cent wheat growers were observed to be in high constraints group and only 13.75 per cent respondents perceived low level of constraints in recommended wheat and maize crop interventions. This study also supported by the Phukan et al. (2017) who concluded that among the various constraints, lack of proper local market yard facilities was perceived as the most serious constraint (severity 92.5 %). It was also evident from the study that lack of wholesale market

(severity 81.6 %) was quoted as the second serious constraint.

CONCLUSION

It is concluded 52.78 per cent beneficiary farmers faced medium level of constraints in adoption of organic farming technology. It was followed by 34.44 per cent and 12.78 per cent respondents were found in low and high level constraints category, respectively.

It showed that "More labour required in organic farming", "More care required in organic farming", "Training is not provided in an effective manner" by the government officials and "Marketing facilities are not provided nearby the village" were important constraints expressed by the beneficiary farmers in adoption of organic farming practices.

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IMPACT OF CSR INITIATIVES ON EMPOWERMENT OF RURAL WOMEN

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ABSTRACT

The progress and welfare of a society is not only the responsibility of the Government alone, but many more stakeholders need to be involved to attain the development goal. Companies too have been the target of those perturbed by this uneven development and as a result, their contributions to society are under severe scrutiny. Thus, from pure profit to profit with social responsibility, many corporate are endorsing the term 'Corporate Social Responsibility (CSR)'. They are working towards empowering women by improving income and employment for them in rural areas. Business houses equally claim that their social projects for women empowerment aim to establish a bright and empowered future for the rural women. The present paper thus highlights the impact of CSR initiatives of private players on empowerment of rural women in particular in terms of involvement in decision making in economic matters, access to and control over economic resources.

INTRODUCTION

Corporate sector in India is trying to play a pivotal role in ensuring private investment flow to those rural areas that have been left out of the development process so far and also to work for sustainable development of rural areas in general. Corporate Social Responsibility (CSR) deals with corporate responsibility towards society, talking about women becomes equally important. Corporate world also recognizes women in every possible area in which it functions. As the women are core of family system in India, it is important for the rural society, like in urban society, that she should not only be educated but also socially and economically empowered. Women in rural areas live a life that requires social and economic upliftment. Their role in development is obviously not a simple one; it relates to a complete range of socio- economic activities. They are not only users of basic services, bearers and socializers of children, and keepers of the home; where they are under employed or inefficient and overworked, they also represent a productive potential which is not being tapped. Industrial houses are trying to augment rural women's income to sustain their livelihoods thereby focusing on creating, supporting and developing rural women-led enterprises, supporting women's role along value chains,

enhancing their income opportunities and promoting their linkages to high value markets. They also strive to support women-led associations and small scale businesses in overcoming their supply side constraints so that they can take full advantage of opportunities offered by the market. Business houses equally claim that their social projects for women empowerment aim to establish a bright and empowered future for the rural women. Though various studies are planned from time to time to study the impact of Government schemes and policies, sporadic attempts have been made in this regard to study the impact of these companies' CSR. Therefore, there was a need to study and understand how corporate enterprises are using CSR initiatives and what is the impact of CSR initiatives on empowerment of rural women in particular. Thus, the present investigation was planned with the aim of assessing the impact these companies have been able to make on rural women beneficiaries.

RESEARCH METHODOLOGY

The present study was conducted in Rajasthan state. Among the different Indian states, Rajasthan has been among top 10 CSR fund recipient past three financial years (Rajasthan CSR Report, 2018). Rajasthan, the largest State in India is situated

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between the northern and western growth hubs of India, with 40 per cent of the Delhi-Mumbai Industrial Corridor (DMIC) falling within the State. Its location is truly strategic, giving it a unique advantages and opportunities for profitable investment in many sectors. The State has been one of the fastest growing states for past five years in terms of industrial production; business investment, start-up incubation, and CSR spend by companies in development projects. It has attracted a large number of Multinational Companies to set up projects in the State. Judgmental sampling was used to select first ten companies following the criteria of having annual turnover of more than Rs. 1000 crores, having branch offices or plants in Rajasthan since last 10 years and carrying out CSR activities at least from last 3 years. Further a sub sample of four companies comprising of Hindustan Zinc Limited (HZL), Chambal Fertilizers and Chemicals Limited (CFCL), JK Lakshmi Cement Limited (JKCL) and Shree Cement Limited (SCL) was purposively selected from the initial sample on the basis of their activities focusing on empowerment of rural women. From each company 60 rural women beneficiaries of CSR initiatives and 60 non beneficiaries were included in the study to make a total sample of 300 respondents. A performa prepared covering aspects of income earned, decision making, access to resources and control over resources was monitored on the respondents. Frequency, percentage, mean percent scores, mean weighted scores, Kendall's coefficient of concordance, Z test, paired t test, and F-test were used to analyze the data.

RESULTS & DESICUSION

Economic empowerment of rural women through CSR activities: Empowerment is now increasingly seen as a process by which the one's without power gain greater control over their lives. This means control over material assets, intellectual resources and ideology. The questions surrounding women's empowerment, the condition and position of women have now become critical to the human rights based approaches to development. To see the impact of CSR initiatives on the economic

empowerment, monthly income before and after becoming the beneficiaries of CSR, involvement in decision making, access to resources, control over resources and ownership of assets were assessed of both beneficiaries and non beneficiaries.

Mean income gain of rural women beneficiaries: It was observed during the collection of data that all the four selected companies worked for women empowerment under CSR by organizing the women into Self Help Groups. These SHGs were involved in thrift, savings and interloaning. Entrepreneurial trainings on stitching, embroidery, beauty parlour, food processing were given to these groups from time to time, so that they can take up these activities to generate income and become economically independent. Mere giving trainings would not suffice economic empowerment until and unless these are further taken up into ventures or enterprise to generate employment. Study revealed that out of the total beneficiaries selected, all the beneficiaries at HZL were involved in group enterprise. At HZL, after completion of the training in stitching/embroidery, the trainee group was given orders to stitch kurtas, pajamas, skirts and various apparels. They were linked to Centre for the Study of Values (Cos-V), an NGO through which they sold the products and received payment on item basis. Out of the total trainees 35 per cent at JKCL, 21.66 per cent at SCL and 20 per cent at CFCL started some sort of enterprises at individual level. Mean income gain before and after CSR initiatives (Table 1) shows highest gain in income in case of beneficiaries of HZL followed by JKCL, CFCL and least in case of SCL. The reason being, HZL beneficiaries were not earning any income before the CSR initiatives and their source of income was through the group enterprise, while others were already into farming or farm labourers.

Decision making: A decision can be defined as a course of action purposely chosen from a set of alternatives to achieve day to day objectives or goals. Decision making on the part of rural women is their involvement to take day to day decisions related to various economic matters. Results highlight that the respondents lack their say in

important decisions like buying and selling of land, buying and selling of house, construction and renovation of house. Further it was observed that beneficiaries had greater say in decisions like food to consume, food to buy, buying and selling of household assets, expenditure on clothing and purchase of gold or jewellery.

An attempt was made to categorize the respondents on the basis of their involvement in decision making i.e. poor, average and good. Results in Table 2 reveal that majority of the non beneficiaries (91.66%) had poor involvement in decision making with a few of the non beneficiaries (8.33%) having average involvement. On the other hand more than half of the beneficiaries (67.91%) had average involvement in decision making and 29.71 per cent poor involvement. The difference in the categories clearly indicates that decisions related to economic matters is affected by income in hand. When the women become economically independent she gains confidence to put forth her views and influence decisions. The findings get support from study by Das (2006) who reported improvement in women's decision making after employment.

Access to resources: Resources can be defined

as assets that are used for the benefits. Access implies unhindered use of the resources at our disposal. The respondents were asked whether the listed resources were in their range of utilization. In the study it was seen that the beneficiaries had their own source of income, were skilled enough to generate income and had cash savings compared to non beneficiaries. Beneficiaries had greater access to resources as compared non beneficiaries. Beneficiaries reported better access to adequate food, clothing, decent accommodation compared to non beneficiaries.

Categorizing of the respondents on the basis of access to resources (Table 3) reveals that majority of the non beneficiaries (89.34%) had poor access to resources, while more than half of the beneficiaries (66.25%) had average access to resources with a few beneficiaries (1.3%) even having good access to resources. The reason being that due to income in hand they were able to use it for availing various resources as and when required compared to non beneficiaries.

Control over resources: In the study it was seen that the respondents exercise less control on aspects like buying and selling of land, buying and selling of house, construction and renovation of

Table 1. Mean income gain of the respondents

Income gain categories	Beneficiaries	Non- beneficiaries
Poor	29.16	91.66
Average	67.91	8.33
Good	2.91	0

Table 2. Categorisation of the respondents by their of decision making

Decision Making Categories	Beneficiaries	Non- beneficiaries
Poor	29.16	91.66
Average	67.91	8.33
Good	2.91	0

Table 3. Categorization of the respondents on the basis of access to resources

Access to resources	Beneficiaries	Non- beneficiaries
Poor	32.45	89.34
Average	66.25	10.66
Good	1.3	0

Table 4. Categorization of the respondents on the basis of control over resources

Control over resources	Beneficiaries	Non- beneficiaries
Nil	4.16	88.33
Partial	91.66	11.66
Complete	4.16	0

house compared to aspects like foods to consume, foods to buy, expenditure on clothing, spending on marriages. Probe into the matter revealed that resources and assets of greater importance are controlled by the male members or the husband and women exercise either no control or partial control. Respondents were further reported to exercise less control on aspects like treatment of self, treatment of sick, planning of family budget, spending of family savings. This was so reported, because though they had income in hand but doubted their judgment and knowledge to take such decisions and thus exercised less control. Non beneficiaries on the other hand exercised less control on all aspects compared to beneficiaries.

The results in Table 4 reveal that majority of the non beneficiaries (88.33%) had nil control over resources compared to majority of the beneficiaries having partial control (91.66%). The results find support from findings of Jain (2012) who reported meager respondents (6%) in good control over livestock resources.

CONCLUSION

It is concluded that women's economic empowerment through the private companies have been able to instill a change in rural women's position but still a lot needs to be done. Certainly, the primary objective of making them skilled enough to generate income cannot be attained by mere trainings without a detailed overview existing skills, raw materials, marketing and production situations.

It was seen that nearly half of the beneficiaries did not initiate any enterprise due to the sole reason

of not having a market to sell. Thus, only such activities having market potential should be promoted and necessary efforts should be taken for skill up gradation among rural women in establishing marketing linkages. Accordingly, new skill trainings which have a greater scope for sale within and outside the district need to be identified.

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A STUDY ON THE PROFILE CHARACTERISTICS OF BANANA GROWERS UNDER HORTICULTURE MISSION FOR NORTH EAST AND HIMALAYAN STATES (HMNEH) IN ASSAM

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ABSTRACT

The present study was conducted to study the socio personal, socio economic and psychological characteristics of the beneficiaries and non-beneficiaries of the HMNEH scheme in Kamrup and Jorhat districts of Assam which were purposively selected as the mission was more prominently implemented in these districts. Equal number of beneficiaries and non-beneficiaries were selected from each of the selected six ADO circles of two districts having seventy-one numbers of beneficiaries and seventy-one numbers of non-beneficiaries making a total of one hundred and forty-two numbers of total respondents. To study the characteristics, fourteen numbers of variables were selected. The data were collected with the help of pretested schedule by interview method. The collected data were analysed by using proper statistical techniques and the results revealed that majority (72.54 %) of the respondents belonged to the age group of 35 to 50 years with educational level below higher secondary (45.77 %) and having 5 to 7 members in a family with 17 to 25 years of farming experience (57.75 %) and also majority (41.54 %) of them having training experiences of one day training programmes. Majority of the respondents were residing as joint family and engaged as family labour (63.38 %). 85.91 per cent of the beneficiaries had Rs. 1.50-2.50 lakh and 73.22 per cent of non-beneficiaries had annual income of 1.21 lakh to 2.5 -lakh as their annual income. 49.29 per cent of the respondents having membership in only one organization. Both beneficiaries and non-beneficiaries were having medium level of management orientation, risk bearing ability and decision-making ability.

INTRODUCTION

Horticulture sector accounts for 30 per cent of India's agricultural GDP from 8.5 per cent cropped area. Assam has a wide variety of climate and soils on which a large number of horticultural crops are grown. Gradually horticulture has moved from rural confinement to commercial venture attracting rural people as it is economically rewarding. Realising the importance of Horticulture sector, the Government of India has launched a centrally sponsored scheme called the Mission for Integration Development of Horticulture (MIDH) during 2014-15 and Horticulture Mission for North Eastern and Himalayan states (HMNEH) became a part of MIDH with the objectives to enhance horticulture production and improve nutritional security and

income support to farm households and others through area based regionally differentiated strategies.

Among various fruits grown in Assam, banana is a predominant fruit crop that contributes significantly to the socio-economic and cultural life of rural community in addition to its economic value, nutritional value, and the diverse uses of the fruits. The prospects to bring about a socio-economic transformation of rural masses are immense through banana cultivation. Keeping in mind all the facts, the present study was conducted with an aim to know and compare the socio personal, socio economic and psychological characteristics of the beneficiaries under HMNEH scheme for banana cultivation and the non-beneficiaries having banana

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cultivation which may be of great help to the policy makers and extension professionals in formulating different strategies.

RESEARCH METHODOLOGY

Out of the thirty-three districts of Assam, Kamrup and Jorhat districts were selected purposively as the scheme was more prominently implemented in these districts. Three ADO circles from each district were selected purposively as the number of beneficiaries benefited with banana sucker was more in comparison to the other ADO circles of both the districts, which was available in the list collected from the State Department of Agriculture of both the districts. The selected ADO circles were Madhapur, Borholla and Bagchung of Jorhat district and Borgaon, Ramdia, Chaygaon of Kamrup district. The respondents included the beneficiaries and non-beneficiaries of the HMNEH scheme. Beneficiaries were the farmers who were included under the HMNEH mission and received banana suckers during 2016-17 and non-beneficiaries were the farmers of the same area who have not received the scheme but have banana cultivation. The beneficiary respondents were selected using snowball technique method. Equal number of beneficiaries and non-beneficiaries were selected from each of the selected ADO circles having seventy-one numbers of beneficiaries and seventy-one numbers of non-beneficiaries which makes a total of one hundred and forty-two numbers of total respondents. To study the socio personal, socio economic and psychological characteristics of the respondents, fourteen number of variables were selected i.e. age, education, family occupation, family type, family size, farm labour availability, annual income, area under banana cultivation, farming experience, training exposure, social participation, risk bearing ability, management orientation and decision making ability. The main tool used for collecting data from the respondents was a pre tested structured schedule. The data were collected personally by the investigator through the interview method of the respondents during the year 2022. The collected data were properly tabulated and analyzed by following statistical techniques viz. frequency

distribution, percentage, mean, standard deviation and coefficient of variation.

RESULTS AND DISCUSSION

The Socio-economic status (SES) is a measure of an individual's or family's social position relative to others. The socio-economic profile of farmers consists of socio personal, socio economic and psychological characteristics which are discussed below.

Age: The observation from the Table 1 reveals that majority (69.02%) of the beneficiaries belonged to the age group of 35 to 50 years followed by 23.94 per cent of less than 35 years and 7.04 per cent who were above 50 years. In case of non-beneficiaries, 76.05 per cent of the farmers were in the age group 35-60 years followed 16.91 per cent in the age group of 50 years and above and 7.04 per cent in the age group below 35 years. Out of the total respondents, majority (72.54 %) of age between 35 to 50 years are involved in banana farming activities which signifies their interest in banana cultivation. The C.V. reflects the homogeneity of the respondents in age. Similar findings were reported by Manhas (2022), Meena *et al.*, (2022), Patra *et al.*, (2018) and Baruah *et al.*, (2022).

Education: The data in Table 2 represent that 45.08 per cent of the beneficiaries had education level of below higher secondary followed by 40.84 per cent of them were under matric and 14.08 per cent had education level of higher secondary and above. In case of the non-beneficiary respondent also 46.47 per cent had education below higher secondary followed by 32.39 per cent of them were under matriculation and 21.13 per cent were higher secondary and above respectively. These findings are in line with the findings of Manhas (2022) but in contrast with the findings of Meena *et al.*, (2022).

It was seen that all of the respondents were above primary school level education. In case of high education, more number of non-beneficiaries (21.13%) were found to have completed higher secondary and above than the beneficiaries (14.08%). It seems educated groups were slightly

less enthusiastic in taking up banana cultivation as 67.59 per cent of non-beneficiary respondents were above matric compared to 59.15 per cent of beneficiary respondents who were above matric. Therefore, awareness and proper training must be provided to develop in banana cultivation that might help to earn additional income.

Occupation of the family: It was evident from

Table 1 that majority of the beneficiaries (60.56%) and non-beneficiaries (52.11%) have banana cultivation along with other horticultural crops and rice. Similarly, for both the category banana is the common crops. The findings revealed that most of the farmers have chosen banana and other crops. Therefore, necessary support can help the farmers to commercialize the banana cultivation.

Table 1. Distribution of respondents according to their age (years)

(N=71+71=142)

S.No.	Category	Beneficiary (n=71)	Non-Beneficiary (n=71)	Total (N=142)
		Frequency (%)	Frequency (%)	Frequency (%)
1	Below 35 years	17 (23.94)	5 (7.04)	22 (15.49)
2	35-50 years	49 (69.02)	54 (76.05)	103 (72.54)
3	Above 50 years	5 (7.04)	12 (16.91)	17 (11.97)
	Mean	38.90	40.63	39.76
	SD	6.60	7.01	6.84
	CV(%)	16.96	17.25	18.60

Table 2. Distribution of respondents according to their education level

(N=71+71=142)

S.No.	Category	Beneficiary (n=71)	Non-Beneficiary (n=71)	Total (N=142)
		Frequency (%)	Frequency (%)	Frequency (%)
1	No formal Education	0	0	0
2	Up to primary school	0	0	0
3	Under matriculation	29 (40.84)	23 (32.39)	52 (36.62)
4	Below HS	32 (45.08)	33 (46.48)	65 (45.77)
6	HS and above	10 (14.08)	15 (21.13)	25 (17.61)
	Total	71	71	142

Table 3. Distribution of respondents according to their family occupation

(N=71+71=142)

S. No.	Categories	Beneficiary	Non-beneficiary	Total
		Frequency (%)	Frequency (%)	Frequency %
1	Banana + other horticultural crops	15 (21.12)	23 (32.39)	38 (26.76)
2	Banana + other horticultural crops + rice	43 (60.56)	37 (52.11)	80 (56.33)
3	Banana + other horticultural crops + rice + service	10 (14.08)	9 (12.67)	19 (13.38)
4	Banana + other horticultural crops + rice + service + business	3 (4.22)	2 (2.81)	5 (3.52)
	Total	71	71	142

Family Type: A glance at Table 4 indicates that majority (53.53%) of the beneficiary respondents resides in Joint family and 46.47 per cent reside as nuclear family. Similarly in case of non-beneficiary respondents 50.71 per cent respondents reside as nuclear family and 49.29 per cent reside as joint family. While, beneficiaries were dominated by joint families, in case of non-beneficiaries they are almost equally distributed in type of families. These findings are in line with the findings of Manhas (2022) and Meena *et al.*, (2022).

The findings revealed that a majority of the farmers preferred to live in joint family, might be due to the fact that the traditional system of living in joint families still prominent in rural villages. Joint family also ensures availability of farm labour and thus helps in reducing the labour cost.

Family Size (Nos.): Regarding family size, the data presented in Table 5 reveal that majority of both beneficiaries and non-beneficiaries belonged to the medium size family comprising of 5-7 members. The mean family size of both the group of respondents is almost similar.

The existence of medium size family comprising of 5-7 members may be due to the fact that they preferred and secured living together and also the easy availability of labour being engaged in farming activities which would reduce the labour cost.

Farm labour availability: A perusal of the data in Table 6 show that most of the labour were contributed from family in both beneficiaries (67.60 %) and non-beneficiaries (59.15 %) followed by hired labour as 29.57% and 26.76% for

Table 4. Distribution of respondents according to their family type

(N=71+71=142)

S.No.	Category	Beneficiary (n=71)	Non-Beneficiary (n=71)	Total (N=142)
		Frequency (%)	Frequency (%)	Frequency (%)
1	Nuclear	33 (46.47)	36 (50.71)	82 (57.75)
2	Joint	38 (53.53)	35 (49.29)	60 (42.25)
	Total	71	71	142

Table 5. Distribution of respondents according to their family size (Nos)

(N=71+71=142)

S. No.	Category	Beneficiary (n=71)	Non-Beneficiary (n=71)	Total (N=142)
		Frequency (%)	Frequency (%)	Frequency (%)
1	2- 4 members	5 (7.05)	4 (5.65)	9 (6.34)
2	5-7 members	57 (80.28)	60 (84.50)	117 (82.40)
3	More than 7 members	9 (12.67)	7 (9.85)	16 (11.26)
	Total	71	71	142
	Mean	5.15	5.22	5.21
	SD	1.31	1.09	1.15
	CV (%)	25.43	20.88	22.07

Table 6. Distribution of respondents according to farm labour availability

(N=71+71=142)

S.No.	Categories	Beneficiary (n=71)	Non-beneficiary (n=71)	Total
		Frequency (%)	Frequency (%)	Frequency (%)
1	Family labour	48 (67.60)	42 (59.15)	90 (63.38)
2	Hired labour	21 (29.57)	19 (26.76)	40 (28.16)
3	Both	2 (2.81)	10 (14.08)	12 (8.45)
	Total	71	71	142

beneficiaries and non-beneficiaries, respectively. It was assumed from the findings that as majority of the respondents were residing in joint family, so, family members were engaged as a labour in farming.

Annual Income: It was observed from Table 7 that majority (85.91%) of the beneficiary respondents had Rs. 1.50-2.50 lakh as their annual income followed by 11.27% having annual income more than Rs. 2.50 lakh and 2.82 per cent were having less than Rs. 1.50 lakh. While, in case of non-beneficiaries, it was found that majority (73.22%) of them had annual income of Rs. 1.21 lakh to 2.5 lakh followed by 16.90 per cent having less than Rs. 1.21 lakh and 14.08 per cent are having more than Rs. 2.50 lakh as their annual income and in case of non-beneficiaries also. Similar findings were reported by Abedin *et al.*, (2023) and Amaladeepan *et al.*, (2018). The high CV value indicates that the respondents were heterogeneous in nature in annual income.

Area under Banana cultivation: The data

presented in Table 8 reveal that majority (69.01 %) of the beneficiaries possessed 0.36 ha to 1.10 ha land. Whereas in case of non-beneficiaries, majority (74.64 %) had 0.17 ha to 0.46 ha of land under banana cultivation. This show that the land area under banana cultivation is more in case of beneficiaries as compared to non-beneficiary farmers. This might due to the fact that the beneficiary farmers under the scheme were getting all kinds of necessary support that probably helped them to expand the banana's area. Therefore, it could be concluded that if necessary support and guidance are provided, then there is possibility to include more area under this fruit crop.

Experience in farming: The appraisal of Table 9 shows that majority, 73.24 per cent of the beneficiary farmers were found with medium level of experience in farming of 17-25years followed by 16.90 per cent of the beneficiary farmers with high level of experience in farming of more than 25 years and 9.86 per cent of beneficiary farmers with low level of experience in farming of less than 17

Table 7. Distribution of respondents according to their Annual income

(N=71+71=142)

Beneficiary (n=71)			Beneficiary (n=71)			Total (n=142)		
Category	F	%	Category	F	%	Category	F	%
Less than 1.5lakhs	2	2.82	Less than 1.21lakhs	12	16.90	Less than 1.37lakhs	16	11.27
1.5-2.5lakhs	61	85.91	1.21-2.5 lakhs	52	73.22	1.37-2.57lakhs	113	79.58
More than 2.5 lakhs	8	11.27	More than 2.5 lakhs	7	14.08	More than 2.57lakhs	13	9.15
Total	71	100.00	Total	71	100.00		142	100.00
Mean		2.09	Mean		1.89			1.97
SD		0.50	SD		0.68			0.60
CV (%)		23.92	CV (%)		35.97			30.45

Table 8. Area under banana cultivation

(N=71+71=142)

S. No.	Beneficiaries				Non-Beneficiaries			
	Area	Frequency (%)	Mean	SD	Area	Frequency (%)	Mean	SD
1	Below 0. 36 ha	9 (12.67)	0.73	0.39	Below 0. 17 ha	10 (14.08)	0.24	0.23
2	0.36 ha to 1.10 ha	49 (69.01)			0.17 ha to 0.46 ha	53 (74.64)		
3	1.10 ha and above	13 (18.30)			0.46 ha and above	8 (11.26)		

years. In case of non-beneficiaries, a majority (54.92%) of respondents' falls under the medium level of experience in farming followed 25.35 per cent of low level and 19.71 per cent had more than 23 years of experience in farming. The results are in conformity with Gayathri *et al.*, (2022) and Meenambigai *et al.*, (2018).

It was observed that though majority of the farmers of both the groups had experience of farming between 17 to 25 years, the percentage of farmers with low (below 17 years) experience in farming were only 9.86 per cent in case of beneficiary farmers compared with 25.35 per cent in case of non-beneficiary farmers. The mean years of experience in farming between the two groups were similar. The CV value indicates that the respondents were heterogenous in nature.

Training Experience: The data presented in

Table 10 show that majority (46.47 %) of the beneficiaries availed the opportunity to attend one days training followed by two days training (29.57 %) and three days training and above (23.94 %). Non were found of not receiving training. While, it was observed that most of the non-beneficiaries (59.15 %) did not attend any training. Only 36.61 % attended one day training followed by two days training (4.22 %). This indicated that all the beneficiaries under the scheme were provided relevent training to enhance their knowledge and skill especially on banana cultivation.

Social participation: The table 11 depicts that 52.11% and 46.47% of beneficiaries and non-beneficiaries respectively had membership in one organization. A few (26.76 %) beneficiary respondents were not the members in any organizations, while a large portion (45.07 %) of

Table 9. Distribution of beneficiaries according to their experience in farming

(N=71+71=142)

Beneficiary (n=71)			Non-Beneficiary (n=71)			Total (n=142)		
Category	F	%	Category	F	%	Category	F	%
Less than 17 years	7	9.86	Less than 16years	18	25.35	Less than 16	24	16.90
17-25years	52	73.24	16-23years	39	54.92	16-24 years	82	57.75
More than 25years	12	16.90	More than 23 years	14	19.71	More than 24	36	25.35
Total	71	100		71	100		142	100
Mean	19.52			21.12			20.39	
SD	3.51			4.08			3.96	
CV	17.74			12.33			15.70	

Table 10. Distribution of beneficiaries according to their training experience

(N=71+71=142)

S. No.	Categories	Beneficiary	Non-beneficiary	Total Frequency (%)
		Frequency (%)	Frequency (%)	
1	No training	0	42 (59.15)	42 (29.57)
2	One day training	33 (46.47)	26 (36.61)	59 (41.54)
3	Two- day training	21 (29.57)	3 (4.22)	24 (16.90)
4	Three days training and above	17 (23.94)	0	17 (11.97)
	Total	71	71	142

non beneficiaries did not have membership in any organizations. As social participation leads to exposure, hence it is essential that all the farmers should hold either position or members in different village organizations.

Risk Bearing Ability: It was observed from Table 12 that majority (74.64%) of the beneficiary farmers belonged to the category of medium risk bearing ability followed by 14.08 per cent under high risk bearing ability and 11.26 per cent under low risk bearing ability. Similar trend was observed in case of non-beneficiary also as majority (77.46%)

under medium risk-taking ability category followed by 15.49 per cent under high risk taking ability and 7.04 per cent under low risk taking ability. Both the groups were almost similar so far mean risk bearing ability is concerned. The respondents were homogeneous in risk taking ability in both the groups. Same results were reported in the study done by Abedin *et al.*, (2023) and Meenambigai *et al.*, (2018).

Management Orientation: The data in the Table 13 depict that majority (71.83%) of the beneficiary farmers belonged to the medium

Table 11. Distribution of beneficiaries according to their social participation

(N=71+71=142)

S. No.	Categories	Beneficiary	Non-beneficiary	Total Frequency %
		Frequency (%)	Frequency (%)	
1	No membership	19 (26.76)	32 (45.07)	51 (35.91)
2	Membership in one organization	37 (52.11)	33 (46.47)	70 (49.29)
3	Membership in more than one organization	4 (5.63)	3 (4.22)	7 (4.92)
4	Office bearer in one organization	6 (8.45)	3 (4.22)	9 (21.42)
	Office bearer/holding position in more than one organization	5 (7.04)	0	5 (3.52)
	Total	71	71	142

Table 12. Distribution of respondents according to their Risk bearing Ability

(N=71+71=142)

Beneficiary (n=71)			Non-Beneficiary (n=71)			Total (n=142)		
Category	F	%	Category	F	%	Category	F	%
Low (<20)	8	11.27	Low (<21)	5	7.05	Low (<20)	13	11.27
Medium (20-23)	53	74.65	Medium (21-24)	55	77.46	Medium (20-24)	108	74.65
High (>23)	10	14.08	High (>24)	11	15.49	High (>24)	21	14.08
Total	71	100		71	100		142	100
Mean	21.53			22.31			21.92	
SD	1.94			1.37			1.72	
CV (%)	9.01			6.14			7.84	

management orientation category followed by high management orientation (18.30%) and 9.8 per cent under low management orientation category. In case of non-beneficiary also similar trend was seen as majority (74.64%) of the respondent belonged to the medium management orientation group followed by 15.49 per cent under high management orientation group and 9.8 per cent under low management orientation group. The beneficiary farmers' percentage was slightly more as compared

to beneficiary farmers in high management orientation category.

The mean management orientation score of beneficiary farmers (60.40) was higher than that of non-beneficiary farmers (52.87). However, the respondents of both the groups were almost homogeneous in their own group so far management orientation is concerned.

Decision Making Ability: The data in the Table

Table 13. Distribution of respondents according to Management orientation

(N=71+71=142)

Beneficiary (n=71)			Non-Beneficiary (n=71)			Total (n=142)		
Category	F	%	Category	F	%	Category	F	%
Low (<58)	7	9.86	Low (<50)	7	9.86	Low (<52)	14	9.85
Medium (58-63)	51	71.83	Medium (50-56)	53	74.65	Medium (52-57)	104	73.23
High (>63)	13	18.31	High (>56)	11	15.49	High (>57)	24	33.82
Total	71	100		71	100		142	100
Mean	60.40			52.87			56.64	
SD	2.69			2.99			4.70	
CV	7.27			8.54			22.14	

Table 14. Distribution of respondents according to Decision making ability

(N=71+71=142)

Beneficiary (n=71)			Non-Beneficiary (n=71)			Total (N=142)		
Category	F	%	Category	F	%	Category	F	%
Low (<31)	10	19.71	Low (<29)	6	8.45	Low (<30)	13	9.15
Medium (31-35)	53	74.64	Medium (29-34)	61	85.91	Medium (30-34)	112	78.87
High (>35)	8	11.26	High (>34)	4	5.63	High (>34.31)	17	11.97
Total	71	100		71	100		142	100
Mean	32.73			31.58			32.15	
SD	2.06			2.12			2.16	
CV	4.25			4.53			4.69	

14 represent that 74.64 per cent of the beneficiary farmers belonged to the medium category of decision-making ability followed by 19.71 per cent under low decision-making ability group and 11.26 per cent under high decision-making ability group. In case of non-beneficiary also 85.91 per cent of the respondents belonged to the medium decision-making ability group followed by 8.45 per cent respondents under low decision-making ability and 5.63 per cent under high decision-making ability.

The percentage of farmers in high decision-making ability in beneficiary group was almost three times of farmers in non-beneficiary group signifying that decision making ability to be an important character in acceptance of high valued crop like banana. The low CV explains that the respondents were highly homogeneous in their decision-making ability. The findings are in conformity with the results of Baruah *et al.*, (2022).

CONCLUSION

Banana cultivation is one of the best alternative options to improve the socio economic conditions of the rural people. HMNEH scheme was launched with an effort to bring a radical changes in the lives of banana growers through increased production and productivity. Therefore, the present study attempted to assess the profile characteristics of the beneficiaries and comparison was made with non-beneficiaries of the scheme. From the findings it could be inferred that there existed differences in the profile characteristics between the two categories of banana growers as the socio economic conditions of beneficiary farmers were better than non-beneficiaries, more particularly in area under banana cultivation, annual income of family, training exposure, social participation. Therefore, initiatives should be taken to percolate the benefits of the scheme to other banana growers of the State. Also concerned department need to maintain a continuous touch with the beneficiaries for the sustainability of banana cultivation.

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CONSUMER'S SATISFACTION TOWARDS BUYING OF PACKAGED FOOD PRODUCTS IN KOTA DISTRICT OF RAJASTHAN

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ABSTRACT

The urban women consumer buying various commodities for their basic needs in order to sustain life. Among the crucial needs in this earth, packaged food is the most essential requirement. Thus, in order to make desirable changes in the knowledge and buying behavior of the consumer, "consumer Satisfaction" is the need of the hour, which has to be promoted of among urban women consumers. The study was conducted purposely in Kota district of Rajasthan State. The Sample size of the study was comprised of total 240 woman consumers. Total sample was divided into two categories of 120 working urban woman consumers from educational institutions and 120 from non-working urban woman consumers from commercial shops like Big bazar, Mall and Retail shop of Kota city. The result found that majority of the women preferred buying packaged food ready to eat and cook products and their satisfaction is highest for snacks (Score=4.94) and lowest for soup mixes (Score=4.33). Non significant difference exists in the satisfaction level of working and non working women consumers towards ready to eat packaged food, while for ready to cook products significant difference exists in the satisfaction level of working and non working woman consumers except soup mixes. It can be concluded from the above results that working woman consumers were more satisfied with ready to eat packaged food products and better decision regarding buying packaged food products.

INTRODUCTION

Buying of packaged food are the spending habits and preferences of various consumers within specific spending needs an individual who goes for shopping does not necessarily end up buying packaged food products with satisfaction. Various factors, be it cultural, social, personal or psychological influence the buying decision of individuals. The urban consumer buying various commodities for their basic needs in order to sustain life. Among the crucial needs in this earth, packaged food is the most essential requirement. Thus, in order to make desirable changes in the knowledge and buying behavior of the consumer, "consumer Satisfaction" is the need of the hour, which has to be promoted of among urban women consumers.

Kotler & Solomon *et al.*, (2020) considered that description of this last buyer decision stage, it is evident that the marketer's job is not only to make the product sell but also to ensure that the customer

is retained. That is possible by promising only what their brand can deliver instead of any false information. Thus, if the customer's expectation is met, the customer becomes satisfied, if it exceeds the expectations, the consumer is delighted. Nevertheless, every purchase the consumer makes involves some sort of compromise and they feel sad for purchasing products with some drawbacks and missing the benefits of the product that was not purchased. That is called post-purchase dissonance for every purchase. "The proof of the pudding is in the eating," as the old saying goes. In other words, the real test of the decision-making process is whether the customer is happy with the choice they made after all these phases have been passed. The post-purchase assessment closes the loop; it occurs when the customer experiences the product or service they have selected and decided whether their expectations are met or may be even exceeded. Customer satisfaction is essential in order to establish a productive relationship with a customer.

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RESEARCH METHODOLOGY

The sample size of the study comprised of total 240 urban woman consumers. Total sample was divided into two categories, 120 working urban woman consumers were from educational institutions and 120 non-working women were from the commercial shops like Big bazaar, Mart and Retail shops in Kota city. To study the consumers satisfaction towards buying of packaged food items, which were firstly Ready to Eat Food Items - Snacks (Biscuits, Potato Chips, Kurkure *etc.*), Bakery of food Products (Cakes, Bread, Toast, *etc.*), Preservative Products (Jam, Jelly, Catc up *etc.*), Beverages (Horlics, Cold Drink, Canned Juices, *etc.*) and Milk & Milk Products (Flavoured Milk, Cheese, Butter *etc.*) and secondly Ready to Cook Food Items : Snacks Mixes (Idli, Dosa, Khaman, Maggi, Pasta, *etc.*), Dessert Mixes (Gulab Jamun, Kheer, Cakes *etc.*), Curry Mixes (Vegetable, Gravy *etc.*) and Soup Mixes (Tomato, Hot and Sour *etc.*). The multistage random and convenience sampling technique were used for selection of respondents. Data were collected from the respondents through well structured interview schedule. Thereafter, data were analysed, tabulated and interepreteted.

RESULTS AND DISCUSSION

The major objective of the research was to assess the satisfaction of respondents about buying of packaged food products in Kota districts of

Rajasthan. The results about satisfaction of packaged food products are presented in Table 1.

Table 1 shows that maximum number of working women are highly satisfied with all ready to eat products and their satisfaction score ranges from 4.71 to 4.93. In ready to cook category working women are highly satisfied with snacks mix (Score=4.25) and soup mixes (Score=4.21) and they are satisfied with dessert mix (Score=4.08) and curry mixes (Score=4.12). Whereas, majority of non-working women are highly satisfied with all kind of packaged food products. From the above results it can be concluded that majority of the women preferred buying ready to eat products and their satisfaction is highest for snacks (Score=4.94) and lowest for soup mixes (Score=4.33). The present findings are in line with the findings of Chetan Bajaj *et al.*, (2009) who found that urban women consumer's buying behaviour is directed towards the satisfaction of various needs and desires. The decision to buy or not to buy often comes from what one anticipates as the consequences of one's decision for buying. Urban women consumers tend to choose the alternative with the highest perceived net rewards for buying packaged food.

Data presented in Table 2 reveal that the calculated t value is less than tabulated value of all products of ready to eat category. It means that there was no significant difference between working and non working women regarding satisfaction about ready to eat products. Thus, it is concluded

Table 1. Satisfaction level of respondents about buying of Packaged Food Products

Product Category	Type of Product	Working Women		Non-Working Women	
		Mean Score	Satisfaction Level	Mean Score	Satisfaction Level
Ready to Eat	Snacks	4.93	Highly Satisfied	4.94	Highly Satisfied
	Bakery	4.91	Highly Satisfied	4.73	Highly Satisfied
	Preservative Products	4.75	Highly Satisfied	4.83	Highly Satisfied
	Beverages	4.71	Highly Satisfied	4.62	Highly Satisfied
	Milk & Milk Products	4.78	Highly Satisfied	4.68	Highly Satisfied
Ready to Cook	Snacks Mixes	4.25	Highly Satisfied	4.55	Highly Satisfied
	Desserts Mixes	4.08	Satisfied	4.46	Highly Satisfied
	Curry Mixes	4.12	Satisfied	4.38	Highly Satisfied
	Soup Mixes	4.21	Highly Satisfied	4.33	Highly Satisfied

Table 2: Significant difference in the satisfaction level of working and non working woman consumers towards packaged food products

Product Category	Type of Product	Working Women		Non-Working Women		t-value	p-value	Significance
		Mean	S.D.	Mean	S.D.			
Ready to Eat	Snacks	4.93	0.31	4.94	0.235	0.234	0.815	Not Significant
	Bakery	4.91	0.29	4.73	0.48	3.417	0.001	Significant
	Preservative Products	4.75	0.435	4.83	0.374	1.591	0.115	Not Significant
	Beverages	4.71	0.456	4.62	0.488	1.502	0.134	Not Significant
	Milk & Milk Products	4.78	0.414	4.68	0.568	1.69	0.092	Not Significant
Ready to Cook	Snacks Mixes	4.25	0.598	4.55	0.659	3.694	0.000	Significant
	Desserts Mixes	4.08	0.676	4.46	0.622	4.543	0.000	Significant
	Curry Mixes	4.12	0.724	4.38	0.624	3.056	0.002	Significant
	Soup Mixes	4.21	0.672	4.33	0.833	1.279	0.202	Not Significant

Level of Significance = 5%

that there was similar satisfaction level between both the categories of respondents with snacks, bakery, preservative, beverages, and milk & milk products.

Further analysis of table indicates that calculated 't' value is higher than tabulated value of ready to cook items namely Snack Mixes , Dessert Mixes and curry Mixes at 5 per cent level of significance. It inferred that there was significant difference between working and non- working women about satisfaction with snack, dessert and curry mixes. Whereas, non-significant difference was observed about soup mixes between working and non - working women.

The results are in accordance with the result of Karuppusamy *et al.*, (2012) who found that the major reason for non-consumption of packaged food products was produced their products by the respondents at less cost and with better taste. The average monthly expenditure on packaged food products was found to be highest in higher income groups.

CONCLUSION

It can be concluded from the above results that working woman consumers were more satisfied with ready to eat packaged food products than non working women.

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A STUDY ON KNOWLEDGE OF RURAL WOMEN REGARDING CARBON FOOTPRINT

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ABSTRACT

Household pollution arising from electricity consumption and the generation of kitchen, plastic, and cooking fuel waste plays a significant role in contributing to climate change, adding to the global carbon footprint and exacerbating its challenges. An important study conducted in the Bhilwara district of Rajasthan centered on 240 rural women to examine the impact of household activities on climate change. The study results were alarming, indicating that a significant number (86.67%) of the rural respondents lacked awareness about carbon footprints, displaying insufficient knowledge on the subject. Merely a few participants (13.33%) showed an average understanding, and none possessed a good grasp of the subject. This knowledge gap presents a critical obstacle to effectively addressing climate change in the region. However, the study also offers valuable insights that present opportunities for positive transformation. By recognizing these knowledge gaps, the research opens the door to implementing tailored interventions and gender-sensitive policies. Such customized approaches can cater to the specific needs of rural communities in Bhilwara, empowering them with knowledge and resources to combat climate change at the grassroots level.

INTRODUCTION

Climate change is a global issue that has been exacerbated by human activities such as burning fossil fuels, deforestation, and industrialization (Roser 2021). India, with its high population density, poverty levels, and dependence on agriculture, is particularly vulnerable to the impacts of climate change. The country has already experienced rising temperatures, changing rainfall patterns, and more frequent and intense extreme weather events like floods, droughts, and heat waves (Reidmiller, *et al.* 2019). These changes have had significant repercussions on agriculture, water resources, public health, and the economy. Recognizing the severity of the situation, the Indian government has taken various steps to mitigate the effects of climate change (Lynn and Peeva, 2021). It has set ambitious targets for renewable energy adoption and has implemented policies to promote electric vehicles, energy-efficient buildings, and sustainable agricultural practices. Additionally, India has been actively involved in global climate negotiations and has committed to reducing its greenhouse gas emissions intensity by 33-35% by 2030 compared to 2005 levels (Romm,

2022). However, alongside climate change, pollution has emerged as another critical challenge in India, particularly in urban areas. Air pollution, characterized by high levels of particulate matter, nitrogen oxides, and sulfur dioxide, poses significant health risks to residents (Fuller, *et al.*, 2022). Water pollution, caused by untreated sewage and industrial waste, further threatens the nation's water bodies. The detrimental impact of pollution is evident, with pollution-related premature deaths reaching alarming numbers (Lemcke-Stampone, *et al.*, 2022). The latest IPCC report, published in April 2022, highlights the urgency of limiting global warming to 1.5 degrees Celsius to avoid irreversible consequences. As climate change continues to accelerate, its far-reaching effects, including deforestation, droughts, and plastic waste, are increasingly evident worldwide. With the rapid growth of population, urbanization, and industrialization, pollution control has become a formidable challenge for India. Human activities, such as resource use, farming, non-farming activities, mining, and industrial practices, have significantly increased the volume and variety of pollutants and waste in the ecosystem. If pollution continues to

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escalate, it will have severe implications for both the Earth's system and human life (Kaur and Pandey, 2021). To address these pressing issues, the researcher conducted the present study, aiming to shed light on the impact of household activities on climate change and pollution in India. By understanding the current state of knowledge and awareness among rural communities, the study seeks to identify opportunities for targeted interventions and policies that can empower individuals and contribute to a more sustainable future for the country.

RESEARCH METHODOLOGY

Carbon footprint knowledge among rural women was assessed through a self-administered questionnaire that focused on key areas such as cooking fuel consumption, electrical appliance usage, waste management, and plastic waste disposal. The study took place in Bhilwara district, Rajasthan, with a total of 240 respondents selected based on specific criteria from eight villages in rural areas. To gather data on household-level carbon

footprint knowledge, researchers conducted door-to-door interviews with rural women, utilizing 28 closed-ended questions in the questionnaire. Before implementation, the questionnaire underwent careful design, incorporating insights from existing literature, and was evaluated by subject matter experts to ensure clarity and comprehensiveness of the inquiries.

RESULTS AND DISCUSSION

Knowledge is the most important component of behavior and plays an important role in covert and overt behavior of human beings. Once knowledge is acquired, it produces changes in the thinking process of an individual. It helps to develop favorable attitude to take certain action in accepting an innovation. For making any program to be effective, it is most important that people should be first aware and informed about it. Knowledge of the respondents about carbon footprint data were collected under four components which are present as below:

Table 1: Component-wise knowledge of the respondents regarding carbon footprint

n= 240

S. No.	Components	Mean per cent knowledge score
1.	Knowledge about Environment	17.50
2.	Knowledge about household activities responsible for environment pollution	8.96
3.	Knowledge about carbon footprint	0
4.	Knowledge about rules and regulations about environment cleanliness	2.78
	Overall mean per cent of knowledge	7.20

Table 2: Distribution of respondents on the basis of their knowledge regarding environment

n=240

S. No.	Aspects	f	%
1.	Cleanliness of surrounding	108	45
2.	Meaning of environment	50	20.83
3.	Meaning of Environment pollution	40	16.67
4.	Personal problems due to pollution	32	13.33
5.	Types of pollution	36	15

Table 1 illustrate the respondent's knowledge of various components related to carbon footprint. A careful analysis of the knowledge scores reveals that the participants showed poor understanding of the environment (17.50 MPS), household activities contributing to environmental pollution (8.96 MPS), and the rules and regulations concerning environmental cleanliness (2.78 MPS). Remarkably, they had no knowledge and had never heard about carbon footprint. The overall average per centage of knowledge was recorded at 7.20. A detailed investigation into the respondents' knowledge in different areas was conducted to identify specific deficiencies. The aim was to identify areas that require targeted efforts to improve the rural women's knowledge regarding carbon footprint.

The data presented in Table 2 illustrates the respondent's knowledge pertaining to the environment. The findings reveals that approximately 45 per cent of the respondents possessed knowledge regarding the importance of maintaining cleanliness in their surroundings. Furthermore, only 20.83 per cent of the respondents were able to provide a definition of the term "environment," while a mere 16.67 per cent exhibited knowledge about the concept of environmental pollution. Similarly, 15 per cent of the respondents had an understanding of the various types of pollution. The study can be supported by Sompura, *et al.* (2022) who revealed that most of the respondents demonstrated

awareness about environmental concerns and made an effort to adhere to the required procedures for the appropriate management of waste in order to combat this problem.

The data presented in Table 2 indicates that when it comes to understanding the personal implications of pollution, only a small per centage of the respondents (13.33%) demonstrated awareness of the potential negative effects on their own well-being. This aligns with the findings of Leiserowitz and Thaker (2012), the majority of the population of India lacks an adequate understanding of the concepts of climate change and global warming. The study revealed that only 7% of the respondents had a complete understanding of these concepts, while a staggering 41% of the respondents either did not know what these terms meant or had never even heard of them before.

According to the data presented in Table 3 approximately 46.67 per cent of the respondent's demonstrated awareness of the current state of the environment, recognizing that continuous environmental pollution poses a threat to human life. This finding aligns with a study conducted by Reidmiller *et al.* (2018) who reported that releasing greenhouse gas is increased over the past decades and average global temperature also increased. Report warned that if global carbon emission does not start to decreases rapidly it may cause of economic as well as environmental crisis.

Table 3: Distribution of respondents on the basis of their knowledge regarding household activities responsible for environment pollution

n=240			
S. No.	Aspects	f	%
1.	Daily household activities are responsible to pollute the environment	20	8.33
2.	Cooking fuels and electrical appliances used in the house are cause of pollution	10	4.17
3.	Kitchen waste and plastic materials used in the house are reason for environment pollution	16	6.67
4.	Continuous environment pollution will lead to life in danger	112	46.67
5.	Listened about reuse, refuse, recycle or reduce in terms of environment	14	5.83
6.	Sanitary napkins are also made from a kind of plastic material	0	0
7.	Separate dustbin arrangement are there dispose of sanitary napkins	0	0
8.	Sanitary napkin is also cause of pollution	0	0

The data in Table 3 also indicate that 8.33 per cent of the respondents possessed knowledge about the daily household activities that contribute to pollution. This result is consistent with the study by Yu *et al.*, (2013), which found that 85 per cent of their respondents either moderately or strongly agreed that human activities are a cause of climate change. Another study conducted by Sarkar (2015), the total amount of greenhouse gases created either directly or indirectly as a result of human activity, including transportation, the use of electricity for heating and cooling homes, the creation of electrical power, and the production of food and goods, produce greenhouse gas emissions that hasten climate change and global warming.

Furthermore data shows in Table 3 only 6.67 per cent of the respondents were aware that kitchen waste and the use of plastic materials in the household also contribute to environmental pollution. Desa *et al.*, (2011) similarly discovered in their study that a majority of respondents (65.9 per cent) lacked knowledge about waste management.

Table 3 further depicts that small proportion of the respondents, specifically 5.83 per cent, had heard about the principles of "reuse, refuse, recycle, or reduce" in relation to the environment. Additionally, 4.17 per cent of the respondents possessed knowledge about the pollution caused by cooking fuels and electrical appliances used in households.

Similar findings were noted by Dida *et al.*, (2022), who found that respondents in Sub-Saharan Africa had limited knowledge about the health effects and contributing factors of kerosene and fuel wood, which were commonly used as energy sources in many households.

Data presented in Table 3 clearly show that none of the respondents had knowledge about sanitary napkins being made from plastic materials or the importance of having separate dustbins for their disposal. They were also unaware that improper disposal of sanitary napkins could contribute to pollution. Garg *et al.*, (2012) highlighted in their study in June 2010 stated that the Indian government proposed a subsidized sanitary napkin scheme for rural adolescent girls. However, various challenges such as awareness, availability, quality, regular supply, privacy, water supply, disposal, reproductive health education, and family support need simultaneous attention to promote menstrual hygiene.

Overall, the data depicts that knowledge among the respondents regarding different aspects of environmental pollution and sustainable practices is less which highlights the need for educational interventions and awareness campaigns.

It is deeply concerning that even in the present day, a significant number of individuals remain

**Table 4: Distribution of respondents on the basis of their knowledge regarding carbon footprint
n=240**

S. No.	Aspects	f	%
1.	Carbon emission	0	0
2.	Sources of carbon emission	0	0
3.	Carbon footprint	0	0
4.	Meaning of carbon footprint	0	0
5.	Disadvantages of Carbon Footprint	0	0
6.	Negative effects of Carbon Footprint	0	0
7.	Carbon emission can be increased or decreased even by human activities	0	0
8.	Major contributor to Carbon footprint that is food consumption, transportation and household energy	0	0
9.	Calculate one's own carbon footprint	0	0

uninformed about carbon footprint. Table 4 reveals that none of the respondents possessed any knowledge regarding carbon emissions or the sources of carbon emissions. Despite the increasingly visible changes in the environment, the respondents had no understanding of carbon footprint, its disadvantages, or the negative effects it entails. Even though there is clear evidence of carbon's impact on the atmosphere, the respondents were unaware that human activities can either increase or decrease carbon emissions. Numerous problems arise due to the continuous increase of carbon in the atmosphere, yet the respondents had no knowledge about major contributors to carbon footprint, such as food consumption, transportation, electricity usage, and household energy. In today's era, it is crucial for individuals to be aware of the pollution emitted by their activities, yet the respondents in this study had no knowledge of how to calculate their own carbon footprint. As per the report published by the World Health Organization in 2011, a significant number of women in India have limited access to important information regarding weather alerts. Due to this, they face difficulty in adapting to the changing climate conditions. It is said that the lack of access to such crucial information has hindered their capacity to cope up with the negative impacts of climate change. Another study conducted by Tobler *et al.* (2012) also found in their study that people still held several misconceptions regarding carbon emissions and climate change. The respondents appeared to have limited knowledge about the expected patterns of climate and precipitation changes.

It is alarming to discover that in the age where

people are highly engaged in social media, the respondents had zero knowledge and were completely unaware of five essential aspects related to carbon footprint: the role of human activities in increasing or decreasing carbon emissions, the various contributors to carbon footprint including food consumption, transportation, and household energy, the calculation of one's own carbon footprint, and the different ways to reduce carbon footprint. Furthermore, Leviston and Walker (2011) reported in their study that the majority of individuals believed they had little or no personal experience with the effects of climate change, although a significant portion (38.1 per cent) of those who acknowledged human-induced climate change claimed to have experienced moderate effects.

These findings highlight the urgent need for comprehensive education and awareness campaigns to address the significant gaps in knowledge regarding carbon footprint, climate change, and their associated impacts.

The data presented in Table 5 aimed to assess the respondent's knowledge regarding rules and regulations related to environmental cleanliness. Upon analysis, it was found that in rural areas, only 8.33 per cent of the respondents were aware that the Government of Rajasthan had implemented a ban on the manufacturing, sale, and use of specific single-use plastic items like plates, cups, straws, trays, and polystyrene from July 1, 2022. Interestingly, none of the respondents were familiar with the provisions of the Environment Protection Act (1986), which is designed to safeguard the environment and human life. Additionally, they had no information about the Rajasthan Sampark Portal,

Table 5: Distribution of respondents on the basis of their knowledge about rules and regulations regarding environment cleanliness

n=240

S. No.	Aspects	f	%
1.	Government of Rajasthan banned the manufacture, sale and use of identified single – use plastic items like plates, cups, straws, trays and polystyrene from July 1, 2022	20	8.33
2.	Environment protection act (1986) to prevent environment and life of human being	0	0
3.	Cleanliness complaint can be made on Rajasthan Sampark Portal by dialing 181	0	0

a platform where individuals can register information related to cleanliness by dialing 181. These findings highlight a concerning issue. Despite the ever-changing environment and the serious challenges we face as a result, the respondents had limited knowledge about measures and criteria for controlling and preventing environmental issues. In contrast, a study by Yu *et al.* (2013) in China revealed that 93 per cent of respondents agreed that the government should play a leading role in responding to climate change, and 51 per cent expressed positive attitudes towards the government taking proactive measures. However, around one-third of respondents remained neutral and preferred to observe the government's enforcement of climate change initiatives in the future. These results emphasize the need for effective communication and awareness campaigns to bridge the knowledge gap among respondents and the general public regarding environmental regulations, protection measures, and government initiatives aimed at addressing climate change and environmental challenges.

Overall knowledge of the respondent regarding carbon footprint

To know the level of knowledge of the respondents regarding carbon footprint, they were grouped into three categories of knowledge namely poor, average and good on the basis of their mean per cent scores.

Table 6: Distribution of respondents on the basis of overall knowledge regarding carbon footprint

n=240			
S. No.	Knowledge category	f	%
1.	Poor (below 33%)	208	86.67
2.	Average (33% - 66%)	32	13.33
3.	Good (above 66%)	0	0

The data presented in Table 6 clearly shows the distribution of respondents across different categories of knowledge regarding carbon footprint. The majority of respondents, comprising 86.67 per

cent, were classified as having poor knowledge about carbon footprint. This implies that they had limited understanding or awareness of the concept, its significance, and its implications. On the other hand, only 13.33 per cent of the respondents fell into the category of average knowledge, suggesting a slightly better understanding of carbon footprint compared to the majority. Notably, none of the respondent was classified as having good knowledge about carbon footprint. This indicates a complete absence of a high level of understanding or expertise in this area among the respondents. The data strongly emphasizes the overall low level of knowledge among the respondents when it comes to carbon footprint. This aligns with the findings of Almasi *et al.*, (2019) aimed to investigate the waste management knowledge, attitudes, and behaviors of females residing in Kermanshah city, Iran. The research sought to assess their comprehension of waste separation, source reduction, recycling, and the negative environmental and human health impacts resulting from improper solid waste management. The findings indicated that a substantial proportion of the participants, 77%, demonstrated inadequate waste management practices. This suggests a clear requirement for enhanced awareness and education in the field of waste management among the studied population.

The findings highlight a significant gap in knowledge, indicating a need for education, awareness, and information dissemination initiatives to enhance understanding and awareness of carbon footprint among the respondents. This could involve providing resources, conducting workshops or training sessions, and promoting environmental education programs to improve knowledge and consciousness regarding carbon footprint and its implications for the environment and human well-being.

CONCLUSION

The study's results revealed a significant knowledge gap concerning carbon footprint among rural respondents, particularly in regions where none of the participants demonstrated a strong

understanding of the concept. This lack of knowledge in rural areas can be attributed to limited access to educational resources and reduced exposure to environmental information. The research brings attention to the concerning fact that rural women often lack awareness of proper technology usage and engage in household activities that contribute to increased carbon emissions. This highlights the urgent need for targeted educational interventions and awareness campaigns aimed at women in rural communities. Empowering them with knowledge about carbon footprint and its environmental implications can lead to the adoption of more sustainable practices and a reduction in carbon emissions. Promoting environmentally friendly behaviors, such as adopting renewable energy sources, practicing waste reduction and recycling, and using eco-friendly products, can actively contribute to mitigating the negative impact of carbon footprint. Ultimately, the overarching goal is to foster an environmentally conscious society that comprehends the significance of reducing carbon emissions and actively works towards building a sustainable future.

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GROWTH PATTERN AND MANAGEMENT PRACTICES OF SIROHI GOAT KIDS IN BHILWARA DISTRICT OF RAJASTHAN

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ABSTRACT

The body weight in a goat is an important parameter related to selection, feeding and health care. Thus, present study was undertaken to assess the growth performance of 174 Sirohi goat kids born during 2018-21 were recorded for growth based on their at birth, three, six, nine and twelve months of age and management system followed in tribal area of Jhajpur block of Bhilwara district were analyzed. Analysis of growth data of Sirohi goats reared under field conditions for a period of three years revealed that the body weights at birth, three, six, nine and twelve months of age were 2.28 ± 0.04 , 11.13 ± 0.18 , 16.52 ± 0.34 , 21.31 ± 0.48 and 24.57 ± 0.58 kg for male kids and 2.05 ± 0.06 , 10.56 ± 0.26 , 14.46 ± 0.36 , 19.34 ± 0.42 and 22.58 ± 0.62 kg for female kids. Flock size ranged from 2 to 15 goats. It was observed that farmers were not practising any vaccination and scheduled deworming in their flocks. Farmers may be educated about scientific rearing to improve production and reduce mortality losses

INTRODUCTION

India occupies first position in terms of goat population and milk production. Chevon (goat meat) is most preferred and widely consumed meat in the country. Since ancient times goat milk has traditionally been known for its medicinal properties and has recently gained importance in human health due to its proximity to human milk for easy digestibility and it's all round health promoting traits. Still research is needed to explore and validate medicinal properties of goat milk for projecting it as therapeutic milk for human health. Demand for goat milk and milk products for internal consumption and export is expected to rise in coming years. Goat husbandry provides glimpses of future hope for employment generation, nutritional security and prosperity to the millions of small and marginal farmers in the country. Goat plays a significant role in providing supplementary income and livelihood to millions of resource poor farmers and landless laborers of rural India. Small ruminant rearing ensures self-employment and acts as a cushion in distress situations like drought and famine. Rajasthan

having maximum number of goats (20.84 million) followed by West Bengal (16.28 million) and Uttar pradesh (14.48 million).

The Sirohi breed has predominantly brown coat, with light or dark brown patches and occasionally white in colour. Most of the Sirohi goats are wattled and have medium size flat leaf like dropping ears. The breed is also known by other names such as Parbatsari, Devgarhi and Ajmeri, reared mainly for meat and milk production. Body weight is an indicator of its physique and economic viability for marginal as well as landless farmers (Alemayehu *et al.*, 2010). However, this fundamental knowledge is often unavailable to those working with goats in the small scale farming sector, due to non availability of scales. The chief method of weighing animals without scales is to regress body weight on a certain number of body characteristics, which can be measured readily. Farmers generally follow extensive management where goats depend upon natural vegetation and crop stubbles. Hence, a study was conducted to evaluate the growth pattern and management practises of Sirohi goat kids in Bhilwara district of Rajasthan

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RESEARCH METHODOLOGY

The data pertaining to growth records at birth, 3, 6, 9 and 12 months of age of Sirohi kids born during 2018-21 were collected from the farmer's field maintained. A total of 32 families in Jhajpur block of Bhilwara district of Rajasthan were surveyed in adopted villages by Krishi Vigyan Kendra, Bhilwara under Maharana Pratap University of Agriculture and Technology, Udaipur. Data on 174 Sirohi goat kids (64 males and 110 females) born during 2019-20 were recorded for body weights at birth, three, six, nine and 12 months of age, production system, feeding management and prevalence of disease and health care. The data were analyzed as per Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

The present results revealed that the average body weight at birth, three, six, nine and 12 month of were 2.28 ± 0.04 , 11.13 ± 0.18 , 16.52 ± 0.34 , 21.31 ± 0.48 and 24.57 ± 0.58 kg for males and 2.05 ± 0.06 , 10.56 ± 0.26 , 14.46 ± 0.36 , 19.34 ± 0.42 and 22.58 ± 0.62 kg for females goats, respectively (Table 1). Male kids weighed significantly ($P < 0.05$) higher than the females at all the stages of growth except at birth. Similar values for body weight were reported by Swami *et al.*, (2006) and Jagdale *et al.* (2012) in Marwari and Sangamneri goats.

Field survey reveal that in Jhajpur area of Bhilwara district goat rearing was well accepted by all classes of people. Poor and socially backward households tend to rear goats rather than large

animals. The flock size ranged from 2 to 15 with one or two breeding bucks. Almost all the goats were maintained on grazing in uncultivated waste land and harvested field. Goats were not housed inside a shed throughout the day and night but are rather kept in the home premises and farmers offered various tree leaves and kitchen waste etc. Farmers possessing 10-15 goats provided separate Kachcha house near own house (Table 2). Grazing of goats was mainly managed by children in certain household. Farmers having higher number of goats generally assigned a young member of the family to look after the grazing. In a day goats were grazed for 4 to 6 h in the morning and 2 to 3 h in evening. Generally farmers used their own buck for breeding purpose. Natural breeding (100%) of the goats was practised by the farmers.

Marketing of the goats in the district was unorganized. Goats were sold to a middleman, butcher or in the local goat market. Generally farmers sold their goats at any age as per need of cash. Most of the farmers kept the male goats and sold them at higher prices during Dussehra and Eid festivals. In rural areas, farmers got a better price for white male goats used for Surya Pujaa local festival in Jharkhand. Black Bengal goats were found to be affected by peste des petits ruminants (PPR), enterotoxaemia, foot and mouth disease (FMD), mastitis and parasites. Vaccination against PPR, enterotoxaemia, and FMD was not practised by the farmers. The causes of death in adult goats and kids were PPR (34%) followed by invasion of predator (18%) especially by dogs. Almost similar

Table 1. Mean (\pm SE) body weight (kg) of Sirohi goat kids under field conditions

Sex	Birth	3 months	6 months	9 months	12 months
Male	2.28 ± 0.04 (64)	11.13 ± 0.18 (58)	16.52 ± 0.34 (54)	21.31 ± 0.48 (48)	24.57 ± 0.58 (40)
Female	2.05 ± 0.06 (110)	10.56 ± 0.26 (102)	14.46 ± 0.36 (92)	19.34 ± 0.42 (84)	22.58 ± 0.62 (78)
Overall	2.16 ± 0.05 (174)	10.82 ± 0.28 (160)	15.48 ± 0.36 (146)	20.32 ± 0.44 (132)	23.56 ± 0.60 (118)

Means bearing different superscripts within a column differed significantly ($P < 0.05$); Figures in parenthesis indicate number of observation

Table 2. General profile of farmers (n=32) and management practises for goats

Description	Estimate	Description	Estimate	Description	Estimate
Land holding (acre)		Family Size (No.)		Literacy rate (%)	45.82
Irrigated	1.86	Male	2.65		
Un-irrigated	1.20	Female	3.40		
Fodder availability (%)		Flock structure (%)		Grazing distance (km)	
Grown	10.00	Castrated males	20.24	Morning	1.82
Forest	90.00	Breeding bucks	2.60	Evening	1.70
		Does	58.34		
		Kids	18.82		
Average grazing hours		Housing of goat (%)		Vaccination	
Morning	4.26	Only day	0.00	Yes	2.00
Evening	2.40	Only night	0.00	No	98.00
		Day and nigh	100.00		
		Open house	40.38		
		Closed house	59.62		
		Separate house	90.00		
		Attached house	10.00		
		Kachcha house	92.00		
		Pucca house	8.00		

finding were reported by Kashem *et al.* (2011) in Black Bengal goats. However, higher mortality (46.1%) due to dog bite was reported by nandi *et al.* (2011). Others common diseases observed among kids were pneumonia, pneumoenteritis and anaemia. Farmers were not practising scheduled deworming in their flock, resulting in poor performance of the animals. The study suggested that farmers may be educated about scientific rearing practices to improve production and reduce mortality losses.

CONCLUSION

The trends of these significant results revealed that the data on 174 Sirohi goat kids born during 2018-21 were recorded for growth *viz.* birth, three, six, nine and 12 months of age and management system followed in tribal area of Jhajpur block of Bhilwara district were analyzed. The mean body weight at respective ages were 2.28 ± 0.04 ,

11.13 ± 0.18 , 16.52 ± 0.34 , 21.31 ± 0.48 and 24.57 ± 0.58 kg for male kids and 2.05 ± 0.06 , 10.56 ± 0.26 , 14.46 ± 0.36 , 19.34 ± 0.42 and 22.58 ± 0.62 kg for female kids. Flock size ranged from 2 to 15 goats. In the study area, Kachha house were provided for the goats. Farmers fetched more prices, on sale of white coloured male used for the sacrificed purpose during local festival. It was concluded that farmers were not practising any vaccination and scheduled deworming in their flocks. Farmers may be educated about scientific rearing to improve production and reduce mortality losses.

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REASONS FOR JOINING FARMER PRODUCER ORGANIZATION BY THE STAKEHOLDERS OF NAGOUR DISTRICT OF RAJASTHAN

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ABSTRACT

In order to provide a fair price for the product, remove middlemen from the agriculture value chain, and improve direct marketing between farmers and customers, collective action tactics play a vital role in resolving marketing issues. A Farmers Producer Organization is a new kind of collective action that is becoming more popular in India. So, it is important to study the socio-economic profile of members and reasons for joining the FPOs and identify the major stakeholders involved in the formation of Farmers Producer Organization. Hence a study was conducted in Nagaur District of Rajasthan to investigate the socio economic profile and reasons for joining the FPOs and the major stakeholders involved in the formation of Farmers Producer Organization. The members were interviewed personally through a well-structured interview schedule using a sample of 120 members selected from two FPOs. The respondent's profiles revealed that most of the members were from the middle age group, educated up to high secondary, belonged to joint families, and had agriculture as main occupation. Most of them were categorized under the semi-medium category of land holding, were from medium annual income category, associated with one organization of social participation, had a medium level of extension contacts, and medium level of mass media exposure. The main reasons for respondents joining FPOs was to enhance family income and buy inputs at a lower cost. The study also reported that twelve stakeholders were actively involved in the formation of FPOs, and among these funding agencies and customers were the major stakeholders.

INTRODUCTION

Agriculture is the backbone of the Indian economy because it contributes 18.30 per cent to the Gross Domestic Product (GDP) of India. Agriculture is a source of employment for about 60.00 per cent of the population. (Ministry of Statistics & Programme Implementation). This sector is production-oriented rather than market-oriented, with more than 80.00 per cent of farmers being marginal in land holding and contributing to half of the total production. This sector was scattered because agricultural land holdings in the country were dominated by small and marginal farmers (SMFs) with an average size of less than 1 hectare of land. They had a relatively low income compared to their consumption expenditure, at that time, SMFs were facing a tough time thriving or, in

some cases, just surviving due to the economic landscape, where they found themselves unable to pool enough capital deemed credit worthy by banks for loans. Being short of capital for basic activities and making inadequate farm investments, they were unable to access good-quality inputs like seeds, fertilizers, pesticides, herbicides, weedicides, modern farm equipment, better irrigation techniques, etc. that could help enhance productivity.

To eliminate the problems faced by the farmers, aggregation, or collective action in the form of cooperatives and contract farming came into force, but success was observed in very few cases, such as milk cooperatives, seed production, poultry farming *etc.*, covering limited enterprises and restricted to a limited operational area. It was ensured to accelerate the collective farming covering

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different enterprises and to cover a larger operational area all over the country; to overcome the problem, the Yoginder K. Alagh committee was framed. To provide better income enhancement opportunities for the farmers with proper organizational setup on a sustainable basis, Y.K. Alagh's committee on February 6, 2003, recommended the concept of the Farmer Producer Organization (FPO).

Many studies have been conducted on major organizations to understand their operational behavior, excluding those that support small and marginal farmers. Very few research studies have been done to highlight the crucial factors that contribute to the success or failure of FPOs. In this case, a study plays an important role to find out the socio-economic profile of members, reasons behind joining the FPOs and the major stakeholders involved in the formation of Farmers Producer Organizations.

RESEARCH METHODOLOGY

As per the list collected from the Department of Agriculture, Rajasthan, there are 228 FPOs formed by NABARD, RKVY, SFAC, and RACP in Rajasthan. Out of 228 FPOs, Nagaur district has 21 FPOs, which is the highest number among other districts in Rajasthan. Nagaur district holds the first position with 21 FPOs; therefore, Nagaur district was purposefully selected for the study. Out of 21 FPOs, two FPOs, namely, Aman Kishan Samrudhi Producer Co. Ltd. and Maulasar Sarvodaya Kisan Samruddhi Producer Co. Ltd. were selected for the study because they were the first and second FPOs in the district according to their date of registration.

The details of Aman Kishan Samrudhi Producer Co. Ltd. and Maulasar Sarvodaya Kisan Samruddhi Producer Co. Ltd. were collected from both FPOs. As per the information collected from FPOs, Aman Kishan Samrudhi Producer Co. Ltd. has 1005 registered members and 248 stakeholders and Maulasar Sarvodaya Kisan Samruddhi Producer Co. Ltd. has 1010 registered members and 518 stakeholders. As per the list, 40 stakeholders were selected from Aman Kishan Samrudhi Producer Co.

Ltd. and 80 stakeholders were selected from Maulasar Sarvodaya Kisan Samruddhi Producer Co. Ltd. by proportionate random sampling.

To get the answers an interview schedule was prepared. The collected data were analyzed through appropriate statistical tools such as; mean, range, frequency, percentage, standard deviation and Henry Garrett Ranking Technique.

RESULTS AND DISCUSSION

1. Socio-Economic Profiles of FPOs members

Age: As presented in Table 1, 69.17 per cent of the respondents belong to the middle age group, followed by 16.67 per cent and 14.16 per cent of the respondents belonging to the young and old age categories, respectively. It was concluded that middle-aged farmers are mostly joining and running FPOs. These findings are supported by Puneet (2016), Darshan (2019), and Kumar (2020), who also reported that most of the members belonged to the middle-aged categories in the study areas.

Education: The result shows (Table 1) that the majority of respondents had high secondary level education (33.33%), followed by secondary (23.33%), graduate and above (18.33%), middle (15.00%), primary (5.83%), and illiterate (3.74%), respectively. The result explained that practical education is more required and skills are more important than formal education for management and the successful running of FPOs. Analogous findings to this study were reported by Puneet (2016) and Pooja *et al.*, (2022).

Family type: The study reveals (Table 1) that the majority of the respondents were part of joint families (57.50%), but 42.50 per cent were living in nuclear families. The possible reason was that both FPO members belonged to rural communities, and it is a tradition in Rajasthan that people of rural communities prefer to live in joint families. Similar findings to this study were reported by Darshan (2019).

Occupational status: The present study exhibits (Table 1) that most of the respondents engaged in agriculture as their main occupation

(79.17%), followed by agriculture + business (16.66%), agriculture + service (4.17%), and none of the respondents belonged to caste occupation or labour categories. This might be because in rural areas, people are mainly dependent on agriculture for their livelihood. These findings are supported by Singh *et al.* (2019), Manaswi *et al.* (2020), and Sahoo *et al.* (2022).

Land holding: It can be concluded (Table 1) that out of the total farmers, 40.00 per cent were from the semi-medium farmer category of land holding, followed by small farmers (25.83%), medium farmers (24.17%), large farmers (8.33%), and marginal farmers (1.67%). The possible reason could be that the fragmentation of ancestral land from generation to generation might have led to smaller land holdings. These findings are in conformity with the findings reported by Dharmaraj (2019) and Mahesh Babu *et al.*, (2021).

Total annual income: The study shows (Table 1) that most of the respondents belonged to the medium-income group (69.16%), followed by the low-income group (16.67%), and only 14.17 per cent of the respondents fell under the high-income group category. It was observed that most of the respondents were from the medium-income group, this might be because most of them had semi-medium land holdings. These findings are in accordance with the findings obtained by Leelavathi (2017), Kavya (2018), Mahesh Babu *et al.* (2021), and Jose *et al.* (2023).

Social participation: The present study exhibits (Table 1) that the majority of the respondents (87.50%) were associated with only one organization as social participation, followed by 7.50 per cent who were members of more than one organization, 3.33 per cent who were wide public leaders, only 1.67 per cent of respondents who held a position in office of such organizations, and there is no respondent who does not belong to any organization. This was because all the respondents were associated with farmer producer organization and some of them were also members of village cooperative societies and milk cooperative

societies. These findings are in line with the findings of Mahesh Babu *et al.* (2021) and Jose *et al.* (2023).

Extension contacts: The results of Table 1 indicates that the majority of the respondents (82.50%) had a medium level of extension contact, followed by a high level of extension contact (9.17%), and 8.33 per cent of the respondents had a low level of extension contact. The reason behind this, that FPOs enhance the backward and forward linkages of farmers, so members of FPOs had a medium to high level of extension contact in the study area. These findings are in conformity with the findings reported by Priyanka (2016), Leelavathi (2017), Dharmaraj (2019), and Singh *et al.* (2019).

Mass media exposure: The present study exhibits (Table 1) that the majority of the respondents (75.00%) had a medium level of mass media exposure, followed by a high level of mass media exposure (15.83%), and 9.17 per cent of the respondents had a low level of mass media exposure. The reason behind most of the farmers uses social media platforms like Facebook and WhatsApp. The FPOs also have their own WhatsApp group, through which they share most of the information among members. These findings are similar with Madhushree (2014), Singh *et al.* (2019) and Kumar (2020).

Reasons for joining FPO: According to the result of Table 2, the main reason for becoming a member of the FPOs was to increase family income (89.17%), and the second reason (74.17%) was to buy input at a lower cost as compared to the market. Through bulk procurement, FPOs can obtain agriculture inputs at a lower price, passing on the cost savings to their members, improving overall farm productivity, and also increasing family income. Better price realization (70.83%) by the respondents given third place is because FPOs aggregate the produce of individual farmers, creating larger volumes to sell in the market. This collective selling power allows them to negotiate better prices with buyers and processors, ensuring fairer and more competitive rates for their produce. Using

Table 1. Socio-Economic Profile of FPOs members

S. No.	Socio-Economic Profile	Category	Responden			
			Fre-quency	Percent-age	Mean	SD
1.	Age	Young (Age below 40.53)	20	16.67	49.35	8.82
		Middle (Age from 40.53 to 58.17)	83	69.17		
		Old (Age equal to or above 58.17)	17	14.16		
2.	Education	Illiterate	5	4.17	NA	NA
		Primary	7	5.83		
		Middle	18	15.00		
		Secondary	28	23.34		
		High secondary	40	33.33		
		Graduate and above	22	18.33		
3.	Family type	Nuclear	51	42.5	NA	NA
		Joint	69	57.5		
4.	Occupational Status	Labourer	0	0	NA	NA
		Caste Occupation	0	0		
		Agriculture	95	79.17		
		Agriculture + Business	20	16.66		
		Agriculture + Service	5	4.17		
5.	Land holding	Marginal farmers (Less than 1.00 ha)	2	1.67	NA	NA
		Small farmers (From 1.00 ha to 2.00 ha)	31	25.83		
		Semi medium farmer (From 2.01 ha to 4.00 ha)	48	40.00		
		Medium farmer (From 4.01 ha to 10.00 ha)	29	24.17		
		Large farmer (More than 10.00 ha)	10	8.33		
6.	Total annual income	Low (Below Rs. 141497.54)	20	16.67	305500	164002.4
		Medium (From Rs. 141497.54 to Rs. 469502.46)	83	69.16		
		High (Equal to or above Rs. 469502.46)	17	14.17		
7.	Social participation	None	0	0	NA	NA
		Member of one organization	106	88.33		
		Member of more than one organization	9	7.50		
		Office holder in such an organization	3	2.50		
		Wide public leader	2	1.67		
8.	Extension contacts	Low (Below 21.95)	10	8.33	28.08	6.13
		Medium (Between 21.95 to 34.21)	99	82.50		
		High (Equal to or above 34.21)	11	9.17		
9.	Mass media exposure	Low (Below 14.88)	11	9.17	19.28	4.4
		Medium (Between 14.88 to 23.68)	90	75.00		
		High (Equal to or above 23.68)	19	15.83		

common input services (64.17%) was ranked fourth by the respondents because FPO provides extension services, market information, logistics, transportation, and processing facilities to the members. Quick payment settlement (52.50%),

because it is a crucial aspect of agricultural trade, especially for farmers who often rely on immediate income to cover their expenses and invest in the next cropping cycle, storage facility (38.33%) because storage facilities overcome post-harvest

Table 2. Reasons for joining FPO

S. No.	Reasons for joining FPO	Frequency	Percentage	Rank
1	Start a new enterprise	22	18.33	10
2	Enhances the value of production	29	24.17	9
3	Buy input at a lower cost	89	74.17	2
4	Use common input services	77	64.17	4
5	Make a value-added product	34	28.33	8
6	Link to bank credit and use group assets	15	12.50	13
7	Manage natural resources	11	9.17	14
8	Use common marketing facilities	16	13.33	12
9	Assess marketing information	43	35.83	7
10	Increasing bargaining capacity	17	14.17	11
11	Enhance family income	107	89.17	1
12	Better price realization	85	70.83	3
13	Storage facility	46	38.33	6
14	Quick payment settlement	63	52.50	5

losses and maximize the value of their produce, assess marketing information (35.83%) because FPOs collect and disseminate market information, including commodity prices, demand trends, and market opportunities, this empowers farmers to make informed decisions about selling their produce, make a value-added product (28.33%) because FPOs may invest in value-adding activities such as processing, packaging and branding, which add value to the produce. Branded and processed products often fetch higher prices, leading to better returns for farmers, and they also enhance the value of production (4.17%), start a new enterprise (18.33%), and were ranked fifth, sixth, seventh, eighth, ninth, and tenth, respectively.

The reason for increasing bargaining capacity (14.17%) is because FPOs bring farmers together, increasing their bargaining power when dealing with buyers, processors, and input suppliers. By collectively selling their produce or purchasing inputs, they can negotiate better prices and terms

and use common marketing facilities (13.33%) because it can empower farmers to overcome marketing challenges, secure better prices for their produce, and gain a competitive edge in the market. It fosters collective success and contributes to the overall development of the farming community. Linking to bank credit, using group assets (12.50%), and managing natural resources (9.17%) were the eleven, twelve, thirteen, and fourteen ranked by the respondents, respectively.

These findings are in conformity with the findings reported by Nidhi and Kumar (2016) and Mukherjee *et al.* (2018).

CONCLUSIONS

The socio-economic profile of members and reasons for joining the FPOs becomes an important indicator in the establishment and development of FPOs at the grass-root level. From the fact and findings, it can be concluded that the major reasons for joining FPOs were to enhance their family income

through FPOs with lower input costs and better price realization.

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PERCEPTIONS AND SUGGESTIONS OF BENEFICIARY FARMERS TOWARDS AGRICULTURAL INTERVENTIONS OF MPOWER PROJECT IN WESTERN RAJASTHAN

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ABSTRACT

The project Mitigating Poverty in Western Rajasthan (MPOWER) was a poverty reduction initiative implemented in Western Rajasthan by eleven NGOs with the overall goal of improving the quality of life of the poor and creating sustainable livelihood opportunities for the vulnerable and marginalized groups in the project area. MPOWER is supported by the International Fund for Agricultural Development (IFAD), the Sir Ratan Tata Trust (SRTT), and the Government of Rajasthan. MPOWER was implemented in eight blocks and seven districts. It was found that the knowledge of the beneficiary respondents was up-graded, the yield of selected crops increased due to high-yielding varieties. The majority of the beneficiaries (75%) opined that non-availability of agricultural inputs along with advisory services was the major constraint. About 61% of respondents feel that the high cost of improved seeds, fertilizer, and pesticides is a hurdle to their adoption. Most of the beneficiary respondents (92%) suggested that the top priority must be given to arranging more training programs on the recommended package of practices for the selected crops in the region.

INTRODUCTION

Rajasthan is the largest state of India and represents 10.41 percent of the land area, but it has only 1.16 percent of surface water and 1.72% of ground water resources in the country. Rainfall is very low, highly erratic, and variable throughout Western Rajasthan. Rain-dependent kharif crops in arid and semi-arid regions are frequently subjected to aberrant weather conditions. The major challenge in rainfed agriculture is, therefore, to minimize yearly variations in crop yields due to these conditions and to stabilize production at a reasonably acceptable level. Groundwater resources are already overexploited in Rajasthan. The groundwater development in the state is 142 % (2012). Nearly 85 percent of the groundwater in Western Rajasthan is brackish, limiting its use for irrigation purposes. The high salinity of the land in some parts of the project area poses a challenge to agriculture-based development. Therefore, the project Mitigating Poverty in Western Rajasthan

(MPOWER) was initiated with the goal for improving the quality of life of the poor through implementation of agricultural interventions.

RESEARCH METHODOLOGY

The present study was carried out by Agriculture University Jodhpur in the six districts of western Rajasthan (the MPOWER project area) during the years 2017-18.

The data was collected through a questionnaire from the seven blocks of six targeted districts of the MPOWER project. One thousand fifty farmers (respondents) were interacted with one from each household (HHs) from 15 selected clusters in all seven blocks of the working area of MPOWER. Thus, a total of 525 beneficiaries and the same number of non-beneficiaries, i.e., 525, were surveyed. The views of both beneficiary and non-beneficiary respondents were recorded in the structured schedule, and the responses of the respondents were presented in the present study to

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learn about the people's perceptions and to get suggestions for improvement. In addition to these, about 1000 farmers through FGD were also interacted with for the same.

The collected data were converted into soft copy by coding and decoding. It was then processed and analyzed using simple mathematical tools like average, percentage, frequency, and tables according to the objectives of the study.

RESULTS AND DISCUSSION

The results of the study are given hereunder in terms of the people's perceptions and suggestions for improvements in the project area;

Respondents' Perception

Perception refers to a general tendency to form impressions of other people. In the present study, we tried to assess the respondents' views, their opinions about project interventions, and the extent of impressions they arrived at before making inferences. Through interactions and FGDs, it was observed that people's perceptions are community expectations for support from government and non-government organizations to overcome the regional or community problems arising out of agriculture farming. People learn about others' feelings and emotions by picking up information they gather from their physical appearance and verbal and non-verbal communication. Facial expressions, tone of voice, hand gestures, and body expression or movement are just a few examples of ways people communicate without words. A real-world example of social perception would be that others disagree with what one says when one sees them roll their eyes. There are four main components of social perception: observation, attribution, integration, and confirmation.

Observations serve as the raw data of social perception and also the interplay of three sources, persons, situations, and behavior. These sources are used as evidence to support a person's impression or inference about others. Another important factor to understand when talking about social perception is the attribute that expresses an individual's

personality as the source or cause of their behavior during an event or situation. In order to fully understand the impact of personal or situational attributes, social perceivers must integrate all the available information into a unified impression. Most importantly, social perception is shaped by an individual's current motivations, emotions, and cognitive load capacity. Cognitive load is the complete amount of mental effort utilized in the working memory. All of this combined determines how people attribute certain traits and how those traits are interpreted.

Suggestions for improvement of livelihood

Through person-to-person interactions, it was tried to rank the suggestions in different blocks so that the most important ones could be shortlisted for further improvement in these regions. The important suggestions were given by both categories of respondents for improvement in the successes of the project and also to make the interventions more effective.

Beneficiary Respondents

The opinion of the beneficiary respondents was collected on the selected ten suggestions *viz.* exposure on new interventions in their nature setting before introduction, training on recommended Package of Practice (PoP) of selected crops of the region, training on plant protection measures, construction of rain water harvesting with animal sheds, Up-gradation of the catchment areas of RWH structures based on annual rainfall, formation of SHG for male beneficiary, fencing of the demonstration plots of horticulture crops and vegetables for avoiding damages from stray cattle and wild animals like pigs, posting of agriculture trainer in each block, establishment of Agriculture Service & Resource Centre at district Level and improvement in weather based crop insurance schemes in the project area. The responses of the respondents are presented in Table 1.

Across the blocks, the 92% of beneficiary respondents expressed the top-most priority of arranging more training programs on the recommended PoP of the selected crops of the

region, followed by providing fencing for the demonstration plots of fruit, plants, and vegetables (86% of respondents) as their second preference because open grazing systems are prevalent in most of the project area. The third important suggestion made by 83% of respondents was to provide training on plant protection measures for major crops, especially vegetables and horticultural crops. However, beneficiary respondents emphasized the construction of rainwater harvesting with animal sheds, the establishment of an agriculture service and resource center at the district level, and the formation of a SHG for male beneficiaries as their last priorities (VIII, IX, and X).

As regards the block-wise response, the beneficiaries from Abu Road suggested that training should be organized on the recommended PoP of selected crops, followed by fencing of the demonstration plots of fruit plantations and vegetables and specialized training on plant protection measures, while respondents from Baitu preferred to arrange training on the recommended PoP of selected crops and the appointment of an agriculture trainer at the block level. The responses of the respondents were more or less the same for other suggestions in other blocks.

Non-beneficiary respondents

The suggestions of the non-beneficiary respondents were collected through interaction and FGD (Table 2). On the basis of their suggestions, it was revealed that all respondents wanted technical guidance to be provided to all farmers on scientific methods of cultivation, followed by giving every respondent the chance to take advantage of training, exposure, and modification in a weather based crop insurance scheme on a priority basis. 82% of respondents expressed their view of creating market facilities for input and output (IV priority) and, lastly, getting the benefit of the project to be given to all needy farmers (V rank).

Block-wise suggestions of the respondents were very interesting because respondents from Balesar and Abu Road opined to create a market facility for input and output at the local level and should be

part of the project (Table 2). Other suggestions were similar to those observed across the blocks.

Common suggestions about project interventions:

1. Farmer Training and Education

Through education and training on good agricultural practices, the farmers should be encouraged to improve farming techniques, use scientific methods to increase productivity, and enhance their skills. A proper education system would eliminate superstition, conservatism, and ignorance among farmers, and it would be easier to increase productivity through the development of these human qualities.

2. Fencing of Agricultural Land

Provision for the fencing of demonstration plots is of utmost importance. A good fence provides a physical barrier to control the movement of stray animals and keep wild animals from entering their plots to avoid damage. The importance of fencing is greater in the project area because open grazing practices have prevailed in the area for a long time; therefore, it is of prime importance to protect the demonstrations with suitable fencing materials and protect the crops from the attack of wild animals.

3. Training on Plant Protection Measures

Crop protection is the science and practice of managing plant diseases, weeds, and other pests that cause considerable loss to agricultural crops. Agricultural crops include field crops, vegetables, and fruits. The crops in the field are exposed to many factors. The crop plants may be damaged by insects, birds, rodents, fungi, bacteria, etc. Thus, crop protection training encompasses:

- Pesticide-based approaches such as herbicides, insecticides, and fungicides
- Biological pest control approaches such as cover crops, trap crops, and beetle banks
- Barrier-based approaches such as agro-textiles and bird netting
- Animal psychology-based approaches such as

Table.1: Suggestions provided by beneficiary farmers

S. No.	Suggestion	Abu Road	Baap	Baitu	Balesar	Bali	Sanchor	Sankara	Total	Rank
		%	%	%	%	%	%	%	%	
1.	Exposure to new interventions in their natural setting before introduction	99	53	90	80	81	84	54	79	IV
2.	Training on the recommended POP of selected crops	100	64	100	94	60	97	97	92	I
3.	Training on plant protection measures	99	93	69	89	86	64	97	83	III
4.	Construction of rainwater harvesting with animal sheds	86	80	78	71	66	67	89	77	VIII
5.	Upgradation of the catchment areas of RWH structures based on annual rainfall	87	79	87	80	79	80	56	79	VII
6.	Formation of SHG for male beneficiaries	84	57	69	60	60	70	70	68	X
7.	Fencing of the demonstration plots of horticulture and vegetables	100	73	97	86	74	83	79	86	II
8.	Appointment of an agriculture trainer for each block	93	64	100	57	57	56	83	78	VI
9.	Establishment of an Agriculture Service and Resource Center at District Level	79	54	78	69	69	63	79	71	IX
10.	Modify the existing weather based crop insurance schemes in the project area.	97	60	87	63	84	69	80	79	V

% = per cent

Table 2: Suggestions provided by non-beneficiaries farmers

S.No.	Suggestion	Abu Road	Baap	Baitu	Balesar	Bali	Sanchor	Sankara	Total	Rank
		%	%	%	%	%	%	%	%	
1.	The benefit of the project is to be given to all needy farmers	41	89	88	31	100	86	80	78	V
2.	Everybody should get a chance to take advantage of training and exposure	91	97	91	89	100	100	74	92	II
3.	Market facility for input and output to be created	93	76	74	71	87	86	94	82	IV
4.	Provide technical guidance for all farmers on scientific methods of cultivation	100	100	100	100	100	100	100	100	I
5.	Modify the existing weather based crop insurance scheme	100	94	93	89	96	90	79	92	III

% = per cent

bird scares

- Biotechnology-based approaches such as plant breeding and genetic modification

4. Exposure to New Interventions in Their Natural Setting Before Introduction

Exposure visits enable farmers from different regions to interact with and learn from each other, allowing them to view practical examples of successful integration of sustainable practices in farming communities like their own. The interested and enterprising farmers would also need to be exposed to successful interventions in the same projects within the state. This would go a long way in ensuring the replication of activities in large numbers, leading to the success of the project. The relevant FNGO could select representative farmers linked to project activity exposure visits. The exposure visits can be arranged in batches, each batch comprising 30 farmers.

5. Expansion of Credit Facilities

To increase agricultural productivity, it is essential to expand credit facilities appropriately. This would help the farmers fulfill their short, medium, and long-term financial requirements easily. All efforts should be made to provide credit facilities to farmers quickly and economically.

6. Improvement of irrigation Facilities

Agriculture in Western Rajasthan is often called a gamble on rain. More emphasis should be given to storing every drop of rain. The improved rain harvesting structures should be developed, and suitable modifications to the present RWH structures are needed. A network of irrigation facilities should be spread. The small irrigation plans, wells, and tube-well systems should be expanded on a preference basis in safe zones.

7. Plant Protection Scheme

Arrangements should be made to protect the crop, vegetables, and fruit plants from insects and diseases. The farmers should be educated on the efficient use of insecticides, pesticides, and good agricultural practices. The arrangements should be

made to increase their use in the current cropping system. The development of research work relating to diseases should be done for the benefit of peasants.

8. Technical Suggestions

To increase agricultural productivity, it is necessary to have a technical service center for scientific solutions to production problems. Agricultural productivity can be increased on the basis of these technical suggestions. Beside this, farmers are to be promoted for the use of community seed drums (for seed treatment and an improved threshing floor). The respondents should be motivated for the use of improved cultivars of field crops, suitable arid and semi-arid fruits and vegetables, and the adoption of their production technologies through pre-seasonal training and regular field visits by a joint diagnostic team visit of SAU scientists and officers from the Agriculture Department. Visits by master trainers from SAUs should also be arranged for the solution of specific field problems. The crop plants infested with pests and diseases should be sent to the Plant Health Clinic at the Agricultural Research Station for diagnosis and remedial measures.

9. Expansion of Marketing Facilities

Making the marketing system better and more lawful to remove its defects would increase profitability. When the farmers receive a fair price for their produce, they will perform the production activity more efficiently and skillfully.

10. Encouraging cooperative farming

To increase productivity and make the agricultural system progressive, cooperative farming should be rapidly expanded. Cooperative farming would help the farmer to rectify the present uneconomical methods of farming.

11. Reduction in Malnutrition

Effective efforts should be made to improve the health of farmers. A system of proper and balanced diets and health facilities should be established. Only healthy farmers can attain the objective of increasing

productivity. Lack of efficiency by unhealthy farmers results in low productivity, which can be removed only by improvements in health facilities through backyard/tube well gardening and establishing mini-orchards for family consumption.

12. Proper and Quick Implementation of Land Reforms

Proper and quick implementation of land reforms should be done so that the farmers are encouraged to bring in some basic improvements. Elimination of mediators and permanent ownership of land by farmers must be done immediately.

13. Modification of the Existing Weather Based Crop Insurance Scheme

The existing weather-based crop insurance scheme has several defects that need to be rectified at the state or national level. This would not only reduce the risk of production uncertainty but also prove helpful to get reasonable compensation under a natural calamity.

CONCLUSION

It is concluded that most of the beneficiary respondents (92%) suggested that the top priority must be given to arranging more training programs on the recommended package of practices for the selected crops in the region. Looking at the encouraging impacts of agriculture and horticulture interventions in the selected blocks of Western

Rajasthan, the same may be replicated in the remaining blocks in these six districts of Western Rajasthan. Models of livelihood (farm-based) executed by MPOWER in western Rajasthan can be proven to be catalysts for doubling farmers income by integrating them with non-farm activities in rural areas.

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ROLE OF WOMEN IN ANIMAL HUSBANDRY: A CRITICAL REVIEW OF INDIAN DAIRY SECTOR

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ABSTRACT

Dairying is rapidly developing as an industry and can make an impact in changing the rural economy. Operation flood has changed the face of dairying in India. Dairying has played an important role in the development of rural dairy farmers and women to improve their economic and social status. The present study analyzes the past studies in the field of dairying. There is large literature in the field of dairying, but the present paper has considered 43 studies for analysis to generalize the concepts and identify the variables. The finding of the study suggests that there is a need to develop new policies or programs for the development of dairy industry and motivate women engaged in dairying and provide knowledge and education about new schemes and technologies.

INTRODUCTION

India is basically a rural-based agriculture country where 68.84 per cent of the total population lives in rural areas. A dairy industry is a subsector of agriculture economy of India and is most important for several reasons. Dairy industry is the backbone of India's economy. Most of the Indian farmers earn their livelihood by selling milk through dairy co-operatives. Most of the total nation's milk supply comes from rural areas and semi-urban areas. Milk production in India was in deficit before 1965. National Dairy Development Board (NDDB) was formed in 1965 with the objectives of promoting dairy cooperatives, financing dairy infrastructure, and providing technical support to dairy cooperative societies. In 1969 with the recommendation of NDDB, the government of India launched "Operation flood" program with the financial aid from World Bank. Operation Flood helped India to become the world's largest milk producing country. The program has made India self-sustainable rural employment country. Most of the work of animal husbandry and dairying in India are managed by women in rural areas. Government has launched various dairy development schemes in India from time to time which is encouraging dairy farmers and women to adopt new techniques and

methods in dairying. Some of those schemes are: -

- o Dairy Entrepreneurship Development Scheme (DEDS)
- o Dairy Processing and Infrastructure Development Fund (DIDF)
- o Intensive Dairy Development Programme (IDDP)
- o National Dairy Plan
- o National Programme for Dairy Development (NPDD)
- o Other Dairy Development Schemes
- o Support to Dairy Cooperatives

Various women dairy co-operative societies have been setup in India to support women to encourage them for selling milk through dairy co-operatives and earn profits. Government is encouraging women dairy farmers by providing good prices for selling their milk through women dairy co-operatives.

1.1: Role of Operation Flood in Dairy Development

Operation Flood was launched in India in 1970. It was the world's largest dairy development program which has proved to be a milestone in

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Table 1: Review of Studies

	Author	Country / State	Conclusion
1.	Halse, 1980	Anand Gujarat	In this study, it can be concluded that Indian dairy sector can be developed with the help and success of India's dairy cooperatives. This will help in increasing the income of labourers who have small land holding or do not hold land.
2.	Bellur <i>et al.</i> , 1990	N/A	White revolution has helped Amul in evolving as self-dependent unit with the help of government policies. Amul accessed high - growth market segment through its superior quality and low price. Amul was benefited from the existence in public sector which helped them in dominating monopoly for a time in the government-dominated market.
3.	Doornbos & Gertsch, 1994	Netherlands	This paper study about India's operation flood dairy programme which shows the extension & linkage of India's co-operative dairy sector. The study concludes that Operation Flood has positively affected the Indian dairy sector in increasing milk production & its procurement. Financial help from foreign bodies also helped in playing an important role between dairy farmers & dairy co-operative societies.
4.	Mullins <i>et al.</i> , 1996	Kenya	According to this study, it can be concluded that most of the labour engaged in dairy are women. Income is controlled by the male head of the family and women have very less control over the funds which makes the presence of women very minimal in the dairy unit. The study concludes with the result that gender plays an important role in the impact of gender and consumption in dairying.
5.	Shelfner-Rogers <i>et al.</i> , 1998	New Mexico	The study concludes with that dairy farm women who attended or participated in the communication programs were more empowered than female dairy farmers who did not participate in those programmes. There is a need to introduce regular communication programs for female dairy farmers which can help them to increase their earnings from their dairy enterprises. Communication programs can change the lifestyle or perception of female dairy farmers and will empower them to earn more and increase their savings.
6.	Tangka <i>et al.</i> , 1999	Kenya	Cattle play significant role in the living output method of East African region. The productivity of local breeds is very low in the region. Market oriented small holder dairying MOSD scheme is used in the region which helps in increasing dairy production and sales of dairy products. MOSD will benefit women in East Africa region more as they can get more access of land for output of fodder, veterinary services and supplements. MOSD will help in development & offer chances to develop the livelihoods and prosperity of small household holder's women. The study states that women can seize a larger portion of the opportunities offered by MOSD in areas where women are mostly engaged in households.
7.	Umarani, 2002	Andhra Pradesh	Dairying women were not aware about the importance of the proportions of balanced diet. Training programs should be given to farm women about dairy programs. Proper establishment of dairy cooperatives, credit, and marketing services should reach the village.
8.	Ramakrishnappa & Jagannatha Rao, 2006	Karnataka	According to this study, In the selected areas dairy had played a strong influence on the income of the dairy farmers. It had boosted the employment rate in the area. With the implementation of new swarnima scheme the selected area has reaped great rewards and in helping people in dairy development. The study showed that there is a positive rise in income and employment with the implementation of that new swarnima scheme.

9.	Bandyopadhyaya & khamrui, 2007	N/A	It can be concluded from the study that traditional milk products of India have been filled with various problems which have affected the organised sector to increase the production at industrial level. In India, most of these products are produced & sold by small sweet makers without any branding or safety measures. Dairy industry, research institutes, NDDDB should come up with the new technology to copewith this problem. By starting commercial production of dairy products by the Indian dairy industry can be beneficial for the growth of the industry.
10.	Meena <i>et al.</i> , 2007	Uttarakhand	According to the study, animal husbandry practices are done very conveniently in the selected areas of the study. It was seen in the study that there was a difference between the availability of scientific technology and adoption by those farmers. Farmers are not adopting new technologies. There is a need to introduce this technology in the high-altitude areas which are missing in those areas. Training programs should be conducted by the government & veterinary doctors regarding animal husbandry problems & new technology which will help in influencing farmers in adopting those techniques.
11.	Sirohi & Michaelowa, 2008	Karnal Haryana	According to this study, there is a need for the development of a convenient baseline and retrospect methodology for Clean Development Mechanism CDM projects in dairy industry. Issues related to research in the dairy sector should be attached to CDM for inviting new ideas in this sector.
12.	Jothilakshmi <i>et al.</i> , 2009	Chennai Tamil Nadu	This paper studies the involvement of Self-Help Groups in getting technical and scientific information regarding dairy farming. There is a need to provide training to those dairy farm women who are members of SHGs and help them in developing their human resource ability and income. Training of farm women would help in developing the abilities and income of the rural women.
13.	Gautam <i>et al.</i> , 2010	Hisar Haryana , Jammu	Operation flood had unleashed an era of new opportunities for the poor farmers for their livelihood. Livestock revolution will be useful for farmers in the upcoming years for better development of dairy sector with better government policies. For this successful dairy development programme, the government should ensure livelihood security to poor farmers for achieving rapid output growth and their earnings. Government should revisit the operation flood programme for better development in the dairy sector in India.
14.	Kumar Rathod <i>et al.</i> , 2011	Mumbai	According to this study rural women perform an essential role in dairying because they control all activities of livestock management and products related to it. Government needs to proliferate technologies to help rural women for carrying animal husbandry activities easily. The study shows that most of the women are engaged in no financial activities and proper education programmes must be started about scientific management practices for the growth of livestock.
15.	Patel <i>et al.</i> , 2012	Gujarat	The study reveals that the women involved in dairying were not aware of the importance of the proportions of balance diet of livestock. Women wants to learn some important technologies like balanced diet, cultivation of fodder crops, care of pregnant animals, etc. Government should start short duration programmes on dairy practices.
16.	Kathirya <i>et al.</i> , 2013	Rajkot Gujarat	According to this study, most of the delicate tasks are carried by farm women and believed to be an important pillar in small-scale farming. This study shows that most of the women do not get income from their dairy animals and, they have very minimal decision in purchasing and selling of dairy animals. Farm women must be stimulated about getting new scientific information regarding the increase in the production of livestock. Women must be motivated to participate more in financial activities than non-financial activities in which they participate more.

17.	Chander & Rathod, 2013	Izatnagar Uttar Pradesh	The study found that the state department had paid less attention on programs, infrastructure, and budget allocation of livestock extension activities. Only a few states have setup special departments for livestock extension activity which focus on their development programs & budget allocation for livestock procurement. It can be concluded from the study that the state department of Animal Husbandry should create a special wing or office which only focuses on livestock extension regarding budget allocation, trained livestock, and extension specialists to monitor the programme by setup regional or local wings which work according to the state wing.
18.	Jadav <i>et al.</i> , 2014	Navsari Gujarat	This paper resulted that the dairy farm women preferred training in selection of breed, compounding balanced feed, feeding during pregnancy, banking and insurance etc. in the area of dairy development. Success in dairy farm has improved the socio-economic status among others in the home and village. More training development programs should be conducted in the areas of selection of breeds, health care, banking and insurance to empower dairy farm women. Government should make efforts to reduce the time lag in adoption by providing financial and technical assistants.
19.	Batool <i>et al.</i> , 2014	Pakistan	The paper reveals that majority of the women participated in practices related to dairy farming in the selected areas of the study. Women contributed exclusively in various dairy farm practices such as routine husbandry and nutritional management. According to the study, providing proper training about livestock production, the working competency of rural women can be increased and made stronger. This study suggested that new and strong programs must be planned to increase the productivity of dairy farms with new technologies to develop the skills of dairy farm women in all related areas.
20.	Patel <i>et al.</i> , 2014	Palanpur Gujarat	According to the study it can be said that dairy women have understood the importance of dairy farming as the means of their socio-economic life upliftment. There is a need for motivation for women to acquire better & innovative practices for dairy farming. Women have adopted medium level knowledge about dairying practices. Most of the respondents in the study possessed medium level of knowledge and have adopted scientific dairy farming. The attitude of the majority of women engaged in dairy farming was moderate and favourable towards dairy farming.
21.	Gade <i>et al.</i> , 2014	Anand Gujarat	The study concludes that the majority of women engaged in dairy farming had very moderate to extreme level knowledge about adopted clean milk production practices. There is also a positive and significant correlation with education, experience, land holding, extension contract and scientific orientation because of the more education facilities available in rural areas in the Anand district. Factors related to dairy farm women knowledge which influence the adoption of clean milk production practices must be linked to any programme of rural development. Extension officers, veterinary doctors should visit villages regularly and guide them to use modern techniques and new ideas.
22.	Soni <i>et al.</i> , 2014	Anand Gujarat	The research paper showed that most of the farmers benefitted about animal husbandry from Krishi Mahotsav programme. The study resulted that most of the farmers had not gained information about the primary treatment of animal disease, age of calves for consuming fodder. It can be concluded with the suggestion that complete knowledge should be provided to the farmers about animal husbandry during Krishi Mahotsav programme.

23.	Raval <i>et al.</i> , 2014	Anand Gujarat	The study focused on partaking of women farmers in animal husbandry activities. Many farm women are engaged in various activities like maintenance of dairy animal, milking, feeding and care & management of small animals. The study concluded that most of the farm women 93.21% participated in mahila mandal. They spent 46.15% of time on cleaning of animal sheds. Farm women participated very less in the insurance of animals. There is a need to educate and motivate farm women about animal insurance and adoption of the culling of uneconomic animals.
24.	Kale <i>et al.</i> , 2016	Karnal Haryana	According to this study there were vast difference in dairy progressiveness in the selected states. There is a need for development of an organized marketing network which would strengthen the dairy progressiveness in the country. Qualitative improvement is required for cross-breeding which would improve the genetic potential of dairy animals. There should be focus on elite indigenous dairy animals such as Gir, Sahiwal, and Tharparkar.
25.	Patel <i>et al.</i> , 2016	Gujarat	According to this study, it was found that there was large gender gap in livestock sector. There is a need to develop required efforts which can increase the efficiency of farm women to satisfy their needs.
26.	Vaidya <i>et al.</i> , 2016	Anand Gujarat	The study revealed that adoption of packages of practices for dairy animals like general livestock management, calf rearing, breeding, and clean milk production was low among the farmers. Farmers are needed to adopt new techniques like insurance of dairy animals, deworming, full hand milking, treatment camps and agriculture fairs, etc. Extension activity is required for raising the acquisition of a package of practices in dairy animals among dairy farmers.
27.	Parmar <i>et al.</i> , 2016	Anand Gujarat	Digital dairy farm management system is a normalized dairy farm management structure which manages the dairy farms from basic information, milk information, vaccination, etc. According to the study, this system will help the dairy farmers to increase & manage their economic returns. This system will bring changes in dairy farm system & management.
28.	Patel <i>et al.</i> , 2016	Anand Gujarat	The study concluded that there is more than three-fourth of the population having moderate level of risk preference. The study showed a positive and significant relationship between the risk preference and overall contribution of tribal farm women in agriculture operations. The study shows that there is no significant relationship between risk preference and the contribution of tribal farm women in animal husbandry activities.
29.	Thorat <i>et al.</i> , 2016	Gujarat	The study showed that majority of tribal women communicate with their relatives and progressive farmers regarding information on animal husbandry. Very low per cent of tribal women participate in krishimela or training programmes. Extension worker need to reach the tribal women to increase the information and explain benefits for the development of dairy. Veterinary doctors, dairy specialists should regularly visit the villages to guide tribal women for increasing their income through dairying.
30.	Vahora <i>et al.</i> , 2016	Gujarat	From the study, it can be seen that tribal women were involved mostly in the care of new born calves, caring of domestic animals, etc. Involvement of tribal women in which they participated actively was of care of sick animals, care of new born calves, vaccination of animals, etc. Dairy women need to be given training & education regarding health care management practices of animal husbandry. They should take the help of veterinary doctors who will help them or assist them in proper health care of their animals.
31.	Vahora <i>et al.</i> , 2016	Gujarat	It can be concluded from the paper, that the majority of dairy women were besmeared in feeding animals, caring of animals, etc. As tribal women have to work harder for their family income and are the most important part of their family. Most of the tribal dairy women were readily participating in the breeding of animals.

32.	Gasti, 2017	Karnataka	According to the study, there are various investment avenues in urban areas which invest the savings of interested people in the market. With a very low percentage of investment avenues into rural areas, rural people don't take risk in investing their savings in the investment market, as they have less knowledge about the investment market. Government and non-government agencies should start an education and awareness programmes to educate the people of rural areas to save their earnings and invest them.
33.	Rathod <i>et al.</i> , 2017	Izatnagar Uttar Pradesh	The study suggested that most of the farmers are not aware about the importance of artificial insemination AI in dairy sector. Researchers and extension experts need to be aware farmers about the importance of AI in the dairy sector. Scientists should analyse the problems faced by the farmers and find suitable solutions for higher adoption of AI at the field level. The approach should be discussed with all categories of farmers.
34.	Squicciarini <i>et al.</i> , 2017	Unites States	The paper showed that for the growth of a country it's essential to develop the agriculture sector. With the growth of income of poor and rural people, activities like animal husbandry dairying needs to offer new possibilities and opportunities. In India, family tradition and owning land play an important role in the participation of dairy farming. High production in dairy sector is highly related with the development of rural people. New areas and possibilities should be created for the growth and development of dairy farmers for commercializing dairy activity.
35.	Parsons & Lombard, 2017	Eastern and Southern Africa	This paper explored the role of women in Non-Bantu speaking herding groups of Eastern Africa and Nama-Khoe communities of southern Africa. It shows that women were respected milk managers in several pastoralist communities, controlling the access and consumption among the Nama-khoe community of southern Africa as they were powerful, well-respected members of the community. In Bantu speaking communities in Eastern Africa there was male dominance among the pastoralist community.
36.	Sujeetha & Anamica, 2017	Chennai Tamil Nadu	According to the study, the role of women in tribal community is essential as they are the real managers of the family as they have to manage the family income and livestock. The Nilgiri tribe lives near mother nature and mostly they depend on it for their survival. Women should be educated regarding preservation of nature and new animal husbandry operations. They should be given knowledge regarding species which can be endangered in the coming years and they should be fully involved in creating awareness programmes regarding the conservation of biodiversity among the tribe's especially tribal women as they are the real managers who can help in conserving the biodiversity. This study concludes that women in tribal areas performed most of the animal husbandry operations.
37.	Girija & Kalaivani, 2018	Coimbatore Tamil Nadu	80% rural women saves approx. 1000 every month but Rural women need to be educated about numeracy, time value of money etc. as this value will be helpful in improving their standard of living and saving habits and encourage them to deposit their savings in banks.
38.	Singh <i>et al.</i> , 2018	Jaipur Rajasthan	Average daily milk production and average daily household milk consumption was found medium and less amount of total milk production were utilized for making value added product. Women dairy cooperative members were disposing their surplus milk to the dairy cooperatives and they were getting lesser prices by selling their milk compared to other agencies Consumer and private dairies .
39.	Singh <i>et al.</i> , 2018	Jaipur	The author explains here that women dairy cooperative societies are playing a vital role in empowering women in rural areas. It has affected a significant change in the annual household income of rural women.

40.	Singh <i>et al.</i> , 2019	Jaipur Rajasthan	Women dairy cooperative societies are playing a vital role in empowering women by providing sustainable livelihood to millions of households in India. There is a change in technological empowerment of the members after WDCS membership. Government and dairy cooperatives should organize need-based training programmes, camps, exhibitions, and farmers fair to enhance their awareness of scientific dairy farming practices.
41.	Tanusha <i>et al.</i> , 2019	Uttarakhand	Females dominate most of the task of animal husbandry. Despite doing most of the work of animal husbandry, females experience, gender inequalities in terms of access to technology, education, credit, and information. The study suggested that gender biasness in cattle stock sector needs to be sound.
42.	Kumar <i>et al.</i> , 2019	New Delhi	This paper concluded that super markets, e-markets, etc. have taken the urban areas by storm by transforming the rural markets by connecting them to urban markets. For channelizing milk marketing from rural areas to urban areas, dairy farmers should be given proper training and education about dairying so they can adopt the channel of distribution. The study suggested that to increase the income and consumption expenditure of dairy farmers, they have to be motivated to participate in dairy value chains. New and innovative marketing techniques should be adopted by dairy cooperatives to improve the services of dairy value chains.
43.	Jain & Swarankar, 2020	Udaipur	Dairy cooperatives of selected areas need to improve their financial health for their bright future. Current level of dairy has improved from the last year. Altman's score of selected areas is under the green zone.

Indian dairy industry. AMUL dairy plant at Anand, Gujarat, was the most successful co-operative started during Operation Flood. The program has been termed as White Revolution. Operation Flood has linked milk co-operative societies directly to the consumers in over 700 towns and cities. It has eliminated middlemen from the dairy society. Operation Flood was launched in 3 phases from 1970 to 1996. Operation Flood has led to adopting new and modern methods to hold & milk livestock, changing the composition of animal feed for better adjustment to the condition. As of 2018-19 India produced 22% of the total world milk output.

1.2: Women in Dairying

The role of women is very considerable in national development. Indian women are involved in all areas of national progress. A country grows with the development of women. Women play a significant & important part in the development of agriculture and associated fields like animal husbandry, dairying, etc. Most of the women in rural areas of India are engaged in dairying and animal husbandry. Major part of rural women population does not get their part of profit. They do not have direct control over their family income. New policies and schemes are launched by the government to support and promote women in dairy farming.

2: Objectives of the study

The objective of the present study is to review the past studies regarding the development of Indian dairy sector and the role of women in dairying and animal husbandry.

RESEARCH METHODOLOGY

The present study is descriptive analyses of the literature available in the area of dairying and animal husbandry. There is a critical examination of the results of the selected 43 studies, as given in Table 1, to determine what is the role of women in dairying.

Significance of the study

The study is significant in terms of finding out the development of dairy sector in India and to determine the role of women in dairying and animal

husbandry.

Analysis of the Existing Studies

Table 1: Review of studies gives an analysis of 43 studies from the existing literature. The analysis provided the region, where the research work was conducted and the findings of the studies.

Most of the studies have indicated that dairying has a positive outcome, i.e., dairying has provided a great help to Indian dairy farmers. Most of the studies found that dairying has a positive impact on Indian dairy sector but there are very few studies which focus on women engaged in dairying and animal husbandry.

CONCLUSION

Dairying has proved to be an important tool for self-dependence and financial independency of rural dairy farmers. It has improved the social and economic status of dairy farmers. On the basis of review of selected studies, the present study analyses that there is a need to motivate and educate women to engage in dairying and animal husbandry. There is a need to setup more women dairy co-operative societies. Proper channels or programs should be made so that the benefits can directly reach the account of women engaged in dairying and animal husbandry. Government needs to implement new policies for the development of dairy sector in India. New training programs should be organized by local authorities on regular intervals.

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