

Impact of integrated fish cum poultry farming training programme on farmers Knowledge gain in Arunachal Pradesh, NER India

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ARTICLE INFO

Original Research Article

Received on April 17, 2024

Revised on April 22, 2024

Accepted on May 19, 2024

Published on May 25, 2024

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PUBLICATION INFO

International Journal of Agricultural Invention (IJAI)

RNI: UPENG/2016/70091

ISSN: 2456-1797 (P)

Vol.: 9, Issue: 1, Pages: 205-213

Journal Homepage URL

<http://agriinventionjournal.com/>

DOI: 10.46492/IJAI/2024.9.1.26

ABSTRACT

The study was conducted to determine the effectiveness of training programme on integrated fish cum poultry farming conducted during 2012-2022 on trainee's knowledge in the West Kameng district of Arunachal Pradesh. The data revealed that just after completion of training, most of participants were having high to medium level of knowledge except 0.19 % *i.e.* only 3 nos. of trainees having low level of knowledge regarding IFS (Fish-Poultry) technology in mid hill and foothill areas of the district. The findings of the study clearly indicates that farmers trainings programme conducted by Krishi Vigyan Kendra, West Kameng on above said duration was effective in enhancing the knowledge gain by the participants to enhance their farming skill through involvement of an integrated approach at village level in far flung areas of Arunachal Pradesh. Most of participants in these training programs were farmers, farm women's, school dropouts, labors, and rural youths. By using this knowledge they can find self-employment along with nutritional security which will be helpful to reduce the fish production gap as well as to support the rural economy of the state of Arunachal Pradesh.

KEYWORDS

Knowledge Gain, IFS, Farming Skill, Trainees, Composite Fish Culture

HOW TO CITE THIS ARTICLE

Misra, V. K., Pathak, M., Kumar, N., Tripathi, A. N., Singh, S., Singh, C. P., Kumar, D., Upadhyay, A. D., Kadirwell, G. (2024) Impact of integrated fish cum poultry farming training programme on farmers Knowledge gain in Arunachal Pradesh, NER India, *International Journal of Agricultural Invention*, 9(1): 205-213. DOI: 10.46492/IJAI/2024.9.1.26

In India about 80% of the total population lives in rural areas at subsistence or near subsistence level. These rural folk are greatly under-nourished and need not only a large supplement of animal

protein in their diet but also new sources of gainful employment for their overall development. Now in the new era of fast urbanization in our country, to achieve the rapid progress in rural areas, our

strategy must focus on; conserving their natural resources, enhancing efficient use of resources, increasing productivity and profitability and improving quality and competitiveness through reduced unit cost of production. In this reference integrated fish farming may become a one of the best examples of mixed farming for sustainable development of the rural farming community. It is an age old practice in India and historically popular in South East Asian countries and more popular in China and North Eastern States of India. This type of farming practices in different forms in the various countries is one of the important ecological balanced sustainable technologies. The technology involves a combination of fish poly-culture integrated with crop or livestock production. On farm waste recycling, an important component of integrated fish farming is highly advantageous to the farmers as it improves the economy of production and decrease the adverse environmental impact of farming (Misra *et al.*, 2019).

Generally integrated farming means the production or culture of two or more farming practices but when fish becomes its major component it is called as integrated fish farming. Fish culture can be integrated with several systems for efficient resource utilization. Among various integrated fish farming technologies a simple and economically viable system of fish-cum-poultry farming has been developed which may become a one of the best examples of mixed farming for sustainable development of the rural farming community. It is an important ecologically balanced sustainable farming technology among various integrated farming systems.

The technology involves a combination of fish poly-culture integrated with poultry production. On farm waste recycling, an important component of integrated fish cum poultry farming is highly advantageous to the farmers as it improves the economy of production and decrease the adverse environmental impact of farming. Under this system, the poultry droppings / fully built up poultry litter is recycled in the poly-culture fish ponds which results in production of handsome quantity of fish. Rather than the fish production the systems gives good and immediate returns in term of a good quantity of eggs and chicken meat for supplement of animal protein in their diet at larger scale and may

become a new sources of gainful employment for their overall development. Arunachal Pradesh, geographically largest hill state sharing its international boundaries with Bhutan in the west, China in the north and Myanmar in the east is characterized by a diverse range of climatic conditions due to its varied geographical features. This region experiences subtropical, temperate, and alpine climates as we move from the foothills towards the Himalayas. As for fisheries concern the state has immense potential in general as the maximum population of the state is predominantly tribal and more than 80% derive their food from agriculture and allied activities. At present the State is administratively divided into 28 districts and inhabited by 28 major tribes and 110 sub-tribes, having their own distinct and diverse culture among which the district West Kameng lies approximately between 91° 30' to 92° 40' East longitudes and 26° 54' to 28° 01' North latitudes have Monpa tribal population and endowed with vast natural resources with an ideal agro-climatic condition but has failed to show the expected development in fisheries sector. Although the majority of the populace of the district is fish eaters, the irony is that most of the fishes have to come from outside of the state to suffice their demand.

This is attributed to fact that the district lacks fulltime fishermen profession except need based fishing activity from natural resources at family level. So for in concerned with fish culture, there is no specific system in vogue in the region. The farmers are unaware about the scientific method of fish farming with minimum cost of cultivation practices to be adopted, resulting in poor fish production associated with increasing undesired for the same. However various fish culture technologies with modifications to suit the local conditions can gradually should be introduced in this area to increase the fish production and uplift the socio-economic status of the farmers of the district. Therefore the said training programme on integrated fish cum poultry farming had been conducted at mass level by the KVK West Kameng for the farmers to improve the aquaculture production as well as to support the nutritional security at larger scale and to assess their impact on farmers knowledge gain about this technology for long term societal benefit.

Materials and Methods

The present study has been conducted to assess the impact of training on the farmer's knowledge gain and their role in societal benefits.

Location of the Study and Sampling Plan

The present study was carried out from the year 2012-2022 in all the administrative circles of district West Kameng Dirang, i.e. Thembang, Lish, Nafra, Thrizino, Bhalukrong, Jamiri, Rupa, Kalaktaang, Balem and Bomdila. As per the available database of trainees from the available records, a total 1570 farmers were trained on the technology integrated fish cum poultry farming during 2012 to 2022 and they were considered as the population for the study. In this reference primary data were collected during January 2021 to December 2022 from the selected trainees for the impact assessment. The various type trainees comprised of farmers, farmwomen's and school drop outs and unemployed rural youth. The socio-demographic profile of trainees varies from semi-urban to rural, illiterate to post graduates, landless to land holders and different categories with age group between 20-55 years.

Research Design and Data Collection

A knowledge test comprising of twenty five questions with objective and true/false type questionnaires was framed to determine the impact of training programmes before and after the training. Quantitative technique was used to assign marks for each answer of the respondents. Individual participant knowledge score was calculated by assigning one credit for correct answer and no credit for incorrect answer.

Data Analysis

The gain in knowledge was assessed by calculating the difference between the knowledge acquired on scientific package and practices on the technology of integrated fish cum poultry farming by the trainees before and after the trainings programme. The data for knowledge gain was tabulated and analyzed by using the following standard formulas: -

Compute Knowledge Gain (CKG) = Post Training Test – Pre Training Test (Becker, 1998)

Knowledge Index = No. of Correct Responses by the Participants X 100 / Total No of Items (Swetha *et al.*, 2020)

The knowledge scores are further assessed by classifying the trainees into three categories as low (0 to 30%), medium (31 to 60%) and high (more than 60%) level of knowledge.

Results and Discussion

Trainees Socio-demography

The participant's socio demography of trainees was assessed through various characteristics like age group, educational status, gender wise participation, land holding and their occupation etc.

Trainee's Age Group

On the basis of age group the participants were categorized in 5 categories as the farmers having age group 18-25 year in category I, 26-35 year in category II and 36-45 year in category III, 46-55 year in category IV and 56-65 years in category V respectively. The detail about trainee's age group, frequency, percentage and category in fig 1.

The recorded data clearly indicates that the maximum no. of participants were from category II with age group of 26-35 years having frequency value $n = 407$ and percentage 25.92, followed by category III with participants age group of 36-45 years and have frequency $n=367$ with the 23.38 share percentage, category I with 18-25 years of participants age group having frequency $n= 340$ and percent share of 21.65, category IV with age group 46-55 years with the frequency value $n= 321$ having 20.45 % share and for category V with participants age group 56-65 years it was recorded lowest having frequency value $n=135$ and 8.60 percent share. The number of trainees was found highest from Category II might be because there young age along with additional experience and there curiosity about the new interventions and desire to earn sufficient money from various sources to upgrade their life standard whereas the lowest no of participants from group V may be because of their deeper involvement in other subsidiary life sustaining activities rather than agriculture and allied activities. The recorded findings are almost in accordance with findings of (Singh *et al.*, 2013).

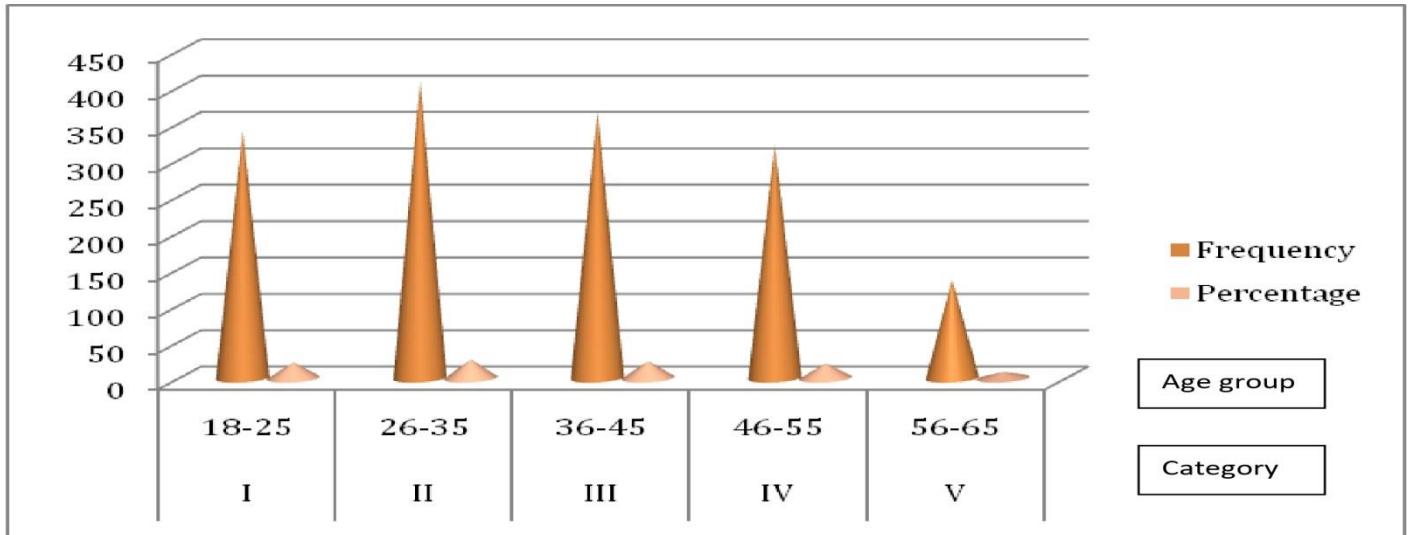


Fig 1. Trainee’s age group and frequency along with percent share

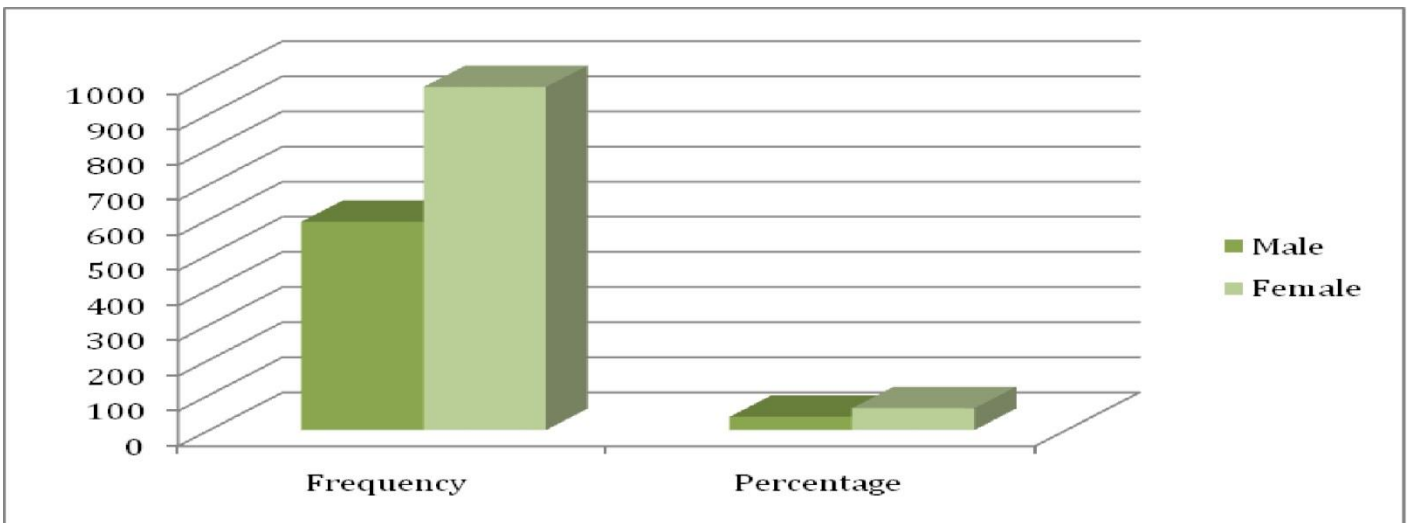


Fig 2. Gender wise trainee’s participation

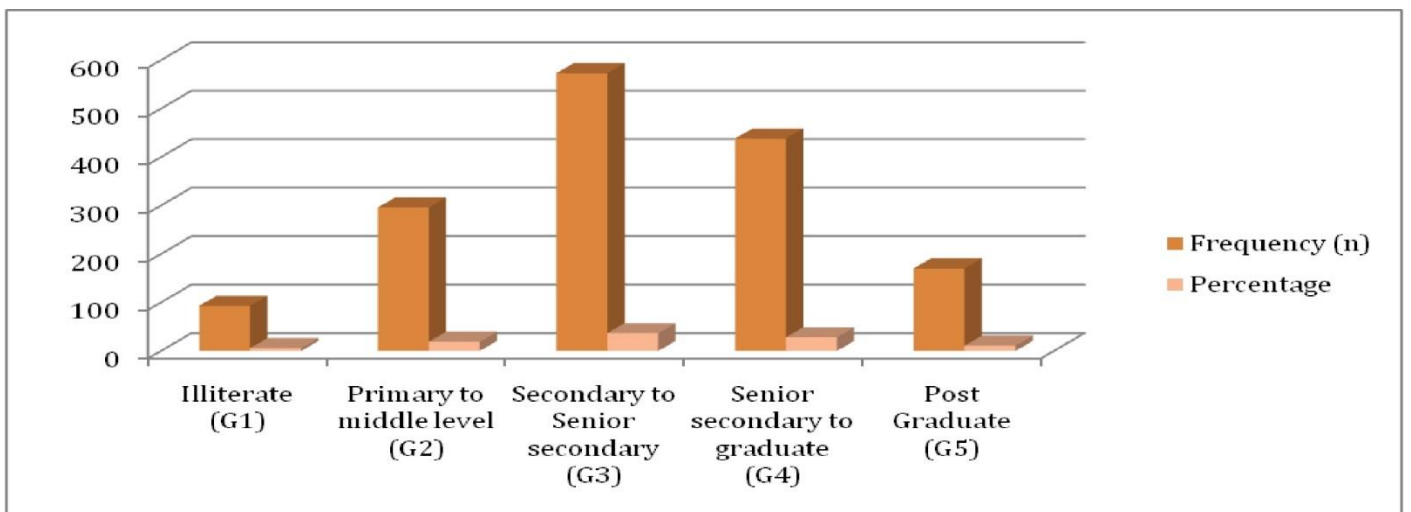


Fig 3. Education standards of the trainees

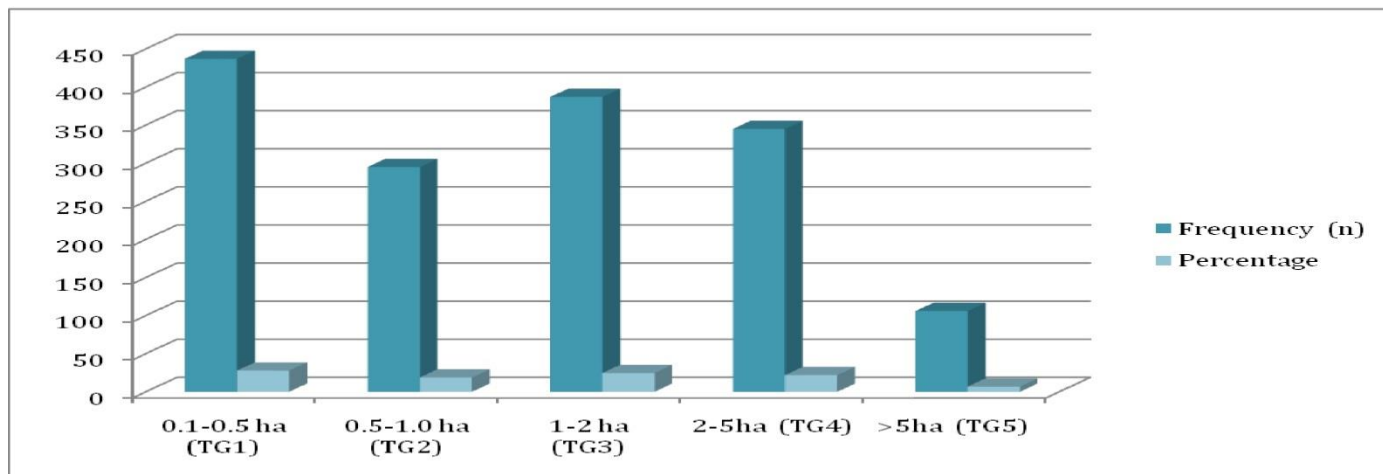


Fig 4. Trainees’ distribution based on land holding and percent share

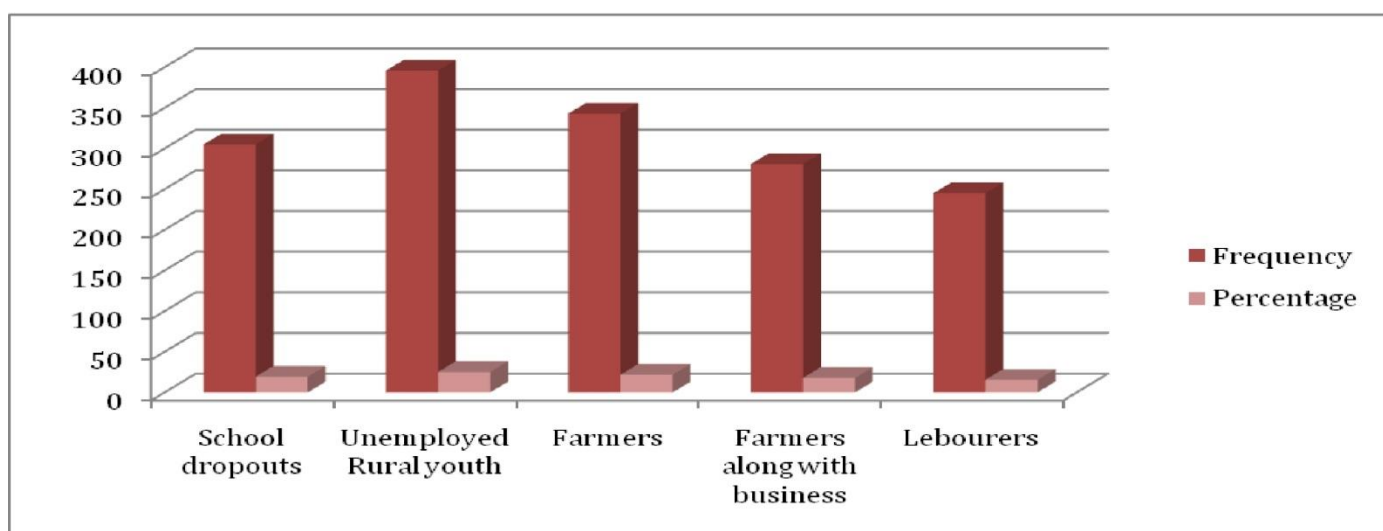


Fig 5. Trainee’s distribution on the basis of occupation

Table 1. Assessment of Trainees Knowledge Before and after Training

S. N.	Knowledge Level	Before Training		After Training	
		Frequency of Trainees (n)	Percentage	Frequency of Trainees (n)	Percentage
1	Low (0-30)	941	59.94	03	0.19
2	Medium (31-60)	592	37.71	693	44.15
3	High (61-100)	37	2.35	874	55.66

Gender Based Trainee’s Participation

Most of the trainees were from tribal community except some labourers who are full time residential workers of landlords with involvement of both male and female gender. The female gender possess’ higher frequency n= 977 with the % share of 62.22 followed by male gender having frequency value n=593 with the share % of 37.78. Gender wise farmer’s distribution has been illustrated in fig 2.

The higher no. of female participants might be due more female population along with the freedom to participate equally for all work in the North Eastern States including Arunachal Pradesh. The same trend of female farmer’s participation has been recorded in the study of women participation in hilly areas of Uttarakhand by (Qureshi *et al.*, 2021) and on study of Women in Fisheries: Roles, Constraints and Recommendations by (Tanuja *et al.*, 2024).

Table 2. Extent of Knowledge Gain by the trainees

S. N.	Parameters	Pre-evaluation (%)	Post-evaluation (%)	Compute Knowledge Gain	Knowledge Index
1.	Selection of suitable Site	11.20	63.17	51.97	252.68
2.	Preparation of pond before stocking	6.00	52.75	46.75	211.00
3.	Selection of suitable fish species for integration	3.00	65.35	60.35	261.40
4.	Stocking size and density of fish species	2.00	55.20	53.20	220.80
5.	Selection of suitable poultry breeds	11.00	61.00	50.00	244.00
6.	Scientific Management Practices of housing for poultry birds	27.00	82.50	55.50	330.00
5.	Feeding of Poultry birds by scientific method	15.00	45.20	30.20	180.80
6.	Pond Water quality monitoring	1.00	45.00	44.00	180.00
7.	Fish health management	5.00	51.86	46.86	207.44
8.	Health Management of Poultry birds	13.00	63.25	50.25	253.00
8.	Marketing	27.00	62.00	35.00	248.00

Note: CKG= Compute Knowledge gain KI= Knowledge Index

Trainee's Education Standard

The education status of respondents was categorized in 5 groups *i.e.* G1, G2, G3, G4 and G5 for illiterate, primary to middle level, secondary to senior secondary, senior secondary to graduate and post graduate respectively which has been illustrated in the fig 3. The highest no of trainees were from G3 having secondary to senior secondary level of education with a frequency of 573 and share percentage of 36.50 followed by G4 with a frequency of 438 and share percentage of 27.90, G2 with a frequency of 296 and percentage 18.85, G5 with a frequency of 170 and percentage 10.83 and G1 having frequency of 93 and percentage 5.92 respectively. The highest share of trainees up to secondary to senior secondary education might be because of extra care by the parents for their kids up to this stage associated with good availability of schools from primary to higher secondary level even in far flung areas too followed by senior secondary to graduate because of the availability of colleges almost in all the district head quarter of whole state of Arunachal Pradesh but after that the share of trainees in higher education becomes low due to rare availability of higher educational institutes and participants economic backgrounds also.

The lower no. of participants *i.e.* illiterate and having education standard primary to middle standard may be because as children's are getting the minimum facilities in school in remote areas also and good awareness about the education at the district, state and regional level by the efforts made by the Governments and trainees are well aware that education is the only a tool that can bring the societal change. The similar findings were also recorded by (Ahmad and Hazarika, 2019) in the study of scenario of primary education in North East India.

Participants Land Holding

The highest no trainees have land holding between 0.1-0.5 ha with a frequency value n= 437 and 27.83 share percentage for the group TG1 followed by the trainees with land holding of 1-2 ha for the group TG3 with highest frequency value n=387 and percent share of 24.65, trainees having land holding 2-5 ha with frequency value n=345 and 21.97 percent share for the group of trainees TG4 and recorded land holding for the group TG2 was between 0.5-1.0 ha with frequency value of n=295 having percent share 18.79 while the trainees land holding was > 5ha with lowest frequency value n=106 and percent share 6.75.

The detail of trainees land holding along with the share percentage has been given fig 4. The maximum no of farmers having moderate size of land holding may be due to hilly terrain of the region and sparse population with respect to size of geographical area while highest size of land holding with smallest no. of trainees which is very common at higher peaks of the district might be because of very less population blessed with higher land availability due to their tough location. Whereas the highest no. of trainees with highest share percentage from foothill areas were found having lowest size of land holding 0.1-0.5 ha only might be due to less farming land and highly condensed population in that geographical location. The almost same types of results were also reported by (Mandal *et al.*, 2007 and Birthal, 2010).

Participant's Occupation

The recorded data indicates that the maximum participants were unemployed rural youth having frequency value n=396 with percent share of 33.86% followed by farmers with n=343 frequency value and percent share of 21.85%, school dropouts with a frequency value n=305 having share of 19.43%, farmers associated with side business having frequency value n=281 with percent share of 17.89% while it was minimum for group of laborers' with frequency value n=245 and 15.61% share percentage. The details are given in the fig 5.

The highest number of trainees recorded from the group of rural youth category could be due to their lower govt. job opportunity in their age group. Their home sickness tendency is also a big reason for unemployment as they don't want to go outside for job purpose and if some youths are willing to go outside of the state then in that case their lower education standard becomes hurdles as most of them have only secondary to senior secondary level of education which makes them usually unfit for good quality private sector job. While the number was lowest for the trainees from laborers' as they have no any other option except their work only to earn their bread and butter and they don't want to miss their daily duty. The same line of findings was also recorded by (Gangwar, 2018) for the study on employment vulnerability of rural youth in the hills of Uttarakhand.

Trainees Knowledge Assessment with Respect to Different Operational Parameters

The table 1 reveals about the knowledge of trainees before and after training programme on integrated fish cum poultry farming imparted by the subject matter specialist from KVK West Kameng. The gain in knowledge was calculated by subtracting the post-training and pre-training percentage while knowledge index had been calculated by the assessment of trainee's responses on different IFS parameters.

Assessment of Trainees Knowledge before and after Training Programme

The pretest data in relation to different operational parameters of integrated fish cum poultry framing before training revealed that the maximum number of participants had low level knowledge with frequency value n=941 and 59.94% of share among all the trainees followed by medium level of knowledge with frequency value n=592 along with share percentage of 37.71% while the recorded data indicates that the lowest number of trainees (only few) have high level of Knowledge having frequency value n=37 with the share percentage of 2.35% only. The difference in knowledge level as well as poor knowledge of trainees for the different aspect of integrated fish cum poultry farming before training might be because of lack of knowledge on complete package and practices of the technology in association with unawareness about the strength and scope of this technology. The almost same lines of findings have also been reported by (Argade *et al.*, 2023) in the study on impact of training on fish farmers' knowledge and attitude in Bihar, India.

After attending the training programme there were a positive change in knowledge level of trainees have been recorded and this is given in the table above. The highest 874 nos. of trainees were found to upgrade their knowledge level at high knowledge (61-100) level with the percent share of 55.66% followed by the 693 nos. of trainees which were able to upgrade their knowledge up to medium (31-61) level with the percent share of 44.15% while very less almost negligible number *i.e.* 03 nos. of participants with 0.19% share were found with low level of knowledge even after attending the training programme. The details have been depicted in the table 1.

The findings clearly indicates that there were very positive change in the up gradation of trainees knowledge level after participation in the training conducted by the subject matter expert (fishery) from KVK West Kameng. The few trainees have been recorded with lowest knowledge might be due to their lack of interest for the programme as well as aquaculture activity because of some social stigma at community level. The increase in highest number of trainees with high level of knowledge and medium number of trainees with medium level of knowledge might be due to their higher interest towards the training programme. The findings are in accordance with the findings of (Sharma *et al.*, 2017) on their study on training impact on farmers perception, performance and entrepreneurship development and in the study of (Singh and Tanwar, 2018) on analysis of vocational training impact on knowledge gain of ornamental fish culture trainees in the state of Maharashtra.

Extent of Knowledge Gain by the Trainees

KI (Knowledge Index) is a parameter to measure the ability of adoption and diffuse the knowledge by the trainees. The data related to knowledge Index have been depicted in the table 2, reveals that it was highest 330.00 with respect to scientific management practices of housing for poultry birds followed by 261.40 for selection of fish species, 253.00 for health management of poultry birds, 252.68 for site selection of integrated fish cum poultry farming, 248 for marketing of produces from said IFS system, 244 for selection of suitable poultry breeds, 220.80 for proper size of fingerlings and their density at the time of stocking, 211 for preparation of pond before stocking, 207.44 for fish health management and 180.80 for feeding of poultry birds by scientific method while the lowest knowledge index was recorded in case of quality monitoring of pond water. There were observed a parameter as well as participant wise variation in the knowledge index which may be due to their personal concern on specific operational parameters in association with the trainee's education standard along with their age group. The above findings are in accordance with the findings of (Singh and Tanwar, 2020) on the study of Impact evaluation of integrated fish farming vocational trainings on knowledge gain by trainees in state of Punjab.

The compute knowledge gain is the difference between post-test after training and pre-test before training, a positive gain score indicates that the post test score was greater than the pre-test score; a negative gain score indicates that the post test score was less than the pre-test score. The highest compute knowledge gain (CKG) was recorded in case of Selection of suitable fish species for integration i.e. 60.35 followed by scientific management practices of housing for poultry birds with the score 55.50, 53.20 for stocking size and density of fish species, 51.97 for selection of suitable site for IFS, 50.25 for health management of poultry birds, 50 for selection of suitable poultry breeds, 46.86 for fish health management, 46.75 for preparation of pond before stocking, 44 for monitoring pond water quality, 35 for marketing of farm produce while the recorded value of CKG was lowest i.e. 30.20 for feeding of poultry birds by scientific method.

The difference in the values of CKG might be due to difference in trainees understanding about the operational parameters along with their experience and standard of education. The results are found almost similar to the findings of (Alam *et al.*, 2017) during the study on existing technology and knowledge on aquaculture by fish farmers in Gomastapur Upazila of Chapai Nawabgonj district, Bangladesh.

Conclusion

It is clear from the study that just after completion of training, most of participants were having high to Medium level of knowledge regarding IFS (Fish-Poultry) technology in the West Kameng district which indicates that study was effective with positive impact. Now the farmer's number is increasing in the district and they are trying to set up IFS unit for their self-employment which will also be helpful in enhancing the farmer's family nutritional status and to support the rural economy of the state of Arunachal.

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