



Attitude of Mixed Farmers towards the Mixed Farming System and its Relationship with the Socio-Economic Characteristics of Farmers

Dr. Sathyavathi M.

Assistant Professor, Department of Economics, Sreekrishnapuram V T Bhattathiripad College, Affiliated to University of Calicut, Mannampatta, Kerala, India,
Email : sathyavathiswaminath@gmail.com,

Abstract: *Mixed Farming System (MFS) are defined as farming systems practiced by households or by enterprises where crop cultivation and livestock rearing together form integrated components of a single farming system. The best known form of mixed farming is when crop by-products or residues are used to feed the animals and the excreta or manure from the animals are used as nutrients for the crops. The objective of the study is to examine the attitude of mixed farmers towards mixed farming system and to examine the relationship between the attitude mean score and socio economic characteristics of mixed farmers. The study area is Palakkad district in Kerala where paddy cultivation is practiced along with cattle rearing. Primary data is collected through structured questionnaires from 394 sampled farmers practicing mixed farming especially paddy cultivation with cattle rearing. A random sampling technique is used to select respondents. A five point Likert scale is used to measure the attitude of mixed farmers. The Spearman's rank correlation analysis and Independent-Samples Kruskal-Wallis Test is performed to examine the relation between attitude mean score and socio economic characteristics of mixed farmers. The study found that mixed farmers have a highly favourable attitude towards mixed farming system. The study also revealed that mixed farmers' attitudes toward mixed farming were not significantly associated with any of the selected socio-economic or farm-related characteristics. Neither the continuous variables (net farm income, farming experience, agricultural area, imputed expenses, and value of milk cattle) nor the categorical variables (age, education, family size, and agricultural activity status) showed statistically significant relationships with attitude mean score.*

Key Words: *Mixed farming, Mixed farmers' attitude, Attitude mean score, paddy - cattle mixed farming.*

1. INTRODUCTION

Food is the most important prerequisite of human lives and agriculture is the primary source of food for the global population. In India, agriculture plays an important role in the economy by providing support to rural livelihood to about 42.3 percent of the population and contributing 18.2 percent towards the country's GDP (Press Information Bureau, 2024). The mixed farming system is well familiar to the Indian cultivator and this type of farming system implies integrating crop production with animal husbandry to sustain and satisfy as many needs of the farmer as possible (ICAR, Mixed Farming in India, 1957). According to the Food and Agricultural Organization (FAO), Mixed Farming System (MFS) are defined as farming systems practiced by households or by enterprises where crop cultivation and livestock rearing together form integrated components of a single farming system. The best known form of mixed farming is when crop by products or residues are used to feed the animals and the excreta or manure from the animals are used as nutrients for the crops. The Poor but Efficient Hypothesis of T W Schultz states that the farmers in traditional agriculture are generally able to allocate their resources in the optimum way and proves their efficiency in utilising their resources and no resources are left unemployed in the agriculture sector. Similarly in a mixed farming system, we can see efficient and effective utilization of resources because waste products of one enterprise that is crop residues are used by the other enterprise, which in turn results in its own waste product that is manure back to the first enterprise. Besides that, the mixed farming system provides full time employment to labour. Robert McC. Netting developed the theory of The Ecology of Small Scale Sustainable Agriculture. From Netting's point of view, mixed crop-livestock farming, especially small scale, often contributes towards sustainable agricultural practices because these practices involve the tight integration of animal wastes into crop production processes. Modern Portfolio Theory (MPT) is the technical



finance theory equivalent to Don't Put All Your Eggs In One Basket. Mixed farming helps in diversifying the sources of income by integrating both crop production and livestock rearing for resource poor farmers and landless labourers and thus offers considerable potential for poverty alleviation. Livestock act as a storehouse of capital and an insurance against crop production risks. The scope of the study covers the attitude of mixed farmers towards mixed farming system. The study focuses on one specific combination within the mixed farming system, which is the integration of paddy cultivation and cattle rearing.

2. LITERATURE REVIEW:

The mixed farming through combination of crop production and their complementary livestock enterprises certainly create great potential of farms, establishing a complementary relationship between crop and livestock enterprises. (Onima et al., 2017) To develop agriculture as a whole and popularizing use of mixed farming for agricultural development; there is a need to understand the attitude of farmers towards relevance of mixed farming. To measure the attitude, the Scale Product Method was followed. The study was conducted on a random sample of 50 mixed farming adopters selected from ten villages of Anand taluka, of Anand district. It was observed that the majority (90.00 %) of the farmers had a positive attitude towards mixed farming. The positivism towards mixed farming was observed uniformly amongst the farmers with irrespective level of their age, education, farming experience, farm size, herd size, social participation, mass media exposure, extension contact, economic motivation and achievement orientation, while it was observed highly positive amongst the farmers with high level of scientific orientation.

Another study was conducted to examine the attitude of rural women towards mixed farming because women play an important role in mixed farming or livestock-crop integrated production system, which is known as the most-sustainable livestock production system in the world. (Fami et al.,) The scale was developed by using Likert's technique of summated rating method and tested and proved to be reliable to measure the attitude of rural women.

A study was conducted in Lower Saxony regarding the attitude of farmers towards diversified farming which protects biodiversity and improves the environment, but many farmers are reluctant to adopt them because of concerns about their economic impact. A study of 145 farmers found that farmers believed diversified crop rotation could increase profits, while cover crops offered environmental benefits with only a small reduction in profit. In contrast, reduced tillage, direct seeding, and flower strips were generally seen as reducing profits, making them less attractive. Farmers with more fertile soils expected better financial outcomes, while risk-taking attitude and previous use of DF practices had little influence on their perceptions. The study concludes that farmers are more willing to adopt DF practices they see as economically beneficial, and practices perceived as less profitable may require financial incentives to encourage wider use.

The study examined scientists' perceptions of the major constraints affecting the growth of mixed dairy farming systems in Hisar district of Haryana. Thirty scientists from the College of Veterinary Sciences were randomly selected to identify key challenges. They considered the most serious constraints to be the younger generation's lack of interest in animal husbandry, shortage of pasture and grazing land, limited availability of green fodder, farmers' inadequate knowledge of improved dairy farming practices, and the high cost of animal feed. In contrast, factors such as concerns about animals spreading diseases, changing milk consumption patterns, limited time for animal husbandry due to crop farming, and lack of markets for dairy products were viewed as less significant. The findings highlight the need for targeted research, improved farmer training, and better resource management to support the sustainable growth of mixed dairy farming systems.

3. RESEARCH GAP:

Although several studies on mixed farming have examined its economic performance, productivity, sustainability, resource-use efficiency and environmental benefits of mixed farming systems. However, relatively few studies have explored the attitude of mixed farmers towards adopting and continuing mixed farming practices. Farmers' attitudes play an important role in influencing their management decisions, technology adoption, and long-term commitment to mixed farming. Moreover, studies examining the attitude of mixed farmers in Palakkad district, Kerala, using Likert scale especially of paddy – cattle integration are limited in Kerala. Therefore, this study attempts to fill this gap by analysing the attitude of mixed farmers and examining the relationship between attitude and the socio-economic characteristics of mixed farmers.

4. OBJECTIVE OF THE STUDY: The objective of the study is to examine the attitude of mixed farmers towards mixed farming system and to examine the relationship between the attitude mean score and socio economic characteristics of mixed farmers.



5. METHODOLOGY:

The study has employed both primary and secondary data. The study area is Palakkad district in Kerala where paddy cultivation is practiced along with cattle rearing. Primary data is collected through structured questionnaires from 394 sampled farmers practicing mixed farming especially paddy cultivation with cattle rearing. A random sampling technique is used to select respondents. A five point Likert scale is used to measure the attitude of mixed farmers. The Spearman's rank correlation analysis and Independent-Samples Kruskal-Wallis Test is performed to examine the relation between attitude mean score and socio economic characteristics of mixed farmers. The data were analysed using SPSS.

6. RESULTS AND DISCUSSION:

Attitude of Farmers towards Mixed Farming

There are 17 statements for measuring the attitude of mixed farmers. All statements are positive statements and the five point Likert scale is used to measure the attitude of mixed farmers. The statement wise responses were collected and presented in Table 1. This table presents the descriptive statistics (sample size, mean, and standard deviation) for respondents' perception towards Mixed Farming Systems (MFS). The responses were obtained from 394 respondents (N = 394). The mean values indicate the level of agreement with each statement, while the standard deviation (SD) shows the variation in respondents' opinions.

Table 1: Attitude of Mixed Farmers towards Adoption of Mixed Farming

Statements	N	Mean	Std. Deviation
Mixed farming increases self-sufficiency in animal feeding through multiple uses of local resources.	394	4.21	1.446
Mixed farming improve soil quality through organic manure available from cattle	394	4.76	.665
Mixed farming promote rural development	394	4.83	.570
Mixed farming facilitates the best use of self-produced manure	394	4.86	.449
Mixed farming is better than separated crop production and livestock rearing	394	4.77	.695
Mixed farming makes the best utilization of self-produced feed	394	4.91	.285
Mixed farming improves product yield and quality including livestock health	394	4.21	1.456
Mixed farming reduces reliance on external inputs.	394	3.99	1.490
MFS could balance risks between crops and livestock	394	4.42	1.161
MFS are supposed to be more resilient as they could diversify product and be thus less sensitive to market fluctuation for one product	394	4.61	.922
MFS are supposed to better due to greater resource use efficiency and lower use in inputs	394	4.69	.821
More jobs are created in MFS as more tasks have to be considered in the farm area.	394	4.67	.837
MFS are supposed to limit water pollution as self produced organic manure is used for paddy cultivation and has a lower use of water.	394	4.87	.365
MFS are expected to encourage biodiversity	394	4.54	.988
Energy balance is supposed to be better in MFS, as less energy is needed to import feed and fertilizer	394	4.72	.748
Mixed farming provides food security to the family	394	4.80	.538
MFS have a competitive advantage in terms of using the diversity of local resources (e.g. through reusing manure on crops and feeding livestock through local cropping systems).	394	4.85	.457

Source: Primary Survey



The statement "Mixed farming increases self-sufficiency in animal feeding through multiple uses of local resources" has obtained a mean score of 4.21 which shows that the majority of farmers strongly agree with this statement. The statement "Mixed farming makes the best utilization of self-produced feed" recorded the highest mean score indicating that respondents strongly agreed that mixed farming efficiently utilizes feed produced within the farm. The very low standard deviation suggests a high level of consensus among respondents. The statements "Mixed farming increases self-sufficiency in animal feeding through multiple uses of local resources" and "Mixed farming improves product yield and quality, including livestock health" also showed positive agreement with mean score of 4.21. However, the relatively higher standard deviations suggest that respondents' opinions were more varied on these aspects. Similarly, respondents strongly agreed that mixed farming facilitates the best use of self-produced manure ($M = 4.86$, $SD = 0.449$) and that mixed farming systems have a competitive advantage through the efficient use of local resources ($M = 4.85$, $SD = 0.457$). These findings highlight the importance of recycling farm resources and improving resource-use efficiency. The statement "Mixed farming systems limit water pollution through the use of organic manure and reduced water use" also received a very high level of agreement with a mean score of 4.87, indicating that respondents recognize the environmental benefits of mixed farming. Likewise, mixed farming promotes rural development ($M = 4.83$, $SD = 0.570$) and provides food security to the family ($M = 4.80$, $SD = 0.538$) were highly rated, reflecting the perceived socioeconomic importance of the system. Respondents also agreed that mixed farming is better than separate crop and livestock production ($M = 4.77$, $SD = 0.695$) and improves soil quality through the application of organic manure from cattle ($M = 4.76$, $SD = 0.665$). Furthermore, they believed that mixed farming contributes to better energy balance ($M = 4.72$, $SD = 0.748$), greater resource-use efficiency with lower external inputs ($M = 4.69$, $SD = 0.821$), and creates more employment opportunities ($M = 4.67$, $SD = 0.837$). The respondents also perceived that mixed farming enhances resilience by diversifying farm products and reducing vulnerability to market fluctuations ($M = 4.61$, $SD = 0.922$), encourages biodiversity ($M = 4.54$, $SD = 0.988$), and balances risks between crops and livestock ($M = 4.42$, $SD = 1.161$). Although these statements received relatively larger standard deviations, the mean scores still indicate strong agreement. Among all the statements, "Mixed farming reduces reliance on external inputs" recorded the lowest mean score ($M = 3.99$, $SD = 1.490$). The results indicate that respondents generally had a very positive attitude towards mixed farming systems, with all mean scores ranging from 3.99 to 4.91, suggesting overall agreement with the stated benefits. This shows a highly favourable attitude towards mixed farming. The statement "Mixed farming makes the best utilization of farm-produced feed for livestock" obtained the highest mean score of 4.91 showing a highly favourable attitude among farmers. But at the same time the statement "Mixed farming reduces reliance on external inputs" recorded the lowest mean score but still indicating a favourable attitude. Although respondents generally agreed with this statement, the comparatively lower mean and higher standard deviation indicate greater differences in opinion regarding the extent to which mixed farming reduces dependence on external inputs. Overall, the findings demonstrate that respondents perceive mixed farming systems as highly beneficial for resource-use efficiency, environmental sustainability, food security, rural development, employment generation, and farm resilience. The high mean scores, together with generally low standard deviations for most statements, indicate a strong level of agreement among respondents regarding the advantages of mixed farming. These results suggest that mixed farming is widely regarded as a sustainable agricultural practice that improves farm productivity while promoting efficient use of local resources and environmental conservation.

Interpretation of Spearman's Correlation Analysis: A Spearman's rank correlation analysis was performed to examine the relationship between the attitude mean score of farmers towards mixed farming and selected socioeconomic and farm-related variables. The correlation between attitude mean score and socio-economic characteristics is shown in the below table

Table 2: Summary of Correlation Results

Variable	r-value	p-value	Interpretation
Net farm income	0.014	0.778	Not significant
Experience in mixed farming	-0.040	0.430	Not significant
Mixed Farm Area	0.047	0.354	Not significant
Total imputed expenses	0.062	0.222	Not significant
Average value of milk cattle	-0.047	0.354	Not significant

Source: Computed from Primary Survey

From the above table it is clear Spearman's correlation analysis revealed that none of the relationships is statistically significant ($p > 0.05$). This shows farmers' attitude towards mixed farming is not associated with net farm



income, experience in mixed farming, mixed farm area, total imputed expenses incurred for mixed farming and value of milk cattle. This shows that farmers' attitude towards mixed farming is independent of net farm income, experience in mixed farming, mixed farm area, total imputed expenses incurred for mixed farming and average value of milk cattle. These findings suggest that farmers' attitudes towards mixed farming are not significantly influenced by the selected socioeconomic and farm-related characteristics.

Table 3: Summary of Kruskal–Wallis Test Results

Null Hypothesis	Test	p-value	Decision
The distribution of attitude mean score is the same across categories of Age	Independent-Samples Kruskal-Wallis Test	0.736	Retain H_0
The distribution of attitude mean score is the same across categories of education.	Independent-Samples Kruskal-Wallis Test	0.728	Retain H_0
The distribution of attitude mean score is the same across categories of Family size.	Independent-Samples Kruskal-Wallis Test	0.580	Retain H_0
The distribution of attitude mean scores is the same across categories of agricultural activity.	Independent-Samples Kruskal-Wallis Test	0.342	Retain H_0

Source: Computed from Primary Survey

The Kruskal–Wallis test indicated that the distribution of attitude mean score did not differ significantly across age categories ($p = 0.736$). Therefore, age does not significantly influence farmers' attitudes toward mixed farming. The Kruskal–Wallis test showed no significant difference in attitude mean score across different educational categories ($p = 0.728$). Thus, educational level does not significantly affect attitude toward mixed farming. No significant differences were observed in attitude mean score among different family-size categories ($p = 0.580$). Therefore, family size is not associated with variations in attitude toward mixed farming. The Kruskal–Wallis test revealed no significant difference in attitude mean score between categories based on whether mixed farming was the farmer's main occupation or a subsidiary occupation ($p = 0.342$). Hence, occupation status does not significantly influence attitudes toward mixed farming.

7. CONCLUSION:

The study found that mixed farmers have a highly favourable attitude towards mixed farming system. The study also revealed that mixed farmers' attitudes toward mixed farming were not significantly associated with any of the selected socio-economic or farm-related characteristics. Neither the continuous variables (net farm income, farming experience, agricultural area, imputed expenses, and value of milk cattle) nor the categorical variables (age, education, family size, and agricultural activity status) showed statistically significant relationships with attitude mean score ($p > 0.05$). These findings suggest that farmers generally maintain similar attitudes toward mixed farming regardless of differences in their demographic, economic, and farm characteristics. This indicates that factors other than those examined in the present study may play a more important role in shaping farmers' attitudes toward mixed farming. The findings of the study agree with another study conducted in Anand district which also concluded that a positive attitude towards mixed farming was observed uniformly amongst the farmers irrespective of their socio economic characteristics.

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