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Attitudes of People Engaged in Dairy Practices in Rajganj Block of Jalpaiguri District, West Bengal

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Abstract

Dairy is one of the crucial parts of the Indian economy, besides agriculture. In this aspect, India ranks 1st in terms of milk production. More precisely, it has an immense potential for uplifting the socio-economic status of associated people. The study in the Rajganj block of Jalpaiguri district aims to understand the attitudes of people involved in dairy practices. Here, 120 respondents were considered through purposive random sampling due to the unavailability of a full sampling frame. The Multiple Correspondence Analysis (MCA) technique has been applied to unfold underlying patterns, which indicate two separate attitudes of the respondents. Dimension 1, which is 16.7% reflects a contrast between modern and traditional perceptions of the respondents, and dimension 2 reflects 15.2% of the contrast between benefit believers and benefit skeptics. This suggests the alarming need for various awareness programmes, scientific education regarding modern dairy practices among the persons involved in dairy practices in the study area. Further Chi-square test of independence was also performed to test the association between two variables, viz., crossbreeds are better and their vaccination is compulsory. The p-value of the Chi-Square test is 0.048 (<0.05), which shows that there is an association between these two variables. Finally, Structural Equation Modelling (SEM) has been done which shows scientific dairy practice may leads to improved profitability and attaining more stability.

Keywords: Dairy practice, Respondents' attitude, Multiple Correspondence Analysis (MCA), Adoption behavior

Introduction:

A great section of the population of the nation is involved in this dairy sector, as it provides a major foundation of rural livelihoods for India, which ensures a reliable income and good nutrition (Dahyabhai and Dhola, 2024). Besides the rural economy, it acted as insurance against any worst natural calamity (Gupta et al., 2020). For that reason, our beast sector is expanding at a CAGR of 7.38 from 2014 to 2023 (Ministry of Finance, 2024). A large section of milk producers has at least 1 milk animal, which helps in yielding approximately 70% of the milk production, it helps in breaking down the 'vicious cycle of poverty' in the

agricultural sector (Thankachan and Joseph, 2019). On the occasion of 'World Milk Day', 1st June, 2024 Government of India stated that the total milk production of the nation increased by approximately 6% per annum and reached 231 million metric tonnes (MMT) between 2022 and 2023. According to Basic Animal Husbandry Statistics (BAHS) 2024, the state of Uttar Pradesh ranked top in the Indian milk production sector (DoAHD).

The motto of investigation in the proposed study is the attitude of farmers involved in dairy practices like investment, crossbreeding, feeding, vaccination, etc. So, in this context, it can be stated that 'attitude' is the important aspect of decision-making for any individual, which deals with acceptance or rejection. Besides this, the attitude of the dairy practitioners is also positive towards embracing the modern dairy practices (Gupta et al., 2013). In the study by Meena et al. (2013) and Prokopy et al. (2008) already confirmed that there is a relationship between attitude towards dairy practice and improving cattle management practices. Basically, attitude towards scientific dairy practices hugely depends on the combination of psychological to social factors (Gupta et al., 2020). That is why the study incorporates variables associated with all of these aspects.

Study Area:

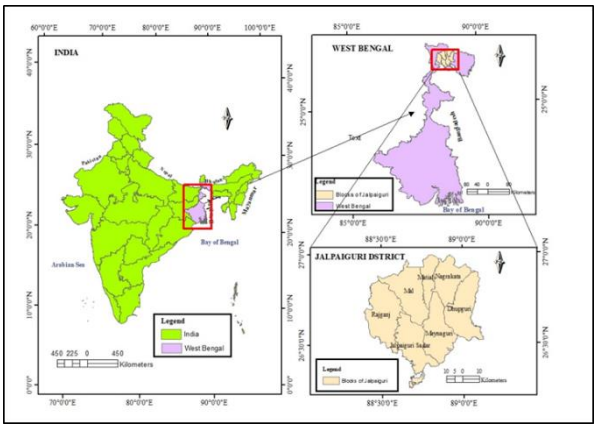

Fig. 1: Location map of the study area

Source - Computed by authors based on Survey of India (SOI)

The Jalpaiguri district was formed in 1869 during colonial rule. It was formerly a part of the Kamata kingdom (Debnath, 2010, p. 4). The extent of the district is from 26º15′47″ & 26º59′34″ N and 88º23′2″ & 89º7′30″ E and shares its boundary with Bhutan and Bangladesh. The total Geographical area of the tract is 3386.18 sq. km. Currently, the district has three subdivisions- (i) Jalpaiguri Sadar ii) Dhupguri iii) Mal, and nine Blocks- (i) Jalpaiguri Sadar, (ii) Dhupguri, (iii) Maynaguri, (iv) Rajganj, (v) Mal, (vi) Matiali, (vii) Nagrakata, (viii) Kranti, (ix) Banarhat. The entire study is based on the Rajganj block, which is hemmed at 26º33′22″N & 88º30′31″ E between the Mahananda and Teesta River. Approximately 25.70% of the population is associated with agricultural activities, and 71.0% of the population is classified as other workers of the block.

Methodology:

The study was conducted during the months June and July, 2025, in the Rajganj Block of Jalpaiguri district, West Bengal, which includes the people involved in the dairy practices (viz. owners, labours, and collection persons) to capture their perception. As the study deals with the micro level, the entire sampling frame was absent; the sampling technique adopted here is Non-probability Purposive random sampling. The respondents were identified with

the help of locals (field referrals). This approach ensures the inclusion of the 120 respondents. The procedure of data collection was conducted through a structured schedule and a focused group discussion.

For analysis of the data, Multiple Correspondence Analysis (MCA) was applied to identify the underlying structure among the selected eight categorical variables. Along with this Chi-Square test of association has been done to find out if the association suggested by the Multiple Correspondence Analysis (MCA) is statistically significant or not. Later on the Structural Equation Modelling (SEM) is applied to find out the variables which deeply influences the attitude of the respondents. The data analysis was done in Microsoft Excel and Jamovi Software version 2.6.17.

Result And Discussion:

The findings of the study have been summarized and discussed below in a summarized way-

Multiple Corresponding Analysis (MCA)

The Multiple Corresponding Analysis (MCA) tool is chosen here due to the categorical or qualitative nature of the data. It is applied where there is a need to reduce the high-dimensional complex variable into a smaller number of variables. Basically, it's a dimension reduction technique that helps in unfolding the pattern of the categorical variables. It is performed here for eight attitudinal variables associated with dairy, which are binary in nature. All the details of the analysis are discussed below.

Table 1 showcases that the 4 components altogether represent 58.9% variance in the dataset. On the other hand, the till component 6 eigenvalue is >0.01.

Table 1: Eigenvalues of Attitudes of Respondents towards Dairy Practice

Eigenvalues

Component	Eigenvalue	% of Variance	Cumulative %
1	0.1669	16.69	16.7
2	0.1521	15.21	31.9
3	0.1461	14.61	46.5
4	0.1239	12.39	58.9
5	0.1197	11.97	70.9
6	0.1125	11.25	82.1
7	0.0963	9.63	91.8
8	0.0825	8.25	100.0

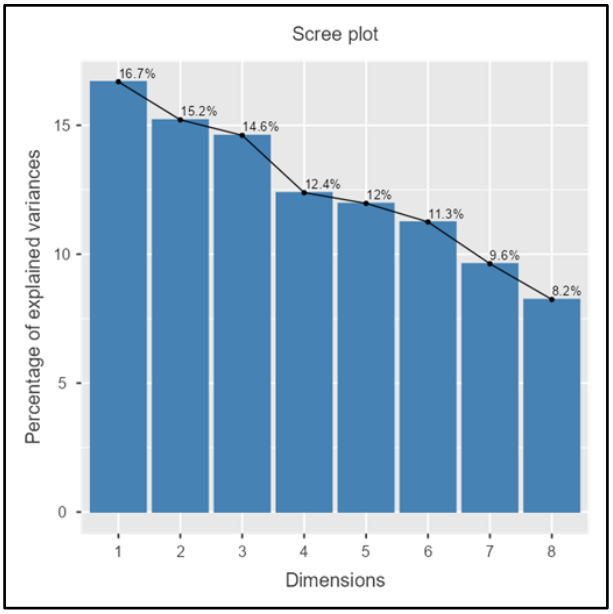

Fig 2: Scree Plot showing Attitudes of Respondents towards Dairy Practice

The Scree Plot also confirms that the first three components have a significant contribution to understanding the perception or attitude of the persons engaged in the dairy of Rajganj block, Jalpaiguri. As there is a sharp decline in the line after the 3rd component, it is clear that the remaining components have a comparatively lesser role. Component 1 contributes 16.69%, Component 2 15.21% and Component 3 contributes 14.61% to explain the variance of the dependent variable.

Table 2: Variable categories across dimensions - coordinate

Variable categories across dimensions - coordinates

	Dimension				
	1	2	3	4	5
Cross_breed_is_better- No	0.829	0.5015	-0.1671	0.56394	0.21825
Cross_breed_is_better- Yes	-0.384	-0.2324	0.0774	-0.26134	-0.10114
Cross_breed_Yielded_more_milk- No	0.299	0.4235	-0.8897	-0.27889	0.46696
Cross_breed_Yielded_more_milk-Yes	-0.133	-0.1888	0.3966	0.12432	-0.20816
Sci_feed_is_better_than_traditional-No	0.392	-0.4185	-0.0869	0.16673	0.30912
Sci_feed_is_better_than_traditional-Yes	-0.653	0.6975	0.1449	-0.27788	-0.51520
Vccination_is_must_for_Cross_breed- No	0.685	0.9823	0.0850	-0.02314	-0.79668
Vccination_is_must_of_Cross_breed-Yes	-0.260	-0.3726	-0.0323	0.00878	0.30219
Govt._subsidy_is_must_on_vaccin- No	-0.721	0.1834	0.4252	1.54269	0.00338
Govt._subsidy_is_must_on_vaccin- Yes	0.190	-0.0483	-0.1119	-0.40597	-8.89e−4
Dairy_is_profitable_than_agriculture- No	-0.574	0.5225	0.2576	-0.33872	0.62863
Dairy_is_profitable_than_agriculture- Yes	0.333	-0.3025	-0.1492	0.19610	-0.36394

Table 2 is representing Variable categories across dimensions – coordinates. Here large positive or negative value represents that this category is strongly associated with that dimension. Here dimension 1 which is 16.7% reflects a contrast between modern and

traditional perception of the respondents. On the other hand, dimension 2 reflects 15.2% of the contrast between benefit believers and benefit skeptics.

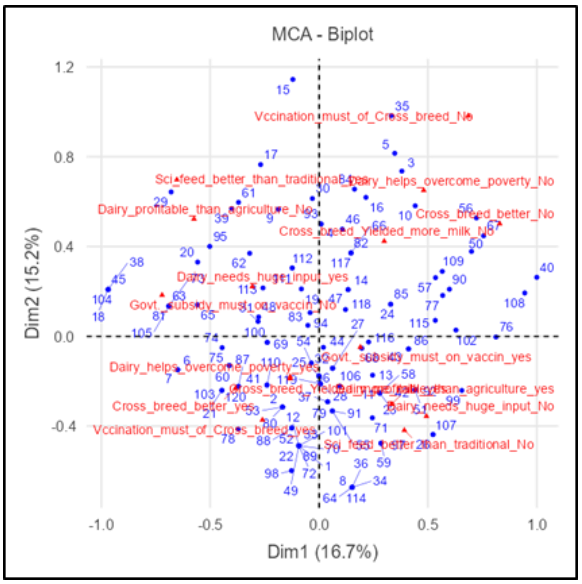

Fig 3: MCA Biplot showing Attitudes of Respondents towards Dairy Practice

By the help of fig 3, which is MCA biplot we can visualize various distinct clusters of attitudes among the people involved in dairy of the study area. The fig depicts that the upper right quadrant holds mostly the negative perception regarding the vaccination of cross-breed, betterment of cross-breed, yielding of more milk. It can be concluded that respondents in this area are skeptical or conservative about modern practices. While the upper left quadrant stated the positive perception of the respondents regarding scientific feed over traditional feed, profitability of dairy over agriculture and alleviation of poverty through dairy. So this is the group of respondents who are optimistic. While the lower right corner of the figure states the negative perception about scientific feed and huge investment in dairy. It shows people's attitude about the adoption of modernity. Now, lower left corner shows again the positive attitude of the respondents about mandatory govt. subsidy on vaccination, betterment of cross breed and yield of more milk by this breed. It shows a strong, supportive and welcoming mindset towards modern practices.

After conducting Multiple Corresponding Analysis (MCA) we able to visualize the patterns in the respondents' attitudes dairy. The MCA biplot shows that the variables 'crossbreeds are better' and 'vaccination is necessary for crossbreeds' both lies closely along dimension 1. This suggests that there may be a potential link between these two attitudinal variables. So, to confirm this a chi-square test of independence has been done.

Chi-Square Test of Independence

Hypothesis for Chi-Square test

H_0: There is no association between the belief that crossbreeds are better and their vaccination is compulsory.

H_1: There is an association between the belief that crossbreeds are better and their vaccination is compulsory.

Table 3: Chi-Square

Contingency Tables

	Vccination_is_must _for_Cross_breed		
Cross_breed_is_better	**No**	**yes**	**Total**
No	15	23	38
yes	18	64	82
Total	33	87	120

Table 4: Nominals

Nominal	
	Value
Phi-coefficient	0.183
Cramer's V	0.183

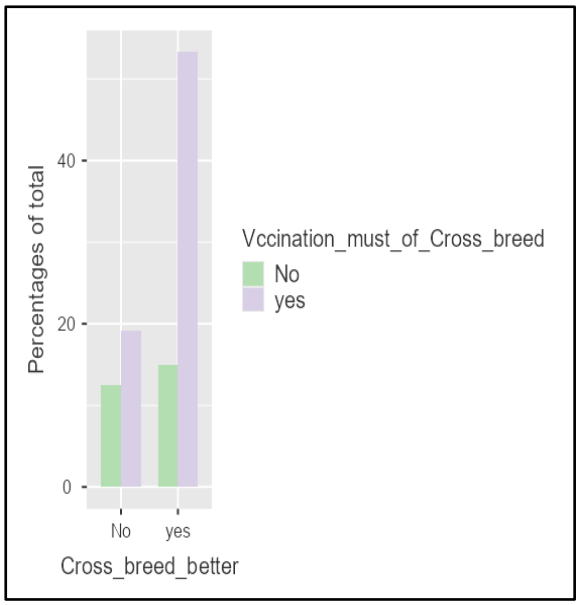

Fig 4: Comparative Bar Diagram Representing the Relationship among Two Variables

The result of this test (Table 3) shows a statistically significant association among these two variables as p = 0.048 (<0.05). It means there is not enough evidence to retain null hypothesis, it can be concluded that there is an association between the belief that crossbreeds are better and their vaccination is compulsory. Besides these Phi Coefficient and Cramer's V value is 0.183, which is clear cut indication of a weak positive relationship between these two variables. So, it can be said that there are also various other factors which may also affects the attitudes of the respondents towards dairy. The comparative bar diagram (Fig 4) further helps to visualize the relationship. We can see the respondents who said cross breed is better is also have highly agreed about the need of vaccination.

After conducting the primary analysis through Multiple Correspondence Analysis (MCA) and chi-square tests, an important association between categorical variables are unfold. These tools are basically not that much helpful to unfold the underlying pattern in-depth, to overcome this relationship Structural Equation model (SEM) was applied. This will helpful for moving behind simple association, basically this will provide a more complex understanding about the data.

Structural Equation Modelling (SEM):

Table 5: Overall model test

Model tests			
Label	**X^2**	**df**	**p**
User Model	12.5	8	0.128
Baseline Model	79.5	15	<.001
Scaled User	10.9	8	0.207
Scaled Baseline	70.4	15	<.001

Table 5 shows a non-significant chi-square value for the user model as p= 0.180, means the proposed model is not that much differ from the observed data. As the non-significant chi-square is desirable for SEM so, it indicates a good fit. Contrary to this, p value for baseline model or null model is highly significant as p= <0.001, it explains that specific model is improvement over the base line model.

Table 6: Fit indices

Fit indices					
			95% Confidence Intervals		
Type	**SRMR**	**RMSEA**	**Lower**	**Upper**	**RMSEA p**
Classical	0.114	0.069	0.000	0.139	0.289
Robust	0.100	0.091	0.000	0.263	0.336
Scaled	0.100	0.055	0.000	0.129	0.397

The fit indices also support the model adequacy. The RMSEA= 0.058 below recommended threshold level of 0.08, indicates an acceptable fit. SRMR =0.114 which is slightly above the threshold but it is also acceptable, CFI= 0.944, TLI= 0.906 both of them above 0.90; suggests a good model fit.

Table 7: Comparison between User model and baseline model

User model versus baseline model			
Comparative Fit Index (CFI)	**Model**	**Scaled**	**Robust**
Tucker-Lewis Index (TLI)	0.930	0.947	0.955
Bentler-Bonett Non-normed Fit Index (NNFI)	0.868	0.901	0.916
Relative Noncentrality Index (RNI)	0.868	0.901	0.916
Bentler-Bonett Normed Fit Index (NFI)	0.930	0.947	0.955
Bollen's Relative Fit Index (RFI)	0.842	0.845	
Bollen's Incremental Fit Index (IFI)	0.704	0.709	
Parsimony Normed Fit Index (PNFI)	0.936	0.953	
Comparative Fit Index (CFI)	0.449	0.451	

From the above table 7, we got the clear-cut comparison between User model and baseline model. It reflects the user model is far better than the baseline model.

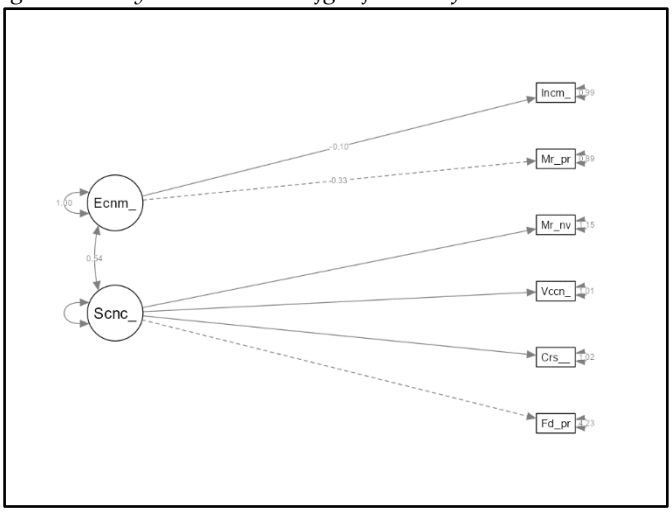

Figure 5: Path Diagram of the Proposed Structural Equation Modelling

The path diagram reveals that scientific attitude has a very strong positive effect on economic benefits of the respondents (beta value- 0.54), it indicates that the people who tends to adopt more scientific practice (viz., feeding habit, vaccination, crossbreeding and investment) will tend to get more benefit economically. On the other hand, indicators of economic benefit have poor or negative loadings, depicting that these variables is not a strong representor of latent construct in the proposed model.

Conclusion:

The study is conducted at a very micro or regional level as most of the people of the study area is completely dependent on agriculture as their primary economic activity. Besides, the majority of people practice dairy by the side of agriculture. Through analyzing the results, we came to know that there is heterogeneity among the respondents' attitudes towards the dairy practice of the Rajganj Block. Mostly the people are not adopting modern of more scientific practices. This suggests that there is a need for various awareness programmes, scientific education regarding modern dairy practices, benefits of vaccination of cattle's etc. The SEM helps us to find out that adoption of scientific dairy practice may leads to improved profitability and attaining more stability. Though the study is exploratory in nature, the findings still hold the gravity of significance for such a micro-level study, which will provide valuable insights for promoting more scientific dairy practice in the study area.

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