

# An Analysis of Profile Characteristics and their Relationship with Digital Literacy among Dairy Farmers of Andhra Pradesh

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## ABSTRACT

India is predominantly agrarian, dependent on agriculture and allied sectors, where information is vital for productivity. Despite growing prominence of digital extension services (DES), their adoption remains uneven due to various socio-economic factors. This study examined how socio-economic factors influence dairy farmer's use of DES to obtain relevant information. An ex-post facto research design was adopted with a sample of 320 dairy farmers across four districts of Andhra Pradesh. The findings revealed that majority of respondents were middle-aged, had moderate family education, low herd size and medium experience in dairying. Majority had marginal to small land holdings with medium level of annual income, extension contact, innovativeness and achievement motivation. Majority were highly risk oriented and had high orientation towards digitalization. All the variables had positive correlation with digital literacy of farmers, except age which was negatively correlated. Family size, occupation and experience in dairying had non-significant relationship with digital literacy.

**Keywords:** Andhra Pradesh, Correlation, Dairy farmers, Digital extension services

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## INTRODUCTION

Agriculture remains a central pillar of the Indian economy, providing livelihood support to a significant share of the rural population. From the pre-green revolution era to the post-green evolution period, agricultural extension in India played a pivotal role in taking research-based technologies to farmers fields (Anuhya et al., 2022). Agricultural extension has evolved significantly over time in response to changing farming systems and farmers information needs. Although India's traditional agricultural extension system has been vital, it needs to be complemented with innovative approaches to address farmers evolving information needs. The need for timely, location-specific and farmer-responsive advisories has led to the emergence of Information and Communication Technologies (ICTs) as a complementary extension pathway, enabling wider reach, faster and easier dissemination of information. This digital transformation in Indian agriculture has the potential to reshape our farming into a more climate-resilient and environmentally sustainable enterprise (Naik et al., 2025).

ICT tools such as mobile phones and social media have rapidly penetrated into the rural sector and emerged as important tools in reshaping agriculture and allied sectors. These tools help in reducing information gaps and encourage technology adoption (Gouroubera et al., 2024). These tools enhanced dairy farmers access to knowledge, guides decision-making, reduce production losses and enhance farm productivity and income. Even though ICTs offer numerous benefits in agriculture and allied sectors, their usage is not

uniform across farming community and is largely influenced by the socio-economic and other profile characteristics of dairy farmers. Therefore, a systematic analysis of dairy farmers profile is important for deeper understanding of their behaviour and identifies the factors that encourage or limit the usage of ICTs, which facilitates more efficient and farmer-focussed extension and development efforts.

## MATERIALS AND METHODS

The research was carried out in Andhra Pradesh state. Two regions namely Rayalaseema and Coastal Andhra were selected and subsequently from each region two districts (Kurnool and Chittoor from Rayalaseema, Prakasam and Nellore from Coastal Andhra) were purposively selected based on dairy animals population and districts having more than one Krishi Vigyan Kendra (KVK) as criteria. From each district, two mandals were selected by grouping mandals under each respective KVK and then randomly selecting one mandal randomly from each group to ensure balanced representation of both operational areas. Two villages from each mandal were randomly chosen and from each village, 20 dairy farmers were chosen at random resulting in a total sample size of 320 dairy farmers. Statistical techniques such as frequency, percentage, arithmetic mean, standard deviation, Cumulative Square Root Frequency (CSRF) method and Pearson Correlation were used for analysing the data.

$$CSRF_i = \sum_{j=1}^i \sqrt{f_j}$$

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Here, CSRF<sub>i</sub> = Cumulative square root frequency upto i<sup>th</sup> class  
 f<sub>j</sub> = frequency of respondents in j<sup>th</sup> class  
 j = class number (1,2,3,...,n)  
 i = class up to which cumulative value is calculated.  
 Karl Pearson's coefficient of correlation (r) is given by

$$r = \frac{\Sigma(X - \bar{X})(Y - \bar{Y})}{\sqrt{[\Sigma(X - \bar{X})^2 \Sigma(Y - \bar{Y})^2]}}$$

Here, r is correlation coefficient  
 Σ is Summation  
 X and Y are Independent variable and Dependent variable respectively  
 X̄ and Ȳ are mean values of Independent and Dependent variables respectively

**RESULTS AND DISCUSSION**

**Age**

The results in table 1 showed that around 45.00 per cent of the dairy farmers belonged to middle aged group followed by old (34.69%) and young (20.31%) age groups. The possible explanation is younger generation showed limited interest in opting for farming as a profession, largely because of the perception that agriculture and related sectors are less profitable and involve physically demanding work. The results were in accordance with Bharath et al. (2025).

**Table 1:** Distribution of respondents according to their socio-personal variables (n=320)

SI. No	Variable	Category	Frequency	Percentage
1	Age	Young (< 35 years)	65	20.31
		Middle (36-50 years)	144	45.00
		Old (>50 years)	111	34.69
2	Sex	Male	214	66.88
		Female	106	33.12
3	Family Education status Mean: 6.68 SD: 3.44	Low (0 - 4.93)	92	28.75
		Medium (4.94 – 8.87)	134	41.88
		High (8.88 – 15.00)	94	29.37
4	Family size	Small (up to 4 members)	265	82.81
		Medium (5-7 members)	42	13.13
		Large (more than 7 members)	13	4.06
5	Experience in dairying Mean: 19.67 SD: 11.78	Low (0.50 – 13.44)	103	32.19
		Medium (13.45 – 30.05)	167	52.19
		High (30.06 – 52.00)	50	15.62

**Sex**

Table 1 indicated that majority (66.88%) of the sampled dairy farmers belonged to male category as against 33.12 per cent of them were females. The probable reason for this could be that, during the time of survey, the dairy activities were being carried out by men in the study area.

**Family Education status**

It was clear from Table 1 that, more than two-fifths (41.88%) of the households belonged to medium family education level. Around 29.37 per cent of them were under high and 28.75 per cent of them under low family education level. The results were in conformity with the findings of Sandeep et al. (2023).

**Family size**

Table 1 inferred that greater than three-fourth (82.81%) of the dairy farmers were having small family size (upto 4 members) followed by 13.13 per cent had medium (5-7 members) and 4.06 per cent were having large family size (more than 7 members). This could be attributed to the growing prevalence of nuclear family systems, increased awareness and adoption of family planning practices. The results are on par with Bansal and Joshi (2019) and Paliwal et al. (2025).

**Experience in dairying**

Table 1 revealed that more than half (52.19%) of them belonged to medium experience in dairying. Around 32.19 per cent of the dairy farmers had low and 15.62 per cent had high experience in dairying. It is obvious that age is directly related to experience, as majority were middle to old aged, the same has been reflected in experience. The results were in accordance with that of Suresh et al. (2022), who reported that majority had less than 25 years of experience.

**Occupation**

The data in Table 2 indicated that majority (83.75%) were engaged in dairy farming and agriculture as their occupation, followed by 6.25 per cent in dairy and as agricultural labour, 5.31 per cent only had dairy farming as their occupation and 4.69% were having business together with agriculture and dairy farming in the study area. For people living in rural areas, agriculture is their major occupation and dependable livelihood option because it is deeply rooted in their tradition. The fact that dairy farming is associated with regular income and its suitability for small landholdings, agriculture and dairy has become the major occupation for rural communities. The results were on par with Mousami (2014).

**Table 2:** Distribution of respondents according to their socio-economic variables (n=320)

SI. No	Variable	Category	Frequency	Percentage
1	Occupation	Dairy farming only	17	5.31
		Dairy farming + Crop farming	268	83.75
		Dairy farming + Agril. labour	20	6.25
		Dairy farming + Crop farming+ others	15	4.69

SI. No	Variable	Category	Frequency	Percentage
2	Herd size Mean: 6.80 SD: 4.84	Low (1.47 – 5.73)	151	47.19
		Medium (5.74 – 11.00)	138	43.12
		High (11.01 – 50.60)	31	9.69
3	Size of land holding	Landless	37	11.56
		Marginal (<1 ha)	92	28.75
		Small (1-2 ha)	75	23.44
		Small-medium (2-4 ha)	72	22.50
		Medium (4-10 ha)	43	13.44
		Large (>10 ha)	1	0.31
4	Annual Income Mean: 217218.75 SD: 65678.83	Low (₹ 1,05,000 - ₹ 191232.97)	120	37.50
		Medium (₹ 191232.98 – ₹ 260508.88)	142	44.38
		High (₹ 260508.89 - ₹ 504000)	58	18.12

**Herd size**

The data on the number of dairy animals (cows and buffaloes) were standardized and analysed in terms of Standard Animal Units (SAU), following the scoring framework recommended by Sirohi *et al.* (2019), to enable uniform comparison and assessment of herd size across the sample. The findings in Table 2 revealed that nearly half (47.19%) of the dairy farmers had low herd size followed by 43.12 per cent of them had medium and 9.69% had high herd size. It was because majority of the rural population had nuclear families, who were generally dependent on family labour instead of hired labour due to financial status and small land holdings. As a result, farmers tend to maintain smaller herds that were manageable and economically less risky. The findings were in accordance with Girish (2024).

**Size of land holding**

Table 2 revealed that around 28.75% of dairy farmers were having marginal size of land, followed by small (23.44%), small-medium (22.50%), medium (13.44%) and large (0.31%) size of land holding. Around 11.56 per cent of the sampled dairy farmers were landless. The possible explanation for this was due to limited financial resources among dairy farmers, inheritance-based fragmentation of agricultural land across generations and challenges in acquiring larger landholdings. Similar results were reported by Paliwal *et al.* (2025).

**Annual Income**

Table 2 indicated that around 44.38 per cent of the dairy farmers had moderate level of annual income, followed by 37.50 per cent under low level and 18.12 per cent under high level of annual income. This was due to most of them had low herd size coupled with marginal to small land holdings. The results were in confirmatory with that of Girish (2024).

**Table 3:** Distribution of respondents according to their communication and psychological variables (n=320)

SI. No	Variable	Category	Frequency	Percentage
1	Extension Contact Mean: 18.50 SD: 3.67	Low (11.00 – 16.38)	116	36.25
		Medium (16.39 – 21.12)	120	37.50
		High (21.13 – 26.00)	84	26.25
2	Innovativeness Mean: 14.97 SD: 3.20	Low (6.00 – 12.72)	87	27.19
		Medium (12.73 – 16.72)	118	36.87
		High (16.73 – 21.00)	115	35.94
3	Risk orientation Mean: 15.75 SD: 2.47	Low (9.00 – 14.01)	91	28.44
		Medium (14.02 – 16.78)	102	31.88
		High (16.79 – 20.00)	127	39.68
4	Orientation towards digitalization Mean: 15.73 SD: 2.89	Low (8.00 – 13.64)	78	24.38
		Medium (13.65 – 16.99)	93	29.06
		High (17.00 – 20.00)	149	46.56
5	Achievement motivation Mean: 16.62 SD: 2.82	Low (8.00 - 14.76)	57	17.81
		Medium (14.77 – 18.06)	196	61.25
		High (18.07 – 25.00)	67	20.94

**Extension Contact**

Table 3 revealed that, around two-fifths (37.50%) of the sampled farmers had medium level of extension contact, followed by low (36.25%) and high (26.25%) extension contact in the study area. Since most dairy farmers were middle aged and had good motivation to achieve, they try to get timely information from various connections which signifies better extension contact. The findings were in confirmatory with Paliwal *et al.* (2025).

**Innovativeness**

The findings in Table 3 inferred that around 36.87 per cent of the dairy farmers had medium innovativeness, followed by 35.94 and 27.19 per cent had high and low innovativeness respectively. Dairy farmers with better extension contact had greater access to information on emerging technologies and successful case studies that motivates them to adopt innovative approaches. The findings were in accordance with Singh (2018).

**Risk orientation**

Table 3 shown that nearly two-fifth (39.68%) of farmers had high risk orientation followed by 31.88 per cent had medium and 28.44 per cent had low risk orientation. A significant proportion of dairy farmers were under high level indicating their confidence and ability, gained through experience and diverse livelihood options, which motivated them to take

calculated risk. Similar findings were indicated by Raksha and Meera (2017).

**Orientation towards digitalization**

Table 3 indicated that nearly half (46.56%) of the sampled farmers had higher orientation towards digitalization, followed by 29.06 and 24.38 per cent under medium and low levels of orientation towards digitalization. Today, ICT tools have become indispensable in day-to-day life due to the

efficiency and convenience they offer. In farmers context, good extension contacts, greater participation in training programmes and the predominance of middle-aged farmers appear to be key factors contributing to this trend.

**Achievement motivation**

Table 3 showed that around 61.25 per cent of the respondents had moderate achievement motivation, followed by 20.94 and 17.81 per cent under high and low levels respectively.

**Table 4:** Correlation matrix showing relationships among profile characteristics and digital literacy (n=320)

	(X <sub>1</sub> )	(X <sub>2</sub> )	(X <sub>3</sub> )	(X <sub>4</sub> )	(X <sub>5</sub> )	(X <sub>6</sub> )	(X <sub>7</sub> )	(X <sub>8</sub> )	(X <sub>9</sub> )	(X <sub>10</sub> )	(X <sub>11</sub> )	(X <sub>12</sub> )	(X <sub>13</sub> )	(X <sub>14</sub> )
Age (X <sub>1</sub> )	1													
Family education(X <sub>2</sub> )	-0.196**	1												
Family size(X <sub>3</sub> )	0.011	.171**	1											
Occupation (X <sub>4</sub> )	-.125*	0.074	.119*	1										
Herd size (X <sub>5</sub> )	-.175**	.184**	0.051	0.013	1									
Size of land holding (X <sub>6</sub> )	-0.045	.173**	0.103	-0.066	.273**	1								
Experience in dairying (X <sub>7</sub> )	.584**	.008	0.054	0.081	-.137*	0.084	1							
Annual income (X <sub>8</sub> )	-.164**	.205**	0.101	.171**	.175**	.116*	-0.005	1						
Extension contact (X <sub>9</sub> )	-.366**	.300**	0.072	0.069	.215**	.191**	-.192**	.166**	1					
Innovativeness (X <sub>10</sub> )	-.226**	.238**	0.023	0.070	.176**	0.032	-0.056	.131*	.480**	1				
Risk Orientation(X <sub>11</sub> )	-.233**	.258**	0.025	-0.007	.209**	0.107	-0.099	0.077	.568**	.585**	1			
Orientation towards digitalisation(X <sub>12</sub> )	-.330**	.323**	0.025	0.088	.176**	0.097	-0.101	0.107	.601**	.606**	.670**	1		
Achievement motivation(X <sub>13</sub> )	-.214**	.207**	0.042	0.038	.095*	0.019	-0.084	0.031	.540**	.373**	.549**	.635**	1	
Digital Literacy (X <sub>14</sub> )	-.516**	.441**	0.001	0.063	.170**	.118*	-.263**	.205**	.578**	.380**	.389**	.549**	.394**	1

\*\* . Correlation is significant at the 0.01 level (2-tailed) and \* . Correlation is significant at the 0.05 level (2-tailed).  
**Values in coloured boxes had non-significant correlation (Green – Positively non-significant and Orange – Negatively non-significant)**

The predominance of middle-aged dairy farmers who have family responsibilities encouraged goal-oriented behaviour, resulted in medium motivation, which reflects a balanced approach that considers improvement with resource availability and livelihood security.

**Table 5:** Relationship between profile characteristics and digital literacy of dairy Farmers

S. No	Independent Variables	Digital literacy
		r value
1	Age (X <sub>1</sub> )	-0.516**
2	Family Education (X <sub>2</sub> )	0.441**
3	Family size (X <sub>3</sub> )	0.001 <sup>NS</sup>
4	Occupation (X <sub>4</sub> )	0.063 <sup>NS</sup>
5	Herd size (X <sub>5</sub> )	0.170**
6	Land holding (X <sub>6</sub> )	0.118*
7	Experience in dairying (X <sub>7</sub> )	-0.263**

S. No	Independent Variables	Digital literacy
		r value
8	Annual income (X <sub>8</sub> )	0.205**
9	Extension contact (X <sub>9</sub> )	0.578**
10	Innovativeness (X <sub>10</sub> )	0.380**
11	Risk orientation (X <sub>11</sub> )	0.389**
12	Orientation towards digitalisation (X <sub>12</sub> )	0.549**
13	Achievement motivation (X <sub>13</sub> )	0.394*

\*\* . Correlation is significant at the 0.01 level.  
 \* . Correlation is significant at the 0.05 level.  
 NS – non-significant

Table 5 revealed that the profile characteristics namely, family education, herd size, land holding, annual income, extension contact, innovativeness, risk orientation and orientation towards digitalization and achievement motivation had positive and significant correlation with the digital literacy of dairy farmers. The main reason could be the dairy farmers with good education background, innovativeness and positive orientation towards digitalization could better understand the latest digital tools and use them, resulting in higher digital literacy. The variables like herd size, land holding and annual income shown positive and significant relationship with digital literacy because these factors motivated dairy farmers to learn and use digital tools for obtaining information on agriculture and dairy sector. The variable risk orientation had shown significantly positive correlation because dairy farmers who were ready to take calculated risk in their farming, have greater probability of trying new innovations like digital tools and technologies for skill development. Extension contact enhances **digital literacy** by exposing farmers to various sources, digital platforms through demonstrations, trainings and guidance. Simultaneously, farmers with strong achievement motivation show a greater willingness to learn and practice digital skills, which strengthen their ability to access, understand, and effectively use digital information for improving farm performance, resulting in better digital literacy. The variables age and experience in dairying had negative and significant relationship with digital literacy because older and experienced dairy farmers were less inclined to adopt and use digital technologies due to lower familiarity and adaptability with digital tools than younger farmers.

## CONCLUSION

The findings highlight the key aspects of farmer's profile characteristics in shaping the adoption and effective use of digital extension services. Most respondents belonged to the middle-aged group with medium family education and showed a higher orientation towards digitalization, suggesting a greater likelihood of adopting digital services. Majority were dependent on dairy and agriculture with good herd size and medium income levels, suggesting strong potential for leveraging ICT-based extension services to enhance productivity. Medium to high levels of extension contact, innovativeness, risk orientation, and achievement motivation indicate farmer's receptiveness to timely and useful information for informed decision-making. The study revealed a positive and significant relationship between digital literacy and variables like family education, herd size, landholding, income, extension contact, innovativeness, risk orientation, digital orientation, and achievement motivation. Targeted capacity-building and training interventions focusing on these factors can substantially improve farmer's digital literacy and effective usage of digital extension services.

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