Relative Contribution of the Dairy Farmers' Socio-Economic Characteristics to their Knowledge Level about Anthrax Management

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ABSTRACT

Anthrax, a dreaded bacterial zoonotic disease seen in dairy animals, is caused by Bacillus anthracis and its eradication could only be possible by creating maximum awareness among dairy farmers, for their safety as well as the welfare of the animals. The present study was undertaken with the objective to assess the knowledge level of dairy farmers pertaining to anthrax disease management. A sum total of 240 respondents were selected for the study from 12 villages of Kerala State based on a multi-stage sampling technique. The knowledge level of the respondents was assessed using a pre-developed knowledge test. 44% of dairy farmers had high knowledge about anthrax. Education of the respondent (r = 0.360), land holding (r =0.286), experience in dairying (r =0.179), mass media exposure (r =0.407), and previous exposure to anthrax (r =0.214) was positive and significantly correlated with the knowledge level of the respondents pertaining to anthrax. The relative contribution of the socio-economic characteristics of the respondents with their knowledge level of anthrax was assessed using stepwise multiple regression analysis and seven variables viz. gender, main occupation, education of the respondent, land holding, experience in dairying, mass media exposure, and previous exposure to anthrax were found to be significant in explaining variations in knowledge of anthrax. The best fit prediction model was $Y=1.372+ 0.530 X2 - 0.459 X3 + 0.383 X5 + 0.730 X8 + 0.039 X10 + 0.309 X15 + 1.764 X18 + e$ and the coefficient of determination was found to be 58.90%.

Key Words: Dairy, Farmer, Knowledge, Anthrax, India, Kerala, Correlation, Regression

INTRODUCTION

Anthrax disease is zoonotic, which will affect humans as well as animals. It is an endemic disease in developing countries (Shivachandra *et al*, 2016). *Bacillus anthracis*, the causative organism for anthrax, and its spores can survive in the environment for several years even in adverse conditions, and initiate infection when favorable conditions arise. Humans get the infection from infected or dead animals accidentally or as an occupational hazard.

Anthrax disease eradication could only be possible by creating maximum awareness among the common people especially dairy farmers, for their safety as well as the welfare of the animals. Whatever would be the programme; its success would be depending on the knowledge level of farmers regarding the dreaded nature of the diseases, their preventive and control measures, and their impacts on the economy and health so that they could take necessary precautionary as well as preventive measures so that the objectives of the zoonotic disease eradication programme could be achieved. Knowledge has been recognized as a valuable organizational resource and an important factor for competitive advantage, effective organizational performance, and success whereas, knowledge management is considered to be a very

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Table 1. Socio-economic characteristics of the respondents   **n = 240**

Variable	Sr.No.	Category	Frequency	Percentage
Age in years	1	Young (<35)	16	6.67
	2	Middle (35-50)	99	41.25
	3	Old (>50)	125	52.08
Gender	1	Male	159	66.25
	2	Female	81	33.75
Primary Occupation	1	Petty jobs	22	9.17
	2	Agriculture	95	39.58
	3	Dairying	89	37.08
	4	Business	17	7.08
	5	Services	17	7.08
Secondary Occupation	1	No subsidiary occupation	60	25.00
	2	Petty jobs	5	2.08
	3	Agriculture	23	9.58
	4	Dairying	150	62.50
	5	Business	1	0.42
	6	Services	1	0.42
Education Status	1	Illiterate	16	6.67
	2	Can read-only	8	3.33
	3	Functional literates	36	15.00
	4	Lower primary school	28	11.67
	5	Upper primary school	34	14.17
	6	Secondary school	56	23.33
	7	Higher Secondary/ Pre-degree	35	14.58
	8	Graduate	27	11.25
	9	Post Graduate and above	0	0.00
Family Education Status in mean scores	1	Low (<3.56)	36	15.00
	2	Medium (3.56-5.49)	143	59.58
	3	High (>5.49)	61	25.42
Family Size in numbers	1	Small (1-2)	63	26.25
	2	Medium (3-4)	88	36.67
	3	Large (>4)	89	37.08

Landholding in hectares	1	Landless (No land)	0	0.00
	2	Marginal (Less than 1)	213	88.75
	3	Small (1-2)	21	8.75
	4	Medium (2-10)	6	2.50
	5	Large (More than 10)	0	0.00
Herd Size in herd units	1	Small (<2.16)	125	52.08
	2	Medium (2.16-5.62)	89	37.08
	3	Large (>5.62)	26	10.84
Experience in dairying in years	1	Low (<24)	173	72.08
	2	Medium (25-40)	49	20.42
	3	High (>41)	18	7.50
Total milk production in liters	1	Low (<16)	174	72.50
	2	Medium (16-31)	52	21.67
	3	High (>31)	14	5.83
Income from dairying in rupees	1	Low, <29000	149	62.08
	2	Medium, 29000-102500	62	25.83
	3	High,>102500	29	12.08
Annual income in rupees	1	Low, <55000	151	62.92
	2	Medium, 55000-159000	59	24.58
	3	High, >159000	30	12.50
Social participation of the respondent	1	No membership in any organization	129	53.75
	2	Membership in one organization	74	30.83
	3	Membership in more than one organizations	25	10.42
	4	Office bearer	12	5.00

Table 2. Distribution of dairy farmers based on their knowledge about anthrax. n=240

Sr. No.	Category	Score	Frequency	Percentage
1	Ignorant	0	23	9.58
2	Low	1	29	12.08
3	Medium	2-4	82	34.17
4	High	5-7	106	44.17

difficult task in the Indian scenario and become one of the foremost agendas in many research institutions and organizations (Kumar *et al*, 2018). The study was intended to analyze the knowledge level of farmers regarding anthrax disease affecting bovines, and the factors influencing it.

MATERIALS AND METHODS

Kerala State was purposefully selected for the study. The multi-stage sampling technique (Arya *et al*, 2018) was adopted for the study based on the agro-climatic zones of Kerala. There are five agro-climatic zones in Kerala. These are the north zone, central zone, south zone, high-altitude zone, and problem-area zone. The problem-area zone and high-altitude zone were not included because of this criterion. Thus, the north zone, central zone, and south zone were purposefully selected for the study. From the north zone, central zone, and south zone, those districts that were not overlapped with any other zones were selected for the sampling. Thus, from the north zone (Kasargod and Kozhikode), from the central zone (Thrissur and Ernakulam districts), and from the south zone (Kottayam, Kollam, Pathanamthitta and Thiruvananthapuram districts) were selected, and from each zona, one district was randomly selected for the purpose of the study. So, a total number of 3 districts were selected for the study, one taluk from each selected district and four villages from each selected taluk so a total number of 12 villages were selected for the study. The respondents of the study were those dairy farmers who had at least one lactating bovine at the time of data collection. Twenty respondents were randomly selected from each village. Thus, a total number of 240 respondents were selected for the study. The knowledge level of the respondents was assessed using a pre-developed knowledge test. By directly interviewing all 240 respondents, the data collected and were tabulated. Appropriate statistical tools were selected for the purpose of analysis depending on the data collected and analysis was done using SPSS 21.0

RESULTS AND DISCUSSION

Socio-economic profile of the dairy farmers

Results (Table 1) clearly indicated that majority (52.08%) of the dairy farmers, belonged to the old age category. The majority (66.25%) were males followed by females (33.75%). The dairy farmers who took agriculture as their main occupation were 39.58%. The major subsidiary occupation of dairy farmers was dairying (62.50%). Dairying is considered a secondary occupation, as an aid to agriculture. 25% were not having any subsidiary occupation.

Results indicated that most (23.33%) of the dairy farmers got a secondary level of schooling. There were no dairy farmers who had an education above graduate level under study. Illiterates were 6.67%. The data delivered the education level of the dairy farmers of Kerala State, where the majority had secondary schooling. The major thrust area was that around 90% of the dairy farmers were literate. This eases them even to understand some major complicated areas like livestock production management, and also reducing the efforts of extension agents in this sector.

The majority (59.58%) of dairy farmers were in the medium-family education category (3.56-5.49). Family education status had a great contribution to every family member's awareness and adoption of different practices where they share information with each other. The majority (37.08%) of the dairy farmers had more than four family members (large category). The majority (88.75%) of dairy farmers were marginal farmers. There were no landless or large farmers. The absence of landless dairy farmers as well as the presence of the majority of marginal farmers enlightened the scope of dairying in Kerala as it can be recommended in areas where land availability is less. The majority (52.08%) of dairy farmers had small herd sizes.

Majority (72.08%) of the dairy farmers had less experience in dairying which showed that they were newcomers to the sector and this may be due to the impact of more dairy development programmes in

Table 3. Rank order of the items regarding knowledge about anthrax n=240

Sr.No.	Items	Frequency	Percentage	Rank
1	Anthrax is a lethal disease.	212	88.33	I
2	It will affect both animals and humans	167	69.58	II
3	Infected animals will transmit anthrax to humans.	153	63.75	III
4	Death followed by oozing of tarry coloured blood from natural orifices is the main symptom.	120	50.00	IV
5	Those who handles meat has more chance to contract anthrax (like butchers, even house wives)	106	44.17	V
6	Don't open or sell carcass for slaughtering	106	44.17	VI
7	Preventive vaccines are available	85	35.42	VII

the State. Majority (72.50%) of the dairy farmers had low milk producers. This increased milk production of fewer than 16 liters even in the low category may be due to the high productivity of the milch animals of Kerala due to cross-breeding. Majority (62.08%) of the dairy farmers had low annual income from dairying and low gross income.

Majority (53.75%) of the dairy farmers responded haven't had membership in any organization, and only a negligible (5.00%) were office bearers of any organization. The data is very important considering the milk flow in the unorganized sector, where the majority didn't have membership even in milk cooperatives. Moreover, it could hinder the role of these organizations in ensuring the participation of dairy farmers in the knowledge management part of zoonotic disease eradication programmes.

Knowledge about anthrax

Results (Table 2) pointed out that 44.17% of dairy farmers had high knowledge about anthrax followed by medium (34.17%) and low (12.08%). But, 9.58% of the dairy farmers were totally ignorant about the disease. Anthrax is one of the most dreaded zoonotic diseases, so a thorough knowledge of it should be there among dairy farmers to safeguard human beings as well as animals. Majority (88.33%) of dairy farmers knew that anthrax is a lethal disease, it has effect on both animals and humans (69.58%), anthrax could be transmitted

from infected animals to humans (63.75%) (Table 3). It was even used as a biological weapon (Goel, 2015) which might have drawn media attention and because of the importance given by mass media and veterinary institutions after outbreaks in recent years in the study area (Mathrubhoomi, 2022), the dairy farmers might have a high level of knowledge pertaining to anthrax. The findings were similar to those of Rahman *et al* (2020) who mentioned that his respondents had a satisfactory level of knowledge regarding anthrax as well as of Dutta *et al* (2021) who opined that the majority of his survey participants (62.73%) had knowledge about anthrax.

Death followed by oozing of tarry-coloured blood from natural orifices as the main symptom was known to half of the respondents is a matter of serious concern. Unless the farmer couldn't identify the disease tentatively, it is very difficult for them to inform the veterinary institutions about this. The majority (55.83%) without knowledge still open or sell anthrax-infected carcasses. At times, when the death of animals was sudden, farmers would sell them for slaughter and as a result, the disease could be transmitted. Anthrax, being an occupational hazard, transmission could be much more possible in close occupational proximity (Goel, 2015), the datum majority of dairy farmers (55.83%) don't know that meat handlers' chance to contract anthrax is worth alarming.

Table 4. Stepwise multiple regression analysis of independent variables with dependent variable, knowledge about anthrax

Sr. No.	Independent variable	Correlation coefficient	Regression coefficient	Standard error	t- value
1	Gender (Male:1 and Female: 0)		0.530	0.263	2.014*
2	Main occupation		-0.459	0.127	-3.623**
3	Education status of the respondent	0.360**	0.383	0.079	4.855**
4	Land holding	0.286**	0.730	0.220	3.324**
5	Experience in dairying	0.179**	0.039	0.012	3.357**
6	Mass media exposure	0.407**	0.309	0.068	4.538**
7	Previous exposure to anthrax	0.214**	1.764	0.563	3.131**

* (P<0.05)   ** (P<0.01)   F=21.064**   Intercept = 1.372   R square = 58.90%

Prediction models to estimate the relative contribution of the socio-economic characteristics of the respondents with their knowledge level

In order to assess the relative contribution of each of the independent variables, the data were subjected to stepwise multiple regression analysis. It could be observed that all the seven variables viz. gender, main occupation, education of the respondent, land holding, experience in dairying, mass media exposure, and previous exposure to anthrax were found to be significant in explaining variations in knowledge of anthrax and all variables were positively and significantly related to the dependent variable, knowledge of anthrax. The multiple regression equation fitted to the data was $Y=1.372+ 0.530\ X_2 - 0.459\ X_3 + 0.383\ X_5 + 0.730\ X_8 + 0.039\ X_{10} + 0.309\ X_{15} + 1.764\ X_{18} + e$. The coefficient of determination was found to be 58.90%. This indicated that 58.90% of the total variability in the knowledge of anthrax could be attributed to the seven independent variables. It's worth mentioning that previous exposure to the disease as well as experience contributes to a higher level of knowledge pertaining to anthrax management. Mass media has a predictive role in knowledge dissemination as per the results, and it should take the lead role in disseminating information on vaccination for anthrax. Availability of preventive vaccines was known to only 35.42% of the respondents (Table 3). Economic characteristics like landholding have a positive predictable impact on knowledge management of anthrax. This may be because of the fact that the more the land held, the more will be chances to get into dairying, and more will be knowledge about diseases that could backstab the farmer. Personal characteristics like gender and education status have a positive and significant predictive effect on the knowledge level about anthrax. It is obvious that as the education level could be correlated with the knowledge level. The main occupation has a significant but negative predictive effect on anthrax management (correlation coefficient, -0.198, regression coefficient, -0.459) which may be due to the fact that around 40% of the respondents under study have agriculture as their primary occupation (Table 1).

CONCLUSION

Anthrax is one of the most dreaded zoonotic diseases, so a thorough knowledge of it should be there among dairy farmers to safeguard human beings as well as animals. But, 9.58% of dairy farmers were totally ignorant about the disease. The lack of awareness of the major symptoms leads the farmer to open the carcass before burial which may foster occupational hazards. Also, a lack of proper knowledge will also delay the reporting time to veterinary institutions. The positive and significantly correlated socio-economic characteristics of the

dairy farmers with their knowledge level pertaining to anthrax showed the areas where the extension agencies have to focus while planning awareness programmes. The coefficient of determination of the multiple regression equation fitted showed the contribution of identified independent variables to the knowledge level of the respondents. Proper and timely knowledge management activities from the side of veterinary /dairy organizations only could reduce the gravity of the issue. There is further scope for action research in knowledge management pertaining to anthrax.

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