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A study on predisposing factors for the prevalence of anaplasmosis in dairy cattle

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Abstract
The present study was conducted to assess the prevalence of anaplasmosis in cattle farms. The data were collected from 120 sample cattle owners selected from 6 blocks in 3 districts of North east zone of Tamil Nadu viz. Kancheepuram, Tiruvannamalai and Vellore districts. The data was collected from cattle farms with the incidence of anaplasmosis during the month of December 2013 to March 2014. A total of 60 anaplasmosis affected cattle farms were studied. The results of the study indicated that there was a significant association between age, sex, breed, season, acaricide application and prevalence. The prevalence was high in animals at the age group of 3 to 5 years (36.59 percent), females (29.71 percent), crossbred Holstein-Friesian cattle (32.38 percent), summer season (35.23 percent) and acaricide-not-used animals (33.62 percent). Hence, care should be taken on the affected animal instantly to avoid these losses. Thus, the losses due to these diseases in cattle could be prevented by application of scientific management practices and control over these predisposing factors. Further lack of knowledge to manage the diseased animals had resulted in avoidable economic losses. Thus, the appropriate policy suggestions have to be made to control of anaplasmosis in cattle and minimise the economic losses due to this disease.

Keywords: Anaplasmosis, predisposed factors, prevalence

1. Introduction
India has huge livestock population especially cattle (190.9 million), which accounts for 37.28 percent of the total livestock population [1]. Livestock capital is a very important element of the overall capital stock of world agriculture [2]. In India the livestock sector contribution is nearly 3.9 percent of total GDP and 25.85 percent of agriculture and allied activities. It is estimated that during the year 2011-12, the gross value of output from livestock sector, at current prices was INR 4,59,051 crores out of which milk and milk products were INR 3,05,484 crores and the meat was INR 83,641 crores [3]. Despite the advantages it offers to vulnerable poor farmers in areas of socio-economic hardships, dairy cattle rearing suffer from inherent constraints. Among the constraints, diseases pose a more serious threat to cattle production. The diseases spread by ticks are a major constraint to animal productivity while causing morbidity and mortality in animals [4]. An animal disease outbreak would have serious economic impact on producers. Anaplasmosis is the common diseases frequently encountered in India resulting greater economic loss [5]. Bovines are highly prone to tick borne diseases which is indirectly cause huge economic loss to farmers. There are hardly a few studies exist in the research literature focusing on the impact of these diseases in creating an economic loss. Thus, the objective of the study is to analyse various predisposing factors for the prevalence of anaplasmosis in dairy cattle.

2. Materials and Methods
For the present study, Kancheepuram, Tiruvannamalai and Vellore districts of North eastern zone of Tamil Nadu were purposively selected. Since these districts have a unique blend of milk shed, cattle population and high incidence of tick borne diseases like anaplasmosis among the cattle. From each of the selected districts, two blocks were selected by simple random sampling and from each block five villages were selected by simple random sampling and from each village; four cattle farms with the incidence of anaplasmosis were selected. Thus a total sample size for the study is 120 farms. The period of the study was from December 2013 to March 2014. The primary data for the study was collected through a well structured pre-tested interview schedule.

2.1 Statistical analysis

The collected data were analysed by conventional percentage and average analysis and chi square analysis to achieve the objectives of the study.

Chi-square analysis (χ^2) was used to test the Hypothesis, H_o: The factors are independent.

$$\chi^2 = \sum \frac{(f_o - f_e)}{f_e} \chi^2 = \sum \frac{f_o}{f_e} - N$$

Where,

$\chi 2$ = Chi-square statistic

fo = Observed frequency

fe = Expected frequency

N = Number of observation

The decision rule: reject Ho if $\chi 2 > \chi \alpha 2$ (K-1), where, α is the level of significance and K-1 is the degrees of freedom.

3. Results and Discussion

3.1 Age wise prevalence of anaplasmosis in cattle

The age wise prevalence of anaplasmosis is presented in Table 1. The chi-square analysis showed a highly significant (p<0.01) association between age of animal and prevalence of anaplasmosis. The prevalence rate was higher in cattle between the age of 3 to 5 years (36.59 percent) and followed by cattle above 5 years of age (16.67 percent) and those less than 3 years of age (22.95 percent). The young animals might receive humoral antibodies from their dam while those above 5 years age group animal might be immune following clinical infection.

Table 1: Age wise prevalence of anaplasmosis (in numbers)

Condition	Less than 3 years	3 to 5 years	Above 5 years	Overall
Affected	14 (22.95)	30 (36.59)	16 (16.67)	60 (25.10)
Non-affected	47 (77.05)	52 (63.41)	80 (83.33)	179 (74.90)
Total	61 (100.00)	82 (100.00)	96 (100.00)	239 (100.00)
χ^2	Between age and prevalence			9.53**

(Figures in parentheses indicate percentages to the respective total)

**significant (p<0.01)

3.2 Sex wise prevalence of anaplasmosis in cattle

The sex wise prevalence of anaplasmosis is presented in Table 2. The chi-square analysis showed a highly significant (p<0.01) association between sex of animal and prevalence of anaplasmosis. The prevalence rate was higher in the female animals (29.71 percent) than the male animals (12.50 percent). The reason for higher prevalence of both the tick-borne diseases in females could be attributed to the fact that females are kept for much longer period for breeding and milk production purposes[6] compared to their male counterpart.

Table 2: Sex wise prevalence of anaplasmosis (in numbers)

Condition	Male	Female	Overall
Affected	8 (12.50)	52 (29.71)	60 (25.10)
Non-affected	56 (87.50)	123 (70.29)	179 (74.90)
Total	64 (100.00)	175 (100.00)	239 (100.00)
χ^2	Between sex and prevalence		7.39**

(Figures in parentheses indicate percentage to respective total)

**significant (p<0.01)

3.3 Breed wise prevalence of anaplasmosis in cattle

Chi-square analysis revealed a significant (p<0.01) association between breed of animal and prevalence of anaplasmosis (Table 3). The prevalence of anaplasmosis was higher in crossbred Holstein-Friesian cattle (32.38 percent) followed by crossbred Jersey cattle (29.51 percent), Indigenous pure breed (11.54 percent) and Non-descript breed (10.64 percent) cattle. Similar results were reported by Alim *et al*., [7]. It could be inferred that native and indigenous breeds possess certain degree of immunity to both tick infestation and in turn to such diseases transmitted by them and probably were less affected compared to crossbred cattle. The higher prevalence of the anaplasmosis in clinically normal crossbred cattle of south India indicated the subclinical infections or carrier status of these vector borne diseases. Though the carrier animal does not exhibit any symptoms; they remain act as a silent source of infection [8].

Table 3: Breed wise prevalence of anaplasmosis (in numbers)

Condition	Crossbred Holstein-Friesian	Crossbred Jersey	Non-descript	Indigenous pure bred	Overall
Affected	34 (32.38)	18 (29.51)	5 (10.64)	3 (11.54)	60 (25.10)
Non-affected	71 (67.62)	43 (70.49)	42 (89.36)	23 (88.46)	179 (74.90)
Total	105 (100.00)	61 (100.00)	47 (100.00)	26 (100.00)	239 (100.00)
χ^2	Between breed and prevalence				11.36**

(Figures in parentheses indicate percentage to respective total)

**significant (p<0.01)

3.4 Season wise prevalence of anaplasmosis in cattle

The prevalence of anaplasmosis in different seasons is presented in Table 4. Chi-square analysis revealed highly significant (p<0.01) difference in the prevalence of anaplasmosis during various seasons of year in cattle. The prevalence was more in summer season (35.23 percent), followed by rainy season (22.88 percent) and winter season (6.06 percent). These results were in accordance with the studies by Atif *et al*. [9] and Alim *et al*., [7].

These diseases were found more frequently during summer months because ticks and blood sucking flies, which are more prevalent in summer and rainy season whereas in winter season it might be due to the iatrogenic transmission.

Table 4: Season wise prevalence of anaplasmosis (in numbers)

Condition	Winter	Summer	Rainy	Overall
Affected	2 (6.06)	31 (35.23)	27 (22.88)	60 (25.10)
Non-affected	31 (93.94)	57 (64.77)	91 (77.12)	179 (74.90)
Total	33 (100.00)	88 (100.00)	118 (100.00)	239 (100.00)
χ^2	Between season and prevalence			11.47**

(Figures in parentheses indicate percentage to respective total)
**significant ($p<0.01$)

3.5 Acaricide application and prevalence of the diseases

Table 5 presents the relationship between acaricide application and prevalence of anaplasmosis in cattle. The prevalence was more in cattle that was not treated with an acaricide (33.62 percent) when compared to those cattle treated with acaricide (17.07 percent). The Chi-square analysis revealed highly significant ($p<0.01$) relationship between prevalence and acaricide use in cattle. Significantly lower prevalence of anaplasmosis in acaricide applied animals showed the importance of acaricide application in the control of anaplasmosis through indirectly controlling of the vector ticks.

Table 5: Relationship between acaricide application and prevalence of anaplasmosis (in numbers)

Condition	Acaricide used	Acaricide not used	Overall
Affected	21 (17.07)	39 (33.62)	60 (25.10)
Non- affected	102 (82.93)	77 (66.38)	179 (74.90)
Total	123 (100.00)	116 (100.00)	239 (100.00)
χ^2	Between Acaricide application and prevalence		8.69**

(Figures in parentheses indicate percentages to the respective total)
**significant ($p<0.01$)

4. Conclusion

The present study concluded that there was a significant association between age, sex, breed, season, acaricide application and prevalence. The prevalence was high in animals at the age group of 3 to 5 years, females, crossbred Holstein-Friesian cattle, summer season and acaricide-not-used animals. Hence, care should be taken on the affected animal instantly to avoid these losses. Thus, the losses due to these diseases in cattle could be prevented by application of scientific management practices and control over these predisposing factors. Further lack of knowledge to manage the diseased animals had resulted in avoidable economic losses. Thus, the appropriate policy suggestions have to be made to control of anaplasmosis in cattle and minimise the economic losses due to this disease.

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