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Original Research

A Study on Factors Influencing Economic Losses Due to Downer Cow Syndrome in Dairy Farms in Selected Districts of Tamil Nadu

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Abstract

Livestock diseases particularly metabolic disorders especially downer cow syndrome in dairy animals cause reduction in production efficiency leading to severe economic losses. A downer cow is one down for at least 24 hours without apparent reason for being down. For the study, 67 downer cow syndrome female bovines were selected through multistage random sampling technique from Namakkal and Karur districts of Tamil Nadu. The collected data were analyzed by using multiple linear regression model. Among different independent variables, the late stage of lactation, milk yield and season summer were found to be highly significant (P≤0.01) association with economic losses due to downer cow syndrome. The coefficient of average daily milk yield per animal (18.199) indicated that the economic losses due to downer cow syndrome would increase by Rs.18.20 per affected animal as the average daily milk yield of the animal increases by one litre of milk from its mean level.

Keywords: Downer Cow, Metabolic Diseases and Multiple Linear Function

Introduction

The livestock sector particularly dairy farming plays a significant role in securing the livelihood of rural farmers by providing income and employment generation in rural areas. However, this sector is facing several disease problems due to introduction of exotic germ plasm for higher productivity and changing global climate which cause huge economic loss resulting from mortality and low productivity of animals (Singh and Shivprasad, 2008). Due to disease outbreak, there has been a significant fall in investment in livestock sector, less efficient resource use, declining growth in the partial and total factor productivity, increasing inter and intra-regional disparities, persistence of wide spread poverty and malnutrition and an alarming natural resource degradation and need of faster stock replacement rates, all of which requires additional commitment of financial as well as personnel resources (Rupasitiwari *et al.,* 2013). Control and treatment of diseases also add to the additional economic losses. India loses Rs.20,000 crore per year due to the uneconomic performance of the animals because of adverse effect of some diseases (Mathur and Dubey, 1994). Livestock diseases particularly metabolic disorders in dairy animals cause reduction in production efficiency leading to severe economic losses (John Christy and Thirunavukkarasu, 2006).

Downer cow syndromes are resulting from hypocalcaemia with demonstrable muscle, tendon or nerve injuries (Littledike *et al.,* 1981). Downer cow syndrome is defined that the animal down for at least 24 hours without apparent reason (Cox *et al.,* 1986 and Raja *et al*., 2018). Analyzing the various causative factors involved in downer cow syndrome is important to help in understanding the effective management and prevention of this disease, which can aid in losses to be avoided in dairy farming. Keeping the above facts in view, the objective of this study is to analyse the various causative factors involved in the occurrence of downer cow syndrome in Namakkal and Karur districts of Tamil Nadu.

Materials and Methods

For the study, 67 downer cow syndrome female bovines were selected through multistage random sampling technique from Namakkal and Karur districts of Tamil Nadu. Affected dairy animals were identified by case registers of veterinary dispensaries and clinics of Veterinary College and Research Institute, Namakkal and practicing private veterinary doctors in both districts. This study is based on the primary data collected through personal interviews with the farmers using pre tested interview schedule. The data collected from the sample respondents included information on size of animal holdings, breed, parity, stage of lactation, frequency of occurrence, stage of calving, feeding practices, number of days illness, system of rearing, milk yield, season of disease occurrence and production losses were also collected. A multiple linear regression function of the following form was fitted to study the factors influencing economic loss due to downer cow syndrome in dairy farms.

$$Y_j = a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b_5X_5+b_6X_6+b_7X_7+b_8X_8+b_9X_9+U_j$$

Where,

Yj = Per animal annual economic loss due to downer cow syndrome
a, bi = Coefficients to be estimated
Uj = Error term

The description of variables used in multiple linear regression analysis for downer cow syndrome in dairy animals is presented in Table 1.

Table 1: Description of variables used in multiple linear regression analysis for downer cow syndrome in dairy animals

Explanatory variables	Levels	Specifications	X_i
Stage of lactation [a]	Early stage; Mid stage; Late stage	1-if Mid; 0-Otherwise	X_1
		1-if Late; 0-Otherwise	X_2
Parity (Order of lactation)	Continuous	In number of calving	X_3
Season [b]	Summer; Winter; Monsoon	1-if Summer; 0-Otherwise	X_4
		1-if Winter; 0-Otherwise	X_5
Number of days illness	Continuous	In number of days ill	X_6
Average daily milk yield	Continuous	Litres per day	X_7
Species of dairy animal	Cow; Buffalo	1-if Cow; 0-Otherwise	X_8

[a] Reference category: Early lactation; [b] reference category: monsoon.

Results and Discussion

The demographic profiles of sample respondents are shown in Table 2. A total of 67 respondents were selected for this study all the respondents are having downer cow affected animal, among which 32 from Namakkal and 35 from Karur districts. Among total respondents of Namakkal district, about 50 per cent belonged to small farmer category followed by marginal farmers (about 18 per cent), large farmers (about 22 per cent) and landless labourers (10.00 per cent). The distribution pattern of sample respondents in Karur district was in the order of small farmers (40.00 per cent), marginal farmers (22.86 per cent), large farmers (22.86 per cent) and landless labourers (14.28 per cent). About 40 per cent of the sample respondents were illiterates and around 25 per cent had collegiate education in Namakkal district. The primary and secondary level educated respondents of both districts were contributed about 20.90 per cent and 17.91 per cent of the total sample respondents.

Table 2: Demographic profile of sample respondents (in numbers)

District	Land holding					Educational status				
	LL	MF	SF	LF	Total	I	P	S	C	Total
Namakkal	3 (9.37)	6 (18.75)	16 (50)	7 (21.88)	**32 (100)**	13 (40.62)	6 (18.75)	5 (15.63)	8 (25)	**32 (100)**
Karur	5 (14.28)	8 (22.86)	14 (40)	8 (22.86)	**35(100)**	15 (42.86)	8 (24.44)	7 (22.86)	5(14.29)	**35(100)**
Total	**8 (11.94)**	**14(20.9)**	**30 (44.77)**	**15 (22.39)**	**67 (100)**	**28 (41.79)**	**14 (20.9)**	**12 (17.91)**	**13 (19.4)**	**67 (100)**

Figures in parentheses indicate percentage to total; Land holding: Marginal *farmers - up to 2.5 acres; Small farmers - 2.5 to 5 acres; Large farmers - more than 5 acres. Educational status: I-Illiterate; P-Primary; S-Secondary; C-Collegiate.*

Based on the results of ANOVA, linear regression models were fitted for downer cow syndrome to assess the contribution of different factors to the economic loss arising due to downer cow syndrome in dairy animals and the results are presented in Table 3. On perusal of the Table 3, it could be noted that the computed F-value of the function was 12.307 and it statistically significant at one per cent level ($P \leq 0.01$). This indicating the definite statistical relationship exists between the dependent variable and the independent variables. The 'F' statistic showed that the estimated regression model fitted the data well. The coefficient of multiple determinations (adjusted R^2) in the model fitted for downer cow syndrome was 0.578 which implied that the model was a good fit and that about 57.80 per cent of the variation in the dependent variable, i.e., economic losses due to downer cow syndrome could be explained by the chosen independent variables.

Table 3: Regression coefficients of linear models fitted to analyse the factors influencing downer cow syndrome in dairy animals

Variables	Estimated elasticity coefficients	Standard error	t statistics	Probability level
Constant	1799.154	138.007	13.037	0
X_1 = Mid Stage of lactation	-95.898	56.572	-1.695	0.095
X_2= Late Stage of lactation	264.932**	50.897	5.205	0
X_3= Order of lactation	90.569*	37.226	2.433	0.018
X_4= Season summer	251.496**	67.576	3.722	0
X_5= Season winter	96.631*	47.01	2.056	0.044
X_6 = Number of days illness	17.725	11.479	1.544	0.128
X_7 = Milk yield	18.199**	6.655	2.735	0.008
X_8= Species	-93.33	67.04	-1.392	0.169
Adjusted R^2	0.578			
F statistic	12.307**			
N	67			

*(Dependent variable Y = Economic loss due to downer cow syndrome in dairy animals); *Significant at five per cent level (P≤0.05); **Significant at one per cent level (P≤0.01)*

The independent variables were order of lactation, mid stage of lactation, late state of lactation, milk yield, season summer, season winter, number of days illness and species taken as explanatory (independent) variables. Among different independent variables, the late stage of lactation, milk yield and season summer were found to be highly

significant (P≤0.01) association with economic losses due to downer cow syndrome. The variables such as order of lactation and season winter were observed to be significant at five per cent level (P≤0.05). The other variables viz., mid stage of lactation, number of days illness and species were found to be non-significant.

The coefficient of variable of late stage of lactation, showed that for every one late stage of lactation, indicated that the economic losses due to downer cow syndrome would increase by Rs.264.932 per affected animal from its mean level. Erb *et al.* (1984) reported that the downer cow was more common within 15 days postpartum. The coefficient of average daily milk yield per animal (18.199) indicated that the economic losses due to downer cow syndrome would increase by Rs.18.20 per affected animal as the average daily milk yield of the animal increases by one litre of milk from its mean level. It was similar with the study of Erb and Grohn (1988), stated that high milk yield animals were at higher risk of milk fever and downer cow syndrome (Lucey *et al*., 1986 and Rajala-Schultz *et al.*, 1999), who stated that the milk fever and downer cow syndromes were observed to be maximum in more than 15.1 litres yield category in both cows, buffaloes and overall bovines.

Similarly, the estimated elasticity coefficient for summer season showed that presence of summer season, indicated that the economic losses would increase by Rs.251.496 per downer cow affected animal from its mean level. Erb and Grohn (1988) had found that the significant association between downer cow syndrome and season for which the highest risk might be the summer. Heat stress and green fodder shortage in addition to specific etiological factors might be the reason for the occurrence of downer cow syndrome during summer season. Soto *et al.* (2003) stated that the heat stress is a common condition predisposing dairy cattle to eat less and be more susceptible to metabolic diseases. Thirunavukkarasu *et al.* (2010) selected the same parameters for analyzing these downer cow syndromes in dairy farms were in accordance with the metabolic disease analysis. The coefficient of elasticity for order of lactation and season winter were 90.569 and 96.631 respectively and these two variables are significant at five per cent level and had influence over occurrence and economic losses of downer cow syndrome in dairy farms.

Conclusion

The results of this study, revealed that the farmer should take of their animal and nutritive feed supplement during late stage of lactation, high milk yielding animals and summer season, hence, these variables were found to be highly significant. As it analyzing these factors involved in downer cow syndrome causes economic losses in dairy farms, will aid the researchers, planners and policy makers to design suitable policy decisions and appropriate preventive measures to combat this disease. Creating awareness about the important of this disease and nutritive values of various commonly used feed ingredients at field level through extension programmes to minimize this disease loss.

Conflict of Interests

There is no conflict of interest.

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References

1. Cox, V.S., Marsh, W.E., Steuernagel, G.R., Fletcher, T. F. & Onapito, J.S. (1986). Downer cow occurrence in Minnesota dairy herds. *Preventive Veterinary Medicine*, 4, 249.
2. Erb, H.N., Smith, R.D., Hillman, R.B., Powers, P.A., Smith, M.C., White, M.E. & Pearson, E.G. (1984). Rates of diagnosis of six diseases of Holstein cows during 15 day and 21-day intervals. *American Journal of Veterinary Research,* 45, 333.
3. Erb, H.N & Grohn, Y.T. (1988). Epidemiology of metabolic disorders in the peri parturient dairy cow. *Journal of Dairy Science*, 71, 2557-2571.
4. JohnChristy, R. & Thirunavukkarasu, M. (2006). Emerging importance of animal health economics–a note. *Tamil Nadu Journal of Veterinary and Animal Sciences*, 2(3), 113-117.
5. Littledike, E.T., Young, J.W. & Beitz, D.C. (1981). Common metabolic diseases of cattle: ketosis, milk fever, grass tetany and downer cow complex. *Journal of Dairy Science*, 64, 1465.
6. Lucey, S., Rowlands, G.J. & Russell, A. (1986). Short term associations between disease and milk yield of

dairy cows. *Journal of Dairy Research*, 53, 7-15.
7. Mathur, P.B & Dubey, S.C. (1994). Infectious diseases. Sheep and goat diseases, ICAR, New Delhi, pp. 25-50.
8. Raja, S., A. Vijayarajan, M. Palanisamy, V. Prabaharan, R. Rajkumar and P. Jayaganthan. (2018). An overview of peripartum downer cow and its fertility. *Indian Farmer*, 5(06): 608-614.
9. Rajala-Schultz, P.J & Grohn, Y.T. (1999). Culling of dairy cows: part 1. Effects of diseases on culling in Finnish Ayrshire cows. *Preventive Veterinary Medicine*, 41, 195-208.
10. Rupasitiwari, Sharma, M.C., Mishra, K.K. & Singh, B.P. (2013). Economic impacts of infectious diseases of livestock. *Indian Journal of Animal Sciences*, 83, 316-320.
11. Singh, B & ShivPrasad. (2008). Modelling of economic losses due to some important diseases in goats in India. *Agricultural Economics Research Review*, 21, 297-302.
12. Thirunavukkarasu, M., Kathiravan, G., Kalaikannan, A. & Jebarani, W. (2010). Quantifying economic losses due to milk fever in dairy farms. *Agricultural Economics Research Review*, 23, 77-81.

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