FACTORS INFLUENCING ECONOMIC LOSSES DUE TO MILK FEVER IN DAIRY ANIMALS

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ABSTRACT

A study was conducted to assess the factors influencing the economic losses due to milk fever by gathering data from a random sample of 557 milk fever affected bovines (516 cows and 41 she buffaloes), from five districts of Tamil Nadu viz., Coimbatore, Erode, Madurai, Vellore and Villupuram, during 2005-08. A multiple linear regression function was fitted to assess the contribution of different factors to the economic losses due to milk fever in dairy animals. R² of the model fitted indicated that 62.40 per cent of the variation in economic losses due to milk fever could be explained by the chosen independent variables. The estimated regression coefficients of average daily milk yield, order of lactation and duration of illness were significant. The coefficient of average daily milk yield animal indicated that economic losses due to milk fever would increase by Rs.47.98, as the milk yield increases by one litre from mean level. The coefficients of variables - order of lactation and duration of illness - implied that economic losses due to milk fever would increase by Rs.56.34 and Rs.145.89, as the order of lactation and duration of illness increase by one unit, respectively.

INTRODUCTION

Milk fever, a metabolic disease occurring within one or two days after calving, occurs as a result of rapid synthesis of milk, draining a greater amount of calcium from blood, is considered economically important, as it results in huge reduction in milk output. If left unattended to, the affected animals may even succumb to the disease, taking the loss to the proportions unable to be tolerated by poor farmers. However, there are not many studies available on the attributes that have an effect on the monetary losses arising from milk fever. Hence, this study was conducted to assess the factors influencing the economic losses due to milk fever.

MATERIALS AND METHODS

The study was conducted in five milkshed districts of the State viz., Coimbatore, Erode, Madurai, Vellore and Villupuram. A random sample of 557 milk fever affected bovines (516 cows and 41 she buffaloes), spread across the five identified districts of Tamil Nadu, were selected for data gathering for the study. The data were collected using the pretested interview schedule during the period from August 2005 to June 2008. For assessing the economic losses caused by milk fever, cost of treatment (including the cost of medicines, veterinarian’s fee for treating the animals at their home / farm or at veterinary institutions, wages incurred to the additional labour to take them to veterinary centres and to look after them and also the cost of feed supplements to bring their ailing
animals back to their original milk yield), value of reduced milk output (calculated by multiplying the quantum of lost milk in litres during the disease period by the profit per litre of milk), value of animals dead and cull value of animals sold out (mortality and culling loss), if any, were all taken into consideration.

**Multiple Linear Regression**

A multiple linear regression function was fitted taking the economic loss per animal due to milk fever as dependent variable and the factors influencing the economic losses as explanatory variables. The choice of linear function was guided by the analysis of scatter diagram. The planned mathematical model was as below:

\[ Y = a + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + U_j \]

Where,

- \( Y \) = Economic loss per affected animal due to milk fever
- \( X_1 \) = Species dummy (= 1 if cow, = 0 if buffalo)
- \( X_2 \) = Breed dummy (= 1 if exotic or crossbred cow/Murrah or graded buffalo, = 0 if otherwise)
- \( X_3 \) = Average daily milk yield per animal in litres
- \( X_4 \) = Order of lactation (\( X_4 = 1, 2, 3, 4, \ldots \))
- \( X_5 \) = Duration of illness (from onset of disease to cure) in days
- \( a, b_i \) = Coefficients to be estimated and \( U_j \) = Error term

**RESULTS AND DISCUSSION**

**Economic losses due to milk fever**

Table 1 presents the economic losses incurred by the farmers on each milk fever affected dairy animal. One of the most immediate economic losses is the money the farmers spent on treating their ailing animals. It could be seen that the farmers lost Rs.617.67 per each cow affected by milk fever on treating them. The loss due to treatment of milk fever affected buffaloes was slightly less at Rs.488.09. The value of the milk lost was estimated to be Rs.345.99 per affected cow, based on the price of milk (ranging from Rs.7.50 to Rs.11.50 per litre) existing in the study areas concerned. The loss due to milk reduction in buffaloes affected due to milk fever was however less (Rs.177.45 per affected animal) compared to cows. Kossaibati and Esslemont (1997) also investigated the economic losses due to milk fever in Holstein cows and observed a loss of £40 for a mild case and £100 for a severe case of milk fever. Rajala-Schultz et al. (1999) studied the effects of milk fever on milk yield in Finnish Ayrshire cows and observed that the milk loss varied between 1.1 and 2.9 kg per day as a result of milk fever.

In general, mortality of animals affected by milk fever is rare. This may be due to the fact that affected animals can be successfully treated with calcium injections. Occasionally, some of the animals do not regain their earlier production potential prior to the disease in terms of milk yield. However, the decline in productivity of the affected animals usually calls for the need to cull them, as rearing or managing them further becomes more and more uneconomical for the farmers. Hence, culling of such animals becomes imperative for the farmers to avoid further losses. As no mortality and culling were
<table>
<thead>
<tr>
<th>Species</th>
<th>Number of affected animals</th>
<th>Loss due to treatment (Rs.)</th>
<th>Loss due to milk loss (Rs.)</th>
<th>Loss due to mortality and culling (Rs.)</th>
<th>Total (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle</td>
<td>516</td>
<td>617.67 (57.80)</td>
<td>345.99 (32.37)</td>
<td>105.04 (9.83)</td>
<td>1068.70 (100.00)</td>
</tr>
<tr>
<td>Buffalo</td>
<td>41</td>
<td>488.09 (73.34)</td>
<td>177.45 (26.66)</td>
<td>-</td>
<td>665.54 (100.00)</td>
</tr>
<tr>
<td>Overall</td>
<td>557</td>
<td>608.13 (58.53)</td>
<td>333.58 (32.11)</td>
<td>97.31 (9.36)</td>
<td>1039.02 (100.00)</td>
</tr>
</tbody>
</table>

Figures in parentheses indicate percentages to total.

Table 1: Estimated economic losses due to milk fever per affected animal

observed in buffaloes, no details relating to buffaloes are presented in the table. Only two of the milk fever affected cows and two of the calves of the milk fever affected cows died. The average loss per milk fever affected cow due to mortality was thus only Rs.105.04.

All these individual loss components led to a total loss of Rs. 1,068.70 per milk fever affected cow and Rs.665.54 in buffaloes. It can be discerned from this that more than half (57.80 per cent) of the total loss had resulted from treating the affected cows, while around 3/4th (73.34 per cent) of the total loss coming from this component in case of buffaloes. It needs to be emphasized that treating milk fever affected animals is the first and foremost activity that needs to be undertaken when the signs of this disease are first noticed, without which it is possible that the farmer(s) might lose more milk or even lose their animal(s). Hence, giving top priority to treating affected animals, incurring a relatively huge cost, is not an over emphasized priority among the farmers, considering the opportunity cost of this option.

Loss due to milk yield, though contributes only 32.37 and 26.66 per cent to total loss in cows and buffaloes, respectively, is not insignificant. There could also be a possible inverse relationship between treatment cost and milk loss, because if one fails to offer an appropriate treatment to the affected animals, may be at a relatively a high cost, the loss due to reduction in milk yield might increase manifold that could be even more alarming to the farmers. As already stated, the loss due to mortality and culling of affected animals is not that significant, but is likely to mount to serious losses that might be really frightening and shocking, if the
Factors influencing economic losses due to milk fever

A linear regression analysis was carried out to assess the contribution of different factors to the economic losses arising due to milk fever in dairy animals and the results are presented in Table 2. The coefficient of multiple determination (R²) in the model fitted for milk fever was 0.624. It implied that the model was a good fit and that 62.40 per cent of the variation in the dependent variable, i.e., economic losses due to milk fever, could be explained by the chosen independent variables. The ‘F’ statistic also showed that the estimated regression model fitted the data well.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Estimated Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>-310.604</td>
</tr>
<tr>
<td>Species dummy (X₁)</td>
<td>44.891</td>
</tr>
<tr>
<td>Breed dummy (X₂)</td>
<td>19.844</td>
</tr>
<tr>
<td>Average daily milk yield in litres of the animal (X₃)</td>
<td>47.978**</td>
</tr>
<tr>
<td>Order of lactation (X₄)</td>
<td>56.339**</td>
</tr>
<tr>
<td>Duration of illness (X₅)</td>
<td>145.894**</td>
</tr>
<tr>
<td>Co-efficient of multiple determination (R²)</td>
<td>0.624</td>
</tr>
<tr>
<td>Adjusted R²</td>
<td>0.621</td>
</tr>
<tr>
<td>F Statistic</td>
<td>183.530**</td>
</tr>
<tr>
<td>N</td>
<td>557</td>
</tr>
</tbody>
</table>

(Figures in parentheses indicate standard errors) ** Significant (P<0.01)

Factors influencing economic losses due to milk fever

The estimated regression coefficients of three variables, viz., average daily milk yield, order of lactation and duration of illness, included to explain the variations in losses due to milk fever were found to be significant (P ≤ 0.01). The other factors, species and breed, though positively affected the losses in the model, had not however significantly influenced the losses due to milk fever. The coefficient of average daily milk yield per animal (47.978) indicated that economic losses due to milk fever would increase by Rs 47.98 per affected animal, as the average daily milk yield of an animal increases.

affected animals are not effectively attended to through efficient treatment.
by one litre from its mean level. The coefficient of
variable - order of lactation was 56.339, which
implied that economic losses due to milk fever would
increase by Rs.56.34 as the order of lactation
increases by one unit from its mean value. The
coefficient of duration of illness (145.894) indicated
that, as the duration of illness extends by one day
from its mean level, the economic losses are liable
to increase by Rs.145.89 per affected animal.

CONCLUSIONS

As the economic losses arising out of milk
fever are significantly and positively influenced by
the milk yield and the order of lactation of the animal,
the farmers need to be advised to exercise extra
cautions to prevent milk fever in their animals when
they are high yielders and or when their number of
calvings increases. It can also be discerned from
the results of this study that the farmers can reduce,
if not unable to totally avoid, their losses arising
from milk fever, if they can treat their animals
immediately or sufficiently in time, as the duration
of illness significantly influences the economic loss.

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