EFFECT OF STAGES AND LEVEL OF MILK PRODUCTION ON MASTITIS INCIDENCE IN COWS AND MURRAH BUFFALOES

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ABSTRACT

The experimental data on mastitis incidence was collected from the cows and buffaloes to find out the incidence of mastitis as influenced by stages of lactation and level of milk production. The incidence of mastitis was more in early and mid stages of lactation in comparison to late stages of lactation. The stages of lactation and level of milk production significantly (P<0.05) influence mastitis incidence in crossbred cows and buffaloes but indigenous cows (Sahiwal and Tharparkar) behaved differently. It was concluded that mid and early stages of lactation are very prone to mastitis incidence. Therefore better care is required to minimize mastitis incidence in high yielding cows and buffaloes in this stage.

Keywords: Mastitis, stage of lactation, level of milk production, cows and buffaloes.

Number of Tables : 4
Number of References : 23
INTRODUCTION
Mastitis, an inflammation of the mammary gland, is a complex and costly disease in dairy herds (Beheshti et al., 2010). It stands second to foot and mouth disease as most challenging disease in high yielding dairy animals (Varshney and Mukherjee, 2002), while it stands at first position due to high prevalence rate (90%) in high yielding dairy cows and causes huge economics loss in dairy herds of developing and developed countries (Sharma et al., 2007). The losses due to mastitis are not only economic, but issues such as animal health and welfare, milk quality, antibiotic usage and the image of the dairy sector are important reasons to focus on mastitis control.

The present investigation was undertaken to estimate the incidence of clinical mastitis during different stages of lactation and at different level of milk production in crossbred (Karan Fries and Karan Swiss), indigenous (Sahiwal and Tharparkar) cows and Murrah buffaloes.

MATERIALS AND METHODS
The data on mastitis incidence was collected from institute livestock farm for a period of twelve years (2000-2011). Lactation records (n=6251) comprising Karan Fries, KF (n=2553), Karan Swiss, KS (n=351) Sahiwal (n=1554), Tharparkar, TP (n=323) cows and Murrah buffaloes, Mu. (n=1470) were grouped based on milk yield and stages of lactation. The data was classified into 3 production groups (low producer, medium producer and high producers) based on lactation milk yield (LMY) of all completed lactations. Animals that had LMY greater than the herd average +1 standard deviation (SD) were defined as high yielders, animals with LMY within the herd average ±1SD considered as medium yielders and those with LMY lesser than herd average –1SD were treated as low yielders. A binary response variable was created for the disease. If a cow got infected with the disease at least once in lactation, a response of “1” was attributed to the record. A healthy record with a response of “0” was created for a cow that was never recorded for the disease.

The number of days in milk at the time of onset of mastitis was considered to define the stage of lactation for each animal. The lactation data was partitioned as early lactation (up to 90 days), mid lactation (91 to 180 days) and late lactation (181 days & above) and analysed statistically by chi-square method.

\[ \text{Chi-square} = \sum \frac{(O - E)^2}{E} \]

Where, \( O \) = Observed frequencies and \( E \) = Expected frequencies.

The Expected frequencies was calculated as: \( E_{ij} = \frac{(R_i \times C_j)}{GT} \)

where: \( R_i \) = \( i^{th} \) row total; \( C_j \) = \( j^{th} \) column total; \( GT \) = Grand total.

RESULTS & DISCUSSION
Effect of stage of lactation on mastitis incidence: Stages of lactation significantly influenced (\( P < 0.01 \)) incidence of clinical mastitis in crossbred KF and KS cows, indigenous SW and TP cows and Murrah buffaloes (Table 1). The incidence was highest in early lactation in Indigenous cows and buffaloes and was lowest in late stage of lactation but in crossbred cows incidence was more in mid stage of lactation. The incidence of mastitis was more(6.97 to 21.47%) in KF and KS...
cows, (4.76 to 26.57%) and was lower, (2.61 to 28.48%) in SW cows, and Tharparkar (4.94 to 26.01%) cows. The incidence of mastitis varied from 6.31 to 15.71% in Murrah buffaloes during different stages of lactation. It was observed that prevalence of clinical mastitis decreased as stage of lactation length increased in SW and TP cows and Murrah buffaloes, barring the crossbred cows which suffered more during mid-lactation.

**Effect of milk yield on incidence of mastitis**

The level of milk production significantly affected (P < 0.01) incidence of clinical mastitis in KF, KS, SW cows and Murrah buffaloes, but effect was non-significant in Tharparkar cows (Table 2, 3, & 4). The animals having higher or lower milk yield suffered more with incidence of mastitis (P < 0.05) in comparison to medium producers. However, medium producing TP cows had more incidences of mastitis than the crossbred KF and KS cows and Murrah buffaloes. The frequency of clinical mastitis in relation to level of milk production varied from 53.04 to 30.53, 57.75 to 26.56, 58.97 to 27.37, 68.33 to 26.37 and 51.34 to 18.75% in KF, KS, SW, TP cows and Murrah buffaloes respectively (Table 3, 4 and 5).

The highest incidence of mastitis in all the breeds of cows and Murrah buffalo during early lactation (upto 90 days) in this study corroborates with the earlier reports in cattle and buffaloes (Biffa et al., 2005; Kocak, 2006; Zwaldet al., 2006; Fadlemula et al., 2009; Corbett, 2009; Steeneveld et al., 2008; Sharma, et al., 2011; Grohnet et al., 2004; Wilson et al., 2004). The incidence of mastitis was highest in early lactation in SW cattle (52.94%) and Murrah buffaloes (52.30%) probably due to non-adaptation of animals to the milking methods, more udder pressure and weaning associated milking behaviour. Contrary to this higher incidence of mastitis (43.42 to 51.81%) in late lactation in crossbred cows and buffaloes were reported earlier by Chishty et al. (2007) and Kavitha et al. (2009). We observed decreasing mastitis incidence in order of early, mid and late lactation in indigenous (SW and TP) cows and Murrah buffaloes, but crossbred cows exhibited more mastitis in early lactation due to higher milk yield followed by late and mid lactation. The higher incidence of mastitis during early lactation in crossbred cows attribute due to poor prepartum management, changed udder environment and increased udder size which renders mammary gland more vulnerable to mastitis (Singh et al., 2001). The clinical mastitis in early lactation restricts differentiation of secretory cells and increase in milk yield until peak lactation thus resulting in more severe reduction of milk yield (Capuco et al., 2001). Further increasing milk yield in early lactation impairs immune system due to increased metabolic stress (Knegset al., 2007) and negative energy balance, hyperketonemia (Janosiet al., 2003; Suriyasathaporn et al., 2000). In addition to this, dairy cows and buffaloes are more susceptible to infections during this period because of compromised host defence mechanisms which may be directly owing to numerous physiological and environmental factors during transition period (Gittoet al., 2002). The increased
oxygen demand and an increased oxygen-derived reactants, collectively termed as Reactive Oxygen Species (ROS) damage the cell membrane of phagocytic cells and compromise the immune system of animals (Sharma et al., 2011a). Therefore, high incidence of mastitis observed in high yielders in this study was due to more udder stress and negative energy balance in early lactation in comparison to mid and late stages of lactation (Sori et al., 2005).

ACKNOWLEDGEMENT

We are thankful to The Director, National Dairy Research Institute, India for providing necessary facilities to conduct this study. Thanks are also due to the staff of Animal Health Complex and Record Section of the institute to facilitate the data collection of different breeds.

Table 1: Incidence of clinical mastitis (%) in various breeds of cattle and buffaloes in different stages of lactation:

<table>
<thead>
<tr>
<th>Stages of Lactation</th>
<th>Breed</th>
<th>Karan Fries</th>
<th>Karan Swiss</th>
<th>Sahiwal</th>
<th>Tharparkar</th>
<th>Murrah Buffaloes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>Mastitis (%)</td>
<td>No.</td>
<td>Mastitis (%)</td>
<td>No.</td>
<td>Mastitis (%)</td>
</tr>
<tr>
<td>Early lactation (1-90 days)</td>
<td>2734</td>
<td>21.47(590)</td>
<td>365</td>
<td>26.57(97)</td>
<td>1552</td>
<td>28.48(442)</td>
</tr>
<tr>
<td>Mid lactation (91-180 days)</td>
<td>2366</td>
<td>6.97(164)</td>
<td>315</td>
<td>4.76(15)</td>
<td>1248</td>
<td>4.97(62)</td>
</tr>
<tr>
<td>Late lactation (181 days &amp; above)</td>
<td>2001</td>
<td>9.34(188)</td>
<td>295</td>
<td>7.80(23)</td>
<td>920</td>
<td>2.61(24)</td>
</tr>
</tbody>
</table>

The values with different superscripts differ (P<0.05) in a row.

No. - Number of observation; Figures in parentheses indicate the number of observation of mastitis animals.

Table 2: Incidence of clinical mastitis in Karan Fries and Karan Swiss cows in relation to level of milk production:

<table>
<thead>
<tr>
<th>Milk production</th>
<th>Breed</th>
<th>Karan Fries Cows</th>
<th>Karan Swiss Cows</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cows</td>
<td>No. of Mastitic cows</td>
<td>Incidence of mastitis (%)</td>
</tr>
<tr>
<td>High yielder</td>
<td>509</td>
<td>270</td>
<td>53.04</td>
</tr>
<tr>
<td>Medium yielder</td>
<td>1343</td>
<td>410</td>
<td>30.53</td>
</tr>
<tr>
<td>Low yielder</td>
<td>701</td>
<td>262</td>
<td>37.38</td>
</tr>
</tbody>
</table>

The values with different superscripts differ (P<0.05) in a row.
Table 3: Incidence of clinical mastitis in Sahiwal and Tharparkar cows in relation to level of milk production:

<table>
<thead>
<tr>
<th>Milk production</th>
<th>Sahiwal cows</th>
<th>Tharparkar cows</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cows</td>
<td>No. of Mastitic cows</td>
</tr>
<tr>
<td>High yielder</td>
<td>290</td>
<td>171</td>
</tr>
<tr>
<td>Medium yielder</td>
<td>581</td>
<td>159</td>
</tr>
<tr>
<td>Low yielder</td>
<td>683</td>
<td>198</td>
</tr>
</tbody>
</table>

The values with different superscripts differ (P<0.05) in a row.

Table 4: Incidence of clinical mastitis in Murrah buffaloes in relation to level of milk production:

<table>
<thead>
<tr>
<th>Milk production</th>
<th>Murrah buffaloes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of buffaloes</td>
</tr>
<tr>
<td>High yielder</td>
<td>261</td>
</tr>
<tr>
<td>Medium yielder</td>
<td>752</td>
</tr>
<tr>
<td>Low yielder</td>
<td>457</td>
</tr>
</tbody>
</table>

The values with different superscripts differ (P<0.05) in a row.
REFERENCES


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