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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 Murrahbuffaloes.

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 asearly lactation (up to 90 days), mid lactation (91 to 180 days) and late lactation (181 days & above) and analysed statistically by chi-square method, Chi-square = $\Sigma (O - E)^2 / E$, Where, O = Observed frequencies and E = Expected frequencies.

The Expected frequencies was calculated as: $E_{ij} = (R_{i.}) (C_{.j}) / GT$

E*ij* = Expected frequency belong to i^{th} row and j^{th}column ;$R_{i.}$= i^{th} row total; $C_{.j}$ = j^{th} column total; GT = Grand total

RESULTS& DISCUSSION

Effect of stage of lactation on mastitisincidence: 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,baring the crossbred cows which suffered moreduring 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(Table2,3&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 (upto90 days) in this study corroborates with the earlier reports in cattle and buffaloes(Biffa *et al.,* 2005; Kocak, 2006;Zwald*et al.,* 2006;Fadlemula*et al.,* 2009; Corbett, 2009; Steenevelde*t al.,* 2008; Sharma, et al., 2011; Grohn*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 earlierby Chishty *et al.* (2007) and Kavitha *et al.*(2009). We observeddecreasing mastitis incidence in order of early, mid and late lactation in indigenous(SW and TP) cows and Murrah buffaloes, but crossbred cows exhibited moremastitis 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 yieldin earlylactation impairs immune system due to increased metabolic stress (Knegsel*et al.,* 2007)and negative energy balance, hyperketonemia (Janosi*et 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 (Gitto*et 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.,* 2011[a]).Therefore high incidence of mastitis observed in high yieldersin 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).

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

Stages of Lactation	Breed									
	Karan Fries		Karan Swiss		Sahiwal		Tharparkar		Murrah Buffaloes	
	No.	Mastitis (%)	No.	Mastitis (%)	No.	Mastitis (%)	No.	Mastitis (%)	No.	Mastitis (%)
Early lactation (1-90days)	2734	21.47(590)	365	26.57(97)	1552	28.48(442)	323	26.01(84)	1470	15.71(231)
Mid lactation (91 - 180days)	2366	6.97(164)	315	4.76(15)	1248	4.97(62)	222	7.21(16)	1285	6.34(79)
Late lactation (181 days &above)	2001	9.34(188)	295	7.80 (23)	920	2.61 (24)	162	4.94(8)	1167	6.31(76)

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:*

Milk production	Breed					
	Karan Fries Cows			Karan Swiss Cows		
	No. of cows	No. of Mastitic cows	Incidence of mastitis (%)	No. of cows	No. of Mastitic cows	Incidence of mastitis (%)
High yielder	509	270	53.04[a]	71	41	57.75
Medium yielder	1343	410	30.53[b]	192	51	26.56
Low yielder	701	262	37.38[b]	88	43	48.86

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:*

Milk production	Breeds					
	Sahiwal cows			Tharparkar cows		
	No. of cows	No. of Mastitic cows	Incidence of mastitis (%)	No. of cows	No. of Mastitic cows	Incidence of mastitis (%)
High yielder	290	171	58.97[b]	48	33	68.33[b]
Medium yielder	581	159	27.37[a]	93	27	29.03[a]
Low yielder	683	198	29.91[a]	182	48	26.37[a]

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:*

Milk production	Murrah buffaloes		
	No. of buffaloes	**No. of Mastitic buffaloes**	**Incidence of mastitis (%)**
High yielder	261	134[a]	51.34
Medium yielder	752	141[b]	18.75
Low yielder	457	111[c]	24.29

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

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