Epidemiological Studies on Calf Diarrhea in Jammu Region

Abha Tikoo¹, Jaswinder Singh Soodan² and Gagandeep Singh^{3*}

¹Division of Veterinary Medicine, F.V.Sc. & A.H., R.S. Pura, SKUAST-Jammu, INDIA ²Division of Teaching Veterinary Clinical Complex, F.V.Sc. & A.H., R.S. Pura, SKUAST-Jammu, INDIA ³Regional Research and Training Centre, GADVASU, Talwara, Hoshiarpur, Punjab, INDIA

*Corresponding author: G Singh; Email: gssudan84@gmail.com

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ABSTRACT

Calf diarrhea is one of the most important causes for losses to the dairy farmers. In order to access the losses, epidemiological study was conducted to study the effect of age, season, sex, parity and other factors on calf diarrhea. In the study, it was found that highest incidence of diarrhea cases was found in winter season, where as species wise more number of cases were found in buffalo calves as compared to cow calves. Birth weight wise both the incidence and mortality was higher (34.1 and 7.6 per cent, respectively) in 20 - 25 Kg birth weight category. Sex wise higher incidence for calf diarrhea and mortality was recorded in male calves in comparison to female calves, where as age wise both the incidence and mortality due to calf diarrhea was higher in 11 - 20 days age group and with dam parity wise both the incidence and mortality for calf diarrhea was recorded in calves born in first and second parity.

Keywords: Calf diarrhea, Incidence, Epidemiology, Mortality, Jammu

Neonatal calf diarrhea is a multifactorial disease which despite decades of research is implicated as the major cause of morbidity and mortality in calves during the first three weeks of life, resulting in severe direct and indirect economic losses (Smith, 2009; Lorenz, 2004). In addition to the costs associated with the additional labour, drug expenditures, and calf death, there is the potential economic impact associated with the poor long-term performance of affected calves. Weaning weights have been shown to decrease up to 15.9 kg per affected calf due to calf morbidity (Perino et al., 1995). Annual loses of approximately US \$ 9.5 million are attributed to neonatal calf diarrhea worldwide (Jindal et al., 2000). Therefore keeping all these facts in mind, a study was planned to carry out a epidemiological investigation to study the effect of age, sex, species, birth weight, dam parity, season, and other factors on calf diarrhea.

MATERIALS AND METHODS

Study area and sampling locations

The studies were carried out in farms of diverse

management systems viz., organized and unorganized dairy farms which were visited periodically and samples were collected from neonatal bovine calves below 30 days of age in and around Jammu region. The samples were collected from Referral Veterinary Hospital, SKUAST-J, Government Cattle Breeding Farm, Belicharana, Satwari, Army cattle farm, Belicharana, Satwari, areas in and around R.S. Pura namely Keer Pind, Gagian, Chohala, Kotli-Mir-Dian, Badyal Brahmna, Badyal Kazian, Chak Agra and private dairy owners of Jammu.

Epidemiological investigations

The comparative epidemiological incidence of neonatal calf diarrhea in relation to various management systems, seasons, sex, age groups and dam parity were studied and observations were recorded.

RESULTS AND DISCUSSION

Overall incidence of neonatal calf diarrhea

During the study period 485 calves were observed from



both organized and unorganized dairy management systems in and around Jammu. Diarrhea was recorded in 158 calves with an overall incidence of 32.6 per cent (Table 1). Amongst these 485 calves, 92 were from unorganized dairy farms and 393 from organized ones. In unorganized dairies, diarrhea was recorded in 28 calves with an incidence of 30.4 per cent. Out of 393 calves studied from organized dairy farms, diarrhea was observed in 130 calves with an incidence of 33.1 per cent. Overall mortality recorded was 5.7 per cent (Table 1). Out of these 9 calves, one was from unorganized dairy and eight calves were from organized dairies with incidence of 3.6 and 6.2 per cent respectively.

Season wise per cent incidence and mortality due to diarrhea

The season specific incidence was highest in winter (36.9 per cent) followed by monsoon (21.3 per cent) and summer (14 per cent). The incidence of mortality observed across

the three seasons was 7.7 per cent in monsoon followed by winter with 21.7 per cent. No incidence of mortality was recorded in summer season (Table 2). Calfhood diarrhea and resultant mortality has been studied by many workers and there are various views regarding seasonal pattern and its relationship with neonatal diarrhea. Some studies have found highest incidence and mortality in winter (Khan and Khan, 1996; Pan and Mullick, 1996), while others in monsoon (Somavanshi, 1995), summer (Santra and Pachalag, 1996,) and spring (Neeraj, 1988) while other workers reported no significant relationship between calf mortality and season (Wittum et al., 1994; Sivula et al., 1996). In the present study, highest incidence was recorded in winter which can be related to post calving season and winter stress. Moreover, as recorded by several workers the mean serum immunoglobulin level concentrations are lowest in winter born calves and increased during the spring and summer, thus, making them vulnerable to infectious diseases (Bhullar and Tiwana, 1985; Odde, 1988; Verma et al., 1995).

Table 1: Overall per cent incidence and mortality of calf diarrhea in different management systems

	Type of Management System	Calf Population	No. of diarrheal samples screened	Per cent incidence	Number of deaths	Per cent mortality
A	Unorganised Management System					
1	Private Dairies in Jammu	32	8	25.0	0	0.0
2	Clinical Cases at Referral Hospital and Villages around R. S. Pura	60	20	33.3	1	5.0
	Total	92	28	30.4	1	3.6
В	Organised Management System					
1	Military Cattle Breeding Farm, Belicharana Satwari, Jammu.	230	75	32.6	7	9.3
2	Govt. Cattle Breeding Farm, Belicharana, Satwari, Jammu.	163	55	33.7	1	1.8
	Total	393	130	33.1	8	6.2
	Grand Total	485	158	32.6	9	5.7

Table 2: Season wise per cent incidence and mortality due to diarrhea

Season	No. of births	No. of diarrheal Per cent incidence		Mortality	Per cent mortality	
		cases				
Summer (March to June)	50	7	14.0	0	0	
Monsoon (July to Oct)	61	13	21.3	1.0	7.7	
Winter (Nov to Feb)	374	138	36.9	8.0	21.7	
Total	485	158	32.6	9.00	5.7	

Species wise per cent incidence and mortality due to diarrhea

An overall incidence of 27.9 per cent and 38.1 per cent was observed in cow and buffalo calves, respectively, depicting highest incidence in buffalo calves. The respective incidences of mortality in cow and buffalo calves were observed as 9.6 and 2.4 per cent, respectively (Table 3). No reason for species specific incidence has been reported although, several workers have reported similarity in the incidence rates of calf diarrhea in cattle and buffalo calves (Jindal et al., 2000; Malik et al., 2012).

Birth weight wise per cent incidence and mortality due to diarrhea

The overall incidence across various categories of birth weight was 34.1, 23.3, 11.8, and 7.4 per cent in 20 - 25Kg, 26 - 30 Kg, 31 - 35 Kg and 36 Kg and above birth weight categories, respectively. The respective mortality in 20 - 25 Kg, 26 - 30 Kg, and 31 - 35 Kg and above 36 Kg birth weight categories was 7.6, 4.2, 1.2 and zero per cent per cent, respectively. The incidence and mortality was highest (34.1 and 7.6 per cent, respectively) in 20 – 25 Kg birth weight category (Table 4). This reason could be attributed to the fact that the lighter weight calves might have experienced an additional risk because they have a greater body surface area in relation to their body mass, which would allow heat to dissipate and increase their energy requirements in winter months. Moreover,

Table 3: Species wise per cent incidence and mortality due to diarrhea

Buffalo calves

Grand Total

in the present study, a number of lower weight calves were prematurely born and thus were unable to suckle adequate amount of colostrum in the first few weeks of life. These findings have been supported by a number of workers (Guyton, 1981; Koterba and Madigan, 1990). Earlier workers have also associated decrease in calf mortality with increase in birth weight with minimum in calves weighing 41 Kg and above at birth, which are in corroboration with findings of present study (Singh et al., 1980; Bhullar and Tiwana, 1985).

Sex wise per cent incidence and mortality due to diarrhea

Incidence of morbidity and mortality of neonatal colibacillosis in bovine neonates with respect to sex was documented as 50.3 and 20.9 per cent, 7.2 and 3.3 per cent respectively, in male and female calves (Table 5). Reason for this higher incidence in male calves might be due to differences in serum immunoglobulin levels, required for the protection from different diseases during neonatal life which are absorbed less in males than females in their early life, thus competition between microorganisms and immunoglobulins for a common intestinal receptor does occur in early few hours of life and due to this competition male calves become more immunodeficient than female calves, therefore, former become more vulnerable to bacterial diseases than later. Our findings are in corroboration with similar findings by a number of

2

9

No. of diarrheal Percent incidence Sl. No. **Bovine Calves Total No. of** Mortality Percent mortality calves born calves 73 27.9 7 1 Cow calves 262

Table 4: Birth weight wise per cent incidence and mortality due to diarrhea

223

485

Sl. No.	Birth Weight (Kg)	No. of births	No. of diarrheal cases	Per cent incidence	No. of deaths	Per cent mortality
1	20-25	270	92	34.1	7.0	7.6
2	26-30	103	24	23.3	1.0	4.2
3	31-35	85	10	11.8	1.0	1.2
4	36 and above	27	2	7.4	0.0	0.0
	Grand Total	485	158	32.6	9.0	5.7

85

158

38.1

32.6

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2

9.6

2.4

5.7



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workers (Sangwan *et al.*, 1985; Staley and Bush, 1985; Khan and Khan, 1997).

Age wise per cent incidence and mortality due to diarrhea

The highest percent incidence of 38.6 and mortality 18.2 per cent recorded in the present study was in 11 to 20 days age group (Table 6). The first seven to 14 days of age define the age of susceptibility as well as the age calves are most likely to become infective and shed the agents in their feces. Neonatal calf mortality in the first month of age accounted to be 84 per cent of the total mortality and is particularly high in the third week of life (Umoh, 1982). Moreover, calf is exposed the day it is born, and varied pathogens invade the calf during this period. (Nydam *et al.*, 2001). Tikoo *et al.* (2009) also reported the highest incidence of *E. coli* based diarrhea in two weeks old calves in Jammu.

Dam parity wise per cent incidence and mortality due to diarrhea

The overall incidence in male calves with respect to 1st, 2nd, 3rd, 4th and 5th calving was recorded as 57.7, 42.9, 12.5, 25.0, 25.0 per cent, respectively with maximum morbidity in calves born of first calvers. The respective incidences in female calves with respect to 1st, 2nd, 3rd, 4th and 5th calving was recorded as 31.8, 17.9, 18.3, 8.3 and 8 per cent, respectively, with highest incidence in calves born of first calving. The incidence of mortality in male calves born of 1st and 2nd calving was recorded as 7.6 and 6.7 per cent (Table 7). The mortality in female calves was recorded as 1.9 per cent in the calves born of first calvers. As parturition problem decreases with age and parity of the dam, the amount of colostrum available and concentration of colostral immunoglobulins increases, thus making the neonates immune sufficient (Sangwan et al., 1985). Studies conducted by Odde (1988) indicate immune status to be better in calves from multiparous than

Table 5: Sex wise per cent incidence and mortality due to diarrhea

Table 6: Age wise per cent incidence and mortality due to diarrhea

Sl. No.	Sex	No. of Births	No. of Diarrheal Calves	Percent incidence	No. of Deaths	Per cent mortality
1	Male	193	97	50.3	7	7.2
2	Female	292	61	20.9	2	3.3
	Grand Total	485	158	32.6	9	5.7

Age group (in days) Sl. No. No. of diarrheal cases Per cent incidence Mortality Per cent mortality 1-10 20.9 2 1 33 6.1 2 11-20 61 38.6 6 9.8 3 21-30 34 21.5 1 2.9 4 30 31-40 19.0 158 9 Total 5.7 ____ ____

Table 7: Dam parity wise per cent incidence and mortality in diarrhea	

		Male					Female					
Sl. No.	Parity	Births	Morbidity	Per cent incidence	Mortality	Per cent mortality	Births	Morbidity	Per cent incidence	Mortality	Per cent Mortality	
1	1	137	79	57.7	6	7.6	107	34	31.8	2	1.9	
2	2	35	15	42.9	1	6.7	67	12	17.9	0	0	
3	3	8	1	12.5	0	0	60	11	18.3	0	0	
4	4	4	1	25.0	0	0	24	2	8.3	0	0	
5	5	4	1	25.0	0	0	25	2	8	0	0	
6	6	1	0	0.0	0	0	2	0	0	0	0	
7	7	4	0	0.0	0	0	6	0	0	0	0	
8	8	0	0	0	0	0	1	0	0	0	0	
Total		193	97	50.3	7	7.2	292	61	20.9	2	3.3	

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primiparous dams. Better immune status of calf depicts that survival will not be affected by the gastrointestinal or respiratory diseases (Khan and Khan, 1996). Furthermore, in the present study the incidence of morbidity was more in first and second calvers in males group which might be due to the fact that male calves have more body weight at birth than the female calves which predisposes them to problems like dystocia at parturition making them vulnerable to infectious diseases in neonatal life. This fact has been supported by Bellows *et al.* (1987) and Patterson *et al.* (1987).

CONCLUSION

From the present study it can be concluded that, epidemiological studies help in identifying the population which are at more risk for developing diseases and also which further helps in planning various strategies for the control and eradication of diseases.

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