Research Article

Effect of Non-Genetic Parameters on Mortality Pattern in Nagpuri Buffalo Calves

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Abstract | The study was conducted on mortality pattern in Nagpuri Buffalo calf at Cattle Breeding Farm, Nagpur Veterinary College, Nagpur, Maharashtra. The data on 58 calves, died during the period 2005-2016, was used for the assessment of mortality pattern in non-genetic parameter studied. As per the analysis, the maximum numbers of deaths were observed in monsoon season, followed by winter and least in summer season. The mortality was higher in the female than the male calves. The mortality percentage reduces with the age advancement of calves, however, the maximum being during first month of age (15.89 %). The predominant causes of mortality were found to be Gastroenteritis (22.41%), Pneumonia (10.34%) and other diseases (56.90%). The period and age had significant effect (P<0.05) on the female and male mortality rate in calves respectively. However, the season and parity wise incidence of mortality rate was non-significant (P>0.05). It is concluded that the period of calving and parity of Nagpuri buffaloes play very important role in calf mortality. Intensive health care and management is the prerequisite for young calves' especially in rainy season and in winter months to minimize mortality due to digestive and respiratory problems.

Keywords | Nagpuri buffalo, Calf mortality, Gastroenteritis, Pneumonia.

INTRODUCTION

Even though calves are the future of the livestock industry, they are usually neglected in day to day management. Calf management plays an important role in the development of the dairy sector of the country. The future success of the dairy industry depends on appropriate calf management. Calf care is not only essential for sustenance of the dairy industry but is also essential in the wake of preserving and maintaining our good quality germplasm. Important aspects in the calf rearing are the good health management and proper nutrition. The success of any dairy enterprise depends upon the survival of the calf crop produced. A high survival rate in a dairy herd helps to increase the selection pressure which is one of the main factors controlling genetic gain and more economic returns. Mortality of calf is an important trait both for breeding and economic point of view in dairy enterprise. The first month of the

Buffalo calfs' life is very crucial and it is found that the calf mortality is as high as 19.5% (Sreedhar et al., 2010).

Calf mortality is a serious problem in buffaloes causing a severe economic loss to the farming community. Hence the present study envisages to ascertain the level of incidence and to delineate the factors affecting the mortality in indigenous buffalo calves raised by farmers under field conditions. The knowledge of occurrence and pattern of animal diseases becomes vital in the management, as the main objective of the good management is to reduce the disease incidence and increase the production and reproduction. Estimation of mortality rate in the population is an important tool for determining the disease status (Chaudhary et al. 2013). Reports of disposal pattern in cattle are available, but for Nagpuri breed of buffalo such information is scanty. Therefore, the present work was taken up to identify and summarize causes of mortality of Nagpuri Buffalo calves

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MATERIAL AND METHODS

Data

The data of present study were collected from the records of Nagpuri buffalo herd, maintained at Nagpuri Buffalo and Gaolao Caw Research and Training Center, Nagpur Veterinary College, Nagpur, Maharashtra, covering a period of 12 years from 2005-2016. Information on the date of birth and death, sex, breed, parity of dam and causes of death were collected from the farm records at the individual animal level. The collected data were analyzed to study mortality pattern in different age groups.

Data Classification

The total period of the calf mortality was divided into three (P1=2005 to 2008; P2=2009 to 2012; P3=2013 to 2016). The year was divided into three seasons (Summer = March-June; Monsoon=July-October; Winter=November-February). The parity of dam was determined as first (Pty-1), second (Pty-2), third (Pty-3) and fourth onwards (Pty-4). Calf mortality records kept at the farm were used for the study that covered 2005-2016. Number of calves born in this period was 151 of which 58 died (38.41%).

Statistical Analysis

The percent of animal disposed off from the herd due to different reasons was calculated by proportion using descriptive statistics. The data was analyzed as per the procedure laid down by Snedecor and Cochran (1980).

RESULTS AND DISCUSSION

Period Wise Incidence of Mortality:

The mortality accounts were taken from post-mortem records for the period of 2005 to 2016. These years were alienated into 3 periods of four years each (Table 1). The higher percentage of mortality of 45 percent was stuck between the period of 2009 to 2012 and the least of 11.11 percent of mortality accounted between the periods of 2013-2016. The lowest percentage of calf mortality in third phase of establishment of herd might be due to small number of population in the dairy herd. The period had significant effect (P<0.05) on the female mortality rate in calves. Gupta et al. (2016) showed significant effect of period on overall mortality rate in Murrah buffalo calves. Whereas, Himmat et al. (2013) showed that the effect of period on mortality was found to be non significant (P>0.05) in Surti buffaloes.

Mortality Rate According to Season of Birth

Season-wise distribution (Table 2) showed that the highest calf mortality rate (75%) was determined in those calves born in the summer (March to June). The percentage of mortality in male calves was recorded as 33.33%, whereas, that of female calves was 100% during summer season. The lowest (35.51%) percentage of mortality was recorded during monsoon season (July to October). However, the differences in mortality rate due to season were non-significant (P>0.05). These results were supported by the reports of Himmat et al. (2013) the effect of mortality rate due to season was found to be non significant (P>0.05) in Surti buffaloes.

Mortality Rate According to Season of Death

Each year was alienated into three seasons viz. summer, monsoon and winter (Table 3). In present study, the highest mortality in Nagpuri buffalo calves was observed in monsoon season (44.83%), followed by winter (39.65%) and summer season (15.52%). However, Panchasara et al. (2009) reported the highest occurrence of mortality of 48.57%, 47.14% and 4.29% respectively during monsoon, winter and summer season in Mehsana buffalo calves; whereas Himmat et al. (2013) observed mortality rate for calves born in the rainy, winter and summer season were 22.35 ± 2.27, 21.81 ± 2.589 and 15.33 ± 3.541 per cent respectively in Surti buffaloes. The higher mortality rate in monsoon season (44.83%) noticed in Nagpuri buffalo calves may be due to hot and humid conditions along with rainfall which may be suitable for growth and proliferation of disease causal agents in the calf shed. Season had a significant effect on the calf mortality as well as on the absorption of the immunoglobulin's in neonatal calves (Fink, 1980). The mean serum immunoglobulin concentrations were the lowest in winter born calves and increased during the spring and early summer (Norheim, 1985), perhaps this may also be the reason that the higher mortality rate of 39.65% has been observed in winter born calves than (15.52%) in summer born calves in this study.

Parity/Lactation Wise Incidence of Mortality:

The overall mortality rate was the highest at 69.23 percent among the calves born of 1st parity buffalo and the lowest at 25.93 percent among the calves born of buffalo of 2nd parity (Table 4). These results are supported by the findings of Panchasara et al. (2009) in Mehsana buffalo calves. However, the parity wise incidence of mortality rate was non-significant (P>0.05).

Effect Of Age On Buffalo Calf Mortality

Table 5 revealed that age had a significant effect on the mortality (P>0.05). It was noticed that younger the calf, the more was the mortality rate. The highest rate was observed in the first month of birth (15.89%) which gradually declined with age. These results are in agreement with the findings of Verma et al. (1980) and Khan et al. (2007). These results revealed that the first 30 days of the age are more sensitive for the calves rearing; thereby special care

Table 1: Period wise mortality in Nagpuri buffalo calves

Period	Male			Female			Overall Mortality		
	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)
P1	30	11	36.67	34	17	50.00	64	28	43.75
P2	25	10	40.00	35	17	48.57	60	27	45.00
P3	14	3	21.43	13	0	0.00	27	3	11.11
Chi-square value	0.75NS			6.08*			5.51NS		

*Significant at $P<0.05$; NS= non significant

(P1=Period from 2005 to 2008; P2=Period from 2009 to 2012; P3= Period from 2013 to 2016).

Table 2: Mortality rate of Nagpuri buffalo calves according to season of birth

Season of birth	Male			Female			Overall Mortality		
	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)
Summer	3	1	33.33	5	5	100.00	8	6	75.00
Monsoon	53	19	35.85	54	19	35.19	107	38	35.51
Winter	13	4	30.77	23	10	43.48	36	14	38.89
Chi-square value	0.060NS			2.461NS			1.767NS		

NS= non significant

Table 3: Mortality rate of Nagpuri buffalo calves according to season of death

Season of death	Number of calves died	Percentage (%)
Summer	9	15.52
Monsoon	26	44.83
Winter	23	39.65
Total	58	100

Table 4: Parity wise mortality rate in Nagpuri buffalo calves

Number of Parity	Male			Female			Overall Mortality		
	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)
Pty-1	12	6	50.00	14	12	85.71	26	18	69.23
Pty-2	11	2	18.18	16	5	31.25	27	7	25.93
Pty-3	15	5	33.33	10	5	50.00	25	10	40.00
Pty-4	31	11	35.48	42	12	28.57	73	23	31.51
Chi-square value	1.28NS			5.29NS			5.37NS		

NS= non significant

The parity of dam first (Pty-1), second (Pty-2), third (Pty-3) and fourth onwards (Pty-4).

Table 5: Mortality rate of Nagpuri buffalo calves according to age group

Age (Month)	Male			Female			Overall Mortality		
	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)	No. of Birth	Total No. of death	Mortality (%)
0-1	69	10	9.52	82	14	17.07	151	24	15.89
1-3	59	2	1.90	68	4	5.88	127	6	4.72
3-6	57	8	7.62	64	6	9.38	121	14	11.57
6-12	49	0	0.00	58	6	10.34	107	6	5.61

| 9-12 | 49 | 4 | 3.81 | 52 | 4 | 7.69 | 101 | 8 | 7.92 |
| Chi-square value | 10.3* | | | 4.62NS | | | 10.8* | | |

*Significant at P<0.05; NS= non significant

and management practices must be maintained during this period. In early age immune system of a young calf is under development. Colostrum can provide passive immunity only against those diseases for which a dam possesses antibodies. Even the provision of antibodies to young calves in colostrum cannot guarantee the protection against a disease (Blood et al., 1994).

Table 6: Mortality rate of Nagpuri buffalo calves according to causes of diseases

Causes	Number of calves died	Percentage
Pneumonia	6	10.34
Gastroenteritis	13	22.41
Septicemia	3	5.17
Cold shock	1	1.72
Pasturellosis	2	3.45
Other	33	56.90
Total	58	100.00

MORTALITY RATE ACCORDING TO CAUSES OF DISEASES

The highest mortality (Table 6) in Nagpuri buffalo calves was recorded due to Gastroenteritis (22.41%) which is in close agreement with the findings of Shrivastava et al (2013). The high incidence of Gastroenteritis in calves might be due to bacterial or viral infections, or due to delayed feeding of colostrum to the calves. On the other hand Panchsara et al. (2009) and Himmat et al. (2013) reported the highest rate of mortality in Mehsana and Surti buffalo calves respectively due to Calf Scours-Diarrhea and Pneumonia.

CONCLUSION

From the present study, it is concluded that the period of calving and parity of Nagpuri buffaloes play very important role in calf mortality. Intensive health care and management is the prerequisite for young calves' especially in rainy season and in winter months to minimize mortality due to digestive and respiratory problems. The controlling of calf mortality is one of the most important factors for increasing profits from dairy farming. The early death of buffalo calves affects not only the milk and meat production but also result in reduction of genetic progress, and disruption of breeding programs due to early mortality of male and female calves.

CONFLICT OF INTEREST

There is no conflict of interest.

AUTHORS CONTRIBUTION

All authors contributed equally.

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