CALVING PATTERN IN BUFFALOES, INDIGENOUS AND CROSSBRED CATTLE IN ANAND AND KHEDA DISTRICTS OF MIDDLE GUJARAT

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Received 29-5-2015 ***Accepted 24-6-2015***

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ABSTRACT

Buffaloes are established seasonal breeders in India, while cattle show perennial breeding and calving pattern, however no comparative studies are yet available in the literature. Hence, Calving records of 12,816 graded Murrah buffaloes; 1,022 indigenous cattle and 10,264 crossbred cattle of 30 villages covered under Productivity Enhancement Programme (PEP) of Kheda and Anand districts of middle Gujarat attended over three years period were used to study and compare their calving pattern. The year was divided into four seasons, viz, summer (Mar to May), rainy/monsoon (Jun to Aug), autumn (Sept to Nov) and winter (Dec to Feb). The month and season had significant effect on calving pattern only in buffaloes. The highest calving frequency was noted in the month of October (17.24%) for buffaloes, in December for indigenous cattle (10.27%) and in January for crossbred (9.51%) cattle. The lowest calving were recorded for buffaloes in March (2.54%), and for indigenous (7.34%) and crossbred (7.08%) cattle in June. The highest calving frequency in buffaloes was observed during autumn season (45.91%), followed by winter (25.00%), rainy (20.50%) and summer (8.57%) seasons. However, no such distinct seasonality of calving was found in indigenous and crossbred cattle of the same region, although the highest calving frequency was recorded for indigenous cattle during winter (27.98%) and in crossbreds during autumn (26.66%), and the lowest percentages of calving were during the rainy season in both crossbreds (22.33%) and indigenous (23.68%) cattle. Seasonality of calving index (CI = ratio of number of calving in month with fewest calving and number of calving in month with most calving) was 85.29, 28.57 and 25.51 in buffaloes, indigenous and crossbred cattle, respectively. The results revealed that seasonality of calving is more pronounced in buffaloes than in indigenous and crossbred cattle of middle Gujarat.

KEY WORDS: Calving Pattern, Middle Gujarat, Buffalo, Indigenous, Crossbred cow, Calving Index

INTRODUCTION

Regular and constant supply of milk is required at consumer level but dairy species, particularly buffalo, do not meet such demands as they have tendency of seasonal breeding and calving. One option to bridge the gap of demand and supply is through processing milk and making it available in the lean season. However, this increases the cost for consumer to an unaffordable level. The other option may be to combine the dairy species such that the production of milk is regular throughout the year. In Gujarat buffaloes are the main dairy animal and HF crossbreds have emerged as an important segment of cattle population during the last decade. About 60 % of milk produced in Anand and Kheda districts is contributed by buffaloes and 40% by cattle. Buffaloes are main producer of milk but are notorious for poor reproductive performance. Studies are documented of seasonality in breeding and calving in buffalo (Bhavsar *et al.,* 1989; Dhami *et al.,* 1993; Mandali *et al*., 2002), however, comparative studies involving indigenous & crossbreds cattle are not available. The objective of the study was to document the pattern of calving in graded Murrah buffaloes, indigenous and crossbred cattle of middle Gujarat.

MATERIALS AND METHODS

The study was conducted on cattle and buffaloes of 30 villages of Anand and Kheda districts of middle Gujarat covered under Productivity Enhancement Programme (PEP) of AMUL. The data on 12,816 calving of graded Murrah buffaloes; 1,022 calving of indigenous cattle and 10,264 calving of crossbred cattle recorded over a period of three years from 2011 to 2014 were included in the study. The year was divided into four seasons, viz, summer (March to May), rainy/monsoon (June to August), autumn (September to November) and winter (December to February) as per agro-climatic conditions of the region. In middle Gujarat, summers are harsh and winters are mild. Pattern of calving was analyzed and compared between graded Murrah buffaloes, indigenous cattle and crossbred dairy cattle. Seasonality of calving index (CI = ratio of number of calving in month with fewest calving and number of calving in month with most calving) was calculated as given by Oseni *et al.* (2003).

RESULTS AND DISCUSSION

Table 1 shows the frequency (number and per cent) of animals calving in different months of a year and the overall seasonality index in the three species under study.

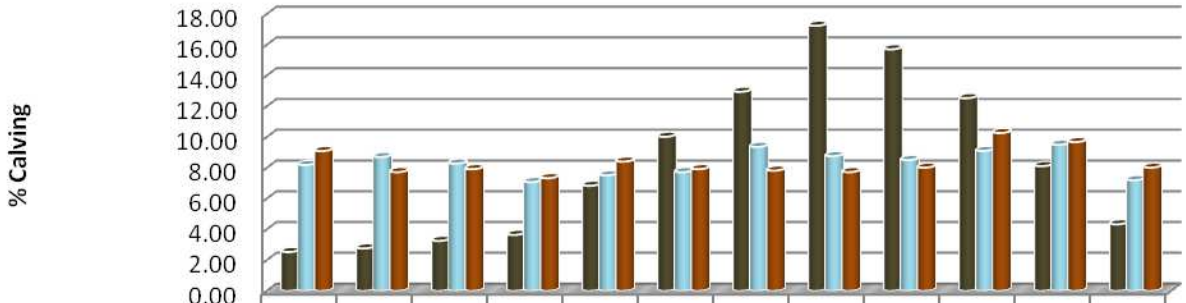
Table 1: Monthly and seasonal pattern of calving in buffaloes & cows in middle Gujarat

Season	Month	Buffaloes		Crossbred Cow		Indigenous Cow	
		Number	%	Number	%	Number	%
Summer	March	325	2.54	841	8.19	93	9.10
	April	355	2.77	894	8.71	79	7.73
	May	418	3.26	850	8.28	81	7.93
Total		**1098.00**	**8.57**	**2585.00**	**25.19**	**253.00**	**24.76**
Rainy	June	468	3.65	727	7.08	75	7.34
	July	877	6.84	772	7.52	86	8.41
	August	1285	10.03	793	7.73	81	7.93
Total		**2630.00**	**20.52**	**2292.00**	**22.33**	**242.00**	**23.68**
Autumn	September	1660	12.95	962	9.37	80	7.83
	October	2210	17.24	900	8.77	79	7.73
	November	2014	15.71	874	8.52	82	8.02
Total		**5884.00**	**45.91**	**2736.00**	**26.66**	**241.00**	**23.58**
Winter	December	1607	12.54	935	9.11	105	10.27
	January	1041	8.12	976	9.51	99	9.69
	February	556	4.34	740	7.21	82	8.02
Total		**3204.00**	**25.00**	**2651.00**	**25.83**	**286.00**	**27.98**
Seasonality Index		**85.29**		**25.51**		**28.57**	

The effect of month and season was found to be statistically highly significant for calving pattern only in buffaloes, while cattle showed perennial breeding and calving behavior. The highest calving frequency was recorded in the month of October (17.24%) for buffaloes, in December for indigenous cattle (10.27%) and in January for crossbred (9.51%) cattle. The lowest calving were recorded for buffaloes in March (2.54%), and for indigenous (7.34%) and crossbred (7.08%) cattle in June. Further with respect to seasonality in buffaloes, the calving frequency was highest ($P<0.01$) during autumn season (September-November; 45.91%), followed by winter (December-February; 25.00%), rainy/monsoon (June to August; 20.50%) and summer (8.57%) seasons. However, no such clear

seasonality of calving was observed in cattle (Table 1; Figure 1).

Figure. 1. Season and month wise calving pattern in buffaloes, indigenous and crossbreed cattle



	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb
Buffalo %	2.54	2.77	3.26	3.65	6.84	10.03	12.95	17.24	15.71	12.54	8.12	4.34
Crossbred cow %	8.19	8.71	8.28	7.08	7.52	7.73	9.37	8.77	8.52	9.11	9.51	7.21
Indigenous cow %	9.10	7.73	7.93	7.34	8.41	7.93	7.83	7.73	8.02	10.27	9.69	8.02

The results of the present study indicated that the autumn and winter seasons were the main calving seasons for buffaloes, indigenous and crossbred cattle when more than 70.91%, 51.57% and 52.48% of the total calving took place, respectively. The calving pattern of buffaloes revealed distinct seasonality, while cattle showed almost uniform pattern of breeding and calving round the year. Calving pattern of indigenous and crossbred cattle was more or less similar. The present findings of seasonal calving pattern closely corroborated with the earlier observations of Bhavsar *et al.* (1989), Dhami *et al.* (1993) and Mandali *et al.* (2002) in buffalo breeds of Gujarat. Further, the main calving period has also been documented as between August to January for Murrah, Pandharpuri, Jaffrabadi and Surti buffaloes in Haryana, Maharashtra, Gujarat and Rajasthan states, respectively (Anonymous, 2008). Bhavsar *et al.* (1989) and Sule *et al*. (2001) confirmed a distinct seasonality in breeding behavior in Surti buffaloes reared in Gujarat and Rajasthan, respectively. The monthly and seasonal calving pattern of Surti buffaloes indicated that buffaloes calved round the year but have a tendency to calve more during the autumn season (September to November) followed by the winter season (December to February). The rainy and winter season appeared the most favorable seasons, while the summer appeared the most unfavorable season for reproduction. Similar findings have also been reported earlier in Surti buffaloes of middle Gujarat by Mandali *et al.* (2002).

According to Shah *et al*. (1989) high environmental stress together with under-nutrition during the summer season might be responsible for the long periods of seasonal anoestrus in buffaloes. McCool *et al.* (1987) also reported similar effects of these factors on oestrus activity in Australian swamp buffaloes. However, Borghese (2005) reviewed the calving seasonality in buffaloes and reported that the reproductive seasonality in the buffalo does not seem to depend on diet, food availability or metabolic status, while climate and particularly photoperiod, depending on melatonin secretion, play a vital role. Melatonin is a hormone secreted by the pineal gland during the night and represents the endocrinal signal of the light-dark rhythm in the environment. Parmeggiani *et al*. (1994), found high levels of melatonin during the night, and the persistency of its levels was clearly related to the photoperiod: the levels were the highest in December and decreased progressively from March, April to June.

Overall in the present study, the seasonality was more pronounced in buffaloes (calving index, CI 85.29), and so such trend could be seen in indigenous (CI 28.57) and crossbred cattle (CI 25.51) in middle Gujarat.

CONCLUSION

It is concluded that seasonality of calving is more pronounced in buffaloes than dairy cattle in middle Gujarat. The results of present study and of various reports suggest a relationship between photoperiodism and the seasonal reproductive trend in dairy animals. However, optimum feeding regime of concentrate and cultivated green fodder is necessary throughout the year, and proper housing would be beneficial in getting throughout the year calving.

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