Available online at www.ijpab.com

DOI: http://dx.doi.org/10.18782/2320-7051.5814

ISSN: 2320 – 7051

Int. J. Pure App. Biosci. **6 (1):** 1283-1287 (2018)

Research Article

International Journal of Pure & Applied Bioscience

OPEN ACCESS

Seasonal Variation of Calving in Murrah Buffalo at Organized Dairy Farm

Pankaj Gunwant[1], Anand Kumar Pandey[2*], Inderjeet Singh[3], J. B. Phogat[2], Sandeep Kumar[1] and Sunil Kumar[4]

[1]Department of Veterinary Gynaecology and Obstetrics,

[2]Veterinary Clinical Complex,

[3]ICAR-Central Institute for Research on Buffalo, Hisar 125 004, Haryana, India

[4]Department of Animal Genetics and Breeding, College of Veterinary Science, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar 125 004, Haryana, India

*Corresponding Author E-mail: dranandpandey@gmail.com

Received: 30.09.2017 | Revised: 26.10.2017 | Accepted: 1.11.2017

ABSTRACT

The present study was conducted on 190 Murrah buffaloes maintained at organized dairy farms. Keeping in view the climatological data, the year was divided into two seasons: winter (August to January) and summer (February to July). The results of present study indicated that calving in Murrah buffaloes occurred throughout the year. However, maximum calving recorded in the months of September and October, 11.57% and 13.15%, respectively. While lowest percentage of calvings was reported in the months of May and June, 5.26% and 5.78%, respectively. On the basis of season, majority of calving was observed between July and January. Analysis of variance showed a significant effect ($p<0.05$) of month and season on calving. Similarly, maximum percentage of buffaloes exhibit estrous in the month of November and December while, minimum percentage was recorded during March and May. In conclusion, buffaloes have tendency to mate and calve more in the days with shorter photoperiod as compared to days with longer photoperiod.

Key words: *Buffalo, Calving, Estrous, Seasonality.*

INTRODUCTION

As a source of draft power, milk and meat, water buffaloes are amongst the most important ruminants and considered as the backbone of Indian farmer's economy as well as dairy industry. The buffalo is considered as sluggish breeder as the reproductive efficiency of buffalo is adversely affected by certain constraints such as late maturity, irregular estrous cycle, seasonality in breeding, poor conception rate and prolonged inter-calving interval[7]. Buffalo calves and exhibits estrus throughout the year, but a distinct seasonal pattern with respect to estrous and calving has been reported from different countries of the world[4,21]. Moreover, previous studies conducted at different time periods and locations on different breeds of buffaloes managed under different management systems showed that seasonal pattern in estrus expression and conception is often followed by seasonal pattern in calving[5].

Cite this article: Gunwant, P., Pandey, A.K., Singh, I., Phogat, J.B., Kumar, S. and Kumar, S., Seasonal Variation of Calving in Murrah Buffalo at Organized Dairy Farm, *Int. J. Pure App. Biosci.* **6(1):** 1283-1287 (2018). doi: http://dx.doi.org/10.18782/2320-7051.5814

In India, percentage of animals exhibiting anoestrus during summer remains appreciably higher as compared to winter season (74–86 vs. 22–26%, respectively)[18].

The reproductive seasonality of the buffalo is mainly influenced by climate and photoperiod; however, nutrition also plays an important role. High ambient temperature during summer months hampers the reproductive performances of buffaloes in tropical and subtropical countries[10]. Further, temperature humidity index (THI) of >75 was shown to have a negative effect on the reproductive functions of buffaloes[21]. In addition to climatic conditions, the seasonal reproductive characteristic in water buffaloes also depends on melatonin secreted from pineal gland[23]. Seasonal variation in melatonin concentration with highest concentration during darker season of the year corresponding to the start of hypothalamus-pituitary- ovarian axis activity has been reported in Mediterranean buffaloes[3]. This seasonality in buffalo reproduction has been a debatable topic among scientific community, causing economic loss to the dairy farmers as well as reduced milk supply during summer months. Therefore, the present study was designed with an objective to study the seasonal pattern of calving of Murrah buffaloes, black gold of India, at organized dairy farm.

MATERIAL AND METHODS

The present study was conducted on 190 Murrah buffaloes maintained at two organized dairy farms, located in Hisar, Haryana, India (29.1492 ^{0}N, 75.7217 ^{0}E). These buffaloes were considered as a single group as these were raised under similar environmental and managemental conditions. Buffaloes were maintained under intensive system of management and were fed according to the standard feeding schedule, providing 17% digestible crude protein and 72% total digestible nutrients meeting the standard requirement of adult lactating animals. Buffaloes were fed with green fodder along with dry fodder like wheat straw to meet the dry matter requirement. All animals had free access to water and mineral blocks containing trace elements and vitamins. The buffaloes were milked manually twice a day, morning and evening. During last trimester of pregnancy, the animals were kept separately from rest of the herd. Estrus was detected by observation of estrous behaviour (marked by bellowing, being sniffed and mounted by teaser buffalo bull). All animals were inseminated twice at 12 hours interval at standing estrus, and pregnancy was confirmed 40–60 days after mating by per rectum palpation by experienced veterinarian.

Estrus and calving data of 190 Murrah buffaloes were used for this study. Keeping in view the climatological data, the year was divided into two seasons: winter (August to January) and summer (February to July). Statistical analysis was carried out on subpopulation of all the buffaloes using the SPSS, version 16. Differences at a p-value less than 5% ($p<0.05$) was considered statistically significant. Analysis of variance was performed according to the procedures described by Zar[22].

RESULTS AND DISCUSSION

The result of present study indicated that calving in Murrah buffaloes occurred throughout the year. However, maximum calving occurred in the months of September and October, 11.57% and 13.15%, respectively. While lowest percentage of calvings was reported in the months of May and June, 5.26% and 5.78%, respectively (Figure 1). Further, based upon the season, majority of calving occurred between July and January. Analysis of variance showed a significant effect ($p<0.05$) of month and season on calving. The finding of present study is in agreement with Anonymous[2] and Reddy *et al*.[15] in Murrah buffaloes in India. The results of the present study showed that season have been a prominent factor governing the calving pattern in Murrah buffaloes. Similarly, maximum percentage of buffaloes exhibit estrous in the month of November and December while, minimum percentage was recorded during March and May (Figure 2).

Similar observations were recorded in previous studies[1,17]. The percentage of animals exhibiting estrous during days with shorter period was higher as compared to days with longer photoperiod.

The present study indicate that buffaloes have the tendency to mate and calves more in the days with shorter photoperiod as compared to days with longer photoperiod. As these buffaloes were maintained under an intensive system of management and fed according to standard feeding regimen, so it indicates that photoperiod may play an important role rather than the nutrition, with respect to seasonal pattern of reproduction in buffaloes. The endocrine signal responsible for mediating the effect of photoperiod on the hypothalamus-pituitary axis is through melatonin secretion by the pineal gland in direct proportion to the period of darkness[8]. The evidence of an effect of the photoperiod on seasonality of buffalo reproduction is indicated by initiation of cyclicity in summer anoestrus buffaloes administered melatonin implants[6]. In a study conducted by Singh *et al*.[16] in buffaloes showed that the photoperiod was negatively correlated with the number of buffaloes showing estrous and anoestrous during long day length can be overcome by the short periods of artificial darkness. Therefore, it might be suggested that the regulation of gonadotropin releasing hormone (GnRH) secretion by melatonin hormone may be central to the seasonal regulation of ovarian cyclicity in buffaloes as reported in ewes[3,9,12].

Furthermore, reproductive performance of water buffaloes is known to be adversely affected by high ambient temperature coupled with relative high humidity during summer season. During summer season there is low circulating concentration of progesterone, estradiol and luteinizing hormone in buffaloes and responsible for poor expression of estrus and low conception in buffaloes[13,14]. Moreover, buffaloes show low reproductive activity during summer, when intensity of solar radiation is high and duration of sun shine is more[20]. Abayawansa *et al*.[1] reported negative correlation between monthly postpartum estrus incidences and mean maximum air temperature and suggested that high air temperature caused immediate suppressive effect either on ovarian activity or on estrus expression. High temperature humidity index predisposes water buffaloes to develop oxidative stress characterized by modulation of estrous cycle and uterine environment causing defective embryo development, reproductive failure in buffaloes and prolongation of the postpartum anestrus[11,19].

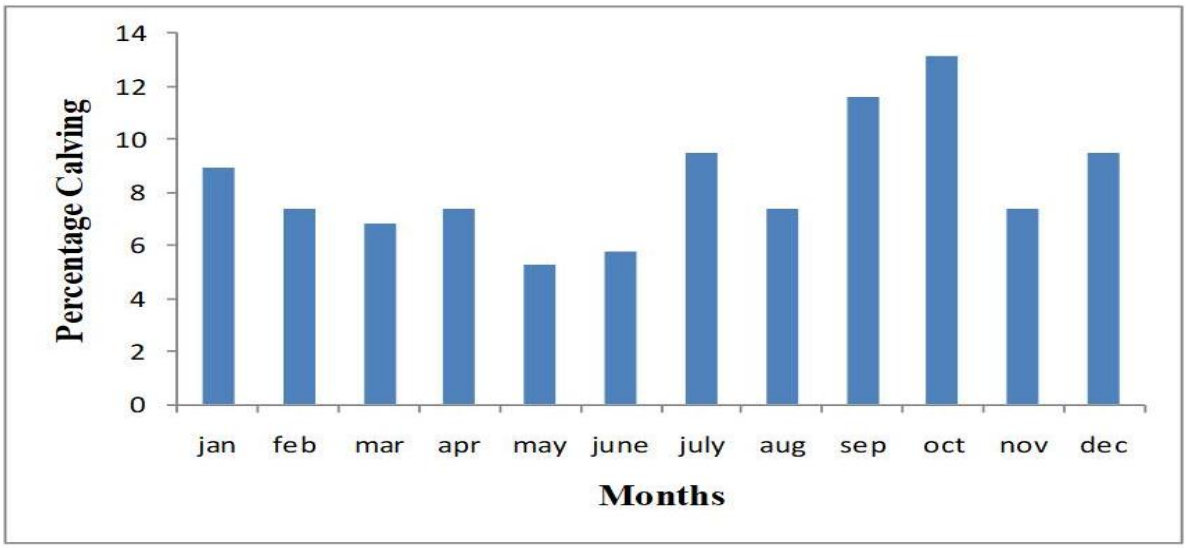

Figure 1. Month-wise calving pattern of Murrah buffaloes.

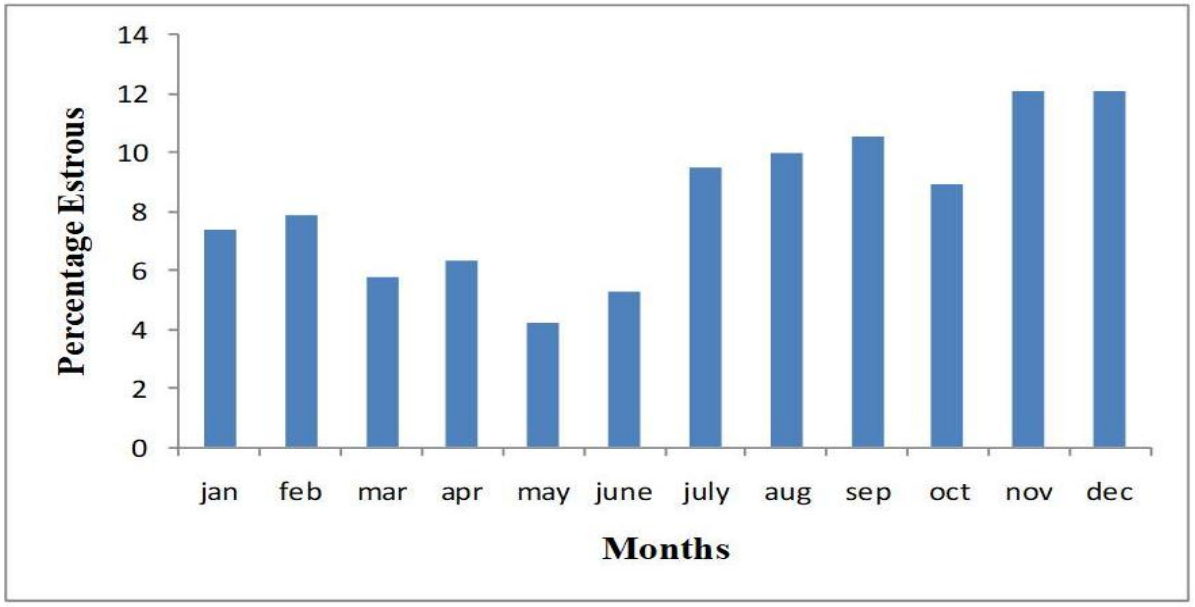

Figure 2. Month-wise estrous pattern of Murrah buffaloes.

CONCLUSION

In conclusion, the results of present study suggest that although buffaloes calved and exhibited estrous throughout the year but seasonal variation in calving and estrous pattern has been reported in Murrah buffaloes. Buffalo tends to reproduce and breed in days with shorter period as compared to longer photoperiod and high ambient temperature during summer season could hamper the reproductive performances of buffaloes.

Acknowledgements

This work was done under the project entitled "Characterization of Murrah buffaloes based on melatonin receptor gene polymorphism and its association with reproductive seasonality (Scheme No. 5024-C(g)-TVCC-4-O.A)" funded by Haryana Council for Science and Technology, Panchkula, Haryana, India.

REFERENCES

1. Abayawansa, W.D., Prabhakar, S., Singh, A.K. and Brar, P.S., Effect of climatic changes on reproductive performance of Murrah buffaloes in Punjab: A rertrospective analysis. *Indian J. Anim. Sci.*, **81(4):** 334 (2011).
2. Anonymous, Annual Report (2007-08) of Network Project on Buffalo Improvement. Central Institute for Research on Buffaloes, Hisar (Haryana), India. (2008).
3. Borghese, A., Barile, V.L., Terzano, G.M., Pilla, A.M. and Parmeggiani, A., Melatonin trend during seasons in heifers and buffalo cows. *Bubalus Bubalis*., **1:** 61–64 (1995).
4. Das, G. K., and F. A. Khan., Summer anoestrus in buffalo–a review. *Reprod. Domest. Anim.*, **45(6):** 483-494 (2010).
5. Kamboj, M.L. and Chawla, D.S., A study on breeding performance of Nili-Ravi buffaloes. *Indian J. Anim. Res.*, **40(2):** 118-122 (2006).
6. Kumar, A., Mehrotra, S., Singh, G., Maurya, V.P., Narayanan, K., Mahla, A.S., Chaudhari, R.K., Singh, M., Soni, Y.K., Kumawat, B.L., Dabas, S.K. and Srivastava, N., Supplementation of Slow-Release Melatonin Improves Recovery of Ovarian Cyclicity and Conception in Summer Anoestrous Buffaloes (*Bubalus bubalis*). *Reprod. Dom. Anim.,* **51(1):** 10–17 (2016).
7. Madan, M.L., Factors limiting superovulation responses in embryo transfer programme among buffaloes. *Theriogenology*., **33(1):** 280 (1990).

8. Malpaux, B., Migaud, M., Tricoire, H. and Chemineau, P., Biology of mammalian photoperiodism and the critical role of the pineal gland and melatonin. *J. Biol. Rhythms.*, **16:** 336–347(2001).
9. Malpaux, B., Viguié, C., Skinner, D.C., Thiery, J.C. and Chemineau, P., Control of the circannual rhythm of reproduction by melatonin in the ewe. *Brain res. bull*., **44(4):** 431-438 (1997).
10. Marai, I.F.M. and Haeeb, A.A.M., Buffalo's biological functions as affected by heat stress - A review. *Livest. Sci*., **127(2):** 89-109 (2010).
11. Megahed, G.A., Alghandour, S.E.M., Othman, R.H. and El-Zohery, F.A., The relationship between oxidant/antioxidant imbalance and postpartum fertility in cattle. *Assiut Vet Med J*., **52:** 226-40 (2006).
12. Parmeggiani, A., Seren, E., Esposito, L., Borghese, A., Di Palo, R., Terzano, M.G., Plasma levels of melatonin in buffalo cows. Proceedings of International Symposium on Prospect of Buffalo Production in the Mediterranean and in the Middle East, Cairo, Egypt. EAAP Publication, Pudoc, Wageningen, **62:** 401–403(1993).
13. Rao, L.V. and Pandey R.S., Seasonal changes in the plasma progesterone concentration in buffalo cow (Bubalus bubalis). *J. Reprod. Fertil*., **66:** 57-61(1982).
14. Rao, L.V. and Pandey R.S., Seasonal variations in oestradiol-17 B and luteininzing hormone in the blood of buffalo cows (*Bubalus bubalis*). *J. Endocrinol*., **98:** 251-255(1983).
15. Reddy, A.O., Ramesha, K.P. and Rao, M.K., Effect of climate on the incidence of oestrus, conception and cycle length in Murrah buffaloes. *Indian J. Anim. Sci.*, **69(7):** 485-489 (1999).
16. Singh, J., Nanda, A.S. and Adams, G.P., The reproductive patterns and efficiency of female buffaloes. *Anim. Reprod. Sci.*, **60:** 593–604 (2000).
17. Singh, R. and Nanda, A.S., Environmental variables governing seasonality in buffalo breeding. *J. Anim. Sci.*, **71:** 119 (1993).
18. Tailor, S.P., Jain, L.S., Gupta, H.K. and Bhatia, J.S., Oestrus and conception rates in buffaloes under village conditions. *Indian J. Anim. Sci.*, **60(8):** 1020-1021 (1990).
19. Tucker, C.B., Rogers, A.R. and Schütz, K.E., Effect of solar radiation on dairy cattle behaviour, use of shade and body temperature in a pasture-based system. *Appl. Anim. Behav. Sci*., **109(2):**141-154 (2008).
20. Upadhyay, R.C., Ashutosh, R.R., Singh, S.V., Mohanty, T.K. and Gohain, M., Impact of climate change on reproductive functions of Murrah buffaloes. *J. Anim. Plant Sci*., **22(3):** 234-236 (2012).
21. Vale, W.G., Effects of environment on buffalo Reproduction. *Ital. J. Anim Sci.*, **6:** 130–142 (2007).
22. Zar, J. H., *Biostatistical Analysis*. 4th edn. Dorling Kindersley (India) Pvt. Ltd. Pearson Education. Delhi, Ind (2008).
23. Zicarelli, L., Reproductive seasonality in buffalo. *Bubalus Bubalis.*, **4:** 29–52 (1997).