INTRODUCTION

India, with its 107 million heads of Buffalo (18th Livestock census) has the largest Buffalo population in world, out of which more than 20% of the population is comprised of Murrah buffaloes. Genetic improvement for growth in Murrah buffaloes is of great importance in the large ruminant based meat industry in India, since buffaloes contribute 52.6% of total milk and 21.2% of the total meat production (BAHS, 2010). In addition, the growth of a heifer calf until it matures to a cow is important trait because it characterizes the adaptability and economic suitability of the animal for meat industry. Reports on growth traits of Murrah buffaloes were few (Basu & Rao, 1979; Annual Report NDRI, 1982; Patnaik, 1988; Yadav et al., 2001; Kumaravel et al., 2004) and little is known about the non-genetic factors that can interfere in attaining proper body weight at different ages in Murrah buffaloes. The prerequisite for effective management of production is the accurate quantitative knowledge of the factors affecting production performance (Amimo et al. 2007). Therefore, adjusting records for non-genetic effects is essential to define appropriate models for estimation of variance components and improving selection procedures. Considering this background, present study aimed to evaluate effects of various non-genetic factors on body weight and first lactation traits of Murrah buffaloes, which will improve our understanding about genetic factors and will help to formulate suitable evaluation procedures as It is expected that animals growing faster in terms of body weight may also initiate physiological functioning of reproduction and milk production earlier.

MATERIALS AND METHODS

Data collected from weight registers and history sheets of Murrah buffalo herd maintained at National Dairy Research Institute, Karnal. The overall least squares means for body weights were 32.63 ± 0.42 kg for birth weight, 103.03 ± 1.19 kg for six months body weight, 162.67 ± 1.98 kg for twelve months body weight, 254.92 ± 2.69 kg for eighteen months body weight, 344.49 ± 3.11 kg for twenty-four months body weight and 418.17 ± 3.36 kg for thirty months body weight. Least square analysis of variance indicated significant (P<0.01) effect of season on body weight at six months of age, period was having significant effect on all body weight but birth weight. The least squares means for first lactation traits were found to be 1307.18 ± 12.39 days for age at first calving, 326.13 ± 6.70 days for first lactation length, 1760.69 ± 42.25 kg. for first lactation 305-day milk yield, 1942.75 ± 53.79 kg. for first lactation total milk yield, 513.43 ± 10.34 days for first calving interval, and 208.23 ± 9.78 days for first service period. Season and period were having significant (P<0.01) affect on age at first calving.

Keywords: Non-Genetic factors, Growth traits, First lactation traits, Murrah Buffalo

Data Analysis
Data were analyzed by least squares analysis of variance procedures for unequal subclasses (Harvey, 1975). Birth weight was used as a co-variable for other body weight traits and AFC used as a co-variable for other first lactation traits to account for differences in other body weights and first lactation traits. Following model was adopted:

For Birth weight
\[ Y_{ijk} = \mu + S_i + P_j + e_{ijk} \] ...........(1)

For other Body weights
\[ Y_{ijk} = \mu + S_i + P_j + b_{ij}(Z_{ijk} - Z) + e_{ijk} \] ...........(2)

For AFC
\[ Y_{ijk} = \mu + S_i + P_j + e_{ijk} \] ..........................(3)

For other First lactation Traits
\[ Y_{ijk} = \mu + S_i + P_j + b_{ij}(Z_{ijk} - Z) + e_{ijk} \] ...........(4)

Where, \( Y_{ijk} \), is the dependent variable (BW, Other body weight traits, AFC and other First Lactation Traits); \( \mu \) is the overall mean; \( S_i \), is the Season effects, \( P_j \) is the effect of Periods, \( Z_{ijk} \), is the Birth weight and AFC to be taken as a co-variable with other body weights and other first lactation traits used in the model, \( Z = \) Average birth weight of the herd and \( e_{ijk} \) = Random error, assumed to be normally and independently distributed with mean zero and constant variance i.e. NID \((0, \sigma^2)\). Wherever, the effects were significant, the difference between pairs of levels of effects was tested for significance by Duncan’s Multiple Range Test as modified by Kramer (1957).

RESULTS AND DISCUSSION

Body weights
Least squares means for body weights at different ages and different first lactation traits are presented in Table 1. Reported birth weight is higher than those obtained by Yadav et al. (2001) and Thiruvenkadan et al. (2009), six month body and twelve month body weight estimated is higher than those reported by Vij et al. (1993) and Thiruvenkadan et al. (2009). Body weight at eighteen, twenty four and thirty month was estimated to be close as that of Tien and Tripathi (1990) at same herd. Among the body weight traits at different ages, season of birth had highly significant effect (P<0.01) on the body weight at twelve months of age. Mean of the weight of animal born in winter was significantly lower than animal born in any other season. Similarly period of birth was having significant effect on the body weight at all ages but the weight at birth (P <0.05). Animals born in later part of the year for which data was collected showed greater body weights which indicate improvement in the management of farm in later part of year. These findings were in accordance to the findings of Tein and Tripathi (1990) in same farm and Thevarnanoharan et al. (2001) reported similar findings in swamp buffaloes of Thailand and Alim (1991) in buffaloes of Pakistan. Thiruvenkadan et al. (2009) find the similar effect of period. It was also found that regression of birth weight on other body weights (which is confounded with the effects of birth weight) was important (P <0.01) for weight at six month of age. Weight at six months found to be higher for those animals which were having higher birth weight, as animals with higher birth weight tend to grow faster due to comparative better feeding.

First Lactation traits
Table 2 represents the least squares mean of the different first lactation traits. Estimated AFC of 1307.18 ± 12.39 days was found to be close with those obtained by Yadav et al. (2001); Gajbhiye (1987) and El-Arian (1986). FL305-DMY and FL1MY value obtained in present study were comparable to the values already reported by Gajbhiye (1987) and Rana et al. (2002). Kumaravelu et al. (2006) obtained lower value for these parameters from southern states of India and it might be due to genotype x environment interaction. Climatic conditions of Murrah buffaloes in its breeding tract are generally hot, semi-arid and dry in nature; whereas the climatic condition in southern coastal region is hot, semi-arid and humid in nature. The high humidity and temperature of southern peninsular coastal region of Tamil Nadu are perhaps the reason for the lower estimate in this region.

Among the first lactation traits, season of calving was having significant (P <0.01) effect only on AFC. All other first lactation traits were not significantly affected by the season of calving.
On first lactation traits period of calving was having high significant effect (P <0.05) on AFC, FLL and FL305DMY and this finding was in close agreement with the Wakchaure et al. (2011). The differences in AFC, FLL and FL305DMY in different period could be due to variation in management practices followed over time and change in environmental conditions. The year of calving was observed to have no significant effect on FLTMY, FSP and FCI. The effect of age at first calving was found to be significant (P<0.05) on first lactation 305 day milk yields.

CONCLUSIONS

The study revealed that the non-genetic factors such as season and period of birth might be considered when performing an evaluation of Murrah calves based on growth and first lactation traits. Therefore, the effects of environmental variables must be taken into consideration to provide the best estimates of genetic values and parameters in the dairy animal for selection and evaluation purpose.

ACKNOWLEDGMENTS

We express our deep gratitude to the director, National Dairy Research Institute Karnal and Head, Dairy Cattle Breeding Division, NDRI, Karnal for providing necessary facilities.

REFERENCES


