



## Performance evaluation of Murrah buffaloes under warm humid climatic conditions in the North Eastern Hill state of Tripura

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### ARTICLE INFO

#### Article history:

Received: 02 December, 2021

Revision: 21 December, 2021

Accepted: 29 December, 2021

Key words: Murrah performance evaluation; Tripura; Buffalo; Northeast India.

### ABSTRACT

The present study was conducted to evaluate the productive and reproductive performance of female Murrah buffaloes under warm humid climatic conditions in the North Eastern Hill state of Tripura. The Data of 11 Murrah buffaloes, collected from Livestock farm, ICAR RC for NEH Region Tripura Centre were analysed. Least-squares means were estimated for production and reproduction traits. The overall least-squares mean estimates ( $\pm$  S.E) for birth weight, male calf birth weight and female calf birth weight were  $34.08 \pm 1.28$  kg,  $35.75 \pm 1.84$  kg and  $32.41 \pm 1.72$  kg, respectively. The averages for 305-day and total lactation milk yields, and lactation length were  $1407.65 \pm 79.98$  litres and  $1465.93 \pm 91.02$  litres, and  $346.26 \pm 28.28$  days, respectively. The means for age at first calving, service period, dry period, gestation length and calving interval (CI) (in days) were  $1376.30 \pm 76.28$ ,  $258.20 \pm 39.85$ ,  $267.94 \pm 24.27$ ,  $333.30 \pm 6.69$  and  $636.18 \pm 49.46$ , respectively. It can be concluded that Murrah buffaloes' performance was within the permissible levels and they performed quite well in the hot humid climatic conditions of Tripura.

### 1. Introduction

Murrah is the finest buffalo breed of India as well as of the world, in terms of milk production. The home tract of Murrah buffaloes is Haryana. Along with the home tract, these animals are distributed beyond the home tract and various studies are carried out related to their performance in different climatic regions of India and outside India.

Murrah buffaloes performance in the home tract, for 305 days' milk yield was  $1977.9 \pm 36.2$  kg which was observed by Chitra *et al.* (2018) and  $2066.93 \pm 20.22$  kg was observed by Jakhar *et al.* (2016). Peak milk yield observed by Jakhar *et al.* (2016) was  $10.08 \pm 0.96$  kg and  $10.16 \pm 0.26$  kg was observed by Chakraborty *et al.* (2010). Lactation length, dry period, service period and calving interval were  $311.68 \pm 3.35$ ,  $173.34 \pm 5.59$ ,  $187.10 \pm 5.91$  and  $479.47 \pm 4.88$  days, respectively (Jakhar *et al.*, 2016)

The performance of Murrah buffaloes as observed by various workers in South Indian states are as follows. Pramod *et al.*, 2018, observed body weight at birth of female and male Murrah calves were  $32.83 \pm 0.63$  Kg and  $37.06 \pm$

$0.73$  Kg respectively, Murrah buffaloes herd maintained at Livestock Research Station, Thiruvazhamkunnu, Kerala. In the coastal state of Tamil Nadu, the performance of Murrah buffaloes, in terms of 305-days milk yield, lactation length, service period, calving interval and dry period were  $1855.6 \pm 16.1$ kg,  $297.8 \pm 1.9$  days,  $225.0 \pm 5.5$  days,  $532.8 \pm 5.5$  days and  $230.2 \pm 4.9$  days, respectively (Thiruvankadan *et al.*, 2014) and ages at first mating and calving were  $1222.3 \pm 11.0$  and  $1578.7 \pm 20.3$  days, respectively (Thiruvankadan *et al.*, 2015). Similarly, in Andhra Pradesh, the mean lactation milk yield, mean lactation length, mean peak yields, average age at first service period (AFS), the average age at first calving (AFC), average service period (ASP), average dry period (ADP), average calving interval, conception rate (CR) and birth weight of Murrah buffaloes observed in the farm were  $1723.71 \pm 77.64$  kg,  $293.54 \pm 11.23$  days,  $10.69 \pm 0.46$  kg,  $36.7 \pm 3.66$  months,  $49.2 \pm 3.29$  months,  $164.13 \pm 20.3$  days,  $173.8 \pm 27.03$  days,  $459.79 \pm 23.02$  days,  $58.87\%$  and  $29.2 \pm 0.56$  kg, respectively (Rao *et al.*, 2021).

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Globally, the performance of Murrah buffaloes was observed by various foreign workers as well. Performance of Murrah buffalo in Northern Srilanka, ages at first calving, birth weight, lactation length, total milk yield and calving interval were  $1845 \pm 76.8$  days,  $27.7 \pm 0.28$  kg,  $298 \pm 6.62$  days,  $1249 \pm 50.98$  kg, Dry period  $180 \pm 14.24$  days and  $479 \pm 14.59$  days, respectively (Charlini *et al.*, 2015). Similarly in Brazil, 305- days' milk yield was 1813 kg (Aspilcueta-Borquis *et al.*, 2010).

In different parts of India and outside India, performance of Murrah buffaloes varied due to genetic and environmental factors. Keeping the above cited reasons in mind, Murrah buffaloes were introduced in the North Eastern state of Tripura in 2013 to evaluate the performance of these animals under the climatic conditions of Tripura. The present study aimed to evaluate the productive and reproductive performance of Murrah Buffaloes in warm humid climatic conditions in the North Eastern Hill state of Tripura.

## 2. Materials and Methods

The different production and reproduction traits pertaining to 11 Murrah female buffaloes, collected from Livestock farm, ICAR RC for NEH Region Tripura Centre, Lembucherra, West Tripura. The performance records were taken from the year 2018 to 2020. The farm is located approximately at 23.90 N latitude and 91.31 E longitude at an altitude of about 42 meters from mean sea level. The climate of Tripura exhibits a strong seasonal rhythm. The state is characterised by a warm and humid tropical climate with five distinct seasons, namely, spring, summer, monsoon, autumn and winter. Spring starts in late mid-February & continues till mid-March. Humidity is generally high throughout the year. In the summer season, the relative humidity varies from 50 to 74 percent; whereas, in the rainy season, it is over 85 percent (<http://tripuratourism.gov.in/geography>). The Animals were maintained under an intensive management system. During the cooler part of the day, animals were housed in an open paddock and during the hotter part of the day and during the night animal were kept in the semi-closed house. During summer, foggers were used to prevent heat stress and during winter window curtains were used to protect animals from extreme cold. In feeding, green fodder (Hybrid Napier, Thin Napier and Maize) was supplied most of the year, except during the lean season from February to April. During the lean season, paddy straw was served to animals. Concentrate feeding was done in the morning and evening throughout the year as per the productive and reproductive stage of the animal. Animals were dewormed and vaccinated regularly. For, heat detection, bull parading was practiced daily during morning hours and natural service was practiced for breeding. Data of various traits were taken from farm records after excluding the incomplete lactation due to abortion, premature

birth and death or disposal of animals or non-availability of complete data. Production traits included in the study were birth weight, 305- day milk yield, lactation length, lactation milk yield and reproduction traits included ages at first mating (AFM), ages at first calving (AFC), service period, gestation length, dry period, and calving interval. SPSS 2017 was used for the analysis of data.

## 3. Results and Discussion

### Birth weight

As mentioned in table 1, the overall least-squares mean estimates ( $\pm$  S.E) for birth weight of Murrah buffalo calves was  $34.08 \pm 1.28$  kg with a range of 22.75-48.70 kg. This is higher than the values reported by (Charlini *et al.*, 2015 and Kumarvel *et al.*, 2004) for Murrah's calves. The overall least squares mean estimates ( $\pm$  S.E) for birth weight of male calves was  $35.75 \pm 1.84$ . The birth weight of male calves observed in the present study was higher than that reported by Nambiar *et al.* (1962) but lower than that of reported by Pramod *et al.*, (2018). The overall least squares mean estimates ( $\pm$  S.E) for birth weight of female calves was  $32.41 \pm 1.72$  kg. This is very close to the values reported by Boopathi *et al.* (2020) and it is slightly higher than the values reported by Nambiar *et al.* (1962).

### 305 Day Lactation Milk Yield, Lactation Milk Yield and Lactation Length

The 305-day milk yield mentioned in table 1 in the present study was  $1407.65 \pm 79.98$  litres. Maximum and minimum 305-day milk yield was 1915 litres and 1029 litres, respectively. The value reported in the present study was similar to the value of  $1365 \pm 03$  litres reported by Pandey *et al.*, (2015). On the contrary, several co-workers reported higher 305 days milk yield (Chakraborty *et al.*, 2010, Thiruvankadan *et al.*, 2010, Jamuna *et al.*, 2016 Chitra *et al.*, 2018).

The overall least-squares mean estimates ( $\pm$  S.E) for the total lactation milk yield was  $1465.93 \pm 91.02$  litres. Maximum and minimum lactation milk yield was 2235.76 litres and 926 litres, respectively. The overall lactation milk yield obtained was lower than that observed by Thiruvankadan *et al.* (2010). The lower performance of Murrah buffaloes with respect to milk production might be due to less adaptability of animals in the warm humid region or due to poor labour skills.

Mean estimates ( $\pm$  S.E) for Lactation length were  $346.26 \pm 28.28$  days. Maximum and minimum lactation lengths were 602 days and 193 days, respectively. The values reported in the present studies were higher than those reported by several workers (Dutt *et al.*, 2001, Sachan *et al.*, 2006, Thiruvankadan *et al.*, 2014) in the same breed of

**Table 1.** Least-squares means ( $\pm$ S.E.) for production traits of Murrah Buffaloes

Sl.No	Traits	N	Mean $\pm$ S.E	Maximum	Minimum
1	Birth weight(kg)	20	34.08 $\pm$ 1.28 kg	48.70 kg	22.75 kg
2	Male calf birth weight(kg)	10	35.75 $\pm$ 1.84 kg	48.70 kg	28.00 kg
3	Female calf birth weight(kg)	10	32.41 $\pm$ 1.72 kg	40.00 kg	22.75 kg
4	305 days milk yield(Litres)	13	1407.65 $\pm$ 79.98	1915	1029
5	Lactation yield(Litres)	16	1465.93 $\pm$ 91.02	2235.76	926
6	Lactation length(Days)	15	346.26 $\pm$ 28.28	602	193

**Table 2.** Least-squares means ( $\pm$ S.E.) for reproduction traits of Murrah Buffaloes

Sl.No	Traits	N	Mean $\pm$ S.E	Maximum	Minimum
1	Age at First Calving(Days)	5	1376.30 $\pm$ 76.28	1641.50	1186.50
2	Service period(Days)	15	258.20 $\pm$ 39.85	579	106
3	Dry period(Days)	19	267.94 $\pm$ 24.27	433	105
4	Gestation length(Days)	13	333.30 $\pm$ 6.69	369	303
5	Calving interval(Days)	16	636.18 $\pm$ 49.46	900	330
6	Age at first Mating (Days)	4	998.25 $\pm$ 36.72	894	1055

Buffalo. The lactation length of 321.62  $\pm$  2.34 days observed by Wakchaure *et al.* (2011) is in slight accordance with present study. Longer lactation length might be due to a longer service period.

#### AFC, AFM, Service period, Dry Period, Gestation length and Calving interval

Overall mean age at first calving (AFC) mentioned in table 2 was 1376.30 $\pm$  76.28 days while maximum and minimum AFC was 1641.50 days and 1186.50 days, respectively. The value reported in the present study is in accordance with those reported by Suresh *et al.*, 2004, Wakchaure *et al.*, 2011 and Jamal *et al.*, 2018. Higher AFC was observed by Thiruvankadan *et al.*, 2015 and lower AFC was reported by Kumaravelu *et al.*, 2006 with respect to the present observation.

The mean AFM presented in table 2 was 998.25 $\pm$ 36.72 days. Maximum and minimum AFS was 894 and 1055 days, respectively. The value reported in the present study was lower than the same values reported by Thiruvankadan *et al.*, 2015 and Rao *et al.*, 2021. Comparative lower AFM and AFC might be due to climate may favoured the reproductive performance of animals born in Tripura.

Mean estimates ( $\pm$  S.E) for the service period were 258.20 $\pm$ 39.85 days while the maximum and minimum service period was 579 days and 106 days, respectively. The result observed in the present study is in concordance with earlier reports on the same breed of Buffalo (Kundu *et al.*, 2003 Thiruvankadan *et al.*, 2010). The present value was lower than the service period of 308 $\pm$ 3 days which was observed by (Kumar *et al.*, 2001). Several authors observed lower values

than the present value (Dev *et al.*, 2015, Das *et al.*, 2015 Wakchure *et al.*, 2008). Higher humidity might be the reason for a longer service period as the same value was observed by Thiruvankadan *et al.*, (2010) in the coastal climate of Tamil Nadu.

The overall least squares mean estimates ( $\pm$  S.E) for dry period were 267.94 $\pm$ 24.27 days while the maximum and minimum dry period was 433 days and 105 days, respectively. The results observed for the dry period in the present study are in accordance with Thiruvankadan *et al.*, 2014.

The mean gestation length observed was 333.30 $\pm$ 6.69 days while maximum and minimum gestation lengths were 369 days and 303 days, respectively. Observation in the present study is higher than as reported by Singh *et al.*, 2003 in the same breed of Buffalo.

Overall mean Calving interval observed was 636.18 $\pm$ 49.46 days while maximum and minimum Calving interval were 900 days and 330 days. The present observed value is higher than those reported by several co-workers (Wakchure *et al.*, 2008, Jakhar *et al.*, 2016 and Gandhi *et al.*, 2009). Longer calving intervals might be due to longer service periods and longer gestation length.

#### 4. Conclusion

The study revealed that production traits expressed in warm humid climatic conditions are quite better than in some parts of the world, although not at par with the home tract of Murrah buffaloes. Reproductive performance of some traits like calving interval and service period are quite long compared to studies done in other parts of India and the

world. It might be due to poor genotype x environment interaction. But those animal born in Tripura, their AFM and AFC was lower than the study done in other parts of India. Tripura born Murrah buffaloes are more acclimatized to the climate of Tripura. It can be concluded that Murrah buffaloes performance was within the permissible levels and performed quite well in the hot humid climatic conditions of Tripura.

## 5. References

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