



Performance of Murrah buffaloes at coastal region of Tamil Nadu, India

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India is the largest producer of milk in the world. In India, although the proportion of buffaloes to cattle is 1: 2, buffaloes contribute around 57% of the total milk obtained from cattle and buffaloes. Tamil Nadu with 9.14 million cattle and 1.66 million buffaloes produce an estimated 4.75 million tonnes of milk (Report 2006). The Murrah breed is the finest genetic material of milk-producing buffalo not only in India but also probably in the world. This breed has been used extensively throughout India to upgrade the non-descript buffalo stock to improve the milk production potential. The home tract of Murrah buffaloes is a hot and dry climatic region in the north-western part of India. Breeding these buffaloes in the southern peninsular region of India, which is hot and humid, may affect their performance and adaptability. Hence, the present study was made to study the performance of Murrah buffaloes purchased from its breeding tract at coastal region of Tamil Nadu to assess any genotype $\times$ environment interaction in production traits.

The study was based on data pertaining to Murrah buffaloes purchased in its breeding tract and reared at the central cattle breeding farm, Alamadhi, Chennai, Tamil Nadu, India from 1974 to 2002 (29 years). This farm is located approximately at 13° N latitude and 80° E longitude at an altitude of about 20 m above mean sea level. The climate is generally hot, humid and tropical in nature. Data on milk production traits of Murrah buffaloes (1828 lactation records of 395 Murrah buffaloes) were extracted from history and pedigree sheets. The traits studied were peak yield, days to attain peak yield, 305-day milk yield, lactation length and milk yield, milk yield/day of lactation and milk yield/day of calving interval. Period and season were the fixed environmental effects considered for all the traits studied. The LSMLMW and MIXMDL PC-2 version computer program of Harvey (1990) was used to study the effect of various non-genetic factors and the means were compared

using Duncan's multiple range test.

Least-squares means ($\pm$ SE) of different milk production traits are presented in Tables 1 and 2. The time to reach peak yield in the present study was substantially higher than that reported for Murrah buffaloes at different places in India (Kundu *et al.* 2003, Suresh *et al.* 2004). The overall 305-day milk yield obtained for Murrah buffaloes in this investigation was comparable to the value reported by Ulaganathan *et al.* (1983), however higher than the values reported by other researchers (Kandasamy 1987, Suresh *et al.* 2004) for Murrah buffaloes reared in various places. Differences in the estimates might be due to sampling errors, genetic constitution of the herds, agro-climatic variations and management conditions. In general, the performance in terms of the first lactation milk yield of Murrah buffaloes at the central cattle breeding farm, Alamadhi is quite comparable (Sethi and Khatkar 1997, Kumar *et al.* 2002) with those herds in Haryana (home tract of Murrah buffaloes) indicating that there might not be any appreciable genotype $\times$ environment interaction.

Period and season of calving played a highly significant ($P < 0.01$) effect on the variation of peak yield, 305-day milk yield, lactation milk yield, milk yield/day of lactation and milk yield/day of calving interval. The highly significant ($P < 0.01$) influence of period of calving observed in the present study on different production traits was supported by similar findings on Murrah buffaloes maintained at different places in India (Kandasamy 1987, Sethi and Khatkar 1997, Suresh *et al.* 2004, Yadav *et al.* 2007). Winter calvers had higher 305-day and lactation milk yields than the monsoon calvers and they differed significantly ($P < 0.05$). The highly significant effect ($P < 0.01$) of season of calving on different production traits corroborates the findings of earlier workers (Dass and Sadana 2000) and indicates that there was a pronounced seasonal influence on the traits under study. The higher 305-day and lactation milk yields in winter season calvers might be due to the buffaloes calving in those periods having less gestational stress as a result of the longer service period and delayed conception, also during their descending stage of lactation,

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Table 1. Least-squares means ($\pm$ SE) of different milk production traits of Murrah buffaloes

Effect	n	Peak yield (kg)	Days to attain peak yield (days)	305-day milk yield (kg)
Overall mean (μ)	1828	9.09 $\pm$ 0.07	52.38 $\pm$ 0.86	1706.52 $\pm$ 17.85
<i>Period of calving</i>		**	**	**
P ₁ (1974-1979)	688	10.01 $\pm$ 0.09 ^c	44.54 $\pm$ 1.12 ^a	1742.42 $\pm$ 23.27 ^c
P ₂ (1980-1985)	689	9.02 $\pm$ 0.08 ^b	49.24 $\pm$ 1.07 ^b	1624.73 $\pm$ 22.14 ^b
P ₃ (1986-1991)	169	8.18 $\pm$ 0.18 ^a	55.46 $\pm$ 2.29 ^c	1556.50 $\pm$ 47.48 ^a
P ₄ (1992-1997)	143	9.59 $\pm$ 0.18 ^c	58.48 $\pm$ 2.32 ^d	1970.66 $\pm$ 48.01 ^d
P ₅ (1998-2002)	139	8.66 $\pm$ 0.17 ^b	54.46 $\pm$ 2.26 ^c	1638.27 $\pm$ 46.84 ^b
<i>Season of calving</i>		**	**	**
Winter (Jan -Feb)	342	9.42 $\pm$ 0.12 ^b	53.41 $\pm$ 1.58 ^b	1800.97 $\pm$ 32.77 ^c
Summer (Mar -May)	343	8.62 $\pm$ 0.12 ^a	55.82 $\pm$ 1.57 ^b	1675.43 $\pm$ 32.58 ^a
South-west monsoon (June - Sep)	573	8.87 $\pm$ 0.1 ^a	55.02 $\pm$ 1.24 ^b	1615.10 $\pm$ 25.62 ^a
North-east monsoon (Oct - Dec)	570	9.46 $\pm$ 0.09 ^b	45.46 $\pm$ 1.21 ^a	1734.58 $\pm$ 25.05 ^b
<i>Parity</i>		**	**	**
First	112	8.37 $\pm$ 0.2 ^a	54.64 $\pm$ 2.60 ^b	1643.28 $\pm$ 53.99 ^b
Second	307	9.77 $\pm$ 0.13 ^c	52.15 $\pm$ 1.73 ^{ab}	1835.02 $\pm$ 35.82 ^c
Third	356	9.26 $\pm$ 0.12 ^b	51.91 $\pm$ 1.52 ^a	1776.64 $\pm$ 31.52 ^d
Fourth	315	9.29 $\pm$ 0.12 ^b	58.76 $\pm$ 1.60 ^c	1781.55 $\pm$ 33.09 ^d
Fifth	267	9.02 $\pm$ 0.13 ^b	49.55 $\pm$ 1.72 ^a	1657.63 $\pm$ 35.72 ^b
Sixth	188	9.24 $\pm$ 0.16 ^b	49.12 $\pm$ 2.02 ^a	1718.01 $\pm$ 41.83 ^c
Seventh and above	283	8.70 $\pm$ 0.14 ^a	50.91 $\pm$ 1.82 ^a	1533.50 $\pm$ 37.76 ^a

**, P<0.01; Means bearing same superscript within classes do not differ significantly (P>0.05).

Table 2. Least-squares means ($\pm$ SE) for lactation milk yield and milk production efficiency traits

Effect	n	Lactation length (days)	Lactation milk yield (kg)	Milk yield/day lactation (kg)	Milk yield/day calving interval (kg)
Overall mean (μ)	1828	289.06 $\pm$ 2.37	1759.65 $\pm$ 19.58	5.94 $\pm$ 0.04	3.61 $\pm$ 0.05
<i>Period of calving</i>			**	**	**
P ₁ (1974-1979)	688	295.62 $\pm$ 3.09	1798.90 $\pm$ 25.51 ^b	6.03 $\pm$ 0.06 ^{ab}	4.14 $\pm$ 0.06 ^c
P ₂ (1980-1985)	689	284.38 $\pm$ 2.94	1679.11 $\pm$ 24.27 ^a	5.75 $\pm$ 0.05 ^a	3.62 $\pm$ 0.06 ^b
P ₃ (1986-1991)	169	290.23 $\pm$ 6.30	1612.37 $\pm$ 52.06 ^a	5.41 $\pm$ 0.12 ^a	3.27 $\pm$ 0.12 ^a
P ₄ (1992-1997)	143	293.46 $\pm$ 6.37	2002.17 $\pm$ 52.64 ^c	6.69 $\pm$ 0.12 ^c	3.74 $\pm$ 0.12 ^{bc}
P ₅ (1998-2002)	139	281.61 $\pm$ 6.21	1705.71 $\pm$ 51.36 ^b	5.83 $\pm$ 0.12 ^a	3.26 $\pm$ 0.12 ^a
<i>Season of calving</i>			**		
Winter (Jan-Feb)	342	294.88 $\pm$ 4.35	1855.40 $\pm$ 35.93 ^c	6.12 $\pm$ 0.08	3.68 $\pm$ 0.08
Summer (Mar-May)	343	284.77 $\pm$ 4.32	1711.41 $\pm$ 35.72 ^b	5.92 $\pm$ 0.08	3.54 $\pm$ 0.08
South-west monsoon (Jun- Sep)	573	283.24 $\pm$ 3.40	1667.12 $\pm$ 28.09 ^a	5.72 $\pm$ 0.06	3.45 $\pm$ 0.07
North-east monsoon (Oct- Dec)	570	293.34 $\pm$ 3.32	1804.68 $\pm$ 27.46 ^c	6.01 $\pm$ 0.06	3.74 $\pm$ 0.06
<i>Parity</i>			**	**	**
First	112	310.17 $\pm$ 7.16	1721.22 $\pm$ 59.20 ^c	5.46 $\pm$ 0.13 ^a	3.25 $\pm$ 0.14 ^a
Second	307	302.48 $\pm$ 4.75	1931.47 $\pm$ 39.27 ^c	6.26 $\pm$ 0.09 ^b	3.83 $\pm$ 0.09 ^b
Third	356	298.72 $\pm$ 4.18	1846.18 $\pm$ 34.55 ^d	6.03 $\pm$ 0.08 ^b	3.65 $\pm$ 0.08 ^b
Fourth	315	284.70 $\pm$ 4.39	1815.71 $\pm$ 36.28 ^d	6.26 $\pm$ 0.08 ^b	3.85 $\pm$ 0.08 ^b
Fifth	267	278.20 $\pm$ 4.74	1690.93 $\pm$ 39.16 ^b	5.91 $\pm$ 0.09 ^{ab}	3.57 $\pm$ 0.09 ^{ab}
Sixth	188	283.04 $\pm$ 5.55	1750.79 $\pm$ 45.86 ^c	6.06 $\pm$ 0.10 ^{ab}	3.70 $\pm$ 0.11 ^b
Seventh and above	283	266.10 $\pm$ 5.01	1561.27 $\pm$ 41.40 ^a	5.60 $\pm$ 0.09 ^a	3.39 $\pm$ 0.10 ^a

**, P<0.01; Means bearing same superscript within classes do not differ significantly (P>0.05).

there was an abundant availability of fodders coinciding with the monsoon seasons. The lowest milk yield in south-west monsoon calvers might be because they suffered from heat and humidity stress and the non-availability of quality fodder during a major part of the lactation period.

Parity had a highly significant ($P < 0.01$) effect on all the traits studied except lactation length and it is in accordance with the results obtained by other researchers (Dass and Sadana 2000, Kundu *et al.* 2003) on Murrah buffaloes. Highest peak yield, 305-day milk yield, lactation milk yield and milk yield per day of lactation was observed in animals calving in second parity and they were significantly ($P < 0.05$) different from rest of the parities. On the contrary, Ulaganathan *et al.* (1983) and Kandasamy (1987) observed highest 305-day and lactation milk yields in third parity in Murrah buffaloes maintained at different places in Tamil Nadu.

SUMMARY

The present study was made to study the performance of Murrah buffaloes purchased from its breeding tract at coastal region of Tamil Nadu to assess any genotype $\times$ environment interaction in production traits. The study revealed that non-genetic factors such as period and season of calving had highly significant effect on all the traits studied. In general, the milk production performance of the Murrah buffaloes purchased from its breeding tract and reared at coastal region of Tamil Nadu was comparable with those maintained under other government and institutional herds in India, indicating that there might not be any appreciable genotype $\times$ environment interaction.

REFERENCES

- Dass G and Sadana D K. 2000. Factors affecting some economic traits in Murrah buffaloes. *Indian Journal of Animal Research* **34**: 43–45.
- Harvey W R. 1990. *User's Guide for LSMLMW and MIXMDL PC-2 Version. Mixed model least-squares and maximum likelihood computer program.* Ohio State University, Columbus, Ohio, U S A.
- Kandasamy N. 1987. 'Genetic analysis of milk records in farmbred murrah buffaloes of Tamil Nadu.' Ph D thesis submitted to Tamil Nadu Agricultural University, Coimbatore, India.
- Kumar A, Rana Z S, Dhaka S S, Dalal D S, Singh S and Sethi R K. 2002. Test day yield and lactation parameters of Murrah buffaloes. *Proceedings of the 7th World Congress on Genetics Applied to Livestock Production.* 19th to 23rd August, 2002, Montpellier, France.
- Kundu S, Pandey R S and Singh S K. 2003. Studies on some persistency traits in Murrah buffaloes. *Indian Journal of Animal Research* **37**: 28–31.
- Report. 2006. *Basic Animal Husbandry Statistics AHS Series-10.* Government of India, Department of Animal Husbandry, Dairying and Fisheries, New Delhi. pp. ix, 162, 14.
- Sethi R K and Khatkar M S. 1997. Genetic parameters of production traits in Murrah buffaloes. *Indian Journal of Animal Sciences* **67**(1): 141–42.
- Suresh R, Bidarkar D K, Ramesh Gupta B, Sudhakar Rao B and Sudhakar K. 2004. Production and reproduction performance of Murrah buffaloes. *Indian Journal of Animal Sciences* **74**: 854–57.
- Ulaganathan V, Venkatarajulu K and Balachandran S. 1983. Estimation of breeding values in Murrah buffaloes by maximum likelihood method with adjustment for season of calvings. *Tropical Veterinary and Animal Science Research* **1**: 33–36.
- Yadav B S, Yadav M C, Singh A and Khan F H. 2007. Study of economic traits in Murrah buffaloes. *Buffalo Bulletin* **26**: 10–14.

***Textbook of Veterinary Parasitology*. 3rd edn. 2010. Bhatia, B. B., Pathak, K. M. L. and Juyal, P. D. Kalyani Publishers, 1/1, Rajinder Nagar, Ludhiana-141 008, P. 655+23. ₹ 350.00**

Textbook of Veterinary Parasitology was first published in 2004 for B.V.Sc. & A.H. students in urge of a complete textbook for teaching the subjects assigned for 'Veterinary Parasitology' as approved by the Veterinary Council of India (VCI). Keeping in view the rapid changes in climate due to pollutants and their impact on increasing host-cells, the book is revised twice within a short period of six years. The present edition of the textbook not only provides updated text but also puts a changed pattern of presentation of facts comprehensively to expand the scope of its utility amongst students of Preventive Veterinary medicine, field veterinarians, clinicians and personnel engaged in diagnostic and public health services.

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The whole text of the book is divided into eight parts as per the requirements and sequences of teaching varied theoretical and practical courses concerned to Veterinary Parasitology and its allied. Besides the first part, the subsequent chapters are on Veterinary Helminthology, Veterinary Entomology and Acarology, Veterinary Protozoology, Immunity to Parasites, Anthelmintic

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