

## PRODUCTION PERFORMANCE OF NAGPURI BUFFALO UNDER FIELD CONDITION

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A total of 800 animals from 20 villages from different zones (Tahsils) of vidharbha region in Maharashtra were randomly selected. Data with respect to daily milk yield (DMY), peak milk yield (PMY), lactation milk yield (305 days, LMY), lactation length (LL) and dry period (DP) were recorded two times i.e. morning and evening and filled in as per the questionnaires developed by NBAGR, Karnal. The total LMY was then adjusted to 305 days of standard lactation yield. The data, thus collected was analyzed as per the standard statistical method. Significant differences ( $P \leq 0.01$ ) between lactations were observed for all the traits under study. The DMY, PMY, LMY were found to be increasing from second to fourth lactation. The DMY starts declining after sixth lactation and was recorded to be lowest in seventh lactation. The PMY and LMY declined after fourth lactation. Non-significant effect of parities on LL upto third lactation was observed, while significant difference between means of first three lactations with that of fourth lactation onwards was noticed. A decreasing trend of LL was observed from first to seventh lactation. Difference between DP of first and second lactation was observed to be non

significant, however DP of sixth lactation was significantly different from successive lactations. The DP increased from second to fourth lactation and then decreased gradually. Highly significant correlation of DMY with PMY, LMY and DP was observed. Negative but significant correlation between DMY and LL was observed. The correlation between PMY and LL was observed to be negative but non-significant. Highly significant association between LMY and DP was recorded. A non-significant correlation was found between LMY and LL, while LL and DP was found to be negative but non-significant.

**Keywords:** production performance, Nagpuri buffalo, milk yield, peak yield, lactational yield

**INTRODUCTION**

Nagpuri buffalo is a well- defined and important buffalo breed of Maharashtra. The natural habitat of this breed includes Vidarbha (MS) and Hyderabad region (A.P) and some districts (Berar region) of Madhya Pradesh (Ganai, 1998). The available information on physicals and economic characteristic of the breed is confined to

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the data of organized farms only. This is not based on scientific survey and did not cover the extent of variability presenting the animals of the breed. No information is available about their native environment and management to which this breed was subjected. This is, thus, a need to generate information on physical confirmation, body measurement and economic parameters related to growth, production, reproduction and survivability. In addition, the information about feed resources, prevalent management practices and system of handling etc. need to be documented. Hence, the present investigation was undertaken to assess only the production and performance of Nagpuri buffaloes in its breeding/ home tract.

## MATERIALS AND METHODS

The present study was carried out in the breeding/home tract of nagpuri buffalo comprising of five villages each from four tehsils (survey centre) of Yeotmal district in Vidharbha region of Maharashtra. The four survey centre (Tahsils) along with their villages include Pusad (Kopra, Jamb-Bazar, Bhojla, Kawadipura and Nimbi), Darwha (Dudhgaon, Talegaon, Phukagaon, Shilodi and Channi), Wani (Waghdhara, Chikkalgaon, Naigaon, Neelapur and Borgaon) and Yeotmal (Tiwsa, Jambwadi, Kamandeo phatta, Bodhgaon and Akola bazar). Stratified two stage sampling design was adapted. Different zones (Tahsils) within the districts were identified constituting different strata. Density of Nagpuri buffaloes were taken into consideration at the time of identification and constitution of different strata. Lactation-wise distribution of Nagpuri buffaloes in study area is given in Table 1.

The data for the present study were collected and compiled from the information obtained from the owners and filled in the questionnaires developed by NBGAR, Karnal with little modification whenever necessary.

Under the survey study it was not possible to record the lactation milk yield and lactation length accurately and therefore the milk yield of individual animal from the survey area was recorded two times i.e. morning and evening; with the help of weighing machine i.e. spring balance. The total lactation milk yield was adjusted to 305 days of standard lactation yield as per the under mentioned formula.

$$SLPY = LY \left\{ \frac{(LD-305)ADY}{LD} + \frac{ADY(LD-305)}{3} \right\}$$

Where: SLPY-Standard lactation period yield (Kg), LY- Lactation Yield (Kg), LD-Lactation Days and ADY-Average daily Yield (Kg). The date pertaining to peak milk yield was taken as maximum amount of milk produced on any day during the lactation. This information was also based on the information provided by the owner.

Production traits under study include daily milk yield in Kg (DMY), peak milk yield in Kg (PMY), lactation milk yield in Kg (LMY), lactation length in days (LL) and dry period in days (DP). The data recorded for the production traits were analyzed by using Completely Randomized Design with unequal numbers as described by Snedecor and Cochran (1967). The Correlation Coefficients and their Standard Errors were worked out by following the methods of Panse and Sukhatme (1985).

## RESULTS AND DISCUSSION

The means along with their standard error (SE) and coefficient of variance (CV) of DMY, PMY, LMY, LL and DP is given in Table 2.

### Average daily milk yield

The overall average DMY was  $3.88 \pm 0.05$  with a coefficient of variation of 39.71%. Differences between lactations were highly significant ( $P \leq 0.01$ ). The means of DMY from first to seventh lactation differ significantly. Seventh lactation DMY was lowest than rest of the other lactations. DMY increased from second to fourth lactation but declined from the sixth lactation onwards. The significant increase in milk yield with increase in parity may be due to development of mammary gland and other systems on account of recurring pregnancy and lactations.

The overall average DMY of Nagpuri buffalo observed in the present study is comparable with the DMY of 3.31 kg reported in Bhadawari and 3.84 kg in Marathwada (Singh and Singh, 1977),  $3.86 \pm 0.10$  kg in Murrah (Agrawal *et al.*, 1982) and  $3.68 \pm 0.5$  kg in Surthi (Tailor *et al.*, 1999). The overall average DMY of Nagpuri buffaloes was comparatively higher than that reported in village buffaloes from Krishna Delta in Andhra Pradesh (Raut and Singh, 1978) and from Murrah buffaloes maintained at the coastal and hilly areas of Eastern region of Orrisa (Sharma *et al.*, 1990). Singh and Singh (1999) recorded lower daily milk yield of Bhadawari buffaloes under farm ( $2.88 \pm 0.29$ ) and village ( $2.57 \pm 0.32$ ) conditions. The average DMY in the present study is lower than that was recorded in Nilli-Ravi by Amble *et al.* (1970) and in Murrah by Dani and Gaikwad (1972).

### Peak milk yield

The overall average PMY was  $6.00 \pm 0.03$  kg with a coefficient of variation of 17.23%. Highly significant ( $P \leq 0.01$ ) difference between PMY of different lactation was observed. The PMY showed rising trend from second to fourth lactation and thereafter it declined. The means of second, third and fourth lactation were not significantly different from each other. Seventh lactation peak milk yield was significantly less than sixth lactation. Fifth and sixth lactation yield did not differ significantly, while these two lactational peak yields were significantly different from seventh lactation peak yield.

The average peak yield reported in the present study is higher than that reported by Bokade (2001) in Purnathadi (strain of Nagpuri) buffalo from livestock instructional farm, Dr. Punjabrao Desmukh Krishi Vidyapeeth, Akola indicating the presence of considerable variation in this trait and hence there is an abundant scope of improvement of Nagpuri buffaloes for milk production. The peak yield obtained in this study was lower than Murrah, Jaffrabadi, Surthi, Mehsana, and Nili-Ravi buffaloes (Shukla and Gajbhiye, 1986; Thangaraju, 1990; Chawla, 1999; Paliwal *et al.*, 1999). However, it was comparable with the peak yield reported in local and graded Murrah buffaloes from Madras (Thangaraja, 1990). The average peak yield of Nagpuri buffaloes in the present study was quite higher than that reported in Bhadawari buffaloes maintained under farm ( $4.44 \pm 0.33$  kg) and village ( $4.34 \pm 0.36$  kg) conditions respectively as reported by Singh and Desai (1962) and Singh and Singh (1999). It was also found to differ with the overall mean peak yield of  $5.32 \pm 0.17$  liters observed in Marathwadi buffaloes from Parbhani district of Maharashtra (Kalyankar, 2001).

### **305 days lactation milk yield (LMY)**

The overall average 305 days milk yield was observed to be  $1230.46 \pm 17.93$  kg with a CV of 41.17%. Highly significant difference ( $P \leq 0.01$ ) in lactation yield was observed between parities. The average lactation yield increased up to fourth calving after which it declined. The LMY in proportion to first lactation is given in Table 3.

The overall LMY observed in the present study was comparatively higher than that reported by previous workers for the same breed viz 1103 kg by Tiwana and Dhillon (1999) and  $720.41 \pm 14.89$  kg by Bokade (2001) in purnathadi strain. The overall LMY of Nagpuri buffaloes observed under the present study is more or less comparable with that reported by Bire *et al.* (1994) in Purnathadi buffaloes of Akola district. They had observed the overall lactation yield of  $1224.2 \pm 305.69$  kg. Several studies conducted by various workers indicated that considerable variation is present in this trait and hence there is an abundant scope for improvement of Nagpuri buffaloes for milk production. An overall increase in milk yield of this breed during subsequent years could possibly be due to the changes in the feeding and management practices by adoption of comparatively better animal husbandry practices by the farmers rearing these animals. The lactation yield of Nagpuri buffaloes observed in the present study is quite higher than Marathwada buffaloes (Hadi, 1965; Kalyankar, 2001). The LMY of present study is also comparable with LMY of some other Indian buffalo breeds viz Murrah (Tiwana and Dhillon, 1999) Surti (Taneja, 1999) and Bhadawari (Tiwana and Dhillon, 1999).

### **Lactation length (LL)**

The overall average LL was observed to be  $322.5 \pm 4.16$  days. The LL for the first lactation

was observed to be highest ( $343.21 \pm 4.20$  days), however non-significant effect of parities on LL up to third lactation was observed, while significant difference between means of first three lactation with that of fourth lactation onwards were noticed. A decreasing trend of LL was observed from first to seventh lactation, which is similar to that reported by Deb and Kadu (1977) and Belorkar *et al.* (1977).

The findings in the present study are in close agreement with that of Pargaonkar (1969) who also reported longer LL of 365 days in Berari strain of Nagpuri buffaloes. Similar observation of  $325.08 \pm 5.95$  days was recorded for the LL in Nagpuri buffaloes of Yeotmal cattle breeding farm by Ambalkar (1971) and Ambalkar *et al.* (1977). The average LL obtained in this study was higher which could be attributed to better management practices being followed by the farmers. The same opinion was expressed by Ray and Rao (1999) who discussed that the LL of Parlakhemundi buffaloes ranged from 448 to 468 days. These workers observed higher yield during initial days, lasting for above 3 to 4 months, thereafter it declines rapidly and continued until the animal got conceived.

### **Dry period (DP)**

The average DP of Nagpuri buffaloes was found to be  $187.40 \pm 3.17$  days with a coefficient of variation of 20.38%. Highly significant ( $P \leq 0.01$ ) differences with respective DP between lactation were observed. The difference between DP of first and second to sixth lactation was observed to be non-significant, except sixth lactation. This was significantly different from DP of successive lactations. The DP increased from second to fourth, whereas it decreased gradually in fifth, sixth and seventh parities respectively with the maximum DP of  $216.82 \pm 3.691$  days in third lactation. Similar observation of longest average DP of  $214.9 \pm 1.07$

Table 1. Lactation-wise distribution of Nagpuri buffaloes in study area.

Tahsils	Lactation orders							Total
	L1	L2	L3	L4	L5	L6	L7	
Pusad	14	32	46	48	31	19	10	200
Darwha	4	31	52	49	27	15	22	200
Wani	10	38	29	50	28	21	24	200
Yeotmal	13	32	57	50	26	18	4	200
Overall	41	133	184	197	112	73	60	800

Table 2. Mean±SE and CV of DMY, PMY, LMY, LL and DP.

Lactation order	No.		DMY(kg)	PMY(kg)	LMY(kg)	LL(days)	DP(days)
I	41	Mean±SE CV	3.01 ± 0.15 <sup>a</sup> 32.88	4.39 ± 0.20 <sup>a</sup> 29.86	1232.03 ± 47.08 <sup>a</sup> 24.26	343.21 ± 4.20 <sup>a</sup> 7.84	175.56 ± 4.04 <sup>a</sup> 14.73
II	133	Mean±SE CV	4.08 ± 0.16 <sup>a</sup> 45.24	6.73 ± 0.09 <sup>b</sup> 16.13	1254.61 ± 47.95 <sup>a</sup> 44.07	337.14 ± 4.11 <sup>a</sup> 14.02	172.45 ± 3.97 <sup>a</sup> 26.47
III	184	Mean±SE CV	4.35 ± 0.13 <sup>c</sup> 42.75	6.78 ± 0.07 <sup>b</sup> 15.18	1397.65 ± 57.63 <sup>b</sup> 55.93	335 ± 2.65 <sup>a</sup> 10.73	216.82 ± 3.69 <sup>b</sup> 23.03
IV	197	Mean±SE CV	4.67 ± 0.14 <sup>d</sup> 42.53	6.69 ± 0.06 <sup>b</sup> 14.15	1401.89 ± 44.93 <sup>b</sup> 44.98	320.03 ± 4.14 <sup>b</sup> 18.13	210.96 ± 2.51 <sup>b</sup> 16.69
V	112	Mean±SE CV	4.26 ± 0.14 <sup>ce</sup> 36.47	5.95 ± 0.09 <sup>c</sup> 17.47	1300.87 ± 45.06 <sup>b</sup> 36.65	316.53 ± 4.33 <sup>b</sup> 14.41	202.18 ± 4.16 <sup>b</sup> 21.69
VI	73	Mean±SE CV	4.2 ± 0.20 <sup>ef</sup> 39.66	6.23 ± 0.12 <sup>c</sup> 16.81	1251.51 ± 60.69 <sup>a</sup> 41.15	300.06 ± 3.63 <sup>b</sup> 10.27	183.8 ± 6.30 <sup>a</sup> 29.06
VII	60	Mean±SE CV	2.48 ± 0.11 <sup>f</sup> 34.76	5.19 ± 0.10 <sup>d</sup> 15.05	774.66 ± 37.17 <sup>bc</sup> 37.17	305.5 ± 6.06 <sup>b</sup> 15.24	150 ± 6.34 <sup>b</sup> 32.48
Overall	800	Mean±SE CV	3.88 ± 0.05 39.71	6.00 ± 0.03 17.23	1230.46 ± 17.93 41.17	322.5 ± 4.16 12.95	187.4 ± 3.17 20.38

P≤0.01

Values bearing different superscript column wise differs significantly.

Table 3. LMY in different parities in proportion to first lactation.

Order of lactation	N	305 days milk yield (kg)	
		Mean	Proportion to first lactation
I	41	1232.03	1
II	133	1254.61	1.01
III	184	1397.65	1.13
IV	197	1401.89	1.14
V	112	1300.87	1.05
VI	73	1251.51	1.01
VII	60	774.6	0.63

Table 4 Correlation coefficients among productive traits of Nagpuri buffaloes.

Traits	PMY(kg)	LMY(kg)	LL(days)	DP(days)
DMY(kg)	0.1909**	0.8627**	0.1253**	0.1323**
PMY(kg)		0.1651**	0.0589**	0.1571**
LMY(kg)			0.0708**	0.1571**
LL(days)				-0.0282 <sup>NS</sup>

\*\*P $\leq$ 0.01, NS-Non Significant

days noticed in Marathwada buffaloes of Kolegaon center of Parbhani district (Kalyankar, 2001). The overall average DP obtained in the present study is quite higher than that reported in Nagpuri buffaloes by several workers (Kadu *et al.*, 1978; Ambalkar *et al.*, 1977; Bire *et al.*, 1994; Kalyankar, 2001). Difference in dry period with respect to Nagpuri buffaloes may due to difference in management practices followed at different places. Secondly, the shorter dry period reported by the above workers may due to better sexual health control and husbandry practices adopted during this period.

#### Correlation among production traits

The correlation coefficients among productive traits of Nagpuri buffaloes are present

in Table 4. Highly significant correlation of DMY with PMY, LMY and DP was observed. Similar association of DMY with PMY and LMY was reported by Vij and Tiwana (1986). Highly significant correlation of DMY with PMY, LMY and DP indicates that selection based on any of this trait will result in improvement in desirable direction through positive correlation response in all other traits. Negative but significant correlation between DMY and LL was observed which is in contrast with the report of Umrikar and Deshpande (1985) who recorded highly significant but negative relationship between these two traits. The correlation coefficient between PMY and LL was observed to be negative but non-significant is in agreement with the findings of Rao *et al.*

(1970). Contrary to the above finding, Umrikar and Deshpande (1985) reported negative but significant association between PMY and LL of Murrah buffaloes. A positive and significant correlation between PMY with LMY and DP was recorded and is in agreement with the response of Vij and Tiwana (1986). Highly significant association between LMY and DP was recorded. A non-significant correlation was found between LMY and LL and between LL and DP.

## REFERENCES

- Agrawal, S.B., R.K. Patel and K.N.S. Sharma. 1982. Estimation of performance characteristic of Murrah buffalo under village conditions. *Indian J. Dairy Sci.*, **40**: 200-204.
- Ambalkar, S.S., R.T. Desai and V.R. Thatte. 1977. Studies on certain economic traits in Nagpuri buffaloes. *Maha. Vet.*, **3**: 99-104.
- Ambalkar, S.S. 1971. *A study of performance of nagpuri buffalo under Nagpur climatic condition*. M.V.Sc. Thesis, Punjabrao Desmukh Krishi Vidyapeeth, Akola, India.
- Amble, V.N., R. Gopalan, J.C. Malhotra and P.C. Mehrotra. 1970. Some vital statistic and genetic parameters of Indian buffaloes at military dairy farm. *Indian J. Anim. Sci.*, **40**: 377-388.
- Belorkar, P.M., D.W. Khire, M.S. Kadu and A.S. Kaikini. 1977. Studies on effect of service period on lactational yield, lactational period and dry period in Nagpuri buffaloes. *Indian Vet. J.*, **54**: 384-388.
- Bire, P.V., R.V. Tambat and B.W. Ramekar. 1994. Purnathadi buffalo a strain of Berari buffalo-Potential animal for milk production. *Livestock Adviser*, **19**(12): 28-36.
- Bokade, S.V. 2001. *Peak yield and its association with lactational yield in Purnathadi buffaloes*. M.V.Sc. Thesis, Punjabrao Desmukh Krishi Vidyapeeth, Akola, India.
- Chawla, D.S. 1999. Improvement of buffaloes for milk production: method and organisation. *Indian J. Anim. Prod.*, **31**: 25-39.
- Dani, G.V. and S.L. Gaikwad. 1972. Effect of seasonal calving on some of the economic traits in Murrah buffaloes. *PKV Research Journal*, **1**(1): 101-105.
- Deb, R.N. and M.S. Kadu. 1977. Some observation on production character in Nagpuri buffaloes. *Indian J. Anim. Health*, **16**: 35-38.
- Hadi, M.A. 1965. A preliminary study of certain productive and reproductive characters of Marathwadi buffaloes of Maharashtra state. *Indian Vet. J.*, **42**: 692-698.
- Kadu, M.S., D.W. Khire, P.M. Belorkar and M.S. Kaikini. 1978. Studies on reproductive efficiency in Nagpuri buffaloes. *Indian Vet. J.*, **55**: 94-98.
- Kalyankar, S.D. 2001. *The performance of Marathwadi buffaloes in Parbhani district*. M.Sc. Thesis, Marathwada Agriculture University, Parbhani, India.
- Paliwal, P.C., L.S. Jain, M.C. Yadav and S.P. Tailor. 1999. Inheritance of peak yield in Surti buffaloes. *Indian J. Anim. Prod.*, **31**: 95-98.
- Panse, V.G. and P.V. Sukhmate. 1985. *Statistical Methods for Agriculture Worker*, 4<sup>th</sup> ed. ICAR, New Delhi, India. 121p.
- Pargaonkar, D.R. 1969. *Study of certain aspect of reproduction in Nagpuri buffaloes*. M.V.Sc Thesis, Punjabrao Desmukh Krishi Vidyapeeth, Akola, India.
- Rao, T.P., B.P. Singh and M. Dutta. 1970. Studies on lactation curves and association of certain

- production traits in Murrah buffaloes. *Indian J. Anim. Sci.*, **40**: 246-251.
- Raut, K.C. and S. Singh. 1978. Production structure and some production traits of buffaloes in rural areas. *Indian J. Anim. Sci.*, **48**: 331-334.
- Ray, S.K. and S.V. Rao. 1999. The parlakhemundi buffalo its description, evaluation and conservation for milk, draught and horn industry. *Indian J. Anim. Prod.*, **31**: 53-58.
- Sharma, P.J., M. Mishra and A. Mohanty. 1990. Lactational yield of Murrah buffaloes and its prediction incostal and hilly areas of hot humid climate. *Indian Journal of Animal Production and Management*, **6**(3): 127-129.
- Shukla, K.P. and P.U. Gajbhiye. 1986. Report on breed characteristic performance traits of Jaffrabadi buffaloes. *Buffalo Bull.*, **5**: 6-8.
- Singh, H.P. and R. Singh. 1977. Statistical studies of some economic traits of Indian buffaloes. *Indian Vet. J.*, **54**: 823-833.
- Singh, S.B. and R.N. Desai. 1962. Production character of Bhadawari buffaloes. *Indian Vet. J.*, **39**: 332-343.
- Singh, V.K. and B.P. Singh. 1999. Description and identification of some endangered Bhadawari breed of buffaloes in its native tract. *Indian J. Anim. Prod.*, **31**: 105-08.
- Snedecor, G.W. and W.G. Cochran. 1967. *Statistical Methods*, 6<sup>th</sup> ed. Oxford and IBH publishing Co., Calcutta. 332p
- Tailor, S.P., O.P. Pathodia, B. Singh and S.B.S. Yadav. 1999. Different measures of milk production efficiency in Surti buffaloes. *Indian J. Anim. Prod.*, **31**: 91-94.
- Taneja, V.K. 1999. Management of buffaloes genetic resources for milk, meat and drought. *Indian J. Anim. Prod.*, **31**: 1-8.
- Thangaraju, P. 1990. Performance of local and graded Murrah buffaloes in Madras city. *Livestock Advisor*, **15**(10): 14-17.
- Tiwana, M.S. and J.S. Dhillon. 1999. Genetic improvement of buffaloes for milk production-method and organisation. *Indian J. Anim. Prod.*, **31**: 99-103.
- Umrikar, U.D. and K.S. Deshpande. 1985. Genetic studies on lactation length and dry period in Murrah buffaloes. *Indian J. Anim. Sci.*, **55**: 888-892.
- Vij, P.K. and M.S. Tiwana. 1986. Phenotypic and genetic parameters of some productiontraits in buffaloes. *Indian Vet. J.*, **63**: 838-845.