EVALUATION OF BREEDING VALUES MURRAH BUFFALO BULLS UNDER ORGANIZED FARMS

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ABSTRACT

In the present study, breeding information spread over a period of 14 years from 1995 to 2008, was collected from the history-cum-pedigree sheets and milk yield registers of Murrah buffaloes maintained in four centres of Network Project on Murrah Buffalo Improvement (National Dairy Research Institute, Karnal; Central Institute for Research on Buffalo, Hisar and Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana and Choudhary Charan Singh Haryana Agricultural University, Hisar). Data on first lactation traits of 832 Murrah buffaloes sired by 95 bulls were used for the study. Farm had significant effect on FL305MY, while season and year of calving did not affect significantly in the present study. Breeding value for first lactation 305 days milk yield was estimated using best linear unbiased prediction (BLUP) method. The breeding value of different bulls varied from 1630.40 kg in fifth set to 2022.61 kg in seventh set.

Keywords: BLUP, breeding value, FL305MY, murrah buffalo

INTRODUCTION

Selection of the superior sires with maximum accuracy is of utmost importance for any breed improvement programme, as sires are easily and rapidly disseminated in various herds under progeny testing programme. Robertson and Randle (1954) opined that as much as 61% of genetic gain in dairy cattle resulted from selection of sires through two paths, i.e. bulls to breed cows and bulls to breed bulls. Hence, accurate selection of bulls used in artificial insemination (AI) programme is of prime importance for long-term genetic progress in the population.

The prediction of breeding values constitutes an integral part of most breeding programmes for genetic improvement of the sire for different economic traits. The accuracy of estimating the breeding value of an animal is the major factor that affects the genetic progress due to selection. The sire evaluation based on milk yield was most widely used criteria. To make rapid genetic progress in performances through selection for traits of economic importance, the animals must be chosen accurately for their superior breeding values. Over the times various methods have been used for sire evaluation, Henderson's (1973) mixed model or best linear unbiased prediction (BLUP)

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procedure has become the method of choice for evaluating the genetic worth of the bulls. BLUP is one of the accurate sire evaluation methods to obtain unbiased estimates of breeding values of sires (Mukherjee *et al*., 2007). The model of analysis under BLUP takes into account, the fixed effect and relationship among animals. Therefore, the breeding values of animals are estimated with higher accuracy.

MATERIALS AND METHODS

The Murrah bulls in 7 sets (11, 12, 15, 14, 15, 16 and 12 bulls) were inducted for progeny testing at Central Institute for Research on Buffalo (CIRB), Hisar, National Dairy Research Institute (NDRI), Karnal Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana, Choudhary Charan Singh Haryana Agricultural University (CCSHAU), Hisar. The daughters of first 7 sets have completed their first lactation records. The first lactation 305 days milk yield (FL305MY) records of 832 daughters of 95 bulls calved during 14 years from 1995 to 2008, were used for this study. The period of 14 years was divided into 14 years. Each year of calving was further classified into 2 seasons, viz. most calving season (January to June) and least calving season (July to December) based on calving pattern. All information was classified in four farms viz. NDRI, CIRB, GADVASU and CCSHAU. The breeding value of sires was estimated by best linear unbiased prediction (BLUP) method as given by Henderson (1973).

The model of BLUP estimation was considered as follows:

$$Y = Xb + Za + e$$

where, Y, b, a and e denotes the vector of observations (FL305MY), fixed effects (farm, season and period effect), random effect (sire effect) and random error and X and Z are incidence matrices pertaining to fixed effects and random effects.

RESULTS AND DISCUSSION

The overall least squares mean of total first lactation milk yield (Table 1) was, however, lower than that reported by Patil (2011) and Geetha (2005) in Murrah buffalo. Higher than this was reported by Katneni (2007). Farm had significant effect on FL305MY in the present study. Centre-wise least-squares means for 305MY for NDRI, CIRB, GADVASU and CCSHAU were found to be 1792.45±31.94, 1684.71±37.88, 1941.02±42.90 and 1969.26±104.80 kg, respectively. Season and year of calving did not affect significantly the FL305MY of Murrah buffaloes in the present study.

The information on bulls along with their breeding values is given in Table 2 to Table7. The breeding value of different bulls varied 1683.44 to 1976.89 kg in first set, 1746.03 to 1952.91 kg in second set, 1720.94 to 1929.56 kg in third set, 1730.12 to 1907.14 kg in fourth set, 1630.40 to 2011.21 kg in fifth set, 1710.75 to 1981.79 kg in sixth set and 1709.76 to 2022.61 kg in seventh set. The highest breeding value was observed for sire 88 (set 7) followed by 66 (set 5) and 69 (set 6). Singh and Singh (1999) observed breeding value of Murrah bulls between 1137.30 to 1329.01 kg using BLUP method. Pandey and Singh (1999) computed breeding value of 52 Murrah bulls for first lactation milk yield by corrected contemporary daughter average index and reported it ranges from 1349.62 to 1934.39 kg.

Table 1. Least-squares means of first lactation milk yield in Murrah buffaloes.

Factor	No. of Observation	FL305MY
Overall (μ)	832	1846.86±35.94*
Farm		
NDRI	305	1792.45±31.94[b]
CIRB	314	1684.71±37.88[a]
GADVASU	188	1941.02±42.90[c]
CCSHAU	25	1969.26±104.80[c]
Season of calving		
Least calving season	291	1881.96±43.57
Most calving season	541	1811.75±36.94
Year of calving		
1995	5	2070.52±220.35
1996	19	1956.38±117.84
1997	33	1754.71±92.10
1998	9	1665.17±165.24
1999	77	1884.81±62.23
2000	66	1860.91±65.15
2001	67	1736.42±65.23
2002	72	1804.10±63.26
2003	108	1788.41±53.71
2004	91	1871.62±57.91
2005	81	1903.16±56.12
2006	87	1855.29±57.40
2007	89	1889.94±53.04
2008	28	1814.57±93.51

*Significant $P < 0.05$; Values with different superscript differ significantly: Milk yields are in kg.

Table 2. Breeding values of Murrah buffalo bulls in set 1.

Sire	No. of Daughters	Breeding Value	Rank
1	5	1946.02	11
2	6	1962.25	6
3	8	1976.89	4
4	18	1948.54	10
5	19	1856.7	44
6	18	1683.44	94
7	10	1694.78	93
8	4	1884.15	32
9	5	1840.46	53
10	2	1804.92	62
11	11	1819.11	58

Table 3. Breeding values of Murrah buffalo in set 2.

Sire	No. of Daughters	Breeding Value	Rank
12	9	1835.51	55
13	8	1889.71	30
14	11	1906.64	23
15	7	1952.91	7
16	2	1863.89	40
17	8	1882.1	33
18	11	1754.49	77
19	15	1927.16	15
20	10	1841.04	52
21	9	1749.77	79
22	9	1746.03	80
23	13	1771.69	74

Table 4. Breeding values of Murrah buffalo bulls in set 3.

Sire	No. of Daughters	Breeding Value	Rank
24	9	1829.47	56
25	4	1929.56	14
26	8	1905.36	25
27	11	1775.59	73
28	3	1916.97	19
29	6	1920.06	18
30	4	1809.36	60
31	3	1767.56	75
32	2	1892.23	29
33	3	1915.45	20
34	5	1757.44	76
35	21	1781.17	71
36	11	1808.65	61
37	7	1720.94	88
38	9	1875.56	36

Table 5. Breeding values of Murrah buffalo bulls in set 4.

Sire	No. of Daughters	Breeding Value	Rank
39	18	1860.85	43
40	9	1781.36	70
41	5	1845.41	49
42	9	1793.57	66
43	6	1796.92	65
44	5	1856.17	45
45	6	1730.12	85
46	11	1899.66	27
47	7	1878.6	34
48	9	1743.18	81
49	11	1875.07	37
50	5	1845.71	48
51	11	1907.14	22
52	8	1841.94	51

Table 6. Breeding values of Murrah buffalo bulls in set 5.

Sire	No. of Daughters	Breeding Value	Rank
53	16	1728.66	87
54	3	1848.07	47
55	12	1630.4	95
56	7	1789.89	68
57	6	1800.28	64
58	6	1790.09	67
59	6	1862.63	41
60	8	1842.65	50
61	3	1698.94	92
62	6	1838.57	54
63	11	1888.87	31
64	9	1803.98	63
65	22	1963.15	5
66	12	2011.21	2
67	12	1933.16	13

Table 7. Breeding values of Murrah buffalo bulls in set 6.

Sire	No. of Daughters	Breeding Value	Rank
68	10	1735.45	83
69	20	1981.79	3
70	7	1788.69	69
71	2	1710.75	90
72	3	1819.02	59
73	4	1905.32	26
74	8	1875.61	35
75	15	1867.7	38
76	14	1925.69	16
77	5	1728.86	86
78	7	1825.39	57
79	10	1949.13	9
80	10	1906.24	24
81	5	1951.98	8
82	4	1716.71	89
83	7	1739.52	82

Table 8. Breeding values of Murrah buffalo bulls in set 7.

Sire	No. of Daughters	Breeding Value	Rank
84	18	1861.04	42
85	8	1749.87	78
86	13	1780.19	72
87	8	1921.59	17
88	6	2022.61	1
89	4	1735.16	84
90	3	1709.76	91
91	13	1899.06	28
92	6	1909.69	21
93	13	1864.92	39
94	9	1848.93	46
95	17	1934.11	12

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