RESEARCH ARTICLE

ESTIMATION OF SIRE INDEX FOR MURRAH BULLS FOR AVERAGE DAILY MILK YIELD

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ARTICLE INFO	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 at 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 average first lactation daily milk yield (MY/FLL), while season and year of calving did not affect significantly in the present study. Breeding value for MY/FLL was estimated using least-squares (LS) method. The breeding value of different bulls varied from 4.683 kg in fifth and seventh set to 7.655 kg in seventh set.

INTRODUCTION

Agriculture sector in India contributes nearly 14.7 % of gross domestic production (GDP). Livestock sector including dairying, which is the component of the agriculture sector in India, has shown remarkable development in the recent past and contributes to about 28–30 % in the agricultural GDP. Buffaloes play a pivotal role in Indian livestock industry which includes their contribution in terms of milk, meat, skin, manure, and draft animal power. About 63 % of the world's buffalo milk and 95% of buffalo milk in Asia is contributed by Indian buffaloes (Anonymous, 2012). India possesses the largest buffalo population of the world, which is about 105.34 million (Anonymous, 2008), and their numbers are showing positive growth trends. Among the 13 buffalo breeds present in India, Murrah breed is essentially the cynosure for dairy animal and constitutes about 19 % of the total buffalo population. Identification of the best sires is of utmost importance for any breed improvement programme, as sires are easily and rapidly disseminated in various herds under progeny testing programme. 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 index values constitutes an integral part of most breeding programmes for genetic improvement of the sire for different economic traits.

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The accuracy of estimating the index 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, Harvey (1987) gave the concept of least-squares analysis for non-orthogonal data. By incorporating sire as a random effect in the model of least-squares analysis, the effect of sire can be determined for their genetic merit for effective sire evaluation. The least-squares analysis for estimation of breeding value of sires has widely been used in India by different workers. The sire indexes are used to determine the transmitting ability, and ranking of bulls as required in progeny testing programmes. The present study was therefore, planned to estimate the sire index of the animals for comparative ranking for milk yield using least-squares procedure. The information so generated will be useful in optimising the future breeding programmes for genetic improvement of the buffalo population in the country.

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

Table 1. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 1

Sire	No. of Daughters	Breeding Value	Rank
1	5	6.983	13
2	6	7.049	08
3	8	7.048	09
4	18	6.786	21
5	19	6.443	40
6	18	5.474	87
7	10	5.549	84
8	4	6.709	23
9	5	5.757	74
10	2	4.884	92
11	11	5.752	76

Table 2. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 2

Sire	No. of Daughters	Breeding Value	Rank
12	9	6.198	56
13	8	6.574	30
14	11	6.517	33
15	7	7.102	07
16	2	6.894	17
17	8	6.503	36
18	11	5.481	86
19	15	6.644	28
20	10	6.768	22
21	9	5.494	85
22	9	5.735	77
23	13	6.143	59

Table 3. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 3

Sire	No. of Daughters	Breeding Value	Rank
24	9	6.128	60
25	4	7.027	11
26	8	6.648	27
27	11	5.770	73
28	3	7.166	06
29	6	7.200	05
30	4	5.702	79
31	3	5.389	88
32	2	6.559	31
33	3	6.903	15
34	5	5.349	89
35	21	6.159	58
36	11	6.259	54
37	7	5.855	67
38	9	6.302	50

Table 4. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 4

Sire	No. of Daughters	Breeding Value	Rank
39	18	6.274	53
40	9	6.416	43
41	5	6.295	51
42	9	5.871	66
43	6	6.234	55
44	5	6.409	44
45	6	5.653	81
46	11	6.475	38
47	7	6.644	28
48	9	5.641	82
49	11	6.419	42
50	5	6.076	64
51	11	6.705	25
52	8	6.428	41

Table 5. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 5

Sire	No. of Daughters	Breeding Value	Rank
53	16	5.791	71
54	3	6.306	49
55	12	5.078	90
56	7	5.804	69
57	6	6.361	48
58	6	6.399	46
59	6	6.539	32
60	8	6.122	61
61	3	4.683	93
62	6	6.479	37
63	11	7.033	10
64	9	6.174	57
65	22	6.821	19
66	12	7.237	04
67	12	6.706	24

Table 6. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 6

Sire	No. of Daughters	Breeding Value	Rank
68	10	6.101	63
69	20	6.901	16
70	7	5.794	70
71	2	4.885	91
72	3	5.756	75
73	4	6.952	14
74	8	6.511	35
75	15	6.374	47
76	14	6.587	29
77	5	5.673	80
78	7	5.712	78
79	10	6.882	18
80	10	6.989	12
81	5	7.361	03
82	4	5.635	83
83	7	5.812	68

Table 7. Breeding values of Murrah buffalo bulls for MY/FLL (kg) in set 7

Sire	No. of Daughters	Breeding Value	Rank
84	18	6.795	20
85	8	6.112	62
86	13	5.996	65
87	8	7.443	02
88	6	7.655	01
89	4	5.780	72
90	3	4.683	93
91	13	6.473	39
92	6	6.516	34
93	13	6.280	52
94	9	6.400	45
95	17	6.701	26

completed their first lactation records. The average first lactation daily milk yield (MY/FLL) 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 index of sires was estimated

by least-squares (LS) method as given by Harvey, 1979 was used as follows:

$$Y_{ij} = \mu + s_i + e_{ij}$$

where,

Y_{ij}: is the observation on jth progeny of ith sire on the data corrected for significant non-genetic factor for the trait
μ: is overall mean for the corrected data
s_i: is effect of the ith sire
e_{ij}: is random error $\sim NID\ (0, \sigma_e^2)$

Index (I) of ith sire was estimated by following formula:

$$I = \mu + s_i$$

RESULTS AND DISCUSSION

The data were adjusted for significant non-genetic factors. The overall least-squares mean for MY/FLL was estimated as 6.34 ± 0.10 kg. Higher than this was reported by Katneni, 2007. Farm had significant effect on MY/FLL in the present study. Farm-wise least-squares means for NDRI, CIRB, GADVASU and CCSHAU were found to be 6.25 ± 0.09, 5.79 ± 0.11, 6.74 ± 0.12 and 6.59 ± 0.30 kg, respectively. Season and year of calving did not affect MY/FLL of Murrah buffaloes in the present study. The information on bulls along with their breeding values for MY/FLL is given in Table 1 to Table 7. The breeding value of different bulls varied 4.88 to 7.049 kg in first set, 5.481 to 7.102 kg in second set, 5.349 to 7.200 kg in third set, 5.653 to 6.705 kg in fourth set, 4.683 to 7.237 kg in fifth set, 4.885 to 7.361 kg in sixth set and 4.683 to 7.655 kg in seventh set. The highest breeding value was observed for sire 88 (set 7) followed by 87 (set 7) and 81 (set 6). Singh and Singh (1999) observed breeding value of Murrah bulls for MY/FLL between 2.51 to 5.63 kg using least-squares method.

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