CONVENTIONAL METHODS FOR EVALUATION OF MURRAH BREED SIRES

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Abstract: The data available on 577 daughter-dam pairs of Murrah buffaloes, distributed over 34 years and maintained at seven military farms and university farm were used for studying and comparing the six sire evaluation methods, namely, Simple daughter's average index, Equivalent parent, Corrected daughter average index, Contemporary daughter average index, Corrected contemporary average index and Dairy search index. The contemporary daughter average and the corrected contemporary daughter average indices were found to be better in estimating the breeding value of the sires in this study. The rank correlation between simple daughter average index (I_1) and the contemporary daughter average index (I_4) was maximum as 0.986, thereby indicated that the index I_1 and the index I_4 gave the ranking of the sires in the same order. The rank correlations between the corrected contemporary daughter average index (I_5) and the rest of the indices were found to be comparatively quite low, indicating comparatively more independency of the index I_5. The rank correlations among indices I_1, I_2, I_3 and I_4 were of highly significant. The rank correlation between I_5 and I_6 was also highly significant.

Keywords: Breeding value**,** sire evaluation, sire index, rank correlation.

Introduction

There are many methods used for selecting the sires. The sire evaluation based on first lactation milk yield trait is a widely used criterion. There are some limitations of using advanced sire evaluation as most of the progeny testing programmes are limited only to the organized farms, herd sizes are also small, data are spread over a longer period and complexity in analyzing the data. Therefore, an investigation was planned to compare different sire evaluation methods and suggesting the most practical method under Indian conditions. The six sire evaluation methods used were, namely, Simple daughter's average index, Equivalent parent**,** Corrected daughter average index**,** Contemporary daughter average index**,** Corrected contemporary average index and Dairy search index by utilizing the first lactation milk yield records of 577 daughter-dam pairs of 68 sires.

Material and Method

The data on 577 daughters-dams pairs of Murrah buffaloes, distributed over 34 years (1960-1993), were used in the present investigation for studying the six sire evaluation methods,

namely, Simple daughter's average index [2] , Equivalent parent[3], Corrected daughter average index [8] , Contemporary daughter average index , Corrected contemporary average index [5] and Dairy search index [12]. The data maintained at military farms viz. Ferozepur, Ambala, Jallandhar, Jhansi, Lucknow, Bareilly, Agra, and Instructional Dairy Farm, Pantnagar were used.

Spearman's coefficient of rank correlation [10] was applied to data in the form of ranks. The formula used was:

$$r = 1 - \frac{6 \sum_i d_i^2}{n(n^2 - 1)}$$

whereas r = rank correlation, n = number of sires, and d_i = difference between rank of the sire ranked by two methods. The significance of rank correlation was tested by using Student's t-test, which is given by, $t = r \sqrt{\frac{(n-2)}{(1-r^2)}}$ with (n-2) degree.

Result and Discussion

The index values computed based on 300-day milk yield of daughters (Index, I_1) ranged from 809.68 kg to 2436.80 kg. The 39 sires had a higher value than the herd average index value of 1672.68 kg. The index values of the sires computed from the equiparent index (I_2) varied from 1263.28 kg to 2064.25 kg, and 38 sires showed higher index values than the herd average. Index values of the sires computed by using the corrected daughter average index (I_3) were observed between 1087.83 kg and 2222.39 kg. In this case also, 38 sires indicated higher index values than the value of herd average. Sires index values computed by the contemporary daughter average index (I_4) fall in the range of 1184.77 kg to 2271.70 kg. The index values of 38 sires were found to be more compared to the herd average value. The sire index values computed using the corrected contemporary daughter average index (I_5) ranged from 1329.44 kg to 3413.53 kg. The index values of 56 sires were higher than the herd average index value. The index values of sires computed from dairy search index (I_6) ranged between 900.10 kg and 5123.76 kg, whereas 50 sires were found to have a higher index value than the herd average value. It is evident from the results that the relative ranking of sires evaluated by indices I_1 to I_4 was almost same. The index I_5 and I_6 indicated almost same ranking of the sires. However, the ranking of the sires using I_1, I_2, I_3, and I_4 indices was different as found using I_5 and I_6 indices. The sire no. 21 was at first rank as per the indices I_1, I_2, I_3, and I_4, whereas sire no. 67 was ranked first according to the indices I_5 and I_6. The

indices I_1, I_2, I_3 and I_4 showed rank 4 for the sire no. 67. Therefore, it can be stated that the ranking of sires depends upon the method of indexing. The present findings agree with the reports of Raheja [9] and Deulkar and Kothekar [1]. They also reported a similar trend in the sire index values. However, the present finding differs from the reports of Tajane and Rai [13] and Vinoo *et al.* [14].

The estimates of variances of sire index values were lowest in the case of contemporary daughter average index (I_4) and the highest in the case of dairy search index (I_6). The perusal of standard errors (Table 1) also revealed that contemporary daughter average index was the most efficient followed by corrected contemporary daughter average index with least standard error in evaluating the sires. The values of standard error in the case of I_1, I_2, I_3, and I_6 were comparatively very high. The results indicated that contemporary daughter average index (I_4) was most efficient method of indexing the buffalo sires. The dairy search index was found to be the least efficient method among the six sire valuation methods. The simple daughter average index (I_1) was observed to be slightly superior to the dairy search index (I_6). The various indices according to the superiority of the variances of the index values were ranked as I_4, I_5, I_3, I_2, I_1 and I_6 in relative descending order of superiority. These findings revealed that the breeding values of the sires with dairy search index could have been underestimated compared to the other indices. The variations could be reduced by using the contemporary comparison corrected over the year differences, and the accuracy of the index could be increased by making comparison within age groups. That is why the contemporary daughter average and the corrected contemporary daughter average indices were found to be better in estimating the breeding value of the sires in this study. These reports were in accordance with the report of Hatwar and Chawla [4].

The rank correlation between simple daughter average index (I_1) and the contemporary daughter average index (I_4) was maximum as 0.986, thereby indicated that the index I_1 and the index I_4 gave the ranking of the sires in the same order. The rank correlations between the corrected contemporary daughter average index (I_5) and the rest of the indices were found to be comparatively quite low, indicating comparatively more independency of the index I_5. The rank correlations among indices I_1, I_2, I_3 and I_4 were of highly significant. The rank correlation between I_5 and I_6 was also highly significant. Therefore, it can be concluded that the corrected contemporary daughter average index (I_5) is better for evaluating the sires compared to the other indices.

Table 1. Comparison of six different sire index methods

Sire index	Standard Error (kg)	Rank of the method
Simple daughter's average index (I_1)	123.79	5
Equiparent index (I_2)	122.73	4
Corrected daughter average index (I_3)	121.08	3
Contemporary daughter average index (I_4)	65.54	1
Corrected contemporary daughter average index (I_5)	68.23	2
Dairy search index (I_6)	124.64	6

Table 2. Rank correlations among different indices

Indices	I_1	I_2	I_3	I_4	I_5
I_2	0.9779				
I_3	0.979	0.981			
I_4	0.986	0.969	0.9551		
I_5	0.480	0.473	0.504	0.594	
I_6	0.456	0.500	0.496	0.448	0.927

I_1 – Simple Daughter Average Index, I_2 – Equiparent (or Intermediate) Index, I_3 – Corrected Daughter Average Index,
I_4 – Contemporary Daughter Average Index, I_5 - Corrected Contemporary Daughter Average Index, and I_6 – Dairy Search Index

Conclusions

The contemporary daughter average and the corrected contemporary daughter average indices were found to be better in estimating the breeding value of the sires in this study.

References

[1] Deulka, P. B. and Kothekar, M. D. (1999). Sire evaluation considering first lactation yield of improvement of lifetime production in Sahiwal. Indian J. Anim. Sci, 4: 24-248.

[2] Edwards, J. (1932). The progeny test as a method of evaluation the dairy sire. J. Agric Sci, 22: 811-837.

[3] Hansson, N. (191). Meddelande: 78:1-85.

[4] Hatwar, R. K. and Chawla, D. S. (1989). Evaluation of Murrah bulls on the basis of first lactation traits, milk constituents and total scores. Indian J. Anim. Sci., 6: 696-702.

[5] Jain, J. P. and Malhotra, J. C. (1971). Comparative study of different methods of indexing sires. Indian J. Anim. Sci, 41: 1101-1108

[6] Jain, J. P. and Malhotra, J. C. (1971). Relative efficiency of different methods of indexing sires. Indian J. Anim. Sci ,41: 1108-1114.

[7] Kornel, D. and Patro, B. N. (1994). Evaluation of Surti buffalo bulls. India J. Anim. Sci, 64: 414-417.

[8] Krishnan, K. S. (1956). A new sire index for milk production. *Indian J. Vet. Sci. and Anim. Husb,* 26: 149.

[9] Raheja, K. L. (1992). Comparison of progeny testing of Sahiwal sires by different methods of sire evaluation. Indian J. Dairy Sci., 2: 64-69.

[10] Spearman, C. (1904). Anim. J. Psych. ,15: 88 (Snedecor and Cochran, 1981).

[11] Sundaresan, D., Gurnani, M. and Sidhu, S. P. (1965). Evaluation of breeding value of bulls used in two herds in India. J. Dairy Sci, 48: 1498-1505.

[12] Sundaresan., Puri, T. R. and Gurnani, M. (1965). Method of sire evaluation for milk production of Indian farms. J. Dairy Sci., 48: 1494-1497.

[13] Taneja, K R, Rai A K (1990) Efficiency of sire evaluation methods to improve milk yield of Sahiwal x Holstein Friesian cattle. Indian J. Anim Sci., 60: 183-191

[14] Vinoo R, Narsimha Rao, G., Gupta, B. R. and Rao, K. (2005). Genetic evaluation of Ongole sires. Indian J. Anim. Sci 75: 1071-1072.