The Indian Journal of Animal Reproduction, 24(1): 62-64, June 2003

SHORT COMMUNICATION

Comparison of various sire evaluation methods in a herd of Holstein Friesian cattle*

T. ASWATHANARAYANA[1]

Department of Animal Husbandry & Veterinary Services
Govt. of Karnataka, Bangalore

Received: October 6, 2001
Accepted: May 18, 2002

ABSTRACT

Relative efficiency of the sire evaluation procedures based on minimum standard error of procedures indicated that both BLUP and MCC methods were more appropriate and efficient in estimating the breeding values of sires compared to SDA and CC. The accuracy and efficiency of BLUP and MCC procedures was probably due to their ability to remove the inherent biases in the data which are likely to arise from sampling sire progeny, progeny per sire effect of geographical location, period and season. In general, BLUP procedure was found to be the best in its application due to its consistency and unbiasedness in ranking of sires in comparison to other procedures. The present findings strongly recommend the use of BLUP procedure for evaluating sires under field and farm conditions, since the BLUP procedure had an advantage over MCC, especially in the absence of data on contemporary daughters.

Key words: Sire evaluation, reproductive traits, BLUP

Milk and milk products constitute an important part of human diet in almost all parts of the world, especially in the vegetarian dominated countries like India. The ever-growing human population and the increasing purchasing power have caused greater demand for dairy products.

Cunningham (1976) suggested that the improvement in milk production should become the central part of the drive for food security and economic growth throughout the developing countries including India. With the introduction of artificial insemination in combination with frozen semen technology, it has been reported that more than 75 per cent of the genetic improvement in milk production can be brought out from selection of bulls (van Vleck, 1990). Therefore an accurate evaluation of bulls is considered as vital in any dairy cattle programme.

The most commonly practiced methods of sire evaluation in India are Simple Daughter's Average, Contemporary Comparison and Best Linear Unbiased Prediction based on sire models. Further, in most bases, the breeding value of sires has been estimated using single trait model and in som cases sire indices incorporating more than one tra have been used. However, now-a-days, there is constant thrust to get sire evaluated using multiple trait and animal model depending up the goal of breeding programmes (Lin and La 1986, Ducrocque and Besbes, 1993) in orde improve more than one trait at a time. An effici estimation of any genetic parameter always nee the removal of bias due to non-genetic influen Adequate attention has to be given to adjustment of records for various non-ge factors which is essential in efficient evaluati sires. Spectacular advances have been achiev evaluating the sires with maximum efficien most of the countries advanced in dairy produ

Although efficient methods of sire evalu have been developed in other countries, they not be appropriate for direct adoption to the In conditions. Further, very little efforts have made to assess the efficiency of recen evaluation procedures. Therefore, this stud contemplated to compare the relative efficie various methods of sire evaluation procedur respect to production and reproduction trai purebred HF cattle.

The data pertaining to 889 farm bre

*Part of the Ph.D. thesis submitted by the author to Bangalore University, Bangalore, [1]Director, Department of Animal Husbandry and Veterinary Services, Govt. of Karnataka, Bangalore.

Table 1: Standard Error of sire evaluation procedures.

Sire evaluation procedure	Age at First Calving (days)	Standard Lactation Yield (kg)	Inter-Calving Period (days)
SDA	11.86	97.11	7.22
CC	9.38	100.97	8.18
MCC	-	95.94	7.21
BLUP	9.70	82.94	6.72

pedigreed Holstein Friesian cattle maintained at the Ashirvanam Farm, Kengeri, Bangalore were utilized for the investigation. Information on genetic groups, age at first calving, ages at First, Second and Third calvings and standard lactation yields during the period from 1978 to 1997 was compiled from pedigree for production and reproduction records.

The data were adjusted for significant sources of non-genetic variation by using Harvey's Mixed Model Least Squares and Maximum Likelihood computer program (Harvey, 1990). Least squares constants and means were estimated by generating a set of normal equations and the standard error of least squares mean was estimated using Harvey Computer package (Harvey, 1990). The adjusted records were used for constructing sire indices. The Estimated Merit of Sires (ESM) was computed using 4 different sire evaluation procedures, viz., 1. Simple Daughter's Average (SDA), 2. Contemporary Comparison (CC), 3. Modified Contemporary Comparison (MCC) and 4. Best Linear Unbiased Prediction (BLUP) methods. Relative efficiency of indices was measured in terms of Standard Error of indices. The standard error of an index was calculated as the square root of variance of the index. The variance of index was calculated as per standard procedure (Snedechor and Cochran, 1967).

The mean values of AFC, Inter Calving Period and Standard Lactation Yield were 902.38 ± 4.40 days, 438.38 ± 3.00 days and 3271.69 ± 21.70 kg, respectively. The results pertaining to Standard error of procedures with respect to all the traits under consideration is presented in Table 1. The method that is accomplished with least standard Error is considered as the best and most efficient method of sire indexing.

1. Age at First Calving:

The CC procedure was found to have least standard error and therefore, it was considered as most accurate, followed by BLUP, as determined by SE of indexes. It could be concluded that CC and BLUP would be preferred over SDA for evaluation of HF sires on the basis of AFC. The highest standard error obtained in SDA procedure of sire evaluation reveals its poor reliability and lack of precision in evaluation of sires on the basis of AFC.

2. Standard Lactation Yield:

Perusal of the standard errors revealed that BLUP was the most efficient followed by MCC with least standard error in evaluating sires. These observations are in close unison with the conclusions drawn from earlier studies (Deb, 1974 and Powell *et al.*, 1977).

The SE of sire evaluations observed in the present investigation was generally more for SDA, which pointed out its poor predictability of sire merit based on SDA procedure. It could be concluded that under the conditions specific to the present data, BLUP would be a more accurate and efficient method for evaluating sires. Thus, it supported the conclusions of Everett (1974) and Crettenand (1975).

3. Intercalving Period:

The SE for sire evaluation procedure based on ICP in purebred HF sires revealed that the standard error was least for BLUP followed by MCC in comparison to CC and SDA. This clearly reflected the superiority of BLUP method over other methods in reducing ICP through sire selection.

REFERENCES

Crettenand, J. (1975), The use of linear equations in sire evaluation. Thesis, Swiss Federal Institute of Technology, Zurich, Switzerland (Animal Breed. Abst., **45:** 668).

Cunningham, E.P. (1976). The use of egg transfer techniques in genetic improvement. Seminar on egg transfer in cattle, 10-12 December 1975, Cambridge.

Deb, R.N. (1974). The effects of genetic and environmental influences on Jersey dairy cattle in Pennsylvania. Dissertation Abstracts International B, **34**:3575-3576.

Ducrocque, V. and Besbes, B., 1993. Solution of multiple trait animal models with missing data on some traits. J. Anim. Breed. Genet., **110**:81-92.

Everett, R.W. (1974). Problems in evaluating dairy sires. In First World Congress in Genetic Applied to Livestock Production, 7-11th Oct., 1974, Madrid Spain.

Harvey, W. R. (1990). User's guide for LSMLMW and MIXMDL computer program, PC-2 version.

Lin, C.Y. and Lee, A.J. (1986). Sequential estimation of genetic and phenotypic parameters in Multi- ple traits mixed model analysis. J. Dairy Sci., 69: 2696 - 2703.

Powell, R.L., Norman, H.D. and Dickenson, F.N. (197 Relationships between bull's pedigree indexes and daughter performance in the modified contempora comparison. J. Dairy Sci., 60: 961 - 966.

Snedechor, G.W. and Cochran, W.G. (1967). Statistic methods. 6th Edn., Oxford and IBH Publication Co., Calcutta.

Van Vleck, L.D. (1990). Theoretical and actual genet progress in dairy cattle. Proc. Int. Conf. Quant Genet., Iowa State Univ. Press, Ames.