EVALUATION OF MURRAH BUFFALO BULLS THROUGH FIELD PROGENY TESTING PROGRAMME IN AMUL MILK SHED AREA

S.B.Patel, M.J. Thesia and Butani M.G.

Amul Research and Development Association (ARDA),
C/o Amul Dairy, Anand-388 001(Gujarat, INDIA)

Received 13-9-2013 Accepted 10-11-2013

Corresponding author: mgbutani@amuldairy.com

ABSTRACT

Field Progeny Testing in Murrah buffalo bulls was initiated in the early 1988 by the Amul Research and Development Association (ARDA) under technical guidance and assistance of National Dairy Development Board, Anand (NDDB). The Murrah buffalo bull calves regularly purchased from breeding tract (Haryana and Punjab), born out of elite buffaloes and male calves of proven sires born through nominated mating were taken as candidate bulls. For baseline information, the milk production data of the registered buffaloes under Surti buffalo bulls Progeny Testing Programme of selected 35 villages of Kheda and Anand districts recorded on monthly intervals in the field along with other necessary reproduction data was utilized to compute the different traits of economic importance. Since the inception of the program, 186 bulls have been put under progeny testing program and 123 bulls were evaluated by daughter average method, out of which 74 buffalo bulls contributed positively in milk production of daughters with predicted difference of 60.04 kg in 305 days that ranged from 3.0 to 178.6 kg between bulls.

KEYWORDS: Murrah buffalo bull, Field progeny testing programe, First lactation milk yield.

INTRODUCTION

The dairy sector in India has shown remarkable development in the past decade and India has now become one of the largest producers of milk and value-added milk products in the world. India with 199.1 million cattle and 105.3 million buffaloes ranked top in the milk production in the world Buffalo (*Bubalus bubalis*) is an important dairy animal in the Indian subcontinent, and continues to be the mainstay of the Indian dairy industry replacing cattle in several milk producing areas. In a selective breeding programme major role (76%) is of bull for improvement in its progeny. Selective breeding in buffaloes, using proven bulls in the selected breedable buffalo population has been recommended as national policy to systematically improve the milk productivity in buffalo population, year by year. In concurrence to the above policy, a progeny testing programme was implemented by ARDA in 1984 with assistance from Indian Dairy Corporation (IDC), which was revised in 1988 to evaluate Murrah buffalo bulls on Surti and non-descript buffalo population of Amul milk shed area. This paper reports the outcome of field progeny testing programme on Murrah buffaloes implemented by ARDA from 1988 to 2012.

MATERIALS AND METHODS

A total 14 batches of Murrah buffalo bulls (total bulls 186) were put to test during 1988 to 2012. Under the programme, 10-15 Murrah buffalo bulls were put to test for one to one and a half yearly period. As the Kheda and Anand districts are not breeding tract of Murrah breed, pedigreed young bulls were obtained from breeding tract of Murrah (Haryana and Punjab), after verifying dam's milk yield, body conformation true to type and health status. These bulls are reared and maintained at ARDA's semen station – Ode, Anand. Semen doses of bulls put to test were distributed in 35 selected villages in such a way that the semen of all the bulls under test goes to all villages to ensure that each bull produces daughters in all possible environments and any daughter of particular

bull do not get comparatively better environment to perform than the others.

In order to record all events such as registration of animals (dams and daughters); an information system was developed for artificial insemination (AI), pregnancy diagnosis (PD), calving and milk recording. Under this system all events of AI, PD, calving, milk yield and fat per cent were recorded in a specially designed computerized format on monthly basis. At the village level all breeding activities were carried out by village inseminators. The village level inseminators entered the information in the computerized formats and were sent to the ARDA headquarter at Anand on a monthly basis. The data were then entered in the computer using the Dairy Herd Improvement Program Action (DIPA) information system package developed by the NDDB for the programme. All animals included in the programme were identified by applying a plastic ear tag having an eight digit unique computerized number with a check digit. All events of animals were recorded using these ear tag numbers. Three months after test insemination the records of all inseminated buffaloes were checked to determine what proportion was reported for re-insemination and confirmed pregnant. Accurate records of all follow ups from the entire test AI were maintained and bulls having substandard fertility were eliminated from the system.

The milk production of every freshly calved buffalo was recorded on 12^{th} - 15^{th} day post calving for first time and after that recording was continued up to 10 months on monthly basis on fixed dates. On the day of record, artificial insemination workers record milk yield for 24 hours in two milking (morning and evening) with an interval of 12 hours. This milk yield was multiplied by days of month to calculate monthly total milk production. One separate milk recording card was given to each owner in which data of milk yield and fat per cent were recorded for the information of the owner. Field data available were analyzed to calculate breeding value of bulls by using “BLUP” (best linear unbiased prediction) method. Age at first calving was taken as continuous variable whereas village, year and season of calving were taken as random variables. The male calves selected as future candidate bulls were shifted to calf rearing centre of semen station- Ode and reared under better feeding and management conditions to study the growth performance, age and weight at maturity and development of genitalia. Later on, bull calves were selected on these criteria for semen production. Out of candidate bull calves, 10 to 15 suitable calves per batch were put on test mating programme randomly in all the buffalo populations of selected villages.

RESULTS AND DISCUSSION

Since 1988 to 2012, total 186 Murrah buffalo bulls were tested in different batches during different years. Out of 186 buffalo bulls, 123 bulls of the first eight batches were evaluated by daughter’s first lactation milk production performance and 74 bulls were declared as having positive breeding value (BV). As per the result of evaluation, the semen of top most 10% positive bulls was used on elite buffaloes for the production of future candidate bull-calves.

The bull calves were reared under better feeding and management conditions. Under this management the bull calves attained sexual maturity at the age of 22-24 months and donation of semen started at the age of 30-32 months. First eight batches of buffalo bulls were evaluated for their breeding value, i.e. positive and negative effect on daughters milk yield. The eighth batch of buffalo bulls was evaluated recently (Table 1). Out of 15 bulls evaluated in eighth batch, 12 bulls proved as positive on the basis of predicted difference. The highest predicted difference for milk yield was observed for bull No. 280 (82.925 kg) followed by bull No. 285 (77.164 kg) and 284 (51.235 kg). The milk production performance of first lactation (305 days) of daughters of these bulls was 1678.77, 1664.37 and 1669.92 kg, respectively.

The predicted difference of positive 74 buffalo bulls averaged 60.04 kg, and ranged from 3.10 and 178.60 kgs between bulls, with bull No. 214 and 121 at extremes. The 305 days milk production was 1453.50 and 1585.00 kgs for daughters of respective bulls. Seventy four positive buffalo bulls

of eight batches had 1936 daughters. The average milk production of these daughters was 1535.00 ± 07.92 kgs in 305 days. This result of the average first lactation milk yield in upgraded Murrah buffaloes was in line with the results observed by Singh and Yadav (1987) and Khatkar *et al.* (1996). The average first lactation milk yield in Murrah buffaloes varied between 1540 to 1867 kg, whereas the average milk yield for 991 daughters of 49 negative bulls was 1448.69 ± 10.77 kgs. Overall difference of milk yield in both the groups of daughters was 86.31 kgs (Table 1).

Table 1. Batch-wise Average 305 Days Milk Production for Bulls with Positive and Negative Breeding Value (BV)

Batch & Bull Nos.	Bulls with Positive BV			Bulls with Negative BV			Difference in milk yield (kg)
	No. of Bulls	No. of Daughters	Average milk yield (kg)	No. of Bulls	No. of Daughters	Average milk yield (kg)	
I-13	11	357	1496.63 ± 15.65	2	67	1351.50 ± 74.50	145.13
II-16	14	367	1505.21 ± 15.88	2	59	1395.50 ± 00.50	109.71
III-17	13	294	1508.85 ± 15.13	4	87	1441.50 ± 15.17	67.35
IV-11	5	70	1518.96 ± 08.78	6	74	1461.10 ± 38.69	57.86
V-16	5	61	1527.32 ± 29.51	11	136	1391.16 ± 14.66	136.16
VI-15	5	91	1556.58 ± 36.54	10	204	1434.75 ± 13.36	121.83
VII-20	9	311	1580.80 ± 21.41	11	268	1511.19 ± 15.62	69.61
VIII-15	12	385	1599.80 ± 16.77	3	96	1561.89 ± 17.85	37.91
Total-123	74	1936	1535.00 ± 07.92	49	991	1448.69 ± 10.77	86.31

Genetic evaluation of dairy animals for milk production based on test-day yields (24-h measurements) instead of 305-day lactation yield has generated a considerable interest in recent years (Schaeffer *et al*., 2000; Togashi and Lin, 2003; 2004). Today in most of the developed countries, because of variability of lactation days of dairy animals, the use of test day model (TDM) instead of lactation model (LM) is of more interest in genetic evaluation of dairy animals (Geetha *et al.*, 2007). It is particularly important in Indian condition where not many organized farms are available and recording of data is not a routine practice.

Tailor and Singh (2011) used first lactation yield derived from test-day records in farm bred Surti buffaloes and estimated breeding values of the sires by regressed least squares method. The average breeding value was 1161.43 kg with 29.4% sires having breeding values more than average and 70.6% of sires having breeding values less than average. Difference of highest and lowest breeding value was 1053.2 kg.

A number of methods for bull evaluation in cattle and buffaloes have been studied under Indian

condition; the most common of these are; simple daughters averages, contemporary comparison, least–squares and best linear unbiased prediction (BLUP) using a sire model. None of these methods is sufficient byway of utilizing all the available information (from all the relationship among animals). However, use of BLUP method using an individual animal model has become very common in advanced countries owing to its various advantages including sufficiency i.e. utilization of all the available relationships among animals. Jain and Sadana (2000) utilized first lactation records of 683 Murrah buffaloes maintained at NDRI, Karnal for comparing the sire evaluation for age at first calving, first lactation 305-day milk yield and first service period using various methods including BLUP. The sires were evaluated using simple daughters averages, contemporary comparison, least–squares and BLUP methods. The BLUP evaluations were obtained under single, two and three trait individual animal models. The BLUP method under multi-trait animal model incorporating first lactation milk yield with first service period as a covariable and age at first calving in the model was found to be more efficient and accurate for sire selection in Murrah buffaloes.

Earlier Pandey and Singh (1999) compared different methods of sire evaluation, viz., simple daughter average index, equiparental index, corrected daughter average index, contemporary daughter average index and corrected contemporary daughter average index in Murrah buffalo. They obtained higher average first lactation milk yield (1632.14 kg) than in the present finding. They however, utilized records of pure Murrah buffaloes from organized farm (military dairy farms) unlike in the present study where field records from graded Murrahs were used.

REFERENCES :

Geetha, E., Chakravarty, A.K. and Vinay Kumar K. (2007). Estimates of genetic parameters using random regression test day model for first lactation milk yield in Murrah buffaloes. *Indian J. Anim. Sci.,* **77**(9): 898-901.

Jain, A. and Sadana, D.K. (2000). Sire evaluation using animal model and conventional methods in Murrah buffaloes. *Asian-Aus. J. Anim. Sci.,* **13**(9): 1196-1200.

Khatkar, M.S., Shethi, R.K. and Tripathi, V.N. (1996). Proc. 2nd Asian Buffalo Congress. Manila, Philippines, pp: 346-348.

Pandey, A.K. and Singh, Harpal (1999). Comparison of different methods of sire evaluation in Murrah buffaloes. *Indian J. Anim. Sci*., **69**(12): 1067-1069.

Schaeffer, L.R., Jamrozik, J., Kistemaker, G.I. and Van Doormaal, B.J. (2000). Experience with a test-day model. *J. Dairy Sci*., **83**(5): 1135-1144.

Singh, C.V. and Yadav. M.C. (1987). Inheritance of part lactation yield in Indian buffaloes. *Indian J. Anim. Sci.,* **57** (5): 453 - 455.

Tailor, S.P. and Singh, B. (2011). Genetic evaluation of sires using test day yield. *Indian J. Anim. Sci.,* **81**(8): 882-885.

Togashi, K. and Lin, C.Y. (2003). Modifying the lactation curve to improve lactation milk and persistency. *J. Dairy Sci.,* **86**(4): 1487-1492.

Togashi, K. and Lin, C.Y. (2004). Efficiency of different selection criteria fort persistency and lactation milk yield. *J. Dairy Sci.,* **87**(5): 1528-1535.

❑