

Advances in Murrah Buffalo A2 Milk Production Technologies and Dairy Farming in West U.P. State of India

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Abstract

The opening balance of Murrah buffaloes as on 01.04.2011 was 223 heads (62 males and 161 females). Additions in the herd were due to birth of 23 female and 31 male calves (54 heads). The closing balance of the buffalo herd as on 31.03.2011 was 150 buffalo heads (118 females and 32 males). The overall mortality was 6.07%. The overall female and male group mortality were 3.38% and 15.87%, respectively. A total of deaths were recorded in buffalo herd during the current year (10 males and 5 females). The overall conception rate was 50.00%. The figures in heifer and adult groups were 43.24% and 53.84%, respectively. The overall calving abnormalities were 18.64%, which included 1.69% abortions, 1.69% unseen abortions, 1.69% dystokia, 5.08% retention of placenta, 1.69% prolapse and 6.77% premature births and still births. The least squares' means (LSM) for age at first calving, service period, dry period and calving interval were 45.61±3.22 months, 152.91±20.66 days, 207.38±22.22 days and 460.89±17.90 days, respectively. The least squares' means (LSM) for overall live body weights at birth, 3, 6, 12, 18 and 24 months of age were 32.75±0.63, 63.40±1.95, 123.73±3.41, 226.53±7.84, 308.13±7.21 and 377.90±6.53 kg, respectively. The weight at first calving during the current year was 498.44±16.72 kg. Means for overall wet and herd averages were 5.82 and 3.39 kg, respectively. On an average, 57.44% of the total adult females were in the milk during this period. The LSM's for total lactation milk yield, average lactation length, average 305 days yield and peak yield were 2208.41±170.08 kg, 308.75±107.72 days, 2276.82±182.85 kg and 11.54±0.37 kg, respectively. The Fat, SNF and Total Solids were 8.08, 9.67 and 17.76 %, respectively.

Keywords: murrah, milk, health, female, herd

1. Introduction

Livestock sector is an important sub-sector of the agriculture of Indian economy. It forms an important livelihood activity for most of the farmers, supporting agriculture in the form of critical inputs, contributing to the health and nutrition of the household, supplementing incomes, offering employment opportunities, and finally being a dependable "bank on hooves" in times of need. It acts as a supplementary and complementary enterprise.

According to NSSO 66th Round Survey (July 2009-June 2010) on Employment and Unemployment, 15.60 million workers as per usual status (Principal status plus subsidiaries status) were engaged in farming of animals, mixed farming and fishing. Whereas as per estimate of NSS 68th Round (July 2010-June 2011) survey on Employment and Unemployment, 16.44 million workers as per usual status (Principal status plus subsidiaries

status) were engaged in the activities of farming of animals, mixed farming and fishing. Animal Husbandry and Dairying activities, along with agriculture, continue to be an integral part of human life since the process of civilization started. These activities have contributed not only to the food basket and draught animal power but also by maintaining ecological balance. Owing to conducive climate and topography, Animal husbandry and Dairying Sectors have played prominent socio-economic role in India. Traditional, cultural and religious beliefs have also contributed in the continuance of these activities. They also play a significant role in generating gainful employment in the rural sector, particularly among the landless, small and marginal farmers and women, besides providing cheap and nutritious food to millions of people. Livestock production and agriculture are intrinsically linked, each being dependent on the other, and both crucial for overall food security.

2. Methods and Materials

Under ICAR-IVRI Research Projects various experiments have been conducted on Cattle and Buffalo farm. There are more than 1100 animals on the C&B farm. Under animal nutrition Fodder farm and Feed plant are main source of green and dry feed, concentrate supply to these animals. A team of Animal Breeders, Animal Nutrition expert, Reproduction Scientists, Medicine-Surgery scientists and livestock production scientists and including one Agronomy Scientist work together under the Vridawani, Tharparkar cattle improvement and Murrah buffalo improvement net work project under ICAR-IVRI funded research projects. The projects are in long term basis. During 2009-10 and 2010-11 major findings have been observed which may bring advancement in dairy farming and milk industry.

3. Result and Discussion

Advancement in Clean Milk Production: There are various developments in clean milk production in C&B farm.

Advances in Milk Production Technologies: Various advancements have been reported in the dairy farming and Murrah buffalo milk production on the C&B farm.

Variation in Udder and Teat Traits and Its Association With Various Economic Traits in Murrah Buffaloes: In Murrah buffaloes, variation in udder and teat traits indicated that most of the Murrah buffaloes possessed bowl shaped udders (88.13%) followed by pendulous (11.86%).

Funnel Shape Teat and Bowl Shape Udder: Majority of the Murrah buffaloes possessed cylindrical teats (65.38%) followed by funnel (21.15%), pear shaped (11.53%) and bottle shaped (1.92%). The average monthly milk yields were highest in funnel shaped (225.29 kg) followed by cylindrical teats (220.05 kg).

Live Body Weight and Milk: Milk yield per kg of live body weight and its association with conformation, live body weights and milk quality in Murrah buffaloes: Period/year/season of calving significantly affected milk yield per kg of live body weight in Murrah buffaloes.

Lactation Order and Age: Lactation order and age at calving class expressed significant effect on MY/BW of Murrah buffaloes.

Phenotypic Correlation, Body weight and Milk Yield: Phenotypic correlations between adult monthly live body weights/conformation traits and milk yield per kg of live body weights in Murrah buffaloes were negative and significant indicating that the efficiency of milk production will be enhanced with decrease in adult monthly live body weights/conformation/body size.

Fat % and A-2 Beta Casein in Milk: Murrah buffaloes should be given appropriate weightage on account of higher fat% in milk (FCM), as well as, presence of A-2 β casein in the milk. A2 milk is produced from Murrah buffalo and from native cattle namely Tharparkar and Sahiwal. Badri cow in Himalayan region known for A2 milk quality cow in Uttarakhand, HP states of India. Badri cow grazes on various types of herbs and drink pollution free water. In future demand for such A2 type milk may be increased in higher price per kg of milk.

Economic-Milk Yield at Low Cost: Selection on the basis of milk yield per kg of live body weight as against the prevailing practice of total lactation milk yield (ignoring their adult live body weights) in Murrah buffaloes would be more efficient and economical.

Small Farmers-Dairy Farming: It would prove beneficial for majority of the small and marginal farmers with meager resources, who are mainly engaged in dairy farming in India.

Feeds and Fodders Resources: Conservation, Economic gains- It will not only make the milk production process efficient, but will also help in saving dry matter content for other livestock in a nation like India where severe deficiency with regard to feeds and fodders for livestock is existing.

Concentrates-Ration Technology: At the same time, the saved concentrate mixture ingredients, fit for human consumption, could efficiently be used to satisfy the hunger of India's ever increasing human population (Singh Om, 2004).

Skin and Coat Traits and Their Correlation With Important Growth, Milk Production and Reproduction Traits in Murrah Buffaloes: The skin and coat traits influenced the ability of Murrah buffaloes to exchange heat (heat tolerance) with the environment.

Management practices giving proper importance to hair and skin coat of these cattle and buffalo breeds may result into swifter improvement in growth, production and reproduction and milk quality characters of these breeds.

Effect of Coat Traits on Milk Quality of Murrah Buffaloes: The coat and milk quality traits vary from one age class to another age class leading to different types of hair coat and milk quality traits in different age class.

Age-Effect on Milk Yield: These traits were found to be maximum in magnitude in between 6-7 year age class. Parity had shown non-significant effects on almost all coat and milk quality traits.

Hair Density-Effect: Hair density were maximum in winter and minimum in summer which may be due to the adaptation to climate for optimum transfer of energy between animals and environment during different season.

Season-Effect on Milk Yield: With regards to season of calving, coat thickness and weight of hair coat were maximum in Spring while, hair density, hair length and hair diameter in Winter season in Murrah buffaloes.

Phenotypic Correlation-Effect: The phenotypic correlations of coat traits with milk quality traits were found to be non-significant positive for almost all parameters but few were significant (positive-negative) in Murrah buffaloes.

Selection-Criteria Developed: Selection of desirable hair coat depending upon the climatic conditions and age group of animals may prove helpful in bringing out improvement in coat and milk quality traits.

Comparative Study of Weaned Murrah Buffalo Calves at Cattle & Buffalo Farm: Weaning (at birth) in Murrah buffalo calves could successfully be done with no adverse effect on growth of calves or mortality. It has also been observed that weaning effect can enhance the conception rates of dams and reduce the service period.

Study on Efficacy of Dam Evaluation Methods in Murrah Buffaloes: In Murrah buffaloes, the winter born calves were heavier at birth and heavier calves expressed better growth and production throughout their life as compared to lighter calves.

Life Time Production-Selection: The number of female calves born up to 5th lactation gradually increased with increase in lifetime production. For evaluation of dams, BLUP was best followed by STS (Single trait selection), EBV and MPPA.

Study on Comparative Susceptibility Pattern for Diarrhoea and Pneumonia in Murrah Buffalo Calves Up to 3 Months of Age: In Murrah buffalo calves, the mortality rates were very high in suckling calf group of Murrah calves, as compared to weaned groups. At the same time, sires expressing low incidence of Pneumonia and diarrhea in their pedigrees may be preferred for breeding as compared to high incidence groups.

Studies on First Lactation Curve and Preliminary Sire Evaluation in Murrah Buffaloes: It has been observed in Murrah buffaloes that the part 305 days first lactation milk yield could efficiently be used for prediction of 305 days first lactation milk yield and in this way, maximization of genetic gain in lactation milk yield by progeny testing could be achieved.

Disposal Trend Analysis in Murrah Buffaloes Under Organized Farm Conditions: In Murrah buffaloes, the involuntary disposal (mortality and transfer) of females should be as low as possible to maximize genetic improvement. At the same time, involuntary culling based on stunted growth, off breed characteristics, unknown pedigree, serious health problems, congenital/physical abnormalities in females should be done as early as possible. In case of availability of sufficient female replacement stock, buffaloes beyond 6th parity having teat/udder problems, erratic reproductive status may be culled at the earliest.

Trends of Culling and Its Impact on Performance of Murrah Buffaloes: A total of 606 Murrah buffaloes were disposed off in which 300 were males and 306 were females. Total 232 Murrah buffaloes died away (38.28%) comprising of 101 males (16.67%) and 131 females (21.62%); 257 heads were transferred (42.41%) comprising of 172 males (28.38%) and 85 females (14.03%) and 117 Murrah buffaloes were auctioned (19.31%) consisting of 27 males (4.46%) and 90 females (14.85%).

Annual Replacement Index: Annual replacement index in in Murrah buffaloes varied from 0.28 (2002) to 3.67 (2004). The turnover rate in Murrah buffaloes ranged from 3.41 (2004) to 37.14% (1999). The sex ratio in Murrah buffalo herd ranged from 0.56 (2002) to 2.60 (2001).

Maximisation of Profit Upto 5th Lactation: In Murrah buffaloes, for maximizing the profit (up to 1st lactation) and to reduce cost of rearing, milk yield and reproductive traits considered may be improved by getting optimum birth weight, reducing incidence of abnormal calvings, culling poor yielding animals as early as possible, enhancing the lactation lengths. Sinha et al. (2010) reported studies of calf rearing.

Retaining animals up to 5th parity, optimizing AFSS and AFC, auction/transfer of animals after completion of first lactation, providing adequate management and health care (reproductive health too) during rainy season and to cull poor yielders as early as possible.

Rearing Cost-Reduced: The rearing cost of heifers should be decreased by using non-conventional sources of feeds in place of concentrate mixture to reduce cost. Optimum phenotypic, genetic and environmental trends should be achieved by improving the management. Sinha et al. (2010) also studied dairy farming in rural and urban areas.

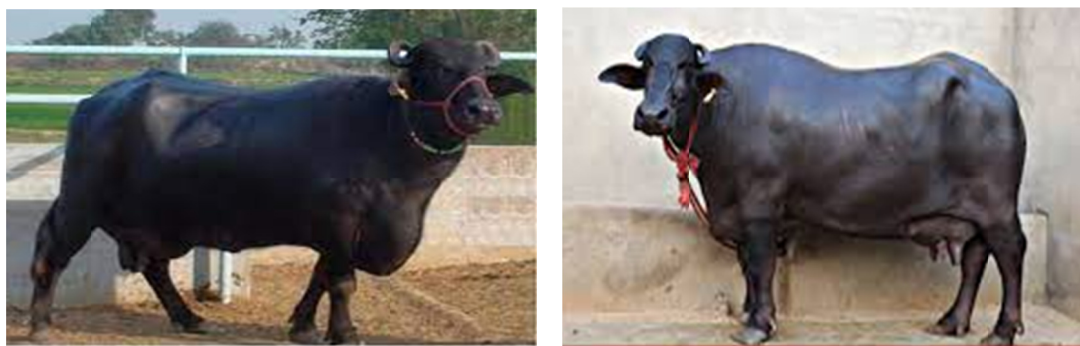


Photo 1. Murrah buffalo breed at CBF

Advances in Fodder Technologies Development: Feed and fodder management is a major factor of dairy management and influence milkproduction and its quality.

The fodder farm of the institute comprises 140 hectares of fertile land. The land is divided into 12 plots inter-connected with underground irrigation channels and concrete roads. Sinha et al. (2010) reported breeding, healthcare management practices (Singh et al., 2009, 2011, 2012).

Table 1. Dairy Farm Cattle and Buffalo Herd, Milk yield(kg) Performance during 2009-10

Breed (Cattle/Buffalo)	Herd/Head	Female Nos.	Conception %	Milk Yield (Kg)	Mean Wet (kg)	Mean Herd (kg)	Fat %	SNF %	Total Solid %
Vrindavani	573	475	32.75	719147	11.05	8.27	4.41	8.80	13.20
Tharparkar	138	113	36.26	36455	4.62	1.51	4.49	8.83	13.32
Murrah	211	168	44.61	103953	6.68	3.34	7.97	9.70	17.67

Table 2. Dairy Farm Cattle and Buffalo Herd, Milk yield(kg) Performance during 2010-11

Breed (Cattle/Buffalo)	Herd/Head	Female Nos.	Conception %	Milk Yield (Kg)	Mean Wet (kg)	Mean Herd (kg)	Fat %	SNF %	Total Solid %
Vrindavani	532	458	41.34	618684	10.82	7.75	4.42	8.82	13.24
Tharparkar	143	120	41.46	38001	3.86	1.50	4.52	8.84	13.36
Murrah	224	170	38.09	118150	5.75	3.36	7.78	9.06	16.84

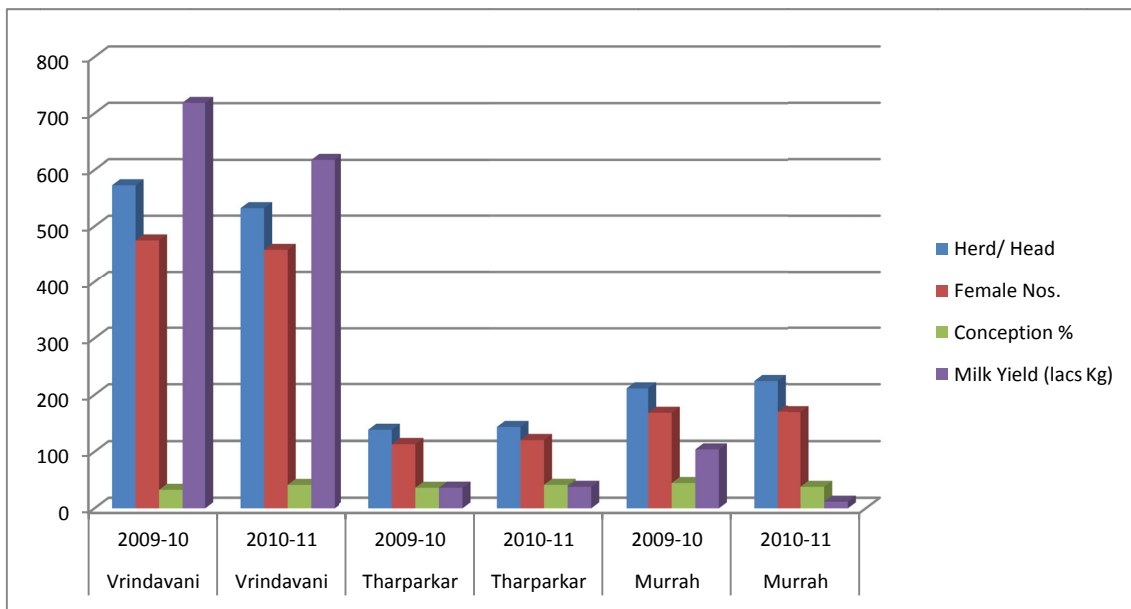


Figure 1. Head, female Nos., conception % and milk yield (lakh kg) cattle and buffalo at CBF

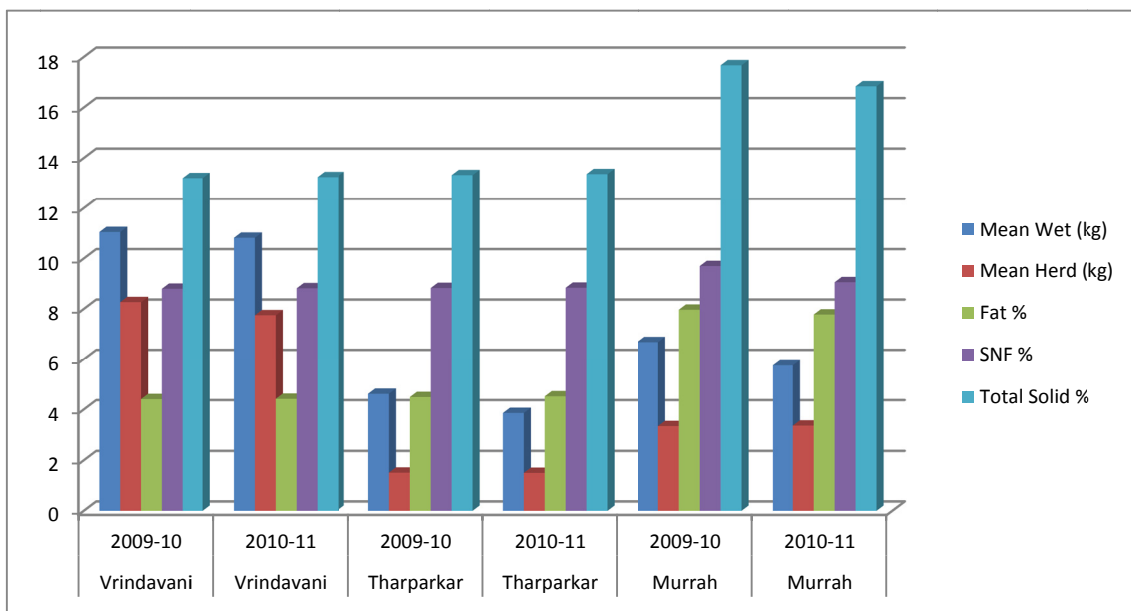


Figure 2. Overall mean wet milk (kg),herd milk (kg), fat %,SNF %, total solid % of herd

Nutritious Fodder Production: High yielding crops and varieties raised, 2011-12.

Fodder crops grown	Area covered (in acres)	Fodder Produced (in quintals)
Green Fodder	-	-
Oat	120.00	14979.00
Maize	454.50	36921.12
Sorghum	113.00	13414.44
Cowpea	12.00	312.00
Bajra	10.50	1323.80
Berseem	82.00	18264.80
Barley	3.00	40.60
Total	845.00	85255.76
Dry Fodder	-	-
Oat Straw	-	646.00
Grand Total	845	85901.76

Net sown area under crops: 325.00 Acres; Total cropped area: 845.00 Acres; Cropping intensity: 260% (percent).

Seed Production: High Yielding Varieties, dual purpose crops in seed production

Name of seeds	Quantity (in Quintals)	Sale of oat seed (in quintals)	For sowing in farm field (in quintals)
Oat Seeds	444.0	380.0	64.0

Revenue Generation: During Year: The farm section has generated a revenue of Rs. 8,56,900.0 (Rupees Eight lac fifty six thousands nine hundreds) through the sale of oat seed and farm services rendered to the campus employees of the Institute during the reported period.

Run Off-Drainage System-Advancement-Most of the plots have quick and efficient drainage system of run-off water (Singh et al., 2012).

High Yielding Varieties: Grown-The farm section produces quality green fodder of HYVs released under different fodder crops time to time.

Sorghum: Green forage Sorghum in kharif season is grown to supply green fodder from April to November months (single & multi-cut crops). This helps round the green fodder supply to the project animals (Singh et al., 2011, 2012).

Forage Crops: Round the Year- Maize, Makchari, Bajra, Cowpea, Oat and Berseem fodder crops are grown at the farm round the year. Suitable crops have been identified on the basis of production yield and quality of feed and fodder (Singh et al., 2012).

Green Fodder Supply: The farm section supplies green fodder daily to the institute's cattle & buffalo farm (LPM) and more than 20 experiment animal sheds of various Divisions.

Surplus Green Fodder: It is used for fodder conservation purposes. And off season supply.

Hay-Preparation From Surplus Fodder: The surplus green fodder is also conserved at the farm in the form of "Hay" & "Silage" for its utilization in the lean period. The Farm Section of the institute has three underground concrete silo pits of about 15,000 quintals green fodder capacity (Singh et al., 2011).

Silage: Preparation for lean peiod of green fodder supply-These silage pits are permanently covered by tubular steel and G.I. sheet structure to ensure availability of safe and secure storage even during rainy season.

Agro-forestry: Teak Plantation -Farm is maintaining about 5000 teak plants along the farm road sides and at field no. 13. Plantation of poplar trees in the 25 acres of farm land at field No. 18 and 19 are being managed nicely by this section. This section is also manageing 200 kinno plants along the farm road sides. Farm has also prepared and maintained 1000 square meters of high quality lawns at field No. 9 for dfferent purposes (Singh et al., 2009).

Mechanisation on Farm: Farm is equipped with 10 tractors, and other farm equipments.

Irrigation Pumps-100 % Irrigation: There has been lotof advancement by creating 9 deep irrigation tube-wells and adequate agricultural machineries.

High Water Use Efficiency: Sub irrigation System developed - All the irrigation tube-wells are inter-connected by underground irrigation channels (Hume pipes) spread throughout the farm area for better application and utilization of available irrigation potential.

Feed Technology Advancement: The feed technology unit prepares and supplies about 16000 quintals of animal feed required for animals used for research experiments.

Species at Farms: There are like cows and buffaloes, sheep and goats, pigs and laboratory animals of Izatnagar and Mukteshwar Campuses. The unit has automatic feed ingredient loading and lifting unit, grinding unit (Hammer Mill), mixing unit, conveyor elevator unit, dust separation and collection unit, go-downs and office-cum feed plant building.

Pashu Chokolater Development: This year, the Unit has fabricated 5 Nos. machines named "Pashu Chokolater" (UMM Block making machine) to facilitate efficient mass production of Pashu chocolates and thereby popularizing their uses among animals farmers and dairy entrepreneurs.

4. Conclusion

The overall female and male group mortality were 3.38% and 15.87%, respectively. A total of deaths were recorded in buffalo herd during the current year (10 males and 5 females). The overall conception rate was 50.00%. The figures in heifer and adult groups were 43.24% and 53.84%, respectively. The overall calving abnormalities were 18.64%, which included 1.69% abortions, 1.69% unseen abortions, 1.69% dystokia, 5.08% retention of placenta, 1.69% prolapse and 6.77% premature births and still births. Murrah Buffalo is a superior germ plasm at the C&B Farm for research and management purpose. It has bright future for its growth and spread in the country.

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