

Evaluation of Clean Milk Dairy Farming Practices and Advances in Murrah Buffalo Quality Milk Production Technologies

Om Singh¹, A. K. S. Tomar¹ & Ayushi Singh¹

¹ Livestock Production and Management, CBF, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, UP, India

Correspondence: Om Singh, Livestock Production and Management, CBF, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, UP, India. E-mail: omsingh1964@gmail.com

Received: July 18, 2013 Accepted: September 1, 2013 Online Published: October 15, 2013

doi:10.5539/jas.v5n11p246

URL: <http://dx.doi.org/10.5539/jas.v5n11p246>

Abstract

The opening balance (herd strength) of Murrah buffaloes as on 01/04/2012 was 150 heads (32 males and 118 females). In all, 38 animals were deleted from the herd due to various reasons, whereas 54 animals were added due to new births. The new calvings were well distributed over all the months of year, except during April-May 2012 when no calvings took place. The male:female ratio of new calvings was 1.00:0.83. The closing balance of the buffalo and 38 males, the overall mortality was 3.45% (female-2.11%, male-6.56%). The overall conception rate was 60.42% (heifer-47.05%, adults-67.74%). The overall calving abnormalities were 22.64%, which included 3.77% dystocia, 3.77% retention of placenta, 5.66% prolapse and 1.89% premature births and still births. The age of first calving, service period, dry period and calving interval were 39.69±2.82 months, 213.49±26.37 days, 232.93±21.36 days and 479.29±22.88 days, respectively. The overall live body weights (in kg) at birth 3, 6, 12, 18 and 24 months of age were 35.58±0.53, 69.43±1.76, 126.63±3.57, 234.26±11.42, 334.62±8.98 and 377.93 kg, respectively. The respective values for females and males were 33.63±0.78, 69.96±2.46, 126.30±4.82, 233.53±13.84, 334.62±8.98 and 391.25±8.84 kg respectively; and 37.53±0.71, 68.91±2.52, 126.95±5.30 and 235.00±20.18 kg, respectively. The weight at first calving during the current year was 535.71±25.87 kg. Buffaloes produced 82098 kg milk. Overall wet and herd averages were 5.66 and 3.59 kg, respectively. On an average, 62.92% of the total adult females were in milk. The total lactation milk yield, average lactation length, average 305 days yield and peak yield were 2249.40±8.46 kg, 316.43±08.41 days, 2242.31±108.05 kg and 11.01±0.34 kg, respectively. The milk analysis of 872 samples revealed fat, SNF and total solids per cent as 7.88, 9.81 and 17.75, respectively.

Keywords: Murrah, milk, fat, snf, dairy, fodder, conception

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 2011-June 2012) 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.

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 Vrindawani, Tharparkar cattle improvement and Murrah buffalo improvement network project under ICAR-IVRI funded research projects. The projects are in long term basis. During 2009-10 and 2011-12 major findings have been observed which may bring advancement in dairy farming and milk industry.

3. Result and Discussion

Advances in Dairy Farming and Murrah Clean Milk Production Technologies: There are continuous changes in dairy farming practices, management, and clean milk production from Murrah buffalo in cattle and buffalo farms.

Advances in Murrah Buffalo Milk Performance: The following changes were recorded for the last two years (Singh et al., 2011).

Colostrum Feeding Is Life Saving in Kids: The colostrum feeding (from Zebu or Murrah buffalo) in Rohailkhandi goat kids was found to improve and maintain health, performance and immunoglobulin levels and, hence, may prove a boon for life saving of orphaned kids as well as undernourished kids, thereby, enhancing the profits of goat farmers.

BCS in Murrah Buffalo: In Murrah buffaloes, BCS gain was prominent up to a week prior to calving, followed by a sharp fall immediately after calving and then gradual decrease during the lactation phase. It could be inferred that buffaloes with ≤ 3.5 pre-partum could withstand the lactation stress and regain their body condition as in parturition much earlier as compared to > 3.5 pre-partum BCS buffaloes.

Higher Body Weight: Negative Impact: Higher body condition score at pre-partum period could negatively impact post-calving body condition leading to higher loss and energy deficiency. Singh et al. (2011) evaluated production and reproduction on farm studies and found the similar results. The body condition depletion and energy deficiency in > 3.5 BCS buffaloes during dry and early lactation period could be linked to lower total cholesterol levels after calving, hence, considered as a reliable indicator of energy balance status during early lactation.

Pre-partum BCS: Hence, higher pre-partum BCS could affect the udder health and milk quality. The BCS has positive correlations with reproductive traits. Thus, it is not advisable to possess extra fat prior to calving.

Murrah Milk Fat, SNF, TS and Lactose: The BCS was negatively associated with milk yield, while, positively associated with milk protein and SCC. The milk Fat, SNF, TS and lactose recorded a negative phenotypic correlation with pre-partum BCS.

Animal Selection: For selection of animals with enhanced efficiency, in spite of, total lactation milk yield, milk yield per kg of live body weight was developed and assessed in Tharparkar and Vrindavani cattle along with Murrah buffaloes. Khan et al. (2023) predicted lifetime milk yield of Murrah buffaloes.

Economic and Efficient Production: It was observed that the selection on the basis of milk yield per kg of live body weight in Murrah buffaloes along with Tharparkar and Vrindavani cows would be more economical for efficient production purpose within limited resources, Singh, R.R., et al. (2011) Characterised Vrindawani on farm and found similar results.

Small Size Animal Requires Lesser Inputs: It is observed that as small sized animals require lesser inputs than that of the large sized animals. In this way, efficient milk producing animals consuming lesser dry matter may be selected thereby enhancing the profitability of the dairy animals.

Saving of Dry Matter and Solution of Fodder Deficit: Any saving of dry matter through this phenomenon may ultimately lead to the solution of the present problem of feeds and fodder for livestock which is expected up to around 40-50%.

Priority for Human Consumption: In addition, this saving of dry matter, if at all, fit for human consumption, may also be diverted towards the human population living below poverty line, about 30%.



Photo 1. Murrah buffaloes and new born calf

Data of trials is given in Table 1 and Table 2 as below:

Table 1. Dairy farm cattle and buffalo herd, milk yield (kg) performance during 2011-12

Breed (Cattle/Buffalo)	Herd/Head	Female Nos.	Conception %	Milk Yield (Kg)	Mean Wet (kg)	Mean Herd (kg)	Fat %	SNF %	Total Solid %
Vrindavani	500	405	52.30	536846	10.53	8.31	4.30	8.76	13.06
Tharparkar	154	124	64.78	21679	3.39	1.48	4.34	8.77	13.12
Murrah	223	161	50.00	111895	5.82	3.39	8.08	9.67	17.76

Table 2. Dairy farm cattle and buffalo herd, milk yield (kg) performance during 2012-13

Breed (Cattle/Buffalo)	Herd/Head	Female Nos.	Conception %	Milk Yield (Kg)	Mean Wet (kg)	Mean Herd (kg)	Fat %	SNF %	Total Solid %
Vrindavani	358	312	53.80	475242	9.21	7.80	4.14	8.85	13.01
Tharparkar	98	83	48.35	28927	3.55	2.11	4.24	8.88	13.13
Murrah	150	118	60.42	82098	5.66	3.59	7.88	9.81	17.75

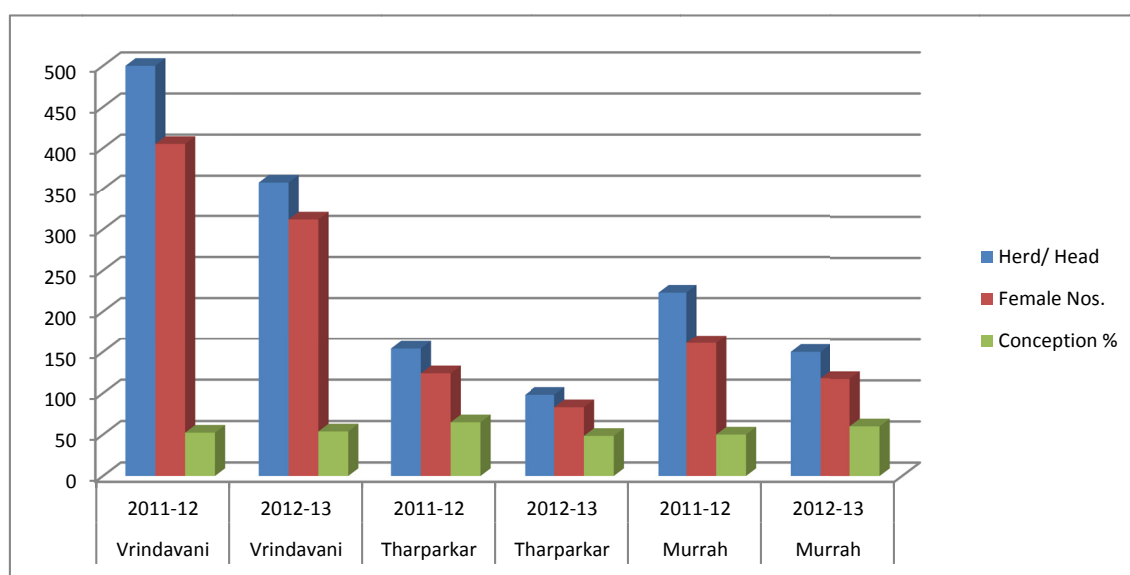


Figure 1. Herd strength, female Nos and conception % in Vrindavani, Tharparkar and Murrah

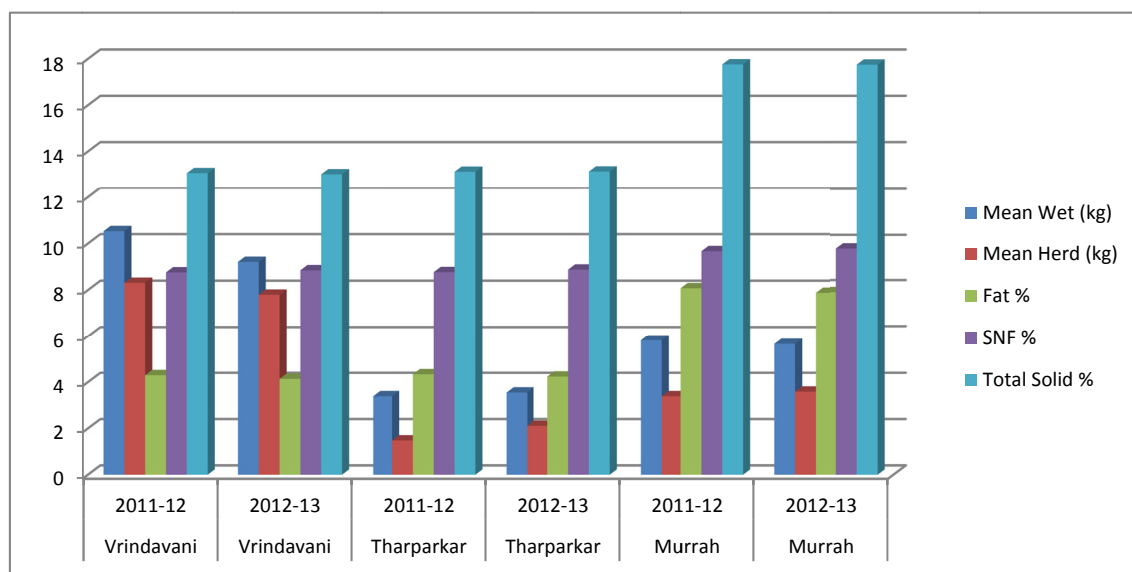


Figure 2. Mean milk wet (kg), herd milk (kg), fat%, SNF %, total solid% of cattle buffalo

Technologies Developed in Fodder Production: Various changes in farm production technologies have been taken as per requirement to maximum utilisation of farm resources.

Maximum Farm Land Utilisation: The fodder farm of the institute comprises 140 hectares (350 acres) of fertile land. The land is divided into 15 plots inter-connected with underground irrigation channels and concrete roads.

High Yielding Varieties at Fodder Farm: Most of the plots have quick and efficient drainage system of run-off water. The farm produces quality green fodder of HYVs released under different fodder crops time to time.

Forage Crops Identified suitable for Fodder Farm: Sorghum (single & multi-cut crops), maize, makchari, bajra, cowpea, oat, berseem and Chinese cabbage fodder crops and their combinations are grown at the farm round the year.

Cattle and Buffalo Farm Supply of Palatable and Nutritious Green Fodder Throuout the Year: The farm section supplies green fodder daily to the Institute's Cattle and buffalo farm (LPM) and 20 experimental animal sheds of various Divisions.

Fodder Conservation: The surplus green fodder is also conserved at the farm in the form of hay and silage for its utilization in the lean period.

Hay and Silage Preparation: The farm section of the institute has three underground concrete Silo pits of about 15,000 quintals green fodder capacity. 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.

Farm Forestry: Farm is maintaining about 5000 teak plants along the farm road sides and at Field No. 13 and popular trees in the 25 acres of farm land at Field No. 18 & 19.

Farm Machinery: Farm is equipped with 12 tractors, 09 deep irrigation tube-wells and adequate agricultural machineries.

Farm Irrigation: Sub-Surface Method: All the irrigation tube-wells are interconnected by underground irrigation channels (Hume pipes) spread throughout the farm area for better application and utilization of available irrigation potential. The farm is 100% irrigated (Singh et al., 2012).

Revenue Generation: Rs 15,14,538 for current year through farm production, seeds.

The details of the farm produce and revenue generated at farm during 2012-13: Table 3.

i. Fodder Production Advances: Selection of Crops and Varieties in Crop Rotation, Cropping System: Agronomic Achievements:

Fodder Crops Grown	Area Covered (acres)	Fodder Produced (q.)
Green Fodder: Crop Rotation	-	-
Oat & Oat + Chinese Cabbage	103.0	13898.4
Berseem & Berseem + Chinese Cabbage	62.0	16484.8
Maize & Maize + Cowpea/Makchari	339.0	33659.0
Jowar & Jowar + Cowpea	57.0	9247.4
Makchari	6.0	1128.9
Cowpea	6.0	682.9
Total	573.0	75101.4
Dry Fodder	-	-
Oat Straw	110.0	888.0
Grand Total	683.0	75989.4

ii. Agronomic Advancement in Cropping Systems-Efficiency:

Net Cultivated Area: 319.0 Acres;

Total Cropped Area: 683.0 Acres;

Cropping Intensity: 214.1%;

Average Green Fodder Supply (q/day): 205.75.

iii. Seed Production: Truthful level seeds high yielding crop introduced:

Name of Seed crop	Area (Acres)	Quantity (q.)	Sale of oat seed (q.)	Farm Sowing (q.)
Oat seeds	110	1050.0	980.0	70.0
Bareley	01	15.0	14.0	1.0

iv. Revenue Generation:

Sale of Oat Seed: 13,39,660.0

Sale of Tender Forms: 2500.0

Sale of green fodder to ELENCO Project: 1,62,878.0

Services provided by the section: 9500.0

Total Rs: 15,14,538.0

The fodder farm has generated a revenue of Rs. 15,14,538.0 (Rupees fifteen lac fourteen thousand five hundred thirty eight) through the sale of oat seed, sale of green fodder, sale of quotation forms and other farm services rendered to the campus employees of the institute during the reported period.

Feed Technology Plant and Balanced Ration Preparation: The feed technology unit prepares and supplies about 16000 quintals of animal feed required for animals used for research experiments 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 (Singh & Gupta, 2009).

Machines Fabricated for Fodder Production: During the year, the unit has fabricated 7 Nos. machines named "Pashu Chokolater" (UMM Block making machine) and 20 Nos. of foetal extractor thereby popularizing their use. Project Cattle and Buffalo (Singh et al., 2011).

4. Conclusion

The overall calving abnormalities were 22.64%, which included 3.77% dystocia, 3.77% retention of placenta, 5.66% prolapse and 1.89% premature births and still births. The age of first calving, service period, dry period and calving interval were 39.69±2.82 months, 213.49±26.37 days, 232.93±21.36 days and 479.29±22.88 days, respectively. The overall live body weights (in kg) at birth 3, 6, 12, 18 and 24 months of age were 35.58± 0.53, 69.43±1.76, 126.63±3.57, 234.26±11.42, 334.62 ±8.98 and 377.93 kg, respectively. The respective values for

females and males were 33.63 ± 0.78 , 69.96 ± 2.46 , 126.30 ± 4.82 , 233.53 ± 13.84 , 334.62 ± 8.98 and 391.25 ± 8.84 kg respectively; and 37.53 ± 0.71 , 68.91 ± 2.52 , 126.95 ± 5.30 and 235.00 ± 20.18 kg, respectively. The weight at first calving during the current year was 535.71 ± 25.87 kg. Buffaloes produced 82098 kg milk.

References

Annual Report: DADF, GoI, New Delhi, 2012-13.

Annual Report: ICAR-IVRI, Izatnagar, UP, 2011-12.

Khan, T. A., Tomar, A. K. S., Dutt, T., & Bhushan, B. (2013). Principal component regression analysis (PCRS)—An approach for lifetime milk yield production in Murrah buffaloes. *Indian J. Anim. Prod. Management*, 29, 46-49.

Singh, O. (2011). Forage Production and Quality of Berseem, Makkhan Grass and Barley Forage crops as influenced by Organic Manures. *J. of Tropical Agric.*, 29(3-4), 357-359.

Singh, O., & Arya, H. P. S. (2011). Farm Trials on Integrated Plant Nutrition Management for Sugarcane Inter-cropping in Western U.P. *J. of Tropical Agric.*, 29(3-4), 351-356.

Singh, O., & Gupta, P. C. (2009). Evaluation of Sunflower Promising Varieties and hybrid Released for cultivation in different states of India. *J. of Agric. Sci.*, 1(2), 137-144. <https://doi.org/10.5539/jas.v1n2p137>

Singh, O., Singh, A., Singh, A., & Singh, A. (2012). On Farm Trials for Evaluation of Forage Maize African Tall Cultivar with High Yielding Varieties of Maize. *Progressive Research-An International J.*, 7(Sp.), 608-610.

Singh, O., Singh, A., Singh, A., & Singh, A. (2012). Study on Wheat-Legume-Maize cropping sequence on Farmer's Field in Adopted Villages in Rohilkhand Region of U.P. *Progressive Research-An International J.*, 7(Sp.), 605-607.

Singh, R. R., Dutt, T., Kumar, A., Tomar, A. K. S., & Singh, M. (2011) On-Farm characterisation of Vrindavanicattle in India. *Indian J. Anim. Sci.*, 81, 267-271.

Singh, R. R., Dutt, T., Kumar, A., Tomar, A. K. S., & Singh, M. (2011). Evaluation of production and reproduction traits in Vrindavani cattle. *Indian J. Anim. Sci.*, 81, 296-298.

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).