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Bajra napier hybrid, a potential quality green fodder for replacing concentrate feeds and reducing cost of milk production: a field study

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Abstract

The study was carried out to analyse the potential of bajra napier hybrid (BN hybrid) as a quality green fodder on cost of milk production and replacement of concentrate in dairy animals. Farmers (120) were selected randomly who adopted BN hybrid cultivation with the initiatives of ICAR-IVRI, Izatnagar. The stem cuttings of BN hybrid were supplied to these adopted farmers through personal contact and postal services to the farmers of distant places. The results clearly revealed that cost of milk production and feeding price of dairy farm got reduced after adoption of BN hybrid cultivation. Further, milk productivity and lactation period of dairy animals also showed significant improvement after inclusion of BN hybrid as a quality green fodder in their daily diet.

Keywords: Dairy farmers, Green fodder, Milk production, Total cost

India ranks first among the world's milk producing nation (187.7 mt) and also in livestock population (535.83 million) which are reared on 2.29% land area of the world (Anonymous, 2018-19). This milk production can be increased further if the area under green fodder cultivation is increased, since lack of quality green fodder is a major constraint affecting milk productivity, lactation period and livestock health including fertility. Sufficient availability of green fodder plays a key role in correcting infertility problem, enhancing milk production and finally improving economic prosperity of dairy enterprise (BIRTHAL and JHA, 2005; GHOSH *et al.*, 2022). As fodder and feeds constituents about 60% of the total cost of milk production (KUMAR *et al.*, 2012a), which can be significantly lowered by improving feeding system based on green fodder and replacing ingredient of concentrate feeds with leaf meal and enriched complete feed block (KUMAR *et al.*, 2012b). The country faces a net deficit of 30.65 to 33.10% in green fodder, 11.41 to 11.85% in dry crop residues and 44% in concentrate feeds (Anonymous, 2013). In order to meet

out the deficit, green forage supply has to grow @ 1.69% annually. The green fodder is cultivated only on 8.4 million hectares (5.23%) of total cropping area in India, which is static since last two decades. Small operational land holdings (less than 4 ha) with marginal, small and semi-medium farmers (own about 87.7% of livestock) make it difficult to increase the area under forage crops. Total grassland areas has again reduced from 18 million ha to 12.3 million ha during 2005 to 2015 (SHINDE and MAHANTA, 2020).

It is estimated that, feed alone constitutes about 60-65% of the total cost of milk production which can be reduced to 30-40% by providing inexpensive and quality green fodder like hybrid napier (THOMAS, 2008) with productivity of 280 t/ha (GUPTA *et al.*, 2019). Considering the scarcity of green fodder for the dairy animals at field level, our institute promoted the latest nutritious BN hybrid varieties, CO-4 and CO-5 among the farmers through workshop, interface meet, farmers training, you-tube videos, whatsapp of napier growers, mobileApp on BN hybrid, and writing in local newspapers. These approaches led to popularization and adoption among the farmers of more than 12 states viz., Uttar Pradesh, Uttarakhand, Delhi, Haryana, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra, Bihar, Jharkhand, Assam and Manipur. A total of 945460 cuttings of BN hybrid were distributed to 760 farmers of these states. Besides, 210 farmers were provided stem cuttings through postal services. Keeping in view the above extension efforts of the institute in popularizing and increasing the area under BN hybrid cultivation at field level, the present study was undertaken to ascertain the effect of BN hybrid feeding on replacement of concentrate and reduction in cost of milk production.

A total of 120 farmers out of 760 farmers spread across 12 states who adopted BN Hybrid were selected randomly during 2018. The data were collected from the

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farmers through mobile phone by contacting personally and interviewing with the help of well structured, comprehensive and pre-tested interview schedule. The socio-personal characteristics of dairy farmers, cost of cultivation of BN hybrid, opinion of farmers regarding BN hybrid, economic analysis of cost of milk production and utilization pattern of wheat straw as replacement was recorded. For calculating the cost of cultivation of BN hybrid, the expenditures on irrigation, fertilization and hoeing were taken into consideration. The cost of irrigation was comprised of money spend on *viz.*, electricity, labour hiring, water utilisation charges (if regular source was not available). Data were compared between before and after adoption of BN hybrid fodder. A multiple regression equation as given below was fitted to identify the factors significantly influencing cost of milk production (litre/household); $P = f (X_1, X_2, X_3, X_4, X_5, X_6)$ where, P was cost of milk production (litre/household), X_1 was age of farmers, X_2 was education, X_3 was landho-

lding in acres, X_4 was number of dairy animals, X_5 was lactation period in days and X_6 was feeding cost (which included dry and concentrate feeding).

The socio-economic variables of farmers were recorded (Table 1). It was observed that most (52.5%) of the farmers belonged to the age group of 25-49 years with the dominance of male farmers (97.5%). The education level of the farmers revealed that 39.16% had completed graduation and 25.83 per cent had the education level up to high school. Regarding the source of income it was found that crop cultivation and animal husbandry were the major sources of income of the farmers. Similar findings were obtained by Pathade *et al.* (2020). Average experience in dairy farming was 25 years and on an average, they owned 15 dairy animals per household. Regarding landholding, it was found that most of the farmers (35.83%) were small farmers possessing 2.5-5 acres of land followed by 30.83% of farmers possessing 5-10 acres of land, which was in confirmatory with the findings of Singh (2013).

Table 1. Socio-economic characteristics of the respondents

Variables	Frequency (N=120)	Percentage	Standard deviation
Age			
25-49	63	52.5	14.80
49-73	49	40.83	
73-97	08	6.67	
Gender			0.15
Male	117	97.5	
Female	03	2.5	
Education			1.28
Illiterate	5	4.16	
Primary	7	5.83	
Middle	1	0.83	
High	31	25.83	
Intermediate	29	24.16	
Graduate & above	47	39.16	
Income Source			0.57
Farming	116	96.66	
Dairy	118	98.33	
Others	34	28.33	
Dairy experience (years)	25 (Avg)		15.51
0-15	20	16.66	
15-30	100	83.33	
Dairy animals (numbers)	15 (Avg)		46.62
0-5	05	4.16	
5-10	15	12.5	
10-15	100	83.33	
Landholding (acre)			9.45
0-2.5	18	15	
2.5-5	43	35.83	
5-10	37	30.83	
>10 acre	22	18.33	

BN hybrid reducing the cost of milk production

The production in quintal/acre per annum and cost of cultivation of BN hybrid were also recorded (Table 2). It was found that there was gradual increase in green fodder production with the progress of year ranging from 84.20 to 103.30 quintals/acre/annum. This was in line with the findings of Ramya *et al.* (2017) who reported that after plantation of BN hybrid, the yield increased in subsequent years, while Singh *et al.* (2019) reported highest level productivity of BN hybrid as 27.1 tonnes/acre/cut during 3rd year of its cultivation with the total green fodder yield of 163 tonnes/acre/year. Further, cost of cultivation per acre/annum in terms of expenditures on irrigation, fertilization and hoeing reduced from Rs. 1832.91 in first year to Rs. 1225.50 in third year. This clearly indicated the economic importance of cultivation of BN Hybrid as a fodder. The cost of fertilization was reduced due to gradual decrease of requirement from early stage to final stage during the cultivation of BN hybrid.

The opinions of farmers (Table 3) about the BN hybrid cultivation in terms of productivity and economic advantages were recorded. The statements were framed

and response of the farmers recorded on 3-point continuum *viz.*, most favourable, least favourable and not favourable. It was observed that most of the farmers showed favourable responses towards the adoption of BN hybrid. Most of the farmers (>80 %) reported that cultivation of BN hybrid was an economic affair and reduced the cost of concentrate, augmented the milk production, availability was throughout the year and economically feasible as compared to other fodders. The results were in conformity with the findings of earlier workers (Birthal and Jha, 2005; Kadam *et al.*, 2017; Singh *et al.*, 2019).

The total variable cost was calculated and compared between before and after adoption of BN Hybrid as a fodder by the farmer (Table 4). The noted difference was observed in feeding costs, which contributed to 74.91% of total variable cost before adoption of BN hybrid while after adoption of BN Hybrid the feeding cost contribution reduced to 57.25%. The similar findings were reported earlier (ICAR, 2018). This clearly indicated profound impact of feeding cost on total variable cost. The other

Table 2. Production and cost of cultivation of BN hybrid/acre (in Rupees) (N=120)

Number of irrigation	Expenditure on irrigation	Expenditure on fertilization	Expenditure on hoeing	Average (Rs/annum)	Production (q/acre/annum)
First year					
6.85	989.58	479.16	401.66	1832.91	84.20
Second year					
5.28	760.33	285.83	221.42	1238.41	95.00
Third year					
5.25	756.58	287.08	218.42	1225.50	103.30

Table 3. Opinion of farmers about BN hybrid (N=120)

Statements	Most favourable (3)	Least favourable (2)	Not favourable (1)
Feeding green fodder of BN hybrid enhances milk production	102 (85)	18 (15)	0
Growing BN hybrid is an economical affair as it reduces the cost of concentrate	103 (85.83)	17 (14.16)	0
Growing BN hybrid is favourable for small land holders	81 (67.5)	39 (32.5)	0
Cultivation of BN hybrid provides an entrepreneurship opportunity	110 (91.66)	10 (8.33)	0
Comparing to sorghum, growing BN hybrid is economical	110 (91.66)	10 (8.33)	0
BN hybrid provides sufficient green fodder throughout the year	116 (96.66)	04 (3.33)	0
Scarcity of green fodder is the main reason of low milk yield of animal	105 (87.5)	15 (12.5)	0
Growing BN hybrid is an economical affair as it is one-time investment in five years	107 (89.16)	13 (10.83)	0

Figures in parenthesis indicated percentage

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components viz., labour cost, veterinary expenses and miscellaneous were contributed 16.97, 4.17 and 4.21% of total variable cost, respectively. The miscellaneous cost comprised of electricity charge, transport cost and water charges. This finding was in agreement with earlier studies (Bardhan and Sharma, 2012; Dixit and Singh, 2017). Further, Gupta *et al.* (2019) reported the cost of production of BN hybrid was lower (Rs. 153.57/t) than local grass (Rs.837.69/ t) which was further reduced in subsequent years, since later no cost was involved in bund preparation, root-slips purchase and labour for planting.

The cost of milk production per household per annum per litre was calculated and compared before and after adoption of BN hybrid as fodder crop. The results revealed

that lactation period of the dairy animals increased (221 days) after adoption of BN hybrid and also total milk production per litre improved from 6125.91 to 6492.85 litres per annum due to sufficient availability of green fodder. The results were in conformity with earlier findings (Singh *et al.*, 2018; Mohini *et al.*, 2007; Prabu, 2012). The ultimate effect was observed on cost of milk production, which was reduced to Rs. 9.98 per litre after adoption of BN hybrid as fodder by the farmers.

The wheat straw utilization pattern was observed across the households (Table 5). It revealed that the quantity of utilizing wheat straw was diminished after adoption of BN hybrid which also helped to reduce the cost of feeding by Rs 8176 per annum per household. The results were in confirmatory with earlier findings (Kumar *et al.*, 2012a;

Table 4. Economic analysis of milk production (N=120)

Variables	Before adoption of BN hybrid	After adoption of BN hybrid
Expenses (Rs/ household/annum)		
Feeding cost	63213.55 (74.91)	48308.09 (57.25)
Labour cost	14322.03 (16.97)	14322.03(16.97)
Veterinary expenses	3524.16 (4.17)	3524.16 (4.17)
Miscellaneous	3555 (4.21)	3555 (4.21)
Total variable cost	84376.05	69470.59
Cost of milk production		
Total milk production(Lit/household/annum)	6125.91	6492.85
Lactation period (days)	201	221
Cost of milk production (Rs/litre)	11.62	9.98

Figures in parenthesis indicated percentage of total cost

Table 5. Wheat straw utilization pattern per household

Parameters	Mean values
Wheat straw requirement before adoption of BN hybrid (q/ household/ annum)	64.76
Wheat straw requirement after adoption of BN hybrid (q/ household/ annum)	44.32
Price of purchased wheat straw (Rs/q)	400
Total rupees per annum spent on wheat straw before adoption of BN hybrid	25904
Total rupees/ annum spent on wheat straw after adoption of BN hybrid	17728
Amount saved/ annum after adoption of BN hybrid	8176

Table 6. Multiple linear regression model

Model (constant)	Unstandardized coefficients		Standardized coefficients	t	Significance
	B	SE	Beta		
	14.300	4.184		3.417	.001
Age	-.086	.036	-.161	- 2.353*	.020
Education	.552	.427	.090	1.293	.199
Land holding	.243	.103	.290	-2.352*	.020
Dairy animals	.069	.105	.139	.663	.509
Lactation period	-.025	.012	-.147	-2.108*	.037
Feeding cost	-7.407	.000	.979	9.949**	.000
Milk production	-.001	.000	-.949	- 3.641**	.000

BN hybrid reducing the cost of milk production

ICAR, 2018). Overall, the factors (Table 6), which significantly affected the cost of milk production were age, landholding, lactation period, feeding cost and total milk production. This clearly implied that cost of milk production decreased with increase in age of the farmers, landholding possessed by the farmer, lactation period and milk production of dairy animals. While the cost of milk production positively correlated with the feeding cost, since when the cost of feeding decreased, it also reduced the cost of milk production (Pathade *et al.*, 2020).

The study concluded that feeding cost and cost of milk production decreased while there was augmentation in milk production per litre along with lactation period due to adoption BN hybrid feeding. Further, the low cost of cultivation of BN hybrid and the reduction of expenditure on concentrate feeding by utilization of BN hybrid as green fodder enhanced the economic viability of dairy farming.

References

- Anonymous. 2013. Vision 2050 document. ICAR-Indian Grassland and Fodder Research Institute, Jhansi, India. <https://www.igfri.res.in/2013/Vision-2050.pdf> (Accessed on Sept. 09, 2020).
- Anonymous. 2018-19. Annual Report. Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India, Krishi Bhawan, New Delhi.
- Bardhan, D. and M.L. Sharma. 2012. Economics of milk production in the Kumaon region of Uttarakhand. *Indian Journal of Dairy Sciences* 65: 416-22.
- Birthal, P.S. and A.K. Jha. 2005. Economic losses due to various constraints in dairy production in India. *Indian Journal of Animal Sciences* 75: 1476-1480.
- Dixit, A. K. and M.K. Singh. 2017. An economic analysis of goat rearing in Mahoba district of Bundelkhand region. *Indian Research Journal of Extension Education* 18: 110-12.
- Ghosh, P.K., S.K. Mahanta, D.R. Palsaniya, Vijay Dunna and J.B. Singh. 2022. *Textbook on Forages*. Directorate of Knowledge Management in Agriculture, Indian Council of Agricultural Research, New Delhi. pp. 1-212.
- Gupta, J.J., A. Dey and B.P. Bhatt. 2019. Performance of bajra napier hybrid grown on bunds in comparison to native grasses. *Range Management and Agroforestry* 40: 250-254.
- ICAR. 2018. Round the year green fodder made dairy farm a profitable venture. <https://icar.org.in/node/313> (Accessed on Sept. 09, 2020).
- Kadam, S.S, A. Kumar and M. Arif. 2017. Hybrid napier for round the year quality fodder supply to the dairy industry- a review. *International Journal of Current Microbiology and applied Sciences* 6: 4778-4783.
- Kumar, Sunil, R.K. Agrawal, A.K. Dixit, A.K. Rai, J.B. Singh and S.K. Rai. 2012a. Forage production technology for arable land. Technical Bulletin. ICAR-Indian Grassland and Fodder Research Institute, Jhansi, India.
- Kumar, Sunil, R.K. Agrawal, A.K. Dixit, A.K. Rai and S.K. Rai. 2012b. Forage crops and their management. Indian Grassland and Fodder Research Institute, Jhansi, India.
- Mohini, M., V. Mani and G.P. Singh. 2007. Effect of different ratios of green and dry roughage on milk production and methane emission in cattle. *Indian Journal of Animal Sciences* 77: 79-82.
- Prabu, M.J. 2012. CO-4 grass used as fodder increases milk yield considerably. <https://www.thehindu.com/sci-tech/co4-grass-used-as-fodder-increases-milk-yield-considerably/article3551839.ece> (Accessed on Sept. 08, 2020).
- Ramya, S., V. Ramesh, J. Muralidharan and M.R. Purushothaman. 2017. Fodder yield and chemical composition of hybrid napier and multi-cut sorghum fodder at different stages of cutting. *Indian Journal of Small Ruminants* 23: 181-185.
- Pathade, S. S., B. P. Singh, Mahesh Chander and D. Bardhan. 2020. Profitability of dairy and goat production system: A multivariate typology of farm households. *Indian Journal of Animal Sciences* 90: 275-280.
- Sinde, A.K. and S.K. Mahanta. 2020. Nutrition of small ruminants on grazing lands in dry zones of India. *Range Management and Agroforestry* 41: 1-4.
- Singh, V.K., A.K. Singh, M.K. Tiwari, S.K. Singh, V. Singh and P.K. Singh. 2018. Effect of green fodder feeding on crossbred milking animals in Odisha. *International Journal of Research* 5:1636-1638.
- Singh, B.P., P.K. Mukherjee, Mahesh Chander, S.R. Singh and K. Pordhiya. 2019. Adoption of bajra napier hybrid: Green fodder at farmers' field. *Indian Farming* 6: 28-30.
- Singh, A. K. 2013. Income and livelihood issues of farmers: a field study in Uttar Pradesh. *Agriculture Economic Research Review* 26: 89-96.
- Thomas, C.G. 2008. *Forage Crop Production in the Tropics*. 2nd edn. Kalyani Publishers, New Delhi. pp. 1-333.