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EVALUATION OF BAJRA NAPIER HYBRID FODDERS IN CROSSBRED DAIRY CATTLE DURING SUMMER IN KERALA

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SUMMARY

An on-farm trial was conducted over two consecutive years, 2023-24 and 2024-25, in Velamanoor, Kareepra and Pattazhy Panchayat of Kollam district, under the ICAR-Krishi Vigyan Kendra, Kollam. The objective was to assess the effect of the new fodder variety 'Susthira,' released in 2021 by Kerala Agricultural University, on the production parameters of crossbred cattle during the summer season. During the assessment period (2023-2025), selected farmers from each panchayat were provided with 30,000 slips of the Bajra Napier fodder variety 'Susthira' as part of the experiment. The trial was a lactation study carried out on twelve crossbred Jersey cows in their second lactation period, divided into two groups of six animals each, for the two-year study. The treatment group was fed the Bajra Napier fodder variety 'Susthira,' while the control group was given the Super Napier (SN) Pak Chong-1 variety. The feeding trial lasted for 90 days. Milk yield was recorded separately for morning and evening sessions, and the total daily yield was calculated over three months, from February to April, in both years. During the assessment period, the production parameters of the treatment group (T) were significantly higher ($p<0.05$) than the control group (C), indicating that 'Susthira' fodder is ideal for milch animals and contributes to improved daily milk yield and overall milk production parameters during the summer season.

Key words: Dairy cattle, green fodder, Susthira, Super Napier, production parameters, B:C ratio

India, ranked first in global milk production with a 24 percent share, has seen consistent growth in milk production, increasing from 209.96 million tonnes in 2020-21 to 221.06 million tonnes in 2021-22, registering a 5.29 percent increase. Dairy farming plays a crucial role in the rural economy, serving as a primary source of income, employment, and nutritional security for families in Kerala. A key factor influencing milk production is the availability of quality fodder. Sufficient availability of green fodder plays a key role in correcting infertility problems, enhancing milk production, and finally improving economic prosperity of dairy enterprises (Birthal and Jha, 2005; Ghosh *et al.*,*20*22). Green fodder, known for its high palatability and digestible nutrients, is essential for improving digestion, rumination, and overall milk yield in crossbred dairy cattle. Success of the dairy sector depends on feeding with quality feed and fodder of high nutritional value, which accounts for 70 percent of the expenses of animal feed (Kumar *et al.*, 2012). In Kerala, 90 percent of dairy farmers are marginal, owning 87 percent of the state's cattle, and they spend 16.44 percent of their total expenses on providing roughage (Sabin *et al.*, 2022). The majority of farmers feed their animals with crop residues and poor-quality fodder, which accounts for around 97 percent, and feeding animals with this poor-quality fodder causes ill health to animals and a decline in productivity (Hegde, 2012). As per (Hatam *et al.*, 2001), performance regarding the production of good quantity and quality milk relies on the feeding of green fodder at various intervals during the year. Commercial concentrates are too expensive for farmers, and the existing fodder is not available in sufficient quantity for livestock. Hence, to increase fodder production and to reduce the feed cost, efforts have been intensified to evolve outstanding hybrid forage (Panneerselvam *et al.*, 2020). As per the data from the Dairy Development Department, the total required fodder for the milch animals in the state is 335.5 lakh kg per day, and Kerala produces only 60 percent of the roughage required for its cattle, posing a major challenge for small and

marginal farmers who have limited land for fodder cultivation (Dairy Development Department Annual Plan 2023-2024). The shortage of quality fodder remains a significant constraint in enhancing milk production. To address this challenge, farmers adopt various fodder cultivation practices to ensure sustainability in the dairy sector. Among these, multi-cut perennial grass fodders, particularly hybrid Napier varieties, are widely preferred due to their higher tiller density, superior leaf production, and greater fodder yield compared to traditional Napier grass. The hybrid is a triploid and hence sterile and does not produce seed. Pandey and Roy (2011) reported that among the improved fodder grass species, hybrid napier is a multi-cut perennial grass with profuse tillering and very good tonnage throughout the year. It is estimated that feed alone constitutes about 60-65 percent of the total cost of milk production, which can be reduced to 30-40 percent by providing inexpensive and quality green fodder like hybrid napier (Thomas, 2008) with a productivity of 280 t/ha (Gupta *et al.,* 2019). Napier hybrids are typically produced by interspecific hybridization of Bajra (*Pennisetum glaucum*) and Napier grass (*Pennisetum purpureum)*. 'Susthira'- a bajra napier hybrid (*Pennisetum glaucum* x *Pennisetum purpureum*) recently released under AICRP on forage crops at the College of Agriculture Vellayani, Kerala Agricultural University in 2021. Super Napier (SN) Pak Chong-1, a hybrid Napier variety resulting from the cross between *Pennisetum purpureum* (ordinary napier) x *Pennisetum glaucum* (pearl millet), was developed in Thailand and is rapidly gaining acceptance among dairy farmers in Kollam District. (Kiyothong, 2014) The developer of Super Napier himself pointed out that it can yield more crude protein, about 16 to 18 percent. (Liangco *et al.*,2019), in their study, stated that Super Napier grass requires lower inputs and is easier to establish compared to maize, and it can be a good alternative, especially in production situations that require consistent nutrition on a daily basis.

The present study was designed to compare the production performance in dairy cattle in the summer season by feeding two different napier fodder varieties 'Susthira' recently released by Kerala Agricultural University and Super Napier, commonly practiced by dairy farmers in Kollam District.

MATERIALS AND METHODS

The present study was conducted over two consecutive years, 2023-24 and 2024-25, in Velamanoor, Pattazhy, and Kareepra Panchayats of Kollam District as part of an on-farm trial in Animal Husbandry under ICAR-Krishi Vigyan Kendra, Kollam. The objective was to compare the production performance in crossbred dairy cattle when fed with the newly released Bajra Napier hybrid fodder variety 'Susthira' with the widely used Super Napier fodder variety. The study aimed to assess the impact of this newly released variety on the production parameters of crossbred dairy cattle during the summer season in Kollam District. For conducting the on-farm trial, six farmers from each panchayat were selected over the two-year period, ensuring similar soil and nutrient conditions. During the assessment period (2023-2025), 30,000 Susthira fodder slips were distributed to each farmer who has already cultivated the Super Napier variety, covering an area of one hectare per fodder variety per trial.

The field was ploughed twice using a tractor to loosen the soil and then levelled to prevent waterlogging. Two-noded stem cuttings (slips) were used as the planting material. Ridges and furrows were prepared, and the cuttings were planted at a 45° angle with a spacing of 60 cm × 60 cm. During planting, fertilizer application was done with 25 tons of farmyard manure (FYM) per hectare to improve soil fertility, along with fertilizer application at the rate of 200:50:50 kg NPK/ha. The first irrigation was given at the time of planting, the second on the third day, and then on a weekly basis based on rainfall availability. Hand weeding can be done on a need basis during the 30th and 60th days after planting (DAP). The first fodder harvest was done on the 75th day, and subsequent harvests were done every 45 days. Fresh fodder biomass for daily feeding was measured by using a digital electronic weighing balance.

An assessment of production parameters was conducted on twelve lactating crossbred Jersey cows during their second lactation. The cows were divided into two groups of six animals each for the two-year study. The treatment group was fed the Bajra Napier variety 'Susthira,' while the control group received the widely used Super Napier variety. All animals were maintained under an intensive management system, provided with a concentrate mixture based on their daily milk yield, and given water ad libitum. After a one-month adaptation period, the fodder feeding trial lasted for 90 days from February to April in both years. Group I (Treatment) animals were fed 25 kg of Susthira green fodder daily, while Group II (Control) animals received 25 kg of Super Napier fodder. Milk yield and milk fat content were recorded separately for morning and evening milkings. Total daily milk

yield and fat content were calculated for each group over the three-month summer period in both years. The data on milk yield and fat were analyzed using the independent t-test method, following Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Result data regarding the effect of feeding hybrid Napier varieties on milk yield and fat during summer months in 2023-24 and 2024-25 was given in Table 1.

It was evident from Table I that the average initial milk yield during the summer season in crossbred Jersey cows of Group I (treatment group) for the years 2023-24 and 2024-25 was 12.11 and 10.69 litres, respectively, and in Group II (control group), the corresponding values were 10.51 and 8.86 litre. During the 2023-24 and 2024-25 summer trials, Group I showed significantly higher milk yield than Group II.

The mean milk fat values in Group I during the summer months of 2023-24 and 2024-25 were 5.17 percent and 5.16 percent, respectively, while in Group II, they were 4.30 percent and 4.54 percent. The milk fat percentage in Group I during the feeding trial was significantly higher than in Group II. During the assessment period of 2023-24 and 2024-25, milk production in Group I increased by 13.21 percent and 17.11 percent, respectively, and milk fat by 16.82 percent and 12.02 percent in cows fed with the Bajra Napier variety 'Susthira.'

These findings are in agreement with those reported by (Sharma *et al.*, 2019) and Muia (2000), who highlighted that cultivating and feeding the hybrid Napier variety 'Phule Gunwant' as a palatable green fodder source can enhance milk yield. Contrasting findings with (Anu *et al.*, 2023), they observed a 21% increase in milk yield in the Super Napier-fed group compared to a maize-fed group but did not find a statistically significant increase in milk fat percentage, suggesting that yield gains may not always align with compositional improvements.

The cost of cultivation and economics of production during 2023-24 and 2024-25 were given in Table 2.

ECONOMICS

Table II clearly revealed that the economic analysis indicated a higher net return in milk production is obtained via feeding of the Susthira variety compared to the Super Napier variety. The cost of milk production is reduced in Group I by feeding Susthira Bajra Napier fodder, which has been observed with better palatability and reduced wastage. (Hossain *et al.*, 2017) reported that the feed cost was reduced for every liter of milk production due to the green fodder inclusion in the lactating cattle. Group I showed lower feeding costs and higher net returns and B:C ratio compared to Group II.

TABLE 1
Effect of feeding hybrid Napier varieties on milk yield and fat during summer months in 2023-24 and 2024-25

	Average Milk Yield in Litres Mean ± S.E.		Milk Fat in Percentage Mean ± S.E.	
	2023-24	2024-25	2023-24	2024-25
Group I	12.11± 0.095	10.69 ± 0.038	5.17± 0.045	5.16 ± 0.042
Group II	10.51 ± 0.042	8.86 ± 0.079	4.3 ± 0.103	4.54 ±0.116
p - value	.0000	.0000	.0000	.0000
t value	15.44	20.54	5.73	5.01

A p-value which is less than 0.05 was considered statistically significant and less than 0.01 was considered highly significant.

TABLE 2
Economics of production during 2023-24 and 2024-25

Varieties	Gross cost (Rs.)		Gross return (Rs.)		Net return (Rs.)		BC ratio	
	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25	2023-24	2024-25
Group I	66500	68000	194400	159036	127900	91036	2.92	2.33
Group II	86500	91000	147000	123606	60500	32606	1.69	1.35

CONCLUSION

In conclusion, findings of the study revealed that the 'Susthira' perennial multi-cut Bajra Napier hybrid is considered more productive and profitable for the dairy farming community of Kerala compared to the widely used Super Napier. A daily intake of 25 kg of Susthira fodder by dairy cattle has been shown to increase average milk yield by 1.5 litres per day, along with higher net returns and an improved benefit-cost (B:C) ratio. Thus, it is concluded that 'Susthira' boosts milk production and profits, especially in summer, and also the lower cultivation cost compared to Super Napier suggests it is economically viable for dairy farming.

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