Journal of Rural Advancement
(ISSN 2347 - 2561)
Vol. 09, Issue 02, October 2021

Nutritional Evaluation of Dinanath Grass (*Pennisetum pedicellatum)* at Pre and Post Flowering Stage for Crossbred Heifers

Awadhesh Kishore and Lakshman Singh

School of Agriculture
ITM University, Gwalior, India

Abstract

To compare the feeding value of Dinanath grass with sorghum fodder at the post-flowering stage, sixteen crossbred heifers (274±11 d) and weight (85.3±4.9 kg) were grouped in 8 pairs based on their age and weight. One animal from each pair was randomly allotted to one of the two groups DF and SF. In DF, the animals were offered Dinanath grass fodder, whereas, in SF sorghum fodder ad-lib, the fodders were enriched with urea, @ 0.4 and 0.2% on a fresh weight basis, respectively. They were also given 1 Kg concentrate mixture (40% wheat grain; 40% groundnut cake; 20 % gram husk), 30 g common salt, and chalk 30 g daily for 13 weeks. The bodyweight of the animals was calculated by weekly multiplication, of length (cm) and heart girth (cm) of the animal divided by 11200. After 21 days of adaptation, a 7-day digestibility trial was conducted to find out intake and digestibility data. The samples were chemically analyzed for proximate principles using standard techniques. The data were subjected to statistical analysis using suitable methods. It can be concluded that Dinanath grass and sorghum fodders both are equally inferior in nutritive value in the post-flowering stage and should not be continued for a long period.

Keywords: Crossbred heifers, Dinanath grass, Green fodder, Nutritive value, Pennisetum *pedicellatum*, Pre-Flowering stage, Post-flowering stage.

Introduction

The regional deficits of fodder are more important rather than the national deficit (Tewari et al 2016). The pattern of deficit varies in different parts of the country. To supply green fodder from one location to another is not feasible because of the involvement of transportation. In such conditions locally available weeds, inland, or imported fodder crops play important role in sustainable livestock production.

It is very much difficult to increase the area under fodder crops because of the population pressure for food and fiber (Riaz et al 2020). Fortunately, the Indian sub-continent is one of the world's mega centers of crop origin and crop plant diversity, because of the availability of a wide spectrum of eco-climates. The Indian gene center possesses a rich genetic diversity in native grasses and legumes. Almost one-third of Indian grasses are considered to have fodder value for livestock. It is needful explore high-yielding fodder crops which may be suitable for cultivation in particularly green fodder deficit locations, evaluate locally available fodder crops, and their improvement to overcome inferiority factors.

With profusely tillering capability, Dinanath grass (*Pennisetum pedicellatum*) is a quick-growing, luscious, leafy, and

thin-stemmed grass and grows well in poor, eroded soils in areas receiving 500-1500 mm annual rainfall. It is a high-yielding, tall, erected annual tufted perennial forage. This crop is of short duration and fits well in the small period between two major crops. The grass thrives and performs well on a wide range of soils (including degraded sandy or ferruginous soils) provided they are well-drained (FAO 2010). Because of high fodder production potential, tolerance towards drought, insect and disease infestation, Dinanath grass is becoming popular day by day but reducing the unwanted volume and extracting true seeds from spikelet for efficient post-harvest handling, transportation, and various farm operations is required for large-scale utilization of Dinanath grass as forage for animals (Vijay et al 2018). Maity et al (2017) worked on layered pelleting of the nucleus seed of Dinanath grass with soil and observed the highest germination of 91%. The seed yield of grasses is very low, while demand for seed upgrading of grasslands (Meena and Nagar 2019). The feeding value of Dinanath grass fodder at early and pre-flowering stages has been assessed and found similar to sorghum fodder (Kishore and Verma 2000).

Keeping the above facts in consideration, the present experiment was conducted to compare the feeding value of Dinanath grass at pre and post-flowering stages for crossbred heifers.

Materials and Methods

Dinanath grass (Variety T-10) and sorghum (Variety CSH-1) were sown at the farm at a suitable interval to maintain the stage of plant at harvest for feeding, following standard agronomical practices. At the stage of post-flowering, the crops (Dinanath grass: 90-110 days after sowing; Sorghum: 80-90 days after sowing) were harvested for proximate analysis (O'shea and Maguire 1962, AOAC 1990) and offered to the experimental animals.

Sixteen crossbred heifers (Sahiwal x Jersey) were selected at the dairy farm and grouped into 8 pairs based on their age (274±11 d) and weight (85.3±4.9 kg). One animal from each pair was randomly allotted to one of the two groups DF and SF.

In group DF the animals were offered Dinanath grass fodder whereas, in SF sorghum fodder ad-lib. The fodders were enriched with urea, at the rate of 0.4 and 0.2% on the fresh fodder weight basis in DF and SF groups, respectively. They were also given 1 Kg concentrate mixture (40% wheat grain; 40% groundnut cake; 20% gram husk), 30 g common salt, and 30 g chalk daily.

The experimental heifers were housed in a large-sized shed having partitions in troughs for individual feeding. The fodder was offered to the animals in the forenoon and concentrate mixture in the afternoon. The heifers were let loose in an open enclosure for 4 hours before feeding fodder. The animals had free access to drinking water.

The body weight of the animals was calculated weekly based on body measurements i.e. multiplication of length (cm) and heart girth (cm) of the animal divided by 11200. After 21 days of adaptation, a 7-day digestibility and sample collection trial was conducted to find out intake and digestibility data. The collected samples were chemically analyzed for proximate principles using standard techniques (O'shea and Maguire 1962, AOAC 1990). The data recorded during the experiment were subjected to statistical analysis using suitable methods (Snedecor and Cochran, 1967).

Results and Discussion

The contents of dry matter, crude protein, ether extract, gross energy, organic matter, acid insoluble ash, hemicellulose, and total carbohydrates were present in high and

crude fiber, neutral detergent fiber and acid detergent fiber, ash, and nitrogen-free extract low in sorghum fodder in comparison to those in Dinanath grass (Table 1). These results were found contrary to Kishore and Verma (2000) which could be due to the different stages of fodder harvesting. The ranges of the nutrients in both the fodders confirmed the study (Chakrabarti et al 1988, Ranjhan 1991, Kishore 1992). Because of enrichment with urea, the content of crude protein was increased which may be due to the presence of high content of nitrogen (46%) in urea.

Table 1 Chemical Composition of Dinanath Grass (%)

Nutrient	Pre-flowering stage		Post-flowering stage		Concentrate Mixture
	Enriched with urea		Enriched with urea		
	Without	With	Without	With	
DM	15.7	85	30.5	29.2	92.5
CP	7.88	17.06	4.9	7	16.9
EE	3.74	4.74	4.26	4.28	5.59
CF	32.4	34.4	38.9	38.3	18.1
NDF	65.9	65.7	68.3	67	51.3
ADF	44	42.5	39.4	39	25.7
GE*	3.19	3.29	3.31	3.28	3.73
ASH	12.09	11.69	10.3	10.2	12
NFE	43.9	32.1	46.6	39.9	47.4
OM	87.9	88.8	89.7	89.9	88
AIA	2.93	2.85	2.79	2.78	3.09
Hemicellulose	21.9	23.2	28.9	28	25.6
TCHO	76.29	66.51	80.5	78.5	65.5

** Mcal / kg*

The consistently but not significantly ($P>0.05$) higher dry matter digestibility of dry matter in DF compared to that in SF is contrary to the findings of Das et al (1974), which could be perhaps because of the method of estimation (Table 2). As far as the comparison of digestibility coefficients of different nutrient understudies is concerned, the findings confirmed the results of Kishore and Verma (2000). The higher digestibility coefficient in DF in comparison to those observed in the literature (Jakhmola and Pathak 1983) may be due to the enrichment of fodder with urea which increased the CP content of the feed and hence, enhanced microbial activities in the rumen ecosystem. It is a well-known fact that for the fullest expression of potential digestibility of non-leguminous forages the crude protein content of the diet should be 8 percent (Verma 1981). The digestibility coefficients of energy and fiber components especially acid detergent fiber were observed on the higher side in DF in comparison to those in SF and confirmed the findings of Kishore and Verma (2000).

Significantly higher intake of dry matter and crude protein were recorded in SF ($P<0.05$) in comparison to in DF (Table 2). The intake data in SF is in agreement with Randhawa, et al (1988). A higher intake of digestible nutrients like digestible dry matter, digestible crude protein, and digestible energy may perhaps be due to a higher intake of the nutrients. The present intake data was recorded in line with the results reported in the literature (Kishore and Verma 2000).

The average daily gains in the two groups (Fig) under study were non-significant ($P>0.05$), despite significantly higher

intake data in SF. The average daily gain was showing a trend of fall. The animals started losing weight in week 10 in DF and 12 in SF. The reason for this declension could perhaps be due to the availability of nutrients in both the fodders at the post-flowering stage

Table 2 Nutrient utilization

Nutrient	Pre-flowering stage	Post-flowering stage
Digestibility (%)		
Dry matter	65.4±0.68*	60.7±1.1*
Crude Protein	69.1±1.27	68.6±1.0
Crude fibre	69.1±2.11*	40.7±3.9*
Neutral Detergent fibre	64.3±1.94*	53.2±1.2*
Acid detergent fibre	64.9±0.66*	44.0±2.2
Energy	64.7±0.59	60.1±1.3*
Intake		
Dry matter (kg/100kg LW)	2.43±0.13	2.17±0.10
(g/kg$W^{0.75}$)	74.4±4.12	68.8±4.7
Digestible dry matter kg/100kg LW)	1.59±0.09	1.87±1.00
(g/kg$W^{0.75}$)	48.7±2.97	38.8±2.2
Crude Protein (kg/100kg LW)	427±22.16*	243±13*
(g/kg$W^{0.75}$)	13.14±0.8*	7.19±0.30*
Digestible Crude Protein (kg/100kg LW)	296±17.31*	161±9*
(g/kg$W^{0.75}$)	9.2±0.67*	4.94±0.28*
Digestible energy (Mcal/100kg LW	5.12±6.57	5.12±0.27
(Kcal/kg$W^{0.75}$)	157±8.62	134±7
Average Daily Gain (g/d)	412±65.6*	101±99.83*
ME (Mcal/kg)	1.72	1.66
DCP (%)	12.14*	7.79*

** Values bearing different superscripts within the row differed significantly, i.e. (P<0.05).*

The conclusion, based on digestibility, intake, and average daily gain data, can be drawn that Dinanath grass fodders at the pre-flowering stage were superior compared to that at the post-flowering stage.

References

AOAC 2019. Official Methods of Analysis. 21st Edition. Association of Official Analytic Chemists.

Asmare B, Demeke S, Tolemariam T, Tegegne F and Wamatu J. 2017. The potential of desho grass (*Pennisetum pedicellatum* Trin.) for animal feed and land management practices in Ethiopia: A review. Global Journal of Animal Scientific Research. 5(1): 35-47.

Chakrabarti N, Mandal L and Banerjee G C. 1988. Chemical Composition of Certain Graminaceous: Fodders. Indian Journal of Animal Nutrition. 5(1): 52-56.

Das B, Arora S K and Luthra Y P. 1974. Comparative study on the chemical

composition and in vitro digestibility of Dinanath grass (*Pennisetum pedicellatum*), bajra (*Pennisetum typhoides*) and sorghum (*Sorghum vulgare*). Indian Journal of Dairy Science. 27(4): 234-237.

FAO 2010. The Hague Conference on Agriculture, Food Security and Climate Change: Climate-Smart Agriculture .

Policies, Practices and Financing for Food Security, Adaptation and Mitigation. FAO Rome.

Jakhmola R C and Pathak N N. 1983. Chemical composition and nutritive value of Dinanath grass for sheep. Indian Journal of Animal Sciences. 53(1): 94-95.

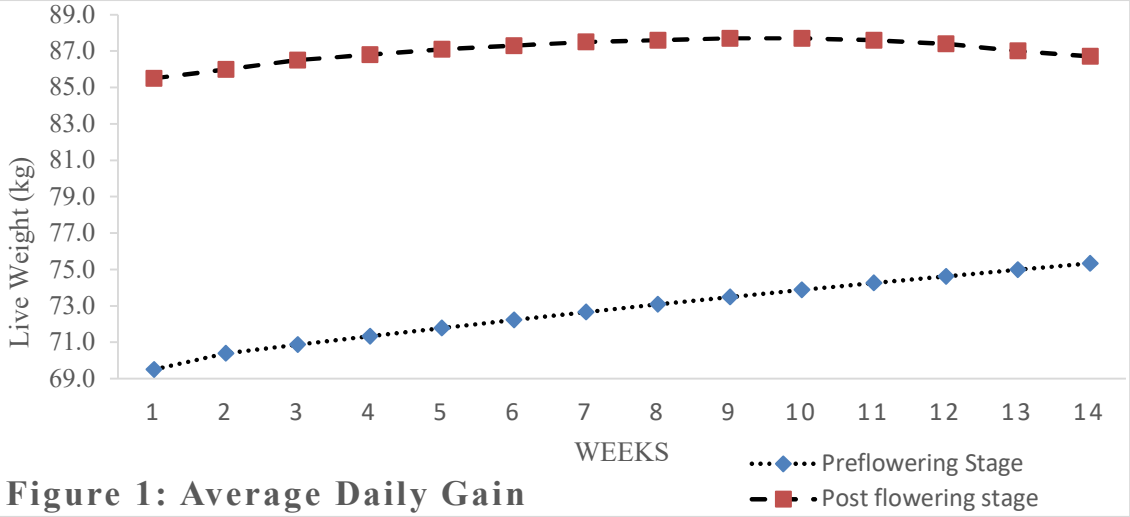

Figure 1: Average Daily Gain

Kishore A. 1992. Comparison of feeding value of Dinanath grass and sorghum fodder for crossbred heifers. Thesis, M.Sc.(Ag.), GBPUAT, Pantnagar.

Kishore A. Verma M L. 2000. Comparative feeding value of Dinanath grass and sorghum fodder for crossbred heifers. Indian Journal of Animal Nutrition. 17(4):311-314.

Maity A, Vijay D, Singh S K and Gupta C K. 2017. Layered pelleting of seed with nutrient enriched soil enhances seed germination in Dinanath grass (*Pennisetum pedicellatum*). Range Management and Agroforestry. 38: 70-75.

Meena S S and Nagar R P. 2019. Effect of pelleting material on seedling emergence and growth parameters in Cenchrus species. Range Management and Agroforestry. 40: 313-317.

O'shea J and Maguire M P. 1962. Determination of calorific value of feedstuffs by chromic acid oxidation. Journal of Science of Food and Ageiculture.13(10): 530-534

Randhawa S S. Gill R S, Gill S S and Hundal L S. 1988. Effect of feeding green sorghum, its silage or hay on milk production in buffaloes. Indian Journal of Dairy Science. 41: 255-257.

Ranjhan S K. 1991. Chemical Composition and Nutritive Value of Indian Feeds and Feeding of Farm Animals. ICAR, New Delhi.

Riaz F, Riaz M, Arif M S, Yasmeen T, Ashraf M A, Adil M, Ali S, Mahmood R, Rizwan M, Hussain Q, Zia A, Ali M A, Arif M and Fahad S. 2020. Alternative and Non-conventional Soil and Crop Management Strategies for Increasing Water Use

Efficiency. In: Environment, Climate, Plant and Vegetation Growth. Springer Link, pp 323-338.

Snedecor G W and Cochran W G. 1989. Statistical methods. 8th Edn. Iowa State University Press, Ames.

Tiwari J C, Pareek K, Raghuvanshi M S, Kumar P and Roy M M. 2016. Fodder Production System-A Major Challenge in Cold Arid Region of Ladakh, India. MOJ Ecology & Environmental Science. 1(1): 00005.

Verma M L. 1981. Forage sorghum in animal nutrition. Forage Research. 7A: 157-177.

Vijay D, Gupta C K and Malaviya D R. 2018. Innovative technologies for quality seed production and vegetative multiplication in forage grasses. Current Science. 114: 148-154.

Sharma T and Kishore A. 2022. The feeding values of Dinanath grass and Sweet Sorghum fodder at the post-flowering stage for crossbred heifers. Ymer. 21(5): 511-516.