Full Length Article

EVALUATION OF CUMBU NAPIER HYBRIDS Co(CN)4 AND Co(BN)5 IN CROSSBRED CATTLE

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ABSTRACT

Green fodder feeding is most important for milking cows. An experiment was carried out to compare the growth, performance, proximate composition and nutritive value of Bajra Napier hybrid Co(BN)5 (improved variety) with the standard variety Co(CN)4.Both the cultivars were cultivated in irrigated land comprising red sandy loam soil by following standard agronomical practices and 0.5 acre of land area was utilized for each cultivar. Fodder was harvested on 75th day after planting and subsequent harvest at every 45 days in each experimental plot. The growth and yield parameters were measured.The yield was significantly ($p<0.01$) higher in Co(BN)5 (360.50t/ha/year)followed by Co(CN)4(290.12t/ha/year).The biometric observations showed the significant ($p<0.05$) difference in Co(BN)5 than Co(CN)4. The samples were collected for analyzing chemical composition.The results indicated that the crude protein, crude fibre, NDF, ADF and cellulose content of Co(BN)5 were significantly ($p<0.01$) higher than Co(CN)4. The fodder crop cultivars were analysed for IVDMD.The IVDMD of Co(BN)5 (49.18%) was significantly higher than the Co(CN)4 (43.09%). A Lactation trial was conducted in twelve cross bred cows during mid lactation period and separated into two groups with six animals in each group. One group was named as control (C) and fed with Co(CN)4 green fodder and another group named as treatment (T) and fed with Co(BN)5. The animals were housed in standard condition, dewormed and fed with clean potable drinking water ad libitum.The experiment was conducted for 90 days. Except green fodder variation, animals were offered ad libitum paddy straw and concentrate mixture according to their level of production. The feed and fodder intake, left over and dry matter intake were recorded every day. The average dry matter intake was recorded and inferred that it was significantly ($P<0.05$) different. The average milk yield, milk fat, solid non-fat and total solids were recorded for both groups. The average milk yield in treatment group is highly significant ($p<0.01$) than control group. There was no change observed in the milk fat and solid non-fat. The feed cost was calculated for every litre of milk production.The feed cost is significantly ($p<0.01$) reduced in treatment group due to the less requirement of Co(BN)5 fodder when compared to Co(CN)4 fodder. It is concluded that Cultivar Co(BN)5 is superior than Co(CN)4 in terms of crop growth and biomass yield. Hence, cultivation of Bajra Napier Cultivar Co(BN)5 and feeding the same to improve the milk yield in cattle is the outcome of this study.

Keywords: Cumbu Napier hybrid, Dry matter digestibility, Dry matter intake, Growth, yield, Lactation

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INTRODUCTION

Livestock rearing plays a very important role in Indian economy. In India,

fodder crops are cultivated in around 8.3 million hectare of land area and in Tamil Nadu, the cultivated fodder area is around 0.17 million hectare (1.23% to the gross cultivated area). Availability of green fodder is about 600 million tonnes and leaving a deficit of 40 %. The projected balance between demand and supply of fodder presents a challenge in the productivity of livestock (Gnanaraj *et al.,* 2020).

Green fodder production is very much essential for rearing livestock with less cost of milk production. In Tamil Nadu, Cumbu Napier hybrid grass variety Co(CN)4 is commonly cultivated by the farmers because of its increased biomass yield from unit land area. But this Cumbu Napier hybrid grass variety Co(CN)4 is grown only in plains, excluding some hilly areas where frost is a common phenomenon. To overcome this problem, Cumbu Napier hybrid grass variety Co(BN)5 was developed by Tamil Nadu Agricultural University, Coimbatore with the characteristics feature of winter hardiness and superior ratooning ability. Feeding of green fodder is important in dairy cattle and availability of green fodder is limited. Hence, the newly developed variety is to be found for feeding dairy cattle for milk production. With this in view, the study was formulated to compare the growth and yield performance, proximate composition and nutritive value of Cumbu Napier hybrid Co(BN)5 (improved variety) with the standard variety Co(CN)4 as standard.

MATERIALS AND METHODS

An experiment was carried out at Institute of Animal Nutrition, Kattupakkam in Red sandy loam soil. Cumbu Napier hybrid grass cultivars Co(CN)4 and Co(BN)5 were cultivated in irrigated land area by following standard agronomical practices and 0.5 acre of land area was utilized for each cultivar. The field was ploughed twice by using tractor and applied Farm Yard Manure @ 5 tonnes/ acre. The recommended dose of 150: 50: 40 kg NPK ha^{-1} was applied. Fifty per cent of the recommended N and full dose of P_2O_5 and K_2O were applied basally. Broad casting of the fertilizer prior to planting was done. Ridges and furrows were formed and stem cuttings were planted with a spacing of 60 X 50 cm. First irrigation was given at the time of sowing and the life irrigation on third day after sowing. The subsequent irrigations were scheduled at weekly interval depending upon the rainfall. Weeding was also performed based on the weed growth. Top dressing of fertilizers was applied on 30th day of planting. Hand weeding was done on 30^{th}& 50^{th} day after planting.Fodder was harvested on 75^{th} day after planting and subsequent harvest every 45 days at different places in one square meter area in each experimental plot and the weight of fresh fodder biomass was measured using digital electronic weighing balance and sampling for estimation of moisture was done on the experimental plots itself. The growth and yield parameters were measured.

The fresh fodder biomass yields of respective treatment group were estimated. The plant samples of both the fodder varieties were collected from six different locations, leaves and stems were separated. Each variety samples were then pooled, shade dried and ground to pass through 1 mm sieve in Willey mill. The ground sample was preserved in an air tight container for further chemical

analysis. The chemical composition of fodder (AOAC, 2012) and *in vitro* dry matter degradability (IVDMD) (Tilley and Terry, 1963) was studied.

Experimental animals and design

A lactation trial was conducted in twelve cross bred cows during mid lactation period and separated into two groups with six animals in each group. One group was named as control (C) and fed with Co(CN)4 green fodder and another group named as treatment (T) and fed with Co(BN)5. The animals were housed in standard condition, dewormed and fed with clean potable drinking water *ad libitum*.Except green fodder variation, animals were offered *ad libitum* paddy straw and concentrate mixture according to their level of production. During experimental period animals were allowed only for stall feeding and the quantity of feed and fodder intake, left over and dry matter intake were recorded every day. The fodder of both the varieties after chaffing was offered for 90 days. The adaptation period of 7 days was given for the animals. Cows were milked twice daily with an interval of 12 hrs. between the two milking and milk yield were recorded separately for morning and evening. The per cent milk fat was estimated by Gerber's method as per BIS (1977). Total solids were estimated by Gravimetric method as per BIS (1961). The experiment was conducted for 90 days.The feed cost was calculated for every litre of milk production.

Statistical analysis

The data were subjected to one-way analysis of variance (ANOVA) using (Snedecor and Cochran, 1994). Means showing significant differences in the ANOVA table were compared using the Duncan multiple range test (Steel and Torrie,1980).A p-value of 0.05 was considered statistically significant and 0.01 was considered as highly significant.

RESULTS AND DISCUSSION

The data on growth and yield parameters of Cumbu Napier hybrid grass varieties Co(CN)4 and Co(BN)5 were presented in Table. 1. The yield was significantly ($p<0.01$) higher in Co(BN)5 (360.5 tonnes/ha/ year) followed by Co(CN)4 (290.12 tonnes/ ha/ year). The yield of Co(BN)5 in the present study was recorded lower against the yield of 467.5 tonnes/ha/ year by Ramya *et al*. (2017).

The biometrical observations of plant morphology are presented in table 1. The cultivar Co(BN)5 had expressed significant ($p<0.01$) difference in plant height, leaf yield, sheath yield, stem yield and leaf stem ratio. The results showed that the Co(BN)5 cultivar had shown higher plant height, increased number of tillers per clump, number of leaves per tiller which in turn recorded more number of leaves per clump than Co(CN)4. The leaf length and leaf stem weight of Co(BN)5 was observed higher than Co(CN)4, which in turn increased the leaf stem ratio in Co(BN)5.The decrease in leaf stem ratio with increasing stage of cutting was mainly due to rapid extending of stem fraction with advancing plant maturity. It is the reason for the lower biomass yield in Co(CN)4. Similar results were reported by Ramya *et al.*(2017).

Table 1. Growth and yield parameters of Co(CN)4 and Co(BN)5 (Mean ±SE) (n=6)

Parameters	Co(CN)4	Co(BN)5
Plant Height (cm)	194.17 ± 16.81[a]	286.17 ± 6.13[b]
No. of tillers /clump	8.00 ± 0.89 [a]	13.17 ± 1.54 [b]
No. of leaves/clump	86.5 ± 7.41 [a]	212.33 ± 24.76 [b]
No. of leaves /tiller	17.17 ± 1.19 [a]	43.33 ± 1.48 [b]
Leaf length (cm)	62.67 ± 3.29 [a]	91.17 ± 2.23 [b]
Leaf Breath (cm)	10.17 ± 0.48 [a]	8.18 ± 0.15 [b]
Leaf wt. (g)	0.038 ± 0.00 [a]	0.15 ± 0.02 [b]
Stem wt.(g)	0.17 ± 0.03 [a]	0.22 ± 0.04 [b]
Leaf Stem Ratio	0.248 ± 0.05[a]	0.790 ± 0.20[b]
Green fodder yield (t/ha/year)	290.12 ± 21.2[A]	360.50 ±29.5[B]

a, b - Means bearing different superscripts within a row vary significantly ($p<0.05$)

A, B - Means bearing different superscripts within a row vary significantly ($p<0.01$)

Proximate composition showed significant differences among the cultivars and presented in Table. 2. Crude protein content which gives an approximate value of protein content in forage crops differed significantly among the cultivars. When crude protein content of both hybrids were considered, Co(BN)5 seems to be superior than Co(CN)4, whereas Vijayakumar *et al.* (2009) reported that the cultivar Co(CN)4 had an average crude protein content of 10.5 per cent. The cultivars also differed significantly in terms of crude fibre. The crude fibre content is significantly ($p<0.05$) lesser in the Co(BN)5 than the Co(CN)4 which makes the fodder more relished by the cattle.Ash content gives an indication of minerals present in the sample. There were significant ($p<0.01$) differences between cultivars with respect to total ash content.The ether extract content, which represents crude fat fraction of the sample was found to be higher in Co(BN)5 than Co(CN)4. Nitrogen free extract (NFE) represents the digestible carbohydrates present in feed. All the chemical composition studied were higher in Co(BN)5 than Co(CN)4 except crude fibre. Senthilkumar *et al.* (2020) also reported that higher CP and lower NDF content in the Andhra pradesh hybrid Napier (APBN1) fodder variety.The IVDMD of Co(BN)5 was significantly higher than the Co(CN)4. Thirumalaisamy *et al.* (2015) also reported that the IVDMD of Co(CN)4 was 42% at 48 hours. The higher IVDMD of Co(BN)5 indicated that the availability of nutrients are higher than that of Co(CN)4.

Table 2.Chemical composition and *in vitro* dry matter degradability (IVDMD) of Co(CN)4 and Co(BN)5 on dry matter basis (Mean ± SE)

Parameters	Co (CN) 4	Co (BN) 5
Moisture (%) on fresh basis	75.12 ± 2.56	79.24 ± 2.77
Crude protein (%)	9.72 ± 0.52[a]	10.31 ± 0.62[b]
Ether extract (%)	1.32 ± 0.12	1.54 ± 0.11
Crude fibre (%)	32.36 ± 2.78[b]	29.68 ± 2.36[a]
Total ash (%)	14.07 ± 1.21[b]	17.23 ± 1.08[a]
NFE (%)	42.53 ± 1.88	41.24 ± 1.52
Neutral detergent fibre	64.29± 1.15[a]	69.43 ± 1.48[b]
Acid detergent fibre	35.27± 1.56[b]	26.59 ± 1.78[a]
Cellulose	28.59 ± 0.26[b]	20.67 ± 0.35[a]
IVDMD (%)	43.09 ± 2.15 [a]	49.18 ± 2.64[b]

a, b- Means bearing different superscripts in a row varies significantly ($p<0.01$)

Lactation trial

The lactation trial was conducted and the results on average dry matter intake, milk yield, fat, solids not fat, total solids and feed cost are presented in table 3.

Table 3. Milk yield in crossbred cattle offered with Co(CN) 4 and Co(BN) 5

Parameters	Control	Treatment
Average green fodder intake (kg/day) on drymatter basis	1.75 ±0.01[a]	2.25 ±0.01[b]
Average dry matter intake (kg/day)	8.42 ±0.41[a]	9.36 ±0.47[b]
Milk Yield (litres/day)	4.98±0.27[a]	5.94±0.32[b]
Fat (in percentage)	4.85 ±0.24	5.10 ±0.31
Solid-Not-Fat (%)	8.43±0.42	8.78±0.41
Total solids (%)	13.28 ±0.63	13.88 ±0.68
Feed cost (Rs/litre)	18.57 ±0.92[b]	14.52 ±0.72[a]

a, b - Means bearing different superscripts within a columnvary significantly ($p<0.01$)

The average dry matter intake was significantly ($p<0.01$) higher in treatment group. The increased dry matter intake discloses the palatability of Co(BN)5 fodder and reduced the fodder wastage. Since, the crude fibre content of Co(BN)5 fodder is lesser, the intake of the dry matter was higher. Kumar *et al.* (2015) recorded the increased dry matter intake of Co4 grass of hybrid Napier. The average milk yield in treatment group is highly significant ($p<0.01$) than control group. The increased dry matter intake is responsible for increasing the milk yield. Shambharkar *et al.* (2018) reported that the feeding of sorghum green fodder to lactating crossbred cattle produced 5.38kg of milk per day. There was no change observed in the milk fat, solid non-fat and total solids.The milk quality was not changed in both the groups even though the fibre content of Co(BN)5 fodder was less, which may be due to the higher intake of drymatter. The cost of milk production is significantly($p<0.01$) reduced in the treatment group by feeding Co(BN)5 fodder which has the higher biomass yield. Hossain *et al.* (2017) reported that the feed cost was reduced for every litre of milk production due to the green fodder inclusion in the lactating cattle. It is concluded that Cultivar Co(BN)5 is superior than Co(CN)4 in terms of crop growth and biomass yield. The nutritive value of Cumbu Napier grass cultivar Co(BN)5 is higher for milk production in dairy cattle. Hence, it is recommended for cultivation and feeding to improve the milk yield in cattle.

CONCLUSION

It is concluded that Cumbu Napier grass cultivar Co(BN)5 had reported higher plant height, increased number of tillers per clump, number of leaves per tiller which in turn recorded more number of leaves per clump than Co(CN)4. The green fodder yield of Co(BN)5 was higher than Co(CN)4. In terms of nutritional quality, Co(BN)5 was superior than Co(CN)4. It is highly palatable, increased daily milk yield and reduced feed cost. Hence, it is concluded that Cultivar Co(BN)5 is recommended and better than Co(CN)4 for cultivation and feeding to improve the milk yield in cattle.

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