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STUDY ON EFFECT OF HYDROPONIC MAIZE FODDER SUPPLEMENTATION ON MILK YIELD IN MILCH BUFFALOES

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SUMMARY

Hydroponic fodder production plays significant role in augmenting fodder shortage of small holder dairy production system in scarce rainfall areas. The present experiment was conducted in the adopted villages of Krishi Vigyan Kendra, Yagantipalle, Kurnool dist., A.P. to assess the effect of hydroponic maize fodder (HMF) on production performance in the milch buffaloes. A low cost hydroponic fodder production devise (Krishi Fodder Master) was fabricated and utilized in the experiment. Twenty graded murrah buffaloes of 2nd and 3rd lactation were equally divided into two groups (T_1&T_2). First group fed with 5kg sorghum straw per day along with recommended quantity of concentrates and the second group fed with 5kg sorghum straw and 12kg HMF per day. Data on HMF production, milk yield/day, % fat in milk and 3.5% FCM/day was collected for 60 days trial period. 7.2kg HMF was obtained from one kilogram of maize seed within 7 days without using any nutrients in the irrigated water. The DM, CP, CF, EE, TA and NFE contents in HMF were 14.3 15.8, 12.62, 3.74, 3.27 and 64.57 respectively. The data revealed that 6.5% increased mean milk yield/day was recorded in T_2 (6.88±0.47) as compared to T_1 (6.46±0.49). The mean % fat and SNF in T_1 and T_2 were recorded as 6.78±0.19, 8.86±0.16 and 7.08±0.23, 9.14±0.12 respectively. The gross income per day was 13.05% more in T_2 (Rs.250.47±17.31) than T_1 (Rs.221.55±15.49). The data revealed that saving of Rs.15.61/buffalo/day on concentrate feeding and increased net returns of Rs. 44.58/buffalo/day were recorded on supplementing HMF. These results were found significant at 5% ($P<0.5$). Feeding of HMF to buffaloes produced under Krishi Fodder Master was found to be economical for medium producing animals in low rain fall areas.

Key words : Graded murrah buffaloes, low cost hydroponic system, hydroponic maize fodder, krishi fodder master

Kurnool district of Andhra Pradesh falls under scarce rainfall zone with average rainfall of 670mm. Dairy farming is the sustainable livelihood activity for the farmers with 2-5 milch buffaloes per household in rain fed agriculture. Feeding of dairy animals in this area is mostly on grazing for 6-8hours per day with additional dry fodder supplementation. Due to scarcity of water, fodder cultivation is meagre in this zone. At this junction hydroponics technology is an alternative to grow green fodder for farm animals. But the high cost and expenses involved in conventional method of hydroponic fodder production system is not economically suitable for small and marginal farmers. Studies revealed that hydroponics fodder can be produced in low cost greenhouses or devices (Naik *et al.*, 2014 and Krishna Murthy et al 2017).

However, only a few reports are available on the feeding of the hydroponic green fodder to lactating cows (Naik *et al.*, 2014) but no reports are available on feeding of hydroponic maize fodder (HMF) to milch buffaloes. Therefore, present experiment was conducted under National Initiative on Climate Resilient Agriculture (NICRA) project during 2016-17 with the following objectives.

- To study the effect of feeding HMF on milk production in milch buffaloes.
- To study the economic impact of feeding HMF to milch buffaloes.
- To assess the efficiency of Krishi Fodder Master for green fodder production in scarce rainfall areas.

MATERIALS AND METHODS

Low cost hydroponic device

Krishi Fodder Master is a portable structure with PVC pipes prepared to hold ten hydroponic trays in five rows vertically with 6.5' (H) × 4' (W) × 2' (B) measurements covered with 90% green shade net. The trays used in the system were U.V. stabilized and have protrudes in the bottom for easy drain for excess water. The size of tray was 2.5feet × 1.5feet. Irrigation facility for each row was provided with one mister connected to 0.5hp motor controlled by a cyclic timer.

Cultivation of Hydroponic maize fodder

Clean seeds of maize (*Zeamays*) were soaked in tap water for 12h and kept for sprouting in air tight condition for 36h. The sprouted maize seed spread in the trays @2.0kg/3.75sft^{-1}. The first trays were on the top row and change every day to the lower rows replacing with new trays as mentioned by Krishna Murthy *et al. (*2017*).* The seedlings were allowed to grow for 5 days and on sixth day, entire fodder along with root mat removed and fed to the dairy animals.

Experimental details

Twenty graded murrah buffaloes of 2nd and 3rd lactation were selected in Meerapuram village of Banaganapalli mandal and equally divided into two groups. First group (T_1) fed with sorghum straw (5kg) and recommended quantity of concentrate feed. The second group (T_2) fed with sorghum straw (5kg) along with 12kg HMF. Data on milk yield, Fat and SNF in the milk, income and expenditure on feeding was recorded for 60 days. The data was statistically analyzed for its significance using ANOVA.

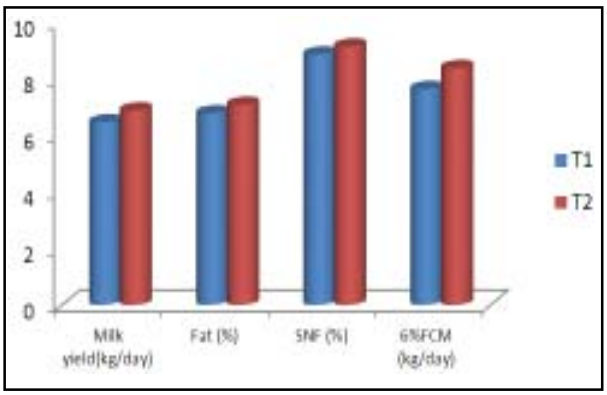

Fig. 1. Comparison T_1 and T^2.

RESULTS AND DISCUSSION

The biomass yield of HMF was recorded as 6.2kg per kg seed. Similarly Naik et al (2014) reported as 5.5kg and Krishna Murthy *et al.* (2017) reported as 4.82kg fresh biomass yield per kg seed. The dry matter content in the fresh HMF was observed as 14.3% whereas Naik *et al* (2014) reported as 18.3%. Similarly Dung *et al.*, (2010) reported DM as 19.7% in hydroponically grown barley fodder.

The CP, CF, EE, Total ash and NFE contents in HMF were 15.8, 12.62, 3.74, 3.27 and 64.57 respectively. Higher CP, CF and Total Ash and less EE and NFE were observed in HMF compared to maize grains. However 13.3%CP, 6.37% CF, 1.75% EE and 75.32%NFE were reported in the earlier studies (Naik *et al.*, 2014). Similarly Reddy *et al.* (1988) observed that the hydroponically grown barley fodder was comparable to leguminous fodders and superior to non leguminous fodders. Sneath and Mclntosh, 2003 have reported in their studies as the sprouted grain are rich source of anti-oxidants and related trace minerals such as selenium and Zn and feeding of the sprouted

TABLE 1
Nutrients details of experiment feeds and fodder

Nutrient	Hydroponic fodder	Maize grain	Sorghum straw
Dry matter	14.3	89.58	89.6
Crude protein	15.8	9.75	3.4
Ether Extract	3.74	2.93	0.84
Crude fiber	12.62	2.95	34.19
NFE	64.57	82.27	52.43
Total Ash	3.27	2.1	9.14

TABLE 2
Average milk yield and milk composition of experimental animals.

Particulars	T_1	T_2
Milk yield(kg/day)	6.46±0.49	6.88±0.47
Fat (%)	6.78±0.19	7.08±0.23
SNF (%)	8.86±0.16	9.14±0.12
6%FCM (kg/day)	7.64±0.56	8.38±0.59

TABLE 3
Economics of milk production per day (Average of 60 days)

Particulars	T_1	T_2
Gross income	Rs. 221.55±15.49	Rs. 250.47±17.31
Expenditure on feeding	Rs. 68.11±4.12	Rs. 52.5±3.01
Net income	Rs. 153.42±11.46	Rs. 197.98±16.36
B : C ratio	1:3.25	1:4.77

grains improve the animals' productivity.

The data on daily milk yield, fat in milk and 6%FCM yield were given in table 2. The data revealed that 6.5% increased milk yield was recorded in T_2 over T_1. Naik *et al.*, (2014) reported as 13.7 per cent increased milk yield on feeding of HMF to cows and Reddy *et al.*, 1988 reported as 7.8 per cent milk yield improvement on supplementation of ration containing hydroponic barley fodder to cows. The higher milk yield was due to high protein content in the ration containing HMF. The fat and SNF contents were 6.78± 0.19, 8.86±0.16 and 7.08±0.23, 9.14±0.12 respectively in T_1 and T_2. The data revealed that 4.42% improvement in milk fat was recorded in T_2 over T_1. The 6%FCM was also high in T_2 (8.38±0.59) compare to T_1 (7.64±0.56). The results were found significant at 5% level (p>0.5).

The gross income, cost of feeding and benefit cost ratio were given in table 3. The average daily gross income was 13.05% more in T_2 (?250.47±17.31) as compared to T_1 (?221.55±15.49). The cost of feeding in T_1 and T_2 were Rs. 68.11±4.12 and Rs. 52.5±3.01 respectively. The data revealed that saving of Rs. 15.61/buffalo/day on concentrate feed by supplementing 12kg HMF and it was reflected in net income and also benefit cost ratio. Increased net profit of Rs. 44.58/buffalo/day was recorded on supplementing HMF. Naik *et al* (2014) reported in their studies as higher net profit of Rs. 12.67/cow per day due to feeding of hydroponic maize fodder.

CONCLUSIONS

The fodder shortage in the scarce rainfall areas can be overcome with Krishi Fodder Master with minimum expenditure. Feeding of hydroponic maize fodder effected on increased milk production, fat and SNF in milk due to its high nutritive value. The cost of concentrate feed can be reduced on supplementation of HMF. Hence it is concluded that hydroponic fodder production with low cost devises are more apply suitable for low rain fall areas to meet the green fodder demand of Small and marginal farmers with higher net returns.

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REFERENCES

Dung, D. D., R. Godwin, and J. V. Nolan, 2010 : Nutrient content and in Sacco digestibility of barley grain and sprouted barley. *J. Anim. Vet. Adv.* **9** : 2486-2492.

Krishna Murthy A., G. Dhanalakshmi and Kalyan Chakravarthy 2017 : Study on Performance of Different Fodder Crops under Low Cost Green House Hydroponic Fodder Production System. International Journal of Environment, Agriculture and Biotechnology (IJEAB) Vol-2, Issue-2, Mar-Apr- 2017: 951-953.

Naik, P. K., R. B. Dhuri, M. Karunakaran and B. K. Swain and N. P. Singh. 2013b. Hydroponics technology for green fodder production. *Indian Dairyman*, March Issue, pp. 54-58.

Naik, P. K., R. B. Dhuri, M. Karunakaran, B. K. Swain, and N. P. Singh. 2014 : Effect of feeding hydroponic maize fodder on digestibility of nutrients and milk production in lactating cows. *Indian J. Anim. Sci.* **84** : 880-883, August 2014.

Reddy, G. V. N., M. R. Reddy and K. K. Reddy. 1988 : Nutrient utilization by milch cattle fed on rations containing artificially grown fodder. *Ind. J. Anim.* Nut. **5** : 19-22.

Sneath, R. and F. Mclntosh. 2003 : Review of Hydroponic Fodder Production for Beef Cattle. Queensland Government, Department of Primary Industries, Dalby, Queensland.