Effect of hydroponic maize fodder as partial substitute with concentrate mixture on nutrient intake of gir calves

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Abstract
An endeavor was made to assess the effect of hydroponic maize fodder as a partial substitute with concentrate mixture on nutrient intake of gir calves. A feeding trial of 120 days was undertaken on 16 Gir calves (6-12 months of age) divided into four groups of four calves using the basal roughage with various levels of hydroponics maize fodder to assess the nutrient utilization efficiency. In the study, a highly significant ($P<0.01$) effect of feeding of hydroponics maize fodder was observed on DMI (in terms of g/d, kg/100 kg b.wt and g/kgW$^{0.75}$). Highest dry matter intake g/d was observed in T$_1$ group where 75% of crude protein of concentrate mixture was replaced by hydroponics maize fodder and lowest was observed in control group. Highest dry matter intake kg/100 kg b.wt and g/kgW$^{0.75}$was observed in T$_1$ group which was comparable with T$_3$. However, a non-significant effect was observed on organic matter intake (in terms of g/d, kg/100 kg b.wt and g/kgW$^{0.75}$). Looking at the results of the present investigation, it could be concluded that hydroponics maize fodder has a beneficial effect on DMI in terms of g/d, kg/100 kg b.wt and g/kgW$^{0.75}$ in gir calves and it can replace upto 75% of crude protein of concentrate mixture.

Keywords: Hydroponic maize fodder, nutrient intake, GIR calves

Introduction
Hydroponics comes from the Latin language where, ‘hydro’ means water and ‘ponos’ means labour by simply putting it together it could be concluded that hydroponics maize fodder has a beneficial effect on milk yield.

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Material and Methods
Experimental Animals, feed and procedure
16 male gir Calves of almost the same age group and uniform conformation procured from the dairy farm of College of Veterinary and Animal Science, Navania, Vallabhnagar were taken in the experiment. Animals were housed in well ventilated, hygienic and protected sheds and acclimatized for 10 days before to experimental feeding. The animals were given prophylactic doses of panacure as anthelmintic. Faecal and blood smears were examined periodically for parasitic infestation. The animals were given a measured quantity of experimental feed and ad lib. water every morning. The experimental Gir calves were distributed by randomized block design on the basis of body weight into four groups of four animals in each subjected to different treatment. The production of hydroponics maize was done in a hydroponics chamber of Ayurvet Progreen machine equipped with automatic irrigation having the potential of producing 240 kg fresh hydroponics maize fodder on daily basis. Clean maize seeds were soaked for overnight in tap water and thereafter distributed in trays. On first day, trays were placed in the top most row of growth chamber and then everyday were shifted to the respective lower rows. Inside the growth chamber the plants are allowed to grow for the duration of 7 days and then on eight day, these are harvested and fed to the animals. Daily allowance of concentrate and roughage were offered to meet their nutrient requirements (ICAR, 1985) [10]. The palatability/dry matter intake of experimental feeds in terms of g/d, kg/100 kg b.wt and g/kg W0.75 were calculated from the figures of dry matter consumption and live weight recorded during experimental period.

The treatment groups were designated as under
T1 – Basal Roughage + Concentrate mixture (Control)
T2 – Basal Roughage + Concentrate mixture + 25% CP of concentrate mixture through Hydroponics maize green fodder
T3 – Basal Roughage + Concentrate mixture + 50% CP of concentrate mixture through Hydroponics maize green fodder
T4 – Basal Roughage + Concentrate mixture + 75% CP of concentrate mixture through Hydroponics maize green fodder

Statistical Procedure
The data obtained in the experiment were analyzed using statistical procedures as suggested by Snedecor and Cochran (1994) [23] and significance of mean differences was tested by Duncan’s New Multiple Range Test (DNMRT) as modified by Kramer (1957) [12].

Results and Discussion
Nutrient intake
Dry matter and organic matter consumption was calculated as g/d, kg/100 kg b.wt and g/kg W0.75 and has been presented in Table 1. The result of statistical analysis of data showed highly significant (P<0.01) effect of treatment on dry matter intake in terms of g/d, kg/100 kg b.wt and g/kg W0.75. Highest dry matter intake g/d was observed in T4 group where 75% of crude protein of concentrate mixture was replaced by hydroponics maize fodder and lowest was observed in control group. Significantly higher dry matter intake kg/100 kg b.wt and g/kgW0.75 was observed in T4 group where 75% of crude protein of concentrate mixture was replaced by hydroponics maize fodder. However, a non-significant effect was observed on organic matter intake (in terms of g/d, kg/100 kg b.wt and g/kgW0.75).

The results of dry matter intake in terms of g/d, kg/100 kg b.wt and g/kg W0.75 corroborates with the findings of Maity et al. (1996) [15] and Misra et al. (1996) [16]. They reported the decrease in dry matter intake of artificially grown barley fodder which was due to change in roughage to concentrate ratio. Fazaeli et al. (2011) [18] reported that the decreased dry matter intake of hydroponics fodder which could possibly be due to high water content that have made bulky leading to limited dry matter intake by the experimental animals. Similarly, Reddy and Reddy (1988) [19] reported dry matter intake of artificially grown barley fodder was significantly lower. However, Rule et al. (1986) [24] reported that the sprouted wheat included at 25 or 50% of the diet showed no difference in feed intake when compared with the unsprouted wheat but when sprouted wheat included at 75% of the diet, dry matter intake of the unsprouted wheat diet was 21% less than that of the sprouted ones. Verma et al. (2015) [24] reported the dry matter intake (% of b.wt) were higher in groups where 50% of crude protein and energy requirements were met through concentrate mixture, T2 and 100% of crude protein and energy requirements were met through hydroponics barley fodder, T3 (3.38 kg and 3.35 kg respectively) in comparison to control T1 (2.93 kg). Whereas, Naik et al. (2014) [18] reported the dry matter intake was similar in both the groups, in which one was fed with hydroponics maize fodder and other with conventional green fodder. Similarly, Reddy et al. (1991) [20] reported no significant difference in dry matter intake when concentrate quota of production requirement was replaced by machine grown barley green fodder at 50 and 25 percent levels. Kide et al. (2015) [11] reported significant improvement in dry matter intake in a group of goats fed with hydroponic maize fodder @ 20%, 40% and Mixed maize + barley hydroponic fodder (20%-20%). Dadich et al. (2019) [6] also reported significant effect (P<0.01) of hydroponics maize fodder on DCP and TDN percent in Rathi calves.

Table 1: Effect of hydroponic maize fodder on nutrient intake of gir calves

| Attribute               | Treatment Groups       | SEM  |
|-------------------------|------------------------|------|
|                        | T1                     | T2   |
| Dry Matter Intake       |                        | T3   | T4   |
| g/d                     | 4469.30a               | 4522.43a | 4537.74a | 4610.58a | 9.3  |
| kg/100 kg b.wt          | 3.33b                  | 3.20b | 3.20b | 3.15b | 0.01 |
| g/kg W0.75              | 113.40b                | 112.78b | 110.49b | 109.69b | 0.3  |
| Organic Matter Intake   |                        |      |
| g/d                     | 3962.95a               | 3945.12a | 4037.15a | 4136.04a | 37.87 |
| kg/100 kg b.wt          | 2.9                    | 2.92  | 2.87  | 2.82  | 0.02 |
| g/kg W0.75              | 100.54                 | 98.4  | 98.29 | 98.39 | 0.89 |

Note: Means with different superscripts in a row differ significantly from each other.
Conclusion
The results from the study confirms that feeding of hydroponics maize fodder has beneficial effect on DMI in terms of g/d, kg/100 kg b.wt and g/kg W^0.75 and could replace concentrate mixture up to 75% on protein basis in gir calves.

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