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## Effect of feeding of hydroponics maize fodder on balances of nitrogen, calcium and phosphorus in Rathi calves

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### Abstract

In order to study the effect of feeding hydroponics maize fodder on balances of nitrogen, calcium and phosphorus, twenty Rathi calves were equally distributed in five groups of age (6 - 12 month) and average body weight (96 kg). The feeding trial was conducted for 30 days followed by 7 days of metabolism trial in College of Veterinary and Animal Sciences, Bikaner (RAJUVAS). In group T<sub>1</sub> (control), T<sub>2</sub>, T<sub>3</sub> & T<sub>4</sub>; 100%, 75%, 50%, 25% of CP requirement was met through concentrate mixture (20%); 1.5 kg, 1.125 kg, 0.75 kg, 0.375 kg respectively, rest through hydroponic maize fodder 2.63 kg, 5.27 kg, 7.9 kg, 10.54 kg in T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> & T<sub>5</sub>, respectively. In addition, all the animals were offered *ad lib.* wheat straw along with 2.5 kg groundnut straw. Non significant effect of hydroponics maize fodder on nitrogen intake, balance of nitrogen as % of intake and % of absorbed was observed. Regarding balance of nitrogen as g/d significant ( $p < 0.05$ ) improvement was recorded on account of feeding hydroponics maize fodder. Similarly, all the animals subjected to experiment were in positive calcium and phosphorus balance and non significant effect in terms of intake, balance and % of intake and % of absorbed was observed.

**Keywords:** Hydroponics maize fodder, Rathi calves, nitrogen balance, calcium balance, phosphorus balance

### Introduction

India primary possess an agro based economy, where agriculture and livestock are interrelated with each other. India has untapped potential in this sector. Grazing based production system is severely affected by change in urban scenario leading to insufficiency in green fodder requirement of animal. Furthermore, various climatic and edaphic factors also possess obstacle in green fodder production. In order to overcome all the shortcomings, hydroponic technology is coming up as an ideal alternate for meeting the green fodder requirement of livestock (Sneath and McIntosh 2003; Naik *et al.* 2011; Naik *et al.* 2012) <sup>[10, 7, 8]</sup>. Hydroponic fodder is superior in proteins, fibres, vitamins and minerals (Bhise *et al.*, 1988; Chung *et al.*, 1989) <sup>[1, 3]</sup> with therapeutic effects on animals (Kanauchi *et al.*, 1998; Boue *et al.*, 2003) <sup>[5, 2]</sup>.

### Materials and Methods

Hydroponic maize fodder production was done in a hydroponics chamber of Ayurvet Progreen machine (480 kg/day production) equipped with automatic irrigation. Overnight soaking of maize seeds was done prior to transfer in growth chamber. On first day, trays were placed in the top most row of growth chamber and then everyday were shifted to the respective lower rows for a period of 7 days. On eight day, these are harvested and fed to the animals.

Twenty Rathi calves of similar age (6 - 12 month) and average body weight (96 kg) were distributed by randomized block design in five groups in dairy farm of College of Veterinary and Animal Science, Bikaner. Deworming of animals was done with panacure as anthelmintic. Periodical Examination of faecal and blood smear was performed for parasitic infestation. The animals were given measured quantity of experimental feed and *ad lib.* water every morning. Animals were housed in well ventilated, hygienic and protected sheds and were allotted to acclimatize for a period of 10 days prior to experimental feeding.

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The feeding trial was conducted for 30 days. In group T<sub>1</sub> (control), T<sub>2</sub>, T<sub>3</sub> & T<sub>4</sub>; 100%, 75%, 50%, 25% of CP requirement was met through concentrate mixture (20%); 1.5 kg, 1.125 kg, 0.75 kg, 0.375 kg respectively, rest through hydroponic maize fodder 2.63 kg, 5.27 kg, 7.9 kg, 10.54 kg in T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub> & T<sub>5</sub>, respectively. In addition, all the animals were offered *ad lib.* wheat straw along with 2.5 kg groundnut straw. At the end of 30 days experimental feeding, a metabolism trial of 7 days was conducted for estimation of the balances of nitrogen, calcium and phosphorus.

#### Collection of feed, faecal and urine samples

Feed stuff offered and their residues left, samples were collected of each animal for chemical analysis. Separate faecal bags and urine bags were used for sample collection purpose. Daily at 8:00 A.M., both urine and faecal samples were collected. Weight of faeces was measured by counter balance and measuring cylinder was used for urine. During the period of collection, faeces and urine samples of each animal were taken after thorough mixing. For the purpose of N determination 1/500 sample of faeces was taken and preserved in 10 ml of 40% H<sub>2</sub>SO<sub>4</sub> in Kjeldahl flask. Similarly, the 1/500 sample of total urine of individual animal was taken separately in marked Kjeldahl flask containing concentrate H<sub>2</sub>SO<sub>4</sub> daily and pooled for 7 days. Whereas, for balances of minerals about 1/20 part of total urine of individual animal was taken in labelled glass bottle containing toluene and pooled for 7 days.

The total nitrogen content of feed, faeces and urine were

determined following standard Kjeldahl's method using KelPlusSemi Automatic Nitrogen Analyzer (Pelican Equipments). The method of Talpatra *et al.* (1940) [12] was followed for the determination of calcium and phosphorus. The data obtained in the experiment were analyzed using statistical procedures as suggested by Snedecor and Cochran (1994) [11]. Significance of mean differences was tested by Duncan's New Multiple Range Test (DNMRT) as modified by Kramer (1957) [6].

#### Results and Discussion

All the animals were found to be in positive nitrogen, calcium and phosphorus balance. All the parameters of nitrogen balance *viz.* intake (g/d), balance in terms of % of intake and % of absorbed showed non significant effect of feeding of hydroponics maize fodder in different treatment groups (Table-I). Similarly, calcium and phosphorus parameters *viz.*, intake (g/d), balance in terms of g/d, % of intake and % of absorbed showed non significant effect of feeding of hydroponics maize fodder in different treatment groups (Table-II). Balance of nitrogen g/d showed significant effect of feeding of hydroponics maize fodder in different treatment groups. The probable reason for significantly higher values of nitrogen balance (g/d) in hydroponics maize fodder groups is the improvement of digestibility of crude protein observed in respective groups (Dadhich *et al.* 2019) [4]. Similarly, Reddy and Reddy (1988) [9] also observed higher nitrogen balance in group of lambs fed with artificially grown barley fodder.

**Table 1:** Effect of hydroponics maize fodder on balance of nitrogen in Rathi calves

Treatment groups						
Parameters	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	SEM
Intake (g/d)	88.78	91.2	93.15	102.25	99.26	37.996
Excretion through						
Faeces (g/d)	38.3	38.48	37.44	41.02	38.99	
Urine (g/d)	29.95	30.48	31.7	33.35	34.07	
Total (g/d)	68.26	69.32	69.14	74.37	73.06	
Balance (g/d)	20.53 <sup>a</sup>	21.88 <sup>ab</sup>	24.018 <sup>ab</sup>	27.88 <sup>c</sup>	26.2 <sup>bc</sup>	5.49
as % of intake	22.79	23.98	25.87	27.46	25.48	8.721
as % of absorbed	40.04	41.4	42.89	44.55	42.93	13.25

**Table 2:** Effect of hydroponics maize fodder on balance of minerals in Rathi calves

Treatment groups						
Parameters	T <sub>1</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>4</sub>	T <sub>5</sub>	SEM
Calcium balance						
Ca Intake (g/d)	46.78	47.98	49.04	53.79	51.85	11.4221
Excretion through						
Faeces (g/d)	22.73	21.71	20.97	22.38	21.42	
Urine (g/d)	3.85	3.92	4.27	4.23	4.2	
Total (g/d)	26.58	26.63	25.24	26.61	25.62	
Balance (g/d)	20.2	22.36	23.81	23.91	26.23	12.4119
as % of intake	43.04	45.9	48.09	48.84	48.93	15.8982
as % of absorbed	83.8	84.4	84.16	84.98	84.64	6.5268
Phosphorus balance						
P Intake (g/d)	18.6	19.09	19.51	21.41	20.39	1.453
Excretion through						
Faeces (g/d)	7.35	7.84	6.9	7.3	7.19	
Urine (g/d)	2.74	2.46	2.58	2.69	2.44	
Total (g/d)	10.08	10.29	9.48	9.99	9.62	
Balance (g/d)	8.52	8.8	10.04	11.42	10.76	1.667
as % of intake	45.54	45.47	51.09	52.01	51.97	12.638
as % of absorbed	75.32	77.48	79.17	79.7	79.29	11039.02

## Conclusion

Replacing the 75% concentrate requirements with hydroponics fodder resulted in significant improvement of Nitrogen balance (g/d) and all the individuals were in positive nitrogen, calcium and phosphorus balance with no significant effect on intake (g/d), balance as % of intake and % of absorbed.

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