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Comparative Study on Chemical Composition of different Feeding Ingredients with Hydroponically Grown and Conventionally Grown Green Maize Fodder

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ABSTRACT: In the present research study was undertaken at Livestock Instructional Farm, Dr. P.D.K.V., Akola during the year 2018 for a period of 90 days. Five feeding treatment were studied on calves, In hydroponic fodder production system, it can be possible to grow 6 to 8 kg of green fodder from 1kg seeds and in conventional fodder production we require minimum 60 days. The chemical composition i.e. dry matter, crude protein, ether extract, crude fibre, nitrogen free extract, total ash of all feeding material used in treatment (Tur straw, green fodder *i.e.* berseem, hydroponic maize, conventional maize, concentrate) were analyzed. The results obtained reveled that crude protein, crude fiber, ether extract were constantly increased in hydroponically grown fodder *i.e.* 14.10, 4.07, 75.12, 7.17 and 1.80 per cent, CP, EE, NFE, CF and Total ash respectively.

Keywords: Hydroponic Green Maize, Conventional Green Maize, Yield, Chemical Composition.

INTRODUCTION

Fodder produced by growing plants in water or nutrient solution but without using any soil is known as hydroponic fodder or sprouted grains or sprouted fodder. Hydroponic plants are produced in greenhouses under controlled environment within a short period. The hydroponic green fodder production helps to solve this problem by producing food during drought and scarcity periods with acceptable fodder yields and great value. The science shows that, there is great nutritional benefit provided by hydroponic sprouted grain and it is suitable for all livestock including sheep, cattle, goat provides animals with improved growth and overall health. The hydroponic green fodder is produced from forage grains that are germinated and grown for short period of time inside special growing chambers, provided with the appropriate growing conditions (Sneath and McIntosh 2003). Hydroponic fodder is highly nutritious, disease-free animal food in a hygienic environment free of chemicals like insecticides, herbicides, fungicides and artificial growth promoters (Ak karaki and Al-Hashmi 2008). This process takes place in a very versatile and intensive hydroponic growing unit where only supplying cereal grain with necessary water, nutrients and sunlight to produce a grass and root combination that is very lush and high in nutrients. This green fodder is extremely high in protein and metabolizable energy, which is highly digestible by most animals (Ready *et al.,* 2013). Hydroponics green fodder requires just 2-3 liters of water to produce one kg of lush green fodder, as compared to water required near about 60-80 liters for conventional system of fodder production. Hydroponics is a year-round growing system that produces a consistent quantity and quality of plant material or fodder, regardless of outside weather

MATERIAL AND METHOD

Selection of Animals

Twenty crossbreed calves were selected. The calves were divided into five groups. Thus, each group was consisted of four calves for the study.

Table 1: Details of allotment of treatments in feeding trials.

Treatment	Details
T_1	Dry roughages (ad lib) + Green roughages + Concentrate.
T_2	Dry roughages (ad lib) + Green roughages (30% green maize of field condition + 70% Green fodder) + Concentrate.
T_3	Dry roughages (ad lib) + Green roughages (30% Hydroponic green maize of controlled condition + 70% Green fodder) + Concentrate.
T_4	Dry roughages (ad lib) + Green roughages (40% green maize of field condition + 60% Green fodder) + Concentrate.
T_5	Dry roughages (ad lib) + Green roughages (40% Hydroponic green maize of controlled condition + 60% Green fodder) + Concentrate.

Cultivation of hydroponic maize fodder. Green maize was cultivated by hydroponic method. A hydroponic unit setup at livestock instructional farm using 75 per cent green shed net cover for maintain optimum temperature in the shed and ventilation with diameter of 15.0 × 22.0 ft. with 0.4 per cent slope for effective drainage of excess water. The internal structure was prepared by using galvanized stands with two shelves with capacity of 120 plastic trays, sized of 1.5 × 1 ft. equipped with semi-automated sprayer irrigation. The trays with hole at the base were to allow drainage of excess water. Water was free from any additives. The temperature and humidity inside the green shed net was controlled and maintain a range of 22-27°C temperature with 70 per cent relative humidity. Daily requirement of hydroponic maize fodder for experimental animals was obtained by rotational soaking and sprouting of maize seed. Average 6 kg hydroponic maize fodder was produced from 1 kg maize seeds on 8th day.

Proximate analysis of feeds and fodder. The samples of the dry roughages (Tur straw), hydroponic green maize, green fodder (green maize), berseem and concentrate mixture were analysed for the proximate principles viz., Dry matter, Crude protein, Crude fibre, Ether extract, Nitrogen free extract and Total ash was determined by adopting the process as prescribed by A.O.A.C., (1995).

RESULT AND DISCUSSION

Chemical composition. Chemical composition of feed stuff used in experiment period for feeding the crossbred calves is tabulated in Table 2.

Table 2: Chemical composition of experimental feeds fed to crossbred calves (% DM basis).

Particulars	Hydroponic Green Maize	Conventional Green Maize	Tur straw	Berseem	Concentrate
DM	11.10	25.75	94.13	24.50	89.2
CP	14.10	9.83	7.30	14.50	19.65
EE	4.07	1.79	1.15	1.20	6.55
NFE	75.12	49.92	42.50	51.90	60.12
CF	7.17	33.13	40.75	19.70	6.10
Total Ash	1.80	8.12	8.25	12.70	7.58

From Table 2, it was observed that, the per cent DM, CP, CF, EE, NFE and Ash from concentrate mixture were 89.2, 19.65, 6.10, 6.55 60.12 and 7.58 per cent respectively. The per cent DM, CP, CF, EE, NFE and Ash content in tur straw were 94.13, 7.30, 1.15, 42.50, 40.75 and 8.25 per cent respectively. The per cent DM, CP, CF, EE, NFE and Ash content in green maize were 25.75, 9.83, 33.13, 1.79, 49.92 and 8.12 per cent respectively. The per cent DM, CP, CF, EE, NFE and Ash content in berseem were 24.50, 14.50, 1.20, 51.90, 19.70 and 12.70 respectively.

Naik *et al.* (2014) reported that increase ($P<0.05$) in the digestibility of CP and CF of the cows due to feeding of hydroponics maize fodder; however, the increase ($P<0.05$) in the digestibility of DM, OM, EE and NFE was non-significant (Table 2). Reddy Reddy *et al.* (1988) also observed significant increase in the digestibility (%) of DM, CP, CF, EE and NFE and concluded that the increase in the digestibility of the nutrients may be due to the tenderness of the fodder to its lower age. In the present investigation, the dry matter content in hydroponic maize fodder was found as 11.10 per cent. This value was in agreement with the result reported by Naik *et al.* (2014) in hydroponic maize fodder as 18.30 per cent and lower than values reported by Thadchanamoorthy *et al.* (2012) in hydroponic maize fodder as 26.07 per cent (reported moisture content as 73.93 per cent). The present value of crude protein was 14.10 per cent lower than findings reported by Thadchanamoorthy *et al.* (2012) in hydroponic maize fodder as 16.54 per cent and higher than the values reported by Naik *et al.* (2013) as 13.30-13.6 per cent, Singh (2011) as 13.57 per cent and Naik

et al. (2014) as 13.30 per cent in hydroponic maize fodder.

The ether extract content observed in the present study was 4.07 per cent. The value reported by Thadchanamoorthy *et al.* (2012) in hydroponic maize fodder as 6.42 per cent was higher than the present value. The values reported by Naik *et al.* (2013) of 3.27-3.50 per cent, Singh (2011) as 3.49 per cent and Naik *et al.* (2014) as 3.27 per cent in hydroponic maize fodder were lower than the present findings. The comparable crude fiber content was reported by Naik *et al.* (2013) in hydroponic maize fodder as a range of 6.37-14.10 per cent. The higher value of crude fibre was reported by Singh (2011) as 14.07 per cent and lower values also reported by Thadchanamoorthy *et al.* (2012) as 8.21 per cent and Naik *et al.* (2014) as 6.37 per cent.

In the present investigation, the nitrogen free extract content of hydroponic maize fodder was found as 75.12 per cent. The comparable value of NFE was reported by Naik *et al.* (2013) in hydroponic maize fodder as range of 66.70-75.32 per cent. The higher value to the presently investigated result was reported by Naik *et al.* (2014) in hydroponic maize fodder as 75.32 per cent and lower values reported by Singh (2011) in hydroponic maize fodder as 66.72 per cent.

The value of total ash in hydroponic maize fodder was found to be 2.3 per cent agreement results were reported by Naik *et al.* (2013) in hydroponic maize fodder as a range of 1.75-3.80 per cent. The value reported by Singh (2011) in hydroponic maize fodder as 8.34 per cent was higher than the present findings where as values of Naik *et al.* (2014) in hydroponic maize fodder as 1.75 per cent were lower than the present findings. The value of CP, EE, CF, NFE and TA in green maize fodder were found to be 9.83, 1.79, 33.13, 49.92 and 8.12 per cent respectively. Agreement result were reported by Naik *et al.* (2012) in green maize fodder as a range of 10.67, 2.27, 25.92, 51.78 and 9.36 per cent

Kalyani *et al.* (2012) She reported the chemical composition on green maize is DM (25.75%), CP (9.76%), EE (1.17), CF (32.73%), TA (7.81%) and NFE (48.53%). Mandal and Banerjee (2009) shows chemical composition of berseem was 14.5, 19.7, 1.2, 51.9 and 12.7% CP, CF, EE, NFE and total ash respectively. Bhanderi *et al.* (2014) observed effect of feeding calf starter on daily weight gain, immune status and parasitic load in crossbred HF calves. He reported the chemical composition of green maize is CP (4.90), EE (1.75), TA (6.65) and OM (93.35) per cent respectively.

The present values of EE content of tur straw are in similar with those reported by Raut *et al* (2002); Rekahte *et al*. (2004); Rekhate *et al.* (2008); Reddy *et al*. (2012). The EE values of tur straw ranged from 1.17 to 1.41 per cent. The present value of EE in in tur straw was 1.15 per cent which appears to be slightly lower side. The NFE values of tur straw ranged from 37.86 to 42.53 per cent, the present value is 42.50 and appears between the same values.

CONCLUSION

The hydroponic green maize, green maize, tur straw, berseem and concentrate mixture were containing on an average 11.10, 25.75, 94.13, 24.50 and 89.2 per cent DM respectively. While the CP content were 14.10, 9.83, 7.30, 14.50 and 19.65 per cent respectively. The chemical composition indicated that hydroponic green maize contained more NFE than that of other feed stuff. Similarly, the ash content of hydroponic maize fodder was on lower side.

FUTURE SCOPE

Data obtained in present investigation is useful to the Researchers as well as Dairy Managers to calculate, plan and provide balance feed to the livestock as per feeding standards when they use same feed and fodder.

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Conflict of Interest. Nil.

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