

Effect of Hydroponic Maize fodder as a Substitute for Green Grass during Summer on Milk Yield in Indigenous Breed and Cross Breed Cows of Ganjam District

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Abstract

Milk yield in the dairy cattle depend on quality management of feed and fodder. To get better milk production, proper utilizations of nutrients is highly essential for the dairy animals. Usually farmers feed their animals with natural resources like roughage, rice bran, wheat bran etc. without considering balance quantity of feed. During summer season the availability of Green Grass is very less which is essential for the milking animals. The study is carried out to find out the effect of Hydroponic Maize Fodder (HMF) as a substitute of Green fodder during summer season. 20 lactating cows were selected for this Study (10 cows from Indigenous breed and 10 cows from Cross Breed). Both Breeds of cows again divided into two groups, five cows in each group from. The treated cows of each group were fed concentrate feed along with 10 kg Hydroponic Maize Green Fodder where as the control group cows fed with concentrated feed without HMF. The feeding trail was tested for 3 months. After the trial period milk yield were recorded for 7 consecutive days & found that the milk yield was significantly higher in the animal fed with HMF in both treated groups as compare to control groups. The use of HMF during summer season can enhance and maintain dairy farming productivity and improve farmer's income. Hydroponic Maize Fodder can be a substitute for green grass during summer season on milk yield in indigenous breed and cross breed cows of Ganjam district.

Keywords: HMF, Cows, Milk.

Introduction

The method of Hydroponic Fodder production was introduced during 1800s (Kerr et al., 2014). Sprouted grains were fed as a feed by the dairy farmers of Europe to their cows during the winter to improve the fertility and maintain the milk production. To fulfil the green fodder demand, the most important alternatives is hydroponic fodder as an extra supplement to the meagre pasture. The hydroponics word is discovered from a couple of Greek words: 'hydro' which means water and the word 'ponos' which means labour. Hydroponic fodder can be produced in low cost both in sophisticated, large automated commercial systems where the ambient environment is suitable for fodder production. In these days, hydroponics can also be developed in the harsh climates like poor soil area, urban area and also in the desert where

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the traditional cost for agriculture is very high. Developing of hydroponic is a pleasure, soil free, free from fertilizer, chemical, pesticides, herbicides. Developing of grains will result to increase the amount of quality and quantity of protein, minerals, vitamin and sugars. The most important benefit of nutrition delivered by the sprouted hydroponic fodder is to enhance the performance and general health of dairy cattle with minimizing the cost of the feed. Therefore, the study is intended at "Economic value and Nutritional improvement

of hydroponically sprouted maize fodder". (Life Sciences International Research Journal, 2015)

Advantages of Hydroponic fodder

The hydroponic system reduces the wastage of water as it is directly applied to the roots of the plant and is frequently used for number of times (FAO, 2015). Hydroponics is a growing plants method in the base of water solution, free from soil and produce quick and nutrients rich fodder from Maize, Ragi, Bajra, barley, oats, Cowpea and Horse gram, etc. (Bakshi et al., 2017). The hydroponic system need very less time and space than conventional systems. The root of hydroponic fodder's plant are usually very smaller as compare to the traditional fodder as a result more numbers of plants grows in lesser space. Approximately 600 to 1000 kg green maize fodder in a day can be produced within 7-8 days of growth cycle in 45-50 m² area compared to the traditional farming (Naik and Singh, 2013; Rachel Jemimah et al., 2015). Hydroponic fodder contains rich source of vitamin C, vitamin A, vitamin E, riboflavin, biotin, niacin, thiamine, free folic acid, anti-oxidants such as B-carotene (Cuddeford, 1989; Finney, 1982; Naik et al., 2015) and minerals (Chung et al., 1989; Bhise et al., 1988; Fazaeli et al., 2012).

Objective of the study

To know the effect of hydroponic maize fodder as a substitute for green grass during summer on milk yield in indigenous breed and cross breed cows of Ganjam district.

Materials and Methods

The study has conducted to find out the effect of Hydroponic maize fodder as a substitute of Green fodder during summer season. 20 lactating cows were selected for this Study (10 cows from Indigenous breed and 10 cows from Cross Breed). Both Breeds of cows again divided into two groups, 5 cows in each group from (Indigenous Breed & Cross Breed). The treated cows from each group were fed concentrate feed along with the supplementation of 10 kg Hydroponic Maize Green Fodder where as the control group of cows were fed with concentrated feed without hydroponic maize fodder. The feeding trail is tested for 3 months (March, April, and May). During the trial period milk yield were recorded & found that the milk yield was significantly higher in the animal fed with Hydroponic Maize Fodder both in Indigenous breed & crossbreed cows group as compare to the

control group cows. After feeding for a time of three months the samples of the milk were collected for 7 consecutive days. The milk samples from all groups were collected & measured by measuring cylinder and recorded daily. The data has been statistically analyzed by student's t-test (Microsoft excel 2007).

Results and Discussion

The contents of nutrients in the concentrate mixture are according to the BIS specifications of compounded Dairy animal feed (Table 1). Hydroponic Fodder looks just similar to mat of 20-30cm tallness containing seeds of sprouted implanted inside the white roots with green sprouts (Naik et al., 2011a, Naik et al., 2013b). The DM content (on fresh basis) of the hydroponics maize fodder was slightly lower than the concentrate mixture. According to Naik and Singh (2013) harvests of 5 to 6 folds on the basis of fresh (1 kg seed produces 5-6 kg HMF) and content of DM is 11 to 14 percent are familiar for HMF; even though, occasionally the content of DM is up to 18.3 percent is observed in this study. The hydroponics maize fodder had high in EE, CP, NFE and lower CF, TA and AIA %. Earlier, Naik et al., (2012(b)) has confirmed higher EE, NFE and CP and CF is lower, TA and AIA % in the maize hydroponics fodder as compare to conservative maize fodder.

According Naik et al., 2015, Hydroponics fodder needs very little amount of water to grow. These plants grow without soil and only the tap water can be used. The plants grow within very short duration (approx. 7 days). In our country, grain maize must be preferred for hydroponics fodder production. Hydroponics maize fodder feeding can enhance the nutrients digestibility of the ration and that will leads to increase the production of milk (8-13 per cent). In some circumstances, where the conservative green fodder can't be able to grown-up effectively, hydroponics maize fodder can be harvest by the dairy farmers to feed their livestock with low cost strategies during the scarcity of green grass. "The hydroponics fodder's nutrient contents are higher with few particular non-leguminous fodders but similar to leguminous fodders." As developed grains (hydroponics maize fodder) are very rich in enzyme and it is commonly in the nature of alkaline, so that hydroponics fodder's feeding improves the productivity of the livestock by increasing a strong immune system due to nullification conditions of the acid. On the other hand, it helps to the anti-nutritional elimination factors like grains phytic acid. Hydroponics maize

fodders are very good foundation of chlorophyll and also it contains a factor of grass juice, which increases the performance of the dairy animal.” (Naik et al., 2015).

Indigenous Breed Cows

In the case of Indigenous breed cows, the animals (Treated Group) feed with Hydroponic Maize fodder and concentrated feed shows little higher milk yield as compare to the animals (Control group) fed with concentrate feed and paddy straw without Hydroponic maize fodder. Which is significantly high ($P < 0.01$) result on avg. milk production per day. Addition of Hydroponic Maize fodder along with concentrate improved the milk

yield and Health status of indigenous breed cows. (Fig. 1 & Table 2)

Cross Breed Cows

The animals (Treated Group) feed with Hydroponic Maize fodder with concentrated feed shows higher milk yield as compare to the animals (Control group) fed only concentrate feed without Hydroponic maize fodder. Which was also found highly significant ($P < 0.5$) result on avg. milk production per day. The animal fed with Hydroponic Maize fodder not only enhanced the milk production but also developed their health, body growth and positive effects on mortality, conception rate and abortion. (Fig. 2 & Table 2)

Table 1: Composition of Chemical (on % DM basis) of fodder and feeds

Parameters	Concentrate mixture	Hydroponics maize fodder
Dry matter (on fresh basis)	92.4	18.3
Crude protein	21.68	13.3
Ether extract	4.83	3.27
Crude fibber	8.39	6.37
Nitrogen free extract	58.27	75.32
Total ash	6.83	1.75
Acid insoluble ash	1.16	0.57

Table 2: Effect of Hydroponic Maize Fodder with nutritional supplement on milk yield of Indigenous Breed and Cross Breed dairy cows. Value of milk yield is kg/day (Mean \pm SEM), Numbers in parentheses indicate number of animals used, significant at different Level.

Effect of Hydroponic Fodder	Indigenous breed cows	Cross breed cows
Control	4.5 \pm 0.19 (5)	10.3 \pm 0.31 (5)
Treated	6.0 \pm 0.09 (5)	13.4 \pm 0.35 (5)
P	$P < 0.01$	$P < 0.5$

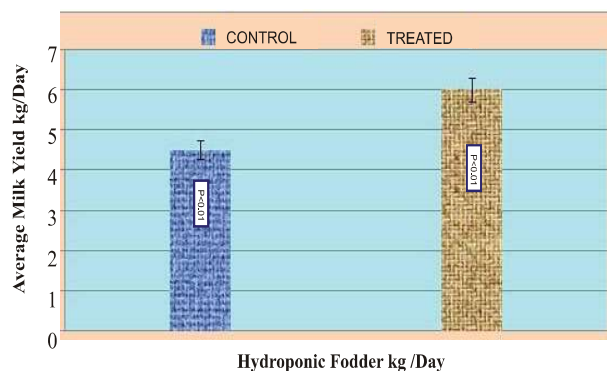


Fig. 1: Effect of Hydroponic Maize Fodder with nutritional supplement on milk yield of Indigenous Breed Dairy Cows. Value of milk is kg/day. Columns represent the mean values and vertical Bars SEM

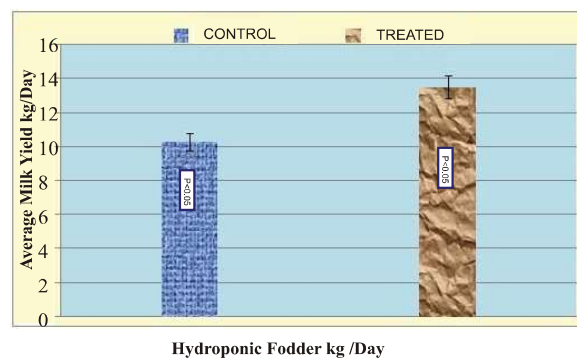


Fig. 2: Effect of Hydroponic Maize Fodder with nutritional supplement milk yield of Cross Breed Dairy Cows. Value of milk is kg/day. Columns represent the mean values and vertical Bars SEM



Pic 1 . Process of hydroponic maize fodder



Pic 2 hydroponic maize fodder



Pic 3 hydroponic maize fodder



Pic 4. Feeding of Hydroponic maize fodder

Conclusion

In the developed countries where there is scarcity of quality fodder and feed, the hydroponic fodder production is less competitive than traditional production of fodder when compared on per kg dry matter basis. (Bakshi et al., 2017). Paddy straw was used as a main source of roughage and chemical composition was similar to other roughages like jowar straw and wheat straw. Hydroponic fodder is highly relished, palatable and digestible by the animals. If the milk yield of a dairy cows is about 5 k/g per day, than 1 k/g mixture of concentrate can be substituted by 10 k/g per day green fodder maize without disturbing the daily milk production providing that the majority

of the livestock should be satisfied by ad lib roughage such as jowar straw. (Naik et al., 2012). The procedure of hydroponically developing green fodder allowed regulating the conditions of the climate for optimal growth with definite output per day. It has proved that Green fodder production through Hydroponics technology could be a real alternative source to overcome the fodder deficiency.

Maize is the best source of fodder producing under hydroponics, the system of hydroponics can be prepared using low cost material, no soil media and no nutrients are added for hydroponics production. But, in rural areas, where the timer facility is not used, it was difficult to get the uniform growth of fodder (Kammar et al., 2019).

It is accomplished that the effect of hydroponic fodder can be a substitute for green grass during summer on indigenous breed and cross breed cows of Ganjam district.

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