



“Hydroponics” A Better Option for Green Fodder Production

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INTRODUCTION

Hydroponics is a technique in which crops are grown using only water and nutrients without planting in the field. Today hydroponics farming is playing an important role in the agricultural production of the world. Growing cattle population, shortage of cultivable land, climate change, water scarcity and deteriorating water quality are all constraining farmers to turn to alternative methods of horticulture. Hydroponics enables cattle feed to have fresh food instead of food stored over long periods. This system ensures better plant growth, as well as uses up to 95 percent less water than soil-based gardening. Through this, plants of high quality and yield can be grown in large numbers. Therefore, through this technique, maximum profit can be obtained by growing any crop in a controlled environment in any season.

Hydroponics technology for fodder production

The word hydroponics has been derived from the Greek word, “Hydros” meaning ‘water’ and “Ponic” meaning ‘working’. Hydroponics is a technique in which growing of plants/crops in water without any soil, generally in controlled conditions/environment. Water and plant nutrients are essential for plant growth which is incorporated. However, with the use of only fresh water green fodder can be produced. For cultivation of green fodder through hydroponic seed, water sunlight and added nutrients are the only inputs that are required as the green fodder is fed to the animals after about 6-8 days of plant growth. Maize, Oats, Barley, Wheat, Cowpeas, etc., are the important cultivars using hydroponics to produce high quality nutritious green fodder for dairy animals. Sorghum when fed, less than 45 days of growth causes prussic acid (HCN) toxicity so it is not preferred in hydroponic fodder production.



Through Hydroponics techniques Oat, Maize, Wheat, Barley, Cow pea, etc. can be grown. However geographical and agro-climatic conditions and easy availability of seeds are the choice for hydroponics technology. In India, easy availability of seed, lower seed cost, good biomass production and quick growing habit; maize is the choice of grain for hydroponics fodder production. The grain should be clean, sound, undamaged or not insect infested, untreated, Viable and good quality. For the production of hydroponics fodder, seeds are soaked in normal water for 4-24 hours, depending upon the type of seeds followed by draining and placing it in the individual greenhouse trays for growing inside the greenhouse. For maize, 4 hours soaking in normal water is sufficient. The seed rate (quantity of seeds loaded per unit surface area) also affects the yield of the hydroponics fodder, which varies with the type of seeds. Hydroponics maize fodder can be well produced with seed rate of 6.4-7.6 kg/m². If seed density is high, there is more chance of microbial contamination in the root mat, which affects the growth of the fodder. The starting of germination and visibility of roots varies with the type of seeds. In case of maize and cowpea seeds, germination start on about 2nd and 1st day and the roots were clearly visible from 3rd and 2nd day onwards, respectively. Maintenance of clean and hygiene is very

much important in the production of hydroponics fodder as greenhouse is highly susceptible to microbial contamination, particularly of mould growth due to high humidity. Inside the greenhouse, generally the grains are allowed to sprout for seven days and on day eight; these are fed to the dairy animals.

Livestock status in India

India is an agriculture-based country and having highest livestock population in the world. Total livestock population is 535.82 million in the country showing an increase of 4.64 % over (20th Livestock census 2019). There was decreasing 6 % in the total Indigenous cattle population. Productive performance of Indigenous cattle (2.93 kg/day) is very less compared to Exotic / crossbred cow (7.71 kg /day). The demand for milk and milk products in India is creating new potential in the profitability of dairy farming as an occupation. At the same time, there is a substantial decline in fodder availability. In addition, the area under food crops is also declining owing to urbanization and industrialization. The shortage of fodder due to ever decreasing area under cereals and fodder crops is getting compensated with increased use of commercial cattle feed, resulting in increased costs of milk production. Several attempts have been made to find alternate sources of cattle feed. Hydroponics is

considered as the most economic and efficient feed substitute and a sustainable feed for livestock. Green fodder is an important feed component of the dairy animals ration;

otherwise the productive and reproductive performance of the dairy animals is adversely affected.



Hydroponics is a method of growing plants without soil. Only moisture and nutrients are provided to the growing plants. Hydroponic growing systems produce a greater yield of fodder over a shorter period of time in a less area than others traditionally grown fodder crops. Although the methods of hydroponic fodder production date back to the 1930's, there is renewed interest in hydroponic fodder as a feed-stuff for Cattle, sheep, goats, and other livestock. Hydroponically grown fodder is an extremely economical feed supplement for cattle. With hay, grain, corn and soybean prices reaching record highs, dairymen need a better feed option. This leads to total control over meat or milk production and operational costs. There is also reduction of pesticides and herbicides because the plants are growing fully protected environment.

Advantage of hydroponic techniques of green fodder production

1. **Nutritional Advantages:** The green fodder from hydroponics is highly palatable, easily digestive and of better quality as compared to traditional fodder production. In comparison to conventional green fodders, Hydroponics Green Fodder (HGF) contains more crude protein (13.6% v/s 10.7%) and less crude fibre (14.1% v/s 25.9 %) as compared to traditional fodder production.
2. **More Palatability:** The fodder is more succulent, palatable, nutritious and intake

HGF by livestock is more as compared to CGF and this results in more milk and meat production.

3. **Water savings:** Hydroponic techniques require 2-3 litres of water to produce one kilogram of green fodder as compared to 55 to 75 litres of water required for the traditional Cultivation practices. No wastage of water as the available water is also recycled and utilized.
4. **Wider temperature range:** Temperature range of 15-35o C and 70-80% relative humidity (RH) without any fungal growth and technology is economic and environmental friendly.
5. **Minimal Land requirement:** only 10 m X 5 m is required to grow 600-650 kg of fodder per day whereas to produce the same quantity, one hectare of land would be required under traditional cultivation system. 20-25 adult cattle can be reared by this quantity of fodder for one year.
6. **Easily Measurable:** The hydroponics production can easily be measured to cater to the needs of farmers owning just two head of cattle.
7. **Less labor required:** Under the HGF system, just one labourer can complete the entire process in 2-3 hours per day whereas for same fodder production through tradition system requires more labour to undertake land preparation, sowing, irrigation, cutting, transporting

fodder from field to cattle shed, cutting the chaff and finally feeding the cattle.

- 8. More fodder in less time:** Just 7-8 days is required for HGF when they are about 20 to 30 centimeter in height.
- 9. Biomass conversion is more:** The biomass conversion ratio is as high as 6-7 times that of the CGF grown for 65 to 80 days.
- 10. 365 Day in a year fodder production:** 365 days in year we can produce green fodder under semi-protected conditions.
- 11. Minimal losses:** Loss is minimal because the whole portion of plant comprising of roots, leaves, grain and stem is fed to the animals.
- 12. Organic/natural green fodder:** Due to non-adding of any nutrient without using soil the green fodder is organically grown.

13. Higher growth and More Production:

Green fodder production at a faster rate and result in high yield of fodder.

CONCLUSION

Hydroponics can be used as an ideal green fodder substitute for livestock, fish and poultry, this technology will be taken up in a big way by the dairy and poultry farmers, especially, by those who have less land as well as scarce conditions for fodder production. It can be concluded that hydroponics is a promising source of feed for chicken and other meat animals effective in improving, Growth performance, Digestibility, Milk production, Reduces the feeding cost.