



# Hydroponic fodder production: a novel approach

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*Article Received: 10 April 2021*

*Published: 11 April 2021*

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In the dairy farming fodder plays a very crucial role, being it green fodder or dry fodder. Here we discuss about the importance of green fodder and the methods to increase the availability of green fodder. As we all know that green fodder plays a crucial role in feed of milch animals, as it provides the nutrients for milk production and to maintain the health of the dairy animals. For better green fodder availability we require cultivable land, but due to increasing population fodder land proportion is decreasing so is the availability of green fodder for dairy animals. To compensate this non availability of quality green fodder round the year, dairy farmers are forced to utilize extra concentrate ration to optimize milk production. Ultimately this leads to higher cost of milk production. To overcome this difficulty, novel technologies like hydroponics could become a major player in producing green fodder for the dairy animals.

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## HYDROPONICS TECHNOLOGY

Hydroponics is a type of agriculture in which we grow plants, usually crops, fodder crops without soil, by using mineral nutrient solutions in an environmentally controlled houses or machines. It could be efficiently used to cope up the deficiency of the land to grow green feed for the livestock. Plants need three things to grow i.e. water, nutrients from earth and sunlight. Hydroponics might be an easy way of providing of these nutrients without the need of soil under controlled environmental conditions to optimize the expansion of plants. This technology has been tested on various crops as Maize, Sorghum, Barley, and Oats for producing high quality of nutritious green fodder

for dairy animals. Beside this hydroponics are often used for growing wheat grass, paddy saplings etc in seven days of some time for optimum growth. Fodder obtained from hydroponics consists of germinated grains along with roots, stem and leaves as compared to only stem and leaves part in conventionally grown fodder. Nowadays progressive livestock farmers are adapting to hydroponics fodder production rather than conventional production methods, as the fodder produced by hydroponics is more nutritious and provide fodder round the year and also conserve water.

### **PROCESS OF HYDROPONIC FODDER PRODUCTION:**

Before the start of hydroponics fodder production we have to make sure that we have a controlled environment facility likely with a temperature range of 15-32 °C and relative humidity of 80-85%. Along with this, control light is also needed. For this we can adopt the commercialized structure or can build a small shed net or a low-cost greenhouse. To make a low-cost greenhouse, we can use a bamboo log, iron rod, or plastic pipe for construction structure and some agrinet or gunny bags to cover this structure.

#### **Construction**

- According to demand of our fodder quantity, we can build a Hydroponic fodder system, most commonly used size is 10 ftx10 ft space net, it is also recommended that construction of hydroponics shed should be near the location of livestock as it becomes easy to operate.
- Take care that the structure should be well ventilated so that we can maintain the temperature and humidity easily.
- For growing hydroponic fodder, we must have medium-size trays of about 1.5 x 3 Ft size made up of good plastic and which should have strength to hold the fodder's weight. We have to avoid metal trays as they can easily rust. These trays should have holes in bottom for draining any excess water.
- The rack to hold the trays can be made of bamboo, plastic or metal rack. Arrange these racks in three to four layers and take care rack that these should not be too high as it could become difficult to remove the trays and dispense water. Also make a drainage line under the racks to properly drain out water.

#### **The hydroponic fodder production process**

##### ***Seed selection and preparation***

We must take care that we have to use only good quality seed for hydroponic fodder production; don't use defective or unhealthy seeds as these will not germinate properly. First of all dry the seeds under direct sunlight one day prior to seed washing and remove all the defective and broken seeds, after that store the seeds in dry and clean space. On next day start the procedure by soaking the seeds in 5-7 liters of warm water in a bucket. Now all remove seeds that are floating on the water as they will not germinate also remove other impurities floating on water. After that, add 50 -100 gm salt in water; as it minimizes fungus growth on the sprouted seed. Further allow these seeds to soak water for around 12 hours.

For hydroponic fodder production we can use maize, pulses, wheat, and horse gram seeds, but do not use sorghum and pearl millet seeds because their sprouted leaves may contain poisonous substance that can harm the livestock. So Most of the farmers use Maize seeds to produce hydroponic fodder. In, in hot climatic conditions, maize seeds are suitable for hydroponic fodder production whereas in cold climatic conditions, we can use wheat and oats for fodder production.

### ***Seed loading and racking***

After 12 hours of soaking, drain the water and wash the seeds with clean water. Transfer the washed seed in a gunny bag and allow them to sprout. Seeds will take more than 24 hours to germinate in cold environment, while in hot conditions they will take about 24 hours to germinate. Before transferring the seeds to the tray, wash the trays properly and check all holes for any kind of blockage, if found remove the blockage. Now transfer germinated seeds to the trays and evenly spread them. Now we have to put the loaded trays in racks according to the days of loading.

### ***Maintenance and Harvesting***

We have to give light sprinkle of water every day to sprouted seeds, for this we can use watering cans or a sprinkler system. Maintain the frequency of watering after two hours in hot weather, and in cold weather, after 4 hours to maintain moisture. Also ensure that all trays receive sufficient water. If left side of the tray shows more growth than the right side (or vice-versa) then rotate the tray such that left side comes to the right side and right side of the tray goes to the left side. Also shift the trays to next level daily so that they move one step ahead in the growth cycle.

Also maintain the utmost cleanliness in the shed to reduce fungus and mold development. After around seven days fodder mat becomes ready to feed the livestock. When preparing hydroponic fodder facility ensure that we make the racks according to our fodder requirement, for example if we need 10 trays of fodder then we have to prepare the racks those can hold 70 trays.

### **Feeding of Hydroponic Fodder to livestock**

After seven days fodder becomes ready to get harvested, take out the fodder slabs from the tray and cut them in small pieces before feeding to the livestock, as it becomes easier for the animals to eat this fodder. Don't keep the fodder more than nine days in the trays because after nine days the nutrient value of fodder starts to decrease slowly and fiber starts to develop. We can give this hydroponic fodder along with dry fodder, usually farmer gives the combination of half a hydroponic fodder with concentrate ration or dry fodder. As the Hydroponic fodder is soft in texture and tasty, animals readily eat this fodder.

### **Advantages of Hydroponics**

- **High yield of fodder:** the plants grow at the faster rate under the ideal conditions of hydroponics facility as compared with the traditional method of fodder production so we will get higher yield of fodder.

- **Water conservation:**we require just 2- 3 liters of water for one kg of green fodder, as compared to 60-80 lts in ordinary system of fodder production. Also we can use leftover water of drainage again in hydroponics.
- **Less Land requirement:** Hydroponics fodder production facility requires very less land (about 11mts x 5mts land / unit), as compared to at least one hectare of land for conventional green fodder production. This can become an asset for the areas where agriculture is difficult or for densely populated areas.
- **Reduced labour requirement:**as compared to conventional fodder production which requires intense labour for cultivation in hydroponics labour required is 2- 3 hours / day only.
- **Less time for fodder production:** to get fodder we require just 7 days from seed germination to completely grown plant as compared to traditional fodder production which require at least 60-80 days.
- **Around the year availability of fodder:**this technology is capable to provide green fodder around the year, as per the demand regardless of rain, storm, sunshine or drought.
- **High nutritive value of fodder:**we can reinforce the nutritive value of fodder by adding additional growth promoters, nutrients, etc to improve the quality milk in dairy animals.
- **Higher milk production:** by providing green fodder to milch animals we can attain higher milk yield and also can reduce cost of production by compensating the reduced concentrate feeding.
- **Unseasonal fodder Production:** the main advantage of this Technique is that we can grow the fodder crops regardless of their growing seasons so that we can cultivate the crops round the year and can ensure the green fodder availability all around the year.
- **Additionally these can be the benefits to livestock:** Faster weight gain and growth in young ones, better carcass quality, lower feed cost per kg of weight gain. Improved health with lower veterinary care spends. Increased fertility and high conception rate. Lactating animals could show better lactation length and yield, also we can find improved herd health & longevity.

#### **Precautions while adopting hydroponics:**

- Don't use the Seeds which were treated with pesticides and fungicides
- Doesn't use the contaminated water for hydroponics, so we have to always ensure the supply of clean water.
- To reduce the fungal growth, take care of the cleanliness and avoid use of Fungicides as any residue of fungicide could adversely affect health of animals.
- Ensure the quality seeds for fodder cultivation in hydroponics.
- Hydroponics facility should have proper aeration and light to get optimum production.

- Maize, Oats, Barley, Wheat, Cowpeas etc., are preferred crops for using Inhydroponics to get high quality nutritious green fodder for dairy animals. As Sorghum if fed prior to 45 days of growth can cause HCN toxicity so it is preferably avoided in hydroponics.

### **Conclusion**

Green fodder produced by Hydroponics technique is a highly nutritious, palatable and digestible alternative to conventionally grown fodder and also it can be grown in any area with low cost techniques using locally available resources. Keeping in view of the benefits and low cost of hydroponic fodder we can easily avert the situation of climate change and less availability of land. That's why we can rely on hydroponics for fodder production in different agroclimatic regions of India.