

## CHALLENGES AND USE OF HYDROPONICS FODDER AS LIVESTOCK FEED--A REVIEW

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### ABSTRACT:

Hydroponics fodder is a method of growing cereal grains to produce fresh green grass leaves within 6 to 8 days. The leaves are very nutritious and with high crude protein and is very economical feed for all grazing animals including horses, cattle, hogs, sheep, goats, rabbit and zebra. The major challenges of hydroponics fodder production are losses in total dry matter because a lot of studies reported that sprouting resulted in 7 to 47 % loss in dry matter from the original seed. Also high temperature in green house slows down the growth of hydroponics fodder similarly high humidity lead production and the light used to create energy for Biochemical activity in the plant. to the infestation of mold. In managing the production of hydroponics fodder it is recommended to disinfect the planting materials using chlorine solution and also maintain correct moisture, pH and temperature in green house. Lighting is the one the most important aspect of hydroponics fodder

Key words: Hydroponics fodder, challenges, production

### INTRODUCTION

Hydroponics is a method of growing plants without soil. Hydroponics fodder systems are usually used to sprout cereal grains such as barley, oats, wheat, sorghum, and corn or legumes such as alfalfa, clover or cowpea Al-Karaki and Al-Hashimi, (2012). It is a well-known technique for high fodder yield, year round production and least water consumption. This technology may be especially important in the regions where forage production is limited Fazaeli *et al.* (2012). Sprouting is a simple technique to germinate the seeds for the improvement of their nutritive value. Germination eliminates the effect of phytic acid by the production of phytase enzyme and increases the plant enzyme contents Shipard, (2005). Fresh green grass sprout fodder (6 to 8 day old) is a very nutritious and economical feed for all grazing animals including horses, cattle, hogs, sheep, goats, rabbits, zebras Hydroponics Farming, (2013). From time to time, hydroponics growers may face challenges with their hydroponic systems and fodder. Some challenges can easily be resolved without causing too much stress. The most common issues in hydroponics production usually involve high cost initial startup, mold and control of temperature and humidity.

### MAJOR CHALLENGES OF HYDROPONICS, FODDER PRODUCTION LOSS IN TOTAL DRY MATTER

A number of studies reported that sprouting resulted in 7 to 47 % loss in Dry Matter from the original seed after sprouting for a period of 6 to 7 days of growth, mainly due to respiration during the sprouting process Putnam *et al.*, (2013). Seed soaking activates enzymes that convert starch stored in endosperm to a simple sugar, which produces energy and gives off carbon dioxide and water, leading to loss of Dry Matter with a shift from starch in the seed to fiber and pectin in the roots and green shoots.

### HUMIDITY AND TEMPERATURE CONTROL CHALLENGE

These are highly sophisticated, fully automated fodder production system with controlled environments and are immune to natural weather variations. The required water, light, temperature, humidity and aeration are fully controlled by sensors. Exposed to direct sunlight, strong wind and heavy rain. During the growing period the seeds are kept moist by either drip or spray irrigation but are not saturated. The environmental factors for optimum growth of a fodder are; temperature between 19

to 25 °c humidity between 40 to 80 % (optimum being 60 %) light (2000 lux intensity between 12 to 16 h) El-Deeba *et al.* (2009). The sprouts grow, albeit slowly outside the optimal condition mention above, but at higher temperature humidify mold infestation is one of the biggest challenge that needs to addressing.

### **MANAGEMENT CHALLENGE ON PRODUCTION OF HYDROPONICS FODDER**

The quality of hydroponics fodder is greatly influenced by the management of the hydroponics system. Some of the best practices that must be observed in the hydroponics fodder production are; use of clean planting materials, maintaining the correct moisture, pH and temperature in the green house and disinfecting the trays using chlorine solution Sneath and McIntosh, (2003).

### **MOLD**

There are a number of challenges in producing hydroponics fodder. A common challenge that causes many problems for those with fodder sheds is mold. Given the warm moist environment within a fodder shed mold can easily take hold, ruin the fodder and cause livestock health issues if fed. Thus, active management of mold risk is essential. Moldy sprout have decreased livestock performance in trials and has been known to result in animal deaths. Mold is actively managed within sheds through pretreatment of the seed. Additives to the water are used for pre-soaking the grain to minimize the risk of mold. Shed hygiene is also important and thus considerable attention is paid to ensuring the growing trays are well cleaned following each seed and prior to the sowing of the new seed Al-Karaki and Al-Hashimi, (2012).

### **PATHOGEN AND DISEASE**

Pathogen and disease can spread throughout your hydroponics system. They can be brought in by pest or bought on by environmental conditions keeping your hydroponics house clean, a sterile environment free of pests, and at the proper temperature, you can reduce the chance of pathogen and disease infection your greenhouse. An outbreak of pest or infections in hydroponics grown fodder can be quickly controlled by spraying the crops with appropriate pesticide or fungicide. Fresh and clean water should be used for irrigation as water borne plant disease spread quickly Bakshi *et al.* (2007). Hydroponics fodder heavily infested with *Aspergillusclavatus* should not be fed to dairy/beef cattle. Animals may develop posterior ataxia, knuckling of fetlocks, dragging of hind legs, high stepping in the hind limbs, stiff gait, tremors, progressive paresis, hypersensitivity, recumbences, clonic convulsions, decreased milk yield and possibly death McKenzie *et al.* (2004).

### **LIGHTING CHALLENGE**

Proper lighting is one of the most important aspects of plant environment. Plants use light to create energy, so if they do have the proper light they can create energy needed growth. O'Sullivan (1982) as cited in Morgan *et al.* (1992) reported increased losses of Dry Matter, where no light was provided. The authors found that the rate of decrease of Dry Matter content slowed down after the fourth day in lighted experiments, when leaves began photosynthesizing. Lighting prior to day 3 was of little significance Morgan *et al.* (1992). Results obtained by El-Deeba *et al.* (2009), indicated that root length dose not influence lighting operating hours, however its value was about 6 cm under all treatments of lighting (8, 12, 16, and 24 hours/day).

### **CONCLUSION**

Hydroponics fodder production systems produce large quantities of green, palatable livestock feed. However, the research reviewed in this report shows that there are challenges associated with the production and economic competitiveness of hydroponics fodder relative to alternative feed sources. The costs associated with the establishment and daily operation of a fodder shed, coupled with dry matter yield losses during the sprouting make hydroponic fodder an expensive feed source. There is

an opportunity for some research to be undertaken to examine the performance of livestock on hydroponics fodder and the attributes of the final product.

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