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Potential of hydroponics fodder production for sustainable livestock production

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Abstract
Fodder grown hydroponically is the transformation of seeds into good quality, organic, palatable, disease free lush green grass and root combination animal feed produced in a specially prepared hydroponic unit. Hydroponics fodder technology can be used for production of various forage crops. Hydroponics fodders are good sources of chlorophyll, good sources of antioxidants and are highly nutritious which aid in developing stronger immune system. Hydroponics fodder production requires less maintenance, no fuel cost, no need of soil preparation, less man power and no damage from insects and other animals.

Keywords: hydroponics fodder, livestock

Introduction
Livestock plays a vital role in the natural resource-based livelihood of the vast majority of the population living in India and livestock production has been the backbone of agriculture, source of employment, food and nutritional security in rural areas [1]. The exploitation of genetic potential of the animals is mainly dependant on the nutrient supply, however, feed resources are shrinking in India and there is deficit of 10%, 33% and 35% for dry fodder, concentrate and green fodder, respectively [2]. The availability of fodder is decreasing due to climate change impacts on crop productivity, and higher competition for land and water resources between fodder and cereal crops [3]. Feeding livestock according to their requirement and avoiding wastage is the important in exploiting the production potential for economic growth and sustainability since feed costs are the dominant parts of production that accounts more than 70% and therefore new technology for production of forages i.e., hydroponics fodder production system is now a hope for sustainable livestock production.

Hydroponics technology for fodder production
Green fodder is an essential component of the dairy ration, otherwise the productive and reproductive performance of the dairy animals is adversely affected. Therefore, for a sustainable dairy farming, quality green fodder should be fed regularly to the dairy animals [4]. To overcome the problems associated with fodder scarcity for livestock, hydroponic technology has been introduced. fodder produced by growing plants in water or nutrient rich solution but without using any soil is known as hydroponics fodder or sprouted grains or sprouted fodder [5]. Hydroponics is produced in greenhouses under controlled environment within a short period [6]. Hydroponics is a method of growing plants without soil [7]. Hydroponic 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 [8]. 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 [9]. Sprouting is a simple technique to germinate the seeds for the improvement of their nutritive value [10]. Sprouting grains for human consumption has been used for centuries in Asian countries to improve food value [11]. Nutritional value of sprouted grain improves due to the conversion of complex compounds into simpler and essential form and by minimizing the effect of anti nutritional factors during germination [12]. Sprouting of grains can be used efficiently as it has resulted not only in increased protein quantity but quality also.

Procedure for production of green fodder

Select good quality seeds having 80-85% germination rate, weigh desired quantity, then soak the seeds in water until fully saturated, then drain the excess water. Grain is often soaked or washed with a sterilizing solution to help minimize the risk of mould [13]. Then spread the seeds in trays for sprouting usually for 6-8 days. Seeds are kept moist during this period. The greenhouse needed for the production of hydroponics fodder can be hi-tech greenhouse or low cost greenhouse depending upon the financial status of the farmer and availability of building material.

Advantages of hydroponic fodder

This technology may be especially important in the regions where forage production is limited [14]. It is a well-known technique for high fodder yield, year round production and least water consumption [9]. Sprouting is a simple technique to germinate the seeds for the improvement of their nutritive value [10]. Sprouting activities in the seeds have many changes as in seed protein converted to essential amino acids, carbohydrates are converted to sugars and fats are converted to essential fatty acids. These activities increase as a result of increasing enzymes levels [12]. Sprouts fodder production requires only about 2-3% of that water used under field conditions to produce the same amount of fodder [8]. New sprouts technique can be used for green fodder production of many forage crops for production of fresh forage from oats, barley, corn, wheat and other grains [15]. Sprouting of grains affected the enzyme activity, increased total protein and changes in amino acid profile, increased sugars, crude fibre, certain vitamins and minerals, but decreased starch and loss of total dry matter [16]. Hydroponics fodder is palatable and the germinated seeds embedded in the root system are also consumed along with the shoots of the plants without any nutrient wasting [17]. The DCP and TDN contents of the hydroponics barley fodder were optimum to meet the production requirement of the lactating cows [18].

Research findings by different research workers

Hydroponic system is a potential technique for barley production with least water consumption in GCC (The Gulf Cooperation Council) countries where water is the main limiting factor for agricultural production [19]. Supplementation of maize hydroponic fodder using bioslurry as a fertilizer for corn silage's supplement on dairy cows increases dry matter intake, energy consumption, and nitrogen consumption, also can maintain nutrient digestibility and maintain persistency of milk production during late lactation [20]. Feeding of hydroponic maize and barley fodder to growing goats increased total dry matter intake, per cent feed conversion efficiency, total body weight gain and economically valid [21]. Muthuramalingam and his co-workers evaluated growth performance of the goats fed hydroponic maize fodder and reported that reporting that hydroponic fodder may have profitable application in intensive large scale goat farming with high value outputs, where no land are available to produce green fodder and alternative feed costs are high [22]. Intissar and Eshtayeh investigated that use of hydroponic barley is of an economic importance [23].

Conclusion

Hydroponics fodder can be produced easily and can be fed easily to livestock in all situations, where there is problem of land, manpower, water. Hydroponically grown fodder are palatable, organic and have potential health benefits, however more research is must to get appropriate information.

References

1. Reddy P, Ravi Kanth, Raju Jakkula A, Nagarjun Reddy D, Srinivasa Kumar RK, Sowjanya Lakshmi *et al*. Assesment of feed resources availability for livestock in the semi arid region of Andhra Pradesh, India. Indian Journal of Animal Nutrition 2018;35(1):59-65.
2. Planning Commission. Report of the Working Group on Animal Husbandry and Dairying. 12th five-year plan. Planning Commission, Govt. of India 2012.
3. ESNC, Egypt Second National Communication under the united nations framework convention on climate change, UNFCCC, Published by Egyptian environmental affairs agency (EEAA) 2010.
4. Naik PK, Swain BK, Chakurkar EB, Singh NP. Performance of dairy cows on green fodder maize based ration in coastal hot and humid climate. Animal Nutrition and Feed Technology 2012a;12:265-70.
5. Dung DD, Godwin IR, Nolan JV. Nutrient content and *in sacco* degradation of hydroponic barley sprouts grown using nutrient solution or tap water. Journal of Animal and Veterinary Advances 2010a;9(18):2432-2436.
6. Sneath R, Mclntosh F. Review of Hydroponic Fodder Production for Beef Cattle. Queensland Government, Department of Primary Industries, Dalby, Queensland 2003.
7. Swati Verma, Anand Singh, Anup Kalra, Mohan Ji Saxena. Effect of Feeding Hydroponics Barley (*Hordeum vulgare*) Fodder on Nutrient Utilization, Growth, Blood Metabolites and Cost Effectiveness in Hariana Male Calves. Indian Journal of Animal Nutrition 2015;32(1):10-14.
8. Al-Karaki GN, Al-Hashimi M. Green fodder production and water use efficiency of some forage crops under hydroponic conditions. ISRN Agronomy 2012. DOI: 10.5402/2012/924672.
9. Fazaeli H, Golmohammadi HA, Tabatabayee SN, Asghari TM. Productivity and nutritive value of barley green fodder yield in hydroponic system. World Applied Science Journal 2012;16(4):531-539.
10. Amal BK, Aurang Z, Nizakat B, Shahid AK, Mohammad SK. Influence of germination techniques on phytic acid and polyphenols content of chickpea (*Cicer arietinum* L.) sprouts. Food Chemistry 2007;104:1074-1079.
11. Resh HM. Hydroponic Food Production, 6th ed., Woodbridge Press, Santa Barbara, CA. 2001, 567,
12. Chavan J, Kadam SS. Nutritional improvement of cereals by sprouting. Food Science and Nutrition 1989;28(5):401-437.
13. Morgan J, Hunter RR, O'Haire R. Limiting factors in hydroponic barley grass production. 8th International congress on soilless culture, Hunter's Rest, South Africa. 1992.
14. Bustos CDE, Gonzalez EL, Aguilera BA, Esptnoza GJA. Forraje Hidropónico, Una Alternativa para la Supplementation Caprina En el Semi desire to Queretano. XXXVIII. Reunión Nacional de Investigación Pecuaria. Puebla, México 2000, 383.
15. Rodriguez-Mulea C, Rodriguez HE, Ruiz O, Flores A, Grado JA, Arzola C. Use of green fodder produced in hydroponic system as supplement for lactating cows during the dry season. Proceedings of the American

Society of Animal Science 2004;56:271-274.
16. Lorenz K. Cereal sprouts: composition, nutritive value, food applications. Critical Reviews in Food Science and Nutrition 1980;13(4):353-385.
17. Pandey HN, Pathak NN. Nutritional evaluation of artificially grown barley fodder in lactating crossbred cows. Indian Journal of Animal Nutrition 1991;8(1):77-78.
18. Reddy GVN, Reddy MR, Reddy KK. Nutrient utilization by milch cattle fed on rations containing artificially grown fodder. Indian Journal of Animal Nutrition 1988;5(1):19-22.
19. Asadullah Al Ajmi, Ahmed Ali Salih, Isam Kadim, Yahia Othman. Yield and water use efficiency of barley fodder produced under hydroponic system in gcc countries using tertiary treated sewage effluents**.** Journal of Phytology 2009;1(5):342-348.
20. Nugrohoa HD, Permanab IG, Despalb. Utilization of Bioslurry on Maize Hydroponic Fodder as a Corn Silage Supplement on Nutrient Digestibility and Milk Production of Dairy Cows. Media Peternakan 2015;38(1):70-76.
21. Weldegerima Kide Gebremedhin. Nutritional benefit and economic value of feeding hydroponically grown maize and barley fodder for Konkan Kanyal goats. IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS) 2015;8(7):24-30.
22. Muthuramalingam T, Pothiappan P, Tensingh Gnanaraj P, Meenaksh Sundaram S, Pugazhenthi TR. Studies on Growth Performance of the Goats Fed Hydroponic Maize Fodder. Indian Veterinary Journal 2015;92(4):94-96.
23. Intissar FA, Eshtayeh. A new source of fresh green feed (Hydropnic barley) for Awassi sheep. Thesis.Master in Environmental Sciences, Faculty of Graduate Studies, at Najah National University, Nablus, Palestine 2004.