PRODUCTION AND UTILISATION OF FRESH BARLEY FODDER FROM CONTAINERIZED HYDROPONIC SYSTEM

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Introduction

Consistency in quality and production of a high quality fodder is in essence for a successful animal production system. The cost of pasture production and the competitiveness of land for other uses have generally affected the opportunity and cost of ruminant production in many developing country. In Malaysia, a good pasture yield 25-30 tonne dry matter/yr/hectare and cost approximately RM2500/hectare to develop. In addition, tropical soil and forages are known to be deficient in several essential minerals and nutrients, respectively. The digestibility of the forages is generally low and hence releases low metabolisable energy to support high nutrient requirement of the animals. Cost of feed usually amount to 70% of the daily operational cost in a livestock farm particularly equine and cattle farms. The benefits of soil-free fodder production in a containerised system from cereal such as barley are enormous and proven successful in many semi-arid and desert countries. This includes disease-free, superior nutritive value and high animal productivity including greater milk yield, improved fertility and faster growth. Technically, the operation is easy and economical where 1 tonne of fresh fodder is produced daily from a $40m^2$ environment controlled container. The production cost was estimated 35sen/kg fresh fodder. The project aimed to develop a suitable feeding system based on sprouting barley fodder produced from containerised hydroponic system for high yielding ruminant and horses. An important goal of this project will be to seek outcomes of introducing the sprouting barley and other cereal grains to increase productivity of animals that require high nutrient requirement. Six key areas were studied including nutritive values, digestibility and feed intake, production responses e.g. milk and growth by dairy goats and cattle and economics of developing a feeding system.

Materials and Methods

The project was divided into four sections: (i) setting of the system, (ii) growth of the fodder in the controlled environment, (iii) an evaluation of the nutritive values including digestibility using rumen simulation technique (RISITEC), (iv) feeding trial in dairy goats, and (iv) economics assessment. The fabricated containerised system was set up on a level and hard ground. The container was cleaned and within 5 days, the system was ready to be used for germination of the seeds. The seeds were soaked for 2 hours and spread out evenly in the trays that were arranged on several slotted panels. 140kg seeds were germinated daily to produced approximately 1000 kg of fresh sprouting barley in a 8-day growth cycle. During the germination process and growing process of 8 days, samples were randomly collected daily and analysed for nutrient contents and nutritive values. Rumen simulation technique (artificial rumen technique) was used to assess digestibility and fermentation pattern of the sprouting barley of 1 to 8 days of age. Digestibility trial using 4 male Saanen goats (repeated 4x4 Latin Square Design) was conducted on 8-days old barley. The dry matter yield was also estimated.

Results and Discussion

The sprouting barley or commercially called barley fodder produced from the controlled system has high metabolisable energy content (12 MJ/kg DM) due to low fibre component. The average protein content was 17% (DM basis). Germinating 1kg barley grain produced approximately 7.5kg of fresh fodder, which means that there was no net loss of DM content, before and after germination. The apparent digestibility of the barley fodder was 82.5%. The rate of degradation of the nutrients (dry matter and protein) was rapid.

Conclusions

The containerised system can be appropriately adopted to produced high quality fresh fodder. Other grains such as corn could also be used to produce sprouting corn fodder from the system. The cost of maintaining and operating the machine was approximately RM 4.00 daily, mainly attributed to air conditioning cost. The fodder has high nutritive values and is suitable for livestock that demand high energy. High digestibility, high soluble carbohydrate and crude protein contents plus good Ca:P ratio make barley fodder a suitable feed for ruminants. The containerised system (for germinating barley production) is not labour intensive and most important, is the assurance of having a high quality feed daily to supplement the stocks.

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