



Azolla

**A Low Cost High Quality Additional
Feed Supplement for Farm Animals
in Sri Lanka**

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Preface

The expenditure incurred by farmers who engage in animal husbandry as a business, increased due to the fact that the cost of animal feed has increased. The nutrition level of farm animals can be increased by using Azolla as an additional feed, which is rich in protein, and through this, it can minimize the cost of production. This can be grown easily and, it shows rapid growth. It is to be noted that blue-green alga found in pockets of the leaves of Azolla fixes atmospheric nitrogen and make it usable by Azolla. Even though this is an excellent animal feed, I believe that the lack of awareness in farmers on this cultivation is the reason for the slow popularity.

I would like to extend my sincere thanks to Mrs I.K.Lewke Bandara, a Research Officer in the Division of Farming system at the Veterinary Research Institute, for compiling a hand book in such manner on Azolla and its cultivation in a simple and easy language. I firmly believe that after following the instructions given in this hand book, farmers who are involved in animal husbandry would be able to increase their profit as it increases animal production whilst reducing the cost of production.

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What is Azolla?

Azolla is a fast growing and free floating small aquatic fern with a floating stem (Figure 01). Its roots hang down in water. It is a well-known bio-fertilizer in rice crop and a kind of excellent green fodder. Azolla is cultivated in various countries including Sri Lanka for the above mentioned purposes. When compared with other fodder varieties, Azolla is found to be a less expensive and nutrient rich additional feed supplement for farm animals. Generally, Azolla requires 25% to 50% of full sunlight for its normal growth. The optimum temperature for growth of Azolla is around 25^o Celsius. Azolla has been extensively used as an additional feed supplement for cattle, buffalo, goats, pig, ducks, chicken and other farm animals.



Figure 01

How to grow Azolla?

Azolla can be grown in soil pits, cement tanks (Figure 02 and 03), or any other container which can hold water. The convenient size for the soil pits is 2mx1mx0.3m. This will produce 1kg of Azolla bio - mass per day. The size of the pit can be adjusted according to requirement of the farmer. Mainly it depends on how much of Azolla is expected to feed the animals per day.



Figure 02



Figure 03

The soil pits prepared for growing Azolla should be cleaned thoroughly and levelled. A durable hard polythene sheet should be spread over the bottom and the sides of the pit (Figure 04). All the sides of the sheet should be secured by placing bricks over the side walls (Figure 04 and 05) .



Figure 04



Figure 05

Clean fertile soil (10-15 kg /preferably sieved soil) should be uniformly spread over the pit (Figure 04). A mixture of 10 litres of water and 2-3 kg of cow dung mixed with water (4-5 days old cow dung) should be spread over the soil in the pit and the pit should be filled with clean water (Figure 05), making sure the depth of water is at least 12-15 cm. About 10-15g of powdered super phosphate or rock phosphate should be added to water in the pit for healthy growth of Azolla. Subsequently, the pond should be kept for 2-3 days to facilitate the ingredients to settle.

Approximately 1kg of Azolla should be spread over (Innoculation) the 2mx1mx0.3m size pond filled with soil nutrient mixture and water. While adding Azolla to the pond, gently rub Azolla by hand, to break Azolla plants in to smaller pieces for faster multiplication (Figure 06).



Figure 06

Fresh water should be spread over the Azolla immediately after inoculation, to support the plants stand upright. The top of the pond should be secured with a net to prevent the fall of leaves and debris into the pit, and most importantly, to prevent mosquito proliferation. In addition, this net will facilitate a partial shade which is very essential for Azolla

cultivation. Wooden poles or bamboo sticks should be placed over the pond, before covering the pond with the net (Figure 07).

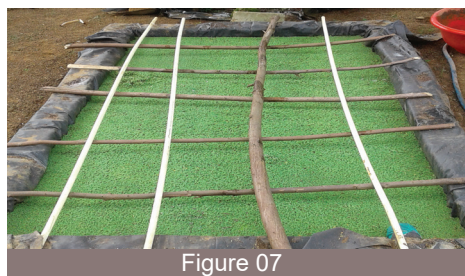


Figure 07

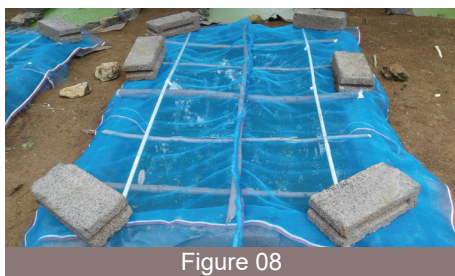


Figure 08

Subsequently, the net should be secured by using wooden poles or stones on top of the net (Figure 08). About 1.0-1.5 kg of Azolla can be harvested, each day after 10-15 days of inoculation of the pit, with seed Azolla under optimum management and environmental conditions. The following figures depict the progression of Azolla bio mass production within 15 days of inoculation of the Azolla in to the pond (Figure 09,10 and 11).



Figure 09



Figure 10

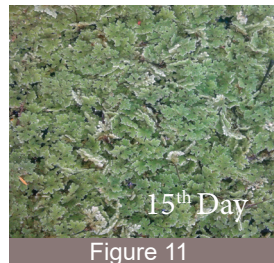


Figure 11

How to feed?

Azolla can be harvested using a plastic or Aluminium strainer (Figure 12). Before feeding, the fresh Azolla should be washed thoroughly to get rid of cow dung smell (Figure 13). Azolla can be fed to animals as such, or can be mixed with rice polish or commercial feed.



Figure 12



Figure 13

It can also be added to straw, hay or other forms of preserved grass. For a cattle or a buffalo. 1.5-2.0 kg per day and for a goat 400-500g animal per day and for a hen 75-100g per day can be fed with other animal feed (Figure 14).

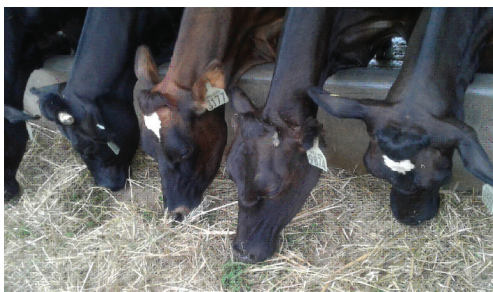


Figure 14

Nutritional composition:

- Dry matter 5-7%
- Crude Protein 20-30% Dry matter basis
- Ether extract 4-5% Dry matter basis
- Crude fibre 14-16% Dry matter basis
- Total ash 15-18% Dry matter basis

Maintenance of the pit:

- While preparing the pond, care should be taken to avoid damages to the polythene sheet
- Polythene cover should be properly fixed to the soil pit to prevent any water leakages
- Once every 10-15 days, old water in the pond should be replaced with fresh water, to prevent Nitrogen build up in the pond.
- Maintain the water level in the pond at least 10 cm, to prevent Azolla root growth in the pond soil, by keeping the roots floating in the pond water. This will facilitate harvesting, and make the Azolla bio-mass clean and palatable for animals (Figure 15).



Figure 15

- Figure 15 depicts an Azolla sample with mud and soil in it, which is not suitable for feeding animals, due to insufficient water depth in the pond.
- Once every 2 weeks, 1 kg of 4-5 days old cow dung and 30 g of super phosphate or rock phosphate should be applied to ensure better/healthy growth of Azolla.
- The Azolla pit should be rejuvenated by emptying the pit, once every 6-8 months and it has to be restarted with fresh water, a fresh mixture of soil and a fresh Azolla culture.
- Care should be taken to manage water overflow during the heavy rainy season. (A simple and small gadget designed and prepared by using a PVC tube and a piece of poly net by the Division of Farming Systems is illustrated here to manage water over flow and protect the Azolla cultivation (Figure 16).
- Daily harvesting has to be carried out to avoid over crowding Azolla in the pond.
- Azolla doubles its bio-mass in 2–5 days, under ideal management and environmental conditions (Shade level, nutrient level and temperature in the pond water).



Figure 16

Scientific Background:

- Azolla plant hosts a symbiotic blue green algae or Cyanobacterium (*Anabaena azollae*). This blue, green, algae is responsible for the fixation and assimilation of atmospheric nitrogen.

Economics of Azolla Production:

Assumptions:

- Farmer uses only his own labour/family labour for the preparation and maintenance of the azolla pit.
- Farmer uses cow dung and several other resources (fertile soil, water and bricks or any form of stones) from his own farm.

**Cost of production calculation for the construction and maintenance of one Azolla pit, with the dimension of 2mx1mx0.3m
(For a one production cycle of 08 months):**

- Cost of hard polythene sheet (2.5m)	- Rs. 200.00
- Cost of a 500 g Super Phosphate	- Rs. 35.00
- Cost of the poly net	- Rs. 135.00
- Total cost	- Rs. 370.00
- Azolla harvest for 08 months (approximately)	- 240 kg
- Cost of production of 1kg of azolla with poly net (approximately)	- 370 Rs/240 kg - <u>1.50 Rs per kg</u>
Cost of production of 1kg of azolla without poly net (approximately)	- Rs. 235/240 kg - <u>1.00 Rs. per kg</u>

For this calculation, average yield, from a standard size, Azolla pond has been considered as 1kg Azolla bio-mass per day. This value can be taken as a reference, as there is a large variation of Azolla bio-mass yield (0.5-1.5kg per standard size pond), due to various factors including soil and environmental factors, farmer awareness, and training on each aspect of production, etc.

Therefore, the actual cost of production can be varied between 1 to 2 Rs. per 1kg of Azolla, under given situations (Under optimum environmental and management conditions).

Important Information:

- Shade for Azolla can be provided by preparing Azolla ponds in coconut lands or planting trees, such as banana and gliricidia to provide a permanent shade. Coconut fronds or shade nets can also be used to cut the light intensity.
- Various scientific studies carried out in India revealed that feeding of Azolla, in dairy cows, increase milk production, and feeding Azolla for poultry birds improves the weight of broiler chicken and increases egg production in layers. Besides, studies further revealed that Azolla feeding increases the production performance of all categories of farm animals.

- Furthermore, a field survey carried out by the Veterinary Research Institute of Sri Lanka; on "Azolla cultivation for feeding livestock in small scale farming systems of Sri Lanka" revealed that farmers in the study have experienced increased milk production performances in dairy cattle as well as increased egg production performances in chicken.
- Gappi fish can be placed in Azolla ponds to prevent mosquito multiplication. They will eat the mosquito larvae as well as mosquito eggs.
- Although Azolla cultivation is very cost effective farming practice, it requires a lot of attention in each and every step that you implement.
- If you take good care of your Azolla pond, you can harvest good quality Azolla fodder every day, and it definitely reduces feed cost and improve the feed quality in your farm.
- In addition, as we are better equipped with technical knowledge of growing Azolla, we are prepared to provide necessary training facilities for the farmers.

Take home message

Azolla can be used as an ideal additional feed supplement for farm animals, especially for cows and poultry reared in small scale farms in rural areas, to reduce the cost of production for attaining higher gain.

*Where can you get **Azolla Seeds** and training on growing Azolla?
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