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Azolla : The Green Goldmine

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Key Points

- Azolla is a low-cost, protein-rich aquatic fern that serves as a sustainable feed supplement, helping address fodder shortages and reduce dependence on conventional livestock feeds.
- Supplementing Azolla in the diets of dairy animals and poultry improves milk yield, growth performance, egg production, immunity, and feed efficiency while lowering overall feed costs.
- Easy cultivation, rapid biomass production, minimal land and water requirements, and nitrogen-fixing ability make Azolla an eco-friendly solution for sustainable livestock production.

Abstract

The increasing demand for livestock feed, coupled with shrinking agricultural land and rising costs of conventional fodders, has intensified the search for sustainable alternative feed resources. Azolla, a floating aquatic fern, has emerged as a promising feed supplement due to its high protein content, balanced amino acid profile, essential vitamins, minerals, and excellent digestibility. Its low cultivation cost, rapid biomass production, and symbiotic association with nitrogen-fixing cyanobacteria make it an environmentally sustainable option. Supplementation of Azolla in livestock and poultry diets has been shown to improve milk production, growth rate, egg production, feed conversion efficiency, and animal immunity while reducing feed expenditure. In addition, Azolla requires very little land and water, making it suitable for smallholder farmers and as an emergency feed resource during fodder scarcity. Although it is not intended to replace conventional fodder completely, Azolla effectively complements existing feeding systems, contributing to improved livestock productivity, farm profitability, and sustainable animal agriculture.

Introduction

Meeting the nutritional demands of India's rapidly growing livestock population has now become more difficult with the rapidly increasing population, urbanization and dwindling

agricultural land. Due to the rising cost of conventional fodders and protein sources there is demand and need for an affordable and sustainable feed source. This has drawn attention towards an aquatic plant “AZOLLA” which is becoming increasingly important due to it’s high nutritional profile, easy and low cost cultivation and it’s potential for environmental sustainability.

Overall Fodder Projections by 2050 :

Fodder type	Expected demand (2050)	Projected deficit by 2050	Current Status/deficit
Green fodder	1,012 million tonnes	18.4% deficit	30.65% deficit
Dry fodder	631 million tonnes	13.2% deficit	11.85% deficit

What is Azolla ? Azolla is an aquatic floating fern also known as Duck weed, often referred to as “Green goldmine” for its high nutrition content and it’s diverse applications. It grows in stagnant water bodies such as pits, canals, ponds etc. Under sunlight or shade of a tree and is widely distributed throughout the tropics and subtropics. It can be used as an ideal feed supplement for cattle, Buffalo, sheep, goat, pigs and poultry due to it’s ease of cultivation, high biomass yield and rich protein content and can also be used by paddy farmers as a biofertilizer in paddy fields as it increases the crop yield and quality.

Why Azolla ? Conventional feeds have certain limitations, green fodders are low in protein and certain essential amino acids and protein concentrates are quite expensive and lack in important vitamins and minerals. Azolla has 20-35% CP, 10-15% minerals, 7-10% (on DM basis) bioactive substances and biopolymers. It provides essential amino acids such as lysine (0.42% more than that found in corn, bran and rice concentrate) methionine, lucine and valine, vitamins (A, B12, E) minerals (Ca, P, K, Mg, Fe) unlike many conventional fodders. It is also highly digestible as it has low lignin content and soft cellular structure. It has lower feed cost (which comprises of 60-70% of livestock expenses) requires minimal investment, land, water and offers fast biomass production and its symbiotic relation with the Nitrogen fixing cyanobacteria *Anabaena azollae* also reduces the need for nitrogen fertilizer making it sustainable and eco-friendly. It can also act as an emergency feed source in seasonal shortages which can limit the fodder availability. Azolla is not competing to replace the conventional

green fodder or protein source but to complement them.



Image1:

<https://m.mediaamazon.com/images/I/71ExP8zaYUL. AC UF1000,1000 QL80 .jpg>

Image2:

https://upload.wikimedia.org/wikipedia/commons/8/80/Azolla_caroliniana0.jpg

Azolla the superfood and it's benefits as a feed supplement : Azolla's value as a protein rich feed substitute is determined by its amino acid content followed by other criteria i.e. crude protein, fibre, digestible carbohydrate etc. Azolla contains 18 Amino acids which are necessary for protein synthesis, additionally it contains almost all essential minerals and vitamins with notable amounts of vitamin B12 and carotene (precursor of vitamin A) with relatively low levels of fat and carbohydrate. Adding Azolla in the diets of ruminants increase the microbial protein synthesis which results in daily weight gain , milk production and reducing the conventional feed cost. In case of dairy cattle and crossbred cows integrating 1.5 to 2 kg of fresh Azolla per day in their diets can increase milk production by 11.2% to 15% and FCM by 12.5% whereas in Buffaloes, supplementing 1kg azolla along with cottonseed cake per day can increase milk output by 16.25% and improves health status of the animal. Azolla supplementation also has a great impact on economics of the feeds, Substituting 15-20% of the commercial feed with sun dried azolla can give approx 20-25% savings in total feed expenditure. Experimentation has revealed that egg production and immunity increases with azolla supplementation in poultry. Incorporating azolla at 5-10% to broiler total ration increase the weight percentage of meat and also enhances the redness, juiciness and overall palatability of cooked meat. Azolla also contains certain compounds i.e. flavonoids which increase the immunity especially against high risk viruses such as Newcastle Virus. Adding 5-10% of azolla in poultry feed has shown to decrease the amount of ration required for a broiler, which subsequently raises the net profit per bird. As for layers, substituting 10-15% of their ration

with azolla have resulted in an increase in egg production, creates stronger eggs with darker yolks.

AZOLLA CULTIVATION – STEP BY STEP GUIDE



★ Azolla is a highly nutritious green feed. Regular maintenance ensures good growth and higher production.

(A.I generated image)

Common Problems while cultivating Azolla and there solutions:

Problem	Reason	Solution
Yellow Azolla	Nutrient Deficiency	Add cow dung & SSP
Slow growth	Shade or Temperature Mismanagement	Give sunlight & cover in winter
Rotting	Deep Water	Reduce the level of water
Thin Growth	Nutrient Depletion	Replace the soil
Contamination	Poor Hygiene & Maintenance	Use of clean water & Harvest regularly.

Comparative study on space requirement and production cost : With decreasing land and increasing cost of conventional feed, azolla production have proven to be useful for farmers in case of space requirement and production cost when compared with other major conventional fodders eg: Green maize, Berseem, Mp chari.

Comparative analysis of green fodder crops based on yield, space requirement and cost of production for one quintal:

Fodder	Green fodder yield (q ha ⁻¹)	Space required for 1 quintal (m ²)	Cost of production (₹ quintal ⁻¹)
Green maize	361.00	27.70	24.39
Berseem	1000–1100	9.09–10.00	41.47–45.62
MP Chari (MP Cherry)	523.89	19.09	43.40
Azolla	Equivalent to 5500 q ha ⁻¹	1.82	56.00

Conclusion

In conclusion , Azolla is an affordable , nutrient rich “green goldmine” that addresses the shortage of conventional feed . Its inexpensive cultivation increases the output of milk , meat , and eggs while significantly reducing feed costs . It is an compact solution that ensures both animal health and farmers financial sustainability .

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