

# A Field Study to Boost and Maintain Sustainable Milk Production by Supplementation of Azolla in Dairy Cows

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## Abstract:

Performance of dairy cows in terms of milk production majorly depends on cost-effective feeding management. Balanced and meticulous feeding yields better utilization of nutrients and optimum milk production. Farmers feed their cows with roughages and concentrate (groundnut oil cake and wheat bran) without any consideration about quality and quantity of feed in Cuddalore District of Tamil Nadu. Traditional supplements based on groundnut oil cake and wheat bran are expensive and cannot completely fulfill the nutritional requirements of the animals. There is ample scope for improving the productivity of livestock by better balancing of nutrients and optimizing the utilization of feed resources. Azolla has been reported as potential feed supplement for dairy animals, which has rich nutrient and mineral profile. Hence, an On-Farm trial was conducted to study the effect of Azolla as feed supplement in dairy cows. The control group (C) representing farmers practice was fed paddy straw and green fodder with groundnut oil cake and wheat bran. In the treatment group (T), 1.5 kg fresh azolla/animal/day was supplemented over conventional ration. The average daily milk yield was significantly higher in treatment group.

**Key words:** Azolla, cow, milk production, groundnut cake

## I. INTRODUCTION

Integrated farming system along with livestock and crop production plays pivotal role in the Indian economy and livestock rearing has been a source of primary occupation in rural areas for centuries. Cattle play a remarkable role in providing nutritional and livelihood security for millions of rural households in India. Traditional supplement based on groundnut oil cake and wheat bran is expensive and cannot fulfill the nutritional requirements to animals. Diligent use of feed additives like probiotics and immunomodulators will prevent heat stress effects and maximize the buffaloes' performance and eventually increase the herd profitability [7]. Many researchers [5], [13] and [15] have identified many unconventional feed and fodder to maintain the milk production particularly in off season. Cattle feeding on pasture lands and management aspects depend highly on environmental factors and seasonal availability of fodders and forage [8]. In this connection, azolla holds the promise of providing a sustainable feed for livestock.

Among many factors governing the livestock productivity, feeding accounts for more than 60-70% of the total recurring cost and hence qualitative and quantitative improvement in this aspect will usually improve productivity. There is acute shortage of feed and fodder for dairy animals due to lack of land availability for growing fodder for animals and high population density. The shortage of fodder is therefore compensated with the use of readymade commercial feed resulting in increased cost of milk production. The search of alternatives to green fodder and concentrates led to a wonderful plant azolla, which holds the promise of providing a sustainable feed for livestock.

Azolla is a free floating, rapidly growing aquatic fern on water surface. It floats on the surface of water by means of numerous, small, closely overlapping scale-like leaves, with their roots hanging in the water. They form a symbiotic relationship with the cyanobacterium *Anabaena azollae*, which fixes atmospheric nitrogen, giving the plant access to this essential nutrient. Under ideal conditions, it grows exponentially, doubling its biomass in every three days. It produces more than 4 to 5 times of protein of excellent quality in comparison to hybrid napier and lucern, respectively. Green plants have long been recognized as the cheapest and most abundant potential source of proteins because of their ability to synthesize amino acids from a wide range of virtually unlimited and readily available primary materials. Azolla is very rich in proteins, essential amino acids, vitamins (vitamin A, vitamin B12, Beta Carotene), growth promoter intermediaries and minerals including calcium, phosphorous, potassium, ferrous, copper and magnesium. Azolla has been reported as one of the most economic and efficient feed substitutes for livestock for the primary reason that it can be easily digested by livestock due to its high protein and low lignin content. Azolla is called "Green Gold" due to these characteristics [17].

Azolla has been used successfully as a protein supplement to dairy animals. According to [1] milk yield was increased by 15 to 20% after feeding azolla in the diet of dairy cows. [12] reported that the main character influencing the value of azolla as feed, is its amino acid composition.

Therefore, the present study was done with the objective to evaluate the use of Azolla meal as feed supplement in the diet of crossbred cows in rural areas of Cuddalore district, Tamil Nadu where animal keepers generally use groundnut oil cake and wheat bran as concentrate rations.

## II. MATERIALS AND METHODS

The present study was carried out by establishing azolla production units in selected villages of Cuddalore District, Tamil Nadu by experts of Division of Animal Husbandry, Annamalai university. The livestock owners were properly trained by on and off campus on azolla production technology, according to [4]. Thereafter, a survey was conducted to assess the feeding, milk production and physical health status of animals in selected villages where azolla production units were established and an On-Farm Trail was conducted to study the effect of azolla on crossbred cows milk yield in selected villages. For this purpose 20 lactating crossbred cows of first to third lactation of 4 to 8 years old at mid lactation were selected for the study and randomly distributed into two groups of ten animals in each. The crossbred cows were hand-milked twice daily. Daily milk yield of each animal was recorded for a period of 2 months. The control (C) group (n=10) farmers practice was fed groundnut oil cake and wheat bran, paddy straw and grazing whereas, the treatment (T) group (n=10) was fed with same quantity of roughages and concentrate with supplementation of 1.5 Kg fresh green azolla (*Azolla pinnata*). The feeding trial lasted for two months. During the trial, daily milk yield were recorded and physical health status of animals were observed.

## III. RESULTS AND DISCUSSION

The present study was undertaken to know efficacy of feeding azolla on milk yield of lactating crossbred cows under field conditions. The milk yield showed increasing trend and it increased to 9.80 L/day from 9.0 L/day after 60 days of feeding 1.5 Kg azolla per day with conventional feed groundnut oil cake and wheat bran.

On an average, milk yield increased by 0.8 L/day. About 9.0 percent increase in the milk yield is a tremendous improvement. It is in confirmation with [14], [9] and [4] in buffaloes. Whereas, [6] found 10% increase in milk yield in lactating buffaloes. [2], [1], [11] and [3] found similar results in cross bred cows. In contrast, [10] found no significant difference among the groups with respect to milk yield in crossbred cows. [12] reported that the main character influencing the value of azolla as feed is its amino acid composition.

Table I. Efficacy of Feeding Azolla Over the Control Group

S.No	Treatments	Milk yield (L/day)
1	T1 = As per farmers' practice (groundnut oil cake and wheat bran, paddy straw, grazing)	9.0
2	T2= T1 + Deficiency of nutrients was fulfilled by providing green azolla meal (1.5Kg/day/animal)	9.8
3	Average Increase	0.8
4	Percent Increase	9.0

In various studies, it is revealed that the azolla can be fed to milch animals without any adverse effects. In this study, the azolla-fed group has not only shown increase in milk yield but also showed improvement in the animals' physical health status and reproductive efficiency. It is thereby concluded that feeding fresh green azolla with groundnut cake enhanced the milk production. In addition, the animals manifested excellent sign of health such as improved hair coat, skin glossiness, brightness in eyes, muzzle moistness and activeness. The animals also manifested perfect estrous signs and settled to service during the trial period. Therefore, it can be culminated that azolla can be used as a valuable green feed supplement for dairy cows, particularly under low input livestock production systems, where livestock owners fed only groundnut cake as concentrate or unbalanced concentrate ration to fulfill the nutrient requirement of animal.

#### IV. CONCLUSION

In accordance with the study, feeding of azolla is highly recommended for dairy cows to boost and maintain sustainable milk production. Azolla along with groundnut cake can fulfill the comprehensive nutritional requirements of dairy cows and help in production of milk at least cost ration.

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