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Comparative yields of Azolla (*Azolla pinnata*) grown on dairy farm liquid waste and conventional methods

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Abstract
The present investigation was carried out to determine the comparative yields of *Azolla pinnata* on Conventional method and bioremediation method. The mean quantities of Azolla (g/m^2) obtained from conventional and bioremediation methods were137.5±3.15 and 124±2.07, respectively and the difference in yield was significant (P<0.01) between the methods. Eighteen Nellore lambs having uniform body weights were selected and randomly divided into 3 groups T0 (0% Azolla), T1 (10% Conventional Azolla), and T2 (10% Phytoremediation Azolla obtained from dairy farm liquid waste) of 6 lambs in each group. The experimental diets were offered to the lambs for a period of 90 days. The Azolla obtained from bioremediation of dairy farm liquid waste is as good as Azolla produced from conventional method and can be successfully used as economic protein source in lambs. This may be the first report of Azolla yield recorded on buffalo farm liquid waste.

Keywords: Azolla, yield comparison in conventional and dairy farm liquid waste

Introduction
Azolla is an Aquatic plant species because of their growth habit appear not to accumulate secondary plant compounds and therefore offer a great potential than tree leaves as a source of protein for monogastric animals. Of these aquatic plant species, the heterogeneous leptosporingiate free floating fern Azolla which grows in association with blue green algae appears to have a potential in replacing conventional protein to a large extent. Azolla belonging to the order Salviniales and family Azollacea is the most promising from view point of ease of cultivation, greater biomass production and high nutritive value. Azolla can fix atmospheric nitrogen with help of blue green algae, Anabaena azollae, which makes the azolla tend to contain relatively high level of nitrogen and can be a protein source for animal feeding. The yield of Azolla reported (390 and 380 g/m^2) by Cherryl *et al.* (2013) [1] and by Liu *et al.* (2008) [6] (100 g/m^2) and Pillai *et al.* (2002) [2] (250-300g/m^2). The present research was carried to find out the comparative yields of *Azolla pinnata* grown on dairy farm liquid waste and conventional methods.

Materials and Methods
Animals and experimental design
Eighteen weaned Nellore lambs of about four months age were selected from Livestock Farm Complex, NTR College of Veterinary Science, Gannavaram and were randomly divided into three equal groups of six animals each on the basis of body weight (BW) in a completely randomized design (CRD). The average body weight (Kg) in each of the group was similar before the start of the experiment. The particulars of the experimental lambs and experimental design are presented in the Table-1.

Housing of lambs
All the experimental lambs were housed in a small animal shed with good ventilation and provision for individual feeding. Fresh, clean drinking water was provided to the animals throughout the day. All the lambs were stall-fed throughout the experimental period. Cleanliness and hygiene was maintained in the shed throughout the experimental period.

Cultivation of Azolla

Conventional method

For the cultivation of Azolla in the conventional method, 6 cement concrete troughs each having the dimensions 6ft × 2ft × 1ft (LXWXD) were used. All the troughs were leak proof and having the even bottom. A thin layer of 10 cm soft soil was spread in the trough such that no large stones or any other contaminants existed. Later, water was filled to a three fourth level in each trough and regular care was taken to maintain the water up to the same level. About 3 kg of fresh buffalo dung dissolved in 10 liters of water was added into each trough with thorough mixing such that the mixture was spread evenly throughout the area. About 5 g of super phosphate dissolved in 5 liters of water was added to the soil in a zigzag manner. Once the preparation was completed, each pit was inoculated with 0.5 kg of fresh and pure culture of Azolla and water was sprinkled over it. The pH of the bottom organic matter and the top water were tested regularly. Once in every 15 days, 3 kg buffalo dung, 5 g super phosphate and 5 g of mineral mixture (Ranmix) per tub were added to obtain continuous growth of Azolla and to avoid nutrient deficiency. Azolla was harvested every week from the troughs, washed thoroughly in clean water, weighed and recorded the yield.

Phytoremediation

The Azolla also cultivated in dairy farm liquid waste in 6 cement concrete troughs each having the dimensionsof6ft× 2ft × 1ft (LXWXD). All the troughs were leak proof and having the even bottom. A thin layer of 10-15 cm soft soil was spread in the trough such that no large stones or any other contaminants existed. Later, the trough was filled with dairy farm liquid waste up to three fourth height. About 5 g of super phosphate dissolved in 5 liters of water was added to the soil in a zigzag manner. Once the preparation was completed, each trough was inoculated with 0.5 kg of fresh and pure culture of Azolla. The pH of the dairy farm liquid waste was tested regularly. Once in every 15 days 5 g super phosphate and 5 g of mineral mixture (Ranmix) was added per trough to obtain continuous growth of Azolla and to avoid nutrient deficiency. Azolla was harvested every week from the troughs, washed thoroughly in clean water, weighed and recorded the yield.

Table 1: Description of the experimental design for growth trial

	C (Concentrate)		T-1 (10% protein replacement in concentrated feed with Conventional Azolla)		T-2 (10% protein replacement in concentrated feed with Bioremediation Azolla)	
	Tag No	**BW (Kg)**	**Tag No**	**BW(Kg)**	**Tag No**	**BW(Kg)**
	119	16.6	84	16.5	136	16.4
	99	16.4	93	16.1	85	16.0
	92	16.3	66	15.3	128	14.3
	E10	12	94	15.1	R8	11.0
	R4	10.5	R9	9.6	R5	13.7
	R6	9.8	E12	8.6	E11	9.8
Mean Body weight		13.6±1.3		13.53±1.42		13.53+1.08

Dietary treatments

The nutrient requirements of the experimental lambs were met from Hybrid Napier green fodder and concentrate mixture as basal diet as per the nutrient requirements (ICAR-2013). Group I lambs (T0) were fed with Hybrid Napier green fodder and concentrate feed, Group II (T1) received similar to T0 diet except 10% of the protein in the concentrate feed replaced with conventionally produced Azolla, Group III (T2) received similar to T0 diet except 10% of the protein in the concentrate feed replaced with Azolla obtained through phytoremediation of dairy farm liquid waste. Care was taken that all the rations were isonitrogenous. The composition of the experimental ration in mentioned in Table-1.

Table 2: Ingredient composition of the experimental ration

S. No	Ingredient	Control	T1	T2
1	Maize	35	35	35
2	Dorb	31	31	31
3	Ginguly cake	11	8.0	8.0
4	Soyabean meal	20	17.5	17.5
5	Min mix	2.0	2.0	2.0
6	Salt	1.0	1.0	1.0
7	Azolla	0	9.5	9.7
8	Cost of the ration	25	23	23

Results and Discussion

Table 3: Yield of Azolla (g/m2) obtained from conventional and bioremediation methods

S. No	Trough No	Azolla Yield (g/m^2)	
		Conventional	**Bioremediation**
1	1	145	126
2	2	134	128
3	3	127	115
4	4	148	128
5	5	136	127
6	6	135	122
7	Overall mean	137.5^{a}±3.15	124^{b}±2.07

Means with different superscripts row wise differ significantly (P<0.01) **

The mean quantities of Azolla (g/m^2) obtained from conventional and bioremediation methods were137.5^{a}±3.15 and 124.33^{b}±2.07, respectively and the difference in yield was significant (P<0.01) between the methods. Compared to the conventional method, 13.17(g/m^2) less biomass of Azolla obtained in bioremediation method. The reason for less yield

of Azolla recorded under bioremediation method may be due to more pH in the dairy farm liquid waste (7.96) compared to neutral pH in conventional method. The yield of Azolla obtained in the present study was less compared to the yield of Azolla reported (390 and 380 g/m^2) by Cherryl *et al.* (2013) [1] and higher compared to the yield reported by Liu *et al*. (2008) [6] (100 g/m^2) and Pillai *et al*. (2002) [2] (250-300g/m^2).

Conclusion

The Azolla obtained from bioremediation of dairy farm liquid waste is as good as Azolla produced from conventional method and can be successfully used as economic protein source in lambs.To the best of our knowledge, this may be the first report of Azolla yield recorded on buffalo farm liquid waste.

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Conflict of Interest

The authors declare no conflict of interest regarding the submission of this manuscript.

References

1. Cherryl DM, Prasad RMV, Jayalakshmi P. A study on economics of inclusion of *Azolla pinnata* in swine rations. International Journal of Agricultural Sciences and Veterinary Medicine. 2013;1(4):50-56.
2. Gevrek MN. The performance of *Azolla mexicana* in Turkish rice field. CIHEAM Options Mediteraneennes. 2001;58:1-4.
3. Giridhar K, Elangovan AV, Khandekar P, Sharangouda, Sampath KT. Azolla's cultivation and its usage as feed supplement for livestock. Published by National Institute of Animal Nutrition and Physiology Adugodi, Banglore, 2013.
4. Kumar DS, Prasad RMV, Kishore KR, Rao ER. Effect of azolla *(Azolla pinnata)* based concentrate mixture on nutrient utilization in buffalo bulls. Indian Journal of Animal Research. 2012;46:268-271.
5. Lakshmi RKS, Seshaiah CV, Reddy PR, Nagaraja K, Kumar I. Influence of Incorporation of Azolla Meal on Performance of Laying Japanese Quails. Indian J Anim. Nutr. 2019;36(1):47-50.
6. Liu X, Min C, Xia-Shi L, Chugchu L. Research on some functions of azolla in CELSS system. Acta Astronautica 2008;63:1061-1066.
7. Pillai KP, Premalatha S, Rajamony S. Azolla –A Sustainable feed substitute for livestock. LEISA India. 2002;4:15-17.
8. Sireesha K, Chakravarthi MK, Gangaraju G, Ramana JV, Suresh J, Naik BR. Growth performance of Newzealand White Rabbits Fed with graded levels of Azolla (*Azolla pinnata*) in the basal diet, 2016.
9. Veerabahu C, Radhika D, Mohaideen A, Indrani S, Priya R. Phytochemical and biochemical profiles of *Azolla microphylla* cultured with organic manure. Int. J Curr. Agric. Res. 2015;4(8):131-133.