

Comparative evaluation of 'Azolla' with Wheat Bran & Mustard Cake in Cross Breed Cow

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INTRODUCTION

Azolla is a floating fern and belongs to the family of Azollaceae. Azolla hosts symbiotic blue green algae, *Anabaena azollae*, which is responsible for the fixation and assimilation of atmospheric nitrogen. Azolla, in turn, provides the carbon source and favourable environment for the growth and development of the algae. It is this unique symbiotic relationship that makes Azolla a wonderful plant with high protein content. Azolla is easy to cultivate and can be used as an ideal feed for cattle, fish, pigs and poultry, and is of value as a bio-fertilizer for wetland paddy (Pillai *et al.* 2002)

In present scenario to meet the demand for milk production and increase the profitability of animal husbandry, the fodder requirement in cross breed cattle is essential. Yet, at the same time, there is a substantial decline in fodder availability. The shortage of fodder is therefore compensated with commercial feed, resulting in increased costs in meat and milk production. Moreover, as commercial feed is mixed with urea and other artificial milk boosters, it has a negative effect on the quality of milk and the health of the livestock. So, the trials have been carried out by using Azolla as a feed substitute.

Azolla is very rich in proteins, amino acids, vitamins like vitamin A, vitamin B₁₂ and Beta- Carotene, growth promoter intermediaries and minerals like calcium, phosphorous, potassium, ferrous, copper, magnesium etc. On a dry weight basis, it contains 25 - 35 percent protein, 10 - 15 percent minerals and 7 - 10 percent of amino acids, bio-active substances and bio-polymers. The carbohydrate and fat content of Azolla is very low (Kathirvelan *et al.* 2015). Its nutrient composition makes it a highly efficient and effective feed for livestock. Livestock easily digest it, owing to its high protein and low lignin content, and they quickly grow accustomed to it. Moreover, it is easy and economic to grow. In India also, Dairy farmers have started to take up the low cost production technology as Azolla feeding in cattle in particular those who have too little land for fodder production.

MATERIALS AND METHODS

The performance of Azolla feeding were evaluated and compared with wheat bran and mustard cake in crossbreed cattle in rural/ tribal areas of Dumka. Twenty cross breed cattle were subjected to this present study. All these cattle were randomly divided in to four groups Viz. Gr I, Gr. II, Gr. III and Gr IV, each of having 5 cattle. All these cattle are between 4- 6 years old age. All the cattle included in this study were reared at 10 marginal farmers, having 2 cattle to each farmer. The cattle were kept in same possible manage mental condition in the farm house of their marginal farmers and kept on following feeding schedule.

Group I- F.P. (paddy straw with wheat bran & mustard cake (2 kg/anim./day)

Group II - Paddy straw + concentrate mix. (2 kg/animal/day)

Group III - F.P. + Azolla (1.5 kg/animal/day)

Group IV - F.P. + concentrate mix. + Azolla

Observation to be recorded

The parameter to be recorded during the trial were the change in milk production (in liter), fat and SNF (%) after 1 month, 2 months, 3 months and 4 months of

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ABSTRACT

Azolla is used as an ideal feed for cattle as it is rich in proteins, essential amino acids, vitamins (vitamin A, vitamin B12 and Beta-Carotene), growth promoter intermediaries and minerals like calcium, phosphorous, potassium, ferrous, copper, magnesium etc. Twenty cross breed cattle subjected to this present study were randomly divided in to four groups with following feeding schedule; Group I- FP (paddy straw with wheat bran & mustard cake (2, kg/anim./ day); Group II - Paddy straw + concentrate mix. (2 kg/animal/day); Group III F.P. + Azolla (1.5kg/animal/day) and Group IV - F.P + concentrate mix. + Azolla. At the age of 4 months, a significantly increase in milk production were observed in all group except group I. Significant increase in milk production in Group III indicate that 'Azolla' may be used as low-cost protein and mineral supplement in cross bred cow feed. Increase in Fat% in group III & IV, showed that Azolla can be used for quality milk production. No any health/ disease problem like diarrhea and anorexia etc. were observed in any group. No any significant rise/decrease in SNF% were observed in any group. Rate of milk in group IV i.e. animal feeding wheat bran, MM, Azolla and concentrate mixture were superior after 4 months of observation.

KEYWORD

Azolla, cross breed, mineral mixture.

parturition and compared with 10 days of parturition as base value. The cost of production and B:C ratio were also calculated in each group.

RESULTS AND DISCUSSION

Result of table 1 shows that there were significantly change ($P<0.05$) in milk production of all the three groups (Gr. I, II and III) except Gr I at different time interval i.e. 1 month, 2 months, 3 months and 4 months of parturition.

In group I, a non-significant change ($P<0.05$) in milk production were observed through the period of observation. In group II, the mean milk production at interval of 10 days, 1 month, 2 months, 3 months and 4 months after parturition were 8.92 ± 0.67^{ab} , 10.14 ± 0.64^{ab} , 10.5 ± 0.59^b , 9.6 ± 0.5^{ab} and 8.4 ± 0.3^b , respectively. Statistical analysis shows that a non-significant change ($P<0.05$) in milk production were observed up to 1 month with their base value however, a significant increase ($P<0.05$) in milk production were observed after 2 months with their base value. In group III, the mean milk production at interval of 10 days, 1 month, 2 months, 3 months and 4 months after parturition were 10.28 ± 0.73^a , 10.9 ± 0.67^a , 11.2 ± 0.62^{ab} , 11.5 ± 1.02^b and 9.6 ± 0.50^a , respectively. Statistical analysis shows that a non-significant increase ($P<0.05$) in milk production were observed up to 2nd month with their base value however, a significant increase ($P<0.05$) in milk production were observed after 3 months. In group IV, the mean milk production at interval of 10 days, 1 month, 2 months, 3 months and 4 months after parturition were 11.0 ± 0.7^a , 12.4 ± 0.6^b , 12.46 ± 0.6^b , 12.0 ± 0.54^b and 10.8 ± 0.37^a respectively. Statistical analysis shows that a significant increase ($P<0.05$) in milk production were observed up to 3 months with their base value the after decrease to their base value. Result of this experiment shows that the combined feeding of concentrate mixture with 'Azolla' produce a synergistically increase the milk production up to 3 months of parturition.

The BCR of group IV were also be far better than the rest three groups. Similar results were also shown by (Basak et al. 2002) with Azolla included at 5% improved live weight, feed conversion ratio, protein and energy efficiency, dressing

Table 1: Mean \pm S.E of total milk production (Liter) of cross bred cow in Gr I, Gr II, Gr III and Gr IV within treatment

Gr./period	Gr I	Gr II	Gr III	Gr IV
10 days	8.4 \pm 0.50	8.92 \pm 0.67 ^a	10.28 \pm 0.73 ^a	11.0 \pm 0.7 ^a
1 month	8.6 \pm 0.58	10.14 \pm 0.64 ^a ^b	10.9 \pm 0.67 ^a	12.4 \pm 0.6 ^b
2 months	8.6 \pm 0.56	10.5 \pm 0.59 ^b	11.2 \pm 0.62 ^a ^b	12.46 \pm 0.6 ^b
3 months	8.0 \pm 0.44	9.6 \pm 0.5 ^a ^b	11.5 \pm 1.02 ^b	12.0 \pm 0.54 ^b
4 months	8.4 \pm 0.2	8.4 \pm 0.3 ^a	9.6 \pm 0.50 ^a	10.8 \pm 0.37 ^a
Cost of production/day (Rs.)	80	80	40	100
Gross return/day (Rs.)	240	240	200	280
B:C ratio	3:1	3:1	5:1	2.8:1

Means bearing the same superscript in a column (alphabet) did not vary significantly

percentage and profitability. Azolla can substitute for sesame meal for higher milk yield and milk fat (Kumar et al. 2008).

Result of table 2 shows that there were significantly ($P<0.05$) increase in fat (%) of all the four groups throughout the period of observation. In Group I, the significant ($P<0.05$) increase in fat (%) were observed after 2 months of parturition up to 4 months where as in rest three group i.e. Gr II, Gr III and Gr IV the significant ($P<0.05$) increase in fat (%) were observed after 1 month of parturition.

The increase in Fat (%) may be due to the rich in iron (1000–8600 ppm dry weight), copper (3–210 ppm dry weight) manganese (120–2700 ppm dry weight), vitamin A (300–600 ppm dry weight.), vitamin A (300–600 ppm dry weigh), chlorophyll and carotenes in Azolla. It also contains 4.8–6.7% dry weight crude fat, with 6.1–7.7% and 12.8– 26.4% total fat for the polyunsaturated acids omega 3 and omega 6 (Paoletti et al., 1987). Similar, statements were also confirmed that *Azolla pinnata* could be used as a protein supplement by replacing 30% of the protein content in ruminant diets (Ahirwar et al. 2009).

Table 2: Mean \pm S.E of Fat (%) of cross bred cow in Gr I, Gr II, Gr III and Gr IV within treatment

Gr./period	Gr I	Gr II	Gr III	Gr IV
10 days	3.92 \pm 0.13 ^a	4.04 \pm 0.08 ^a	4.22 \pm 0.19 ^a	4.12 \pm 0.23 ^a
1 month	4.18 \pm 0.11 ^{ab}	4.28 \pm 0.06 ^b	5.10 \pm 0.24 ^b	5.74 \pm 0.30 ^b
2 months	4.28 \pm 0.10 ^{ab}	4.44 \pm 0.06 ^b	5.06 \pm 0.16 ^b	5.58 \pm 0.30 ^b
3 months	4.40 \pm 0.07 ^b	4.44 \pm 0.05 ^b	4.28 \pm 0.21 ^{ab}	5.34 \pm 0.17 ^b
4 months	4.38 \pm 0.05 ^b	4.42 \pm 0.06 ^b	4.52 \pm 0.13 ^{ab}	5.44 \pm 0.20 ^b

Means bearing the same superscript in a column (alphabet) did not vary significantly

Result of table 3 shows that there were non-significant ($P<0.05$) change in SNF (%) in all the four groups throughout the period of observation.

Table 3: Mean \pm S.E of SNF (%) of cross bred cow in Gr I, Gr II, Gr III and Gr IV within treatment

Gr./period	Gr I	Gr II	Gr III	Gr IV
10 days	9.16 \pm 0.08	9.18 \pm 0.18	9.12 \pm 0.14	9.12 \pm 0.14
1 month	9.29 \pm 0.23	9.46 \pm 0.19	9.52 \pm 0.22	9.52 \pm 0.22
2 months	8.95 \pm 0.19	8.98 \pm 0.29	8.8 \pm 0.19	9.08 \pm 0.08
3 months	9.01 \pm 0.16	9.04 \pm 0.16	9.24 \pm 0.16	9.44 \pm 0.11
4 months	9.16 \pm 0.08	9.18 \pm 0.18	9.12 \pm 0.14	9.12 \pm 0.14

Means bearing the same superscript in a column (alphabet) did not vary significantly

CONCLUSION

Azolla can be used as an ideal feed for cattle and started to take up the low-cost production technology especially in rural area of Jharkhand and Bihar as well as those who have too little land for fodder production. Azolla can be used as a good substitute for the cattle feed. azolla can be used for both quality milk production as well as milk production. No any health/ disease problem like diarrhea and anorexia etc. were observed in any group.

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