

EFFECT OF FEEDING DIFFERENT LEVELS OF CONCENTRATE REPLACE WITH AZOLLA ON NAGPURI BUFFALO CALVES

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ABSTRACT

The experiment on the effect of feeding different levels of concentrate replace with Azolla was conducted on six Nagpuri buffalo calves between the age group of 3 to 6 months and weighing between 49 to 62 kg maintained at Cattle Breeding Farm, Nagpur Veterinary College, Maharashtra Animal and Fishery Science University, Telangkhedi, Nagpur during year 2015-2016. Buffalo Calves were divided into two groups. Three dietary supplements were studied of which two treatments were concentrate replace with Azolla @ 20 % and 30 % of the concentrate respectively and the third treatment was standard diet without any concentrate replace. The effect of three treatments was judged on the basis of daily dry matter intake (DM) and growth performance of calves. The study was undertaken by adopting switch over technique and the experimental calves were fed with standard diet for every seven days before the commencement of treatments feeding for 21 days. In this manner 3 feeding sequences were studied. It was noticed that Azolla is good source of protein and also other nutrient intermediates in the animal. The buffalo calves under the treatment dry fodder ad-lib + green fodder + 70 % concentrate + 30 % Azolla showed significantly ($p < 0.05$) higher DM intake day^{-1} (2.65 kg day^{-1}) as compared to control group (2.49 kg day^{-1}) and calves fed with dry fodder ad-lib + green fodder + 80 % concentrate + 20 % Azolla (2.53 kg day^{-1}). Daily weight gain was significantly ($p < 0.05$) higher in calves under treatment 30 % concentrate replace (0.60 kg day^{-1}) followed by 20 % concentrate replace (0.54 kg day^{-1}) and control group (0.40 kg day^{-1}). The mean gain in body measurement (body height, body length and chest girth) showed the non significant effect, although higher values were recorded with increased level of Azolla in concentrate mixture.

(Key words: Azolla, growth, Nagpuri buffalo calves)

INTRODUCTION

Livestock sector is an important subsector of Indian agricultural economy providing livelihood support to the rural population. It is an important component to small farmers since it provides milk, dung, urine besides fetching monetary advantage over sale of livestock. One of the major constraint in maintaining livestock is the non availability of fodder for natural grazing due to decrease in area under forest and grassland and also the introduction of high yielding dwarf crop varieties which in turn force the farmers to depend completely on concentrate feed that incurs high cost.

Breeding tract of Nagpuri buffalo is Nagpur, Akola and Amaravati districts in Vidarbha region of Maharashtra. This is also called as Ellichpuri or Barari. The milk yield is 700 to 1200 kg^{-1} lactation. The age at first calving is 45 to 50 months and inter calving period is 450 to 550 days.

The bullocks are good and heavy trotting work but slow in movement (Anonymous, 2016). Buffalo calves

grow faster and there is continuous growth of animal from birth to young stage. The aim of good feeding of calves during their early life is to attain optimum growth and better feed efficiency thereby to reach early maturity. The young buffalo calves are future replacement stock and need special attention including feeding, management as growth of calves determines the future production as well as reproduction efficiency.

It would be highly beneficial to the farmers if they opt for an economic feed supplement/ substitute that would be produced on farm itself. Azolla which is a free floating aquatic fern is suitable choice as a livestock feed. Azolla is rich in protein, minerals, amino acids, vitamins and growth promoting intermediates. Its nutrient composition makes it an efficient and ideal feed supplement for livestock, poultry, pigs and fish (Lumpkin, 1984).

Thus, Azolla appears to be a potential source of nutrients especially proteins and has a considerably high feeding value (Hossiny *et al.*, 2008). Keeping these facts in view, present study was focused on the "Effect of feeding

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different levels of concentrate replace with Azolla on Nagpuri buffalo calves”.

MATERIALS AND METHODS

The present study was conducted at Cattle Breeding Farm, Nagpur Veterinary College, Maharashtra Animal and Fishery Science University, Telangkhedi, Nagpur. Six Nagpuri buffalo calves between the age group of 3 to 6 months and weighing between 49 to 62 kg were selected for the present study and randomly divided into two equal groups of three calves and were fed three dietary treatments by switch over method for 21 days thrice on constant feed as per treatment with a initial period of 7 days before every switch over with same diet to nullify the effect of previous feeding. Thus, total period of 84 days was required for the study and having total six replications. Three dietary supplements were T₁: Dry fodder adlib + green fodder + 100 % concentrate mixture, T₂: Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and T₃: Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla. Feeding of ad-lib wheat straw was common in all treatments. The concentrate mixture used for the study was manufactured by private company and Azolla produced in this section was used for feeding. The feed samples were analyzed for nutrient contents i.e. Dry Matter (DM), Crude Protein (CP), Crude Fibre (CF), Ether Extract (EE), Nitrogen Free Extract (NFE) and Ash according to analytical procedure suggested by A.O.A.C. (Anonymus, 1990).

The observations were recorded daily for 21 days for dry matter intake and growth performance after completion of gap of 7 days from the day of changing feed as per treatments. Growth performance was judged on the basis of gain in body weight of the experimental buffalo calves along with increment in their linear body measurements (Body height, Body length and Chest girth). The observations were recorded daily and continued for 21 days after a gap 7 days given for changing the diet. The average data pertaining to chemical composition, daily dry matter intake, daily and weekly body weight and body measurements were subjected to statistical analysis as per the procedure given by Ambale (1975).

RESULTS AND DISCUSSION

Chemical composition

It is indicated from the table 1 that the Crude Protein (CP) content of the wheat straw, green maize, concentrate mixture and Azolla were 3.00, 10.00, 18.59 and 23.02 per cent respectively. Crude Protein (CP) content of Azolla was more than the concentrate mixture, green maize and wheat straw. However, Crude Fibre (CF) content in concentrate mixture, Azolla, and green maize were 7.44, 11.00, and 27.05, while that of wheat straw was 35.20 per cent. Moreover, the Ether Extract (EE) and Nitrogen Free Extract (NFE) content of concentrate mixture (3.02 and 59.87 per cent) were more than the content of Azolla (2.03 and 43.75 per cent), wheat

straw (1.00 and 50.80 per cent) and green maize (2.75 and 53.13 per cent). The Ash per cent of concentrate mixture, wheat straw and green maize were 10.09, 14.20, and 10.05, respectively which was less than Azolla (19.75 per cent).

Thus, it can be revealed from table 1 that Azolla is reasonably good source of energy and high source of protein to the animals. Kumar *et al.* (2012) found that CP, EE, CF, NFE and Ash content of Azolla were 22.5, 2.36, 15.2, 33.8 and 26.1 per cent while, concentrate having 20.3, 1.94, 12.1, 58.1 and 7.66 per cent respectively. The present results are in line with their studies.

Dry matter intake

The average daily dry matter intake of buffalo calves day⁻¹ were 2.49, 2.53 and 2.65 kg for the treatment Dry fodder adlib + green fodder + 100 % concentrate mixture, Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla respectively (Table 2). The analysis of variance for DM intake indicated significant differences in buffalo calves under various treatments. However, Average DM intake by the buffalo calves under the treatment Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla feeding was higher as compared to DM intake of the buffalo calves under the treatment Dry fodder adlib + green fodder + 100 % concentrate mixture and Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla. It was further revealed that with the increase in the level of Azolla feeding, there was corresponding significant increase in the dry matter intake. These results are comparable with Udeybir *et al.* (2000), who concluded that, the dry matter intake is higher in growing cattle than in growing buffaloes but buffalo calves utilized dry matter, energy and protein more efficiently for growth than cattle calves.

Growth performance

Body weight

The average weekly gain in body weight animal⁻¹ was noticed as 2.78, 3.83 and 4.27 kg under the treatments Dry fodder adlib + green fodder + 100 % concentrate mixture, Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla respectively (Table 2). The average daily weight gain was 0.40, 0.54 and 0.60 kg under the treatments Dry fodder adlib + green fodder + 100 % concentrate mixture, Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla respectively. The variation among different treatments was found to be statistically significant (p<0.05). Higher total gain (0.60 kg day⁻¹) was noticed in the treatment where 30 per cent Azolla was replaced with concentrate in addition to normal diet.

Thus, it indicated that concentrate replace with Azolla increased the growth rate of buffalo calves. Hozhabr *et al.* (2014) reported daily weight gain in broiler chicks with

Table 1. Chemical composition of experimental feeds fed to Nagpuri buffalo calves (Per cent on DM basis)

Sr. No	Attributes	Wheat straw	Green maize	Concentrate (Calf starter)	Azolla
1	Dry Matter	91.00	19.52	92.04	12.00
2	Crude Protein	3.00	10.00	18.59	23.02
3	Crude Fiber	35.20	27.05	7.44	11.00
4	Ether Extract	1.00	2.75	3.02	2.03
5	Nitrogen Free Extract	50.80	53.13	59.87	43.75
6	Ash	10.00	10.05	10.09	19.75

Table 2. Mean daily dry matter intake, daily and weekly body weight gain of experimental Nagpuri buffalo calves under different treatments

Tre. No.	Treatments	Average body weight (kg)	Dry matter intake (kg day ⁻¹)	Dry matter intake 100 kg ⁻¹ body weight (kg)	Daily weight gain (kg)	Weekly weight gain (kg)
T ₁	Dry fodder adlib + green fodder + 100 % concentrate	78.30	2.49	3.18	0.40	2.78
T ₂	Dry fodder adlib + green fodder + 80 % concentrate + 20 % Azolla.	79.44	2.53	3.19	0.54	3.83
T ₃	Dry fodder adlib + green fodder + 70 % concentrate + 30 % Azolla.	79.47	2.65	3.33	0.60	4.27
	SE (m) ±	0.41	0.10	0.10	0.05	0.32
	CD 5% level	1.26	0.33	0.35	0.16	1.11

Table 3. Mean gain in body measurement of experimental Nagpuri buffalo calves at the end of each period under different treatments (cm)

Treatments	Initial height	Final height	Initial length	Final length	Initial chest girth	Final chest girth
T ₁ (100 % conc.)	86.72	93.34 (6.62)	74.88	81.31 (6.43)	89.17	95.49 (6.32)
T ₂ (80 % conc. + 20 % Azolla)	84.52	90.32 (5.80)	75.31	81.60 (6.29)	88.59	95.09 (6.50)
T ₃ (70 % conc. + 30 % Azolla)	83.94	90.60 (6.66)	74.48	80.45 (5.97)	88.83	94.27 (5.44)
SE (m) ±	-	0.28	-	0.16	-	0.31
CD 5% level	-	-	-	-	-	-

(Feeding green maize and ad lib wheat straw common in all treatments)

incorporation of Azolla meal in ration. Likewise Parthasarathy *et al.* (2006) revealed that, the weight gain of pigs fed with 10 per cent Azolla was 10 per cent more but the differences among the other Azolla fed groups (viz., 0, 20 and 30 %) were non-significant. The present results are well comparable with them in general.

Body measurement

The results obtained in respect of the body height, body length and chest girth are presented in table 3.

Body height

The mean daily gain in body height during 21 days was 6.62, 5.80 and 6.66 cm for the treatments Dry fodder adlib + green fodder + 100 % concentrate mixture, Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla respectively. Although there was increase in body height with the increase in Azolla share in diet, the variation among different treatment groups was found statistically non significant ($p > 0.05$).

Body length

The mean daily gain in body length during the 21 days was noticed as 6.43, 6.29, and 5.97 cm under the treatments Dry fodder adlib + green fodder + 100 % concentrate mixture, Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla respectively. The variation among different treatment groups was found statistically non significant ($p > 0.05$).

Chest girth

The mean daily gain in body chest girth during the 21 days was noticed as 6.32, 6.50 and 5.44 cm under the treatments Dry fodder adlib + green fodder + 100 % concentrate mixture, Dry fodder adlib + green fodder + 80 % concentrate mixture + 20 % Azolla and Dry fodder adlib + green fodder + 70 % concentrate mixture + 30 % Azolla, respectively. The variation among different treatment groups was found statistically non significant ($p > 0.05$).

Although, the body measurements were statistically non significant, there was corresponding increase in the values of body height, body length and chest girth with corresponding increase in Azolla content in feed concentrate.

Adake *et al.* (2016) reported that, mean gain in body measurement of Osmanabadi goat kids showed the non significant effect, although higher values were recorded with increased level of Azolla in concentrate mixture.

Mohamed *et al.* (2010) observed that, different levels of concentrate (high and low) significantly affected on heart girth of dairy heifers. They also observed that the correlation between live weight and heart girth was positive and significant. The present results are in accordance with their results.

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Rec. on 30.06.2016 & Acc. on 27.07.2016