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Evaluation of Complete Rations Containing Road Side Grass, Maize (*Zea mays*) Silage or Water Hyacinth Leaves (*Eichhornia crassipes*) in Bangladeshi Bull Calves

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Abstract: Nine indigenous bull calves of about 2 years old were divided into 3 groups (3 animals in each). Three rations (A,B & C) were supplied to these groups randomly. The aim of investigation was to evaluate the effect of different rations on the performance of bull calves. Total dry-matter (DM) intake (kg/d) of the animals fed on diet B (2.42) was higher than that of other two. Digestibility of DM was similar in all three cases. Digestibility values for crude Protein (CP) and Ether extract were higher in treatment B group significantly ($P<0.05$) than the other two groups. Digestibility of crude fibre (CF) was higher in treatment A and B groups than that of C. Treatment group B also showed higher live weight gain (152 g/d) than that of group C (115 g/d) and group A (107/gd). The differences were statistically significant ($P<0.01$). Feed efficiency of diet group B (16.61) was also showed statistically higher ($P<0.05$) than that of treatment group C and treatment group A.

Key word: Evaluation, Ration, Bull Calves.

Introduction

In Bangladesh, very little land is available for fodder and feed production and livestock are fed mainly on low nitrogen & mineral but high lignin & silica containing rice straw. So most of the animals are underfed and suffer from malnutrition. Many research works have been done to overcome this problem.

The abundance of road-side grasses in Bangladesh provides an ideal nutritive and economic feed for livestock (FAO, 1987). The intensive cropping system involves more land to produce cereals than fodder production. Road side grass can be used as main green roughage source for livestock. Water hyacinth an aquatic plant abundantly available in Bangladesh can be used as feed for cattle. The growth rate of water hyacinth is very high and it requires no extra land and at the same time no extra labour for its cultivation. Its utilization in the ration of various classes of livestock has been reported (Khan *et al.*, 1981). Round the year availability of this aquatic weed at particularly no cost has prompted to utilize it as a potential fodder source in the ration of cattle. During the scarcity of conventional feed, water hyacinth is the only green fodder which can be used to accelerate the livestock improvement program in Bangladesh.

Maize is another nutritious feed for animals. This seasonal plant can easily be grown in Bangladesh in low, high and sloppy land. It can easily be stored as silage for cattle feed round the year or in scarcity period. Considering the above facts, investigations are required on the growth response of animal, feeding complete ration with roadside grass or water-hyacinth or maize silage. So attempt was made to prepare three types of bulky rations to evaluate their feasibility as a livestock feed.

Materials and Methods

The experiment was conducted with-9 growing bull calves of indigenous origin (about two years of age) for a period of 90 days. The roadside grass and water hyacinth leaves were collected twice daily.

Preparation of maize silage: The green fodder of maize was harvested at the age of 2 months. The plants were chopped in the length of 15-20 cm. and were put into the soil pits. The pits were covered in such a way, so that no air and water from outside can enter in. Two months after ensiling, silage was supplied to the experimental animals.

Animals and diets: Bull calves were grouped into 3, (3 animals in each). Each group of the animals was supplied with each of the 3 diets (A, B & C)(Table1). The concentrate mixture was provided in quantities to satisfy 1/3 rd of the DM requirements. The animals were fed twice daily at the rate of 3% DM of the body weight per day. Daily feed intake was recorded through subtracting amount of leftover from supplied amount of feed. The animals were weighed at the beginning and then once in a week thereafter throughout the experimental period.

A conventional digestibility study was done one week before the end of the experimental period by total collection of feces over 7 days.

Table 1: Composition of the experimental diets (2/3 parts roughage and 1/3 part concentrate of requirement) .

Ingredients	Diets		
	A	B	C
Percentage of DM of required roughage			
Rice straw	40	40	40
Road side grass	60	-	-
Maize silage	-	60	-
Water hyacinth	-	-	60
Percentage of DM of required concentrate			
Wheat bran	27	27	27
Rice polish	40	40	40
Till Oil cake	25	25	25
Fish meal	5	5	5
Bone Meal	2	2	2
Common salt	1	1	1

Analytical methods and design of experiment: Proximate components of the representative sample of feed and feces were determined following the methods of A.O.A.C. (1980).

Table 2: Proximate components of feed ingredients of experimental diets.

Ingredients	DM%	Organic matter OM%	Crude protein (CP%)	Ether extract (EE%)	Crude fibre (CF%)	Nitrogen free extract %	Total Ash %
Rice straw	87.64	87.32	3.26	1.07	33.98	49.01	12.64
Road side grass	24.62	90.81	6.62	1.74	22.90	59.55	9.19
Maize silage	15.15	89.34	10.46	1.20	24.40	53.28	10.66
Water hyacinth	13.59	89.55	14.80	3.38	18.55	53.82	10.45
Concentrate mixture	87.55	88.14	16.39	4.59	9.99	57.17	11.86

Table 3: Digestibility co-efficient of proximate components and over all performance of indigenous bull calves on experimental diets.

Attributes	Groups			Level of significance
	A	B	C	
Digestibility (%)				
Dry Matter (DM)	58.6	59.8	54.1	Ns
Crude protein (CP)	44.5	52.7	43.2	*
Crude fibre (CF)	82.7	82.4	77.7	NS
Ether extract (EE)	76.0	84.7	79.7	*
Animal performance	-	-	-	-
Initial live weight (kg)	65.7	64.7	66.3	-
Final live weight (kg)	75.3	78.3	76.3	-
Live weight gain (g/d)	107	152	115	**
DM intake (kg/d)	2.31	2.42	2.29	NS
Feed efficiency (kg intake/kg gain)	21.74	16.61	19.92	*

* = $P<0.05$ ** = $P<0.01$ NS = Non Significant.

The statistical design followed was the completely randomized design (CRD) (Steel & Torrie, 1980).

Results and Discussion

Total dry matter (DM) intake (kg/d) by animals fed maize silage based diet B (2.42) or road-side grass based diet A (2.31) was higher than those fed on water-hyacinth based diet C (2.29) (Table 3). DM intake of diet B was higher than diet C non-significantly. This difference might be due to more palatability of maize silage.

Proximate components of feed ingredients of experimental diets are shown in Table 2. It is quite evident that proximate component of experimental rice straw was similar to the findings of Kibria *et al.* (1990) and Chakraborty *et al.* (1992). Roadside grass contained 90.81% OM. 6.62% CP, 1.74% EE, 22.09% CF, 59.55% NFE, & 9.19% total ash (Table 2). These results are in agreement with Kibria *et al.* (1990). Jahanara (1992) found 29.82% CF and 1.51% EE in roadside grass which are similar to the present findings. She obtained higher percentage of CP, NFE & total ash. The chemical composition of water hyacinth leaves used in the ration were 89.55% OM, 14.80% CP, 3.38% EE, 18.55% CF, 53.82% NFE and 10.45% total ash. Biswas and Mandal (1987) found 2.05% EE and 51.86% NFE, which are similar to the present findings but they obtained higher percentage of CP, total ash and lower percentage of CF. Reza and Khan (1981) found 14.95% CP, which is similar to this finding but they obtained lower percentage of DM, EE, CF and NFE. Chemical composition of water hyacinth depends upon many factors, of which species is the most important factor (Linn *et al.*, 1975). The composition of water hyacinth varies from water to water where it is grown. Table 2 shows that maize silage contained 89.34% OM, 10.46% CP, 1.20% EE, 24.40% CF, 53.28% NFE and 10.66% total ash. Verma and Mojumdar (1984) found 10.08% CP, 1.59% EE and 25.00% CF in maize silage which are similar to that of present findings but dry matter and ash content of their experiment were higher than the present findings. They obtained lower percentage of nitrogen free extract.

Digestibility co-efficient of proximate component and overall performance of the experimental animals are shown in Table 3. It is evident that the digestibility co-efficient of DM of diet B was higher than that of diet A and diet C which might be due to higher CF (24.4) content and palatability of maize silage which might enhance microbial affinity. But the difference of three diets was not statistically significant. Digestibility of DM of diet C (54.1) was slightly lower than the findings (56.88) of Podder *et al.* (1991) who used wilted water hyacinth in complete ration. This variation might be due to variation of combination of ingredients in ration. The highest CP digestibility (52.7) of diet B was statistically significant ($P<0.05$) than diet A (44.5) and diet C (43.2). It might be due to easily elevated nitrogen (Verma & Mojumdar, 1984 and Brosh *et al.*, 1989). CP digestibility of diet C was lower than the findings of Podder *et al.* (1999) (52.56) and Biswas & Mandal (1988) (60.3). Verma & Majumdar (1984) and Brosh *et al.* (1989) found 58.2 and 64.3% CP in digestibility of maize silage containing ration respectively which was higher than the present work. Diet C showed lower digestibility of CF as compared to diet A and B ($P>0.05$). Diet A and B showed almost similar CF digestibility. It might be due to lower affinity of microbes to the CF of water hyacinth. This result is agreed with the findings of Khan (1977). Diet B showed significantly higher percent digestibility of EE (84.73) than diet C (79.72) and diet A (76). Ether extract digestibility of diet C was higher than the findings of Biswas & Mandal (1988) (67.7). The difference was statistically significant ($P<0.05$). The animals fed on diet B showed higher weight gain (152.g/d) than diet C (115 g/d) and diet A (107 g/d). The differences in live weight gain among the treatment groups was highly significant ($P<0.01$). This finding is agreed with that of Borland & Keshar (1975). Maximum body weight gain was observed in group B and minimum in group A having rice straw + road side grass + concentrate mixture. Borland

and Keshar (1979) obtained similar results in calves fed on maize silage based diet. The higher live weight gain in animals fed on diet B than that of diet C and diet A could have been due to higher digestibility of DM, CP and EE. Generally EE supplies 2.25 times more energy than carbohydrate and protein. So it might also be the cause of higher live weight gain in treatment group B. Highest feed efficiency was observed in group B than in group A followed by group C. Differences in feed efficiency among treatment groups were statistically significant ($P < 0.05$).

It may be concluded that maize silage in combination with straw and concentrate mixture can be fed to growing animals for better performance. Fresh water hyacinth can also be supplied to local bull calves in combination with straw and concentrate mixture without any adverse effect on growth .

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