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Effect of Partial Green Grass over Dry Feeding on the Productive Performance of Early Lactating Crossbred Cows in Bangladesh

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Abstract: This study was undertaken with a view to determining the effect of partial green grass over dry feeding on the productive performance of early lactating crossbred cows. With that understanding, fifteen early lactating crossbred cows having nearly similar body weight, body condition score, milk yield and stage of lactation were selected and divided into three groups composed of five in each group (A, B and C group). Cows of A group received 2 kg concentrates without green grass daily. Group B and C received daily 1.85 kg conc. + 3 kg green grass and 1.75 kg conc. + 6 kg green grass respectively along with *ad libitum* straw for each cow of all groups. Daily feed intake were recorded. Live weight changes of cows were measured fortnightly and condition scores were measured before starting and at the end of the experiment. Milk composition (fat, SNF, protein and ash) as percentage were determined monthly. The average daily DM intake were 7.07±0.12, 7.16±0.03 and 7.78±0.04 kg for A, B and C group, respectively. This study showed that the DM intake, live weight gain, body condition score, milk yield and milk composition in respect of fat, SNF and protein were significantly ($p<0.01$ and $p<0.05$) higher in C group followed by B group and lowest values obtained in A group. Considering the present research, it would be fair to conclude that the partial green grass over dry feeding showed the positive effect on the productive performance of early lactating crossbred cows.

Key words: Green grass, dry feed, *Ad libitum*, crossbred cows, production, performance

Introduction

Like all other rice growing country in Asia, straw contributes more than 80-90% of the total available feed for cows in Bangladesh (FAO, 1980). Under the prevailing condition, the formulation of conventional balanced ration is essential because of limited feed stuffs, both qualitatively and quantitatively. The strategy therefore, is to manipulate this limited quantity of feed supplement, cereals, cereal by-products and green grass in such a way that the basic requirement are minimized. Green grass play an important role in increasing the performance of early lactating crossbred cows. However, in view of its limited availability, cows are mainly reared on dry feeds (straw and concentrates). It is interesting to note that a reasonable number of landless and marginal farmers using crossbred cows as a profitable enterprise. But, poor farmers can't spare land for fodder production for dairy cattle feeding. They maintained their cows mainly on rice straw and concentrates. It has also been observed that minimum quantity of green grass are essential for normal function of the digestive tract of the dairy cattle. Under our condition, nutrients from green grass are cheaper than that from concentrates and that is why we should supply partial green grass over dry feeding for giving maximum out put which are financially profitable for the dairy farmers.

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Materials and Methods

The proposed research programme was carried out at the Dairy Farm under the Department of Dairy Science, Bangladesh Agricultural University, Mymensingh. Fifteen early lactating crossbred dairy cows nearly similar in body weight, body condition, stage of lactation and milk yield were used in this experiment for a period of 120 days. Each of the more similar five cows with respect to the above considerations was allotted to one of the three groups at random.

Formulation of Diets

The experimental diets were formulated with rice straw, green grass, wheat bran, till oil cake and rice polish (Table 1). All the groups were given 2, 1.85 and 1.75 kg concentrate mixture containing 1, 0.85 and 0.75 kg wheat bran for A, B and C group, respectively, but 0.5 kg till oil cake and 0.5 kg rice polish supplied to all groups. 0.5% common salt was supplied as mineral supplement. Diet for A group was considered as control having without green grass, diet for B and C group having 3 and 6 kg green grass, respectively with limited concentrate mixture. *Ad libitum* straw was supplied as a basal diet to the cows of all groups. The ration was formulated according to Agricultural Research Council (ARC, 1980).

Feeding of Animals

In every morning and evening before feeding the cows, each of the ration was weighed carefully and quantity of feed supplied to individual cows was recorded daily. From the second day of feeding trial, before supplying feed to the cows, the leftover of the feed was collected, weighed and recorded. The refused feed of each individual cows during 24 h was deducted from the supplied feed to the cow on the dry matter basis. Clean water was supplied in every morning. Feed intake and live weight gain of each cow were recorded daily and fortnightly, respectively. Body condition scores were estimated before the start and after the end of the experiment. Milk samples were collected from each cow and were analyzed before the start and every after 30 days up to the end of the experiment.

Chemical Analysis

All the feed stuffs used in this experiment were analyzed at the beginning of the trial in the Animal Science Laboratory of the faculty of Animal Husbandry of Bangladesh Agricultural University, Mymensingh for dry matter and crude protein content. Degradability values and metabolizable energy content of feed stuffs were estimated according to Scottish Agricultural Colleges, 1984. Milk protein and milk fat were analyzed by Kjeldahl method and Gerber method, respectively.

Statistical Analyses

Statistical analysis of the collected information were carried out by using analysis of variance (ANOVA) technique by a computer using a MSTAT Statistical Computer Package program in accordance with the principle of Completely Randomized Design (CRD). In case of significant difference, LSD (Least Significant Difference) test was performed to monitor the significant difference among different treatment means.

Table 1: Chemical composition of feed ingredients (DM basis)

Ingredients	DM (g kg^{-1})	ME (Mj kg^{-1} DM)	CP (g kg^{-1} DM)
Rice straw	853	6.0	44
Green grass	210	10.0	100
Wheat bran	870	10.7	170
Till oil cake	905	10.0	300
Rice polish	875	9.3	123

Results and Discussion

Dry Matter Intake

The average daily dry matter intake were 7.07±0.12, 7.61±0.03 and 7.78±0.04 kg in the cows of group A, B and C, respectively (Table 2). The average weekly dry matter intake of each cows of three groups were 49.49±0.85, 53.31±0.22 and 54.47±0.35 kg, respectively. Statistical analysis showed that there was significant difference ($p<0.01$) among the different treatment means. Dry matter intake was significantly higher in B and C group than that of A group. The higher dry matter intake in C group followed by B group were due to the supplying of green grass.

The results of this experiment agrees with the result of Sahoo *et al.* (2000) who stated that as the proportion of green fodder in the ration became increased then the dry matter intake also increased.

Live Weight Changes and Body Condition Scores

The average live weight of dairy cows on the first day of the experiment were 276.4±5.6, 282.2±4.8 and 278.4±19.15 kg for group A, B and C, respectively (Table 3). The average daily live weight gain of cows of B and C group were 16.83±3.3 and 26.67±6.97 g, respectively where that of A group was decreased -4.99±19.85g daily. Average total live weight changes of cows over experimental period were -0.6±2.38, 2.02±0.4 and 3.2±0.84 kg for A, B and C group, respectively. Statistical analysis showed that there was significant difference ($p<0.01$) among the live weight changes of different dietary groups. The results of this experiment also agrees with the result of Sanh *et al.* (2002) who stated that increased forge intake increases live weight gain.

Before feeding the experimental diets, average body condition scores of cows of A, B and C groups were 2.61±0.46, 2.54±0.43 and 2.54±0.49, respectively (Table 3). Body condition scores when recorded at the end of the experiment were apparently higher in C group (3.04±0.42), followed by B group (2.78±0.5) that was compared to cows of A group (2.53±0.45) but no significant difference was observed among different treatment groups.

Milk Yield

The average daily milk yield prior to feeding experimental diets were 3.38 L for A and B group and 3.37 L for C group. It is apparent that on the 30th day, the average daily milk yield were 3.48±0.04, 3.51±0.07 and 3.63±0.03 L for A, B and C group, respectively (Table 4). Statistical

Table 2: Dry matter intake (kg) during the experimental period

	Dietary groups			
Parameters	A	B	C	Level of significance
Average amount of supplied feed	8.75±0.00	12.15±0.00	14.75±0.00	-
Average daily feed intake	8.23±0.18	11.13±0.32	13.59±0.52	-
Average daily dry matter intake	7.07±0.12^{c}	7.61±0.03^{b}	7.78^{a}±0.04	**
Average weekly dry matter intake	49.49±0.85^{b}	53.31±0.22^{a}	54.47^{a}±0.35	**

** = Significant at 1% level

Table 3: Effect of partial green grass over dry feeding on growth performance and body condition scores

	Dietary groups			
Parameters	A	B	C	Level of significance
Average initial live weight (kg^{-1})	276.4±5.6	282.2±4.8	278.4±19.15	NS
Average final live weight (kg^{-1})	275.8±6.6	284.22±4.13	281.6±18.88	NS
Average total live weight change (kg^{-1})	-0.6±2.38^{b}	2.02±0.40^{a}	3.2±0.84^{a}	**
Average daily live weight change (g)	-4.99±19.85^{b}	16.83±3.3^{a}	26.67±6.97^{a}	**
Average initial body condition score	2.61±0.46	2.54±0.43	2.54±0.49	NS
Average final body condition score	2.53±0.45	2.78±0.50	3. 04±0.42	NS

NS = Non Significant ** = Significant at 1% level

Table 4: Effect of partial green grass over dry feeding on milk yield

	Dietary groups			
Parameter	A	B	C	Level of significance
Initial average milk yield (L day^{-1})	3.38±0.01	3.38±0.03	3.37±0.02	NS
Average milk yield at different periods (L day^{-1})				
30th day	3.48±0.04^{b}	3.51±0.07^{b}	3.63±0.03^{a}	**
60th day	3.62±0.02^{b}	3.69±0.03^{b}	3.95±0.04^{a}	**
90th day	3.95±0.04^{c}	4.31±0.31^{b}	4.97±0.11^{a}	**
120th day	4.75±0.05^{c}	5.23±0.32^{b}	5.88±0.38^{a}	**
Average daily milk yield (L day^{-1})	3.78±0.36^{b}	3.95±0.56^{ab}	4.47±0.89^{a}	*

NS = Non Significant, ** = Significant at 1% level, * = Significant at 5% level

analysis showed that there was a significant ($p<0.01$) difference among different groups, similarly on the 60th, 90th and 120th day, average daily milk yield of cows of B and C group were significantly ($p<0.01$) higher than that of the control group. During the experimental period the average daily milk yield (L) in each week for A, B and C group were 3.78±0.36, 3.95±0.56 and 4.47±0.89, respectively. Statistical analysis showed that cows that were in B and C group produced significantly ($p<0.05$) more milk than the cows that were in A group.

It was observed that cows that were in A group consumed significantly less amount of dry matter than that of B and C group. This have created significant difference among the milk yield of different groups. During the period of experiment, cows of control group also produced more milk than initial production. It may be the effect of taking concentrate mixture and stages of lactation.

The results of milk yield of cows of this work agrees with the work of Reddy (1998) who stated that it is beneficial to supplement a rice straw diet with green forages for milk production.

Milk Composition

The average daily fat yield (g kg^{-1}) of milk prior to the start of the experiment were 34.4±0.24, 34.5±0.15 and 34.4±0.27 for A, B and C group, respectively (Table 5). The average daily fat yield (g kg^{-1}) of milk at the end of the experiment were 39.0±0.24, 42.8±0.23 and 45.0± 0.24 for A, B and C group, respectively (Table 5). Statistical analysis showed that there was a significant ($p<0.01$) difference among different treatment groups. It is apparent that the average daily fat yield for the cows of C group on the 30th, 60th, 90th and 120th day was significantly ($p<0.01$) higher than that of the A and B group. It was mentioned in previous parameter that cows that were on A group consumed more concentrate feeds without green grass than those of the B and C group. It has created significant difference between the fat yield of control and other groups.

The result of the scientists working on the changes in milk fat suggest that it depends on many factors, most important of which is the composition of the diets (Lahmar *et al*., 2000). Brien and Guinee (1998) reported that milk fat increased with the increase in grass DM intake.

The average daily SNF yield (g kg^{-1}) of milk prior to the commencement of the experiment were 82.1±0.19, 82.3±0.02 and 82.1±0.11 for A, B and C group, respectively (Table 6). The average daily SNF yield (g kg^{-1}) of milk of the end of the experiment were 84.8±0.14, 85.8±0.17 and 86. 8±0.20 for A, B and C group, respectively. Statistical analysis showed that there was a significant ($p<0.01$) difference among different treatment groups. It was observed that the average daily SNF yield for group C on the 30th, 60th, 90th and 120th day was significantly ($p<0.01$) higher than that of the A and B group (Table 6).

Brien and Guinee (1998) reported that the milk SNF increased with the increase in grass DM intake.

The average daily protein yield (g kg^{-1}) at the onset of the experiment were 34.3±0.02, 34.4±0.05 and 34.3±0.01 for A, B and C group, respectively (Table 7). On the 30th day, there was no significant difference among the average daily protein yield of different groups but on the 60th, 90th and 120th

Table 5: Effect of partial green grass over dry feeding on milk fat

	Dietary groups			
Parameters	A	B	C	Level of significance
Average initial milk fat (g kg^{-1})	34.4±0.24	34.5±0.15	34.4±0.27	NS
Average milk fat at different periods (g kg^{-1})				
30th day	35.0±0.29^{b}	35.8±0.39^{a}	38.4±0.20^{a}	**
60th day	36.8±0.37^{b}	38.6±0.22^{a}	40.0±0.28^{a}	**
90th day	37.6±0.19^{c}	39.8±0.52^{b}	42.4±0.37^{a}	**
120th day	39.0±0.24^{b}	42.8±0.23^{ab}	45.0±0.24^{a}	**

NS = Non Significant, ** = Significant at 1% level

Table 6: Effect of partial green grass over dry feeding on milk Solids Not Fat (SNF)

	Dietary groups			
Parameters	A	B	C	Level of significance
Average initial milk SNF (g kg^{-1})	82.1±0.19	82.3±0.02	82.1±0.10	NS
Average milk SNF at different periods (g kg^{-1})				
30th day	82.4±0.20^{b}	82.8±0.17^{b}	83.8±0.17^{a}	**
60th day	83.6±0.18^{b}	84.8±0.21^{a}	85.4±0.22^{a}	**
90th day	83.8±0.17^{c}	85.2±0.17^{b}	86.2±0.15^{a}	**
12th day	84.8±0.14^{c}	85.8±0.17^{b}	86.8±0.20^{a}	**

NS = Non Significant, ** = Significant at 1% level

Table 7: Effect of partial green grass over dry feeding on milk protein

	Dietary groups			
Parameter	A	B	C	Level of significance
Average initial milk protein (g kg^{-1})	34.3±0.02	34.4±0.05	34.3±0.01	NS
Average milk protein at different periods (g kg^{-1})				
30th day	34.6±0.04	34.7±0.02	34.9±0.01	NS
60th day	34.9±0.03^{b}	35.1±0.02^{ab}	35.4±0.03^{a}	*
90th day	35.3±0.03^{b}	35.6±0.02^{b}	36.1±0.01^{a}	**
120th day	35.7±0.03^{b}	36.1±0.02^{b}	36.8±0.04^{a}	**

NS = Non Significant, ** = Significant at 1% level, * = Significant at 5% level

Table 8: Effect of partial green grass over dry feeding on milk ash

	Dietary groups			
Parameter	A	B	C	Level of significance
Average initial milk ash (g kg^{-1})	69.0±0.27	70.0±0.22	70.0±0.18	NS
Average milk ash at different periods (g kg^{-1})				
30th day	71.0±0.14	70.01±0.07	70.2±0.06	NS
60th day	72.0±0.18	71.6±0.19	71.3±0.02	NS
90th day	73.5±0.09	72.8±0.05	72.0±0.14	NS
120th day	7.36±0.04^{a}	7.29±0.03^{ab}	7.23±0.03^{b}	**

NS = Non Significant, ** = Significant at 1% level

day the average daily protein yield of B and C group were significantly ($p<0.01$) higher than that of A group. On the 120th day, the average daily protein yield (g kg^{-1}) were 35.7±0.03, 36.1±0.02 and 36.8±0.04 for A, B and C group, respectively. Statistical analysis showed that there was a significant difference ($p<0.01$ and $p<0.05$) among different groups. Sairanen *et al.* (2002) reported that feeding green grass with concentrate supplementation increased the milk protein content of cows. The results of this experiment also agrees with the results of Poore *et al.* (1989) who stated that feeding forage with lucerne hay and chopped wheat straw increased the milk protein yield of cows.

The average daily ash yield (g kg^{-1}) of milk before feeding the experimental diets were 69.0±0.27, 70.0±0.22 and 70.0±0.18 for A, B and C group, respectively (Table 8). The average daily ash content of milk on the 30th, 60th and 90th day throughout the experimental period were nearly similar. Statistical analysis showed that there was no significant difference among different treatment groups.

The ash content of milk on the 120th day were 73.6±0.04, 72.9±0.03 and 72.3±0.03 g kg^{-1} for A, B and C group, respectively. Statistical analysis showed that there was a significant ($p<0.01$) difference among different treatment groups.

From the result of overall analysis, it could be advocated that the early lactating crossbred cows of C group performed best than those of the A and B group. For that, supply of partial green grass with straw based diets is beneficial to sustain productive performance of crossbred cows. This sort of innovation may carry benefit for utilization of dry feeds (straw and concentrates). Attempts should be made to deliver the knowledge about this work through the country. So, supply of partial green grass over dry feeding will not only support better utilization of it but also reduces extra load on concentrates and giving maximum output which are financially profitable for the dairy cow owner.

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