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Production potential of lactating Red Chittagong cows due to improved feeding in small-scale dairy farm

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Abstract

The aim of the experiment was to reveal the production potential of lactating Red Chittagong cows through improved feeding. To achieve the aim, the experiment was designed in a completely randomized design with three dietary treatment groups having ten Red Chittagong cows in each group for a period of six months. The cows were randomly allocated to three dietary treatment groups, i.e., T_0, T_1 and T_2. The cows of T_0 group received only farmers' diet (63% of dry matter intake of cows according to ARC, 1995) without the supplementation, served as control. The cows of T_1 group received farmers' diet (63%) plus 25% supplementation of formulated concentrate diet for deficit of requirement of cows {(63 + 9.25) = 72.25% dry matter intake of cows according to ARC, 1995)} and T_2 group received farmers' diet (63%) plus formulated concentrate diet to meet 100% requirement of cows according to ARC (1995) {(63% + 37%) = 100%}. The average milk production of Red Chittagong cows of T_0, T_1 and T_2 groups was 2.40, 3.27 and 4.82 kg per day, respectively. The milk fat, protein, solids not fat, total solids and ash were 4.30, 3.85, 9.02, 13.34 and 0.70; 4.75, 3.70, 8.97, 13.73 and 0.71; and 5.45, 3.56, 8.86, 14.30 and 0.72, g per 100g milk, respectively, for T_0, T_1 and T_2 groups. Therefore, the farmers' diet plus supplementation of formulated concentrate diet (FCD) to meet 100% requirement of cows was a better improved feeding system of lactating Red Chittagong cows to derive good performance.

Key words: Improved feeding, lactating Red Chittagong cows, production potential, milk, fat corrected milk, milk fat

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Introduction

Red Chittagong Cattle is one of few potential types of indigenous milk producing dairy cattle of Bangladesh and rearing an integral part of the rice based farming system in Chittagong region. This variety of cattle in farmer's feeding conditions lives on low quality roughages such as rice straw and naturally grown grasses without supplementation (Yasmin, 2006). Consequently, their diet is deficient in nutrients and thus their milk production efficiency is low.

Feeding of low grade roughage to livestock is a common practice in India and developing countries (Murdia et al. 1999) including Bangladesh (Akbar1992, Saadullah et al. 1981, Khan and Davis 1981). Low quality roughages are characterized by their composition having low level of nutrients such as protein, vitamins and available minerals but high level of indigestible carbohydrates that leads to low feed intake (Akbar et al. 1988, Scherer and Ibrahim, 1989). According to Meyer (1973), protein and energy

deficiency in diet are immediately reflected by decreasing the total quantity of milk produced, but only have limited effect on the composition.

Numbers of studies (e.g. Skunmun et al. 1999) indicate that better animal feeding and husbandry practices are necessary in order to improve production efficiency of dairy cows. Therefore, supplying an improved ration containing all the nutrients in adequate quantities, particularly energy and protein, to dairy cows is crucial for the improvement of milk production. The possible way to improve the nutritive value of low quality farmers' diet is by supplementing concentrate in the ration of ruminants (Saadullah et al. 1981). Therefore, the present study was undertaken to study the effectof improved feeding on productive performances of lactating Red Chittagong cows of SatkaniaUpazila of Chittagong district.

Materials and Methods

***Preparation of supplemented concentrate diet*:** The supplemented concentrate diet was formulated by mixing wheat bran, mustard oil cake, rice polish, rice bran, common salt and dicalcium phosphate in the proportions of 12, 14, 37, 33, 2 and 2 kg per 100 kg, respectively to maintain the required levels of ME and CP.The ingredients were selected depending on the availability in the local market. Ingredient composition of formulated concentrate diet with energy and protein values is presented in Table 1.

Table 1. Ingredient composition of formulated concentrate diet with energy and protein values.

Ingredient	Quantity (kg/100kg)
Wheat bran	12
Mustard oil cake	14
Rice polish	37
Rice bran	33
Common salt	2
Dicalcium phosphate	2
Total	100
Nutrient composition per kg DM, ME (MJ)	7.82
CP (g)	116

***Chemical composition of roughage and concentrate feeds*:** The chemical composition of roughage and concentrate feeds is shown in Table 2. The chemical composition is done by following the procedure of AOAC (2003). Metabolizable energy (ME) was determined by using the *in-vitro* gas production techniques (Menke et al.1979). All the samples were analyzed in duplicate and mean values were recorded.

Table 2. Chemical composition of roughage feeds andfeed ingredients used in formulated concentrate diet

Feeds ingredient	DM (g/ 100g sample)	Chemical composition (g/100g DM)						ME (MJ/kg DM)
		OM	CP	CF	EE	Ash	NFE	
Rice straw	87.50	86.80	3.50	51.23	1.92	13.13	45.70	5.38
Natural grasses	16.00	91.07	11.67	37.50	1.60	8.90	54.60	7.29
Wheat bran	87.85	93.24	11.91	8.50	13.18	6.16	57.98	9.85
Mustard oil cake	89.50	92.95	27.59	9.10	7.88	6.90	66.70	10.22
Rice polish	88.71	90.75	8.99	10.50	15.60	9.50	63.15	7.13
Rice bran	89.07	93.33	7.82	36.80	9.53	11.40	34.42	6.81

DM=Dry matter; OM=Organic matter; CP=Crude protein; CF=Crude fiber; EE=Ether extract; A=Ash; NFE=Nitrogen free extract; ME=Metabolizable energy; MJ=Mega joule

***Deficit of nutrient requirements of lactating RC cows according to ARC (1995)*:** The deficit nutrient requirement of lactating RC cows is presented in Table 3.

Table 3. Deficit of nutrient requirements of lactating Red Chittagong cows

Parameter	Nutrient requirement
Average live weight (kg)	175.47 ±0.54
Average metabolic live weight ($kgW^{0.75}$)	48.21 ± 0.11
Total DM (kg/day)	**1.58**
Total ME (MJ/day)	**12.32**
Total CP (g/day)	**184**
Total DM (kg/100kg Live weight)	0.90
Total DM (g/kg $W^{0.75}$/day)	33
Total ME (MJ/kg $W^{0.75}$/day)	0.26
Total CP (g/kg $W^{0.75}$/day)	3.82
Diet M/D values (MJ/kg DM)	7.80
Diet CP values (g/kg DM)	116

DM=Dry matter; ME=Metabolizable energy; CP=Crude protein; M/D=Energy concentration of diet dry matter; CP=Crude protein concentration of diet dry matter

***Place and duration of the study*:** The experiment was conducted under on-farm condition of Satkania Upazila of Chittagong district in Bangladesh. The duration of experiment was six (6) months from April 2011 to September 2011.

***Selection of lactating Red Chittagong cows*:** Farmers who had at least one lactating Red Chittagong (RC) cow were involved in this study. A total of thirty (30) farmers were randomly selected. Immediately after calving thirty cows with one from each of 30 farmers between 2 and 3 parities were used in this experiment.

***Experimental treatments*:** The experiment had three dietary treatment groups having ten cows in each group. The cows were randomly allocated to three dietary treatment groups, i.e., T_0, T_1 and T_2. The cows of T_0 group received farmers diet (63% of dry matter intake of cows according to ARC, 1995) without the supplementation of formulated concentrate diet (FCD), served as control. The cows of T_1 group received farmers' diet (63%) plus 25% supplementation of formulated concentrate diet (FCD) for deficit of requirement of cows {(63 + 9.25) = 72.25% dry matter intake of cows according to ARC 1995)} and T_2 group received farmers' diet (63%) plus formulated concentrate diet (FCD) to meet 100% requirements of cows according to ARC (1995) {(63% +37%) = 100%}.

***Housing and feeding management of lactating Red Chittagong cows*:** The experimental lactating RC cows were kept in traditional housing. The roughages were given twice daily at between 06:00 to 07:30 hours in the morning and at between 15:30 to 16:30 hours in the afternoon. Rice straw was offered at the beginning followed by natural grasses (Cut and carried system). The total amount of formulated concentrate diet was portioned into two and supplied twice a day before milking of cows in the morning at between 08:00 to 09:00 hours and afternoon at between 15:30 to 16:30 hours. The total amount of FCD was adjusted based on the week of the experiment. The roughages and FCD were weighted and recorded before supplying. Fresh drinking water was accessed *ad libitum* to all the cows at all the times.

***Estimation of feed and nutrient intake*:** The feed intake was defined as the quantity of feed that an animal consumes in 24 hours per 100 kg live weight as well as per unit of metabolic live weight ($W^{0.75}$). The daily offered rice straw, natural grasses and formulated concentrate diet were weighted and recorded before supplying. The leftover feeds were also weighted and recorded on the following morning before offering morning feed. The daily feed intake was determined by subtracting the amount of leftover from the amount of feed given on the previous day. The metabolizable energy (ME) and crude protein (CP) was determined from the amount of dry matter (DM) fed in 24 hours per 100 kg live weight and per unit of metabolic live

weight ($W^{0.75}$). The ME and CP values were determined by multiplying respective ME and CP values of feeds.

***Nutrient requirements*:** The calculations of daily dry matter (DM), metabolizable energy (ME) and crude protein (CP) requirements of lactating RC cows were calculated based on ARC (1995). The M/D values and CP values of feeds were also calculated based on ARC (1995).

***Weight determination of lactating Red Chittagong cows and calves*:** The cows were weighed individually at weekly interval from the start till the end of the trial and recorded regularly. The weight of cows was performed in morning before feeding. The calves were also weighed individually at weekly interval and recorded from the start till the end of the trial. The weight of calves was taken before milking.

***Data collection and record keeping*:** Collection of data on different parameters has been done for a period of 6 months. A formatted register was supplied to each of the thirty (30) farmers under the study for keeping record on the experimental lactating RC cows. Date of calving, daily feed intake, weekly live weight of cows and calves, daily milk yield, post partum heat period and conception rate were recorded and collected for statistical analysis.

***Weighing and recording milk yield*:** The experimental cows were milked twice a day, between 07:30 to 09:00 hours in morning and between 15:30 to 16:30 hours in afternoon. The milk yield of cows was measured immediately after milking and recorded regularly. The milk yield in morning and afternoon were considered as daily milk yield in kg.

***Fat corrected milk(FCM)*:** The fat corrected milk yield (FCM) was calculated by using the following formula:

FCM = M (0.4 + 0.15 X F)

Where, M = Milk yield and F = Fat percent

***Collection and chemical analysis of milk*:** The milk samples were collected for chemical analysis. Analysis was done for fat, protein, solids-not-fat (SNF), total solids (TS) and ash contents of milk with the help of a milk analyzer machine Lacto Star (c) 2005, Funke Gerber, Firmware Rev: 3.24c, # 3510-080203. All the samples were analyzed in duplicate and mean values were recorded.

***Statistical analysis*:** The collected data were analyzed statistically by using Compare Means (CM); Means procedure of One-Way Analysis of variance (ANOVA): Post Hoc Multiple Comparisons, Equal Variances Assumed by Duncan of SPSS 11.5 for Windows (SPSS Inc. 2004) statistical package.

Results and Discussion

***Improved feeding system*:** The farmers feeding system was improved based on the deficit nutrient balance of lactating Red Chittagong cows by supplementing of formulated concentrate diet (FCD) to make it improved feeding system. Red Chittagong cows are famous for its superior milk production and quality. There are evidences that the milk production, post partum heat period (PPHP) and service per conception of cows are improved by supplementing concentrate diets. Thus increase overall productive potential. The formulated concentrate diet (FCD) was prepared in order to minimize the nutrient deficiency. The cows are most productive when fed a diet balanced according to their nutrient needs. The needed nutrients should also be supplied at lowest possible cost. This can be done if producers use locally available feed ingredients and use purchased feeds only to fill the gap in nutrient supply from the locally available feeds.

***Nutrient intake, ARC (1995) requirement and nutritional status*:** The nutrient intake, ARC (1995) requirement and nutritional status of lactating Red Chittagong cows of three dietary treatment groups are shown in Table 4. The dry matter, metabolizabl energy and crude protein intake of lactating RC cows were deficit by 1.43 kg, 11.18 MJ and 172 g and 0.87 kg,

6.82 MJ and 100 g, per day, respectively, for T_0 and T_1 groups. On the other hand, the DM, ME and CP intake of T_2 group fulfilled the requirement according to ARC (1995) of lactating RC cows.

Table 4. Nutrient intake, ARC (1995) requirement and nutritional status of lactating RC cows

Parameter	Dietary treatment group								
	T_0			T_1			T_2		
	NI ±SED	NR ±SED	NB	NI ±SED	NR ±SED	NB	NI ±SED	NR ±SED	NB
ALW (kg)	145.03 ± 0.53			154.98 ±0.56			165.62 ±0.80		
AMLW(kgW$^{0.75}$)	41.79 ± 0.11			43.92 ±0.11			46.35 ±0.16		
TDM (kg/d)	2.99 ±0.02	4.42 ±0.03	-1.43	4.27 ±.05	5.14 ±0.04	-0.87	5.80 ±0.03	5.80 ±0.06	0
TDM (kg/100kgLW)	2.06 ±0.01	3.05 ±0.03	-0.99	2.75 ±.03	3.32 ±0.05	-0.57	3.50 ±0.01	3.50 ±0.05	0
TDM (g/kgW$^{0.75}$/d)	71 ±0.52	106 ±1.04	-35	97 ±1.24	117 ±1.34	-20	125 ±0.67	125 ±1.56	0
TME (MJ/d)	23.38 ±0.14	34.56 ±0.27	-11.18	33.38 ±0.07	40.20 ±0.08	-6.82	45.35 ±0.15	45.40 ±0.05	0
TME (MJ/kgW$^{0.75}$/d)	0.55 ±0.02	0.83 ±0.01	-0.28	0.76 ±0.01	0.92 ±0.02	-0.16	0.98 ±0.02	0.98 ±0.01	0
TCP (g/d)	242 ±1.03	414 ±11.57	-172	390 ±1.23	490 ±1.49	-100	567 ±1.88	567 ±1.71	0
TCP (g/ kgW$^{0.75}$/d)	5.79 ±0.01	9.95 ±0.29	-4.16	8.87 ±0.01	11.15 ±0.38	-2.28	12.23 ±0.01	12.23 ±0.29	0
M/D values (MJ/kg DM)	7.82 ±0.05	11.56 ±0.05	-3.75	7.82 ±0.10	13.44 ±0.01	-5.62	7.82 ±0.04	7.82 ±0.09	0
CP values (g/kg DM)	80 ±0.63	138 ±1.08	-58	91 ±1.20	114 ±0.70	-23	98 ±0.79	98 ±0.73	0

T_0 (control),=Farmers' diet (52% dry matter intake of cows according to ARC, 1995); T_1=Farmer diet plus 25% supplementation of formulated concentrate diet (FCD) of requirement of cows (73% dry matter intake of cows according to ARC, 1995); T_2=Farmers diet plus FCD to meet 100% requirements of cows according to ARC (1995); NI=Nutrient intake; NR=Nutrient requirement; NB=Nutrient balance; SED=Standard error difference; ALW=Average live weight; AMLW=Average metabolic live weight; TDM=Total dry matter, TME=Total metabolizable energy; TCP=Total crude protein; M/D=Energy concentration of kg diet dry matter; CP=Crude protein values of kg diet dry matter.

Feed and nutrient intake of lactating Red Chittagong cows

The feed and nutrient intake of lactating RC cows of three dietary treatment groups are presented in Table 5.

***Dry matter intake*:** The DM intake of rice straw, natural grasses and rice bran were found non-significant (P >0.05) among the T_0, T_1 and T_3 groups. But, the total DM intake were varied significantly (P < 0.05). The variation might be due to supply of formulated concentrate diet (T_1= 1.28 kg and T_2= 2.81

kg). The total DM intake was higher in T_2 than the T_1 and T_0 groups. The higher total DM intake in T_2 group might be due to supply of FCD to meet 100 percent nutrient requirements of cows according to ARC (1995). The percent of total DM intake was 52, 73 and 100, respectively, for T_0, T_1 and T_2. The findings of the present experiment were supported by Ahmed (2006), who reported that the total DM intake of lactating cows was significantly (P<0.01) higher than that of the traditional feeding group in dairy cows of Baghabarighat areas of Pabna district of Bangladesh. The total DM intake, kg per % live weight was significantly (P < 0.05) higher in T_2 than T_1 and T_0 groups and the total DM intake, g per kg metabolic live weight was also significantly (P < 0.05) higher in T_2 than T_1 and T_0 groups.

Table 5. Feed and nutrient intake of lactating Red Chittagong cows

Parameter	Dietary treatment group			SED	Level of significance
	T_0	T_1	T_2		
Average LW (kg)	145.03^c	154.98^b	165.62^a	1.01	*
Average metabolic LW (kg $W^{0.75}$)	41.79^c	43.92^b	46.35^a	0.21	*
DM intake of rice straw (kg/day)	0.79	0.81	0.85	0.19	NS
DM intake of grasses (kg/day)	1.30	1.29	1.30	0.30	NS
DM intake of rice bran (kg/day)	0.90	0.89	0.84	0.21	NS
DM intake of FCD (kg/day)	00	1.28	2.81	-	-
Total DM intake (kg/day)	2.99^c	4.27^b	5.80^a	0.13	*
Total DM intake (kg/100 kg LW)	2.06^c	2.75^b	3.50^a	0.85	*
Total DM intake (g/ kg$W^{0.75}$/day)	71^c	97^b	125^a	0.52	*
Total ME intake (MJ/day)	23.38^c	33.38^b	45.35^a	1.01	*
Total ME intake (MJ/ kg$W^{0.75}$/day)	0.51^c	0.76^b	0.98^a	0.48	*
Total CP intake (g/day)	242^c	390^b	567^a	15.01	*
Total CP intake (g/kg$W^{0.75}$/day)	5.79^c	8.87^b	12.23^a	1.80	*
M/D values of intake diet (MJ/kg DM)	7.82	7.82	7.82	-	-
CP values of intake diet (g/kg DM)	80^c	91^b	98^a	0.87	*

*T_0 (control)=Farmers' diet (52% dry matter intake of cows according to ARC, 1995); T_1=Farmer' diet plus 25% supplementation of formulated concentrate diet (FCD) of requirement of cows (73% dry matter intake of cows according to ARC, 1995); T_2=Farmers diet plus FCD to meet 100% requirements of cows according to ARC (1995);LW=Live weight; NS=Non-significant (P>0.05); *,=Significant at 5% level; ^{a,b,c}=Mean values having different superscripts in a row differed significantly; SED=Standard error difference.*

***Metabolizable energy and crude protein intake*:** The total ME and CP intake of lactating Red Chittagong cows were found significant (P<0.05) different among the three dietary treatment groups. The findings of the present experiment are in agreement with the findings of McNamara et al. (2003), Ahmed (2006) and Islam (2010). The total ME and CP intake of T_2 group was higher than that of T_1 and T_0 groups. The total ME (MJ) and CP (g) intake per kg metabolic ($W^{0.75}$) live weight were also significantly (P<0.05) higher in T_2 than T_1 and T_0 groups. The higher ME and CP intake of T_2 group might be due to supply formulated concentrate diet to meet 100 percent requirement of lactating cows according to ARC 1995.

***M/D and CP values of intake diet*:** The M/D and CP values were varied significantly (P<0.05) among the three dietary treatment groups. The M/D and CP values of intake diet were significantly (P<0.05) higher in T_2 group than the T_1 and T_0 groups cows. The higher M/D and CP values might be due to supply of higher amount of FCD than farmer's diet according to ARC (1995).

Live weight (kg) and metabolic live weight ($kgW^{0.75}$): The average live weight (kg) and metabolic live weight (kg $W^{0.75}$) of lactating RC cows were found significantly (P<0.05) higher in T_2 group than the T_1 and T_0 groups (Table 6). It might be due to improved nutritional support.

Productive performances of lactating Red Chittagong cows

***Live weight changes of cows*:** The live weight changes of lactating RC cows of three dietary treatment groups are presented in Table 6. The average weekly live weight of lactating RC cows were found significant (P < 0.05) different among the three dietary treatment groups. The live weight loss in T_0 group might be due to deficit nutritional balance, whereas, the live weight gain in T_1 and T_2 groups might be due to supply of FCD. The average final live weight was significantly (P < 0.05) higher in T_2 than that of T_1 and T_0 groups. Thus, the total live weight gain and daily live weight gain of cows were significantly (P < 0.05) higher in T_2 than the T_1 and T_0 groups. The findings of the present study are in agreement with the findings of Yasmin (2006) and Islam (2010). Debnathet al. (2003) reported that the daily live weight changes of lactating RC cows of different treatment group ranged from 0.18 to 0.26 kg.

***Milk production and* composition:** The milk production performances and composition of lactating Red Chittagong cows of three dietary treatment groups are presented in Table 7. Lactation number, season of calving and death of calf in early lactation had significant effects on milk yield. Milk production depends on the nutritional status of a cow. The nutrient requirement of cows increase with milk yield, but high producing cows in early lactation cannot consume sufficient DM to support maximum milk yield. The milk production performance varied species to species and even in the same species among the different breeds. The milch breeds produce more milk due to their longer lactation period. Milk yield is the most economic trait of a cow.

Table 6. Live weight changes of lactating Red Chittagong cows

Parameter	Dietary treatment group			SED	Level of significance
	T_0	T_1	T_2		
Initial live weight (kg)	151.10^c	159.20^b	170.20^a	1.98	*
Final live weight (kg)	149.60^c	161.00^b	173.62^a	2.30	*
Total live weight gain (kg)	-1.50^c	1.80^b	3.42^a	0.39	*
Daily live weight gain (g)	-8^c	9^b	19^a	2.19	*

*T_0 (control)=Farmers diet (52% dry matter intake of cows according to ARC, 1995); T_1=Farmer's diet plus 25% supplementation of formulated concentrate diet (FCD) of requirement of cows (73% dry matter intake of cows according to ARC, 1995); T_2=Farmers diet plus FCD to meet 100% requirements of cows according to ARC (1995);LW=Live weight; NS=Non-significant (P>0.05); *=Significant at 5% level; ^{a,b,c}=Mean values having different superscripts in a row differed significantly; SED=Standard error difference.*

***Lactation length*:** The number of days from first milking to the end of milking of a cow is considered as lactation length. Lactation length is the most important factor for profitability of a farm because when lactation period is higher, the profit must be higher. Lactation length gradually increases from first to third lactation.The lactation length of experimental cows was 180 days. Khan et al. (2000), Islam (2010), Alam et al.(2007), Akhter et al.(2004) and Azizunnnesa et al. (2008) reported that the lactation length of Red Chittagong cows were 222.85, 205.36, 242.17, 216, 59 and 238.80, days, respectively.

***Milk yield and fat corrected milk*:** There are many factors influencing to milk production performances of cows like breed, environment, nutrition and interaction between nutrition and environment. The production and composition of milk varies with the uptake of nutrients by the mammary gland, and this is influenced by mammary blood flow and utilization of nutrients by mammary gland (Kume and Tanabe, 1993). In the present study, significant ($P<0.05$) difference was found in daily milk yield among the three dietary treatment groups. The higher milk yield was found in cows of T_2 group than the cows of T_1 and T_0 groups. The milk yield was 2 times (102%) higher in T_2 group compared with T_0 group. Thus, the fat corrected milk (FCM) yield was significantly ($P<0.05$) higher in T_2 than T_1 and T_0 groups. The finding of the present study was higher than the findings of Islam (2010). Ahmed (2006) reported that the milk yield was increased significantly ($P<0.01$) in improved feeding than that of traditional feeding group which support the present findings. The higher milk production of T_2 group may be due to better health of RC cows in pregnancy period and supplementation of FCD.

Table 7. Milk production and composition of lactating RC cows

Parameter	Dietary treatment group			SED	Level of significance
	T_0	T_1	T_2		
Lactation length (days)	180	180	180	-	-
Milk yield (kg/day)	2.40^c	3.27^b	4.82^a	1.04	*
Fat corrected milk (kg/day)	2.51^c	3.64^b	5.87^a	1.45	*
Milk composition (%)					
Fat	4.32^c	4.75^b	5.45^a	0.11	*
Protein	3.85^a	3.70^b	3.56^c	0.30	*
Solids not fat	9.02^a	8.98^b	8.86^b	0.06	*
Total solids	13.34^c	13.73^b	14.31^a	0.12	*
Ash	0.70	0.71	0.72	0.04	NS

*T_0 (control)=Farmers' diet (52% dry matter intake of cows according to ARC, 1995); T_1=Farmer's diet plus 25% supplementation of formulated concentrate diet (FCD) of requirement of cows (73% dry matter intake of cows according to ARC, 1995); T_2=Farmers diet plus FCD to meet 100% requirements of cows according to ARC (1995);LW=Live weight; NS=Non-significant (P>0.05); *=Significant at 5% level; ^{a,b,c}=Mean values having different superscripts in a row differed significantly; SED=Standard error difference*

Reproductive performance of lactating Red Chittagong cows

In the present experiment, the factors that are affected on the reproductive performances of cows were constant to all treatment groups. The reproductive performance of lactating RC cows of three dietary treatment groups are presented in Table 8.

***Post partum heat period*:** The post partum heat period of lactating RC cows varied significantly ($P<0.05$) among the three treatment groups. The PPHP of RC cows decreased in T_2 group and increased in T_1 and T_0 groups. The findings of the present experiment are in good agreement with the findings of Ahmed (2006), who reported that the improved feeding significantly ($P<0.05$) reduced the PPHP of Red Chittagong cattle compared to the traditional feeding. In the present study, longer PPHP in T_0 group was due to under nutrition, whereas better nutrition was the most important contributory factor responsible for reduced PPHP of cows in T_2 and T_1 groups.

***Service per conception*:** In the present experiment, the service per conception (no.) of lactating RC cows was reduced significantly ($P<0.05$) in T_2 than the T_1 T_0 groups. The findings of the present experiment are in good agreement with the findings of Ahmed (2006). The reduced service per conception in T_2 group might be due to supply of FCD.

Growth performance of Red Chittagong calves

The growth performances of RC calves of three dietary treatment groups are presented in Table 8. The growth is an important phenomenon in the life of animals affecting economic traits like milk production. The growth of animal is determined by cell multiplication and maturation and it is greatly influenced by nutrition and environment or management practices. The growth of calves is affected by birth weight, parity, milk production by cows and managements practices. The growth rate of calves were significantly ($P<0.05$) higher in T_2 group followed by T_1 and T_0 group. The findings of the present experiment are almost similar with the findings of Debnath et al. (2003). The higher growth rate in T_2 and T_1 might be due to higher birth weight of calf and higher milk production of cows.

Table 8. Reproductive and growth performances of lactating RC cows and calves

Parameter	Dietary treatment group			SED	Level of Significance
	T_0	T_1	T_2		
Post partum heat period (days)	104^c	86^b	62^a	3.66	*
Service per conception (no.)	1.80^c	1.65^b	1.40^a	0.10	*
Initial live weight (kg)	10.50^c	13.75^b	16.85^a	0.52	*
Final live weight (kg)	42.45^b	48.49^b	57.71^a	1.48	*
Total live weight gain (kg)	31.95^c	34.74^b	40.86^a	1.21	*
Daily live weight gain (g)	178^b	193^b	227^a	6.74	*

*T_0 (control), Farmers' diet (52% dry matter intake of cows according to ARC, 1995); T_1, Farmer's diet plus 25% supplementation of formulated concentrate diet (FCD) of requirement of cows (73% dry matter intake of cows according to ARC, 1995); T_2, Farmers diet plus FCD to meet 100% requirements of cows according to ARC (1995);LW, Live weight; NS, Non- significant ($P>0.05$); *, Significant at 5% level; ^{a,b,c}, Mean values having different superscripts in a row differed significantly; SED, Standard error difference.*

Conclusion

The results of the present experiment showed that the farmers' diet (63%) plus formulated concentrate diet to meet 100% requirements of lactating RC cows according to ARC (1995) {(63% +37%) = 100%} significantly increased the milk production, milk fat, and decreased the post partum heat period and service per conception. Therefore, it can be concluded that the farmers' diet with supplementation of formulated concentrate diet to meet 100 percent requirements of lactating RC cows is a better improved feeding system and it is recommended to use for the small-scale dairy farming system.

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