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Effect of Age on Intake and Growth Performance of Different Age Groups of Red Chittagong Cattle Bulls

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Abstract

An on-station feeding experiment was carried out to study the effect of age on feed intake and growth performance of Red Chittagong Cattle bulls (RCC) fed the same plane of nutrition for 90 days at Pachutia Farm, Bangladesh Livestock Research Institute, Dhaka. Before the feeding trial, 15 RCC bulls in four age groups were split up into four groups and properly dewormed. The average live weight of the four age groups—9–10 months, 15–16 months, 21–22 months, and 27–28 months—was 57.75, 86.40, 112.00, and 160.00 kg, respectively. There were four animals in the 9–10 months age group, five in the 15–16 months group, and three in each of the 21–22 and 27–28 months groups. The data were analyzed using analysis of variance for a Completely Randomized Design (CRD). Bulls in the 27–28-month age group consumed considerably more DM (Dry Matter), OM (Organic Matter), CP (Crude Protein), and ADF (Acid Detergent Fiber) per day ($p<0.01$) than other groups and increased significantly ($p<0.01$) as it grew older. Average daily weight gain significantly increased with age, highest in 27–28-month bulls and lowest in 9–10-month bulls ($p<0.05$). FCR was found in the 9-10 months age group significantly ($p<0.05$) lower and higher in the 27-28 months age group. As per the current findings, RCC bulls aged 9–10 months, 15–16 months, or 21–22 months exhibited higher Feed Conversion Ratio (FCR) performance compared to those aged 27–28 months.

Keywords: Age effect, FCR, Feed efficiency, Growth performance, RCC

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Introduction

The most common type of farming in Bangladesh is mixed farming, with crops, livestock, and fisheries serving as the three main pillars of agricultural systems. With a growth rate of 3.15 percent, livestock accounted for 1.80% of the total GDP among those components (DLS 2023-24). Currently, 25.013 million cattle are contributing significantly to Bangladesh's economy (DLS 2023–24). The livestock industry generates income and jobs, which helps to alleviate poverty in rural areas. But, the shortage of feed and fodder, along with the high cost of feed, has long been recognized as one of the most urgent issues in maximizing livestock farming yield (BARC, 2024). In Bangladesh, the most common type of feeding system for cattle is feeding straw with a small amount of concentrate supplement where straw is fed in its natural state or after processing. Processing may include chopping or supplementation with rice gruel or mixing with a small amount of green grass and concentrate. In most societies around the world, feeding low-quality residues that are easily accessible after crop harvest has become a feasible option and practice due to technological advancements brought about by numerous studies, which helps to lessen the feeding burden (Bhandari, 2019). In Bangladesh, agricultural crop residue—such as rice straw, maize stover, and wheat straw- is a significant source of feed for cattle (Islam et al.2020). Nowadays cattle fattening for beef production has become an important business of the small- scale farmers especially in the urban and peri urban settings in Bangladesh. In recent years, certain regions of the country have implemented an organized fattening system in batches by collecting adult exhausted and young animals particularly bulls and bullocks, and feeding them a decent diet. However, weight gain, feed efficiency and even carcass quality are critical economic factors for beef cattle farmers. Variations in these production attributes can be related to changes in genetic composition, nutrition, slaughter endpoints, and gender (Mandell et al., 1997; Alberti et al., 2008).

Every year, almost 4.1 million cattle are kept for fattening, especially around Eid-ul-Azha (Mahbubul et al., 2025). In 2022, around 9.95 million animals were slaughtered for Eid-ul-Azha (Ferdush et al., 2023). Bangladesh has not yet produced a specific cow or beef breed. Adaptability, disease resistance, and reproductive performance all sharply declined in the crossbreed cattle (Famous et al., 2021). In terms of production and reproduction, several local breeds, such as the Red Chittagong Cattle, Pabna Cattle, Munshigonj Cattle, and North Bengal Grey Cattle, have a higher potential for productivity than the average performance of Bangladesh's native cattle. In Bangladesh, Red Chittagong Cattle (RCC) are enhanced, multipurpose native cattle that can take the place of other native, underdeveloped cattle resources as it requires little amount of quality nutrition plane. Data related to meat production & productivity and feed efficiency of Red Chittagong Cattle are very scanty. Furthermore, there is little to no information on how the age and genotype of local cattle raised on a comparable diet affect their intake, meat production and feed

efficiency. To ensure healthy growth and maintenance, bulls can be developed using a Total Mixed Ration (TMR) of 60% roughage and 40% concentrate (Sarker et al., 2018). According to certain research, profitable RCC bull rearing can make use of a supply of green roughage with 30% concentrate combinations (Hossain et al., 2024). Consequently, the goal of the current study was to investigate the effects of age on the intake and growth performance of RCC bulls following the same feeding practice.

Materials and Methods

Experimental animals, housing and feeding

Red Chittagong bulls available in the cattle research farm of Bangladesh Livestock Research Institute (BLRI), Savar, Dhaka were selected according to their age records and grouped into four age groups (9-10 Months, 15-16 Months, 21-22 Months and 27-28 Months). The animals were distributed in such a way that 4 animals in age group 9-10 months, 5 animals in group 15-16, 3 animals in each of the group's 21-22 and 27-28 months. All the fifteen animals were housed in a double raw face out shed of the farm and having facilities for feeding, watering and refusal collections from individual animals and were dewormed at the beginning of the experiments. Animals were fed Napier silage for the first 2 months of experiment and followed by Napier green grass for another one month. Animals were supplied concentrate mixture @ 1 per cent of their respective body weight. Silage/green grass and concentrate mixture were offered twice daily as two equal meals at 9:00 and 16:00 h. Fresh and clean water was made available in the trial sheds for the whole experimental period. About 15% additional amount of silage/green grass to that required daily for an animal was always made available to ensure adlib feeding and the supply of concentrate mixture to an animal was adjusted with the increase of its live weight. The experiment lasted for 105 days included the first 15 days adjustment period was given in which the animals got adjusted to diets & experimental conditions and the rest 90 days was considered for feeding trial.

Ingredient composition of concentrate mixture

The ingredients used under this experiment were crushed wheat, wheat bran, khesari bran, til oil cake, fish meal, soybean meal, common salt, di calcium phosphate (DCP) and oyster shell and was mixed manually in every two weeks. A vitamin mineral premix was also added at a level of 0.1% in the concentrate mixture (Table 1).

Table 1. Ingredients composition of concentrate mixture (%)

Parameters	Composition of concentrate mixture (%)									
Ingredients	Broken wheat	Wheat bran	Khesari bran	Til oil cake	Fish meal	Soybean meal	Common salt	DCP	Oyster shell	Premix
Amount (%)	10	40	24	15	3.0	5.0	0.5	0.5	2.0	0.1

Measurement of live weight gain and FCR

All the experimental bulls were weighed initially just after arrival in the experiment and weekly thereafter by a platform digital balance with a weighing range 0.00 kg to 1000 kg and a minimum graduation of ± 0.1 kg. Each bull was weighed before morning feeding. The total live weight gain was calculated by subtracting the initial weight from the final weight taken at the experimental period and the daily weight gain was calculated by dividing the total weight gain by the number of experimental days. Feed conversion ratio (FCR) was estimated based on the Dry Matter Intake (DMI) per kg of live weight gain.

Feed intake estimation

The daily feed intake was measured by subtracting the amount of refusals from the amount of feed offered in the previous day. During feeding trial, the total intake i.e., the actual intake of silage/green grass and concentrate mixture fed by the animals were recorded on daily basis.

Sample analysis

During the feeding trial, representative samples of silage or green grass and concentrate mixture were chemically analyzed for dry matter (DM), organic matter (OM) and crude protein (CP) by AOAC (2005). DM contents of fresh sample were determined by oven drying at 105 ^{0}C for overnight. Ash determination was done at 550 ^{0}C for 8 h, total nitrogen (N) by Kjeldahl procedure and CP calculated from N content (CP = N × 6.25) according to the methods described by AOAC- Association of Official Analytical Chemists (2005). The content of acid detergent fiber (ADF) was determined by the procedure described by Van Soest et al. (1991).

Statistical analysis

Data were subjected to analysis by using analysis of variance (Steel and Torrie, 1980) for a Completely Randomized Design (CRD). Treatment means were compared by using Least Significant Difference (LSD)**.** All the analysis was carried out using SPSS (2002) program.

Results and Discussions

The composition of concentrate mixture and nutrient composition of Napier silage, Napier green fodder and concentrate mixture are shown in Table 1 & 2. Table 2

shows that Napier silage contained 9.61 % CP whereas, Napier green fodder contained 10.73% CP and CP content of concentrate mixture was 15.03%.

Table 2. Nutrient composition (%) of experimental diets fed to RCC bulls

Nutrients	Diets		
	Napier Silage	Green grass (Napier)	Concentrate mixture
DM (% fresh basis)	19.22	14.63	90.85
% DM basis			
OM	91.62	87.94	91.51
CP	9.61	10.73	15.03
ADF	42.21	21.81	24.70

The nutrient intake by different age groups of RCC bulls are presented in Table 3. The results indicated that bulls in 27-28 months age group had a significantly ($p<0.01$) higher total daily DM intake, OM intake, CP intake or total daily ADF intake followed by 21-22 months, 15-16 months and 9-10 months age groups, respectively. With the increase of age, the total daily DM, OM, CP or ADF intake, of the animal increased significantly ($p<0.01$). However, when the intake was expressed as % live weight, the total DM intake was significantly higher ($p<0.01$) in 15-16 months age group of animals followed by 9-10, 21-22- and 27-28-months age groups, respectively. The CP intake (g/day) was significantly ($p<0.05$) higher in 27-28 months age group and the lowest in 9-10 months age group. The CP intake did not differ significantly ($p>0.05$) between 12-22 vs 27-28 months age group of RCC bulls. The average live weight gain (g/day) was significantly higher ($p<0.05$) in 27-28 months age group and the lowest in 9-10 months age group of bulls. The body weight gain did not differ significantly ($p>0.05$) among the age groups of 15-16, 21-22 and 27-28 months, respectively. However, as the age of the animal increased, the daily live weight gain increased significantly ($p<0.05$; Table 4). In terms of FCR, it was observed that the significantly ($p<0.05$) lower FCR was found in 9-10 months age group and higher in 27-28 months age group. The LSD values indicated that FCR did not differ significantly among 9-10, 15-16- and 21-22-months age groups (Table 4).

The results in the present study agreed with the results of Huque et al. (2005) who observed significant ($p<0.01$) variations of daily live weight gain among the different age groups of native bulls (BLRI Cattle Breed-1) fed a similar plane of nutrition. The reported gain per day were 285.00 g. 568.66 g and 627.94 g respectively for bulls of ½ to ≤1.0 Y, >1.0 to ≤2.0 Y and >2.0 to 3.0 Y age groups. Similar significant ($p<0.01$) variations of live weight gain among the different age groups of RCC bulls were also reported by Roy et al. (2013) and the reported average daily gain were 359

g, 447 g and 535 g, respectively for 18 months 24 months 30 months age groups. Results from the both studies showed a significantly lower daily live weight gain in the youngest group than other age groups. Similarly, Coleman and Evans (1981) observed greater ADG in older steers than the younger steers (1.25 vs l.l0 kg). The trends are similar that obtained in the present study. Sultana et al. (2020) found that indigenous bulls fed superior diets gained 300 g to 800 g per day on average, depending on the feeding plan. Furthermore, Roy et al. (2017) discovered that buffalo bulls increased body weight more quickly (1.11 & 0.88 kg/day) and had a higher feed conversion ratio than cattle, with 18-month-old bulls performing the best. Hossain et al. (2024) stated in their studies that the average daily live weight increase was significantly ($p<0.05$) higher (0.64kg) in the 70% German grass+30% concentrate mixtures group.

Significantly higher feed conversion efficiencies in the oldest group of this study in line with findings reported by Bures and Barton (2012) and Roy et al. (2013). Hossain et al. (2024) discovered that 10% concentrate replacement with green grass resulted in a significantly reduced feed conversion ratio (DMI/LWG). While Pordomingo et al. (2020) identified 7.93 FCR in an 18-month Angus bull. Bures and Barton (2012) observed significantly ($p<0.01$) higher FCR in heifers slaughtered at 18 months than in those slaughtered at 14 months. Similarly, Roy et al. (2013) reported a higher ($p<0.01$) feed conversion efficiency in RCC bulls of 30-month age group than that of 24 months and 18 months age group. Both studies revealed that, the feed conversion deteriorated as the age of the animal increased. Similarly, Mandel et al (1997) and Kwon et al. (2009) who reported in their study with Charolais, Limousin and Hanwoo steers that the animals consumed more DM of feed per kg live weight gain with increasing days of feed. However, the FCR values in the present study contrary with findings of Huque et al. (2005) who did not observe any significant differences for FCR values among the age groups of Pabna bulls.

Table 3. Effect of age on nutrient intake of bulls fed common plane of nutrition (Mean ± SE)

Parameters	Age group (Months)				Level of Sig.
	9-10 M	15-16 M	21-22 M	27-28 M	
Roughage DMI (kg/d)	1.50^{a}±0.06	2.43^{b}±0.05	2.51^{b}±0.06	3.27^{c}±0.06	**
Concentrate DMI (kg/d)	0.72^{a}±0.03	1.03^{b}±0.02	1.31^{c}±0.03	1.75^{d}±0.03	**
Total DM intake (kg/d)	2.21^{a}±0.06	3.46^{b}±0.05	3.82^{c}±0.07	5.01^{d}±0.07	**
Total DMI (kg, % L. wt.)	2.99^{a}±0.52	3.16^{b}±0.46	2.73^{c}±0.60	2.68^{c}±0.60	**
Total OM intake (kg/d)	2.01^{a}±0.06	3.14^{b}±0.05	3.46^{c}±0.07	4.55^{d}±0.07	**
Total CP intake (g/d)	260^{a}±0.007	400^{b}±0.007	450^{c}±0.009	590^{c}±0.009	**
Total ADF intake (kg/d)	0.68^{a}±0.04	1.09^{b}±0.04	1.17^{b}±0.05	1.58^{c}±0.05	**

Means within row bearing different superscript differ significantly ($p<0.05$); **= $p<0.01$

Table 4. Effect of age on daily weight gain and FCR of bulls fed common plane of nutrition (Mean ± SE)

Parameters	Age group (Months)				Level of Sig.
	9-10 M	15-16 M	21-22 M	27-28 M	
Initial live weight (kg)	57.75^{a}±9.47	86.40^{bc}±8.47	112.00^{c}±10.94	160.00^{d}±10.93	**
Final live weight (kg)	96.47^{a}±8.66	132.00^{b}±7.75	164.67^{c}±10.00	213.73^{d}±10.00	**
ADG (g/d)	440^{a}±0.04	510^{ab}±0.03	550^{b}±0.04	590^{b}±0.04	*
FCR (kg DMI/kg gain)	5.04^{a}±0.62	6.84^{ab}±0.55	6.54^{a}±0.72	8.80^{b}±0.72	*

Means within row bearing different superscript differ significantly ($p<0.05$); *= $p<0.05$; **=$p<0.01$

Conclusion

Although the 27–28 months age group gained more body weight each day, it took more feed to convert that weight gain. In contrast, the 9–10, 15–16, and 21–22 months age groups displayed better feed conversion ratios. Consequently, it can be said that RCC bulls that were 9–10 months, 15–16 months, or 21–22 months old were more responsive in terms of FCR than those that were 27–28 months old.

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