



Performances of Red Chittagong cow under farming and rural conditions

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ABSTRACT

This study aimed to assess the hematological parameters, productive and reproductive performances of Red Chittagong cows (RCC) under farming and rural production systems. Hence, three villages (Sailabari, Munsumi and Baniagati) of Khokshabari union under Sadar upazila of Sirajganj district were selected. The 40 Red Chittagong cows from each production system were taken under this study. Twenty (20) farmers were selected through direct interviewing process with a structured questionnaire. Farming condition and rural condition data were analyzed with unpaired t-test along with GLM procedure of SAS statistical package. Services per conception (times), postpartum heat period (days) and calving interval (days) had significant ($p < 0.01$) differences between farming and rural condition, whereas, age at first calving (months) significantly differed ($p < 0.05$). Average milk yield (kg/d) had significantly different at the values of $p < 0.05$, whereas, lactation period was significantly differed at the values of $p < 0.01$. Hemoglobin (g /100ml) and PCV% were significantly different ($p < 0.05$) between farming and rural condition of RCC in the selected areas. From the study, it may be concluded that the productive and reproductive performances of RCC were better in farming condition than in rural conditions in selected areas.

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Introduction

Cattles are one the most important domestic animals in Bangladesh. Most of the indigenous cattle in Bangladesh are non-descript type. The people of Bangladesh are rearing three categories of cattle like pure breed, crossbred and local breed. The genetic resources of the indigenous cattle in Bangladesh are now at threatening condition due to urbanization and fast expansion of cross breeding. There are some improved cattle namely Red Chittagong Cattle (RCC), Pabna cattle, Munsinganj cattle, North Bengal Grey (NBG) cattle and Sahiwal cattle (Azizunnesa et al., 2010; Hasanuzzaman et al., 2012). These types of cattle are generally known as potential milk and meat producers in

Bangladesh. The RCC is one of the most important breed of livestock in the world. The RCC are considered as the national heritage of Bangladesh. They can easily survive with locally available low-quality feed resources (Mondal et al., 2005). The RCC has distinct phenotypic characteristics like smaller size with red coat color, distinct reddish color of muzzle, horn, hoof, ears, eyeball, eyebrow, vulva and tail switch (Porter, 2002). The milk productions of RCC dairy cows were lower than crossbred cows but other performances like feed conversion ratios (FCR), production of calf per year and disease resistance capacity were better than high-yielding crossbred cows (Nath et al., 2016).

How to Cite

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A breeder has an important tool to evaluate the factors affecting the reproductive traits of indigenous cattle of Bangladesh (Nath et al., 2016). The RCC is one of such promising variety of indigenous cattle in Bangladesh having some important reproductive efficiency due to their regular breeding potentiality (Habib et al., 2003 and 2010). These cattle are mainly found in Chittagong and are now widespread around the milk pocket areas of Bangladesh and reported to have been declining their numbers due to indiscriminate breeding with poor indigenous, exotic and crossbred cattle since last four decades (Hossain et al., 2006). The most important factor that the RCC are highly resistant to diseases especially under rural production systems, require lower input support than others and produce of high quality milk and beef (Bhuiyan, 2007). The Red Chittagong cow attains sexual maturity earlier and calving regularly than that of non-descript Deshi cattle (Khan et al., 1999). Now-a-days government, some non-government organizations, and private sectors are giving special attention to this special potential type of indigenous cattle. The RCC have a valuable indigenous bovine genetic resource of Bangladesh with many attributes better than that of other available indigenous cattle. These cattle are readily distinguishable from others due to its dominant phenotypic features (Alam et al., 2007). The positive features of RCC lie on its ability to withstand extreme tropical climates and to survive on low quality feed during periods of feed shortage. Furthermore, they are reputed to give birth every year and lower calf mortality. They can also give birth of 8-10 calves in their life time, suitable for tillage operation and traction, swift in their movement, hard working in hot, humid and rainfall condition are considered unique characteristics of RCC (Habib et al., 2003). Growth is one of the most important characteristics of cattle and has been investigated for many years (Bathaei and Leroy, 1998). A numbers of studies have so far been carried out on productive parameters of growth and body weights but study on reproductive parameters of indigenous cattle is scanty in Bangladesh (Rabeya et al., 2009). However, data on the performance of RCC in various agro-ecological regions and farming conditions of Bangladesh is very thin. Hence, the study was performed to evaluate the productive and reproductive performances of RCC under farming and rural condition of selected areas in Bangladesh.

Materials and Methods

Study area

The study was conducted during the period of January 2019 to December 2019 in three villages namely Sailabari, Munsumi and Baniagati villages of Khokshabari union under Sadar upazial of Sirajganj district. A total of 40 Red Chittagong cattle (RCC) from 20 farmers having two (2) in each farmer's house and 40 Red Chittagong cows (RCC) from local small and medium farms were selected for this study. The average farm size was 5 to 10 RCC in farming condition production system. The villages were based on poor human resource, milk pocket areas, available green fodder and straw with 2 RCC per household. They purchased the RCC from local Taltoli cattle market and some farmers collected from Chattogram and surrounded areas and reared their own houses during long time. In this way the numbers of RCC increased by horizontal and vertical expansion in the study areas.

Table 1. Chemical composition of feed stuffs in study areas (% DM)

Feed stuff	CP	CF	EE	NFE	Ash
Durba ¹	15.7	22.4	4.3	46.4	10.6
Helencha ²	20.3	15.4	14.2	43.8	6.4
Noll grass	9.8	16.1	3.7	57.6	12.5
Napier ³	9.5	12.6	3.8	68.2	6.1
Miaze ⁴	12.5	16.4	10.5	49.3	12.1
Jackfruit leaves ⁵	20.4	10.0	11.3	51.4	6.6
Sesame oilcake ⁶	22.8	11.8	26.5	31.1	7.4
Rice straw ⁷	4.3	34	1.5	42.0	19.3
Wheat bran	9.65	22.91	3.22	47.13	4.95

¹, *Cynodon dactylon*; ², *Endydra flucturans*; ³, *Cenchrus purpureus*; ⁴, *Zea mays*; ⁵, *Artocarpus purpureus*; ⁶, *Sesamum indicum*; ⁷, *Oryza sativa*; ⁸, *Triticum aestivum*; CP, Crude protein; CF, Crude Fiber; EE, Ether Extract; NFE, Nitrogen-free extract.

Preparation of interview schedule

The interview schedule was carefully prepared based on objectives of the study. A draft schedule was developed before preparing the final schedule. The draft schedule was then pre-tested with selected farmers in area and then it was rearranged and modified as required for the study. The schedule was developed as simple as to avoid misunderstanding and to get accurate information from respondents of the study area. Then it was finalized according to the experience gathered in primarily field level survey.

Methods of feeding

Cows were fed as usual traditional system by the villagers. Most of the animals were mainly stall fed

Red Chittagong cows performance in different conditions

and sometimes tethered. Determination of dry matter, crude protein (CP), EE and ash were done according to AOAC (2005) in the Laboratory of the Department of Animal Science of Bangladesh Agricultural University, Mymensingh. The cows of villagers were generally used for multipurpose such as dairy, draught and meat. Rice straw was the main source of feed of the animals as residual part of crop. The road side green grass (durba, helencha and noll grass), Napier and maize were used *ad libitum* as succulent feed, 2% rice straw per cow was used on the basis of body weight and concentrate feed supplied 0.750-1.0 kg/cow daily in rural condition. Cut and carrying method was applied for supplying green grass at 6 % and 2 % rice straw per cow on the basis of body weight and concentrate feed supplied 1.25-1.5 kg/cow daily in farming condition. Wheat bran, sesame oilcake and common salt were fed to the cows by the comparatively better off farmers. Pure drinking water was supplied *ad libitum*.

Condition score and daily milk yield

Body condition score of the cows had been estimated monthly. The Scottish Agricultural College (1984) grading i. e. 1-5 had been used in this purpose. The indigenous cows' condition score ranged were from 2.25 to 3.50. Milk yield of individual cows were recorded daily morning and evening. Other traits for this study were fat %, lactation period, age of sexual maturity, age of first calving, number of services per conception, conception rate, calving interval, and post-partum heat period and gestation length. Blood parameters like hemoglobin (Hb) and packed cell volume (PCV) indicates the physical health condition and nutritional status for milk producing animals. From this point of view the Hb and PCV were determined. The Hb (g /100ml) and PCV % calculated in the Laboratory of Physiology Department of Bangladesh Agricultural University, Mymensingh.

Statistical analysis

The data were compiled and entered into Microsoft excel. Farming condition and rural condition data were analyzed with unpaired t-test along with GLM procedure of SAS 9.1.3 version statistical package.

Results and Discussion

Reproductive performance of RCC in farm and rural conditions

The reproductive performance of RCC in farm and rural conditions is presented in Table 2. The age of sexual maturity and gestation period (days) had no significant effect ($p > 0.05$). Nath et al. (2016)

showed average mature weight 28.98 months of RCC of five upazilas. These results were not in accordance with the findings of present study. Ali et al. (2006) reported higher values ranging from 32.5 to 42.45 months for indigenous cows. Hoque et al. (1999) found 39.23 ± 4.31 and 35.1 ± 9.24 months for Pabna and Sahiwal \times Pabna cross cows. Hoque et al. (1999) found 25.53 ± 5.59 months of Friesian \times Pabna cross cows which was lower than that of the present study. Services per conception (times), postpartum heat period (days), calving interval (days) and gestation period (days) of RCC had highly significant difference ($p < 0.01$) between production system whereas age of first calving (months) were significantly different ($p < 0.05$).

Average all these traits in RCC were significantly lower in farming condition than rural condition except service per conception (times). The mean service per conception of RCC was higher in farming condition of RCC. Nath et al. (2016) reported lower age of first calving, calving interval and gestation length than the present study but service per conception (times) and gestation period (days) were higher than the present study. The variations of calving interval might be resulted due to different genotype, herd, sample size, feeding system, and reproductive management, disease condition, post-partum estrous period etc. Hasanuzzaman et al. (2012) reported age of first calving and calving interval and gestation period were 42 ± 1.8 months, 14 ± 1.2 months and 279.9 ± 5.3 days, respectively. The mean values of the present study were not in agreement with the results of Hasanuzzaman et al. (2012) that showed lower values than the present study.

Productive traits of RCC in farm and rural conditions

The productive trait of RCC in farm and rural conditions is presented in Table 3. The average milk yield and lactation period differed significantly at the values of $p < 0.05$ and $p < 0.01$, respectively. Birth weight, matured body weight, condition score and fat were found higher in farm condition than rural condition which were not statistically significant ($p > 0.05$). Average milk yield was significantly ($p < 0.05$) higher and lactation period was significantly ($p < 0.01$) higher in farm condition than rural condition for RCC. Hossain et al. (2022) found birth weight of calf of 13.45 kg and condition score of local cattle 2.75. These results were not similar to those found in present study. Mature body weight was not similar with the findings of Hossain et al. (2016) who reported 173.23 kg mature body weight of local cows. Milk yield was almost in accordance with the findings of

Azizunnesa et al. (2010) who showed milk yield 2.10 kg per day of RCC. The mean fat content of RCC cows reared at farm and rural condition during the whole study period was 59.30±2.10 and 58.12±1.25 g/kg, respectively. A little information is available on the fat content of local cow's milk. Islam (2008) conducted a study at BAU Dairy Farm

under the Department of Dairy Science, Mymensingh on the milk quality from different genotypes and found the fat of 56.00, 52.00, 50.10, and 42.80 g/kg of milk from RCC, Jersey cross, Sahiwal cross and Holstein Friesian cross, respectively. These results were not in corroborating with the present study.

Table 2. Reproductive performance (Mean ± SE) of RCC in farm and rural conditions

Traits	Farm condition	Rural condition	Level of significance
Age at sexual maturity (months)	33.15±2.75	33.21±4.23	NS
Services per conception (times)	1.55±0.52	1.44±0.60	**
Age at first calving (months)	44.62±3.40	45.65±2.25	*
Post-partum heat period (days)	56.24±10.5	72.52±23.34	**
Calving interval (days)	456.4±50.81	522.33±123.25	**
Gestation period (days)	280.0±1.81	282.24±2.23	NS

*, $p < 0.05$; **, $p < 0.01$; NS, Non-significant.

Table 3. Productive traits (Mean ± SE) of RCC in farm and rural conditions

Traits	Farm condition	Rural condition	Level of significance
Birth weight (kg)	16.68±0.66	16.00±1.52	NS
Mature live weight (kg)	234.78±5.75	206.5±20.97	NS
Condition score	3.00±0.21	2.85±0.03	NS
Av. milk yield (kg/d)	2.20±0.55	1.91±0.82	*
Fat (g/kg)	59.30± 2.10	58.12±1.25	NS
Lactation period (days)	222.15±15.02	215.60±12.45	**

*, $p < 0.05$; **, $p < 0.01$; NS, Non-significant.

The fat content of Red Chittagong cows was higher due to the supply of more concentrate feed and dry roughage specially rice straw in the study areas. Hossain et al. (2022) found 57.40 g/kg fat for local cattle in their study. This result was almost equal and in agreement with the findings of the present study. The fat percentage may be affected by the quality of feed, number of lactation, stage of milking, exercise of animals, season of year as well as quantity of milk yield (Hossain et al., 2022). The lactation length of RCC found in the present study was not in accordance with Azizunnesa et al., 2010 where they reported 238 days of lactation period. Khan et al. (2000) found an average lactation length of RCC 222.85±16.03 days in farm condition and 214.71±21.68 days in rural condition which were almost similar to the results found in the present study. Ali et al. (2000) found the average lactation period of crossbred and indigenous cows

as 266.42±30.87 days and 220.21±21.69 days, respectively. These results were higher than that of found in the present study.

Hemoglobin (Hb)

Results of blood parameters analysis is presented in Table 4. The estimation of Hb of RCC in farm condition was found non-significantly ($p > 0.05$) higher than that of rural condition rearing system. Similar result was found by Hossain et al. (2016) in rural condition. Normal hemoglobin (Hb) values in most mammals were between 8-15g/100 ml (Banerjee, 1988). Excitement might have increased not only the hemoglobin concentration but the PCV% and erythrocyte number per unit volume were also increased (Swenson, 1977). Hemoglobin and PCV values are also depends on whether the cows are in cyclic condition or anestrus condition, heat stressed or cold condition of the weather and adaptation with the new environment. Turkson and

Ganyo (2015) reported that the Hb concentration was 10.9 g/100 ml of blood where observation in cattle was 440 in their study. This result was higher than that found in the present study. Many researchers reported that Hb level of blood indicates the deficiency of protein level in feed. It indicated that ration was not properly balanced in the feeds provided in rural condition. On the other hand, the supplied ration for the farming condition of RCC was balanced. The animals were suffering from mal nutrition and anemia in rural condition. As a result hemoglobin level was found lower from the normal level in rural condition but in farming condition the hemoglobin level in RCC was found in the normal range (8-15g/100 ml).

Table 4. Results of blood parameter (Mean ± SE) analysis

Parameter	Farm condition	Rural condition	Level of significance
Hemoglobin (g /100ml)	8.15±1.01	7.95±1.20	NS
PCV%	50±0.85	52±3.00	*

*, $p < 0.05$; NS, non-significant

Packed Cell Volume (PCV)

The PCV percentage in RCC was found significantly ($p < 0.05$) higher in animals reared in rural condition than that in farming condition (Table 4). The PCV values fall in early lactation as milk yield rises then tends to rise with the progresses of lactation period. Turkson and Ganyo (2015) reported that the PCV value was 28% of blood where observation cattle were 440. This result did not agree with the results found in the present study. However, values are often low in late winter but recover when cows go out to pasture. Values are highest in summer but in many circumstances high level may be indicative of dehydration. Sometimes this could be due to a reduced water intake which might be caused by social drinking of water. The observed value of PCV percentage was high. The RCC were not supplied sufficient fresh drinking water resulting in higher PCV values in the study areas both farming and rural condition.

Conclusion

It may be concluded from the above results and discussions that the productive and reproductive performances of Red Chittagong cows were found different in farming and rural conditions. Their productive and reproductive performances were found better in farming condition than that of rural condition. Further study is required to evaluate the

productive and reproductive performances of RCC after extending skill development training for farmers on aspects of proper breeding and feeding and management practices.

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Author's contribution

The study was conceptualized and designed by MA Hossain and ME Haque. Data collection and analysis were carried out by MA Hossain, ME Haque and M Tanzin. MA Hossain and ME Haque drafted the manuscript. The manuscript was reviewed, revised, edited and approved by MA Hossain, ME Haque, M Tanzin and MR Islam.

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Conflict of Interest

The authors declare that there is no potential conflict of interest.

Data availability

The data of the research are available from the corresponding author.

Ethical approval

No animals have been sacrificed in this research work. The blood sample was collected by a professional veterinary service provider.

Consent to participate

All the authors agreed to participate and would be happy for any further clarification needed from this paper.

Consent for publication

All the authors agreed and provide their consent for the publication of this manuscript in the journal of Bangladesh Journal of Animal Science.

References

Ali MH, MAS Khan, MN Islam, MKI Khan, Rashid MM, Khatun MJ (2000). Comparative performance study on the crossbreds and indigenous cows

Red Chittagong cows performance in different conditions

- under small holder dairy farming, Pakistan Journal of Biological Sciences, 3(5): 795-798.
<https://doi.org/10.3923/pjbs.2000.795.798>
- Ali MH, Islam MN, Khan MAS, Islam MN (2006). Reproductive performance of different crossbred and indigenous dairy cows at Takerhat milk shed area, under the Bangladesh Milk Producers' Co-operative Union Limited (Milk Vita). Journal of Bangladesh Society of Agricultural Science and Technology, 3(3-4): 91-94.
- Alam M, Bhuiyan AKFH, Ali A, Mamun A (2007). Genetic analysis of birth weight and milk production of Red Chittagong Cattle of Bangladesh. Bangladesh Journal of Animal Science 36, (1-2): 24-32.
- AOAC (2005). Official Method of Analysis, (18th Edition.) Association of Official Analytical Chemists. Washington, D.C., U. S. A.
- Azizunnesa M, Sutradhar BC, Hasanuzzaman M, Miazi OF, Aktaruzzaman M, Faruk MO (2010). Study on the productive and reproductive performances of Red Chittagong cow at rural areas in Chittagong. University Journal of Zoology, Rajshahi University, 28: 27-31.
<https://doi.org/10.3329/ujzru.v28i0.5282>
- Banerjee GC (1988). Feeds and Principle of Animal Nutrition. Revised Edition. Pp. 68-69, 608 Oxford and I. B. H. Publishing Company Private Limited, New Delhi.
- Bathaei SS, Leroy PL (1998). Genetic and phenotypic aspects of the growth curve characteristics in Mehraban Iranian fat-tailed sheep. Small Ruminant Research, 29(3): 261-269.
[https://doi.org/10.1016/S0921-4488\(97\)00142-9](https://doi.org/10.1016/S0921-4488(97)00142-9)
- Bhuiyan AKFH (2007). Cattle and Livelihood in Bangladesh. Article from web resource.
<http://www.vishwagou.org/date 02/09/2008>.
- Habib MA, Bhuiyan AKFH, Bhuiyan MSA, Khan AA (2003). Performance of Red Chittagong cattle in Bangladesh Agricultural University Dairy Farm. Bangladesh Journal of Animal Science, 32(1-2): 101-108.
<https://doi.org/10.3329/bjas.v39i1-2.9673>
- Habib MA, Bhuiyan AKFH, Amin MR (2010). Reproductive performance of Red Chittagong cattle in a nucleus herd. Bangladesh Journal of Animal Science, 39: 9-19.
<http://doi.org/10.3329/bjas.v39i1-2.9673>
- Hasanuzzaman M, Hossain ME, Islam MM, Begum MR, Chowdhury S, Hossain MZ (2012). Performance of Red Chittagong cattle in some selected Areas of Chittagong district of Bangladesh. Bangladesh Journal of Animal Science, 41 (1): 29-34.
<https://doi.org/10.3329/bjas.v41i1.11973>
- Hossain MM, Bhuiyan AKFH, Faruque MO, Dev GK (2006). Characterization and distribution of Red Chittagong Cattle in Bangladesh. Progressive Agriculture, 17 (1): 103-110.
- Hossain MA, Haque ME, Tanzin M, Basar MMN, Islam MR, Kumar A (2022). Production performance of indigenous cows under a village condition of Sherpur District. International Journal of Applied Research, 8 (2): 12-17.
<https://doi.org/10.5281/zenodo.7480243>
- Hoque M, Amin M, Hussien M (1999). Dairy potential of Pabna cows and crossbreds with Sahiwal and Friesian and within-and between-breed sire effects, Asian-Australasian Journal of Animal Sciences, 12 (2): 161-164.
<https://doi.org/10.5713/ajas.1999.161>
- Islam MR, Hassan MN, Siddiki MSR, Khan MAS, Islam MA (2008). Determination of quality of milk from different genotype of dairy cows. Bangladesh Journal of Animal Science, 37 (1): 53-56.
<https://doi.org/10.3329/bjas.v37i1.9868>
- Khan AA, Ali A, Husain SS, Bhuiyan AKFH (1999). Reproductive performances of different genetic group of cows under farm condition. Bangladesh Journal of Animal Science, 28(1-2): 59-64.
- Khan MKI, Haque KS, Mian AG, Khatun MJ (2000). Study on the performance of Red Chittagong cows under different production system. Pakistan Journal of Biological Sciences, 3(2): 318-319.
<https://doi.org/10.3923/pjbs.2000.318.319>
- Mondal SC, Alam MM, Rashid MM, Ali MY, Hossain MM (2005). Comparative study on the productive and reproductive performance of different dairy genotypes reared in Bangladesh Agricultural University Dairy Farm. Pakistan Journal of Nutrition, 4: 222-225.
<https://doi.org/10.3923/pjn.2005.222.225>
- Nath SK, Dash AK, Alam R, Bhowmik DK, Azam NE, Mokbul SB, Barua SR, Rakib TM (2006). Productive and reproductive performance of Red Chittagong Cattle (RCC) in rural rearing system of Bangladesh. Asian Journal of Science and Technology, 7(7): 3152-3156.
- Porter V (2002). Mason's world dictionary of livestock breeds, types and varieties. CABI.
- Rabeya T, Bhuiyan AKFH, Habib MA, Hossain MS (2009). Phenotypic and genetic parameters for growth traits in Red Chittagong Cattle of Bangladesh. Journal of Bangladesh Agricultural University, 7(2): 265-271.
<https://doi.org/10.3329/jbau.v7i2.4733>
- Scottish Agricultural College (1984). Nutritional Allowances for Cattle and Sheep. Scottish Agricultural Publication, Pp. 29.
- Swenson MJ (1977). Duke Physiology of Domestic Animals. Ninth Edition, Pp. 22-28, Comstock Publishing Associates, Ithaca and London.

Turkson P-K, Ganyo EY (2015). Relationship between Hemoglobin concentration and Packed Cell

Volume in cattle blood samples. Onderstepoort Journal of Veterinary Research, 82(1): 1-5.
<https://doi.org/10.4102/ojvr.v82i1.863>