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RESEARCH ARTICLE

PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF RED CHITTAGONG CATTLE (RCC) IN RURAL REARING SYSTEM OF BANGLADESH

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ABSTRACT

Red Chittagong Cattle (RCC) is considered as a variety of cattle usually found in Chittagong, Bangladesh. The study was conducted to estimate the productive and reproductive traits of Red Chittagong Cattle (RCC). Five administrative areas were selected from Chittagong district of Bangladesh. The farmers, who were rearing rearing RCC, were subjected to questionnaire based interview. Data was collected with standard questionnaire by face to face interview, farm record sheet and direct observation to get information on productive and reproductive performances. The result of the collected data revealed different reproductive performances of Red Chittagong Cow such as age at puberty 28.98 months, age at first calving 40.24 months, service per conception 1.615, calving interval 13.05 months, days required to first heat during postpartum period 109.31 days and gestation length 278.74 days. In this study some data were recorded to observe the production performances of Red Chittagong Cows. Milk production and lactation length was 2.35 liter/day and 256.8 days respectively. The maximum milk production was 4 liter/day/cow and the minimum production was 1 liter/day/cow supplied some amount of concentrate along with roughage.

INTRODUCTION

The indigenous cattle genetic resources of Bangladesh are now under threat condition because of urbanization and fast expansion of crossbreeding. Cattle are important domestic animal in Bangladesh. Most of the indigenous cattle in Bangladesh are of zebu type. Among them, some improved cattle such as Red Chittagong Cattle (RCC), Pabna cattle, Munshingonj cattle, Manikgonj cattle and North Bengal Grey cattle are potential producers of milk and meat (Azizunnesa *et al.*, 2008). The people of Bangladesh are rearing three categories of cattle like pure breed, crossbreed and local-breed. In Bangladesh the best local cattle are available in some selected areas like Pabna, Sirajgonj, Chittagong and Munshigonj areas. In Chittagong a beautiful Red cattle with some distinct characteristics are seen known as Red Chittagong Cattle and produce 2.0±0.65 kg milk in farm condition and 1.80±0.87 kg in rural condition per day (Khan *et al.*, 2000). The RCCs are considered as the national heritage of Bangladesh. They are tropically well adapted and distributed mostly in the southern regions (Raozan, Potia, Chandanaish, Satkania, Lohagara) upazillas of Chittagong of Bangladesh. 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 (Pirchner, 2000, Porter, 2002). Although milk production of RCC dairy cows are lower than crossbreed cows, their other performances like feed conversion ratio (FCR), production of calf per year and disease resistance capacity are better. They can survive with locally available low quality feed resources (Mondal *et al.*, 2005). Although data on reproductive performances of exotic and crossbred cows are abundantly available but they are very limited in case of indigenous cattle, because indigenous cattle has not yet been reared under close monitoring system. Indigenous cattle are reared scattered in the rural farmers' house as because very difficult to get information due to poor awareness of the

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farmers. A comprehensive study on reproductive traits of indigenous cattle is essential for improving the breeding efficiency and to formulate selection and breeding strategy. It is also an important tool of a breeder to evaluate the factors affecting the reproductive traits of indigenous cattle of Bangladesh. Red Chittagong Cattle (RCC) is one of such promising variety of indigenous cattle of Bangladesh having some superb reproductive efficiency due to their regular breeding potentiality (Habib *et al.*, 2003, Habib *et al.*, 2010). These cattle are only found in Chittagong and its peripheral regions and reported to have been declining their number due to indiscriminate breeding with poor indigenous, exotic and crossbred cattle since last three and a half 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 milk and beef of high quality (Bhuiyan, 2007). The Red Chittagong Cow attains sexual maturity earlier and calving regularly than that of non-descriptive Deshi (Khan *et al.*, 1999). Now-a-days government and some non-government organizations are paying attention on this potential type of indigenous cattle. Considering the above condition the study work was undertaken to estimate the productive and reproductive performance of RCC in backyard rearing system in Chittagong district.

MATERIALS AND METHODS

The study was conducted in five randomly selected upazillas (Administrative area) namely Anwara, Patia, Chandanaish, Satkania, and Lohagara located in Chittagong district in Bangladesh during the period of March to December, 2015. After site selection an information survey was made by going door to door of farmers who are rearing RCC and a total 200 cows were selected from different selected upazillas during the study period. The selected cows were visited frequently and the information on the productive and reproductive performances of each cow was collected by face to face interviewing the farmers by frequent visit and examination of the cow. After that, all data were recorded in a separate designed survey questionnaire prepared according to objectives. The farmers were given a brief description about the purpose of this study before interviewing. The survey schedule was prepared on the basis of following key items: age at puberty, gestation length, days to post partum heat, calving interval, service per conception, daily milk production per cow, total lactation length. During investigation the management including feeding, housing, ventilation, hygiene etc were also observed and recorded in the questionnaire.

Traits considered for the study

Traits included for this study were age at sexual maturity, age at first calving, number of services per conception, conception rate, calving interval, post partum heat period, gestation length and service period. Age at puberty (AP): The length of time between the date of birth and the date of showing first heat in life of an individual is termed as AP. This trait is positively correlated with the generation interval and has an economic value to the breeders because farmers always expect calf earlier from a heifer that is related to the age at sexual maturity of an individual.

Age at first calving (AFC): The AFC is the age of an individual when first give birth newborn in life.

Number of services per conception (NSPC): It refers to how many services are required for a successful conception of an individual and is calculated by dividing the number of conceptions with the number of inseminations.

Conception rate (CR): It represents the ratio of number of conceptions to number of services and is expressed as percentage.

Calving interval (CI): The CI refers to the time elapses between two successive calving. This trait is very much important to the breeders because the lowest the calving interval the highest the lifetime calf production.

Post partum heat period (PPHP): It is the time between the date of calving to the date of first subsequent estrous. This period is required for resumption of ovarian activity and uterine involution. This trait refers the reproductive efficiency of an individual because the shortest the post-partum heat period the highest the calf production in their lifespan.

Gestation length (GL): The GL is the period between the date of fertile service and the date of calving. This period is almost invariable within individual in a breed or type.

Service period (SP): The SP is the interval from calving to the subsequent conception. It has obvious economic importance to a dairyman because a longer service period increases the calving interval, hence positively correlated resulting in a reduced life time production. Therefore, service period = calving interval – gestation length, however service period ≥ post partum heat period.

RESULTS AND DISCUSSION

Age at puberty (AP)

The AP of RCC heifers in reared farms was 28.98 months presented in Table 1. In the present study the AP was much lesser than the published findings by (M. Hasnath, 1974) who reported AP to be 39.5 months for RCC. Other authors also reported higher values ranging from 32.5 to 42.45 months for non-descript Deshi/Indigenous cows (M. Majid *et al.*, 1995, M. Ali *et al.*, 2006), 39.23 ± 4.31 and 35.1 ± 9.24 months for Pabna and Sahiwal × Pabna crosses cows (M. Hoque *et al.*, 1999). But in case of Friesian × Pabna crosses the value was 25.53 ± 5.59 months (M. Hoque *et al.*, 1999) which is shorter than the present study. The AP was 35.6 ± 0.53 months for Deoni cattle in India which is also higher than RCC. The variation between RCC and other breeds might obviously be due to differences in nutrition body condition score (BCS), management, environment and different genotypes. It was also evident that temperate breeds come into maturity at an earlier age than the breeds of tropical environment (G. Singh *et al.*, 2002).

Age at first calving (AFC)

Table 1 also showed that the AFC of RCC was found 40.24 months. Relatively longer AFC (45.7 ± 0.52 to 54.0 months)

was found for Deoni cattle (G. Singh *et al.*, 2002), for Ongole also known as "*Nellore*" (G. Gaur *et al.*, 2002).

Table 1. Reproduction performances of RCC in five upazillas

Traits	No of observations	Mean
Age at puberty(month)	200	28.98
Age at first calving(month)	200	40.24
No of service per conception	200	1.62
Calving interval(month)	152	13.05
Post partum heat period	152	109.31
Gestation length(day)	200	278.74

A number of previous works indicated that management factors especially nutrition determines pre-pubertal growth rates and reproductive development The better-managed and well-fed heifers grew faster, received service earlier and resulted in more economic benefit in terms of more milk and calves produced during the lifetime of the animal (E. Masama *et al.*, 2003).

Number of services per conception (NSPC)

The mean NSPC observed in this study was 1.62 which is closely in agreement with the findings of (Ahmed and Islam, 1997) for RCC (1.57 ± 0.53) and (Khan *et al.*, 1999) for Pabna deshi cows (1.57 ± 0.07). Comparatively lower NSPC (1.2 to 1.36 ± 0.067) was found by (Alam *et al.*, 1994, Habib *et al.*, 2003, Habib *et al.*, 2010) for RCC and 1.16± 0.37 for indigenous cow (Ali *et al.*, 2006). (Alam *et al.*, 1994, Majid *et al.*, 1995, Sultana and Bhuiyan, 1997) reported higher values of NSPC ranged between 1.6 ± 0.86 to 1.78 ± 0.22 for nondescript indigenous cows in their studies. It was found 1.9 inseminations per conception for Ongole cattle which is also higher than that in RCC (Gaur *et al.*, 2002). NSPC depends on cow itself and other factors related to management and nutrition of cow. Likewise, the cows with reproductive disorders required more services per conception and had longer intervals from calving to first service and also to conception (Shiferaw *et al.*, 2003). Proper and accurate heat detection is a key to efficient reproduction and four to five checks each day to determine the onset of true standing heat gives a better idea on when to inseminate. Although not significant, a decrease in the NSPC required for cows supplemented high level of protein (Tadesse and Zelalem, 2000).

Table 2. Production performances of Red Chittagong Cattle

Traits	No of observations	Mean
Milk production per day (in liter)	200	2.35
Lactation length(days)	200	256.8

Calving interval (CI)

The CI of this study (Table 1) was 13.05 months/400 days. The average calving interval in RCC in farming conditions was 374.73 days (Talukder *et al.*, 2005). But the average calving interval of RCC in farm conditions and in rural conditions was 458.40 ± 71.82 days and 529.35 ± 127.50 days, respectively (Khan *et al.*, 2000). The calving interval of RCC was 12.0 months under traditional production systems (Bangladesh Livestock Research Institute, 2005). The intercalving interval in RCC in rural condition was 634.59 ± 223.92 days (Azizunnesa, 2002). The inter calving interval of crossbred was 635.10 ± 84.90 days and in indigenous cows was 539.40 ± 128.10 days (Ali *et al.*, 2000). The average calving interval of subsistance dairy cow was 18 ± 5 months in Mymensingh district (Azizunnesa, 2002).The variations of CI among the observation of different researchers might have resulted due to different genotype, herd, sample size, feeding regime, general and reproductive management, disease condition, postpartum estrous period, days open etc. The length of gestation and service period are the two main components of calving interval. Since gestation period in cow is more or less consistent, service period constitutes nearly all of the variation in calving interval; the only way to reduce the calving interval in cattle would be through an early conception within biological limits. Selection for calving interval is practically equivalent to selecting for service period (Zafar *et al.*, 2008).

Post partum heat period (PPHP)

Table 1 showed that the mean PPHP of RCC was 109.31. PPHP was 120.04 ± 7.84 days for non-descript deshi cows (Majid *et al*. 1995). Relatively shorter PPHP was noticed 57 days for RCC, 103.64 ± 6.61 days for Pabna cows and 112.76 ± 34.58 days for indigenous cow (Alam *et al.*, 1994, Ali *et al.*, 2006). On the contrary, (Roy, 1999, Rahman *et al.*, 2001) found relatively longer PPHP (141.3 ± 88.36 days for nondescript deshi and 160.72 ± 80.26 days for Pabna cows, respectively) than in RCC. The effect of low level of nutrition on extended postpartum period due to weight loss was noted. They also added that heavier cows at calving and cows that gained weight during the first three months of postpartum were in a positive energy balance, which enabled them to return to normal estrous cycles (Gebreyohannes *et al.*, 2005). Moreover, the increased level of protein supplementation from low (2 kg/day) to high (4 kg/day) reduced the post partum interval from 159 to 100 days (B. Tadesse and Y. Zelalem, 2000). The result is consonance with the results of (Morrow *et al.*, 1966, El-Keraby and Aboul-Ela, 1982) stated that parity did not affect any of the other postpartum intervals. However, others have reported differences due to parity in the interval to first postpartum estrous (Buch *et al.*, 1955).

Gestation length (GL)

The average GL of RCC was found 278.74 days. The result is in consistent with the results of (Hossain and Routledge, 1982) for Pabna and non-descript deshi cows and (Khan *et al.*, 1999) for RCC who found GL ranged between 281 ± 10 to 283.69 ± 11.2 days. Slightly longer gestation period (between 283.08 ± 0.49 to 287 ± 3.46 days) was found by the studies of (S. Ghose *et al.*, 1977, M. R. Amin *et al.*, 2013) for Pabna cows, (M. Habib *et al.*, 2003) for RCC and (Munim *et al.*, 2006) for RCC, local indigenous and other different crossbreds. The mean gestation period was 273.08 ± 7.48 days in farm condition in crossbred cows (Azizunnesa, 2002). The standard gestation length of cows is 285 ± 5 days. The gestation length for RCC was 273.08 ± 7.48 days (Azizunnesa *et al.*, 2008).

Productive performance

The average milk production per cow per day in RCC was 2.35 liter and lactation length was 256.8 days (Table 2). The total lactation yield was 800 liter in RCC under rural condition (Bangladesh Livestock Research Institute, 2005). The average

milk production per cow per day of RCC was 2.0 ± 0.65 kg in farm condition and1.80 ± 0.87 kg in rural condition (M. Khan *et al.*, 2000).

Milk production

The mean milk production of RCC in this study was 2.35 liter per day. Daily milk production of local cows in farm condition was 2.56 liter per cow (Ahmed and Islam, 1997, Kayastha *et al.*, 2016) which is slightly higher than that of the present study. The average milk production of subsistence dairy farm was 3.2 ± 2.2 kg per day per cow (Azizunnesa, 2002). It might have been the lack of nutrition supply, lack of proper management system parasitic infestation, etc were the possible causes of low milk production in this study area. The milk production drops to as low as 1.5 ± 0.89 liter per day in pabna milk shed area of Bangladesh during the period of low feed supply and when cows were fed rice straw only (Azad *et al.*, 2007).

Lactation length

The lactation period of RCC was 256.8 days (Table 2). Few reporters found comparatively less lactation periods (Khan *et al.*, 2000) stated the average lactation length of RCC was 222.85 ± 16.03 days in farm condition and 214.71 ± 21.68 days in rural condition. The average lactation period of crossbred was 266.42±30.87 days and 220.21±21.69 days for indigenous cows. The average lactation period of indigenous cows was 228 days observed. The length of lactation period depends upon some factors. Heredity, adequate nutrition, milk production and weaning practice are the most important factors which influence the lactation length. Minimum 2 months of milking prior to delivery is important for return to heat in post partum period and conception and even subsequent milk production (Ali *et al.*, 2000, Kayastha *et al.*, 2016).

Conclusion

From this study it may be concluded that appropriate feeding, management, heat recognition and timely insemination are required for improvement of reproductive and productive traits of RCC. Therefore, there is still necessitate for more research for a genetic improvement program of RCC in farmers herd in order to put together smallholder dairy farming more profitable at the subsistence farming conditions of Bangladesh.

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