Study on Productive and Reproductive Characteristics of Pure and Crossbreed Red Chittagong Cattle at Govt. Dairy and Cattle Breed Development Farm, Hathazari, Chattogram

A production report submitted in partial satisfaction of the requirement for the Degree of Doctor of Veterinary Medicine (DVM)

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Statements of Author

I, Md. Foisal Shikder, hereby declare that I have completed all tasks and provided the information in this report. The data was gathered through publications, websites, and other sources both domestically and abroad. All citations have been properly acknowledged. As a result, I am entirely responsible for gathering, combining, preserving and publishing all of the data that has accumulated in this report.

The Author

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List of Contents

List of Tables

List of Figures

LIST OF ABBREVIATIONS

ABBREVIATIONS	FULL WORD
RCC	Red Chittagong Cattle
Govt.	Government
AI	Artificial Insemination
BLRI	Bangladesh Livestock Research Institute
Wt.	Weight
kg	Kilogram
DCP	Di-Calcium Phosphate
Max	Maximum
Min	Minimum
SD	Standard Deviation
cm	centimeter
AP	Age of Puberty
PPH	Post-Partum Heat
SC	Service per Conception
n	Number
d	days
l/m	Litter per month
LL	Lactation Length
Avg.	Average
MP	Milk Production
MPL	Milk Production per Lactation
CI	Confidence Interval
BCS	Body Condition Score
SD	Standard Deviation

Abstract

The present study was accomplished at Govt. Dairy and Cattle Breed Development Farm, Hathazari, Chattogram from 20th March 2023 to 11th April 2023. The study aimed to know the general information about pure RCC and mixed breed RCC, common feeding practices along with production and reproduction performance. In this study, about 20 pure and 20 crossbreed RCC were included. The data were collected from the caretaker, milkman, AI technician and farm Deputy Director through a conducted questionnaire. The data demonstrated that pure bloodline RCC heritability is 100% where crossbreed RCC bloodline vary from 50 to 87.5%.Among individual nutrition, supplying maize in ration of RCC at high rate, pure RCC milk is slightly sweetish and yellowish than normal milk of crossbreed RCC. Also average body length of pure RCC (109.283 cm) is shorter than crossbreed RCC (119.771cm). Beside these, pure RCC mature female (avg. 196.924 kg) have lower body wt. than crossbreed RCC female (avg. 248.853 kg). Also, pure RCC female have shorter gestation period (280.4±8.911 days), lactation length (302.15±11.847 days), post-partum heat (92.20±6.542 days) than crossbreed RCC female gestation period (280.95±10.144 days), lactation length (298.1±9.781 days), post-partum heat (108.05±24.237 days).

Finally, it can be said that developing pure bloodline RCC is as great as for using like dairy cattle than crossbreed RCC and to improve indigenous or crossbreed cattle bloodline using like RCC. It is better to use 100% bloodline of RCC for developing this RCC as a dairy and prolific breed worldwide and for fulfilling meat and milk demand in prospect of Bangladesh and developing country.

Keywords: Red Chittagong Cattle, morphology, production traits, reproduction traits.

Chapter 1: Introduction

In the dairy industry, productive traits directly affect the profitability of the farm. These traits depend largely on the genetic potential of the dam and sire. Profitable breeding can be improved by keeping lactation length, dry period, service period between optimal limits, body weight, gestation period and heritability percentage (Çilek & Emin Tekin, 2005).

In order to let an individual express its full genetic potential, it is necessary to optimize the environment. Some environmental factors can measured, such as age, year, season, milking frequency, but some cannot, such as disease. Although, data on performance of pure and crossbred cows are available in Bangladesh, but they are very limited in case of indigenous cattle. A comprehensive study on milk production traits, weight, length of indigenous cattle is essential for improving the breeding efficiency and formulating breeding strategy.

Red Chittagong Cattle (RCC) is a promising indigenous type with some unique features, and is found in Chittagong area. The name "Red Chittagong" cattle is derived from the breed's reddish coat color (Khan et al., 2000; Alam et. al., 2023) and the name of its natural breeding habitat - Chittagong, Bangladesh. Red Chittagong cattle are regarded as an improved native cattle species in Bangladesh (Mason, 1951; Mason & Buvanendran, 1982). Red Chittagong cattle are a dual-purpose breed for dairy and beef production and play a key role in poverty alleviation for small holder farmers in its habitat (BLRI, 2004). The breed also has a short post-partum heat period, high conception rates, greater milk fat content (Halim et al., 2010) and high calving rate (Khan et al., 2012).

In addition, the breed is more resistant to parasites and diseases prevailing in its habitats than other cattle (Ahmed et al., 2015) with high survivability in both adults and calves (Quaderi et al., 2014) . Considering these attributes, RCC may be regarded as a potential cattle genotype to tackle the future challenges of intensive animal production in Bangladesh. Nevertheless, they have been losing their unique features due to indiscriminate breeding with poor indigenous, exotic and crossbred cattle.

Therefore, the present study was conducted to know with the following objectives:

- To know the common dairy cattle feeding practices at Govt. Dairy and Cattle Breed Development Farm, Hathazari, Bangladesh.
- To know the dairy cattle feeding management system in this intensive farm.
- To know the milk production, lactation length, age determination, dentition and live body weight measurement.

Chapter 2: Materials and Methods

Study area and population

The study was carried out through the period from 20th March 2023 to 11th April 2023 during a 23 days internship placement at Govt. Dairy and Cattle Breed Development Farm, Hathazari, Chattogram. The data was collected from the pure RCC and Crossbreed RCC that were reared in the intensive govt. dairy farm to produce pure bloodline RCC. The data collection were completed with a pre-structured questionnaire based on individual-level data through face-to-face interviews of the caretaker, milk man, AI technician and farm Deputy Director through a conducted questionnaire and by observation of the dairy cattle and data from record book to compare the selective traits. A total of 20 pure RCC and 20 crossbreed RCC were included in the study for data collection during the study period.

Geographical Coordinates :

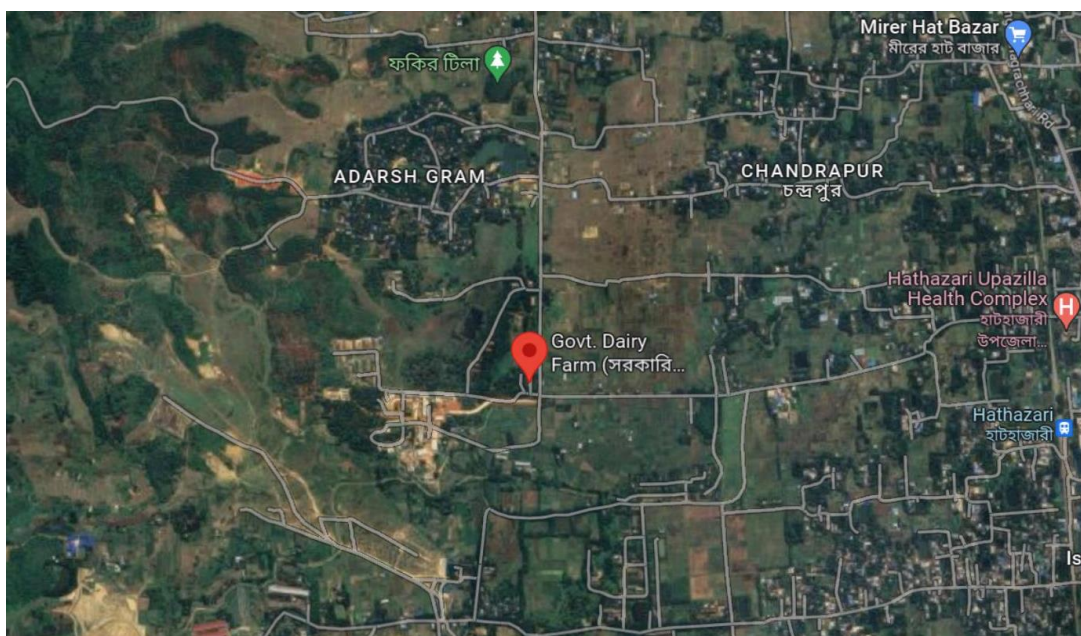Latitude : 22.507465326412415, Longitude : 91.78790366049765

Figure 1: Geographical location of Govt. Dairy and Cattle Breed Development Farm, Hathazari, Chattogram

Data collection process and tools

The data were acquired through face-to-face of the caretaker, milkman, AI technician and farm Deputy Director through a conducted questionnaire regarding the objectives of the study using like as an interview schedule. Information based on different qualitative and quantitative parameters like general information about the pure and crossbreed RCC dairy cattle (farm population size, physical appearance of pure and crossbreed RCC cattle, heritability percentage, BCS etc.), feeding practices of dairy cattle (roughage and concentrate ratio, protein source, carbohydrate source, amount of feed, vitamin/minerals supplement etc.), physical measurements of pure and crossbreed RCC dairy cattle (length, heart girth, horn length and diameter, horn ring), productive and reproductive traits of pure and crossbreed RCC (birth weight of calf, mature weight of female cattle, age at puberty of female cattle, post-partum heat, calving interval, service per conception, gestation length, dry period, lactation length, milk production per month, milk production per lactation) were collected during the study period.

Data analysis

All data were sorted and imported into Microsoft Excel 2016. Standard Deviation (Descriptive Statistics) were adopted mainly to demonstrate the result per the objectives of the study by using an excel sheet.

Chapter 3: Results

General information about Pure and Crossbreed RCC

Among general information about the pure and crossbreed RCC dairy cattle like farm population size, physical appearance of pure and crossbreed RCC cattle (coat, hoof, eyeball, horn, vulva color etc.), heritability %, BCS (Body Condition Score) etc. were observed **(Table 1).** Almost 200 pure RCC and 100 crossbreed RCC are present there. So, I take 10% pure RCC and 20% crossbreed RCC sample for this report. The coat color of pure and crossbreed RCC was classified into 3 and 4 categories where Reddish (pure 55% and crossbreed 60%) was dominant followed by Reddish Yellow (pure 30% and crossbreed 5%), Reddish White (pure 15% and crossbreed 25%) and Reddish Brown (crossbreed 10%). Also, horns are medium in pure RCC where slightly long in crossbreed RCC. There was a percentage variation in Heritability where pure RCC have 100% bloodline but crossbreed have 50 to 87.5% bloodline of pure RCC **(Table 1).**
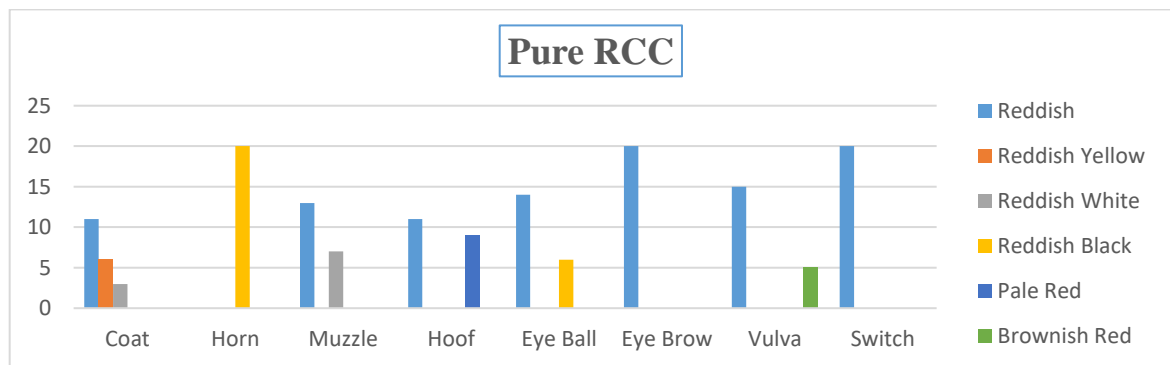

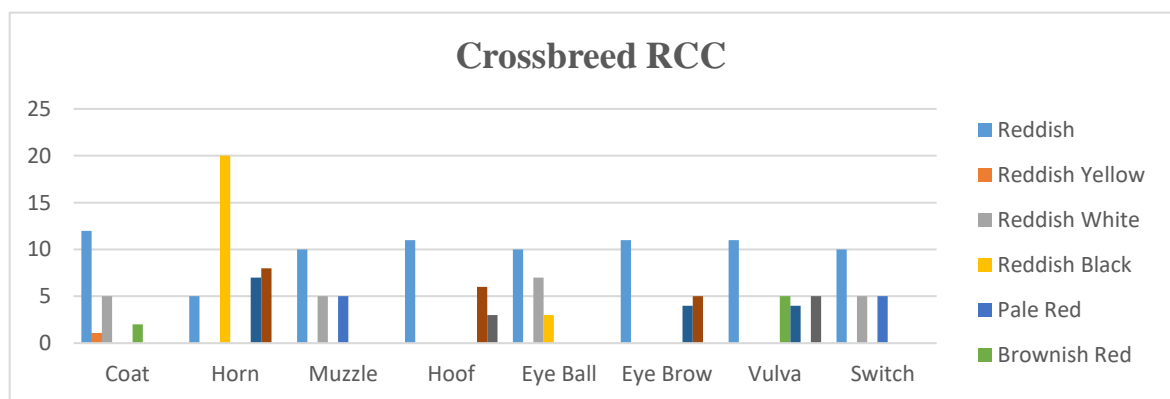**Figure 2:** Physical Appearance of Pure RCC

Figure 3: Physical Appearance of Crossbreed RCC

Table 1: Heritability (%) and Physical Appearance of Pure vs Cross Red Chittagong Cattle

Parameters	Pure RCC		Crossbreed RCC	
	Frequency (n)	Other Descriptions	Frequency (n)	Other Descriptions
Heritability (%)	100% - 20 cattle	20 cattle are 100% pure bloodline	50% - 1 cattle 62.5% - 5 cattle 69.5% - 1 cattle 75% - 7 cattle 87.5% - 6 cattle	Different type of bloodline are available here.
Body	-	The body is blocky. Female is lighter than male	-	The body is not blocky. Female is lighter than male
Physical Condition	-	They are strong and stout in physical condition.	-	They are strong in physical condition.
Head	-	Head is narrow and thin with flat forehead.	-	Head is narrow and thin with slightly rounded forehead.
Hump	-	Hump is well developed and vertically erected. It is less prominent in female than male.	-	Hump is not well developed and vertically erected. It is less prominent in female than male.
Legs	-	Legs are medium, firmly set under the body and well-apart from one another.	-	Legs are long, firmly set under the body and well-apart from one another.
Ears	-	Ears are medium in size, alert and slightly dropping.	-	Ears are medium in size, alert and slightly dropping.
Coat	Reddish-11 Reddish Yellow-6 Reddish White-3	The hair coat is fine, short, strong and smooth with remarkable shine.	Reddish-12 Reddish White-5 Reddish Brown-2 Reddish Yellow-1	The hair coat is fine, slightly long, strong and smooth with remarkable shine.
Horns	Reddish Black-20	Horns are medium and stumpy, tapering to a blunt point.	Black-8 Whitish-7 Reddish-5	Horns are slightly long and stumpy, tapering or straight to a blunt point.
Muzzle	Reddish-13 Whitish Red-7	-	Reddish-10 Pale Red-5 Whitish Red-5	-
Hoof	Reddish-11 Pale Red-9	-	Reddish-11 Blackish-6 Brownish-3	-
Eye Ball	Reddish-14 Reddish Black-6	-	Reddish-10 Reddish White-7 Blackish Red-3	-
Eye Brow	Reddish-20	-	Black-5 Reddish-11 Whitish-4	-
Vulva	Reddish-15 Brownish Red-5	-	Brown-5 Reddish-11 Whitish-4	-
Switch	Reddish-20	-	Reddish-10 Pale Red-5 Whitish Red-5	-

Feeding practices of Pure and Crossbreed RCC

Among common feeding practices of dairy cattle like roughage and concentrate ratio, protein source, carbohydrate source, amount of feed, vitamin/minerals supplement etc. were included in **(Table 2).** Basically in this farm as a carbohydrate source , green grass like Napier and Red Pukchang were supplied @10% of live body weight whereas protein source, like wheat bran, soybean meal, maize and chickpeas were supplied combinedly @1-1.5% of live body weight. For beneficial purpose to reduce feed cost, straw was supplied @2-3% of live body weight of animal. Dietary mineral supplement also given animal in animal feed ration. There is a slightly changes in concentrate feed as like as Maize which is higher in pure breed RCC than crossbreed RCC **(Table 2).** For this, changes in feeding, pure RCC milk is slightly sweetish and yellowish than normal milk.

Table 2: Percentage of different feed parameters related to feeding practices of Pure and Crossbreed RCC

		Pure RCC	Crossbreed RCC
Feed Type	Source of Feed	Amount of feed for 100 kg. Body Wt. Animal	
Roughage (10%)	Napier	5	5
	Red Pukchang	5	5
Concentrate (1-1.5%)	Wheat Bran	0.5	0.6
	Soybean Meal	0.15	0.15
	Maize	0.25	0.1
	Chickpeas	0.10	0.15
Straw (3%)		3	3
Mineral Supplement	DCP	0.02	0.02
	Premix	0.05	0.05
	Common Salt	0.01	0.01

Physical measurements of Pure and Crossbreed RCC

Among physical measurement information regarding like body length, heart girth, horn length, horn diameter, horn ring number were included in **(Table 3).**

Table 3: Physical measurements of Pure and Crossbreed RCC

Parameter	Pure RCC					Crossbreed RCC				
Traits	Average	Min	Max	SD	CI	Average	Min	Max	SD	CI
Length (cm)	109.283	97.5	121.5	7.65	1.711	119.771	101.5	132.65	8.442	1.888
Heart Girth (cm)	134.328	124.95	145.65	5.46	1.222	143.273	126.75	162.75	9.506	2.126
Dentition (n)	3.75	2	4	0.639	0.143	3.45	1	4	0.946	0.211
Horn Ring (n)	1.95	1	3	0.686	0.153	1.3	0	3	0.801	0.179
Horn Length (cm)	12.698	7.5	22.5	4.16	0.929	12.981	6.45	20	4.555	1.018
Horn Diameter (cm)	12.749	8.75	18.75	2.39	0.534	11.56	7.5	17.5	2.189	0.489
Total Cattle Observation	20					20				

Productive and Reproductive traits of Pure and Crossbreed RCC

Among productive and reproductive traits usually it indicates birth weight of calf, mature weight of female cattle, age at puberty of female cattle, post-partum heat, calving interval, service per conception, gestation length, dry period were included in **(Table 4).**

Table 4: Productive and Reproductive traits of Pure and Crossbreed RCC

| Parameter	Pure RCC					Crossbreed RCC				
Traits	Avg.	Min	Max	SD	CI	Avg.	Min	Max	SD	CI
Birth Wt. of Calf (kg)	14.1	8	18	2.553	0.57	14.6	8	17	2.458	0.549
Live Wt. of Mature Female Cattle (kg)	196.924	151.6	248.25	28.265	6.32	248.853	162.8	338.35	47.893	10.709
AP of female cattle (m)	28.85	24	37	3.297	0.737	25.15	21	30	2.207	0.494
Gestation Length (d)	280.4	260	294	8.911	1.993	280.95	245	291	10.144	2.268
Dry Period (d)	60.3	54	68	3.450	0.772	67.15	55	92	9.522	2.129
PPH of female cattle (d)	92.2	79	102	6.542	1.463	108.05	50	150	24.237	5.419
Calving Interval (m)	14.1	13	17	1.119	0.250	14.8	13	18	1.508	0.337
SC (n)	1.9	1	5	1.071	0.239	1.725	1	4	0.850	0.190
LL (d)	302.15	254	311	11.847	2.649	298.1	273	310	9.781	2.187
MP (l/m)	60.705	41.5	76.5	8.01	1.791	51.75	35	64	7.010	1.568
MPL	615.288	422	772.6	83.376	18.643	513.548	350	635.7	69.016	15.432
Total Cattle Observation	20					20				
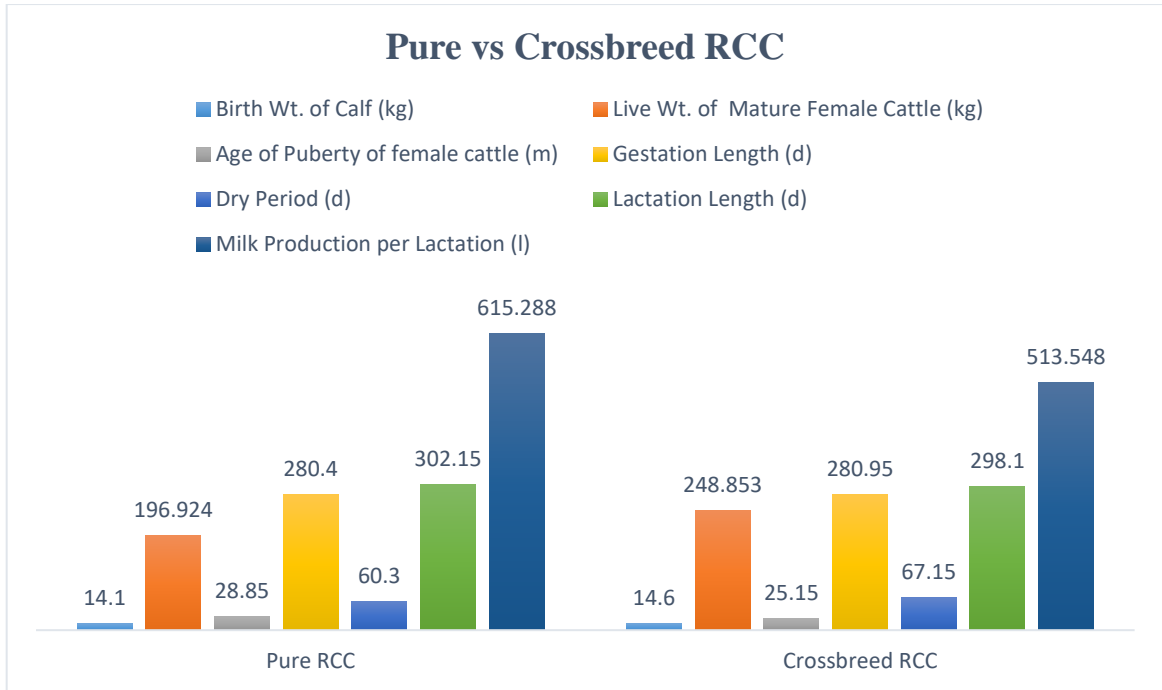
Figure 4: Productive and Reproductive traits of Pure vs Crossbreed RCC

Figure 5: Pure Red Chittagong Cattle

Figure 6: Crossbreed Red Chittagong Cattle

Chapter 4: Discussion

General information about Pure and Crossbreed RCC

The majority of coat color of pure RCC is Reddish (n=11) followed by Reddish Yellow (n=6) and Reddish White (n=3) where crossbreed RCC is Reddish (n=12) followed by Reddish White (n=5), Reddish Brown (n=2) and Reddish Yellow (n=1). So, it can be said that almost crossbreed RCC is having now Pure Blood line RCC in there coat and this crossbreed RCC can be turned into pure bloodline RCC through several generation breeding. The present study also said that pure RCC horn color is Reddish Black (n=20) where crossbreed RCC horn color is Black (n=8) followed by Whitish (n=7) and Reddish (n=5) (Rahatullah et al., 2010). The variation in crossbreed RCC in case of muzzle, hoof, eyeball, eyebrow, vulva and switch color due to their crossing with pure bloodline RCC and this is a good sign to develop this pure bloodline RCC by breeding generation after generation (Siddiky et al., 2013). Most of the pure bloodline RCC legs are medium sized and body is well blocky along with good BCS where crossbreed RCC legs are longer size and body is lighter than pure bloodline with moderate BCS. Beside this, the pure bloodline RCC heritability is 100% where crossbreed RCC bloodline vary from 50 to 87.5% **(Table 1).**

Feeding practices of Pure and Crossbreed RCC

The most preferable feed for mature pure and crossbreed RCC dairy cattle is green grass, which is referred as roughage and act as carbohydrate source. Along with this, these dairy cows are served with different concentrate mixtures and also served with straw and ad libitum water. The effects of nutrition is much greater importance for pregnant and mature pure RCC and crossbreed RCC and its also effect in milk production, calving weight gain and also maintain female dairy cow BCS. In Bangladesh context, green grass and total mixed concentrate ration **(Table 2)** is the reliable way to increase milk production and maintain BCS and having one calf per year from a dairy cow. RCC is a potential dairy cattle variety of Bangladesh and is suitable for smallholder farmers due to its small size and low feed requirements. They are reared under poor quality diet, unbalanced nutrients, improper feeding and poor husbandry management practice and their performances are very poor (Ram et al., 2015). For nutritional balance, mineral supplement as like as DCP, common salt,

mineral premix are supplied to pregnant and lactating dairy pure and crossbreed RCC cattle. In diet, dietary supplement of calcium increase milk production in dairy cattle and decrease from milk fever disease (Kronqvist et al., 2011).

Physical measurements of Pure and Crossbreed RCC

Livestock body weight is the basis for determining ration amounts and sale prices of animals. Body weight plays an important role in reproductive performance of a dairy animal and therefore, influences milk production (Kanuya et al. 2006). Therefore, the accurate estimate of live body weight is of fundamental importance to any livestock research and development. Several techniques are available to measure or estimate the body weight of livestock. Weighing scale, although accurate, is less preferred by dairy producers because it is cumbersome, time-consuming, costly to implement (Heinrichs et al., 1992) and stressful to the herd. Thus, rapid methods using linear body measurements are applied widely. Studies have made good prediction of live body weights of large ruminants through the use of linear body measurements. The European-based weigh tapes developed for Holstein and other European beef breeds overestimate the true weight of east African cattle (Mwacharo et al., 2006; Machila et al., 2008). (Otte et al., 1992) observed greater measurement error of weigh tape in cattle when compared with measurement by scale. Thus, there is a need to validate the preciseness of Rondo tape and compare techniques used to estimate the body weight. Particularly, in resource poor countries such as Bangladesh and from economic standpoint, a practical and inexpensive field technique to estimate cattle body weight without the use of scales is important. In this study, one different techniques were applied as Weighbridge technique. The primary objective was to evaluate and identify techniques providing precise estimates of live RCC cattle body weight in Bangladesh. Weighbridge is a standard calibrated scale, therefore, in this study, it was used as the main point for determining body weight. Animals were allowed to approach the Weighbridge and proceed directly onto the platform. Animals were able to stand for about 10–15 seconds and weight measurement on the scale was recorded in kg.

The live body weights measured by Weighbridge were about 196.924 kg in average and 248.853 kg for pure RCC and crossbreed RCC, respectively **(Table 4).** Age is a big fact for giving daily ration and related to puberty. Data recording sheet also can help to determine actual age of dairy cattle .For this dentition and horn ring number also measured to detect age of pure and crossbreed RCC (Cole et al., 1982).

Dentition is the means of doing so and is the commonly accepted standard. Cattle dentition is generally use as an indicator of age when actual birthdates are not available. Eruption times and wear of the teeth are the major factors used to estimate bovine age. The definition of eruption is the emergence, penetration or piercing of the tooth or teeth through the gingiva (the gum line). An animal at 14 months of age would have a full set of deciduous incisors. All four pairs of teeth are temporary and firmly in place. The teeth are short, broad and usually have a bright, ivory color. There is usually space between the Di1 incisors. Other incisors may touch on the inside corner at the top of the tooth. As the animal ages, the deciduous teeth become loosely set in the jaw, especially the central two incisors. The teeth appear longer and narrower than in younger animals and the teeth may or may not be touching at the upper corners. An animal with this dentition is approximately 15 to 18 months of age old. a permanent central (I1) incisor has erupted. Temporary incisors may or may not be present when the permanent incisor erupts. The permanent incisors usually erupt at an angle and straighten into a definite pattern with growth. In Figure 5 both central (I1) incisors have erupted. They may or may not be in straight line with the incisor corners touching. The central incisors are in place. They have straightened and the inside corners are in line. Animals with eruption of one or more central incisors are considered to be 18 to 24 months of age. When one or both middle (I2) incisors erupted, the animal is considered to be 24 to 30 months of age (Manitoba Agriculture, Province of Manitoba, 2023; MSD Veterinary Manual, 2023). As a result, most of the pure and crossbreed RCC dentition number is 3.75 and 3.45 which indicates they are almost 3-4 years of age where horn ring number on average for pure and crossbreed RCC is 1.95 and 1.3 indicates 10-14 months and 20-24 months. It does not very similar with dentition number of cattle to determination of age of pure and crossbreed RCC.

Productive and Reproductive traits of Pure and Crossbreed RCC

To become qualified for reproduction purpose, a dairy cattle must be qualified on its body weight or BCS. Proper weight gain at proper age may help in reproduction such as puberty, gestation length, proper birth weight of calf, milk lactation etc.

Age at puberty

Age at puberty is the most important reproductive trait. Early estrus for a heifer is very important on the reproductive point of view. In this study the average age at puberty of pure and crossbreed RCC was 28.85±3.297 months and 25.15±2.207 **(Table 4)**. (Sutradhar et al., 2008). One of the research findings was established by (BLRI, 2004) reported that the average age at puberty of RCC was 15.0 months. On the other hand, (Khan et al., 2000) reported that the average age at puberty of RCC was 33.25±2.75 months in farm conditions and 33.41±4.23 months in rural conditions. It is found that the age at puberty on indigenous cows was varying from 36 to 42 months, which is longer than RCC. From the above discussion it is noted that the age at puberty of RCC comparatively lower than that of other crossbred or indigenous heifers though it was not standard for a dairy farm on the economic point of view. Age at puberty depends on different factors: genetic character, a good management including feeding of colostrum, supply of balance feed during growing stage of heifer, body weight gain, regular deworming, disease control and treatment of diseases if any are the most important factors, which influence the onset of puberty. In this study most of the farmers reared their RCC calf without any extra care (Sutradhar et al., 2008).

Days to post-partum heat

Reduce the number of days from calving to the subsequent service of cow increase the economic value of a dairy farm. The average days to post calving heat of pure and crossbreed RCC in this study was 92.20±6.542 days and 108.05±24.237 days **(Table 4)**. Ali et al. (2000) observed that the average post-partum heat period was 109.59±26.87 and 103.83±18.54 days in crossbred and in indigenous cows, respectively. Post-partum heat period of indigenous cows generally varied from 2-6 months. In another study reported that days required for post-partum heat of rural RCC was 73.42±43.36 and in farm conditions was 54.28±11.7 days.

Calving Interval

Calving interval is the most important reproductive parameter that measures the overall reproductive performance of herd. The average calving interval of pure and crossbreed RCC was 14.1±1.119 months and 14.8±1.508 **(Table 4).** (Khandoker et al., 2005) observed the average calving interval in RCC in farming conditions was 374.73 days (12.49 months) which is lower than that of this study. However, Khan et al. (2000) found the average calving interval of RCC in farm conditions and in rural conditions were 458.40±71.82 days and 529.35±127.50 days, respectively, which is higher than that of this study. (BLRI, 2004) reported that inter calving interval of RCC was 12.0 months under traditional production systems. On the other hand, 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). From the above points, it is observable that the calving interval is the lowest in RCC, which is very essential for economic purpose of a dairy cow.

Service per conception

In this result, the average service per conception of pure and crossbreed RCC was 1.9±1.071 and 1.725±0.850 **(Table 4)**. The result is more or less similar to the findings of (Khan et al., 2000b) which were 1.47±0.61 in rural RCC and 1.57±0.53 in farm conditions. Other researchers observed the service per conception was 1.45 of RCC in a dairy farm and 1.5 in rural cow in Mymensingh (Sutradhar et al., 2008). The minimum number of service per conception is one of the indicators of economically profitable dairy farm. For an ideal and sustainable dairy farm, the optimum service per conception should be 1.33 (De Kruif, 1978). It is noted that the RCC required minimum number of service per conception compare to other dairy cattle, which is a better criteria for sustainable dairy production in rural areas.

Gestation length

This study reported the average gestation length of pure and crossbreed RCC was 280.4±8.911 days and 280.95±10.144 **(Table 4)**. Another research work conducted by (Khan et al., 2000b). They found the length of gestation of RCC in rural conditions was 282 days and in farm conditions was 281 days (Sutradhar et al., 2008). The standard gestation length of cows is 285±5 days (Johnson et al., 1987).

Production performance

The average milk production per cow per month in pure and crossbreed RCC was 60.705±8.01 and 51.750±7.010 litter and lactation length was 302.15±11.847 and 298.1±9.781 days **(Table 4)**. (BLRI, 2004) found the total lactation yield was 800 litter in RCC under rural condition. 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. Khan et al. (2000) reported that the average milk production per cow per day of RCC was 2.0±0.65 litter in farm condition and 1.80±0.87 litter in rural condition. Ali et al. (2000) found the average lactation period of crossbred was 266.42±30.87 days and 220.21±21.69 days for indigenous cows. The length of lactation period depends upon some factors. Heredity, adequate nutrition, milk production, weaning practice, are the most important factors, which influence the lactation length. Minimum 2 months off milking prior to delivery is important for return to heat in post-partum period and also conception and even subsequent milk production.

Chapter 5: Limitations

There were some flaws in this research. The study period was limited and the study area was limited. As a result, the findings may not be representative of the entire country.

Chapter 6: Conclusions

The frequency of rearing pure and crossbreed RCC is increasing with rapid urbanization in Bangladesh. The conducted study will give a glimpse about pure and crossbreed RCC feeding practices, production and reproduction performance to the new and existed farm owners where pure RCC have higher milk production in each lactation than crossbreed RCC but also pure RCC have lower mature weight than crossbreed RCC. Farmer who have interest to farm with pure RCC for milk production is better than crossbreed RCC and those who are interest to do farm for multi-purpose can use crossbreed RCC. It will also helps the students related to the field of veterinary science, dairy science and large animal nutrition.

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Appendix

Questionnaire

Farm details :
Farm Director Name :
Phone :
Occupation :

General information of RCC
1.   Id No. :
2.   Age (m):
3.   BCS:1/2/3/4/5
4.   Farm population size :
5.   Coat Color :
6.   Hoof Color :
7.   Eye Ball and Eye Brew Color :
8.   Horn Color :
9.   Vulva and Switch Color :
10.   Heritability % :

Feeding Practices of RCC
1.   Feed type:
2.   Mixing ratio :
3.   Protein source:
4.   Carbohydrate source:
5.   Amount of feed
        (kg/animal):
6.   Vitamin-mineral supplement: Yes/No
7.   Feeding advice:

Physical measurements of Pure and Crossbreed RCC dairy cattle

1.   Body length :
2.   Heart girth :
3.   Horn length :
4.   Horn diameter :
5.   Horn ring number :

Productive and Reproductive traits of Pure and Crossbreed RCC dairy cattle

1.   Birth wt. of calf :
2.   Mature wt. of female cattle :
3.   Age at puberty of female cattle :
4.   Post-Partum Heat :
5.   Calving Interval :
6.   Service per Conception :
7.   Gestation Length :
8.   Dry Period :

Acknowledgement

Biography

This is Md. Foisal Shikder, the child of Md. Babul Shikder and Ayesha Alam, doing his graduation in Doctor of Veterinary Medicine (DVM) at Chattogram Veterinary and Animal Sciences University under the Faculty of Veterinary Medicine. He passed the Secondary School Certificate Examination (SSC) in 2015 from Govt. Muslim High School, Chattogram, and the Higher Secondary Certificate Examination (HSC) in 2017 from Govt. Hazi Muhammad Mohsin College, Chattogram. Currently, he is doing his yearlong internship. He has a great interest in research about pet animal viral diseases, bat virus, wildlife and also worked as a research assistant for the detection of Canine Morbillivirus and Nipha Virus along with Mosquito Born Dengue Virus.