A Comparative Study and Profitability Analysis of Different Genotypes of Dairy Cattle in Milk Pocket Area of Bangladesh

Abstract

The Present research was conducted in Sirajgonj district to know the socio-economic status of dairy farmers; to investigate the feeding practices, productive and reproductive performance of different dairy cattle genotypes and to assess the cost and return of dairy farmers in the areas of Bangladesh. A field survey was carried out with a total of 127 crossbred dairy cows under 3 genotypes studied from July to September 2022. Data were collected through direct interviews and careful observation of different dairy crossbred rearing farmers. The studied parameters were the major socio-economic condition, seasonal feed allowances, productive and reproductive traits and the profitability of different dairy genotypes rearing farmers where data were analyzed by using SPSS version-25. The average age of puberty of HF, Jersey and HF×Jersey crossbreds was 21.28±0.20, 23.40±0.29 and 22.42±0.15 months where the age at first calving was found 44.42±0.21, 43.96±0.19, and 44.51±0.16months respectively. The highest Benefit-Cost Ratio (BCR) was observed at 1.43 in case of HF crossbreds and HF×Jersey crossbreds ranked second where the BCR of 1.41 was found for the overall dairy genotypes rearing farmers. The present results will be helpful for the farmers to compare and select the high-yielding dairy genotype as well as to understand the profitability of rearing among these three genotypes of dairy cattle in the selected areas. From these findings, we may conclude that the productive and reproductive performance of HF cross is higher than the Jersey cross and HF×Jersey crossbred dairy cows in milk pocket area of Bangladesh.

Keywords: Crossbreds, Dairy genotypes,feeding practice, Performance, Benefit-Cost Ratio.

1. Introduction

Livestock plays a crucial role in the development ofthe traditional economy of Bangladesh. Bangladesh is a densely populated agricultural-based sub-tropical country. Though we are now sufficient in meat production (demand and production of 76.08Lakh Metric Tons and 87.10Lakh metric Tons) we have an acute shortage of milk with the demand and production of158.50Lakh Metric Tons and 140.68Lakh Metric Tons respectively [1]. Forecasting the demand for milk production, Bangladesh requires at least 10 years to be independent. The prediction says milk production in 2030 will be 18.1 million tons and the demand will rise by 17.22 million tons [2]. Dairy generates more regular cash income and dairy production, processing and marketing generate more employment per unit value added compared to crops [3, 4]. Production of milk and meat should increase substantially. According to the report of DLS (2022-23), the contribution of livestock to Gross Domestic Product (GDP) is 1.85% with a GDP growth rate is 3.23% and the share of livestock in agricultural GDP is 16.52% [1]. Livestock is an important subsector of agriculture that plays an important role in promoting food security, human health and poverty alleviation as well as the economic development of Bangladesh. Livestock is also an integral component of the complex farming in Bangladesh as it's not only a source of meat and milk production but also a major source of farm power services and the major income generation of the farmers. About 20% of people directly and 50% of people partly depend on the livestock sector [1]. Dairying is an efficient farming system that contributes as a potent tool for developing the national economy and sustainable food production systems [5[. The profitability of dairy farms mainly depends on the higher milk yield and the optimum

reproductive efficiency [6]. Regular breeding of female animals is an economically crucial trait as it affects the calving interval, calf crop, and milk production [7]. The success of dairy farming relies remarkably on the calving regularity of each cow within the normal physiological range [8]. However repeat breeder cows are the major constraint to the efficient and profitable reproductive management of dairy farms [6].

In veterinaria digital, an article published in 15th June 2022 by Dr. David Díez Arias,Veterinary Technical team of Biovet S.A. in this article he said that Bangladesh is currently ranked among the 25 largest milk-producing and 12th meat-producing countries in the world. Production is spread throughout the country and has grown practically year after year in recent decades, since the '70s'. Then, the annual production was approximately 1 million tons of milk, while current production is around 11 million tons. The growth of the sector since 2010 is remarkable, where national milk production has been multiplied by five [9]. Production growth of dairy products was large due to a mutual effect of the government's importance as well as the activities of the governmental organizations. Generally crossbred cows under village conditions yield from 600 to 800 liters per lactation of 210 to 240 days [10]. The low productivity of milking cows in the country is due to a shortage of feeds and fodder, poor genetic potentiality, and widespread diseases. For better performance, suitable breeds of cows have to be developed in our country through proper selection, planned breeding, and upgrading together with improved management practices. Despite all these problems recently some people in the rural areas of the low-income group are very much more interested in small-scale dairy farming than those other professions. Dairy farming is a profitable business in milk pocket areas of Bangladesh. There were few studies regarding the profitability of cross-breed dairy cattle. So this study is taken to know the dairy farming pattern and which genotype of dairy cattle is more suitable and profitable for dairy farming in the milk pocket areas of Bangladesh.

1.1 Objectives:

1. To know the socio-economic status of dairy farmers in the milk pocket area.
2. To investigate the feeding practices,productive, and reproductive performance of different dairy cattle genotypes.
3. To assess the costand return of dairy farmers.

2. Materials and Methods:

2.1 Area selection

The study area wasselectedon the basis of the availability of dairy farmsespecially from the milk pocket area namely Sirajgonjdistrict. Sirajgonjdistrict located in between 24°01' and 24°47' north latitudes and in between 89°15' and 89°59' east longitudesunder the Rajshahi divisions of Bangladesh.

2.2 Data Collection and sampling techniques

A baseline survey was conductedwith a pre-designed questionnaire to know the socioeconomicstatus of the dairy cattle farmers,their average annual Cost and Return from dairyfarming in the study areas. Primary data were collected from the Sirajgonjdistrict under the Rajshahidivisionof Bangladesh. Data were collected from Baghabari village of Sahzadpur upazila under Sirajgonj district. Data were collected both from primary and secondary sources from November to December 2022.Primary datawere collected randomly by questioning the dairyfarmers directlywith a pre-tested questionnaire. The method used for sampling in this research study is random Samplingtechniques. Random sampling is one of the simplest forms of collecting data from the total population. Under random

sampling, the heterogonous number of the subset carries the opportunity to be chosen as a part of the sampling process.A total of 45 Holstein Friesian×Local cross (50%), 30Jersey×Local cross(50%) and 52 from Holstein Friesian×Jerseycrossbred (50%) dairy cows data were collected from 31farmers' households who werereareddifferent dairy genotypes. All the dairy cows of 31 selected farmers were considered during data collection that's why the sample size was different. Data were collected through field survey by direct observation and face-to-face interviewing of the farmers. Secondary data were collected from Key Informant Interviews (KIIs), Focus Group Discussions (FGD)and various sources like books, thesis papers, reports, journals, official records, and statistical yearbooks of Bangladesh. Information regarding the demographic characteristics of farmers, feeding practices in different seasons,productive and reproductive performancesand Cost-Benefit Analysis of different dairy genotypes was also taken into consideration.

2.3 Statistical analysis:

Collected data were entered, sorted, compiled, tabulated and organized into a Microsoft Excel sheet. Then data were statistically analyzed byusing Statistical Package for the Social Sciences (SPSS), Version-25 and performed Analysis of Variance (ANOVA), Post Hoc Multiple Comparison by using Duncan. All data were then tabulated using descriptive statistics such as frequency distribution, percentage, mean and standard error value for further interpretation.

2.4 Analytical technique:

Data-collection techniques allow us to systematically collect information about our objects of study and the settings in which they occur. The equation was used to analyze the Cost-Return and Benefit-Cost-Ratio of different dairy genotypes in the study areas.

$\pi = PF*QF + PS*QS + PR*QR - \sum (PXi\ Xi) - TFC$

Where,

π= net profit (BDT./cow/year)

PF= per unit price of milk (BDT./liter)

QF = milk yield (liter/year)

PS= price of cow dung (BDT./kg)

QS= quantity of cow dung (kg)

PR= no. of calves sold (nos./year)

QR= Price of sold calves (BDT.)

PXi= per unit of i-th inputs used

Xi= quantity of i-th input used, i= (1, 2, 3……n); and

TFC= Total Fixed Cost

To calculate the benefit-cost ratio we used the following formula

$$\text{Benefit-Cost ratio} = \frac{\text{Total Return (TR)}}{\text{Total Cost (TC)}}$$

Total return includes the average return from the main product and by-products of dairy cows. Total cost includes average variable and fixed costs involved in the rearing of different dairy genotypes.

The benefit-cost ratio was a relative measure that was used to compare benefits per cost and helped to analyze the financial efficiency of the farms.

3. Results

3.1 Socio-economic parameters of the farmers

The age of the farmers was categorized into four categories where the maximum 51.61% of farmers' age ranged between 31-40 years with the minimum 3.23% of farmers being18-30 years of age.About 22.60% of farmers were illiterate where 48.40% of farmers had only primary education and 29.0%of farmers had a secondary level of education.Farm size was categorized into small (2-5), medium (6-9), and large (10-above dairy cows) categories where 41.90% of farmers hadlarge-sizedfarms with 35.50 % small and 22.60 % farmers had medium-sizedfarms. About 54.80% of farmers got the training facility on livestock production from different Govt. and Non-Govt. the institution where 45.20% of farmers didn't get any training facility. Table 1 shows some socio-economic parameters of the farmers who mainly reared different genotypes of dairy cattle in the study areas.

Table 1: Major Socio-economic characteristics of different dairy cattle-rearing farmers

Farmer's Age (years)	Percentage (n=31)	Level of Education	Percentage (n=31)	Farm size	Percentage (n=31)	Training facilities	Percentage (n=31)
18-30	3.23 (1)	Illiterate	22.60 (7)	Small (2-5)	35.50 (11)	Yes	54.80 (17)
31-40	51.61 (16)	Primary	48.40 (15)	Medium (6-9)	22.60 (7)	No	45.20(14)
41-50	22.58 (7)	Secondary	29.00 (9)	Large (10-Above)	41.90 (13)	-	-
Above 50	22.58 (7)	-	-	-	-	-	-

3.2 Dairy cattle rearing experience and fodder production of the farmers

Farmers mainly reared Holstein cross (50%), Jersey cross(50%)or both as well asHolstein Friesian×Jerseycrossbred cattle (50%)for dairy purposes in the study area. The maximum 51.60% of farmers reared different crossbreds and they weren't aware ofthe breed selection for dairy purposes rather they preferred cattle based on body size.About 38.7% of farmers reared Jersey crossbred cattle and 8.70% of farmers reared Holstein cross(50%) cattle for dairy purposes. About 29% of farmers had farming experience of 21-25 years and the same percentage was observed for 16-20 years of cattle farming experience.Farmers cultivated fodder an average of 1.22±0.22 hectare land and their annual productivity was 161.85±4.25 tons/hectare. Table 2 shows the rearing experience of different dairy cattle and fodder production of the farmers in selected area.

Table 2: Different dairy genotypes rearing experience and fodder production of the farmers

Cattle genotypes	Percentage (n=31)	Rearing experience (years)	Percentage (n=31)	Parameters	Mean±SE (n=31)
Holstein cross (50%)	8.70 (3)	10-15	19.40 (6)	Fodder land (Hectare)	1.22±0.22
Jersey cross (50%)	38.70(12)	16-20	29.00 (9)	Fodder productivity (Ton/hectare)	161.85±4.25
Different Crossbred (50%)	51.60 (16)	21-25	29.00 (9)	-	-

-	-	26-above	22.60 (7)	-	-

3.3 Feeding practices and daily allowance per dairy cow in Sirajgonj area

Farmers supplied feed for dairy cattle based on availability, season and the price of feed ingredients. In the rainy season, they supplied only straw and concentrate feed but in the summer and winter seasons, farmers provided different fodder with straw and concentrate feed.Farmers provided the highest6.44±0.25kg/day concentrate and 12.26kg/day straw for Holstein cross cow (50%) in the rainy season. In the summer and winter seasons, farmers supplied a maximum of 5.35±0.18kg concentrate, 5.82±0.15kg straw with 21.33±0.33kg fodder per day in the study areas. On the other hand, farmers supplied comparatively lower amounts of concentrate feed (3.33±0.09kg/day) and straw (9.76±0.23kg/day) to their Jersey cross cow (50%) in the rainy season whereas in the summer and rainy season they supplied concentrate feed (2.40±0.09kg), straw (3.30±0.08kg) with fodder (11.80±0.25kg) per day. Significant differences were observed in per day allowance of feeds for three different genotypes of dairy cattle in the Sirajgonjarea. Table 3 shows the feeding practices and feed allowance per dairy cow in different seasons in Sirajgonj area.

Table 3: Seasonal feeding practices and daily allowance per dairy cow

In Rainy season	**Holstein cross(n=45)**	**Jersey cross(n=30)**	**Holstein×Jerseycross (n=52)**	**Overall (n=127)**	**P value**
Concentrate, kg/d	6.44±0.25	3.33±0.09	4.63±0.15	4.96±0.15	≤0.001
Straw, kg/d	12.26±0.17	9.76±0.23	10.36±2.21	10.89±1.99	≤0.001
In Summer and Winter season					
Concentrate, kg/d	5.35±0.18	2.40±0.09	3.17±0.11	3.76±0.13	≤0.001
Straw, kg/d	5.82±0.15	3.30±0.08	4.19±0.16	4.55 ±0.12	≤0.001
Fodder, kg/d	21.33±0.33	11.80±0.25	15.11±0.30	16.53±0.38	≤0.001

(P<0.05=Significant at 5% level)

3.4 Productive performances of different dairy genotypes

Farmers reared an average of 5.44±0.10yearscattle for dairy purposes with an average body weight of 606.69±8.35kg/cow and ano. of calves produced 2.46±0.09. Comparatively highest milk yield/ day (13.40±0.15 Lit.), Peak milk yield (20.15±0.30Lit.)and Dry period (134.88±1.92 days) were observed for Holstein Frisian cross where the lowest average Milk yield/day (10.26±0.32 Lit.) with the Lactation yield (2119.61±82.82 Lit.) were found in Sahiwal cross but the Lactation Length (215.00±0.92days) and Peak milk yield (15.03±0.30 Lit.) were lower in Jersey crossbred cattle. Significant differences were observed for body weight (kg), Peak milk yield (Lit.), Lactation length (days), Lactation yield (Lit.), average milk yield (Lit./day) and dry period among those three genotypes of dairy cattle. Table 4 shows the productive performances of dairy cattle available in the study area. The average milk yield and lactation yield of differentdairy crossbreds was overall 11.41±0.20Lit/d and lactation yield was 2393.22±45.93Lit.

Table 4: Productive parameters (Mean±SE) of different dairy genotypes

Parameters	**Holstein Friesiancross(50%), n=45**	**Jersey cross(50%),n=30**	**Holstein Friesian×Jerseycross (50%), n=52**	**Overall (n=127)**	**P value**

Age (year)	5.77±0.17	5.16±0.14	5.30±0.16	5.44±0.10	0.040
Body weight(kg)	668.88±9.95	560.00±10.41	579.80±14.39	606.69±8.35	≤0.001
Number of calves produced/farm/year	2.77±0.17	2.13±0.14	2.38±0.14	2.46±0.09	0.027
Peak milk yield (Lit.)	20.15±0.30	15.03±0.30	15.51±0.42	17.04±0.29	≤0.001
Lactation Length (days)	213.55±0.72	215.00±0.92	243.84±2.23	226.29±1.62	≤0.001
Lactation yield (Lit.)	2767.11±47.15	2306.66±29.62	2119.61±82.82	2393.22±45.93	≤0.001
Average milk yield/day (Lit.)	13.40±0.15	10.40±0.29	10.26±0.32	11.41±0.20	≤0.001
Dry period (days)	134.88±1.92	132.66±2.34	118.65±2.07	127.71±1.38	≤0.001

(P<0.05=Significant at 5% level)

3.5 Reproductive performance

The reproductive performances werealso considered for different genotypes of dairy cattle in the study areas. The maximum age at puberty of 23.40±0.29months was observed in Jersey-crossed cattle where the minimum21.28±0.20months in Holstein Friesian cross with 22.25±0.13months was in the overall dairy genotypes.The highest body weight at puberty 318.00±2.68kg and calving interval of 12.15±0.10months were observed in Holstein Friesian crossed cattle where the overall 1.31±0.041nos service required for conception in those three different dairy genotypes in the selected areas. But, the maximum age of 1st calving 44.51±0.16months was observed in Holstein Friesian×Jerseycrossed cattle.On the other hand, a comparatively lower body weight of 292.66±3.42kg at puberty and age at first calving of 43.96±0.19months were found in Jersey crossed. Significant differenceswere observed for age of puberty (months) and weight at puberty (kg) among those three different dairy genotypes. Table 5 shows the reproductive performances among three genotypes of dairy cattle.

Table 5: Reproductive parameters of different dairy genotypes in the study area

Parameters	**Holstein Friesian cross (50%), n=45**	**Jersey cross (50%), n=30**	**Holstein×Jerseycross (50%), n=52**	**Overall (n=127)**	**P value**
Age at puberty (months)	21.28±0.20	23.40±0.29	22.42±0.15	22.25±0.13	≤0.001
Weight at puberty (Kg)	318.00±2.68	292.66±3.42	293.65±2.85	302.04±1.99	≤0.001
Age at 1st calving (months)	44.42±0.21	43.96±0.19	44.51±0.16	44.35±0.11	0.147
Service/conception (nos.)	1.31±0.06	1.33±0.08	1.30±0.06	1.31±0.041	0.970
Calving Interval (months)	12.15±0.10	12.00±0.13	11.96±0.11	12.03±0.06	0.426

(P<0.05=Significant at 5% level)

3.6 Benefit-Cost Ratio Analysis

The costs/expenses involved in dairy farming in the selected areas were divided into two categories such as fixed cost (with 10% depreciation) and variable cost. The maximum fixed cost of 23896.66 BDT.and variable cost of 84017.78BDT.was observed for the rearing of Holstein Friesian crossbred cattle where the minimum fixed cost of 15478.66BDT.and variable cost of BDT. 70373.07wereinvolved inthe rearing of Holstein Friesian×Jerseycrossed cattle. The overall depreciation (10%) is 15008.74BDT.on housing, 17891.33BDT. on purchasing cows with

880.70BDT. on buying tools and equipment for the rearing of those three different genotypes of dairy cattle. Moreover, the highest feed cost of 16866.66 BDT and cost of 2288.88BDT. for veterinary services and medicine was found for rearing the Holstein Friesian cross. Farmers required an overall 21392.85BDT. for hired labor and 1026.77BDT. for artificial insemination in the different genotypes of dairy cattle rearing. Table 6 shows the cost/expenses required for the rearing of different dairy genotypes in the study area.

Table 6: Expenses/Costs involved in Dairy cattle rearing farmers

Annual Cost Items In taka (BDT.)	**Holstein Friesian cross (50%)**	**Jersey cross (50%)**	**Holstein ×Jersey cross (50%)**	**Overall**
A. Fixed cost with 10% depreciation				
Housing cost	1767.33	1276.00	1707.11	1626.61
Cow buying cost	21246.66	13316.33	17626.92	17891.33
Tools and equipment cost	882.66	886.00	875.96	880.70
Total fixed cost	**23896.66**	**15478.66**	**20314.80**	**20441.57**
B. Variable cost				
Hired Labor	22404.76	20466.66	21025.00	21392.85
Feed cost:	16866.66	14333.33	14192.30	15173.22
• Fodder	15755.55	14400.00	13384.61	14464.56
• Straw	27177.77	24633.33	23423.07	25039.37
• Concentrate				
Veterinary services and medicine	2288.88	2250.00	2169.23	2230.70
Artificial Insemination	1017.77	1056.66	1030.76	1026.77
Total variable cost	**84017.78**	**77140.00**	**70373.07**	**76800.78**
Total Cost (A+B)	**107914.44**	**92618.66**	**90687.88**	**97242.36**

The maximum total return of 154928.44BDT./cow/yr. was observed in Holstein Friesian crossbred rearing farmers with minimum total returns of BDT.126968.07 in Holstein Friesian×Jerseycross-rearing farmers. Moreover, the highest Net returns47014.00BDT. was found for Holstein Frisian crossbreds with the lowest 36280.19BDT. in Holstein Friesian×Jerseycross-rearing farmers. The overall returns from milk selling, cow dung and selling calves were 109948.79BDT., 3649.21BDT. and 23720.47BDT. per cow per year respectively.The highest Benefit-Cost-Ratio 1.43 was found for the Holstein Friesian cross and the lowest 1.39 for the Jersey cross with the overall 1.41observed for those three dairy crossbredrearing farmers in the study area. Table 7 shows the annual Returns and benefit-cost ratio of different genotypes of dairy cattle-rearing farmers.

Table 7: Annual Returns and BCR ofDairy cattle rearing farmers

Parameters In taka (BDT.)	**Holstein Friesian cross (50%)**	**Jersey cross (50%)**	**Holstein ×Jersey cross (50%)**	**Overall**
Return from selling milk (cow/year)	123548.44	103693.33	101789.23	109948.79
Income from cow dung (cow/year)	4077.77	3908.00	3128.84	3649.21
Income from selling calves	27302.22	21243.33	22050.00	23720.47

Total Returns (cow/year)	154928.44	128845.00	126968.07	137318.66
Net Returns (cow/year)	47014.00	36226.34	36280.19	40076.30
Benefit-cost Ratio (BCR)	1.43	1.39	1.40	1.41

4. Discussion

The findings of [11] indicated that the highest proportion (58.34 percent) of the respondents in the Sirajgonj area were young aged (≤35) category which was nearly similar to the present study but the maximum (100%) farmers had primary level of education which was relatively higher than the present study.

About 40% of farmers in Sirajgonj district had livestock farming experience of 11-20 years was mentioned in the findings of[12] which were slightly higher than the present study. The variation in results was observed due to the difference in sample size and different dairy genotypes considered in the present study.

The results of present research was significant with the study of [13]who surveyed 300 households in 60 northern districts where they mentioned that farmers provided 2.50kg concentrate with 7.25kg straw in the dry season, 2.30kg concentrate with 8.26kg straw during monsoon and 2.50kg concentrate with 8.50kg straw in winter to their crossbred dairy cow. A slight difference in feed supply per cow per day was observed in the present findings due to the high milk yield of the present study cows.

A fieldsurvey was carried out by [14] at Savar Dairy Farm, Dhaka where they reported thatthe highest milk yield was 11.57 0.32 L/day in the case of Frisian cattle which was nearly similar to the present finding. Another study was conducted by [15] where they stated that theaverage milk yield per day for Local×Friesian cattle was 13.9 liter which was similar to the present study but a comparatively higher dry period and lower lactation length were observed in the present study than the findings of [15] where they mentioned that the average dry period for Local×Frisian cattle was 87 days and the lactation length was 277days. The findings of[16] revealed that the average milk productivity was 6.48 liter per cow per day in crossbred cows which shows a lower result than the present findings. In the research of[17] where they estimatedthe productive performance of Holstein-Friesian cattle and mentioned that the lactation length (LL) 314.19±0.91days which was comparatively higher than the present study but relatively maximum dry period was observed in the present research compared to the findings of [17] in which they found the dry period of 87.06±1.63 days in case of Holstein-Friesian cattle. On the contrary, from the study of [18] theyfound the average milk production for Holstein-Friesian× Local Crossbred cattle 15.90±0.72 liter/day/cow and lactation length 9.67±0.72 months which was relatively higher than the present findings. From the findings of[19] they stated that the average test day milk production of Jersey×Deshi Crossbred cows were7.86±0.12 liters which was lower than the present study but they mentionedthe average lactation length 234.76±1.60 days in their findings which was slightly higher than the present study. The variation on results was obtained due to the location, sample size and time was different in the present study.

From the survey data, comparatively lower age at puberty and service/conception was observed in the case of Holstein Friesian crossed cattle than the findings of Islam[14] in which they stated that the higher age of first calving was found in 1779 ± 20.76days and the maximum number of services per conception was 3.36 ± 0.31 in case of Holstein-Friesian. The average service per conception of Local×Friesian crossbred cattle were 1.61 mentioned by [15] which is supported by the result of the present study but a higher result was found in the findings of [17] where they stated that the service per conception was 2.80 ± 0.10. A relatively lower calving interval (410 days) but lower age at first

calving (33.3 months) was found in their study than the findings of the present study. In the study of [17], they mentioned that they estimated the age at maturity (625.40±14.65days) for Holstein-Friesian cattle which was nearly similar to the results of the present findings.In the research of [20] they found that the age at puberty age and age at first calving of Jersey×Local cross cow was 20.44 ±1.60months and 31.08±1.75months which were lower than the present study. They also mentioned that the calving interval and service per conception of Jersey×Local cross cow14.08±0.62months and 1.25±0.13 nos. Comparatively lower calving interval (months) but slightly higher service per conception was observed in the present study than the above findings. Those differences might have arisen due to the location, sample size and study period was different for the present research than the above studies.

In the study of [21] they revealed that dairy farming under commercial management was more profitable than traditional farming. The benefit-cost ratio of commercial farmers was on an average of 1.34 which was nearly similar to the results of present research. In the findings of [20] they reported estimated that the rearing cost of dairy cow was Tk. 67.5/cow/day and return from rearing dairy cows was Tk. 85.2/cow/day. The net return was Tk. 17.7/cow/day from crossbred in the study area and the cost-benefit ratio was 1:1.26. Comparatively higher results were found in the present study than the above findings where the overall rearing cost of the crossbred dairy cow was 266.41Tk/cow/day with the return from rearing dairy cow 376Tk/cow/day and the net return was 109.79Tk/cow/day. In the present study, variations in results may arise due to the location, study period, sampling population, feeding and management practices was different than the above studies.

5. Conclusion

According to the findings of the present study, it can be concluded that the productive and reproductive performance was superiorinHolstein-Friesian crossbred (50%) cattle. Holstein Friesian×Jerseycrossbreds (50%) ranked second and the performance of the Jersey cross (50%) werecomparatively lower than the two breeds. The production performance of Holstein-Friesiancrossbreds was superiorto other genotypes. The profitability of Holstein Friesiancross-rearing farmers was higher although the variable cost remained higher. From this study, we can conclude that Holstein Friesian cross cow rearing is profitable in Sirajgonj district named as the milk pocket area of Bangladesh.

6. Recommendations

- As the literacy level of the farmers is poor, therefore, functional literacy may be induced by hands-on training among the farmers for greater adaptation of dairy technology toincrease productivity.
- Higher production and profitability from dairy farming might be encouraged by the government, NGOs, and private entrepreneurs by providing improved technologies and extension services.
- An efficientattempt needs to be madeto raise milk production by the readjustment of feed inputs in all seasons.
- Ensuringgoodquality Holstein-Friesian bull semen for artificial insemination to improve the genotypes forincreasing the productivity of next-generation dairy cows.

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