

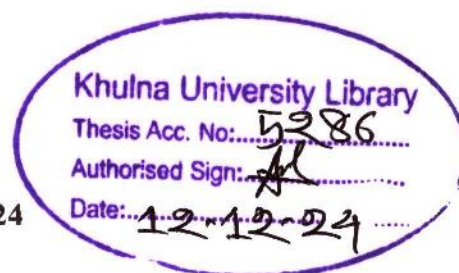
**MILK CONSUMPTION BEHAVIOUR AND DEFICIENCY OF RURAL
POPULATION IN SOUTHWEST COASTAL REGION OF BANGLADESH**

A THESIS

BY

TITIA SHAHA

EXAMINATION ROLL NO. MS- 210824



**A Thesis (Course No. AN-6104) Submitted to Agrotechnology Discipline in Partial
Fulfilment of the Requirement for the Degree of Master of Science in Animal Nutrition**



AGROTECHNOLOGY DISCIPLINE

KHULNA UNIVERSITY

KHULNA-9208

JUNE, 2023

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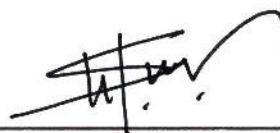
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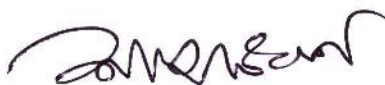
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**DEDICATED
TO MY
PARENTS**

ACKNOWLEDGEMENT

Firstly, I want to thank God deeply for giving me the ability to successfully finish the research and write the thesis within the allotted time.

I would like to express my gratitude to my esteemed professor and supervisor Dr. Sarder Safiqul Islam, Professor, Agrotechnology Discipline, Khulna University, Khulna, under whose careful supervision and guidance, ongoing cooperation, advice, and ideas this study was undertaken. This study would not have been possible without his direction and oversight. No written form can adequately convey my adherence to him. I want to thank my co-supervisor, Dr. Md. Shafiqul Islam, a Professor at Khulna University in the Agrotechnology discipline.

I would like to offer my gratitude to every one of the responders for taking the time to complete my survey. I want to express my gratitude to all of my friends for their support throughout the course of my thesis.

We recall with warm appreciation and great indebtedness for the support, guidance and suggestions extended to us by all of our respected teachers, seniors and friends in Agrotechnology Discipline, Khulna University.

Finally, yet importantly, I am very grateful to my dear parents whose inspiration and constant mental support has helped me largely to complete the research.

Date: June, 2023

The Author

ABSTRACT

The experiment was conducted to observe milk consumption behavior and deficiency in rural areas of southwest coastal region of Bangladesh through field survey using interview schedule. The results revealed that more than half of the respondents (51.1%) said that they are unable to safe milk for their family consumption. For their families, 34.4% of the respondents kept less than 1 kg of milk, which is less than their requirement. Majority of the respondents (92.2%) were not aware of the significance of drinking milk and only 7.8% of the respondents were aware of this information. Most of the respondents (98.9%) were not aware of the optimal milk requirement while only a small percentage (1.1%) of the respondents were aware of the recommended daily intake, which is quite worrying for the health of the next generation. Only 20% of the respondents indicated that their family members often drink milk. For various reasons, the respondents did not drink milk daily. For example, majority (65.6%) of the respondents could not afford to drink milk. Some respondents exhibited lactose intolerance and 6.7% of them had milk allergy. Additionally, 5.6% of respondents said they avoided milk because they did not enjoy it. Only 14.4% of all respondents reported using other excuses for avoiding milk, and only a small percentage of respondents (4.4%) had no problem avoiding milk. About one-third of the respondents (33%) suffered from nerve problems due to low calcium intake. Weak bones and constant fatigue were the two top complaints we heard from 21.2% of respondents. Very few respondents (16.7%) reported having muscle pain and cramps. Some of them have other diseases, and few of them claim that they had no health problems. Only a small percentage (4.4%) of farmers sold milk while receiving antibiotics, compared to 95.6% of all farmers who did not. The biggest problems farmers faced were lack of training opportunities, high feed costs, shortage of pasture, restrictions on vaccines and vitamin supplements, and knowledge gaps. Due to this they could not produce enough milk in their farms. It can be concluded that the people of south-west coastal region consume significantly less milk than their requirement and they need to be motivated to consume enough milk to meet their nutritional needs.

Keywords: Milk consumption, Milk deficiency, Milk Production, Milk Requirement.

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CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Milk is an ideal food containing good balance of protein, fat, carbohydrate and essential nutrients. It provides high animal protein and a good source of vitamins; A, B complex, and riboflavin hence contribute to health of consumers. Due to its high nutritional value, milk is considered an ideal food by the people of Bangladesh. It is not only liked by the majority of people but also it has huge social acceptances (Kalkwalf *et al.*, 2003). It provides significant amount of nutrients necessary for body growth such as magnesium, phosphorus, potassium, zinc, and calcium. Some of the established health benefits of the macro-nutrients and micro-nutrients of milk include increased bone content and reduced protein-deficiency malnutrition (Pereira, 2014).

Drinking milk every day from an early age benefits good eyesight and increases red blood cell count, supplies proteins for body repair and growth, provides magnesium for muscles, calcium for bones and teeth, phosphorus for energy, carbohydrates for vitality and potassium for nerve function. All these nutrients helps the body function well and keeps refreshed through the day (Keventer, 2019).

Milk has a protective effect for stroke risk. The Heart Foundation says that unless you already have coronary heart disease or elevated cholesterol, full fat milk, yoghurt and cheeses are unlikely to increase your risk of heart disease when consumed as part of a healthy eating pattern (Nagpal *et al.*, 2012). If milk and milk products are removed from the diet, it can lead to an inadequate intake of calcium. A big health problem of aged women, osteoporosis is associated with bone loss, may occur due to calcium deficiency (Wang and Li, 2008).

Pure cow milk is full of healthy amino acids and beneficial enzymes and fatty acids. Rich in vitamins and minerals, milk serves various purposes and can be used either for topical application or even as a food item (Thorning *et al.*, 2016). Consuming milk everyday makes skin glowing and supple, it also aids in getting a good night's sleep a serious necessity in our stressful lives. Regular consumption of milk helps build muscles, reduces stress, betters eyesight and even lowers the risk of developing high blood pressure and cholesterol. Overall, a glass of milk every day is a great boon for your health (Keventer, 2019).

Rural people, who have the capacity to farm, can get milk for their family and children but most people cannot afford it for their low income. On the other hand, urban income is increasing faster than rural income, so the demand for milk and milk products in urban areas is increasing rapidly. This demand is being met by increasing the flow of milk from rural areas and increasing imports (Krishnadas *et al.*, 2016). A large proportion of the people in the southwest region of Bangladesh are directly or indirectly engaged in dairy farming. Most dairy farmers do it in a traditional way and face many obstacles such as lack of pasture, high cost of animal feed, drought, floods etc. (Paul *et al.*, 1991). High population growth has put pressure on land that reduces farm size, common grazing areas and the ability of the landless to raise dairy cows. Therefore, milk production from that region is not satisfactory. In addition to the high urban demand for milk, poverty forces them to sell most of their milk production (Shirin *et al.*, 2020).

The pattern of milk consumption presents spatial and temporal variation due to the differences in the socio-economic aspects, tastes and food habits of people across different agro-climatic regions and variation in milk availability in the area. With higher growth of the economy, rising population, and increased health consciousness among the populace, the demand for milk and milk products would increase, leading to the more proportion of income to be spent on milk and milk products. As household size and composition, level of income, prices, food habits and social customs and resource endowments vary across the country and such differences are likely to influence the consumption pattern of milk and milk products significantly (Krishnadas *et al.*, 2016).

Per capita milk consumption annually in India and Pakistan stood at 90 kg and 190 kg respectively; while it was 18 kg in Bangladesh (Kamal, 2015). Moreover, according to a report by IFCN Dairy Research Centre, the rate of growth of milk consumption in Bangladesh has surpassed the rate of growth in supply. When measured against the World Health Organization (WHO) recommended minimum level of 250 milliliters a day, Bangladesh dairy consumption should increase two-fold (157.97 ml/day) (DLS, 2017). The production of milk has been increasing over the past several years. While local milk production has increased from 22.86 lakhs tons in 2008/09 to 92.83 lakhs tons in 2016/17 (BER, 2017). In Bangladesh, 1.8 percent of total protein intake came from milk and milk products where 2.2 percent were consumed by urban population (BBS, 2010). However, given that most of the populations are poor, such a demand is hard to fulfil. Also, milk is

widely used in the making of different products such as sweets, yoghurt and ice cream, which means the potential demand for milk in the country, is quite large indeed (Shirin *et al.*, 2020).

1.2 Statement of the problem

Consumption behaviour refers study of individuals, groups, or organizations and the processes they use to select, secure, use, and dispose of products, services, experiences, or ideas to satisfy needs and the impacts that these processes have on the consumer and society. Consumption behaviour of milk means process of milk selection and uses for consumption purposes. Milk consumption behaviour in rural people is very important time demanding topic for discussion. Because in developing country like Bangladesh; many rural people cannot get enough nutrition from milk for their lower income. They cannot provide milk to their children for their poverty. Milk produced from their farm is majorly or completely sold to reduce their poverty. For this reason they suffer many health problems which are associated with calcium deficiency disease like weak and brittle bone. So it is important to increase milk production at rural level by improving cattle farming and analyzing the reason behind decreased milk consumption ratio in rural areas. The study entitled 'Consumption behaviour and deficiency of Rural Population in Southwest Coastal Region of Bangladesh' was undertaken.

This study was designed to find out the following research questions considering consumption behaviour and deficiency of rural population in southwest coastal region of Bangladesh:

- (i) What is the per capita milk consumption in southwest region of Bangladesh?
- (ii) How much the deficiency of milk consumption and what are its causes in south-western region of Bangladesh?

1.3 Specific objectives of the study

It is important to identify the reasons of milk avoidance and constraints faced by rural people to reserve milk for themselves and their family. With this background, the present study has been formulated with the following objectives:

- (i) Determining per capita daily milk consumption in Southwest coastal region of Bangladesh.
- (ii) To assess the milk consumption deficiency and its causes in the Southwest coastal region of Bangladesh.

1.4 Scope of the study

The present study provides valuable information to the upazila livestock office as well as officials, other extension personnel and planners about the extent of milk deficiency in rural people. The results of the study will help them to design and implement several development programs which help to increase household milk production at rural level by improved cattle farming technique and ensure maximum people drink enough milk to meet their nutritional needs.

CHAPTER TWO

REVIEW OF LITERATURE

This chapter deals with the review of past researches related to this investigation. The reviews are conveniently presented based on the major objectives of the study. In spite of sincere effort adequate numbers of direct related literatures were not readily available for this study. However, the literatures of available studies have been briefly discussed in this chapter as participation in dairy farming activities, review of past studies concerning relationships on the selected characteristics of the respondents with their participation in dairy farming, their milk consumption behavior and conceptual framework of the study.

2.1 Reviews of milk consumption behaviour in the world

Fresh milk consumption is not common in Sri Lanka because the majority of consumers (63%) prefer to use full cream milk powder. One percent or less of the nation's total milk consumption is fresh milk (Central Bank of Sri Lanka, 2005).

China has revealed rapid growth in dairy production in recent decades. While per capita consumption is increasing rapidly, it still remains comparatively low (Wang and Li, 2008). Milk and dairy products were not traditionally taken in large quantities and were seen as medicinal foods for the young, old, and sick, and diets were predominantly plant-based. Milk and other dairy products are gradually being introduced into diets as a result of considerable changes in dietary patterns brought on by economic expansion, urbanization, and more sophisticated marketing methods (Fuller *et al.*, 2005).

Though milk consumption and production have been increasing, there are major discriminations between rural and urban areas, as well as between regions. (Fuller *et al.*, 2005) reported although national levels of per capita consumption have improved since 1990, the average rural resident consumed 2.5 kg of milk compared to 7.5 kg for the metropolitan area. Also, intensive production operations are more common near large cities such as Beijing and Shanghai, thus increasing availability in these urban areas (Yang *et al.*, 2004). At the same time, apparent low consumption patterns in the rural areas raise the question of the possible magnitude of un-recorded home consumption of milk (Ma *et al.*, 2004; Wang *et al.*, 2008).

2.1.2. Milk consumption behaviour in rural children

Milk consumption among children and adolescents has fallen over time in developed countries, according to statistics from national surveys. Milk consumption among children aged 2 to 18 reduced from 94% to 84% between 1977 and 2001 in the United States, as did the number of servings drank daily, which fell from 3.5 to 2.8, and the portion size of each serving, which notably shrank from 460 mL to 410 mL (Nielsen, 2004).

2.2. Milk consumption behaviour in Bangladesh

For daily use and revenue, almost every rural household keeps at least one cow. However, a sizable portion of cattle farmers do not sell milk due to low productivity, limited space and large population, expensive feed, and a lack of training. All those limitations hinder the development of dairy subsectors. Although the Bangladeshi government continues to place emphasis on milk production, it is possible to invest in various existing production techniques that are appropriate for the nation (Hossain *et al.*, 2022).

Bangladesh produces 9.4 million tons of milk (against the requirement of 15.04 million tons) in a year and according to International Farm Comparison Network (IFCN, 2019), total milk production in Bangladesh stands at 8.08 million tons. This implies that Bangladesh produces only 63 percent of the total requirement (while, as per IFCN it is 54 percent).

A recent survey – Household Income and Expenditure Survey (HIES) of BBS also revealed that the per capita per day intake of milk is almost nine fold less than what the World Health Organization (WHO) recommends.

WHO recommends, a person should drink 250 ml or 250 grams of milk every day, to get the required amount of calcium, and protein. In Bangladesh, per capita per day milk consumption stands at only 27.31 grams or ml, states HIES-in its 2016 survey report.

In Bangladesh, the per capita per day milk consumption was 33.7 ml in 2010, and 32.4 ml in 2005, according to the two data of HIES published in the aforementioned years.

Experts concerned

The nutrition experts expressed their worries about the situation and claimed that the country's nutritional situation is in peril due to the decrease in milk intake.

The director of the Dhaka University Institute of Nutrition and Food Science, Professor Dr. Nazma Shaheen, stated, "These data shows that our people are not getting enough animal protein that they require every day, thus they are affected through malnutrition."

She also pointed out that the worst victims of the less milk consumption are the children.

2.3 Extent of milk production and consumption deficiency in Bangladesh

According to (DLS, 2018), Bangladesh produces 9.4 million tonnes of milk (against the requirement of 15.04 million tonnes) in a year and according to International Farm Comparison Network (IFCN), total milk production in Bangladesh stands at 8.08 million tonnes. This implies that Bangladesh produces only 63 percent of the total requirement (while as per IFCN it is 54 percent). In contrast, the Integrated Dairy Research Network (IDRN) estimated for 2018 as 9.4 million tons positing 23rd in the global milk production while the topmost milk producing in the world is India with estimated 201.22 million ton of milk production (IFCN, 2019). The second milk producing country in the world is the United States of America with the estimated milk production of 95.31 million ton. The third and fourth in milk production were Pakistan and Germany corresponding to 48.36 and 33.18 million ton, respectively (Uddin *et al.*, 2020).

The milk availability per capita is reported as 165.07 ml/day/capita against the minimal requirement of 250 ml/day/capita (DLS, 2019). The self-sufficiency according to DLS is 64% while the same is 53% according to (IDRN, 2020).

Bangladesh needs a substantial increase in milk production to be self-sufficient while India and Pakistan are self-sufficient with an average consumption of 430 and 670 ml/day/capita, respectively. To increase the availability of milk at the consumers level might depend on the supply of adequate quality of milk with affordable price which can be done ensuring the responsible actions by the topmost processors, dairy farmers and other marketing agencies (Uddin *et al.*, 2020). Concerning the processing profile in Bangladesh, only 9% of the total milk production is delivered to the processors and the remaining 91% is traded as informally (IFCN, 2019). The major market players in the country are Milk vita, Pran Dairy Ltd, BRAC Dairy and Food (Arong) and Akij Dairy Ltd (Farm fresh) corresponding to only 5% share to the total milk production in the country.

Along the supply chain of milk production to consumption, milk price is one of the major factors for dairy sector competitiveness (Roland *et al.*, 2016) because of its huge influence on the future development of the sector. Creating updated knowledge on the current situation and trend back to the past on milk production is the utmost importance in making the reliable forecasting of the future growth and dynamics of the dairy sector development. In order to predict the future, the past and the present have to be carefully analysed since the future is the further development of the present (Roland *et al.*, 2016).

In order to develop the country's dairy sector, it is necessary for all stakeholders to work together. Each and every one is vital to the process and has to play a specific role to contribute to the sector's progress. The farmers have a responsibility to increase efficiency, reduce costs of milk production and take the necessary steps to avoid adulteration of milk. The processors must too play a role in not only collecting milk but also paying a price that is justified. Above all, the quality of milk is what it comes down to as far as consumer satisfaction is concerned. The processors, therefore, have to create a link between farmers and consumers. Researchers and the academia have a responsibility to define the strategies for the government so that the government can take the necessary steps to develop the dairy sector (Uddin, 2019).

2.4 Importance of milk consumption and associated risks

2.4.1 Importance of milk consumption

Milk is a good source of many essential nutrients, including calcium, protein, and vitamin D. Many people see it as a vital part of a balanced diet. Others, however, cite various reasons for choosing not to consume it. Functions of milk consumption are given below:

Bone health

Milk can be good for the bones because it provides vitamin D and calcium. In fact, it may help prevent osteoporosis.

Brain health

Not only does milk help with physical health benefits, but it has also been proven to help with mental health. Vitamin D levels support the production of serotonin, which can be a driver of sleep, mood swings, and your appetite (Richter *et al.*, 2022).

According to several studies, older persons who eat more dairy products have higher levels of glutathione, a potent antioxidant, in their brains. Antioxidant levels in people who drank three daily portions of milk and milk products were about 30% higher than those in adults who drank less than half a serving.

Blood pressure and heart health

Consuming milk products in their whole is linked to a lower risk of cardiovascular disease. Products made from high-fat milk have a neutral or advantageous connection with cardiovascular disease. Cheese and yogurt have been linked to a lower risk of cardiovascular disease, such as heart disease and stroke (Huth and Park, 2012).

Muscle building and weight loss

Providing about 8 g per cup, milk is a good source of protein, which is necessary for repairing body tissues and preserving or increasing lean muscle mass.

2.4.2 Associated Risks

There are some risks which may affect on consumer's health are given below:

Milk allergy:

A milk allergy is different from lactose intolerance. If a person with a milk allergy drinks milk, they will have an abnormal immunologic reaction, in which the body's immune system produces allergic antibodies such as immunoglobulin E (Lam *et al.*, 2008).

Lactose intolerance

Some individuals struggle to digest milk because they do not produce enough of the lactase enzyme. Lactose, a sugar found in milk, is broken down by lactase. This may occasionally only be a short-term issue, for instance if you have an infection. Consuming milk might make someone with lactose intolerance feel bloated, flatulent, or dizzy. However, each person has a different level of lactose intolerance. Some people may be able to accept lactose-free foods like yogurt and hard cheeses, but others may not be able to stomach even a tiny bit of milk in their coffee (Vesa *et al.*, 2000).

Lactose free milk has added enzymes to help with lactose digestion. This may ease or eliminate these symptoms.



Casein sensitivity

➤ Casein is a protein in milk. For people with a casein sensitivity, consuming milk can trigger inflammation in the digestive system and throughout the body (Kim *et al.*, 2007).

Anyone who suspects that dairy products could be causing symptoms can talk to a dietitian. Trying an elimination diet or undergoing food sensitivity testing may help determine whether or not a dairy free diet is appropriate.

Cardiovascular health

While high-fat dairy products are known to boost high density lipoprotein (HDL) and low density lipoprotein (LDL)-cholesterol concentrations, low-fat, calcium-rich dairy products are typically thought to lower blood pressure. The size of the LDL-cholesterol particles may have an impact on this (Soedamah *et al.*, 2012).

✦ A study shows that a high intake of milk and dairy products, that is, 200–300 ml/day, does not increase the risk of cardiovascular disease. Specifically, there is an inverse association with risk of hypertension and stroke (Thorning *et al.*, 2016).

Cancer

Milk intake does not seem to be associated with risk of pancreatic cancer, ovarian cancer, or lung cancer, whereas the evidence for prostate cancer risk is inconsistent. In women, dairy offers significant and robust health benefits in reducing the risk of the common and serious colorectal cancer and, possibly, also the risk of breast cancer. In men, the benefit of the protective effect of milk and dairy on the common and serious colorectal cancer is judged to outweigh a potentially increased risk of prostate cancer (Huncharek *et al.*, 2009).

Hormones in milk

Some people worry that the hormones in dairy milk, including estrogen and growth hormones, can adversely affect them.

✦ In a 2016 study Trusted Source, researchers found that mice who consumed high concentrations of estrogen in milk underwent hormonal changes. However, they note that the levels of estrogen were far higher than those that usually occur in cow's milk (Savino *et al.*, 2013).

Scientists have not yet found evidence to suggest that the hormones in dairy milk can affect humans negatively.

Raw milk consumption

There are several study on internet claims that there are a risk of raw milk consumption. Because raw milk may contaminate with humane pathogen and causes milk borne disease.



Figure 2.1. Raw milk collection

Other than that raw milk contains several pathogens like *Campylobacter jejuni* and *Listeria monocytogenes*. For this reason raw milk has frequently been identified as the source of foodborne illness outbreaks (Lucey, 2015).

Heavy metals in milk

Heavy metal toxicity is linked with a number of diseases but the severity of situation multiplies too many folds if these heavy metals are found in milk, which is the basic food item of vulnerable age group of people (Ismail *et al.*, 2019).

The toxic metal content of milk and dairy products is due to several factors in particular environmental conditions, the manufacturing process and the possible contamination during several steps of the manufacturing processes (Anastasio *et al.*, 2006).

Some people choose not to consume dairy products such as milk. These people may-

- choose to follow a specific diet, such as vegan
- hope to reduce acne or other conditions

- have an allergy or sensitivity to lactose (the milk sugar) or casein (the milk protein)
- have concerns about methods of dairy farming and their impact on the environment
- have concerns about the possibility that milk contains hormones, such as estrogen
- Some argue that humans are the only species who continue to drink milk after being weaned, implying that milk consumption is unnatural and unnecessary.

2.5 Factors those are associated with milk consumption behaviour

Throughout the world, there are more than 6 billion consumers of milk and milk products, the majority of them in developing countries. As such, if it is to keep pace with the growth in demand, milk production will need to grow by close to 2 percent per year. Approximately 150 million households around the globe are engaged in milk production (Kapaj, 2018).

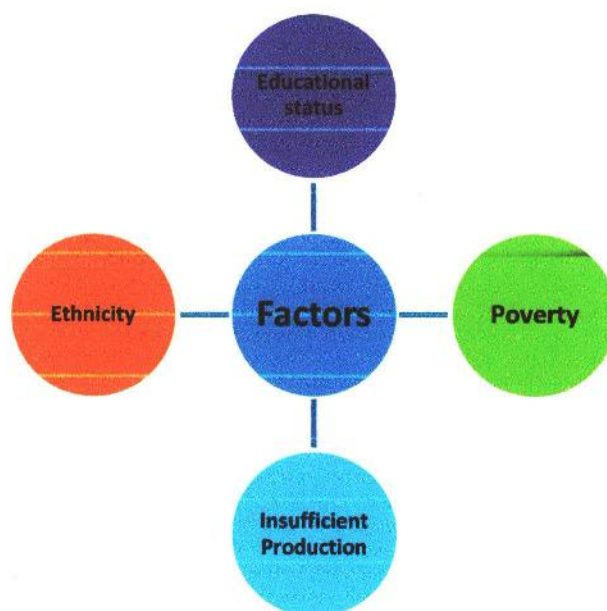


Figure 2.2. Some important factors those are affecting milk consumption behaviour

In most developing countries, milk is produced by smallholders, and milk production contributes to household livelihoods, food security, and nutrition. Milk provides relatively quick returns for small scale producers and is an important source of cash income. In the last three decades, world milk production has increased by more than 50 percent, from 500 million tons in 1983 to 769 million tons in 2013 (FAO, 2016).

Numerous studies have revealed that poor availability, health issues, and unsanitary conditions all have an impact on the consumption of fresh milk. Additionally, lifestyle factors have affected the consumer's regular food selections, and other studies have shown that social category membership, such as gender, age, occupational status, and ethnicity, may affect food selection behaviors as well as the attitudes and beliefs that underlie them (Wham and Worsley, 2003).

The employment status and education level also affects the consumers' decisions. If the household is employed, the chances of purchasing specialty milk are higher compared to an unemployed household. The households' attitude towards the functionally enhanced specialty milk types gets more favourable with a higher education level. Households with an education level of college degree or higher have a greater chance of purchasing specialty milks compared to those with lower education levels (Gulseven and Wohlgenant, 2017).

Several studies have found that gender and presence of young children in the household significantly influence decisions on milk purchases. Female-headed households were found to be significant in affecting dairy products' expenditure (Phuong *et al.*, 2013). They were also generally more health-conscious than men (Radam *et al.*, 2010).

The demand for milk and dairy products is also influenced by domestic and international economic conditions and competing dairy alternatives. In addition, the dairy industry has received some welcome reports relating to the health benefits of consuming dairy products (pei).

Milk consumption is severely affected by soft drink consumption in young adults. During last few decades, soft drink consumption has steadily increased while milk intake has decreased. Excess consumption of soft drinks and low milk intake may pose risks of several diseases such as dental caries, obesity and osteoporosis (Vartanian *et al.*, 2007).

2.6 Regional trends in production and consumption of dairy products

A country's production systems contributes most to global production and consumption of milk differ greatly in farm size, farm structure, labor productivity, land intensification, types of animals, and food self-sufficiency. While improvements in animal genetics and animal production techniques are helping to increase milk production, it remains low in many countries for a variety of reasons. Low production is due in particular to low soil fertility, low

or irregular fodder yields, water scarcity, local competition among types of agricultural production, lack of investment, and competitive prices of imported products.

a. Europe

In 2016, milk output in Europe increased by 30 Mt from 1961 to 224 Mt, representing 28% of global production. The EU has a significant impact on the world thanks to its vast variety of production patterns (Pflimlin, 2010) and the steady growth in milk output after milk quotas were eliminated in 2015 (Commission Européenne, 2017). Exports account for 12% of domestic production in the EU, whereas imports of dairy products account for only about 1% of home consumption (Chatellier, 2016). A temperate environment, great agricultural potential, reliable industrial infrastructure, and a wide variety of completed products are just a few of the primary advantages that some EU member states have (Perrot *et al.*, 2018). Germany, France, the United Kingdom, the Netherlands, and Italy, in descending order of milk production, had a combined output of milk that was comparable to that of the United States in 2016.

Non-EU nations that contribute to European production include Switzerland, Russia (30.8 Mt in 2016), the Ukraine, Belarus, and the Ukraine. The dairy industry in Russia has seen a decline in livestock and milk output over the past 25 years (it was 48 Mt in 1992). Large corporations' increased output cannot make up for family-sized farms' decreased output. Russia is still a significant dairy importer, coming in third in the world behind China and the US, even though it has stopped buying dairy products from the EU since the 2014 embargo (Chatellier *et al.*, 2018).

b. Americas

Milk output in the Americas increased by 100 Mt since 1961 to 184 Mt in 2016 (23 percent of global production). In 2016, North America contributed 57% of the milk produced in the Americas (96.4, 11.8, and 8.2 Mt, respectively, in the US, Mexico, and Canada), 34% of the milk produced in South America (33.9 and 10.3 Mt, respectively, in Brazil and Argentina), and 9% of the milk produced in Central America. While Central America's milk self-sufficiency is lower than the global average (79%), it is close to 100% in South America and around 110% in North America. After India and the EU, the US produces 12% of the total amount of milk produced worldwide.

The majority of large, capital-intensive farms that produce milk (more than half of cows are kept on farms with more than 1,000 cows) will continue to produce more milk as a result of increased animal production and the utilization of outside inputs (USDA, 2017). This growth causes environmental concerns, as it does in other nations. California produces 19% of the nation's milk and 33% (by volume) of its exports, making it the leading dairy state in the US. Recurring droughts are another well-known feature of California. The US engages in extensive trade with Canada and Mexico through the North American Free Trade Agreement (NAFTA), ranking third in the world for dairy exports.

c. Oceania

Almost three times as much milk was produced in Oceania in 2016 (30.7 Mt, or 3.8% of global production) as it was in 1961. Given the sparse population of Oceania, this production significantly outstrips domestic consumption. As a result, Oceania now has a self-sufficiency rate for milk that is almost 290%. New Zealand's production (21.7 Mt) is unique from Australia's (9 Mt in 2016), which experienced a minor decline in production after 2000 (Institut de l'Élevage, 2018). New Zealand farms are among the most effective in terms of milk production cost per unit, as they are high-tech systems based on grazing and high labor productivity. According to (Foote *et al.* 2015), the current growth in production and intensification of agricultural practices (such as fertilization and irrigation) raise severe environmental concerns that may eventually slow the rate at which production is growing each year. 95% of New Zealand's production is exported, primarily to Asian nations and through a single cooperative firm (Fonterra).

d. Asia

In 2016, Asia produced 322 Mt of milk, or 39.8% of global production. Production in this area has changed the most, going up by 280 Mt since 1961, which accounts for 60% of global growth. Asia's level of self-sufficiency is 90%, yet local demand has not yet been completely satisfied.

This growth in production is significantly influenced by India (Masouleh., 2008). Despite internal challenges including low genetic potential in cattle and production dispersed among countless tiny family farms, milk output has grown by 145 Mt since 1961 (33% of worldwide growth), despite these challenges. India's milk production is anticipated to rise by 75 Mt over the following ten years, per the OECD-FAO (2018). In 2027, India is predicted to produce

close to 25% of the world's milk, but it won't have a substantial impact on the market for dairy imports and exports.

China had a negligible impact on the world's dairy production in 2016 (about 4%). Milk production fell after a steady rise between 2000 and 2010 (Chaumet, 2018). A significant restructuring of family smallholdings balances out the growth of milk production on a few large, modern "showcase farms" that are less input self-sufficient. China's milk production has become more stable, but its costs are higher than those in the US or the EU. However, China can meet its domestic demand mainly due to an increase in imports (Institut de l'Élevage, 2018), especially of different types of milk powder. Imports also meet the expectations of consumers who have become less confident in the quality of local products following the scandal of milk contaminated with melanin in 2008 (Pei *et al.*, 2011). In 2027, milk production in China is projected to be lower than that in Pakistan, which has a strong dairy tradition (Zia *et al.*, 2011).

e. Africa

According to FAOSTAT, 6% of the world's milk was produced in Africa in 2016, which has 16% of the world's population. According to the (International Dairy Federation, 2018), Africa's self-sufficiency in dairy products fell marginally from 88% in 2010 to 84% in 2017. Africa's milk production increased by 37 Mt between 1961 and 2016, which is the equivalent of Pakistan or 8% of the global growth.

The influence of the livestock and dairy sectors on the domestic agricultural economy varies greatly among African countries. The top seven milk producers, representing nearly 60% of African milk production, are Kenya (5.3 Mt), Egypt (5.1 Mt), Sudan (4.4 Mt), South Africa (3.5 Mt), Ethiopia (3.5 Mt), Algeria (3.3 Mt), and Morocco (2.6 Mt). Milk is an important component of pastoral populations in Africa. Beyond its intrinsic economic value, it also has a strong social and cultural value.

Although the OECD-FAO predicts that the production of milk in Africa might rise by 30% during the following ten years, these predictions should be taken with a grain of salt. The adoption of economic and trade policies will have an impact on how quickly milk production develops. It is essential to promote domestic manufacturing (as in Kenya) rather than turning to imports from the global market. This raises concerns over the ideal degree of domestic

market protection through tariffs and the contribution of outside investors to the valuation of locally produced milk (Corniaux, 2015).



CHAPTER THREE

MATERIALS AND METHODS

3.1 Introduction

Methodology is the specific procedures or techniques which are used to identify, select, process, and analyse information about a topic. The present study was a field survey on milk consumption behavior and deficiency of Rural Population in Southwest Coastal Region of Bangladesh. To get a structured summery the researchers had to collect valid, active and reliable data. The data was collected according to a pre-tested interview schedule. The interview schedule was prepared very carefully keeping the objectives of the study in mind. All the methods and procedures which were followed in this research are discussed in this chapter.

3.2 Study area

The study was conducted in three upazilas of Khulna division. These three upazilas were Dumuria, Fakirhat and Tala upazila that are chosen randomly. The study area are situated 11.9 km (Dumuria), 33 km (Fakirhat), 43.3 km (Tala), away from Khulna district. The area of Dumuria upazila is 454.23 sq. km, Fakirhat upazila is 160.7 sq. km and Tala upazila is 344.2 sq. km. Thirty people who were associated with cattle farming were selected randomly from each upazila and the total number of respondents interviewed was ninety. Map of three different upazilas are given in figure no 3.1, 3.2, 3.3 respectively.



Figure 3.1. A map of Dumuria Upazila

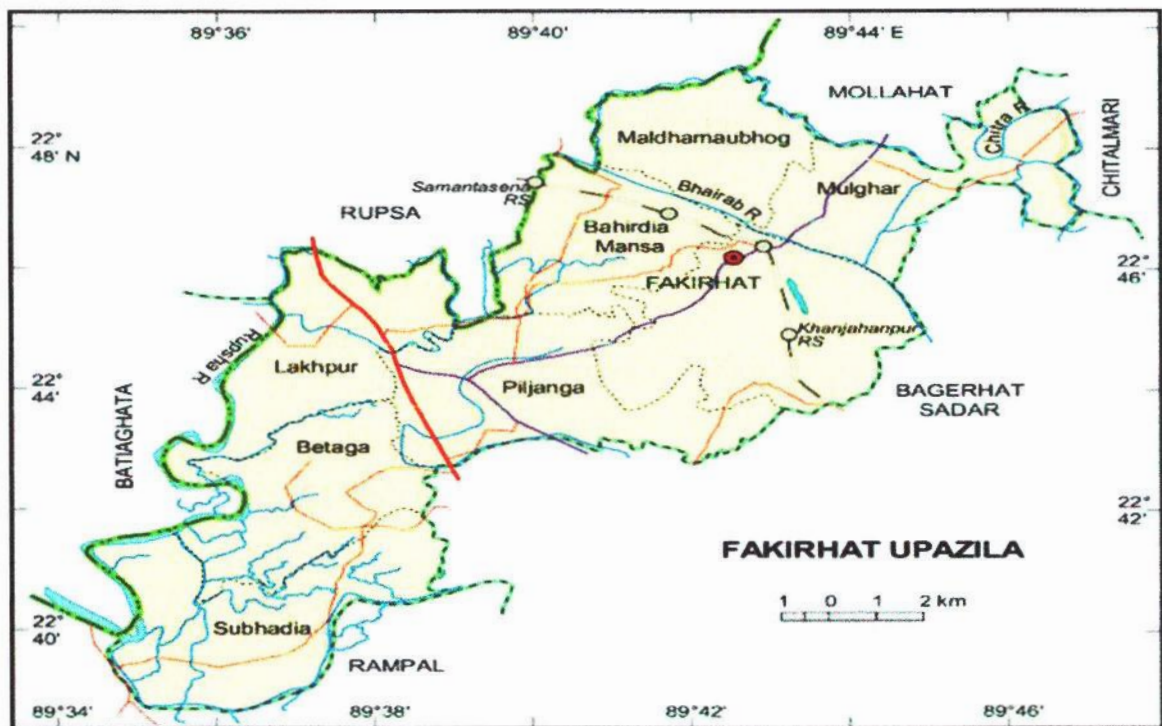


Figure 3.2. Map of Fakirhat upazila



Figure 3.3 Map of Tala Upazila

3.3 Selection of the farmers

While visiting any area, the respondents were selected randomly. Those respondents were chosen who is directly involved in farming and ready or available to provide information. Thirty farmers from each upazila that means total ninety farmers from three upazila were selected for interview.

3.4 Preparation of interview schedule

An interview schedule was prepared very carefully to collect various relevant and useful information aiming the objectives. Both open and close ended questions were contained in it and all the questions were in direct and simple form. The statement as well as the questions were very easy to understand for the respondents so that they could answer them accurately. The corrected and final interview schedule was presented in the Appendix-1.

3.5 Collection of the data

The data were collected by face-to-face interview of the respondents according to the interview schedule. Before starting any question to the respondents the purposes of the study were explained to them so that they could help us by providing the true and accurate

information. The questions were explained with all the efforts when they could not understand any question or felt any hesitation about the question. All the information were collected without any bias. As the respondents had not any written document, they were replying from their memory. The data sheet were checked and verified after every interview to be sure that the responses of the respondents were recorded properly. After completion of each interview, the respondent was thanked.



Figure 3.4. Visual Observation of Cattle House



Figure 3.5. Data Collection

3.6 The variables included in the study

A. Personal information about respondents:

- Age of the farmers
- Gender
- Education levels of the farmer
- Family size of the farmers
- Occupation of the farmers
- Land size
- Training of the farmers
- Annual income

B. Information of the cattle:

- Type of cattle
- Source of cattle
- Type of feed
- Source of feed
- Housing
- Number of Cattle
- Vitamin and mineral supplementation
- Vaccination etc.

C. Factors related to milk consumption behavior:

- Amount of milk production
- Amount of milk sell
- Amount of milk reservation for family
- Causes of milk escaping
- Suffering due to milk deficiency disease, etc.

3.7 Processing of the primary data

After completing collection all, the data were compiled, coded and then tabulated for the processing. For analyzing the data, it was needed to enter them into the computer, that is why they were copied into a master sheet, and finally they were analyzed.

3.8 Data tabulation and analysis

Simple statistical method was used for analyzing the data so that the objectives can be fulfilled easily and accurately. To analysis, the data the IBM SPSS statistics 20.0 program was used. Tabular technique was used in data analysis of the research.

CHAPTER FOUR

RESULTS AND DISCUSSION

In this chapter, findings of the study have been presented in details as found to satisfy the objectives.

4.1 Personal information of the farmer

There are some important information, which play a vital role to find out milk consumption behavior among rural people. To find out the socio-economic condition of the respondents and the problems related to milk consumption behavior, 90 respondents were interviewed.

4.1. 1 Age of the farmers

Distribution of the respondents according to different age groups are presented in Table 4.1. According to the data of Table 4.1, majority of the respondents (77.80%) belong to middle age group (31 to 50 years) followed by old age group (22.20%). The age of the farmers was ranged from 30 to 72. The average age of the respondents in three locations were 44.24 years being highest in Tala (46.27 years) and lowest in Dumuria (41.13 years). This result is nearly similar with the result of (Rahman *et al.* 2012). Therefore, it can be seen that young and middle-aged farmers are more optimist, beseechers, active and energetic where middle aged are experienced though. On the other hand, old are little bit tired and pessimist though experienced.

Table 4.1 Distribution of the respondents according to their age

Categories	Scores (Years)	Respondents(N=90)		Mean	SD	Min	Max
		Number	Percentage				
Young aged	≤ 30	00	00	44.24	9.80	30	72
Middle aged	31-50	70	77.80				
Old aged	>50	20	22.20				
Overall		90	100				

Table 4.2 Average age (years) of the respondents in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	45.33	12.25	30	72
Tala	30	46.27	8.71	32	70
Dumuria	30	41.13	7.31	31	54
Overall	90	44.24	9.80	30	72
F-value		2.41			
Level of significance		0.096 NS			

NS=Non-significant ($p>0.05$)

4.1.2. Sex of the farmers

During my survey I found that, maximum respondents were female which about 71.1 per cent because of my survey duration. Which was morning time and their husband were in their working place. Maximum women manage their household activities and farming at a time. And rest of my respondents were male (28.9 per cent).

Table 4.3 Distribution of the respondents according to their sex

Categories	Respondents(N=90)	
	Number	Percentage
Male	26	28.9
Female	64	71.1
Overall	90	100

4.1.3. Family members of respondents

Number of family member is an important factor which effects on nutrition of that family directly. Big family cannot serve nutritious foods to their children equally all the time. As well as it affects also milk consumption behaviour of that family. (Iftikhar *et al.*, 2017) said that allocation of food per child is likely to decrease with the increase in the number of

children which in turn may adversely affect the nutritional status of children and entire family. From my survey I found that about 53.3 percent respondents have small family, 43.3 percent respondents have medium and rest of the respondents are belongs to large family (3.3%). The average family members of the respondents in three locations were 4.49 being highest in Fakirhat (4.63 members) and lowest in Dumuria (4.37 members).

Table 4.4. Family size category of the respondents

Categories	Score (Years of schooling)	Respondents (N=90)		Mean	SD	Min	Max
		Number	Percentage				
Small	1-4	48	53.3	4.49	1.57	2	10
Medium	5-7	39	43.3				
Large	>7	3	3.3				
Overall		90	100.0				

Table 4.5. Average family members of the respondents in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	4.63	1.866	2	10
Tala	30	4.47	1.634	2	10
Dumuria	30	4.37	1.159	3	7
Overall	90	4.49	1.567	2	10
F-value		0.218			
p-value		0.805NS			

NS=Non-significant ($p>0.05$)

4.1. 4. Level of education of the farmers

According to the level of education, the respondents were categorized into five categories, which were showed in the Table 4.2 and the categories were Illiterate, Primary education, Secondary, Higher secondary, Graduation & above. It was frustrating that more than 27 percent farmers were illiterate. Nearly one-third (28.9 percent) of the farmers were passed primary education. And about 42.2 percent farmers were passed SSC. Very few of them completed their graduation and above (1.1 percent) which was nearly similar to the report of

(Begum *et al.* 2007) and (Sharmin, 2005) where they stated that 20%, 40%, 30% and 10% farmers are illiterate, passed primary, secondary and above secondary education respectively. The average education level of the respondents in three locations were 5.23. Highest in Tala (4.77) and lowest in Fakirhat (4.23).

Table 4.6. Distribution of the respondents according to their education

Categories	Score (Years of schooling)	Respondents (N=50)		Mean	SD	Min	Max
		Number	Percentage				
Illiterate	00	25	27.8	5.23	3.92	00	16
Primary	1 to 5 years	26	28.9				
Secondary	6 to 10 years	38	42.2				
Higher secondary	11 to 12 years	0	00				
Graduation and above	>12 years	1	1.1				
Overall		90	100.0				

Table 4.7. Average education levels of the respondents in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	4.23	3.28	0	9
Tala	30	4.77	4.11	0	10
Dumuria	30	6.70	4.02	0	16
Overall	90	5.23	3.92	0	16
F-value		3.46			
p-value		0.036NS			

NS=Non-significant ($p>0.05$)

4.1.5. Occupation

The total respondents were classified into five categories according to their occupation. As my maximum respondents were female so they involves household activity with livestock

rearing which was about 68.9%, next category was livestock, which was occupied, by 20% percent farmers, livestock & business was occupied with 8.9% farmers and day labourer were occupied by 1.1 percent. Number and percentage distribution of respondents according to the occupation were furnished in the Table 4.5. This result is likely similar with (Ahamed *et al.* 2010) where they reported about occupation that 70.2 percent farmers involved in agriculture and 11.2 percent in business.

Table 4.8. Distribution of the respondents according to their occupation

Categories	Respondents (N=90)	
	Number	Percentage
Livestock rearing	18	20.0
Business	8	8.9
Day labourer	1	1.1
Livestock+Fisheries	1	1.1
Housewife+ Livestock	62	68.9
Overall	90	100.0

4.1.6. Land Ownership

According to land ownership respondents were categorized into two types. They are “had own land” and “had no land”. Maximum respondents have own land which was about 87.8 %. 12.2% respondents had not any land for their living purpose and farming purpose.

Table 4.9. Distribution of the respondents according to their land ownership

Categories	Frequency	Percent
Had own land	79	87.8
Had no land	11	12.2
Overall	90	100.0

4.1.7. Land size

Land size of the farmers were showed in the Table 4.7 where total land (homestead and cultivable) of the respondents were classified into five categories such as landless, marginal, small, medium and large. The major category (41.1 percent) of the farmers belonged to landless category and 34.4 percent farmer belongs to marginal land category, 12.2 percent farmer's had medium land category and only 7.8% percent farmer's belonged to large category. The average land size of the respondents in three locations was 90.77. Highest in Tala (170.59 decimal) and lowest in Fakirhat (12.43 decimal).

Table 4.10. Distribution of the respondents according to their land size

Categories	Score (Amount of land)	Respondents (N=90)		Mean	SD	Min	Max
		Number	Percentage				
Landless	<10 decimal	37	41.1	90.77	179.12	1.0	990.0
Marginal	10 to 50 decimals	31	34.4				
Small	51 to 100 decimals	4	4.4				
Medium	101 to 200 decimals	11	12.2				
Large	>200 decimal	7	7.8				
Overall		90	100.0				

Table 4.11. Average land size of the respondents in three different locations

Locations	N	Mean land size (decimal)	Std. Deviation	Minimum	Maximum
Fakirhat	21	12.43 ^b	10.46	2	30
Tala	28	170.59 ^a	271.86	2	990
Dumuria	30	71.10 ^b	80.07	1	330
Overall	79	90.77	179.12	1	990
F-value		5.55			
p-value		0.006**			

Mean with uncommon superscript differ significantly ($p < 0.05$)

4.1.8. Annual Income

According to annual income farmers were categorized into three categories those are Low (<1 lac), Medium (1 to 2 lac) and High (>2 lac). The data were presented in the Table 4.8 which reveals that majority of the farmers (78.9 percent) belonged to the low category where 14.4 percent farmers belonged to the medium category and few farmers belonged to the high category. It means most of the farmers income was below the range of 1 lakhs. The average annual income of the respondents in three locations was 1.28 taka. Highest in Tala (112966.67 taka) and lowest in Fakirhat (25500.00 taka).

Table 4.12. Distribution of the respondents according to their annual income

Categories	Score (Annual income)	Respondents (N=90)		Mean	SD	Min	Max
		Number	Percentage				
Low Income	(<Tk. 100,000.00)	71	78.9	1.28	0.581	1	3
Medium income	(Tk. 100,000.00 to 150,000.00)	13	14.4				
High Income	(>Tk. 150,000.00)	6	6.7				
Overall		90	100.0				

Table 4.13. Average annual income (BDTk.) of the respondents in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	25500.00 ^b	23672.70	2000	80000
Tala	30	112966.67 ^a	137033.72	5000	550000
Dumuria	30	68266.67 ^b	43535.11	10000	170000
Overall	90	68911.11	90600.95	2000	550000
F-value		8.11			
Level of significance		0.001**			

Mean with uncommon superscript differ significantly ($p < 0.05$)

4.1.9. Housing type of cattle

Data placed in the Table 4.9 expresses that majority of the farmers practiced permanent (40 percent) and semi-permanent (33 percent) housing system for their cattle. Less than one fifth of the farmers (13.3 percent) practiced kacha house for their cattle and very few of the farmers (5 percent) had not any shed for their cattle due to shortage of land or other problems.

Table 4.14. Housing type of cattle

Type of house	Frequency	Percent
Permanent	40	44.4
Semi-permanent	33	36.7
Kacha	12	13.3
No sheds	5	5.6
Overall	90	100.0

4.1.10. Experience in agricultural farming

Farming experience is one of the important factors to get much profit from farming. The respondents are classified into four categories according to their agricultural farming experience. These are “no experience, short term experience, medium experience and long term experience”. Maximum respondents had long term experience (40.0%). 26.7% farmers had short term farming experience and 20 % farmers had no farming experience.

Table 4.15. Distribution of the respondents according to their experience in agricultural farming

Categories	Score (Year of experience)	Respondents (N=90)		Mean	SD	Min	Max
		Number	Percentage				
No experience	00	18	20.0	11.02	10.99	00	45
Short term experience	1 to 5 years	24	26.7				
Medium experience	6 to 10 years	12	13.3				
Long term experience	>10 years	36	40.0				
Overall		90	100.0				

4.1.11. Experience in cattle farming

All the respondents are classified into four categories according to their cattle farming experience. Most respondents had long term experience (41.1%). Then about 40 % respondents told me that they had experience within one to five years that means they had short term experience. And very few (4.4%) respondents had no experience of cattle farming because they just started their farming life.

Table 4.16. Distribution of the respondents according to their experience in cattle rearing

Categories	Score (Year of experience)	Respondents (N=90)		Mean	SD	Min	Max
		Number	Percentage				
No experience	00	4	4.4	11.26	10.17	00	45
Short term experience	1 to 5 years	36	40.0				
Medium experience	6 to 10 years	13	14.4				
Long term experience	>10 years	37	41.1				
Overall		90	100.0				

4.1.12 Farming system

All the respondents are classified into several groups according to their farming system. Such as some respondents are involved only in livestock rearing. Some respondents cultivated crop with fish. A few farmers were able to cultivate crop, fish, rear poultry and they involved in other service. So table 4.12 shows the percentage of respondents those are involved in that particular type of farming system.

4.1.13 Average number of cattle per family in three different locations

The respondents were classified into three types according to location. Maximum number of cattle was in Tala upazila (7.10) and lowest number of cattle was in Fakirhat upazila (1.80). In Fakirhat maximum respondents faces many obstacles during cattle farming. The main problem was lack of grazing land. For this reason they didn't afford cattle feed. That's why number of cattle in Fakirhat was very poor.

Table 4.17. Farming system of the respondents in the studied areas

Components	Frequency	Percent
Livestock	46	51.1
Crop+Fish	11	12.2
Crop+Poultry	7	7.8
Crop+Poultry+Fishery+Service	7	7.8
Poultry+Fishery	5	5.6
Crop+Poultry+Fishery	3	3.3
Poultry+Day labourer	2	2.2
Crop+Poultry+Business	1	1.1
Poultry+Business	5	5.6
Crop+Poultry+Day labourer	3	3.3
Overall	90	100.0

Table 4.18. Average number of cattle per family in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	1.80 ^b	0.55	1	3
Tala	30	7.10 ^a	7.15	1	26
Dumuria	30	2.73 ^b	1.39	1	5
Overall	90	3.88	4.77	1	26
F-value		13.50			
p-value		0.000***			

Mean with uncommon superscript differ significantly ($p < 0.05$)

4.1.14. Average annual income from cattle rearing in three different locations

Annual income of respondents per family is classified in three locations. Highest average income was in Tala which was 87433.33 taka and lowest average annual income was in Fakirhat (11100.00 taka). And average of 90 respondents was 52677.78 taka.

Table 4.19. Average annual income from (BDT) cattle rearing per family in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	11,100.00 ^b	21836.94	0	70000
Tala	30	87,433.33 ^a	114961.97	0	450000
Dumuria	30	59,500.00 ^a	32730.61	10000	100000
Overall	90	52677.78	76265.63	0	450000
F-value		9.092			
p-value		0.000***			

Mean with uncommon superscript differ significantly ($p < 0.05$)

4.1.15. Average income from milk sells out

The respondents were classified into three types according to location. Maximum average income from milk sell out was in Dumuria upazila (28866.67 taka) and lowest average annual income from milk sell out was in Fakirhat upazila (2866.67 taka). And average annual income from milk sell out of 90 respondents was 18788.89 taka.

Table 4.20. Average annual income (BDT) from milk selling per family in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	2,866.67 ^b	3803.21	0	15,000.00
Tala	30	24,633.33 ^a	23134.51	0	80,000.00
Dumuria	30	28,866.67 ^a	19361.77	0	60,000.00
Overall	90	18788.89	20795.69	0	80,000.00
F-value		18.945			
p-value		0.000***			

Mean with uncommon superscript differ significantly ($p < 0.05$)

4.1.16 Type of the cattle

The information furnished in the Table 4.19 reveals that majority of the farmers (32.2 percent) used crossbred, a portion of the farmers (67.8 percent) used indigenous, and very few of the farmers used both of the crossbred and indigenous breed. (Rahman *et al.* 2012) reported that about 28 percent respondents had indigenous, 12 percent crossbred and 60 percent used both of the indigenous and crossbred.

Table 4.21. Type of Cattle

Cattle type	Frequency	Percent
Crossbred	61	32.2
Indigenous	29	67.8
Overall	90	100.0

4.1.17 Source of the cattle

The data furnished in the Table 4.20 expresses that majority of the farmers used own cattle as the source of the cattle rather than purchasing and 63.3 percent farmers belong to this categories but 36.7 percent of the farmers purchased cattle as the source of cattle for farming. Few of the farmers used both own and purchased cattle. (Abdullah, 2017) also found that farmers are reared maximum own cattle (53.3%) than purchase (40%).

Table 4.22. Source of Cattle

Category	Frequency	Percent
Purchased	33	36.7
Own	57	63.3
Overall	90	100.0

4.1.18. Source of feed

Data furnished in the Table 4.21 reveals that maximum farmers (74.4 %) are purchased feed from market. 20% farmers liked to feed their animal from both readymade and homemade sources and very few farmers like 5.6% are liked to use homemade feed for their animal.

Some of them also slightly depended on roadside grass or cultivated fodder who have this access.

(Hossain, 2013) reported that 83 percent of the farmers supplied cultivated fodder and only 17 percent farmers used cultivated fodder and roadside grass during rainy season.

Table 4.23. Source of feed

Category	Frequency	Percent
Purchase/Readymade	67	74.4
Homemade	5	5.6
Both	18	20.0
Overall	90	100.0

4.1.19 Health related parameters

Data in the Table 4.22 shows that maximum farmers never provided growth hormone to their cattle for fattening their cattle. (Abdullah, 2017) reported the same result. But (Hossain,2013) reported that 70 percent of the farmers used hormones, antibiotic and growth promoter for higher meat production and only 30 percent of the farmers didn't use hormones, antibiotic and growth promoter for their cattle.

Data in the Table 4.22 shows that more than three fourth of the farmers (86.6 percent) didn't practice vaccination to their cattle and a few farmers (13.3 percent) practiced vaccination. (Hossain, 2013) reported that about 87 percent farmers vaccinated their cattle and 13 percent farmers didn't vaccinate their beef cattle regularly. (Begum *et al.*, 2007) reported that 83.3 percent farmers provided vaccination.

Again, most of the farmers (86.6 percent) did not use vitamin and minerals to their cattle because they couldn't afford it. And less than half of the farmers (13.3 percent) use vitamin and minerals to their cattle for their improved immunity. From the table 4.22 we can know that maximum farmers (95.6%) didn't provide antibiotic to their sick cattle for early improvement. Only few farmers like 4.4% gave antibiotic treatment to their sick cattle.

Table 4.24. Health related parameter

Parameter	Categories	Frequency	Percent
Use of growth hormone	Yes	5	5.6
	No	85	94.4
Vaccination	Yes	12	13.3
	No vaccination	78	86.7
	Overall	90	100.0
Use of vitamin and minerals	Yes	12	13.3
	No	78	86.7
	Overall	90	100.0
Use of antibiotic for treatment of sick animals	Yes	4	4.4
	No	86	95.6
	Overall	90	100.0

4.1.20. Separation of sick cattle from healthy cattle

Data furnished in the Table 4.23 shows that, only 4.4 percent of the farmers separated disease infected cattle from other healthy cattle whereas, 95.6 percent farmers did not separate disease-infected cattle from other healthy cattle. (Hossain, 2013) reported that 67 percent farmers did not remove their sick animals from healthy stock and only 33 percent farmers removed their sick animals from healthy stock, which was important for organic cattle farming.

Table 4.25 Separation of sick and healthy animals

Category	Frequency	Percent
Yes	4	4.4
No	86	95.6
Overall	90	100.0

4.1.21. Use of antibiotics as growth promoter

Data furnished in table 4.24 shows that most of the respondents (91.1%) didn't use antibiotics for growth promoting purpose. Only 8.9 % farmers use it for early growth of cattle for their much profit. For growth promoting purpose many farmers use antibiotics or growth hormone which is alarming for our health.

Table 4.26. Use of antibiotics

Category	Frequency	Percent
Yes	8	8.9
No	82	91.1
Overall	90	100.0

4.1.22. Marketing of milk due to antibiotic treatment

From the table 4.25 we can see that only a few (4.4%) farmers sold milk while receiving antibiotics, making up 95.6% of all farmers who didn't sell milk during that time. This is good news for our health because cow's milk occasionally contains antibiotic residue following antibiotic treatment, which is particularly detrimental to human health. Without any cause for alarm, humans can develop antibiotic resistance.

Table 4.27. Marketing of milk during antibiotic treatment

Category	Frequency	Percent
Do	4	4.4
Don't	86	95.6
Overall	90	100.0

4.2 Information about milk consumption behaviour

These are some important information which plays an important role to find out milk consumption behaviour of respondents.

4.2.23. Average amount of milk production per family each day

The respondents are categorized into several types according to amount of milk production. Some respondents couldn't able to produce milk (31.1 %) from their farm. About 13.3 % respondents were able to produce medium range of production (2-4 kg) and 40% respondents

told us, above 4 kg milk was produced at their farm. Highest milk production was in Tala upazila (average 5.64 kg) and lowest milk production was at Fakirhat upazila (average 0.72 kg).

Table 4.28. Milk production per family (kg day⁻¹) of the respondents

	Frequency	Percent	Mean	SD
No production	28	31.1	2.18	1.76
Low production ($\leq$ No 1.0Kg)	12	13.3		
Moderate production (1.1 to 2.0 kg)	2	2.2		
Medium production (2.1 to 4.0 kg)	12	13.3		
High production ($>$ 4.0 kg)	36	40.0		
Overall production	90	100.0		

Table 4.29. Average milk production (kg d⁻¹) per family in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	0.72 ^b	1.51	0	5
Tala	28	5.64 ^a	4.97	0	20
Dumuria	20	5.05 ^a	2.01	3	12
Overall	78	3.60	3.98	0	20
F-value		16.31			
p-value		0.000***			

Mean with uncommon superscript differ significantly ($p < 0.05$)

4.2.24. Milk sells per family

The respondents are categorized into several types according to amount of milk they sell. Some respondents couldn't able to sell milk (37.8 %) from their farm. About 28.9 % respondents were able to sell medium range of milk (2-4 kg) and 22.2% respondents told us, above 4 kg milk sold from their farm. Highest sell per family was at Tala upazila (average 5.07 kg) and lowest sell was at Fakirhat upazila (average 0.52 kg).

Table 4.30. Milk sells per family (kg day⁻¹) of the respondents

	Frequency	Percent	Mean	SD
No sell	34	37.8	1.88	1.67
Low sell ($\leq$ No 1.0 kg)	9	10.0		
Moderate sell (1.1 to 2.0 kg)	1	1.1		
Medium sell (2.1 to 4.0 kg)	26	28.9		
High sell (>4.0 kg)	20	22.2		
Overall production	90	100.0		

Table 4.31. Average milk sell (kg d⁻¹) per family in three different locations

Locations	N	Mean	Std. Deviation	Minimum	Maximum
Fakirhat	30	0.52 ^b	1.42	.00	5.00
Tala	28	5.07 ^a	4.47	.00	18.00
Dumuria	23	3.52 ^a	2.25	.00	10.00
Overall	81	2.94	3.57	.00	18.00
F-value		16.49			
p-value		0.000***			

Mean with uncommon superscript differ significantly ($p < 0.05$)

Table 4.32. Milk consumption per family (kg day⁻¹) of the respondents

	Frequency	Percent	Mean	SD
No consumption	46	51.1	0.74	1.02
Low consumption ($\leq$ No 1.0 kg)	31	34.4		
Moderate consumption (1.1 to 2.0 kg)	8	8.9		
Medium consumption (2.1 to 4.0 kg)	-	-		
High consumption (>4.0 kg)	5	5.6		
Overall production	90	100.0		

4.2.25. Milk consumption per family

The respondents are categorized into several types according to amount of milk for their family consumption. The majority of respondents (51.1%) stated that they were unable to

save milk for their household. For their family, 34.4% of respondents store less than 1 kg of milk, which is an inappropriate amount. For their family, 5.6% of respondents store more than 4 kg of milk.

4.2.26. Knowledge about importance of milk consumption

The respondents are classified into two groups. Either they know about importance of milk consumption or not. The majority of responders (92.2%) were unaware of the significance of milk drinking. Only 7.8% of respondents are aware of this information.

Table 4.33. Knowledge about importance of milk consumption?

Category	Frequency	Percent
Have knowledge	7	7.8
Don't have knowledge	83	92.2
Overall	90	100.0

4.2.27. Distribution of respondents according to knowledge of ideal requirement about milk

It is very important to know the ideal amount of milk consumption. Around 240 ml consumption of milk every day provides us with 30 per cent of the daily recommended intake of calcium. Not just this, milk also has protein, fat, vitamin D and vitamin B12, which makes it a super healthy food (Monteiro, 2009). Data furnished in the Table 4.34 that 98.9% of responders were unaware of the optimum milk need. Only a small percentage of respondents (1.1%) are aware of the recommended daily intake of milk, which is quite concerning for the health of the next generation. Children who don't know how much milk their child needs are unable to consume adequate nutrition from milk.

Table 4.34. Knowledge about ideal requirement of milk

Category	Frequency	Percent
Have knowledge	1	1.1
Don't have knowledge	89	98.9
Overall	90	100.0

4.2.28 Information about daily milk consumption

Consumption of low fat dairy foods daily may decrease the risk of obesity, type 2 diabetes, hypertension, and all cardiovascular risk factors linked with increased probability of cognitive impairment (Crichton *et al.*, 2010). Table 4.35 shows that 77.8 % respondents didn't consume milk daily and 22.2 % respondents consume milk every day. Generally who are cable to producing milk from their cattle or buying milk from market those are able to intake milk daily.

Table 4.35. Daily milk consumption pattern of the respondents

Category	Frequency	Percent
Consumed daily	20	22.2
Not daily consumed	70	77.8
Overall	90	100.0

4.2.29. Daily milk intake of their family members

Respondents are classified into two categories. Either their family consume milk daily or not. Most of their respondents (80%) told me "no". Only 20 % respondents told us that their family members consume milk every day.

Table 4.36: Milk consumption pattern by all the family members.

Category	Frequency	Percent
Consume	18	20.0
Not consume	72	80.0
Overall	90	100.0

4.2.30. Causes of milk escaping

The respondents didn't drink milk every day for a variety of reasons, including the fact that the majority of them (65.6%) couldn't afford it. 6.7% of respondents reported having a milk allergy, but just a small number reported having a lactose intolerance. And 5.6% of respondents avoided milk because they didn't like it for this reason. 14.4% of all respondents reported avoiding milk due to other issues. And only 4.4% of respondents said that they had no issue avoiding milk.

Table 4.37. Causes of milk escaping by the respondents

Category	Frequency	Percent
0	4	4.4
Allergy	6	6.7
Lactose intolerance	3	3.3
Personal disliking	5	5.6
Poverty	59	65.6
Other problem	13	14.4
Overall	90	100.0

4.2.31. Problems associated with milk deficiency disease

According to data in Table 4.31, the majority of respondents (33%) experienced nerve problems as a result of poor calcium consumption. People who reported having weak bones and constant fatigue made up 21.2% of our sample. 16.7% of respondents reported having muscle aches and cramps. A couple of them said they had no health issues, while others maintained they had other diseases.

Table 4.38. Problem associated with milk deficiency disease

Category	Frequency	Percent
Weak bone	19	21.1
Nerve problem	30	33.3
Muscle cramps	15	16.7
Muscle pain	15	16.7
Other problem	7	7.8
No problems	4	4.4
Overall	90	100.0

4.2.32 Problems related to milk consumption

Maximum respondents (97.8%) didn't suffer any problem related to milk consumption. Only few respondents (2.2%) told us that they suffered several health problems like allergy, gastric, lactose intolerance due to consumption of milk.

Table 4.39. Problems faced by the respondents due to milk consumption

Category	Frequency	Percent
Problem faced	2	2.2
Not faced	88	97.8
Overall	90	100.0

4.2.33. Product making at home from milk

Maximum respondents (61.1%) didn't make any product at home from milk. Because they are unable to afford milk due to poverty. 38.9% respondents made several products like kheer, payesh, paneer, ghee, butter etc for their family members to meet nutritional need of their family. It is a good idea that those are unable to consume milk due to personal dislikings, they can meet their nutritional need from the milk products.

Table 4.40. Making of products from milk at home

Category	Frequency	Percent
Home-made milk products	35	38.9
No products	55	61.1
Overall	90	100.0



CHAPTER FIVE

SUMMARY AND CONCLUSION

The most complete food in nature is frequently thought to be milk. In Bangladesh, imports and urban consumption of milk and milk products have surged recently while production and rural consumption have fallen. Reduced production and rural consumption are caused by a number of causes, including population pressure on the land, increased draught cow use, incorrect government food production policies, family income, age, and ethnicity. Many rural people cannot obtain enough milk for themselves and their family to meet their nutritional needs due to poverty and lack of information. They experience numerous Ca deficiency diseases as a result, including muscle cramps, brittle bones, neurological issues, and others.

According to the findings, around half of the respondents (51.1%) claimed they couldn't conserve milk for their family. Around one-third (34.4%) of respondents kept less than 1 kg of milk, which is an insufficient amount for their family. Only 5.6% of respondents kept more than 4 kg of milk on hand for their family. Average 92.2 percent of respondents were ignorant of the importance of milk consumption. Only 7.8% of those surveyed are aware of this fact. Most of the respondents (98.9%) didn't know how much milk they actually needed. The fact that only a small portion of respondents (1.1%) are aware of the daily recommended intake of milk is quite alarming for the future health of the population. Only 20% of respondents said their family members regularly consumed milk. The respondents didn't drink milk every day for a variety of reasons. For instance, the majority of participants (65.6%) reported being unable to afford to consume milk. Only a small percentage of respondents showed lactose intolerance, and 6.7% of them had allergy to milk. Only 5.6% of participants also indicated they stayed away from milk since they didn't like it. Only 14.4% of all respondents admitted to avoiding milk with other justifications. And just 4.4% of respondents said they had no problem avoiding milk. The majority of responders (33%) reported having nerve issues as a result of inadequate calcium intake. Two of the most common problems we received from 21.2% of respondents were weak bones and ongoing weariness. Only 16.7% of respondents said they had muscle pain and cramping. Only a small percentage of them claim to be healthy, and some of them have other ailments. Average 95.6% of all farmers did not sell their milk while receiving antibiotics, while only 4.4% of farmers did so. This is fantastic news for our health because cow's milk residue left over from

antibiotic therapy can seriously harm people's wellbeing. Nobody is concerned when a human develops an antibiotic resistance.

It is very clear that the milk consumption behavior at southwest rural region is not at the satisfactory level. The respondents were not aware of consuming milk and can't afford milk due to poverty. Most of them even don't isolate disease infected cattle from other healthy cattle. They even don't vaccinate regularly, deworming practice is not also carried out on a regular basis. It is very clear from the findings that one of the most important problems is the lack of knowledge of the farmers. Lack of training chances, high feed costs, a lack of grazing pasture, limitations on immunizations and vitamin supplements, and information gaps were the top challenges farmers faced. On their farm, they were unable to produce enough milk as a result. Govt. and non-govt. organization should arrange training program especially in the rural area. Extension media and mass media can also play a vital role to make the rural farmers knowledgeable but the mass media also not interested in telecasting any program related to importance of milk consuming. Communication of extension workers and officers with farmers should be increased.

The extent of knowledge of the respondents about milk consumption was not really satisfactory. For improving nutritional status at rural level and meet nutritional support from milk, it is necessary for the GO, NGO and other related agencies to be more active. It is clear that the population in the southwest coastal region consumes significantly less milk than is necessary, and this population needs to be encouraged to meet their nutritional needs.

Recommendations

- The government should implement the necessary measures to enhance rural cattle farming so that individuals in rural areas can obtain the milk they need to meet their nutritional needs.
- To encourage small-scale farmers to raise cattle, the government ought to provide subsidy to them.
- Several NGOs ought to assist farmers by providing animal feed at a reduced cost so that farmers will be motivated to work in the agricultural sector.
- To raise community knowledge regarding milk consumption, a number of groups with ties to the nutrition sector should set up different activities.
- Other researchers might emphasize the factors that led to a decline in milk production and might raise awareness among rural people about importance of milk consumption and milk deficiency disease.

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APPENDIX-I

MILK CONSUMPTION BEHAVIOUR AND DEFICIENCY OF RURAL POPULATION IN SOUTHWEST COASTAL REGION OF BANGLADESH

Serial No:

Date:

A. Personal Information of the Farmer:

1.

Name of the farmer:

Village:Upazila:

Contact no.:

2.

Age of the farmer: Sex: ☐ Male ☐ Female

Number of the family members:

Education:

Main Occupation:

3.

Do you have own land?

Yes ☐

No ☐

Total land:

Used land for fodder cultivation:

4. Annual income:



Sl. No.	Source of income	Income (yearly)	Comments
1.	Agriculture		
2.	Cattle		
3.	Fish		
4.	Poultry		
5.	Goat		
6.	Business		
7.	Others		
	Total		

5) Farm size

Please furnish information about your lands according to use

Sl. No.	Use of land	Area of land	
		Local unit	Hectare
1	Total land		
2	Homestead		
3	Land under cultivation		

6) Housing for cow: Please furnish the information of your sheep shed (put ✓)

Permanent structure ☐ Semi-permanent structure ☐ Bamboo structure ☐
Kacha ☐ No sheds ☐ Others ☐

7) Experience in farming:Years

8) Experience in cattle farming/rearing:Years

9) Farming System (put ✓)

☐ Crop ☐ Livestock ☐ Fisheries
☐ Crop + Fish ☐ Crop + Livestock ☐ Crop + Livestock + Fish
☐ Agriculture ☐ Livestock + Fish ☐ Others

10) Area under cattle/goat rearing:Hectare

11) Number of cow: a)Total:b) Male: c) Female:

12) Number of goat: a)Total:b) Male: c) Female:

13) Income from cow rearing (Tk./year):

14) Income from milk sell out (Tk./year):

15) Income from goat rearing (Tk./year):

16) Income from goat milk sell out (Tk./year):

B. Information of the Cattle/Goat:

1.

Type of the cattle: ☐ Crossbred

☐ Indigenous

Source of the cattle: ☐ Purchase

☐ Own cow

Purchased from:

Type of the goat: ☐ Boer ☐ Sirohi ☐ Black Bengal ☐ Jamunapari ☐ Others

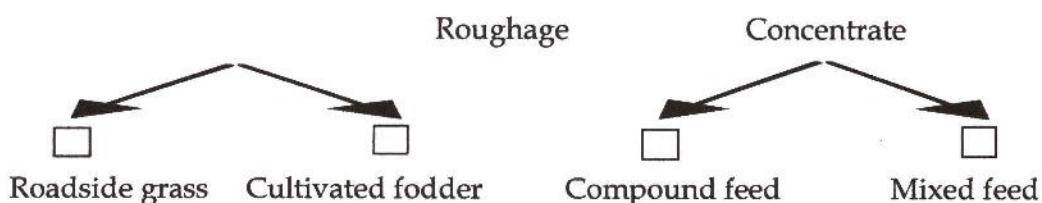
Source of the goat: ☐ Purchase

☐ Own cow

Purchased from:

2.

Which type of feed do you use?



Source of feed: ☐ Purchase

☐ Produce

☐ Both

Do you use vitamin and mineral supplement? ☐ Yes ☐ No

Do you use regular vaccination? ☐ Yes ☐ No

Do you separate sick cattle from healthy cattle? ☐ Yes ☐ No

Do you use growth hormone or any synthetic growth promoter? ☐ Yes ☐ No

Who has recommended you to use synthetic growth promoter?

☐ Local doctor

☐ Veterinarian

☐ Others

C) Information about milk consumption behavior:

1. How much milk is produced in your farm per day?

2. How much milk do you sell per day?

3. How much milk do you reserve for your family consumption?

4. Do you know about the importance of milk consumption?

Yes ☐

No ☐

5. Do you know about ideal requirement of milk consumption?

Yes ☐

No ☐

6. Do you consume milk every day?

Yes ☐

No ☐

7. Do your each family member consume milk every day?

Yes ☐

No ☐

8. Causes of milk avoidance:

Allergy ☐

Lactose intolerance ☐

Personal disliking ☐

Poverty ☐

Lack of knowledge ☐

Other problem ☐

9. Do you suffer any problem associated with milk deficiency disease? Like:

Weak bone ☐

Nerve problem ☐

Muscle cramps ☐

Muscle pain ☐

Other problem ☐

(Thank you for your nice cooperation)

Signature of the enumerator

Date: