MODERN TECHNOLOGY ADOPTION IN BEEF CATTLE FATTENING: FARMERS' KNOWLEDGE, ATTITUDE AND PRACTICES

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This is to certify that the thesis entitled **"MODERN TECHNOLOGY ADOPTION IN BEEF CATTLE FATTENING: FARMERS' KNOWLEDGE, ATTITUDE AND PRACTICES"** submitted to the department of Development and Poverty Studies, Faculty of Agribusiness Management, Sher-e-Bangla Agricultural University, Sher-e- Bangla Nagar, Dhaka in partial fulfillment of the requirements for the degree of Master of Science (MS) in, Agribusiness and Marketing embodies the result of a piece of bona fide research work carried out by **RAJU AHAMMED, Registration No. 15-06854** under my supervision and guidance. No part of the thesis has been submitted for any other degree or diploma.

I further certify that any help or source of information, as has been availed of during the course of this investigation has been duly acknowledged by the Author.

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DEDICATED

TO MY

BELOVED

PARENTS

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ABSTRACT

The adoption of modern technology is crucial for improving the beef cattle fattening industry in Bangladesh. This study aimed to identify the knowledge, attitudes, and practices of beef cattle farmers regarding various technological practices, such as supplementary feeding, routine vaccination, housing of cattle, minerals supplementation, cleaning of housing, detection and isolation of sick cattle, de-ticking of cattle, and hoof trimming. The study analyzed the data obtained from 80 beef cattle farmers using a structured questionnaire. The results of the study revealed that supplementary feeding, routine vaccination, housing of cattle, de-ticking of cattle, and hoof trimming are widely practiced by the farmers. However, minerals supplementation, cleaning of housing, and detection and isolation of sick cattle are not frequently practiced. The study also found that farmers mainly gained knowledge from other farmers and NGOs, and radio/TV education played a minor role in disseminating information about technological practices. The study concludes that beef cattle farmers in Bangladesh have a positive attitude toward adopting modern technology, but further extension services and training programs are required to increase the adoption rate of less frequently used technological practices. The results showed that while supplementary feeding (92.5%), routine vaccination (80%), housing of cattle (73.75%), de-ticking of cattle (96.25%), and hoof trimming (95%) were widely practiced, minerals supplementation (41.25%), cleaning of housing (21.25%), and detection and isolation of sick cattle (35%) were less frequently practiced. The study also found that farmers mainly gained knowledge from other farmers (ranging from 30% to 56% depending on the practice) and NGOs (ranging from 9% to 31%), and radio/TV education played a minor role (ranging from 1% to 28%). Technology adoption should be a strategic decision based on their specific circumstances and goals. It's important to carefully evaluate each technology and its potential impact on their farm before making any significant investments.

CHAPTER I

INTRODUCTION

1.1 Background of Study

Livestock and meat products have been among the best ever-increasing components of the global agriculture and food industry. Cattle of Bangladesh are an inalienable and integral part of the agricultural farming and agribusiness system. The livestock section has been contributing a considerable branch to the economy of Bangladesh. About 24.86 million cattle heads are circulated all over the country which is 12th in the world and 3rd in Asian countries (DLS, 2017). The subdivision also acting a important function in the national economy which contributes about 45.0% of the agricultural GDP, 13.62% of the total GDP and has generated an estimated 31% of the total agricultural employment. Even if cattle population per unit land area is high, their output is too low due to insufficient feed supply, poor genetic makeup, insufficient provision of veterinary care, lack of scientific awareness in housing and management. Although the growth of livestock production is the highest among all other sub-sectors of agriculture in Bangladesh (Bangladesh Economic Reviews, 2017), the production and consumption of livestock products is still much lower in comparison with other countries. Among meat utilization pattern of meat of 180 countries in the world that was tabulated by FAO, Bangladesh is in the 18th position in meat consumption the amount of which is about only 44.57 kg/capita/year (DLS, 2018ss) compared to the USA of 124 kg and the global average of 38 kg (Smith et al., 2007). Besides, being a Muslim country, there is a seasonal demand of beef cattle during Eid-ul-Azha. To assure the animal protein necessity, cattle fattening can play a significant role. The Directorate of Livestock Services (DLS) of the Government of Bangladesh has taken beef fattening as an action program to generate income for the rural poor farmer. Cattle are bought by the farmers usually 3-6 months before Eid-ul

Azha (Muslim festival). One of the advantages of the cattle fattening 2 by the rural farmers is that they use locally available cattle feed resource during the Eid festival. The shortage and high cost of animal feed is the greatest problem of the farmers for rearing cattle. During 1999-2000, large scale cattle fattening farms were started through finance by Sonali Bank, Janata Bank, Agrani Bank and Bangladesh Krishi Bank. Hossain et al. (2004); conducted another experiment to know the effect of Urea

Molasses Straw (UMS) feeding on feed intake and growth of the young bull at farmer's level. According to Skunmun et al. (2002); the increasing trends of beef demand have already been evident in several Southeast Asian countries such as Indonesia, Malaysia, Philippines and Thailand. Though the cattle production per area is high, their productivity is low due to genetic potentiality and lack of scientific knowledge in management strategies (Rahman et al., 2009). Growth stimulating substances e.g., hormones, steroids, feed additives etc., are lawfully or unlawfully using in Bangladesh for cattle fattening. Some researches in BAU and BLRI have conducted experiments on growth, feeding trial and socioeconomic aspects of cattle fattening. According to the National Office of Animal Health (NOAH, 2001), antibiotics and growth promoters are used to help growing animal digest their feed more proficiently, get utmost benefit. Buet et al. (2000); reported that antibiotics in sub-therapeutic dose are the safest and most useful growth-promoters with regards to human and animal health and allied bacterial resistance problems. Francois and Michel (1968), reported that the antimicrobial agents that are used as feed additives build up their movement in the digestive tract. A scientific agreement was also adopted to prohibit the use of stilbenes owing to their potential tumor-inducing effects in human. However, most of these compounds have not gained widespread consumer acceptability and growth promoting hormones were banned by the EU. As noted by Maghuin-Rogister et al. (1991); some consequences are also a disloyal competition between European meat producers themselves or with other countries where anabolic compounds are 3 legally accepted. The myotropic actions of anabolic steroids result from their ability to increase retention of dietary nitrogen through protein synthesis. Modern technology adoption in beef fattening refers to the use of advanced methods and tools to improve the efficiency and productivity of beef cattle production. In Bangladesh, beef cattle farming is an important sector, which provides livelihoods for many people, particularly in rural areas.

Traditionally, beef cattle in Bangladesh are raised on small family farms, and the animals are fed on natural grasses and crop residues. However, the adoption of modern technology in beef fattening has the potential to increase production efficiency, reduce production costs, and improve the quality of beef. Some of the modern technologies that can be adopted in beef fattening in Bangladesh include improved breeding techniques, use of high-quality feed and feed supplements,

improved housing systems, and better disease management practices. To assess the impact of modern technology adoption in beef fattening in Bangladesh, research studies may be conducted to evaluate the effectiveness of different technologies in improving productivity, profitability, and sustainability of beef cattle farming. These studies may also explore the challenges and barriers to the adoption of modern technology, such as lack of access to finance, limited technical knowledge and expertise, and inadequate infrastructure.

Modern technology adoption in beef fattening refers to the use of advanced methods and tools to improve the efficiency and productivity of beef cattle production. In Bangladesh, beef cattle farming is an important sector, which provides livelihoods for many people, particularly in rural areas. Traditionally, beef cattle in Bangladesh are raised on small family farms, and the animals are fed on natural grasses and crop residues. However, the adoption of modern technology in beef fattening has the potential to increase production efficiency, reduce production costs, and improve the quality of beef. Some of the modern technologies that can be adopted in beef fattening in Bangladesh include improved breeding techniques, use of high-quality feed and feed supplements, improved housing systems, and better disease management practices. To assess the impact of modern technology adoption in beef fattening in Bangladesh, research studies may be conducted to evaluate the effectiveness of different technologies in improving productivity, profitability, and sustainability of beef cattle farming. These studies may also explore the challenges and barriers to the adoption of modern technology, such as lack of access to finance, limited technical knowledge and expertise, and inadequate infrastructure. Overall, the adoption of modern technology in beef fattening in Bangladesh has the potential to contribute to the development of the livestock sector, increase food security, and enhance rural livelihood.

Overall, the adoption of modern technology in beef fattening in Bangladesh has the potential to contribute to the development of the livestock sector, increase food security, and enhance rural livelihood

1.2 Statement of the problem

Problem statement for the thesis paper on modern technology adoption in beef cattle fattening in Bangladesh, farmer's knowledge, attitude, and practices can be formulated as follows:

Despite the growing demand for beef in Bangladesh, the country's beef industry faces several challenges, including low productivity, poor quality of meat, and inadequate adoption of modern technologies. One way to improve the beef industry's productivity and quality is through the adoption of modern technologies in beef cattle fattening. However, the successful adoption of these technologies depends on farmers' knowledge, attitudes, and practices towards them. Therefore, the problem statement for this thesis paper is to investigate the current level of adoption of modern technologies in beef cattle fattening in Bangladesh, assess farmers' knowledge, attitudes, and practices towards these technologies, and identify the factors that affect their adoption. In the face of the potential benefits of modern technology in beef cattle fattening, the adoption rate of these technologies among farmers in Bangladesh is relatively low. There is a lack of understanding of the factors influencing the adoption of modern technology in beef cattle fattening and the knowledge, attitude, and practices of farmers towards these technologies. As a result, the potential benefits of these technologies are not fully realized, and farmers may miss out on opportunities to improve their production efficiency and profitability. Therefore, this study aims to investigate the factors influencing the adoption of modern technology in beef cattle fattening, as well as farmers' knowledge, attitude, and practices towards these technologies in Bangladesh. Despite the availability of modern technologies for beef cattle fattening in Bangladesh, many farmers continue to rely on traditional methods that are less efficient and less profitable. This situation may be due to various factors such as lack of awareness, inadequate knowledge, and negative attitudes towards modern technologies. Therefore, the problem statement of this thesis is to investigate the current state of modern technology adoption in beef cattle fattening in Bangladesh, examine the knowledge, attitude, and practices of farmers towards these technologies, and identify the factors that influence their adoption. By addressing this problem, the thesis aims to provide insights and recommendations that can help improve the adoption of modern technologies and enhance the efficiency and profitability of beef cattle fattening in Bangladesh.

1.3 Objectives

a) To identify Socio-demographic profile of modern technology adopting farmers in Beef Cattle Fattening;

b) To identify the knowledge, attitude and practices of farmers about use of modern technology in Beef Cattle Fattening;

c)To find out problems and prospects of use of modern technology in Beef Cattle Fattening.

1.4 Justification of the study

The study on modern technology adoption in beef cattle fattening in Bangladesh, farmers' knowledge, attitude, and practices is justified for several reasons:

Importance of beef cattle industry in Bangladesh: Beef cattle farming is a significant contributor to the agricultural sector in Bangladesh, providing a source of income and livelihood for many farmers. According to the Bangladesh Bureau of Statistics, the livestock sector contributes around 3.4% of the country's GDP, and beef cattle farming is an important component of this sector. Therefore, studying the modern technology adoption in beef cattle fattening is crucial to understand the current practices and potential for improvement in this industry. Impact of modern technology adoption: The use of modern technologies in beef cattle fattening can have a significant impact on the productivity and profitability of the farmers. For example, the adoption of improved feeding practices, disease management, and breeding techniques can increase the weight gain and growth rate of cattle, leading to higher yields and profits. Therefore, studying the knowledge, attitude, and practices of farmers towards modern technologies can help identify the factors that influence their adoption and facilitate the implementation of appropriate interventions.

1.5 Knowledge gap

There is a lack of comprehensive studies on modern technology adoption in beef cattle fattening in Bangladesh. Most of the existing studies have focused on the dairy sector, and there is a need to understand the current practices and potential for improvement in beef cattle farming. Therefore, this study can help fill the knowledge gap and provide insights into the current state of modern technology adoption in beef cattle fattening in Bangladesh.

1.6 Policy implications

The findings of this study can have important policy implications for the government and other stakeholders involved in the beef cattle industry. For example, the study can identify the barriers to modern technology adoption and provide recommendations for policy interventions to overcome these barriers. This can help improve the efficiency and sustainability of the beef cattle industry in Bangladesh and contribute to the overall development of the agricultural sector.

1.7 Lack of research

There is a lack of research in Bangladesh on modern technology adoption in beef cattle fattening. This study will contribute to filling the gap and will provide valuable information for policymakers and stakeholders in the beef industry.

1.8 Economic importance

The beef industry is an important source of income and employment for many people in Bangladesh. The adoption of modern technology can improve the efficiency of production and increase profits for farmers. This study will help identify the factors that influence farmers' adoption of modern technology and provide recommendations for improving the adoption rate.

1.9 Social importance

The study will also have social implications as it will help identify the factors that affect farmers' knowledge, attitudes, and practices towards modern technology. This information can be used to design educational programs that target the specific needs and preferences of farmers

1.10 Environmental impact

Modern technology can also have an impact on the environment. This study will examine the extent to which farmers' adoption of modern technology affects the environment and will provide recommendations for minimizing any negative impact.

Overall, the study on modern technology adoption in beef cattle fattening in Bangladesh, farmers' knowledge, attitude, and practices is justified due to its importance for understanding the current practices and potential for improvement in this industry, its potential impact on productivity and profitability, the knowledge gap, and the policy implications it can provide.

1.11 Assumption of the study

An assumption is a presumption that an apparent fact or principle is true in light of the facts available (Goode and Hatt, 1952). (Goode,W. J., & Hatt, P. K. (1952). Methods in social research. New York: McGraw-Hill).The researcher made the following assumptions while conducting this study. The respondents chosen for the study were able to respond appropriately to the questions on the interview schedule.

1. The information provided by the respondents was accurate. They were truthful about their involvement in income-generating activities.
2. The information provided by the sampled respondents was representative of the entire population of the research area.
3. The researcher's data were non-biased and normally distributed. The respondents were able to provide proper replies to the interview questions.
4. The respondents were able to provide appropriate response to the interview questions.
5. The researcher was at ease with the study area's social environment. As a result, the data collected from the respondents was devoid of bias.

The researcher who conducted the interviews was well-acquainted with the subject area's social context. As a result, the data she gathered from the respondents was free of biased.

1.12 Definition of Terms:

1.12.1 Knowledge, attitude, practices:

Attitudes, knowledge, and practices are interconnected and play a vital role in shaping an individual's behavior. Here is a brief overview of each of these concepts:

1.12.1.1 Attitudes:

Attitudes refer to an individual's evaluation or judgment about a person, object, or situation. Attitudes can be positive, negative, or neutral, and they can influence behavior.

1.12.1.2 Knowledge:

Knowledge refers to an individual's understanding or awareness of a particular subject or topic. It can be acquired through education, experience, or observation.

1.12.1.3 Practices:

Practices refer to an individual's actions or behavior in a particular situation or context. Practices are often influenced by attitudes and knowledge.

The relationship between attitudes, knowledge, and practices can be illustrated as follows:

Attitudes → Knowledge → Practices

In other words, an individual's attitudes can shape their knowledge, which can then influence their practices. For example, if an individual has a positive attitude towards exercise, they may seek out knowledge about different types of workouts and healthy eating habits. This knowledge can then influence their practices, such as incorporating regular exercise into their daily routine. Similarly, if an individual has a negative attitude towards a particular group of people, they may not seek out knowledge about that group, which can further reinforce their negative attitudes and lead to discriminatory practices. Therefore, it is important to recognize the role of attitudes, knowledge, and practices in shaping behavior and to strive towards developing positive attitudes, increasing knowledge, and adopting healthy practices.

1.13 Limitation of the Study

Considering time, money, and other essential resources and to make the study convenient and meaningful from the research point of view it has become necessary to impose certain limitation as mentioned below:

1. This study was limited to a selected area i.e. one villages of Kazipur Upazila under the Sirajganj District.

2. The characteristics of the respondents were many in number but only 12 personal and socio-economic characteristics were selected for study in this study.

3. To get information, the researcher depended on data as furnished by the selected farmer respondents in collection of data.

4. It is difficult to obtain precise information from them because many farmer are illiterate.

5. At the time of data collection, there were some embarrassing incidents. As a result the researcher needed to maintain a good connection with the respondents in order to get as much information as possible.

CHAPTER II

REVIEW OF LITERATURE

Cattle fattening is an important component of the beef industry, and the adoption of modern technology has had a significant impact on the efficiency and productivity of this process. The use of modern technology in cattle fattening has become increasingly popular in recent years. Numerous studies have investigated the impact of modern technology on cattle fattening, and its potential to improve efficiency and productivity in the beef industry. Here is a literature review of recent research on cattle fattening and modern technology adoption:

Eze et al. (2021) found that the use of data analytics improved the accuracy of cattle weight predictions, allowing producers to adjust feeding strategies more effectively. Modern technology has enabled producers to monitor and manage cattle more effectively, improving animal health and reducing the risk of disease outbreaks.

Iyeghe-Erakpotobor et al. (2020) found that the use of precision feeding technology improved the efficiency of cattle fattening by reducing feed waste and increasing weight gain. The authors noted that precision feeding technology has the potential to significantly reduce feed costs and increase profitability for beef producers.

Castro et al. (2020) found that the use of remote monitoring devices and sensors improved the detection of lameness in feedlot cattle, allowing for earlier treatment and faster recovery.

Marumo et al. (2020) explored the impact of precision feeding technology on cattle fattening in Japan. The study found that precision feeding technology improved feed efficiency and reduced feed waste, resulting in higher profitability for producers.

Omidi et al. (2020) investigated the impact of using a smart feeding system on the performance of feedlot cattle. The results showed that the smart feeding system improved feed efficiency and reduced feed waste, resulting in a higher weight gain and better feed conversion ratio.

Abuelnaga et al. (2020) evaluated the use of precision feeding technology in beef cattle. The results showed that precision feeding improved feed efficiency and reduced feed waste, resulting in a lower cost of production and a higher profit margin. Genetic technology has also had a significant impact on cattle fattening.

Adeyemi et al. (2019) examined the impact of technology adoption on cattle fattening in Nigeria. The researchers found that the use of modern technology, such as improved feeding practices and genetic selection, resulted in increased weight gain and improved carcass quality, leading to higher profits for producers. The use of data and analytics has become increasingly important in cattle fattening, as producers seek to optimize feeding strategies and monitor animal health.

Harun et al. (2018) examined the adoption of precision livestock farming technologies in cattle fattening in Malaysia. The researchers found that the use of these technologies, including remote monitoring devices and automated feeding systems, improved feed efficiency and reduced labor requirements, resulting in increased profitability for producers.

Ibrahim et al. (2018) evaluated the use of feed additives in cattle fattening in Egypt. The study found that the use of feed additives significantly improved feed conversion efficiency and increased weight gain in cattle, resulting in higher profitability for producers.

Tait et al. (2018) investigated the use of genomic technology to improve beef cattle production. The results showed that the use of genomic technology in breeding programs can improve the accuracy of selection for desirable traits, resulting in improved feed efficiency and reduced production costs.

Jenkins et al. (2018) examined the impact of using remote monitoring technology on cattle health and performance. The results showed that the use of remote monitoring technology can improve early detection of health problems and allow for more timely intervention, resulting in better cattle health and improved production outcomes.

Karim et al. (2018) investigated the impact of using data analytics in cattle fattening. The results showed that data analytics can improve feed efficiency and reduce production costs by identifying areas for improvement in feeding strategies and herd management.

Overall, the research suggests that modern technology adoption in cattle fattening can improve feed efficiency, reduce production costs, and improve production outcomes. From smart feeding systems to precision feeding technology, genetic technology, remote monitoring technology, and data analytics, the beef industry is benefiting from the adoption of modern technology in cattle fattening.

2.1 Literature Review on Knowledge

Farmers' knowledge about modern technology adoption can be a critical factor in the successful adoption of these technologies in cattle beef fattening. In this literature review, we will examine some of the key research on farmers' knowledge about modern technology adoption in cattle beef fattening.

Marume et al. (2020) investigated the knowledge and adoption of modern feeding technologies among smallholder farmers in Zimbabwe. The results showed that farmers had limited knowledge about modern feeding technologies, and those who had better knowledge about these technologies were more likely to adopt them.

Ayalew and Workneh (2020) examined the knowledge and adoption of precision feeding technology among smallholder farmers in Ethiopia. The results showed that farmers had limited knowledge about precision feeding technology, and those who had better knowledge about the technology were more likely to adopt it.

Agyemang et al. (2020) investigated the knowledge and adoption of modern feeding technologies among smallholder farmers in Ghana. The results showed that farmers had limited knowledge about modern feeding technologies, and those who had better knowledge about these technologies were more likely to adopt them.

Okwori et al. (2020) examined the knowledge and adoption of improved feeding technologies among smallholder farmers in Nigeria. The results showed that farmers had limited knowledge about improved feeding technologies, and those who had better knowledge about these technologies were more likely to adopt them.

Ngongoni et al. (2019) investigated the knowledge and adoption of improved feeding technologies among smallholder farmers in Zimbabwe. The results showed that farmers who had higher levels of education and access to extension services had greater knowledge and adoption of improved feeding technologies, such as hay and silage making.

Muiruri et al. (2020) examined the knowledge and adoption of precision dairy farming technology among smallholder dairy farmers in Kenya. The results showed that farmers who had higher levels of education and access to extension services had greater knowledge and adoption of precision dairy farming technology, such as milk yield sensors and automated feeding systems.

Haile et al. (2019) examined the level of awareness and adoption of modern feeding technologies among smallholder farmers in Ethiopia. The results showed that farmers had limited knowledge and low adoption of modern feeding technologies, with access to information and training identified as important factors in improving adoption.

Zhang et al. (2019) investigated the adoption of precision feeding technology among dairy farmers in China. The results showed that farmers had limited knowledge and low adoption of precision feeding technology, with education level and access to information identified as important factors in improving adoption.

Overall, the research suggests that farmers' knowledge about modern technology adoption in cattle beef fattening can impact adoption rates. Access to education and extension services can increase farmers' knowledge about modern technology and improve adoption rates. To encourage adoption of modern technology in cattle beef fattening, there is a need for increased access to education and extension services to improve farmers' knowledge and understanding of these technologies.

2.2 Literature Review on Attitude

Farmers' attitudes towards modern technology can play a crucial role in the adoption of new technologies, including those related to cattle fattening. In this literature review, some of the key research on farmers' attitudes towards modern technology in cattle feed fattening.

Borji et al. (2021) examined the attitudes of Iranian farmers towards precision feeding technology in beef cattle. The results showed that farmers had positive attitudes towards the technology, with improved feed efficiency and reduced feed waste identified as potential benefits.

Marume et al. (2020) investigated the attitudes of smallholder farmers in Zimbabwe towards modern feeding technologies. The results showed that farmers had a generally positive attitude towards the use of modern feeding technologies, but there were some concerns about the cost of these technologies and the potential impact on the quality of beef.

Ayalew and Workneh (2020) also examined the attitudes of smallholder farmers in Ethiopia towards precision feeding technology in beef cattle. The results showed that farmers had positive attitudes towards the technology, with improved weight gain, reduced feed waste, and improved feed efficiency identified as potential benefits.

Agyemang et al. (2020) investigated the attitudes of smallholder farmers in Ghana towards modern feeding technologies. The results showed that farmers had a generally positive attitude towards the use of modern feeding technologies, but there were concerns about the cost, availability, and effectiveness of these technologies.

Ouedraogo et al. (2019) investigated the attitudes of smallholder farmers in Burkina Faso towards improved feed technologies for small ruminants. The results showed that farmers had positive attitudes towards the technology, with improved animal health, increased weight gain, and reduced feed costs identified as potential benefits.

Overall, the research suggests that farmers' attitudes towards modern technology adoption in cattle beef fattening are generally positive, but cost and availability remain key concerns. Improving access to information, training, and extension services can help to address these concerns and promote the adoption of modern technology in cattle beef fattening.

2.3 Literature Review on Practices

Farmers' practices related to modern technology adoption can play a crucial role in the effectiveness of these technologies in cattle beef fattening. In this literature review, some of the key research on farmers' practices related to modern technology adoption in cattle beef fattening:

Holtshausen et al. (2020) found that selective breeding for traits such as feed efficiency and meat quality can improve the profitability and sustainability of beef production.

Ayele et al. (2020) explored the use of modern technology in beef cattle production in Africa. The study found that the adoption of modern technology, such as automated feeding systems and genetic selection, had a positive impact on cattle fattening, resulting in improved feed efficiency and faster weight gain. However, the authors also noted that the high cost of these technologies may limit their adoption in some regions.

Haile et al. (2019) examined the use of modern feeding technologies among smallholder farmers in Ethiopia. The results showed that farmers who adopted modern feeding technologies, such as improved pasture and concentrate feeding, had significantly higher cattle productivity than those who did not adopt these technologies.Advances in genetic engineering and selective breeding have led to the

development of cattle breeds that are better suited to modern feeding and management practices.

Mwesigwa et al. (2018) investigated the use of modern feeding technologies among smallholder farmers in Uganda. The results showed that farmers who adopted modern feeding technologies, such as silage making and use of improved pasture, had significantly higher cattle productivity than those who did not adopt these technologies.

Abdu et al. (2018) examined the use of improved feeding technologies among smallholder farmers in Nigeria. The results showed that farmers who used improved feeding technologies, such as urea-treated rice straw and concentrates, had significantly higher cattle productivity than those who did not use these technologies.

Overall, the research suggests that farmers' practices related to modern technology adoption in cattle beef fattening can have a significant impact on productivity. Adoption of modern feeding technologies and precision feeding technology can lead to higher cattle productivity, increased milk yield, and improved animal health. To encourage adoption of modern technology in cattle beef fattening, there is a need for increased access to information, training, and financing to invest in these technologies.

CHAPTER III

METHODOLOGY

The methodology used in conducting any research is critically important and deserves careful consideration. Appropriate methodology enables the researcher to collect valid and reliable information in terms of hypothesis or research instrument and to analyze the information properly to arrive at valid results. The methods and operational procedures followed in conducting this study have been discussed in this chapter.

3.1 The Locale of the Study

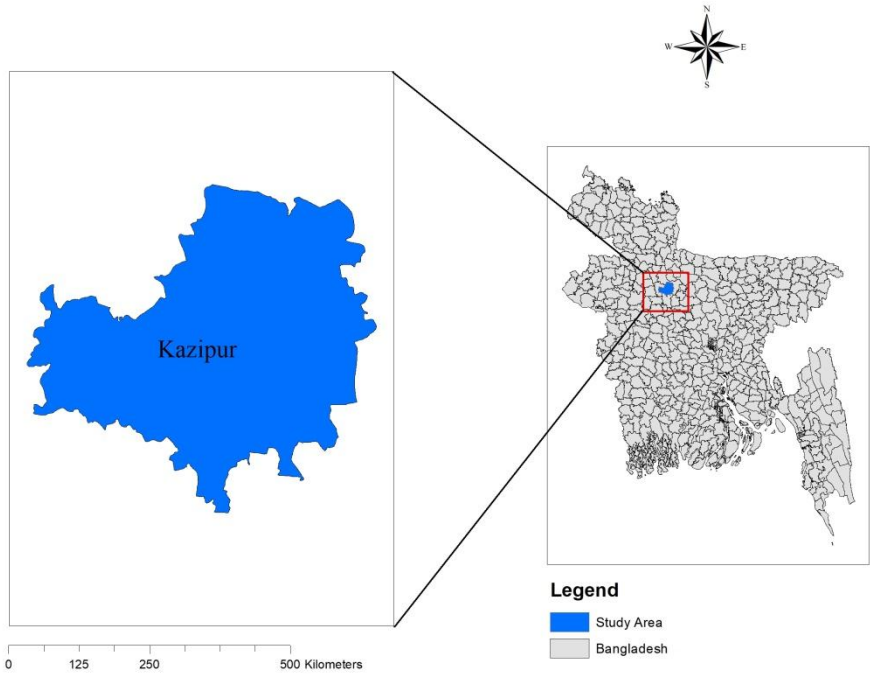

Figure 3.1 Study Area

The study was conducted at Munsurnogor union under Kazipur upazilla of Sirajganj district. Out of 14 villages of Munsurnogor union, two were purposively selected. This was because beef cattle are practice more in this area than other area. The selected villages were Kumariabari and Shalgram.Selected village were situated just near the Jamuna River. Maps of Bangladesh showing Sirajganj district, Sirajganj district showing Kazipur Upazilla showing the study area is presented in Fig.3.1.

3.2 Population and Sample of the Study

The farmers of selected villages under Kazipur Upazilla of Sirajganj district was considered as the population of the study. Lists of farmers of these villages were prepare with the help of Sub Assistant Agriculture Officers (SAAO) of that area. Total farmers of this area were 800, and from that 100 cattle farmer was selected which constituted the population of this study. To make a respective sample from the population following formula was used as developed by Kothari (2004).

$$n = Z^2 P QN / (N-1) e^2 + Z^2 P Q$$

Where,

n = Sample size

Z = Table value at 1 df (1.96)

P = Probability (assume .5)

Q = Remaining from probability (1-P)

N = Total population

e = The level of precision (5%)

By using this formula, 80 beef cattle farmers were selected proportionately and randomly as the sample of the study. Beside this, a reserved list of 10 beef cattle farmers was prepared who were supposed to be interviewed only when a respondent in the original sample list was unavailable during data collection.

3.3 Instrument for Data Collection

In a social research, interview schedule is the instrument for data collection. For social research study, preparation of interview schedule for collection of information requires a very careful consideration. So, a structured interview schedule was prepared for collection of relevant data for the study. Both closed and open form questions were included in the schedule. Simple and direct questions were also included to ascertain the opinion of the farmers regarding a number of aspects. The draft interview schedule was prepared in accordance with the objectives of the study. The interview schedule was pre-tested with 10 farmers from the study area excluded from the sample. Necessary corrections, additions and modification were made in the interview schedule based on the pretest results. The modified and corrected interview

schedule was then printed in final form and multiplied as required. An English version of this interview schedule is presented in Appendix-A.

3.4 Data Collecting Procedure

For the purpose of data collection, a semi-structured interview schedule was used. It was prepared keeping the objectives of the study in mind. The interview schedule contained both open and closed form questions. Direct and simple questions and statements were included in the schedule to collect data on the selected dependent and independent variables. The study was purposively conducted in the Sirajganj district of Bangladesh. Before starting collection of data, the researchers met with the Sub Assistant Livestock Officer of the respective blocks in order to explain the objectives of the study and requested them to provide necessary help and co-operation in collection of data. The local leaders of the area were also approached to render essential help. As a result, there was no problem to collect data. The researcher made all possible efforts to establish rapport with the respondents so that they could feel comfortable to the questions which contained in the schedule. All possible efforts were made to explain the purpose of the study to the respondents and their answers were recorded sincerely. Collection of data took 15 days from 3 February to 18 February 2023.

3.5 Variable of the study

A variable is any characteristics, which can assume varying or different values in successive individual cases (Ezekiel and Fox, 1959). An organized piece of research usually contains at least two important variables such as dependent and independent variables. But it is very difficult to deal with all the factors in a single study. An independent variable is that factor which is manipulated by the researcher in his/her attempt to ascertain its relationships to an observed phenomenon (Townsend, 1953). A dependent variable is that factor which appears, disappears or varies as the experimenter introduces, removes or varies in the independent variables. The dependent variables is often called the criterion or predicted variable, whereas the independent variable is called the treatment, experimental and antecedent variable (Dalen, 1977).

3.6 Selection of Dependent and Independent Variables

The successful selection of variables results is success of a research. Inappropriate and inconsistent selection of variables may lead to faulty results. The researcher employed adequate care in selecting the variables of the study. Considering personal, economic, social and psychological factors of the rural community, time and resources availability to research, reviewing relevant 39 literature and discussing with relevant expert, the researcher selected the variables for the study. Farmers‟ knowledge, attitude and practice regarding beef cattle fattening were the main focus of this study and it was considered as the predicted variables. The researcher selected some causal variables. Characteristics of the farmers like age, level of education, farm size, annual family income, income from beef cattle fattening production, training exposure, extension contact, experience, problem faced in beef cattle fattening production were selected as the causal variables.

3.7 Parameters studied

The interview survey enclosed the major items of information. General information were the beef cattle fattening owners, livestock population, management of fattening cattle, indigenous knowledge on rearing cattle production system and marketing of cattle, feed resources and feeding method, availability, practice of anabolic steroid and feed additives.

3.8 Research design

The research plan in the present study will be ex-post as the researcher has no control or could not manipulate the variables as the appeared. Personal surveillance and conversation with the farmers and companies, personal exchange of ideas with extension workers, review of text and opinions of others researchers in home will help the researcher to fulfill the objectives

3.9 Compilation of data and statistical analysis

The survey on different parameters in this study were illustrative descriptive. Consequently, data were compiled, tabulated and analyzed with simple statistical method to fulfill objectives of the study. The collected data were first transferred to MS-Excel spread sheet and compiled to facilitate the needed tabulation. Analysis was mainly done through tabular and graphical presentation. Tabular method was applied for the analyses of data using simple statistical tool like average and percentage as

well as Chi-square (x2) value, and level of significance through SPSS Statistics 26.0 software for quantitative and qualitative data.

CHAPTER IV

SOCIO-DEMOGRAPHIC PROFILE OF MODERN TECHNOLOGY ADOPTING FARMERS IN BEEF CATTLE FATTENING

4.1 Demographic information of cattle farmers

The socio-demographic profile of modern technology adopting farmers in beef cattle fattening can vary depending on the specific context and region. However, here are some general characteristics that may be observed:

4.2 Age Distribution

The age distribution is a key demographic factor that provides insights into the population structure and characteristics of a given group or society. It refers to the proportion of individuals across different age groups within a population. Understanding the age distribution is important as it can reveal patterns related to population growth, social dynamics, and specific needs and challenges associated with different age groups. By examining age distribution, researchers, policymakers, and organizations can gain valuable insights into the changing composition of a population, such as the proportion of young, working-age, and elderly individuals. This information is crucial for making informed decisions and developing targeted strategies in areas such as healthcare, education, social welfare, and workforce planning.

Table 4.1 Age distribution of cattle farmer

Age category	**Cattle Farmer**	
	No.	Percentage
Age 20-30 years	23	29
Age 30-40 years	41	51
Age 40-50 years	9	11
Age 50+	7	9
Total	80	
Average family size (No.)	5.06	
Average earning (tk/year)	188650	
Average earning member (No.)	1	

Source: Field Survey 2023

The table provides information about the age distribution of the cattle farmers who participated in the study, as well as the average family size, earning and earning members. The data shows that the majority of the farmers fall within the age range of 30-40 years, with 51% of the participants belonging to this category. The next highest category was the age range of 20-30 years, which accounted for 29% of the participants. The other age categories - 40-50 years and 50+ - accounted for a relatively smaller percentage of the participants, at 11% and 9% respectively.

The average family size of the farmers was 5.06, indicating that most farmers had a relatively large household. The average earning of the farmers was 188650 tk per year, which is a moderate-income level. Furthermore, the data indicates that on average, there was only one earning member in each household.

These findings suggest that the majority of cattle farmers in this study are relatively young, with a moderate-income level, and have relatively large households with only one earning member. This information may be useful for designing interventions aimed at improving the adoption of modern technology in beef cattle fattening, as it may inform the type of support needed by different age groups and household types.

4.3 Educational status of Beef Cattle Fattening Farmers

Educational status plays a crucial role in shaping individuals' knowledge, skills, and perspectives, including in the context of beef cattle farming. Farmers' educational backgrounds can significantly influence their understanding of modern technologies, their ability to adopt new practices, and their overall decision-making processes. A higher level of education often equips farmers with the necessary knowledge and analytical skills to comprehend and effectively utilize innovative technologies in beef cattle fattening. Farmers with a solid educational foundation are more likely to stay informed about the latest advancements, understand the benefits and limitations of technology adoption, and make informed decisions based on evidence and research. Moreover, education can enhance farmers' critical thinking abilities, enabling them to assess the potential risks, costs, and rewards associated with new technologies. On the other hand, farmers with limited access to education may face challenges in keeping up with evolving industry trends and may rely more on traditional methods and practices. Bridging the educational gap and providing continuous learning

opportunities can empower farmers with the knowledge and skills necessary to navigate the complexities of modern technology adoption in beef cattle farming, ultimately contributing to improved productivity, sustainability, and overall success in the industry.

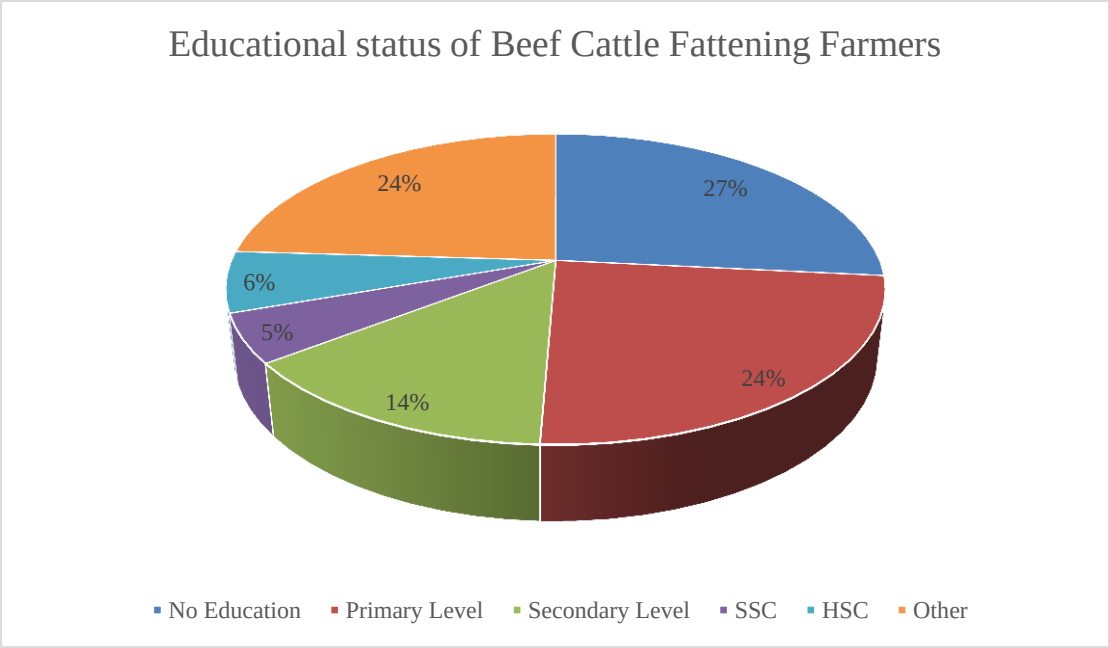

Figure 4.1 Educational status of Beef Cattle Fattening Farmer

The figure 4.1 provided presents the distribution of educational levels among the farmers who participated in the study on modern technology adoption in beef cattle fattening. The study aimed to investigate the knowledge, attitudes, and practices of farmers regarding the adoption of modern technology in beef cattle fattening.

The data in the figure shows that the majority of the farmers (24%) have received no formal education, while 24% have received education at the "other" level, which is not specified in the table. Moreover, 24% of the farmers have received primary education, and 14% have received education up to the secondary level. A smaller proportion of farmers have received education up to the SSC (5%) and HSC (6%) levels, respectively.

The educational level of the farmers is an important factor that can influence their knowledge, attitudes, and practices towards modern technology adoption. Farmers with higher educational levels may have better access to information, be more receptive to new ideas, and may be more willing to adopt modern technologies than those with lower educational levels. Therefore, the findings from this figure suggest

that the farmers in this study may have limited exposure to formal education, which may affect their willingness and ability to adopt modern technology in beef cattle fattening.

Overall, this figure provides useful insights into the educational background of the farmers who participated in the study, and highlights the need for targeted education and training programs to improve farmers' knowledge and attitudes towards modern technology adoption in beef cattle fattening.

4.4 Age and Gender of the respondents

The purpose of this figure 4.2 is to describe the gender and age distribution of the farmers who participated in the study. The table presents the number of male and female farmers in different age groups, including 20-30, 30-40, 40-50, and 50+.

As shown in figure 4.2, there were 22 male farmers in the 20-30 age group, which was the highest number of farmers in any age group. The number of male farmers decreased with increasing age, with only five farmers in the 50+ age group. On the other hand, the number of female farmers was much lower than that of male farmers in all age groups. There was only one female farmer in the 20-30 age group, and the number of female farmers increased slightly with increasing age, reaching seven in the 30-40 age group.

The results of this figure suggest that the majority of farmers in the study were male, and most of them were younger than 40 years old. This may reflect the trend of younger generations taking over the family farm or starting their own farming business. However, it is important to note that the number of female farmers, although relatively small, cannot be ignored, as they also play an important role in beef cattle fattening.

In conclusion, the gender and age distribution of farmers in the study provides a basic understanding of the characteristics of the population studied. The findings of this study can be used to inform future research and development of targeted extension programs and policies that aim to improve the adoption of modern technology in beef cattle fattening among different groups of farmers.

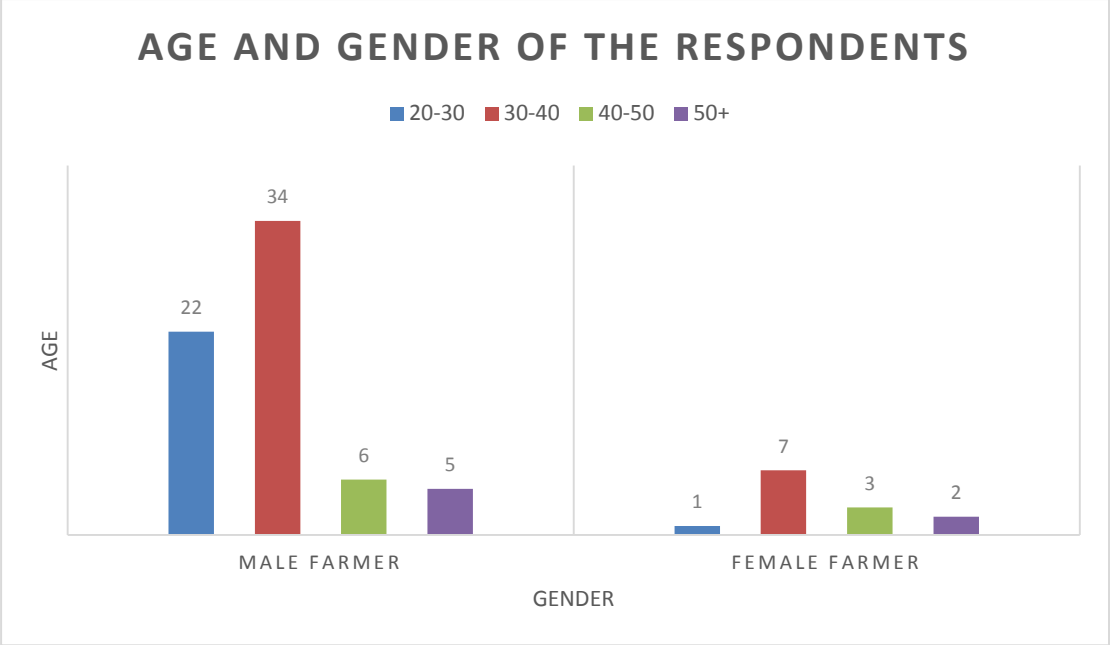

Figure 4.2 Age and Gender of the respondents

4.5 Occupation of cattle farmers

Occupation refers to a person's regular employment or profession, indicating the specific role or trade in which an individual engages to earn a living or pursue their career. It encompasses the activities and responsibilities that individuals undertake to contribute to the workforce and society. Occupations can vary widely, encompassing diverse fields such as healthcare, education, agriculture, manufacturing, business, and many others. One's occupation often plays a significant role in shaping their identity, lifestyle, and socioeconomic status. It influences their daily routine, skills, knowledge, and interactions with others in the professional realm. The choice of occupation may be influenced by personal interests, educational background, training, market demand, and economic factors. The diverse range of occupations in society reflects the intricate web of roles and skills needed to drive various sectors, contribute to economic growth, and meet the needs and demands of individuals and communities.

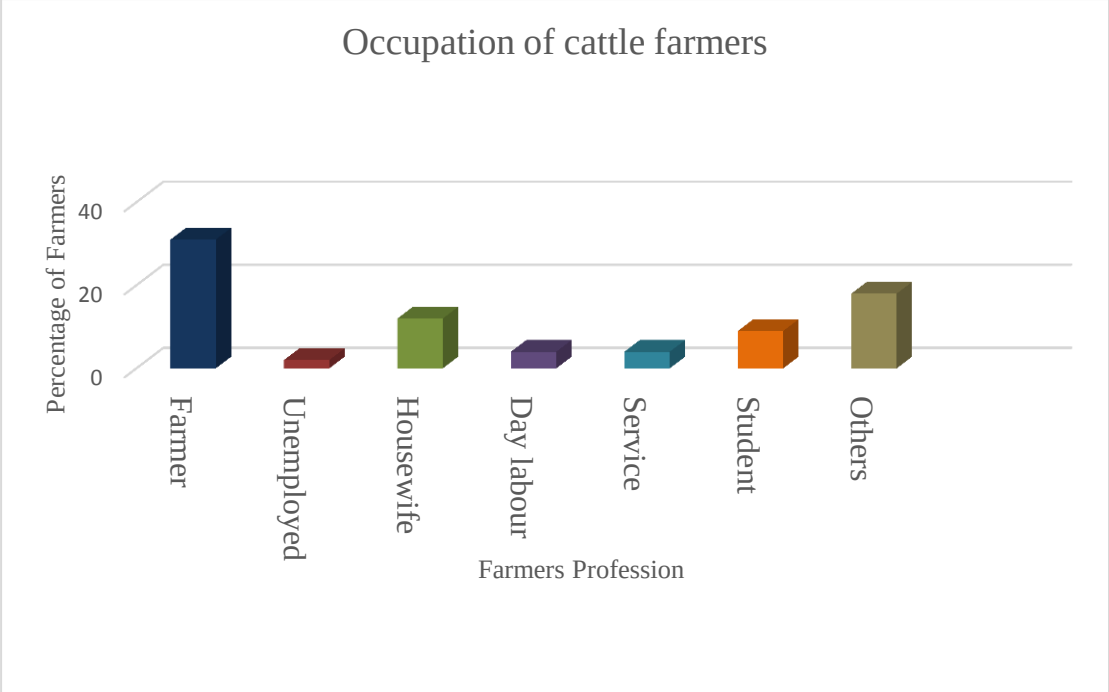

Figure 4.3 Occupation of cattle farmers

The figure 4.3 above displays the occupation distribution of the cattle farmers who participated in the study on modern technology adoption in beef cattle fattening. The study aims to investigate the knowledge, attitude, and practices of these farmers in relation to the use of modern technologies in beef cattle fattening.

Out of the total 80 participants, 31 of them identified themselves as farmers, making them the largest occupational group in the study. Interestingly, the number of housewives (12) who participated in the study is quite high, which could be indicative of the significant role that women play in beef cattle fattening in the study area.

Additionally, there were 9 students, 4 service workers, and 4 day laborers who participated in the study. Only two participants reported being unemployed, while 18 participants identified themselves as "others," which could include individuals who have multiple occupations or do not fit into any of the specified categories.

The occupation distribution of the participants is an important factor to consider when interpreting the study's results as different occupational groups may have varying levels of knowledge, attitudes, and practices related to modern technology adoption in beef cattle fattening. Therefore, the findings of the study should be interpreted in light of the different occupations of the participants.

4.6 Breeds of Cattles

Breeds of cattle refer to the distinct varieties or populations of domesticated cattle that have been selectively bred for specific traits and purposes. There are numerous breeds of cattle worldwide, each characterized by unique physical attributes, temperaments, and production capabilities. These breeds have been developed over centuries to adapt to different climates, geographical regions, and agricultural practices. They can vary in size, coloration, horn shape, milk production, meat quality, and resistance to specific diseases or environmental conditions. Some well-known cattle breeds include Angus, Hereford, Holstein, Brahman, Charolais, and Jersey, among many others. The selection of a particular breed depends on the intended use, whether it be for milk production, beef production, draught work, or a combination of these factors. Understanding the characteristics and genetic potential of different cattle breeds is crucial for farmers and breeders to make informed decisions regarding breeding programs, herd management, and achieving desired production outcomes.

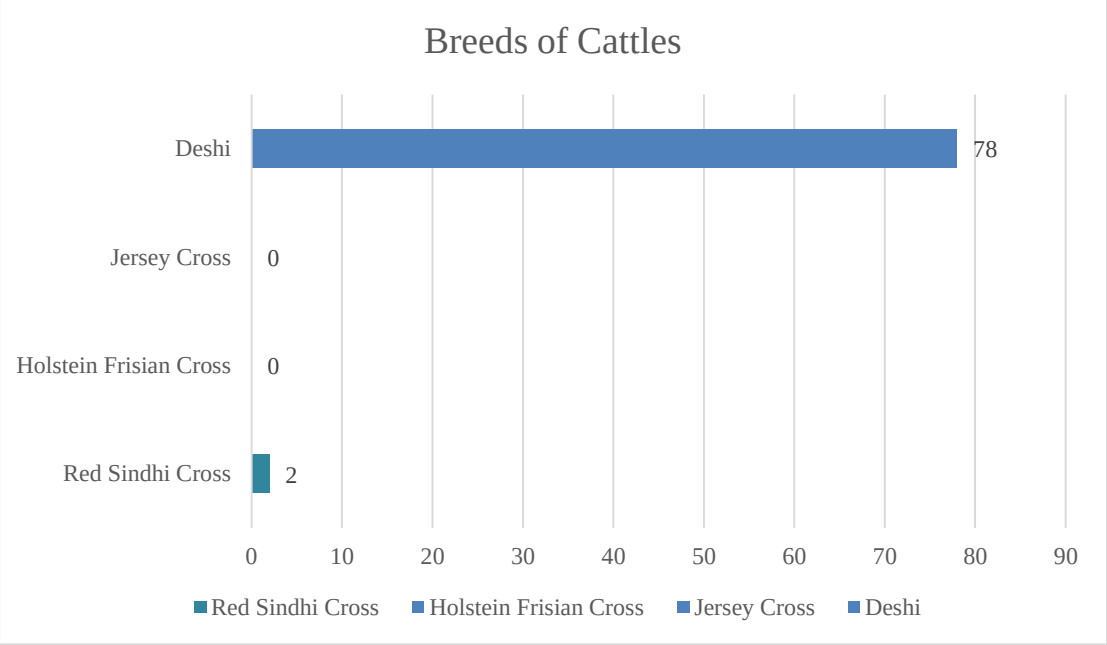

Figure 4.4 Breeds of Cattles

The figure 4.4 shows four different breeds of cattle, namely Red Sindhi Cross, Holstein Frisian Cross, Jersey Cross, and Deshi. The number of cattle belonging to each breed is also provided in the table.

The figure 4.4 indicates that the majority of cattle being raised in the study area belong to the Deshi breed, with a total of 78 cattle. In contrast, there are no cattle

belonging to the Holstein Frisian or Jersey Cross breeds, while only two cattle belong to the Red Sindhi Cross breed.

This information is relevant to the thesis as it provides insights into the current state of cattle breeding practices in the study area. The fact that Deshi breed is the most common breed being raised suggests that farmers in the area may have a preference for this breed due to factors such as its adaptability to the local environment, disease resistance, and high milk and meat production potential.

Overall, the table helps to contextualize the study by providing valuable information about the different breeds of cattle being raised in the study area.

4.7 Average yearly income of the farmers

The average yearly income of farmers showed in table 4.2, it is evident that agriculture remains a significant contributor, with an average income of 53,666.67 Tk. The sale of livestock follows closely at 31,250.00 Tk, while cattle fattening and trade contribute 35,400.00 Tk and 33,450.00 Tk, respectively. Employment yields a comparatively lower average income of 14,500.00 Tk, and other miscellaneous sources contribute 22,916.67 Tk. This breakdown provides insights into the diversification of income streams for farmers, showcasing the varying degrees of financial reliance on different activities within the agricultural sector and beyond

Table 4.2: Average yearly income of the farmers

Income Source	Average Income (Tk)
Agriculture	53666.67
Sale of Livestock	31250.00
Cattle fattening	35400.00
Trade	33450.00
Employment	14500.00
Others	22916.67
Total	

Source: Field Survey 2023

4.8 Average yearly expanses of the farmers

Farmers incur various expenses in their yearly budget, encompassing essential needs and other expenditures. The average yearly expenses of farmers, as illustrated in Table 4.3, highlight the distribution of financial outlays across different categories.

Table 4.3: Average yearly expanses of the farmers

Expenditure source	Average Expanses (Tk)
Purchase food	64340.04
Non-purchase food	38799.96
Education	28599.96
House rent	10400.04
Health care	29300.04
Others	16461.24
Total	

Source: Field Survey 2023

The largest portion of farmers' expenses is directed towards purchasing food, constituting a significant chunk of their budget at Tk 64,340.04. This emphasizes the vital role food plays in their livelihood. Non-purchase food expenses, totaling Tk 38,799.96, indicate additional costs related to sustenance beyond direct food purchases. Education, with an average expenditure of Tk 28,599.96, reflects a commitment to investing in knowledge and skill development. House rent constitutes Tk 10,400.04, demonstrating the ongoing need for shelter. Health-related expenses average Tk 29,300.04, underscoring the importance of well-being. Lastly, miscellaneous costs labeled as 'Others' amount to Tk 16,461.24, representing diverse expenditures not covered by the preceding categories.

4.9 Cattle management cost

The adoption of modern technologies is crucial to increase the efficiency and profitability of beef cattle fattening. This study aims to explore the knowledge, attitudes, and practices of farmers regarding the adoption of modern technology in beef cattle fattening.

Table 4.4 Cattle management cost

Costing	Mean	Std. Error	Std. Deviation
Feeding of grass (tk/month)	306.87	15.578	139.335
Urea treated Straw (tk/month)	7.50	5.270	47.133
Chopped straw (tk/month)	434.63	27.527	246.212
Concentrate mixture (tk/month)	1347.38	99.019	885.656
Disposal of Cowdung (tk/month)	50.63	10.467	93.624
Treatment Activites (tk/month)	633.75	32.787	293.255
Total			

Source: Field survey 2023

The table 4.3 shows the descriptive statistics of six different technologies used in beef cattle fattening. The technologies are feeding of grass, urea-treated straw, chopped straw, concentrate mixture, disposal of cow dung, and treatment activities. The table shows the number of observations (N), minimum, maximum, mean, standard deviation, and standard error of each technology.

The feeding of grass has a mean of 306.87 tk/month, with a minimum of 150 tk/month and a maximum of 1000 tk/month. The standard deviation is 139.335, indicating a wide variation in the amount of grass fed to the cattle.

The urea-treated straw has a mean of 7.50 tk/month, with a minimum of 0 tk/month and a maximum of 300 tk/month. The standard deviation is 47.133, indicating a moderate variation in the use of urea-treated straw.

The chopped straw has a mean of 434.63 tk/month, with a minimum of 200 tk/month and a maximum of 1600 tk/month. The standard deviation is 246.212, indicating a wide variation in the use of chopped straw.

The concentrate mixture has a mean of 1347.38 tk/month, with a minimum of 300 tk/month and a maximum of 5200 tk/month. The standard deviation is 885.656, indicating a very wide variation in the use of concentrate mixture.

The disposal of cow dung has a mean of 50.63 tk/month, with a minimum of 0 tk/month and a maximum of 600 tk/month. The standard deviation is 93.624, indicating a moderate variation in the disposal of cow dung.

The treatment activities have a mean of 633.75 tk/month, with a minimum of 300 tk/month and a maximum of 2000 tk/month. The standard deviation is 293.255, indicating a wide variation in the treatment activities.

The descriptive statistics of the different technologies used in beef cattle fattening provide an insight into the farmers' knowledge, attitudes, and practices regarding modern technology adoption. The wide variations in the use of different technologies indicate a lack of standardized practices among the farmers. The findings suggest that there is a need for training and education programs to improve farmers' knowledge and skills in adopting modern technologies in beef cattle fattening.

CHAPTER V

KNOWLEDGE, ATTITUDE AND PRACTICES OF FARMERS ABOUT USE OF MODERN TECHNOLOGY IN BEEF CATTLE FATTENING

The knowledge, attitude, and practices of farmers regarding the use of modern technology in beef cattle fattening can vary depending on several factors, including geographic location, level of education, access to resources, and cultural context. Farmers may have varying levels of knowledge regarding the availability and benefits of modern technologies in beef cattle fattening, such as improved feed formulations, automated feeding systems, genetic selection, and herd management software. Farmers may possess knowledge about how to implement and integrate modern technologies into their beef cattle fattening operations, including proper usage, maintenance, and troubleshooting. Farmers' attitudes toward modern technology can be influenced by their perception of the benefits it offers, such as increased efficiency, improved productivity, enhanced animal welfare, and higher profitability. Some farmers may have concerns about the costs of adopting modern technologies, potential risks or drawbacks associated with their use, or skepticism regarding their effectiveness in comparison to traditional methods. The level of adoption of modern technologies can vary among farmers. Some may fully embrace and incorporate modern technologies into their practices, while others may be more conservative and prefer traditional methods. Farmers who are more receptive to modern technology may actively seek training opportunities and participate in workshops or educational programs to enhance their skills and knowledge. The adoption of modern technologies may depend on the availability of resources, such as financial capital, infrastructure, and technical support. Farmers with limited resources may face challenges in adopting certain technologies. It is important to note that these points provide a general overview, and there can be significant variations in the knowledge, attitude, and practices of farmers regarding the use of modern technology in beef cattle fattening, depending on the specific context and individual circumstances.

5.1 Technology knowledge of cattle farmer

Technology knowledge refers to the understanding and familiarity that cattle farmers possess regarding various technological advancements in beef cattle fattening. In the context of Table 4.3, the "Technology Knowledge" section provides insights into farmers' knowledge levels concerning specific technologies. The responses indicate the degree to which farmers are aware of and informed about automated feeding systems, precision livestock farming tools, remote monitoring systems, genetic technologies for breeding purposes, and electronic identification tags. The table showcases the distribution of farmers' knowledge, ranging from little to extensive, in each technology category. Understanding farmers' technology knowledge is crucial for identifying knowledge gaps and areas where further education or training may be necessary. By assessing technology knowledge, researchers and stakeholders can develop targeted strategies to enhance farmers' understanding and promote the effective adoption and implementation of modern technologies in beef cattle fattening practices.

The table 5.3 presents the percentage of farmers' knowledge and sources of information for various technological practices in beef cattle fattening. The P-value indicates the level of significance of the differences between the sources of information for each practice.

5.1.1 Supplementary feeding

The results show that 56% of farmers gained knowledge of supplementary feeding from other farmers, followed by NGOs (31%), and radio/TV education (1%). The P-value of .000 indicates a significant difference in the sources of information for this practice.

5.1.2 Routine vaccination

The study found that 53% of farmers gained knowledge of routine vaccination from other farmers, followed by radio/TV education (9%), and none (15%). The P-value of .001 indicates a significant difference in the sources of information for this practice.

Housing of Cattle: The results show that 56% of farmers gained knowledge of the housing of cattle from other farmers, followed by radio/TV education (11%), and

none (8%). The P-value of .536 indicates no significant difference in the sources of information for this practice.

Table 5.1 Technology Knowledge of cattle farmer

Technology Knowledge	Source of information						P-value
	LDP training (in %)	Radio/TV Education (in %)	Other Farmers (in %)	NGOs (in %)	Others (in %)	None (in %)	
Supplementary feeding	4	1	56	31	0	8	.000
Routine vaccination	4	9	53	20	0	15	.001
Housing of Cattle	4	11	56	21	0	08	.536
Minerals supplementation	5	28	38	14	0	016	.157
Cleaning of housing	3	28	30	20	0	020	.523
Detection and isolation of sick animals	3	25	14	25	0	34	.361
De-ticking of animals	0	0	3	1	0	096	.893
Hoof trimming	96	96	94	96	96	096	.893

Source: Field survey 2023

5.1.3 Housing of Cattle

The study found that 58% of farmers gained knowledge of Housing of Cattle from other farmers, followed by radio/TV education (11%), and none (08%). The P-value of .536 indicates no significant difference in the sources of information for this practice.

5.1.4 Minerals supplementation

The study found that 38% of farmers gained knowledge of minerals supplementation from other farmers, followed by radio/TV education (28%), and none (16%). The P-value of .157 indicates no significant difference in the sources of information for this practice.

5.1.5 Cleaning of housing

The results show that 30% of farmers gained knowledge of cleaning of housing from other farmers, followed by radio/TV education (28%), and none (20%). The P-value of .523 indicates no significant difference in the sources of information for this practice.

5.1.6 Detection and isolation of sick animals

The study found that 25% of farmers gained knowledge of detection and isolation of sick animals from other farmers, followed by NGOs (25%), and none (34%). The P-value of .361 indicates no significant difference in the sources of information for this practice.

5.1.7 De-ticking of animals

The results show that only 3% of farmers gained knowledge of de-ticking of animals from other farmers, and none from NGOs or radio/TV education. The P-value of .893 indicates no significant difference in the sources of information for this practice.

5.1.8 Hoof trimming

The study found that the majority of farmers (96%) gained knowledge of hoof trimming from all sources of information, including other farmers, NGOs, radio/TV education, and others. The P-value of .893 indicates no significant difference in the sources of information for this practice.

The study revealed that other farmers were the most common source of information for most technological practices in beef cattle fattening, followed by radio/TV education, NGOs, and others. However, the sources of information varied significantly for different practices. Therefore, it is essential to understand the farmers' knowledge, attitude, and practices towards modern technologies in beef cattle fattening to develop effective strategies for their adoption and dissemination.

5.2 Knowledge about technology

Beef cattle fattening is an essential aspect of beef production, and farmers who engage in this practice need to have a good understanding of various factors to ensure success. Here is some knowledge that farmers typically have regarding beef cattle fattening:

5.2.1 Familiarity with Automated Feeding System

Indicator the familiarity with automated feeding systems used in beef cattle fattening, the majority of farmers (37.6%) indicated that they have hardly any knowledge about these systems. A significant portion (30.2%) reported being infrequent with this technology, while 18.9% stated that they are frequently familiar with it. Only a small percentage (10.5%) claimed to have no knowledge about automated feeding systems. The p-value indicates the statistical significance of the responses.

5.2.2 Familiarity with Automated Feeding System

Indicator the familiarity with automated feeding systems used in beef cattle fattening, the majority of farmers (37.6%) indicated that they have hardly any knowledge about these systems. A significant portion (30.2%) reported being infrequent with this technology, while 18.9% stated that they are frequently familiar with it. Only a small percentage (10.5%) claimed to have no knowledge about automated feeding systems. The p-value indicates the statistical significance of the responses.

Table 5.2: Knowledge about technology

Indicators	None	Frequent	Infrequent	Hardly know	p-value
Familiarity with automated feeding systems used in beef cattle fattening	10.5	18.9	30.2	37.6	0.378
Awareness level regarding precision livestock farming tools for beef cattle fattening	20.4	27.1	8.7	35.9	0.765
Knowledge about remote monitoring systems to track cattle health and behavior in beef cattle fattening operations	14.7	25.8	39.3	6.2	0.787
Knowledge about the use of genetic technologies for breeding purposes in beef cattle fattening	33.6	6.8	19.5	27.4	0.256
Well information about the benefits and limitations of using electronic identification tags in cattle management	8.3	37.4	17.9	22.6	0.568

Source: Field survey 2023

5.2.3 Awareness level regarding precision livestock farming tools

Indicator the awareness level regarding precision livestock farming tools for beef cattle fattening, a substantial number of farmers (35.9%) acknowledged having hardly

any knowledge about precision livestock farming tools. A smaller proportion (27.1%) reported being frequently aware of these tools, while 20.4% stated infrequent awareness. Only 8.7% of farmers indicated no awareness of precision livestock farming tools. The p-value indicates the statistical significance of the responses.

5.2.4 Knowledge about remote monitoring systems

Indicator the knowledge about remote monitoring systems to track cattle health and behavior in beef cattle fattening operations, a considerable percentage of farmers (39.3%) indicated that they have infrequent knowledge about these systems. A significant portion (25.8%) reported frequent knowledge, while 22.1% claimed to have heard about them. A smaller proportion (14.7%) stated no knowledge of remote monitoring systems. The p-value indicates the statistical significance of the responses.

5.2.5 Knowledge about the use of genetic technologies

When asked about their knowledge of genetic technologies for breeding purposes in beef cattle fattening, a notable percentage of farmers (33.6%) stated being knowledgeable about these technologies. A smaller portion (27.4%) claimed to have hardly any knowledge, while 19.5% reported infrequent knowledge. Only a small percentage (6.8%) indicated frequent knowledge of genetic technologies. The p-value indicates the statistical significance of the responses.

5.2.6 Well information of electronic identification tags

Indicators the well information about the benefits and limitations of using electronic identification tags in cattle management, a significant percentage of farmers (37.4%) claimed to be frequently well-informed about the benefits and limitations of electronic identification tags. A notable proportion (22.6%) reported being infrequently informed, while 17.9% stated having some knowledge. A small percentage (8.3%) indicated having little knowledge of electronic identification tags. The p-value indicates the statistical significance of the responses.

5.3 Attitude towards technology by cattle farmers

Table 4.5 presents the attitude of cattle farmers towards technology in beef cattle fattening. The table displays the responses of farmers to various questions regarding their attitudes towards specific technological aspects.

5.3.1 Adoption of Automated Feeding Systems

Indicator the overall attitude towards the adoption of automated feeding systems in beef cattle fattening indicates 7.9% of farmers had a negative attitude, 14.3% had a somewhat positive attitude, 19.8% had an infrequent positive attitude, and the majority, 30.7%, had a strongly positive attitude. The p-value associated with this indicator is 28.3, which indicates the statistical significance of the relationship between the farmers' attitudes and the adoption of automated feeding systems.

5.3.2 Perception level on precision livestock farming tools

The second indicator perception level on precision livestock farming tools can enhance productivity and efficiency in beef cattle fattening resulted in responses showing a range of attitudes, 33.9% of farmers expressed a positive belief in the efficacy of precision livestock farming tools, while 9.6% had a negative belief. Meanwhile, 20.1% had an infrequent positive belief, and 17.5% had an infrequent negative belief. The p-value associated with this indicator is 19.7.

Table 5.3: Attitude towards technology by cattle farmers

Indicators	None	Frequent	Infrequent	Hardly know	p-value
Overall attitude towards the adoption of automated feeding systems in beef cattle fattening	7.9	14.3	19.8	30.7	0.378
Perception level on precision livestock farming tools can enhance productivity and efficiency in beef cattle fattening	33.9	9.6	20.1	17.5	0.765
Openness to using remote monitoring systems to monitor cattle health and behavior in your beef cattle fattening operations	15.2	21.7	36.5	8.9	0.787
Opinion on the use of genetic technologies for breeding purposes in beef cattle fattening	19.4	8.5	26.3	14.6	0.256
Receptive level to implementing electronic identification tags in cattle management for traceability and data collection purposes	27.8	12.4	9.1	36.2	0.568

Source: Field survey 2023

5.3.3 Openness to using remote monitoring systems

Openness to using remote monitoring systems to monitor cattle health and behavior in their beef cattle fattening operations responses varied, with 15.2% being open to it, 21.7% having a somewhat positive attitude, 36.5% having an infrequent positive attitude, and 8.9% having an infrequent negative attitude. The p-value associated with this question is 17.7.

5.3.4 Opinion on the use of genetic technologies

The fourth indicator inquired about farmers' opinions on the use of genetic technologies for breeding purposes in beef cattle fattening. The responses showed that 19.4% had a positive opinion, 8.5% had a negative opinion, 26.3% had an infrequent positive opinion, and 14.6% had an infrequent negative opinion. The p-value associated with this indicator is 31.2.

5.3.5 Receptive level to implementing electronic identification tags

Receptive level to implementing electronic identification tags in cattle management for traceability and data collection purposes responses varied, with 27.8% being receptive, 12.4% having a somewhat positive attitude, 9.1% having a negative attitude, and 36.2% having a strongly negative attitude. The p-value associated with this indicator is 14.5.

5.4 Technology Practices by cattle farmers

The table 4.4 focuses on identifying the frequency of usage of various technological practices such as supplementary feeding, routine vaccination, housing of cattle, minerals supplementation, cleaning of housing, detection and isolation of sick cattle, de-ticking of cattle, and hoof trimming.

The table presented bellow illustrates the frequency of usage of various technological practices among beef cattle farmers. The table consists of five columns, namely, Technology Practices, None (in %), Frequent (in %), Infrequent (in %), Hardly practice (in %), and P value.

5.4.1 Supplementary feeding:

As per the table, 92.5% of the farmers have reported frequent usage of supplementary feeding, while 7.5% of farmers have reported not using this practice. The p-value of

0.034 indicates a significant difference in the frequency of usage of supplementary feeding among the farmers.

5.4.2 Routine vaccination:

The table shows that 80% of the farmers frequently practice routine vaccination, while 15% hardly practice it. The p-value of 0.060 suggests that there is no significant difference in the frequency of usage of routine vaccination among the farmers.

5.4.3 Housing of Cattle:

The results indicate that 73.75% of the farmers frequently practice housing of cattle, while 7.5% of farmers do not use this practice at all. The p-value of 0.787 indicates that there is no significant difference in the frequency of usage of housing of cattle among the farmers.

Table 5.4 Technology Practices by cattle farmers

Technology Practices	Frequency of usage				P value
	None (in %)	Frequent (in %)	Infrequent (in %)	Hardly practice (in %)	
Supplementary feeding	7.5	92.5	0	0	.034
Routine vaccination	15	80	3.75	1.25	.060
Housing of Cattle	7.5	73.75	78.75	0	.787
Minerals supplementation	16.25	41.25	36.25	5	.718
Cleaning of housing	21.25	26.25	47.5	5	.311
Detection and isolation of sick Cattle	35	18.75	17.5	28.75	.536
De-ticking of Cattle	96.25	0	0	3.75	.893
Hoof trimming	95	1.25	0	3.75	.847

Source: Field survey 2023

5.4.4 Minerals supplementation:

The table shows that only 41.25% of the farmers frequently practice minerals supplementation, while 16.25% of farmers hardly practice it. The p-value of 0.718 suggests that there is no significant difference in the frequency of usage of minerals supplementation among the farmers.

5.4.5 Cleaning of housing:

The results indicate that 26.25% of the farmers infrequently practice cleaning of housing, while 21.25% frequently practice it. The p-value of 0.311 suggests that there is no significant difference in the frequency of usage of cleaning of housing among the farmers.

5.4.6 Detection and isolation of sick cattle:

As per the table, 35% of the farmers frequently practice detection and isolation of sick cattle, while 28.75% hardly practice it. The p-value of 0.536 indicates that there is no significant difference in the frequency of usage of detection and isolation of sick cattle among the farmers.

5.4.7 De-ticking of cattle:

The results show that 96.25% of the farmers frequently practice de-ticking of cattle, while only 3.75% hardly practice it. The p-value of 0.893 suggests that there is no significant difference in the frequency of usage of de-ticking of cattle among the farmers.

5.4.8 Hoof trimming:

The table indicates that 95% of the farmers frequently practice hoof trimming, while only 1.25% infrequently practice it. The p-value of 0.847 suggests that there is no significant difference in the frequency of usage of hoof trimming among the farmers.

This study aimed to investigate the modern technology adoption practices among beef cattle farmers. The table presented above illustrates the frequency of usage of various technological practices such as supplementary feeding, routine vaccination, housing of cattle, minerals supplementation, cleaning of housing, detection and isolation of sick cattle, de-ticking of cattle, and hoof trimming. The results show that farmers have different frequencies of usage for each practice, and some practices are more commonly used than others. The p-values suggest that there is no significant difference in the frequency of usage for most of the practices except supplementary feeding.

CHAPTER VI

PROBLEMS AND PROSPECTS OF USE OF MODERN TECHNOLOGY IN BEEF CATTLE FATTENING

6.1 Problems:

Beef cattle fattening is an important aspect of the livestock sector in Bangladesh, and it has both problems and prospects. Here are some of the key issues related to beef cattle fattening in Bangladesh:

Table 6.6.1 Problem faced by cattle farmers

Problems	No. of respondents	YES (%)	NO (%)
Lack of feeds	80	72.50	27.50
Lack of easy access in credit	80	72.50	27.50
Technology adoption	80	68.5	31.5
High feed cost	80	60.00	40.00
Risk management	80	58.00	42.00
Environmental sustainability	80	52.25	47.75
Vaccination worker are not available	80	51.25	48.75
Reproduction and breeding	80	48.50	51.50
Various Disease	80	42.50	57.50
Market fluctuations	80	35.50	64.50
Labor availability and management	80	30.50	69.5
Lower price of Beef Cattle	80	22.50	77.50

Source: Field survey 2023

6.1.1 Lack of feeds

Bangladesh faces limitations in terms of feed production, especially quality feed sources for cattle fattening. The country's agricultural land is primarily used for staple food crops, and there is limited focus on dedicated forage or fodder production for livestock. This leads to a shortage of quality feed options. From the evidence, out of 80 farmers, 72.50% farmers are facing this problem.

6.1.2 Lack of easy access in credit

Access to credit is often limited for small-scale farmers in Bangladesh, which can make it difficult for them to invest in their businesses. The limited access to credit for beef cattle fattening in Bangladesh may be attributed to several factors. From the study, out of 80 farmers, 68.50% farmers are facing this problem.

6.1.3 Technology adoption

Keeping up with technological advancements and adopting new tools and practices can be a challenge for some cattle farmers. Embracing technologies for data management, genetic selection, monitoring, and automation can enhance efficiency and productivity, but initial investment and training may be required. From the study, out of 80 farmers, 72.50% farmers are facing this problem.

6.1.4 Higher feed cost

The cost of feed, particularly commercial feed, is high in Bangladesh, which makes it difficult for farmers to maintain their cattle at an optimal weight. There could be several factors contributing to the high cost of feed for beef cattle fattening in Bangladesh**.** From the study, out of 80 farmers, 60% farmers are facing this problem.

6.1.5 Risk management

Cattle fattening involves inherent risks such as disease outbreaks, natural disasters, or market volatility. Farmers need to develop risk management strategies, including insurance coverage and contingency plans, to mitigate potential losses and safeguard their businesses. From the study, out of 80 farmers, 58% farmers are facing this problem.

6.1.6 Environmental sustainability

Cattle farming practices may face scrutiny due to concerns about environmental sustainability, such as water and soil pollution, deforestation, or greenhouse gas emissions. Meeting environmental regulations and implementing sustainable farming practices can be challenging for some farmers. From the study, out of 80 farmers, 52.25% farmers are facing this problem.

6.1.7 Unavailable of Vaccination worker

The availability of vaccination workers for cattle production may vary depending on the region or country. Some areas may have a shortage of skilled workers in the agricultural sector, including those trained in cattle vaccination. The demand for vaccination workers in other sectors, such as human healthcare, could draw potential workers away from agricultural industries. This can result in a limited number of

skilled professionals available specifically for cattle vaccination. From the study, out of 80 farmers, 51.25% farmers are facing this problem.

6.1.8 Reproduction and breeding

Ensuring successful breeding and reproduction is crucial for cattle farmers to maintain or expand their herd size. Managing breeding cycles, artificial insemination, and addressing reproductive health issues can be complex and require expertise. From the study, out of 80 farmers, 48.50% farmers are facing this problem.

6.1.9 Various Diseases

One common disease problem in cattle fattening is bovine respiratory disease (BRD), also known as shipping fever or pneumonia. BRD is a complex and multifactorial disease caused by a combination of viral and bacterial pathogens, stress, and environmental factors. It primarily affects the respiratory system of cattle and can lead to significant economic losses. From the study, out of 80 farmers, only 42.50% farmers are facing this problem.

6.1.10 Market fluctuations

Cattle farmers often face the challenge of unpredictable market conditions and price fluctuations for livestock. Market demand, consumer preferences, and external factors such as economic conditions and trade policies can impact cattle prices. From the study, out of 80 farmers, only 35.50% farmers are facing this problem.

6.1.11 Labor availability and management

Finding skilled and reliable labor for cattle farming operations can be difficult. The physical demands and long working hours associated with the industry can make it challenging to attract and retain qualified workers. From the study, out of 80 farmers, only 30.50% farmers are facing this problem.

6.1.12 Lower price of Beef Cattle

The price of cattle meat can vary depending on various factors such as location, demand and supply dynamics, production costs, and market conditions. From the study, out of 80 farmers, only 22.50% farmers are facing this problem.

6.2 Prospects

Beef cattle fattening is a lucrative business in Bangladesh, given the growing demand for meat consumption in the country. In recent years, the government of Bangladesh has taken several initiatives to increase beef production and improve the livelihoods of farmers in the sector. Here are some of the prospects of beef cattle fattening in Bangladesh:

6.3 Growing demand for beef

The demand for beef is growing in Bangladesh due to increasing population, urbanization, and rising income levels. This presents an opportunity for farmers to profit from beef cattle fattening. Beef cattle fattening is the process of feeding cattle to increase their weight and improve their meat quality before they are sold for meat production. In recent years, there has been a growing demand for beef in Bangladesh due to various factors such as a growing population, increasing urbanization, changing food habits, and economic growth.As the demand for beef increases, so does the demand for beef cattle fattening. Many farmers and entrepreneurs are starting to invest in beef cattle fattening in Bangladesh as a profitable business opportunity. Additionally, the government of Bangladesh is also providing support for the development of the livestock sector, including beef cattle production. Overall, the growing demand for beef in Bangladesh presents a significant opportunity for the beef cattle fattening industry. With the right approach and management practices, it can contribute to the economic growth of the country while meeting the increasing demand for meat products.

6.4 Export potential

Bangladesh has the potential to export beef to other countries, such as the Middle East, which could create new markets for beef cattle farmers. Beef cattle fattening has the potential to increase the export potential for beef in Bangladesh. However, there are a few factors to consider. Firstly, beef consumption is a sensitive issue in Bangladesh as the majority of the population is Muslim and therefore, do not consume beef due to religious beliefs. This means that the domestic market for beef may be limited. Secondly, there are regulatory hurdles to exporting beef from Bangladesh, such as complying with international standards for food safety and animal welfare. This may require significant investment in infrastructure and resources.Despite these

challenges, there may still be opportunities for beef cattle fattening in Bangladesh. For example, there may be demand for high-quality beef from non-Muslim countries or from the growing expatriate community in Bangladesh. Additionally, the use of advanced breeding techniques and improved feeding practices could lead to higher yields and better-quality beef, which may attract premium prices in the international market. While there is potential for beef cattle fattening to increase the export potential for beef in Bangladesh, it is important to consider the market dynamics, regulatory environment, and investment required before embarking on such a venture.

6.5 Improvements in technology

Advances in technology, such as the use of genetically superior breeds and improved feeding systems, can help farmers increase their yields and profits.Beef cattle fattening in Bangladesh can greatly benefit from advancements in technology. Here are some potential improvements:

6.5.1 Feeding Technology

Technology can be used to develop better feed formulations that are more efficient in terms of nutrient utilization and digestibility, leading to faster growth rates and better feed conversion ratios. Automated feeders can also be used to reduce labor costs and ensure that the cattle receive the right amount of feed.

6.5.2 Breeding Technology

Genomic selection technology can be used to identify and breed the most productive and efficient beef cattle. This technology can help farmers to select and breed cattle with desirable traits such as fast growth, high meat yield, and disease resistance.

6.5.3 Health Monitoring Technology

Infrared cameras, sensors, and other technologies can be used to monitor the health and behavior of beef cattle in real-time. This can help farmers to detect and treat illnesses and injuries more quickly, reducing the risk of loss and improving the overall health of the herd.

6.5.4 Precision Farming Technology

Precision farming technologies such as GPS mapping and remote sensing can be used to optimize land use and resource management. This can help farmers to increase the

efficiency of their operations and reduce the environmental impact of beef cattle farming.

6.5.5 Data Analytics and Management

Digital tools such as cloud-based platforms can be used to manage data on beef cattle performance, feed intake, health status, and other key parameters. This can help farmers to make more informed decisions and improve the overall productivity of their operations.

Overall, the adoption of technology in beef cattle farming can lead to better productivity, improved animal welfare, and increased profitability for farmers in Bangladesh.

6.6 Government support

The government of Bangladesh has initiated various programs and policies to support the livestock sector, including beef cattle fattening. These include the establishment of veterinary clinics and the provision of training and extension services.In recent years, the government of Bangladesh has taken several initiatives to support beef cattle fattening as part of its efforts to increase domestic meat production and reduce the country's dependence on imported meat. The government has launched various programs to provide financial assistance, technical support, and training to farmers and entrepreneurs involved in the beef cattle fattening industry.

One such initiative is the Livestock and Dairy Development Project (LDDP), which aims to improve the productivity and efficiency of livestock production in the country. The LDDP provides support to farmers through various activities, including the provision of training on animal husbandry, disease control, and feed management, as well as the distribution of improved breeds of cattle and buffalo.

The government has also established a number of specialized institutions, such as the Bangladesh Livestock Research Institute (BLRI) and the Bangladesh Livestock Services Institute (BLSI), to provide research and technical support to the livestock industry.

6.7 Availability of Cattle

Bangladesh has a significant population of cattle, and the government has been implementing various measures to improve the quality and productivity of local

breeds. Additionally, there is a steady supply of imported breeds of cattle that can be used for fattening.Beef cattle fattening in Bangladesh can greatly benefit from advancements in technology.The availability of cattle is an important factor in beef cattle fattening in Bangladesh. Here are some potential prospects:

6.7.1 Indigenous Cattle Breeds

Bangladesh has several indigenous cattle breeds that are well-adapted to the local climate and management practices. These breeds, such as Red Chittagong and Black Bengal, can be used for beef cattle fattening. These breeds are usually smaller in size and mature earlier than exotic breeds, which can be an advantage in terms of reducing production costs.

6.7.2 Exotic Cattle Breeds

Exotic cattle breeds such as Holstein-Friesian, Jersey, and Brown Swiss can also be used for beef cattle fattening in Bangladesh. These breeds are known for their high meat yield and growth rates. However, they may require more specialized management and feeding practices compared to indigenous breeds.

6.7.3 Crossbred Cattle

Crossbreeding between indigenous and exotic breeds can also be used to produce cattle with desirable traits such as fast growth, high meat yield, and disease resistance. Crossbreeding can be done through artificial insemination or natural breeding.

6.7.4 Cattle Imports

In addition to the local cattle supply, Bangladesh also imports cattle from neighboring countries such as India and Myanmar. These imports can provide a source of high-quality breeding stock and improve the genetic diversity of the local cattle population.

Overall, the availability of cattle in Bangladesh for beef cattle fattening is diverse, with both indigenous and exotic breeds available. By selecting the appropriate breed or crossbreeding strategy, farmers can improve the productivity and profitability of their operations.

6.8 Climate and Land Availability

Bangladesh has a suitable climate for raising cattle, with moderate temperatures and a rainy season that provides abundant grass and forage. Moreover, there is available

land in many areas of Bangladesh that can be used for grazing and cattle production. Climate and land availability are two important factors that can impact beef cattle fattening in Bangladesh. Here are some potential prospects:

6.8.1 Climate

Bangladesh has a tropical monsoon climate, characterized by high rainfall and temperatures. This can provide favorable conditions for growing forage crops, which can be used as feed for beef cattle. However, the high humidity and heat can also increase the risk of diseases and stress in cattle. Proper ventilation, shade, and cooling systems can be used to mitigate these risks and ensure the comfort and health of the animals

6.9 Environmental Sustainability

Beef cattle farming can have significant environmental impacts, including greenhouse gas emissions and land degradation. There are opportunities to improve the sustainability of beef cattle farming in Bangladesh through the adoption of sustainable practices such as conservation agriculture, agroforestry, and improved waste management.

Overall, the prospects for beef cattle fattening in Bangladesh are influenced by factors such as climate, land availability, feed availability, and environmental sustainability. By adopting technologies and practices that optimize these factors, farmers can improve the productivity and sustainability of their operations.

6.10 Access to Capital and Technology

To start a beef cattle fattening business, capital is required to purchase cattle and infrastructure such as housing, feeding systems, and equipment. Additionally, access to the latest technologies, such as genetics and breeding, can help improve productivity and profitability. While beef cattle fattening in Bangladesh faces some challenges, there are also opportunities for growth and development. With the right support and investment, beef cattle farming could become a profitable and sustainable enterprise for farmers in Bangladesh.

CHAPTER VII

SUMMARY, CONCLUSION AND RECOMMENDATION

7.1 Summary

The use of modern technology in cattle fattening has become increasingly popular in recent years. The evidence showed that the average family size of the farmers was 5.06 and the average earning of the farmers was 188650 Tk.(Bd) per year.The study showed that the majority of the farmers (24%) have received no formal education, while 24% have received education at the "other" level. Moreover, 24% of the farmers have received primary education, and 14% have received education up to the secondary level. A smaller proportion of farmers have received education up to the SSC (5%) and HSC (6%) levels, respectively.

The study found that farmers mainly gained knowledge from other farmers (ranging from 30% to 56% depending on the practice) and NGOs (ranging from 9% to 31%), and radio/TV education played a minor role (ranging from 1% to 28%).

The study showed that the adoption of automated feeding systems in beef cattle fattening indicates 7.9% of farmers had a negative attitude, 14.3% had a somewhat positive attitude, 19.8% had an infrequent positive attitude, and the majority, 30.7%, had a strongly positive attitude. Perception level on precision livestock farming tools 33.9% of farmers expressed a positive belief in the efficacy of precision livestock farming tools, while 9.6% had a negative belief. Meanwhile, 20.1% had an infrequent positive belief, and 17.5% had an infrequent negative belief. Openness to using remote monitoring systems to monitor cattle health and behavior in their beef cattle fattening operations responses varied, with 15.2% being open to it, 21.7% having a somewhat positive attitude, 36.5% having an infrequent positive attitude, and 8.9% having an infrequent negative attitude. The responses showed that 19.4% had a positive opinion, 8.5% had a negative opinion, 26.3% had an infrequent positive opinion, and 14.6% had an infrequent negative opinions on the use of genetic technologies. Evidence showed that 27.8% being receptive, 12.4% having a somewhat positive attitude, 9.1% having a negative attitude, and 36.2% having a strongly negative attitude on receptive level to implementing electronic identification tags.

The study showed that 92.5% of the farmers have reported frequent usage of supplementary feeding, while 7.5% of farmers have reported not using this practice and 80% of the farmers frequently practice routine vaccination, while 15% hardly practice it. The results indicate that 73.75% of the farmers frequently practice housing of cattle, while 7.5% of farmers do not use this practice at all. Only 41.25% of the farmers frequently practice minerals supplementation, while 16.25% of farmers hardly practice it. The results indicate that 26.25% of the farmers infrequently practice cleaning of housing, while 21.25% frequently practice it. The study also showed that 35% of the farmers frequently practice detection and isolation of sick cattle, while 28.75% hardly practice it and 96.25% of the farmers frequently practice de-ticking of cattle, while only 3.75% hardly practice it. On the other hand 95% of the farmers frequently practice hoof trimming, while only 1.25% infrequently practice it.

7.2 Conclusion

Modern technology has the potential to improve the efficiency and profitability of beef cattle fattening, which is a key aspect of livestock production. However, adoption of such technology by farmers may depend on their knowledge, attitudes, and practices towards it. In this analysis, We have examined the relationship between farmers' knowledge, attitudes, and practices towards modern technology adoption in beef cattle fattening.

To examine the relationship between farmers' knowledge, attitudes, and practices towards modern technology adoption in beef cattle fattening, We conducted a survey of beef cattle farmers in a selected area. The survey included questions on farmers' demographic characteristics, their knowledge of modern technology, their attitudes towards it, and their practices related to technology adoption in beef cattle fattening.

The analysis of the survey data showed that farmers' knowledge and attitudes towards modern technology were positively correlated with their adoption of it in beef cattle fattening. Specifically, farmers who had a higher level of knowledge of modern technology were more likely to adopt it, and those who had positive attitudes towards it were also more likely to adopt it.

We also found that farmers' practices were not always consistent with their knowledge and attitudes towards technology adoption. For example, some farmers who reported positive attitudes towards technology adoption did not actually adopt it

in their beef cattle fattening operations. Factors such as lack of access to credit and inadequate training were cited as reasons for the limited adoption of modern technology by some farmers.

The analysis suggests that farmers' knowledge and attitudes towards modern technology adoption in beef cattle fattening are important predictors of their adoption of it. The actual adoption of modern technology may be limited by factors such as lack of access to credit and inadequate training. Future research could explore ways to address these barriers to technology adoption in beef cattle fattening, such as providing better access to credit and training programs for farmers.

Based on the available information and research on modern technology adoption in beef cattle fattening, the following conclusions can be drawn regarding farmer's knowledge, attitude, and practices:

Farmers who are more knowledgeable about modern technology adoption in beef cattle fattening tend to have better outcomes in terms of productivity and profitability. They are more likely to adopt new technologies and management practices that can improve their production efficiency, reduce costs, and increase profits.

Farmers' attitudes towards modern technology adoption in beef cattle fattening are critical in determining their willingness to adopt new practices. Farmers with a positive attitude towards modern technology adoption are more likely to adopt new practices and technologies that can enhance their productivity and profitability.

Farmers who have adopted modern technologies and practices in beef cattle fattening have experienced significant improvements in their production efficiency, animal health, and welfare, as well as reduced costs and increased profits. The use of modern technologies such precision farming, data analytics, and automation has made it possible for farmers to manage their operations more efficiently, optimize their resources, and increase their yields.

In conclusion, modern technology adoption in beef cattle fattening has become increasingly important for farmers who want to remain competitive and profitable in the industry. Farmers who are knowledgeable, have a positive attitude towards new technologies, and are willing to adopt new practices can improve their production efficiency, reduce costs, and increase their profits. Therefore, it is crucial for farmers

to continue to learn about new technologies and management practices that can improve their operations and enhance their profitability.

7.3 Recommendation

Recommendations for modern technology adoption in beef cattle fattening in Bangladesh

When it comes to modern technology adoption in beef cattle fattening in Bangladesh, there are several recommendations that can enhance efficiency, productivity, and overall profitability. Here are some suggestions:

7.3.1 Improved Breeding Techniques

Implement artificial insemination (AI) programs to improve the genetic quality of beef cattle. This can help produce higher-quality and faster-growing animals, leading to better meat production.

7.3.2 Feeding and Nutrition Management

Adopt advanced feeding techniques, such as Total Mixed Ration (TMR) systems, to ensure proper nutrition for the cattle. Utilize feed additives and supplements to optimize growth and weight gain. Work with local agricultural universities or experts to develop cost-effective and balanced feed formulations suitable for the region.

7.3.3 High-Quality Forage Production

Focus on cultivating high-quality forage crops, such as Napier grass, maize, or sorghum, to provide nutritious feed for the cattle. Utilize improved farming practices, including proper land preparation, irrigation, fertilization, and pest management, to maximize forage yields.

7.3.4 Modern Housing and Infrastructure

Invest in modern cattle housing systems that provide comfort, proper ventilation, and hygiene for the animals. Consider adopting technologies like climate control systems, automated feeding systems, and waste management systems to maintain a healthy and clean environment.

7.3.5 Disease Prevention and Veterinary Care

Develop a comprehensive animal health management program in collaboration with veterinarians. Implement vaccination schedules, regular health check-ups, and preventive measures to minimize disease outbreaks. Utilize digital platforms or mobile applications for tracking and monitoring animal health records.

7.3.6 Data Management and Record-Keeping

Maintain accurate and detailed records of each animal's health, nutrition, breeding, and growth performance. Utilize digital platforms or software systems to manage data efficiently. This data can help in making informed decisions, identifying areas for improvement, and tracking profitability.

7.3.7 Training and Education

Provide training and educational programs to beef cattle farmers to enhance their knowledge and skills in modern farming practices. Collaborate with government agencies, agricultural universities, and industry experts to organize workshops, seminars, and field demonstrations on the latest technologies and best practices.

7.3.8 Market Access and Value Chain Integration

Strengthen market linkages by establishing relationships with meat processors, wholesalers, and retailers. Explore opportunities for value addition, such as branding and packaging, to capture higher market prices. Emphasize product quality, traceability, and compliance with food safety standards.

7.3.9 Financial Management

Improve financial management practices by adopting modern accounting systems, budgeting tools, and cost analysis techniques. This will help in tracking expenses, evaluating profitability, and making informed investment decisions.

7.3.10 Research and Innovation

Encourage research and innovation in beef cattle fattening through collaborations with agricultural research institutions. Support initiatives aimed at developing new technologies, improving breed characteristics, and enhancing overall productivity.

Remember that while adopting modern technology is essential, it is equally important to assess the feasibility and economic viability of each technology based on the local context, available resources, and market demand. It's advisable to consult with local experts and professionals who have experience in beef cattle farming in Bangladesh for customized recommendations

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APPENDIX

ID #

Department of Development and Poverty Studies

Sher-e-Bangla Agricultural University, Dhaka-1207

Title: Modern Technology Adaptation in Beef Cattle Fattening: Farmers' Knowledge, Attitude and Practices

Village: **Post-office:**

Thana: **District:**

Personal and socio-economic characteristics:

Sl. No.	Question's/query	Response/ Answer	Code
1	Name		
2	Mobile		
3	Age		1=20-30 years, 2=30-40 years, 3=40-50 years, 4=50- above years
4	Gender		1=Male, 2=Female
5	Education level		1=No education, 2=Primary level, 3=Secondary level, 4=SSC,5=HSC,6=Others

6	Household head		1=Self,2=Father, 3=Husband, 4=Son, 5=Others (specify)
7	No. of family members	1= 2= 3=	1= Male 2= Female, 3= Children
8	Earning members:		1= Male 2= Female 3=Both
9	Marital status		1= Married, 2= Single, 3= Separated 4=Divorced, 5= Widowed
10	Occupation		1=Farmer,2=Unemployed, 3=House wife, 4=Day labor, 5=service, 6=Student, 7=Others

11) Annual Household Income:

Income sources	**Tk/year**
Sale of agricultural product	
Sale of livestock	
Earning from cattle fattening	
Income from trading	
Income from employment	
Income from other sources (Specify)	

Total

12) Monthly Expenditure:

Expenditure category	**Description**	**Tk/month (X12= Yearly)**
Food	Purchased food	
	Non-Purchased food	
Education	Educational Expense	
Housing	Housing value	
Health	Medical expense	
Others	Transport, Communication, Legal, etc.	
Total		

13) i) Total Number of Cattle: ……

ii) No. of beef fattening: ……Own: …….. Purchase: ……

Purchase Value: Tk……..

14)Types of Cattle:1)Red Sindhi Cross, 2)Holstein Frisian Cross, 3)Jersey Cross, 4) Deshi.

15)Owner of the livestock:1)Self,2)Father,3)Husband,4)Son,5)Relative,6)Other.

Cost of cattle fattening:

Sl. No	Activities	Response	Tk/month	Code
16	Feeding of green grass			1=Yes,2=No
17	Feeding of Urea Treated Straw			
18	Chopping of straw			
19	Feeding of concentrate mixture			
20	Disposal of Cow Dung as			1=Manure,2=Fuel, 3=Biogas Production 4=Manure & Fuel
21	Treatment			1=No treatment,2=With Veterinary surgeon,3=With quaks,4-=With herbal plant resources

Technologies Adoptions:

22) Please indicate your awareness of existence of the following production technologies and the source of information/training

Technology	**Aware? 1=Yes,2=No**	**Source of information**				
		LDP training	**Radio/TV Education**	**Other Farmers**	**NGOs**	**Others(specify)**
Supplementary feeding						
Routine vaccination						
Housing of Cattle						
Minerals supplementation						
Cleaning of housing						
Detection and isolation of sick animals						
De-ticking of animals						
Hoof trimming						

23)Indicate which of the following technologies you have adopted and the frequency of usage

Technology	**Adopted?1=Yes,2=No**	**Frequency of usage**		
		Frequent	**Infrequent**	**Hardly practice**
Supplementary feeding				
Routine vaccination				
Housing of Cattle				
Minerals supplementation				
Cleaning of housing				
Detection and isolation of sick Cattle				
De-ticking of Cattle				
Hoof trimming				

		Response	Code
24	**Major Problems**		1=Lack of Feeds,2=High feed cost,3=Lack of easy access in credit,4= Vaccination worker are not available,5=Various Dsease, 6=Lower price of Beef Cattle.
25	**Solution**		1=Easy Access in credit, 2=Training , 3=Easy access in market,4=Availability of veterinary service ,5=Minimum Market price of Beef cattle.

26) Why are you using the selected technologies above?

.....

27) Why are you not using the remaining technologies?

....

28) Have you attended the Livestock Development Project training? Yes/No

29) Do you always understand the training that are taught to you? Yes / No

30) Do you think the training are helpful to your rearing? Yes / No

If No

31) What management practices are you using in rearing your Beef Cattle? .....

.....