

THE ART OF EXPORTING HALAL BEEF: A CASE STUDY OF PAKISTAN

Shahzad Kouser and Abedullah

(CGP # 05-212)

4TH RASTA CONFERENCE

Tuesday, September 03 & Wednesday, September 04, 2024

Roomy Signature Hotel, Islamabad

This document is unedited author's version submitted to RASTA.



RESEARCH FOR SOCIAL TRANSFORMATION & ADVANCEMENT

Competitive Grants Programme for Policy-oriented Research

Pakistan Institute of Development Economics

ABSTRACT

Beef is Pakistan's largest meat export sector, contributing US\$ 332 million. Despite having the 8th largest herd of cattle globally, Pakistan's share in the global halal beef market, valued at US\$ 202 billion, is only 0.2%. The country's beef industry has immense potential to benefit economically from the growing global demands for Halal beef and beef products. Therefore, this study aims to investigate the features of halal beef demanded in the international market and to explore the current practices, challenges, and opportunities at the exporting node in the halal beef export supply chain of Pakistan. We conducted an exporter survey in Karachi, Lahore and Islamabad during 2023-2024. The findings of this survey indicates that consumers and regulatory bodies of GCC countries demand compliance for religious (halal certification), quality (certificate from AQD), origin (certificate from Chamber of Commerce and Industry) and safety standards (through licensing and monitoring the slaughterhouse) from our exporters. The study also identifies several challenges faced by the industry, including regulatory, logistic, quality and infrastructure issues. Regulatory challenges include meat price regulation, illegal slaughtering and smuggling and high production costs. Logistic challenges include a lack of cold chain facilities and limited cattle fattening farms. Infrastructure issues pertain to limited air space for exports and inadequate cold storage and transportation facilities. Quality challenges are related to unnecessary inspections, expensive health certifications, and a lack of animal traceability. Addressing these challenges through targeted interventions such as deregulating meat prices, enforcing animal slaughter control, reducing smuggling, lowering electricity tariffs, and developing an FMD control program could enhance productivity and competitiveness. Additionally, establishing cold storage at airports, building capacity for farmers, and implementing streamlined certification processes are crucial for improving export quality and volume. . In addition, we also conducted the CBA of chilled beef export from Pakistan. On an average, exporters earn a profit margin of Rs 6,693 per animal and Rs 84 per kg, demonstrating modest profit due to high air freight charges, AQD certification fees and costly animal. The study findings reveal that animal buying cost, air freight charges and compliance with international health standards are significant cost factors, while revenue from skin and offal contributes substantially to overall profitability. The study's findings aim to provide policy recommendations to bolster Pakistan's beef export industry, contributing to increased export earnings and market share in the global halal beef market.

Key words: Halal beef, exporter, chilled, frozen, FMD, regulations, logistic, quality, infrastructure, profitability analysis, Pakistan

PREFACE

The research presented in this report aims to investigate the challenges and potential associated with the export of halal beef from Pakistan to international markets, particularly the Gulf countries. The primary purpose of this research is to identify the features of halal beef demanded globally, assess current practices, understand the challenges faced by Pakistani beef exporters and explore possible interventions to address challenges in halal beef exports. By doing so, the study seeks to provide actionable policy recommendations to enhance the competitiveness and profitability of Pakistan's halal beef industry.

We acknowledge various individuals and institutions, who contributed significantly to the completion of this research. The funding and support provided by the Research for Social Transformation and Advancement (RASTA) Competitive Grants Program (CGP) were crucial in carrying out this research. Their financial assistance enabled extensive field visits, surveys, and in-depth analyses, which form the backbone of this report.

Special thanks are extended to the president of All Pakistan Meat Exporters & Processors Association, FAO Livestock experts, Director General Extension of Livestock Department of Punjab Government in Lahore, Additional Director of Foot and Mouth Disease in Lahore, the Vice Chancellor of Cholistan University of Veterinary & Animal Sciences in Bahawalpur, Director of Livestock and Dairy Development Department in Bahawalpur, the cattle growers in Cholistan for their invaluable insights and cooperation. Their on-ground experiences and knowledge greatly enriched the quality and relevance of this research.

Moreover, gratitude is also owed to the beef exporters in Karachi, Lahore and Islamabad, who participated in our surveys and interviews. Their willingness to share detailed information about their practices and the challenges they face provided a comprehensive understanding necessary for this study.

The guidance and feedback from RASTA mentors and experts in the field were instrumental in refining the research methodology, the questionnaires used in our surveys and write-up of the report. Their expertise helped ensure the accuracy and reliability of the collected data.

In conclusion, this research would not have been possible without the collaborative efforts and support of all the individuals and institutions mentioned above. Their contributions have been pivotal in producing a report that aims to inform policy and drive positive change in Pakistan's halal beef export industry.

TABLE OF CONTENTS

ABSTRACT	i
PREFACE	ii
TABLE OF CONTENTS.....	iii
LIST OF FIGURES AND TABLES	v
ABBREVIATIONS.....	vi
INTRODUCTION	1
1.1 Background of the Study	1
1.2 Beef exports of Pakistan: Challenges and potentials.....	2
1.3 Foot and Mouth Disease in Pakistan	6
1.4 FMD Control Programme of India	7
1.5 Objectives of the Study.....	8
LITERATURE REVIEW.....	9
RESEARCH METHODOLOGY	11
3.1 Study Area	11
3.2 Data Collection.....	11
3.3 Time-series Model of Pakistan’s Beef Exports	11
3.3.1 Forecasting Method of Beef Exports from Pakistan	11
FINDINGS AND DISCUSSION.....	13
4.1. Forecasting of Beef Exports from Pakistan	13
4.1.1 Descriptive Analysis	13
4.1.2 Unit Root Test.....	14
4.1.3 Selection of Best Models for Bovine Meat Exports	14
4.1.4 ARIMA Analysis for Bovine Meat Exports	15
4.1.5. Forecasting of Bovine Meat Exports	15
4.2 Field Visits on FMD Control Programs	17
4.3 Findings of Survey of Beef Exporters.....	17
4.3.1 Descriptive Analysis of Beef Exporters.....	17
4.3.2 Regulations and Preferred Features of Halal Beef Exports.....	18
4.3.3 Practices in Halal Beef Exports from Pakistan.....	19
4.3.4 Profitability Analysis of Halal Beef Exports	20

4.3.5 Challenges and Opportunities in Halal Beef Exports from Pakistan	21
RECOMMENDATIONS & POLICY IMPLICATIONS.....	23
CONCLUSION.....	24
REFERENCES.....	25
APPENDICES.....	29
Appendix I: Stages of Progressive Control Pathway for FMD	29
Appendix II: List of Beef Exporters in Pakistan.....	30
Appendix III: Questionnaire Deigned to Interview Beef Exporters.....	32
Appendix IV: HS Codes for Meat Categories	38
Appendix V: Akaike Information Criteria (AIC) for Best ARIMA Model Selection.....	39
Appendix VI: Freight Charges on 2 nd January, 2024.....	40
Appendix VII: Pakistan Bovine Meat Exports by Types and Countries in 2023	41

LIST OF FIGURES AND TABLES

<i>Figure 1: Trends in the population of livestock</i>	1
<i>Figure 2: Trends in the production of halal meat and its types</i>	2
<i>Figure 3: Pakistan’s exports of meat and edible meat offal</i>	2
<i>Figure 4: Pakistan’s export values of fresh or chilled and frozen bovine meat</i>	3
<i>Figure 5: Pakistan’s export quantities of fresh or chilled and frozen bovine meat</i>	4
<i>Figure 6: Pakistan’s export prices of fresh or chilled and frozen bovine meat</i>	4
<i>Figure 7: Setting up of FMD free zone in Cholistan</i>	7
<i>Figure 8: Trends in monthly exports of fresh/chilled and frozen bovine meat (million US\$)</i>	14
<i>Figure 9: Forecast of Pakistan’s exports of fresh/chilled bovine meat (million US\$)</i>	16
<i>Figure 10: Forecast of Pakistan’s exports of frozen bovine meat (million US\$)</i>	16
<i>Table 1: Pakistan’s bovine meat exports across countries in 2023</i>	5
<i>Table 2: Descriptive statistics</i>	13
<i>Table 3: Unit root test outcomes</i>	14
<i>Table 4: Results of ARIMA model</i>	15
<i>Table 5: Descriptive stats of halal beef exporters in Pakistan</i>	18
<i>Table 6: Ranking of halal beef features demanded in the international market</i>	19
<i>Table 7: Sources of live animals for beef exports</i>	19
<i>Table 8: Profitability analysis of chilled halal beef exports</i>	20
<i>Table 9: Challenges and opportunities in halal beef export from Pakistan</i>	21

ABBREVIATIONS

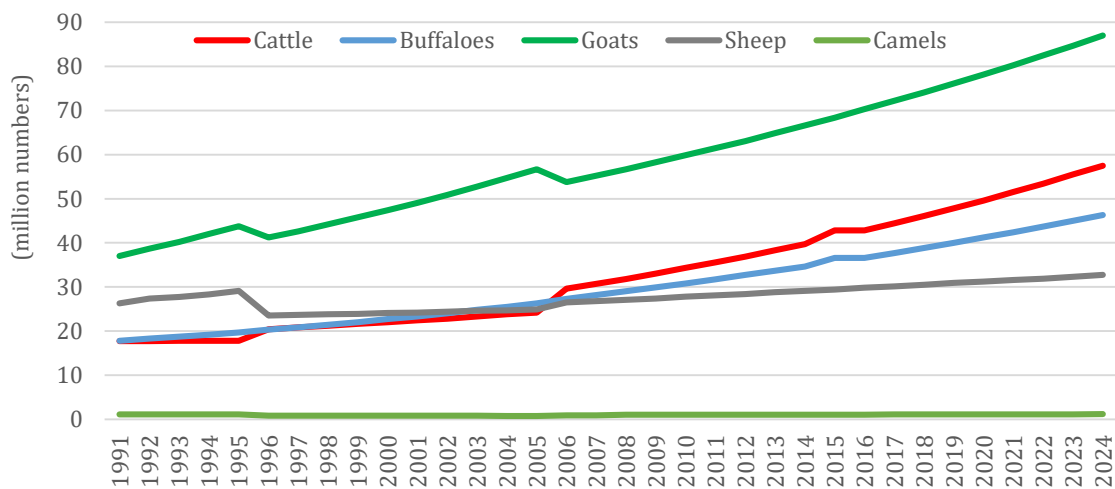
AD	Additional Director
AIC	Akaike Information Criteria
ARIMA	Auto Regressive Integrated Moving Average
APMEPA	All Pakistan Meat Exporters & Processors Association
AQD	ANIMAL Quarantine Department
BLLLD	Bahawalpur Livestock & Dairy Development Department
CAGR	Compound Annual Growth Rate
CPEC	China-Pakistan Economic Corridor
DG	Director General
ECC	Economic Coordination Committee
FAO	Food and Agriculture Organization
FMD	Foot and Mouth Disease
GCC	Gulf Cooperation Council
GOI	Government of India
GOP	Government of Pakistan
MoU	Memorandum of Understanding
NPSES	National Priority Sectors Export Strategy
PAITS	Pakistan Animal Identification and Traceability System
PBS	Pakistan Bureau of Statistics
SBP	State Bank of Pakistan
SPS	Sanitary and Phyto-Sanitary
STPF	Strategic Trade Policy Framework
UAE	United Arab Emirates
WOAH	World Organization of Animal Health

INTRODUCTION

1.1 Background of the Study

Livestock is an important sector in the agro-based economy of Pakistan. It accounts for 60.8% to the agricultural value addition through products like milk and meat, contributes 14.6% to the national GDP and makes up 1.6% of total exports (GOP, 2024c). Over 8 million rural households are engaged in animal husbandry and receive 35-40% of their livelihoods from this sector. The national herd comprises 57.5 million cattle, 46.3 million buffaloes, 87 million goats, 32.7 million sheep, 1.2 million camels, 5.9 million asses, 0.4 million horses and 0.2 million mules (GOP, 2024c). Among meat producing animals, cattle have shown the highest compound annual growth rate (CAGR) of 3.5% from 1991 to 2024, followed by buffaloes (2.9%), goats (2.6%), sheep (0.6%) and camels (0.3%) (see Figure 1) (GOP, 2024c). However, the average carcass weight for cattle/buffalo in the country is 196 kg per animal, significantly lower than the 297 kg per animal seen in leading producers (PBC, 2021). To improve this, Pakistan must focus on healthy meat animals, modern husbandry practices, adequate feeding resources and proper feeding plans. By enhancing per animal meat productivity, Pakistan can position itself as a significant player in the international halal beef market (Aghwan et al., 2016).

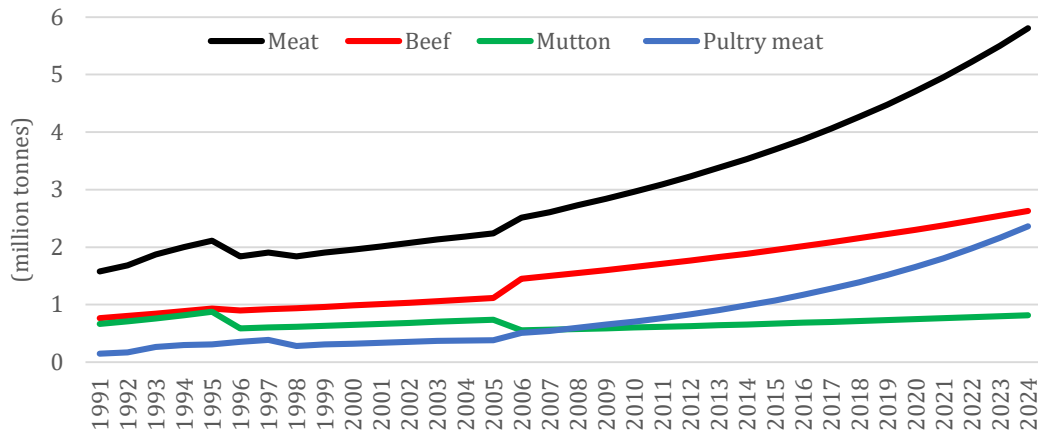
Figure 1: Trends in the population of livestock



Source: GOP (2024c).

Pakistan's halal meat industry is expanding with rapid growth. In 2024, the total production of halal meat, including beef, mutton and poultry meat reached 5.8 million tonnes, with a CAGR of 3.9% (see Figure 2) (GOP, 2024c). However, the country's meat consumption in 2022 was 3.5 million tonnes, with a CAGR of 0.8% (GOP, 2023; ReportLinker, n.d). This significant disparity between the growth rates of meat production and consumption indicates a substantial surplus, presenting a significant opportunity for Pakistan to increase its foreign exchange earnings through meat export. Failure to capitalize on this potential could lead to reduced profitability or drive the illegal sale of live animals.

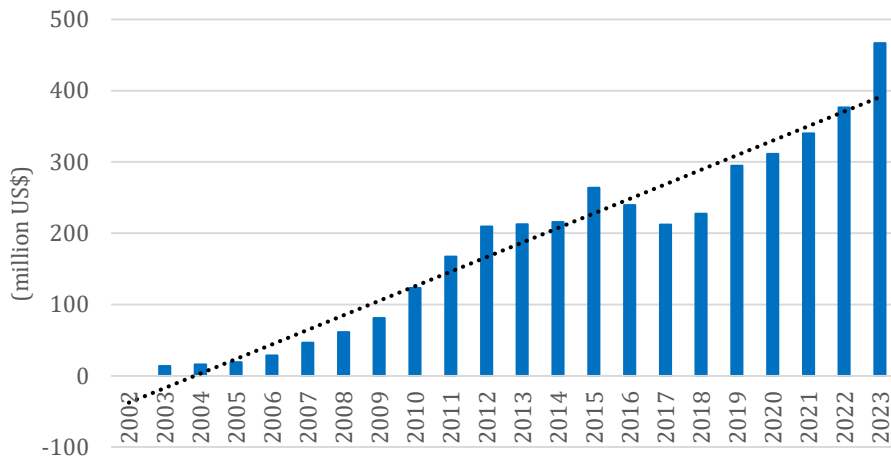
Figure 2: Trends in the production of halal meat and its types



Source: GOP (2024c).

Nonetheless, the government of Pakistan did not permit meat export until the 1998 Annual Trade Policy (PCB, 2021). Consequently, the country’s meat exports were negligible until 2003. According to the State Bank of Pakistan, exports of meat and edible meat offal increased dramatically from US\$ 14 million in 2003 to US\$ 467 million in 2023, growing at a CAGR of 18% (see Figure 3) (GOP, 2024b). Among meat types, beef ranks as the largest meat export sector of Pakistan, contributing US\$ 332 million, followed by mutton with US\$ 42 million, offal of all animals with US\$ 18 million, poultry with US\$ 0.03 million and others with US\$ 74 million in 2023 (GOP, 2024b). Despite being the 15th largest meat producer globally, Pakistan ranks 57th in meat exports, highlighting the underperformance of its meat export industry (FAO, 2018; Trading Economics, n.d.). This underlines the necessity to investigate and address the constraints hindering the expansion of Pakistan’s meat exports.

Figure 3: Pakistan’s exports of meat and edible meat offal



Source: GOP (2024b).

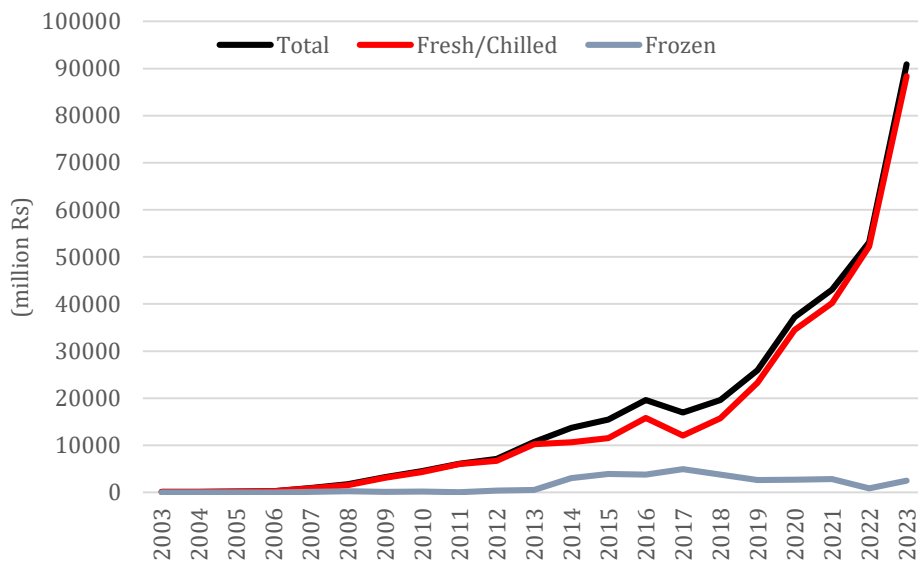
1.2 Beef exports of Pakistan: Challenges and potentials

The global beef industry has experienced exponential growth over the past two decades. The market value for beef (cattle meat) has doubled from US\$ 166 billion in 2002 to US\$ 332 billion in 2022 and is projected to reach US\$ 422 billion by 2028, with a CAGR of 4% from 2022 to 2028 (Renub Markets,

2023). This growth is driven by an increased reliance on beef as a primary protein source due to factors such as the widespread of swine flu, a growing global population and rising income levels. This highlights the significant potential of Pakistan’s beef industry.

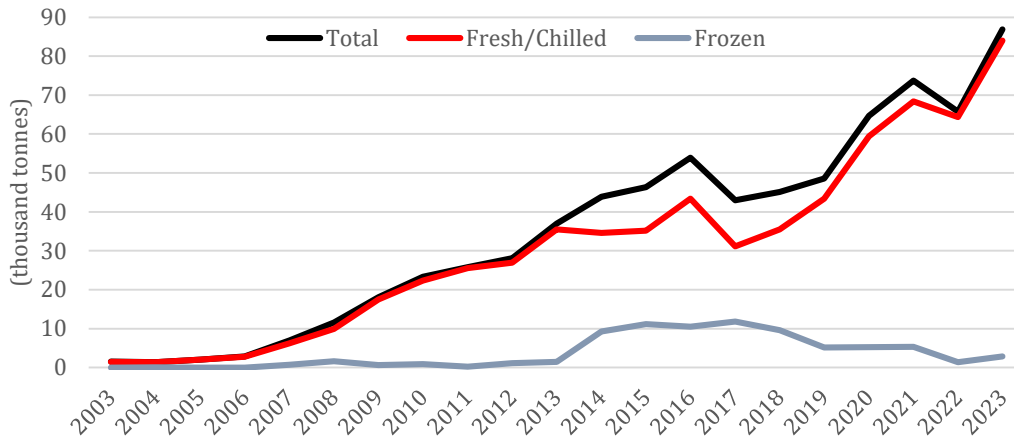
Pakistan’s exports of bovine (cattle and buffalo) meat are continuously rising since 2003. Bovine meat exports have surged from US\$ 0.747 million (Rs 0.1 billion) in 2003 to US\$ 332.271 million (RS 91 billion) in 2023, with a CAGR of 37% (see Figure 4) (GOP, 2024b). Figure 5 shows that export volume of bovine meat has gradually improved from 1.4 thousand tonnes in 2003 to 87 thousand tonnes in 2023, with a CAGR of 21%. Both Figures 4 and 5 illustrate that 71%-99% of Pakistan’s bovine meat exports are in the fresh/chilled category, revealing a significant consumer preference and high demand for Pakistani chilled/fresh bovine meat, particularly in high value markets like the Middle East (ITC, 2022; GOP 2024a). Moreover, gap in exports prices given in Figure 6 explains the premium associated with fresh/chilled bovine meat, due to their superior quality and consumer preferences. Nonetheless, exports of frozen bovine meat show a slight growth in 2013, but observe a notable fall after 2016, except for brief spikes in 2017 and 2021, indicating its poor market expansion as compared to fresh/chilled bovine meat. The decline and volatility in frozen bovine exports demonstrate challenges such as uncompetitiveness with Indian frozen beef, infrastructure limitations, high energy costs and market access issues. Despite having the 8th largest herd of cattle globally, Pakistan’s share of the global beef market remains just 0.08%, which is not only miniscule but also very unstable (ITC, 2022; Khan, 2022).

Figure 4: Pakistan’s export values of fresh or chilled and frozen bovine meat



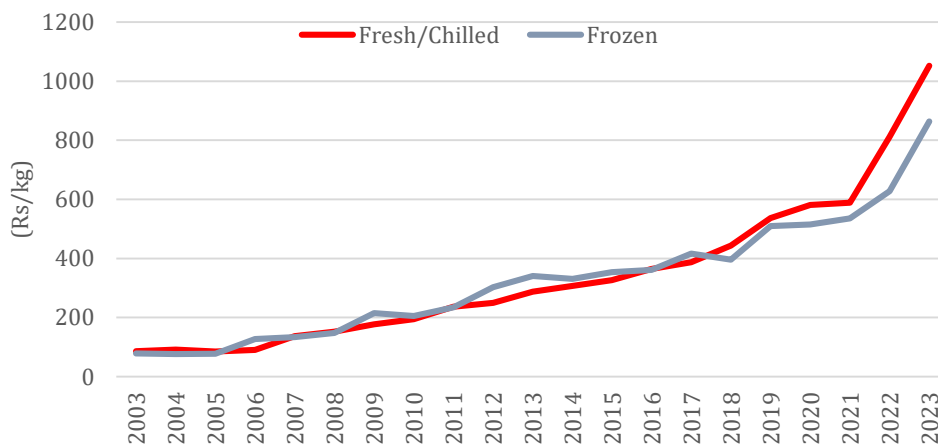
Source: GOP 2024a.

Figure 5: Pakistan's export quantities of fresh or chilled and frozen bovine meat



Source: GOP 2024a.

Figure 6: Pakistan's export prices of fresh or chilled and frozen bovine meat



Source: GOP 2024a.

Table 1 presents Pakistan's bovine meat exports across various countries and bovine meat types for 2023. The country's bovine meat exports are categorized into three types: carcass, cut with bone and boneless (see Appendix VII). Pakistan exported approximately 86,889 tonnes of bovine meat, representing only 3.3% of its total beef production (2.6 million tonnes), to six Gulf Cooperation Council (GCC) countries—United Arab Emirates (UAE) (51%), Saudi Arabia (16%), Kuwait (12%), Qatar (9%), Bahrain (5.4%) and Oman (3.3%)—which collectively account for 95.7% of its total bovine meat exports (GOP, 2024b), highlighting that these are higher value markets. Other export destinations include Uzbekistan (3.5%), Kazakastan (0.4%) and others (0.4%). Similar to Figures 4 and 5, Table 1 also highlights that the majority of Pakistan's bovine meat exports are in the fresh/chilled category, reflecting a strong preference for Pakistani fresh/chilled beef in the Middle East markets because of geographical edge, Pakistani exporters can meet orders in just 24 hours. Despite remarkable expansion in fresh/chilled beef, the market share of frozen beef from Pakistan remains minuscule in the Middle East, due to high competition from Indian frozen beef. However,

this table elaborates that emerging markets like Jordan, Malaysia, Uzbekistan, Thailand, Maldives and Iraq have potential for increased exports, especially in the frozen beef category, which Pakistani exporters should actively explore. The lower prices and smaller quantities in certain markets suggest a need for further investigation to identify issues related to infrastructure, quality, logistic and regulatory compliance in Pakistan’s beef export industry. Addressing these issues could help Pakistan capitalize on its large cattle herd and increase its share in the global halal meat market.

Table 1: Pakistan’s bovine meat exports across countries in 2023

Countries	Total			Chilled/Fresh			Frozen		
	Quantity (tonnes)	Value (m Rs)	Price (Rs/kg)	Quantity (tonnes)	Value (m Rs)	Rate (Rs/kg)	Quantity (tonnes)	Value (m Rs)	Rate (Rs/kg)
Bahrain	4,708	4,652	988	4,708	4,652	988	-	-	-
Egypt	1	2	1494	1	2	1494	-	-	-
Hong Kong	2	1	767	2	1	767	-	-	-
Iraq	28	23	824	5	5	1,049	23	18	775
Jordan	23	26	1,117	19	18	986	4	7	1,699
Kazakastan	346	196	567	346	196	567	-	-	-
Kuwait	10,144	13,076	1,289	10,085	13,031	1,292	59	45	761
Malaysia	29	40	1,394	0.14	0.20	1,511	28	40	1,393
Maldives	141	121	857	28	27	940	113	94	836
Oman	2,870	2,667	929	2,796	2,615	935	74	51	695
Qatar	7,578	7,739	1,021	7,535	7,707	1,023	43	32	749
Saudi Arabia	13,985	15,142	1,083	13,478	14,713	1,092	507	429	846
Thailand	82	73	891	-	-	-	82	73	891
UAE	43,901	44,551	1,015	43,817	44,483	1,015	84	68	809
Uzbekistan	2,995	2,535	846	1,167	906	776	1,828	1,629	891
Vietnam	56	19	337	-	-	-	56	19	337
Total	86,889	90,864	1,046	83,988	88,358	1,052	2,902	2,506	864

Source: GOP 2024a.

The international market for frozen beef is expanding rapidly, reaching US\$ 38.5 billion in 2022 (OEC, 2022). The world’s three largest exporters—Brazil with US\$ 11 billion, the USA with US\$ 5.7 billion, Australia with US\$ 4.5 billion and India with US\$ 2.9 billion —dominate the frozen beef sector. China stands as the largest importer, with imports valued at US\$ 16.6 billion (OEC, 2022). The growing demand for frozen beef is attributed to its prolonged shelf life and the capability to be transported to distant markets via sea routes, making it a more commercially viable and cost-effective option compared to chilled beef. However, producing frozen beef necessitates advanced processing capabilities and robust cold chain maintenance during transportation, which requires significant investment in Pakistan’s beef supply chain.

In addition to the frozen category, the global demand for halal meat is rapidly increasing due to its superior quality, sanitary nature and nutritional value. The global halal meat market was valued at US\$ 202 billion in 2021 and is projected to reach US\$ 375.1 billion by 2030 with a CAGR of 7.1% (Straits Research, 2022). Brazil leads the global halal meat exports with US\$ 16.2 billion, followed by India at US\$ 14.4 billion and the USA at US\$ 13.8 billion (Ahmed, 2022). However, Pakistan’s share to the global halal meat market is a mere 0.2%, placing it 33rd amongst halal meat exporters (Asfia et

al., 2021). Despite Pakistan's production of organic, halal beef with a distinct flavour, its market share remains minimal, highlighting the urgent need for attention from researchers and policy makers. Contrarily, the global trade in halal beef alone is climbing annually by 10.4%, with demand for imported halal beef in the Middle East and Southeast Asia growing by 18.2%, reaching US\$ 1.5 billion/year (FAO, 2018).

1.3 Foot and Mouth Disease in Pakistan

Pakistan's beef industry holds substantial potential for export growth. However, the industry must adhere to quality, sanitary and phyto-sanitary (SPS), safety, halal, and global technical standards set by importing countries. A significant barrier to accessing high-value markets, including China is the prevalence of Foot and Mouth Disease (FMD). The FMD is caused by aphthovirus of Picornaviridae family. This virus has seven global strains—A, O, C, SAT1, SAT2, SAT3 and Asia1. FMD virus strains of A, O and Asia 1 are prevalent in Pakistan (FAO, 2016). These strains infect cloven-hoofed small ruminants (goats and sheep) and large ruminants (cattle and buffaloes). The disease symptoms include acute fever, lameness, and development of vesicular lesions on the mouth, tongue, feet, snout and teats of infected animals (Chepkwony et al., 2021). Besides poor animal productivity, the disease results in abortion of pregnant ruminants but also causes mortality of young cattle and buffaloes. In Pakistan, this preventable disease results in economic losses of over US\$ 300/infected animals, amounting to a total of US\$ 692 million annually (FAO, 2022). According to the World Organization for Animal Health (WOAH), Pakistan is currently at stage 2 of Progressive Control Pathway (PCP) for FMD (GOP, 2022). However, to advance to stage 3, there is a need to implement national official programme for restricting the virus circulation (see Appendix I). In the current country context, controlling this disease presents significant challenges due to the large population of susceptible livestock, about 224 million, the lack of systematic vaccination programs and the unregulated movement of animals between provinces.

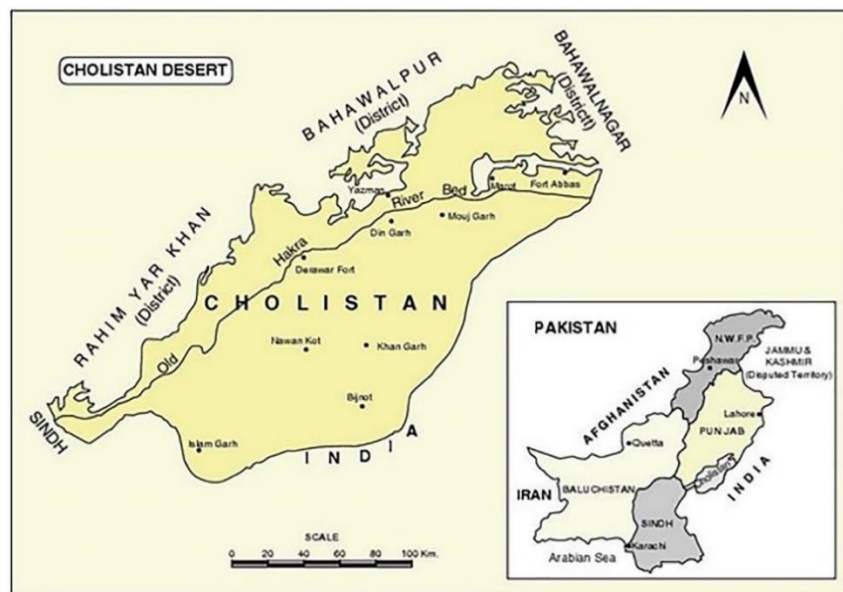
Internationally, two primary approaches are used to achieve FMD-free status: (1) government subsidies for FMD vaccination (2) enforcement of FMD vaccination certificates during animal mobility or purchase. Pakistan has a similar opportunity to significantly enhance its beef exports by eradicating FMD. Preventing FMD requires just two doses of vaccination per animal annually, costing Rs. 500 per animal per year. The national-level marginal cost for FMD vaccination would be US\$ 179 million annually (Rs 51.9 billion/year=Rs. 500*103.8 million cattle and buffaloes) (authors' calculations with FAO-Pakistan experts). This marginal cost of vaccination can be easily recovered by boosting beef exports, potentially reaching 2.5 million tonnes valued at US\$ 13 billion to China and other high value markets.

The Government of Pakistan (GOP) entered a Memorandum of Understanding (MoU) with the Chinese government to establish an FMD free zone with vaccination under the China-Pakistan Economic Corridor (CPEC) initiative (Ali, 2021). However, its implementation was delayed. Current discussions between Pakistani and Chinese governments under phase II (the Agricultural phase) of CPEC are renewing this MoU. These efforts aim to advance Pakistan from Stage 2 to Stage 3 of WOAH, thereby enabling the country to export frozen beef to distant and high value markets, particularly China (PBC, 2021). The Chinese government has expressed keen interest in Pakistani beef, highlighting the need for Pakistan to prepare to capitalize on these opportunities. Recently, government of Punjab and Chinese Royal Group has established an FMD disease control compartment in Sheikhpura. This compartment aims to ensure that livestock within the region are free from FMD through regular vaccination, stringent biosecurity measures and continuous surveillance. By achieving and maintaining an FMD-free status in this compartment, Pakistan can enhance the health of its livestock, improve productivity and gain access to high-value international markets that require strict compliance with animal health standards. This initiative also helps in

boosting confidence among trading partners regarding the quality and safety of Pakistani beef exports. This initiative includes the establishment of an animal quarantine zone.

In 2017, the Government of Pakistan (GOP) signed an earlier MoU with the Food and Agriculture Organization (FAO) of the United Nation to implement a preventive FMD vaccination programme in the Cholistan region (FAO, 2022). This region is chosen to establish an animal quarantine zone due to its geographical location as it has two natural boundaries: Indian frontier from the back side and the river Sindh border from the front side (see Figure 7). Under this programme, the FAO assists the GOP by procuring FMD vaccines, training both government and private sector staff in animal treatment and vaccination and establishing veterinary diagnostic laboratories across the country. All cattle and buffaloes are vaccinated free of charge twice a year. The program has expanded to the Bahawalpur division, covering the districts of Bahawalpur, Bahawalnagar and Rahim Yar Khan. Since its inception, 12 inoculation cycles have been completed, administering 800 million doses of vaccine in the Bahawalpur division (Government of Punjab, n.d.). The Bahawalpur Livestock & Dairy Development Department (BLLLD) has reported zero incidence of FMD in 2023, indicating the program's success.

Figure 7: Setting up of FMD free zone in Cholistan



Source: Wariss et al. (2013)

1.4 FMD Control Programme of India

India has the world's largest population of cattle i.e., 307.5 million, followed by Brazil and China (Cook, 2024). However, FMD is endemic in the country, causing significant economic losses. Severe outbreaks result in annual losses of US\$ 2.8 billion, moderate outbreaks cause losses of US\$ 0.2 billion per annum and mild outbreaks also lead to losses of US\$ 0.1 billion per annum (Singh et al., 2019; Govindaraj et al., 2021). Therefore, the Government of India (GOI) initiated FMD Control programme (FMD-CP) in 54 districts in 2004 and expanded it to 221 districts in 2010 (Audarya, 2021; Subramaniam et al., 2022). Under FMD-CP, only bovine animals were vaccinated. The GOI has adopted WOA's five-year nation-wide comprehensive approach to control FMD in all susceptible small and large ruminants, with an estimated cost of US\$ 1.8 billion (Bhogal & Beillard, 2023). This approach comprises extensive vaccination campaigns, surveillance and monitoring measures. The biannual FMD vaccination with inactivated trivalent vaccine containing FMD serotypes of O, A and

Asia-1 under the National Animal Disease Control Programme (NADCP) of the Department of Animal Husbandry and Dairying to ensure immunity across livestock population (Gunasekera, 2022). To monitor FMD program, the GOI established diagnostic laboratories and a surveillance network nationwide (Subramaniam et al., 2022). This network investigates FMD antibodies in ruminants through collecting and testing blood samples, which help to detect area with low immunity and high outbreak risks. The swift response system, in particular quarantine the infected animal, helps to prevent FMD outbreak. Lastly, the regulated livestock movement between regions further enables the country to control the FMD spread. Under the NADCP, GOI aims to control FMD with vaccinations by 2025 and without vaccinations by 2030. The effectiveness of the NADCP is evident from a decline in FMD incidence and improved animal health. Moreover, India's exports of beef have reached US\$ 3.5 billion in 2023 (Bhogal & Beillard, 2023).

1.5 Objectives of the Study

In context of the situation summarized above, the specific objectives of this study are:

1. To investigate features of halal beef demanded in international market,
2. To assess the current practices in the halal beef exports in Pakistan, including the processes of sourcing, transportation, processing, and storage,
3. To identify the major challenges faced by the exporters in the halal beef exports in Pakistan, including regulatory issues, infrastructure, logistics, and quality control,
4. To explore the opportunities for enhancing halal beef exports from Pakistan.

We also provide a time-series econometric model to forecast Pakistan's beef exports in the short-term based on historical export growth under prevailing investments and regulations. The intent of addressing challenges and opportunities for the beef exports would be to shift the trajectory to a higher level in the medium and long run compared to the short-term forecasts.

LITERATURE REVIEW

Beef is considered as an important source of energy for human beings. It makes up a sizeable amount of the diet and offers essential nutrients including proteins, lipids, vitamins, and minerals. Beef is the largest meat sector in Pakistan. Rehman et al. (2019) have observed that beef production has a positive effect on the agricultural gross domestic product of Pakistan over the long term, while mutton and poultry meat production exhibited an insignificant impact. However, beef from traditional abattoirs in Pakistan does not satisfy international standards, which hurts Pakistan's standing in foreign beef markets. Therefore, export of live animals to Afghanistan, Iran, and the Gulf States is a common practice in the country (Tariq et al., 2023). Despite having the 8th largest population of cattle in the globe, the nation rarely had the opportunity to export meat or meat products to earn foreign currency. Some Middle Eastern nations ceased importing beef from Europe owing to the prevalence of mad cow disease during 1980-90s; it offered an excellent opportunity for Pakistan to reach nearby halal beef markets by improving the quality and safety of its beef exports to meet international standards and regulations. Pakistan's meat industry is thriving with an annual growth of 58% (3.4 million tonnes in 2003 to 5.8 million tonnes in 2023) during the last decade and has experienced significant developments as both government and private sector are focusing on long run policies and developing projects to boost meat production and processing facilities to meet increasing local and global demand for safe and quality produce (Sohaib & Jamil, 2017). In the light of this background, this section highlights several challenges, including regulatory issues, infrastructure, logistics, and quality control in the beef export of Pakistan:

Infrastructure and logistics are critical components of any supply chain, and this is particularly true in the beef export industry. Several studies have highlighted the challenges faced by the beef industry in Pakistan, including the lack of infrastructure for the transportation of live animals and meat products. For example, Hassan et al. (2016) and Warriach et al. (2020) found that the transportation of live animals was a major challenge for the beef industry in Pakistan due to the poor condition of roads and inadequate transportation facilities. Similarly, a study by Javid et al. (2019b) and Tariq et al. (2022) identified inadequate basic sanitation facilities (like light, adequate water supply, space for slaughtering and animal keeping, meat refrigeration, and disposal of offal) and a lack of proper packaging and labelling as major challenges for the beef industry in Pakistan.

Quality control is another critical component of the beef export supply chain, as it ensures that the products meet the standards required by the importing countries. Several studies have highlighted major challenge faced by the beef industry in Pakistan is regarding quality control. For example, a study by Khan et al. (2019) identified the lack of a quality control system, poor sanitation practices, and the use of unauthorized veterinary drugs as major challenges for the beef industry in Pakistan. Similarly, a study by Javid et al. (2019a) found that the lack of standardization in grading and certification systems for meat products was a significant challenge for the beef industry in Pakistan. Moreover, the prevalence of FMD is considered a major obstacle in the export of beef in Pakistan (Jamal et al., 2010). Pakistan needs to learn from the FMD success story of India. India succeeded in addressing FMD by developing own vaccines for different strains of virus prevalent in diverse agro-climatic zones of the country and by conducting massive vaccination campaigns in FMD-prone areas. India has become one of the largest beef exporters globally, due to its thriving buffalo meat industry (Subramaniam et al., 2022).

Regulatory issues also play a significant role in the supply chain of beef export in Pakistan. Several studies have identified the lack of coordination among regulatory bodies as a major challenge for the beef industry in Pakistan. For example, a study by Khalid et al. (2019) found that the lack of coordination among regulatory bodies, including the Ministry of National Food Security and Research, the Ministry of Commerce, and the Pakistan Standards and Quality Control Authority, was a significant challenge for the beef industry in Pakistan.

Pakistan's meat export strategy is part of the National Priority Sectors Export Strategy (NPSES) and aligns with the Strategic Trade Policy Framework (STPF) 2020-2025 (GOP, 2022). This strategy aims to boost economic growth through increased trade opportunities, focusing on the meat sector as a priority area for export diversification. This report emphasizes supply, processing and marketing constraints in the meat export. Moreover, the report highlights that deregulation and improved FMD control can open new markets. Similarly, investing in cold storage can enhance export quality. Lastly, capacity building and better farm practices can improve carcass weight and profitability. In short, Pakistan's beef export strategy highlights the need for structural improvements across the meat value chain, from farm level to market access to unlock Pakistan's meat industry's export potential, enhance competitiveness and secure a more significant share in the global market.

In brief, the supply chains of beef export in Pakistan faces several challenges, including infrastructure and logistics, quality control, and regulatory issues. These challenges not only hinder the efficiency and sustainability of the supply chain but also limit the potential for growth in the beef export market. However, several studies have also identified opportunities for improving the supply chain, including investments in infrastructure and cold storage facilities, the development of a quality control system, and better coordination among regulatory bodies. Addressing these challenges and capitalizing on these opportunities can help the Pakistani beef industry to achieve its full potential in the global market.

RESEARCH METHODOLOGY

3.1 Study Area

Exporters operating in the Karachi, Lahore and Islamabad export markets are mainly involved in the exports of beef from Pakistan. To achieve the study objectives, this study has employed both qualitative and quantitative approaches.

3.2 Data Collection

We collected primary data from beef exporters related to our objectives by following these steps:

1. Firstly, after consulting with domain and field experts, Principal Investigator (PI) and Co-PI have identified the population of interest that is beef exporters involved in the export business of beef in Pakistan. We compiled a list of 24 beef exporters in Pakistan, situated in Karachi, Lahore and Islamabad export markets; out of which, 10 exporters are located in Karachi, 13 in Lahore and 1 in Islamabad (see Appendix I).
2. Secondly, we designed a questionnaire for face-to-face interviews of beef exporters in the Karachi, Lahore and Islamabad export markets (see Appendix II). This questionnaire is divided into five sections: demographic characteristics of exporter and company details, features, costs and benefits of halal beef exports under eight bovine meat categories (their HS codes are given in Appendix III), current practices in the supply chain of halal beef exports, challenges faced by exporters in halal beef exports (including regulatory, infrastructure, logistics and quality control issues) and opportunities for enhancing halal beef exports from Pakistan. The questionnaire was finalized after two rigorous reviews from the assigned international and national mentors by RASTA.
3. Thirdly, we have piloted the questionnaire through telephonic interviews of one beef exporter from Lahore and one beef exporter from Karachi to check for any errors or omissions in the questionnaire.
4. Fourthly, PI and Co-PI conducted face-to-face interviews with 4 beef exporters located in Lahore during December 2023, 1 beef exporter in Islamabad during January 2024 and 4 beef exporters in Karachi during March 2024 after getting their written consents (see glimpses of interviews in appendices 5, 6 and 7). For 10 exporters, we conducted telephonic interviews. However, 5 exporters did not respond us.
5. Fifthly, we entered the collected data in excel files and checked it for completeness, accuracy, and discrepancies, before starting the analysis. We ensured ethical considerations, such as data confidentiality and participant anonymity in the collected data.
6. Lastly, we described the collected data and conducted the profitability analysis of beef exports for drawing conclusion.

3.3 Time-series Model of Pakistan's Beef Exports

3.3.1 Forecasting Method of Beef Exports from Pakistan

Before undertaking the interviews to assess challenges and opportunities, we undertook an econometric analysis of the time series of Pakistan's beef exports under past and current circumstances since 2003. Monthly time series data of exports of fresh/chilled and frozen bovine meat was available from January 2003 to May 2024; therefore, we attempted to forecast monthly exports of fresh/chilled and frozen bovine meat till December 2025. In this regard, we used the Autoregressive Integrated Moving Average (ARIMA) method.

ARIMA is introduced by Box-Jenkins (Box et al., 2015), which is a widely used time series forecasting technique. It is particularly effective for analyzing and forecasting data that exhibits patterns, trends and seasonality (Gibson et al., 2019).

ARIMA models combine three components: autoregression (AR), differencing (I), and moving average (MA).

1. Autoregression (AR): Autoregressive models take into account the relationship between an observation and a certain number of lagged observations (previous values in the series). The AR component of the ARIMA model uses these lagged values to predict future values.
2. Differencing (I): Differencing involves transforming a time series to make it stationary. Stationarity implies that the statistical properties of the series, such as mean and variance, do not change over time. Differencing eliminates the trends or seasonality present in the data by subtracting the previous observation from the current observation.
3. Moving Average (MA): Moving average models use the dependency between an observation and a residual error from a moving average applied to lagged observations. This component helps to capture the impact of previous forecast errors on the current forecast.

The ARIMA method combines these three components to create a model that can capture the patterns and trends in a time series dataset. More specifically, their approach involved considering univariate Y at time point t and adding/subtracting based on the Y values at previous time points (e.g., $t - 1$, $t - 2$, etc.), and also adding/subtracting error terms (e) from previous time points as follows:

$$Y_t = c + \phi_1 y_{dt-1} + \phi_p y_{dt-p} + \dots + \theta_1 e_{t-1} + \theta_q e_{t-q} + e_t \quad (1)$$

This model is typically defined by three parameters: p , d , and q .

- p represents the order of the autoregressive component (AR).
- d represents the degree of differencing required to achieve stationarity.
- q represents the order of the moving average component (MA).

The ARIMA method is useful for short-term and medium-term forecasting. It has been applied to various fields, including finance, economics, meteorology, and demand forecasting. To implement the ARIMA method, monthly data of exports of fresh/chilled and frozen bovine meat (Y) is analyzed to estimate the model parameters, and then future values are forecasted based on these estimates.

FINDINGS AND DISCUSSION

4.1. Forecasting of Beef Exports from Pakistan

4.1.1 Descriptive Analysis

We used monthly time series data from January 2003 to May 2024 of fresh/chilled and frozen bovine meat exports, measured in million US\$. Table 2 presents the descriptive statistics of fresh/chilled (CHILLED) and frozen (FROZEN) bovine beef exports. The average monthly exports of fresh/chilled and frozen bovine meat are US\$ 9.2 million and US\$ 1.6 million, respectively. Fresh/chilled bovine meat exports are approximately six times higher than the frozen beef exports due to higher prices of chilled beef in the Middle East, as discussed in the 1.2 subsection. The values of standard deviation show significant variation in the exports of chilled bovine meat. The probability values from the Jarque-Bera test reject the null hypothesis of normality for both series, suggesting that neither series follows a normal distribution. This non-normality implies that the export data for both fresh/chilled and frozen bovine meat exhibit irregular patterns, likely influenced by market dynamics, seasonal demand fluctuations, and varying international trade conditions over the analyzed period.

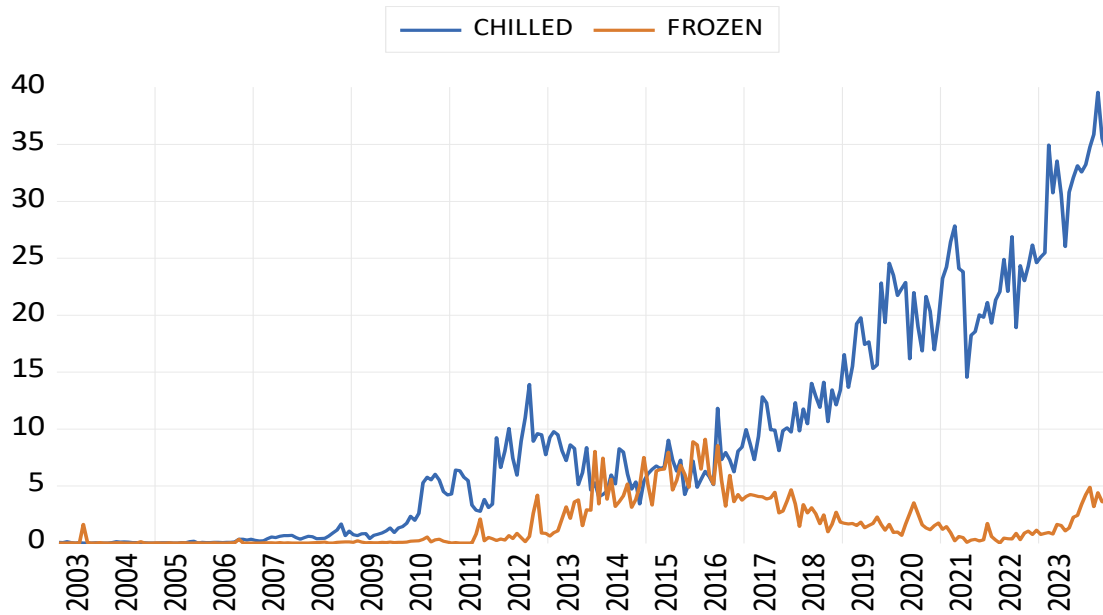
Table 2: Descriptive statistics

Statistics	Chilled	Frozen
Mean	9.226	1.643
Median	6.279	0.669
Maximum	39.573	9.106
Minimum	0.000	0.000
Std. Dev.	9.746	2.122
Skewness	1.075	1.448
Kurtosis	3.232	4.487
Jarque-Bera	50.061	113.438
Probability	0.000	0.000
Sum	2371.185	422.321
Sum Sq. Dev.	24314.110	1152.296
Observations	257	257

Source: Authors' computations.

Both series are showing huge monthly variations across two decades in Figure 8. Fresh/chilled bovine meat export series are showing a positive trend and is growing at a CMGR of 2.5%, while frozen bovine meat export is showing an inverted u-shaped pattern, except in 2023 and 2024. Frozen bovine export is started on April 2003, reached its highest value in March 2016 (US\$ 9.106 million) and then starts declining.

Figure 8: Trends in monthly exports of fresh/chilled and frozen bovine meat (million US\$)



Source: (GOP 2024b).

4.1.2 Unit Root Test

For checking stationarity in the study variables, the unit root tests of Augmented Dickey-Fuller (ADF) proposed by Dickey and Fuller (1979) is applied and results given in Table 3. The ADF unit root test demonstrates that both variables are non-stationary at level or zero order of integration [I(0)]. This finding is consistent with the findings of the descriptive analysis given in Table 2 that show patterns in exports of fresh/chilled and bovine meat, suggesting non-stationary series. However, both series are stationary at the first difference or level 1 or order of integration 1 [I(1)]. Therefore, we proceeded the forecasting analysis with ARIMA method using first differences of the series.

Table 3: Unit root test outcomes

Variables	ADF test	
	I(0)	I(1)
Chilled bovine meat	1.873	-4.199***
Frozen bovine meat	-1.902	-17.953***

Source: Authors' computations.

4.1.3 Selection of Best Models for Bovine Meat Exports

The study estimated 20 different versions of ARIMA models for fresh/chilled and frozen bovine meat exports, as illustrated in figures given in Appendix V. For the selection of the best ARIMA model for forecasting, we applied the most commonly used Akaike Information Criteria (AIC). AIC is used to compare different possible models and determine, which one is the best fit for the data. Lower AIC scores indicate better-fit models. Hence, according to the lowest values of AIC, ARIMA (2, 1, 3) is the best model for forecasting fresh/chilled bovine meat export, while ARIMA (0, 1, 1) is the best model for forecasting frozen bovine meat export.

4.1.4 ARIMA Analysis for Bovine Meat Exports

Table 4 presents the results of the best ARIMA models for fresh/chilled and frozen bovine meat exports in columns 1 and 2, respectively. For fresh/chilled bovine meat exports, the coefficients of AR and MA terms are significant, indicating the importance of including both components in the model. In contrast, for frozen bovine meat exports, only the coefficient of the moving average (MA) term is significant, suggesting that the AR term is not necessary for this series. Consequently, these findings guide us in retaining the significant terms in the respective ARIMA models for accurate forecasting of the export series, ensuring robust and reliable predictions for both fresh/chilled and frozen bovine meat exports.

Table 4: Results of ARIMA model

Variables	CHILLED	FROZEN
AR (1)	0.456*** (0.074)	-
AR (2)	-0.713*** (0.067)	-
MA (1)	-0.975*** (0.074)	-0.628*** (0.036)
MA (2)	1.132*** (0.046)	-
MA (3)	-0.596*** (0.051)	-
Sigma Square	3.309*** (0.154)	0.822*** (0.039)
Intercept	0.139** (0.057)	0.014 (0.024)
R ²	0.272	0.298
Adjusted R ²	0.255	0.293
Observations	256	256

*Note: Standard errors are given in parentheses. *** and ** represent statistical significance at 1 and 5% level of significance.*

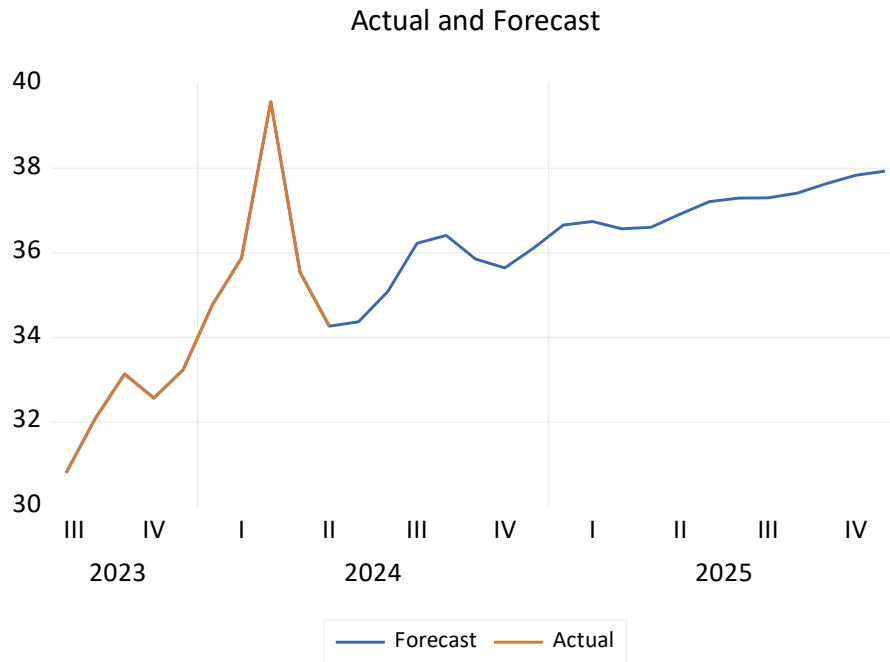
Source: Authors' computations.

4.1.5. Forecasting of Bovine Meat Exports

Next we used the estimates of ARIMA models to forecast future time points in export series of fresh/chilled and frozen bovine meat. We forecasted the export values for the next 19 months (i.e., from June 2024 till December 2025). Figures 9 and 10 show the actual and forecasted export values of fresh/chilled and frozen bovine meat, respectively. The forecasted exports for fresh/chilled bovine meat show a smooth and upward trend, projecting that exports would reach US\$ 37.9 million by December 2025, marking an 11% increase from from May 2024) in the month of. This short-term rise, based on the industry's past and current circumstances, is encouraging for traders and other supply chain actors, indicating a continuation of the recent growth trend. Despite this notable expansion, Pakistan's chilled beef industry remains underperforming, and the country is not fully capitalizing on the rapidly growing global halal beef market (Randhawa et al., 2018). Similarly, as illustrated in Figure 10, there has been a significant increase in the exports of frozen bovine meat since May 2024, with projections indicating that exports would reach US\$ 4.0 million by December 2025, representing a 12% rise. This short-term increase in forecasted frozen bovine meat exports is

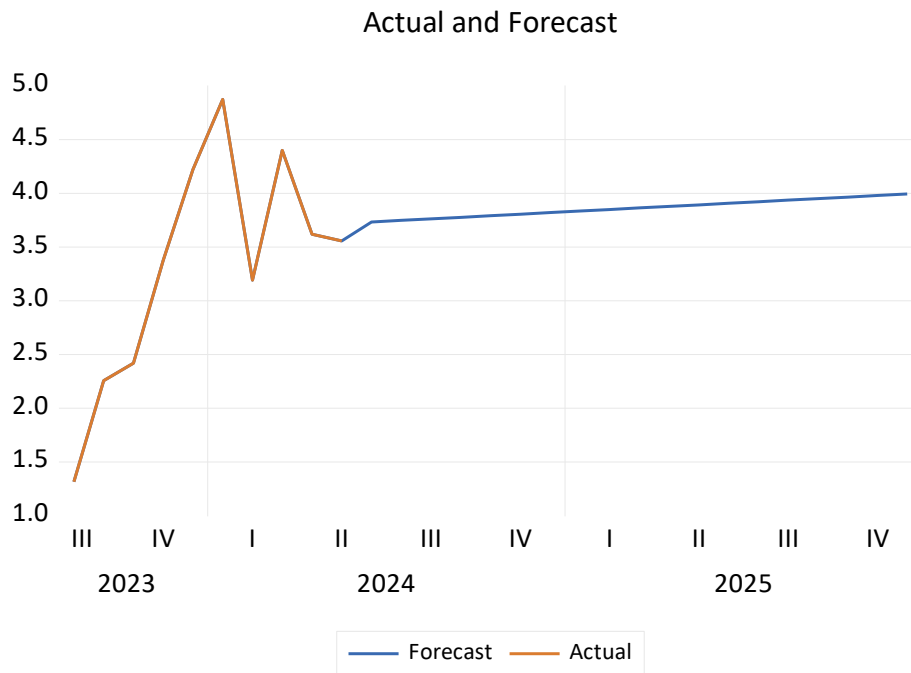
also encouraging for traders and other actors involved in the supply chains, reflecting a recent upturn in the market.

Figure 9: Forecast of Pakistan's exports of fresh/chilled bovine meat (million US\$)



Source: Authors' computations.

Figure 10: Forecast of Pakistan's exports of frozen bovine meat (million US\$)



Source: Authors' computations.

4.2 Field Visits on FMD Control Programs

We visited the Cholistan region on 22-23 November 2023, focusing on the development of an FMD-free region through the joint collaboration of GOP and FAO. During our visit, we engaged with the Livestock & Dairy Development Department (LDDD) in Bahawalpur, which is primarily responsible for FMD monitoring and vaccination efforts (see Appendix V for a glimpse of the BLDDD visit). Additionally, we interviewed several meat growers in Cholistan to assess the efficacy of the FMD vaccination program on their livestock. Both the farmers and the Director General (DG) of the BLDDD reported no incidence of FMD in the region during the current year, highlighting the success of the vaccination program and its positive impacts on animal health and the local meat industry. This accomplishment not only signifies a major milestone in disease control on PCP, but also sets a precedent for similar initiatives in other regions, ultimately contributing to the national goal of eradicating FMD and enhancing the overall productivity and profitability of the livestock sector.

Additionally, we visited the DG Extension of the Livestock Department, Punjab Government in Lahore to learn about the recent development of an FMD-free compartment in Sheikhpura in collaboration with the Chinese company, Royal JW Buffalo (see Appendix V). The Royal JW Buffalo Farm, encompassing 70 acres of land in Mouza Kaliseyan Bhattian, tehsil Safdarabad, District Sheikhpura, is in process of establishing an FMD-free compartment. This status is contingent upon obtaining health certificates for animal movement and conducting regular checks at entry and exit points. Another Chinese company, Royal Cell established Pakistan's first buffalo embryo production and research laboratory in May, 2023 (Aziz, 2023). The Royal Cell creates the in-vitro embryos, which were then implanted into the recipient buffaloes, thereby increasing the population of high-quality milk and meat breeds in Pakistan. As a joint venture with the Royal Cell, the Royal JW Buffalo aims to export Pakistani buffalo embryos (ova and frozen semen) to China. In the next phase, the Royal JW Buffalo group plans to register this compartment as FMD-free, subsequently enabling the export of milk and meat products to China. The development of such compartments will pave the way for farmers, exporters and foreign investors to establish similar compartments in Pakistan. These compartments will serve as a critical safeguard for the local agricultural industry, ultimately ensuring the health and well-being of livestock.

We also visited Additional Director (AD), Foot and Mouth Disease Research Center, Lahore to understand the status of FMD vaccination in Pakistan (see Appendix V). The AD told us that the center resource constraints, including inadequate funding and outdated technology, limit its capacity to conduct advanced research and development. The technological limitations are compounded by the frequent genetic mutations and multiple serotypes of the FMD virus, making it difficult to develop universally effective vaccines. However, the center has the ability to produce 1 million doses of FMD vaccines. He recommended increasing the operational budget of the center to ensure the smooth functioning of the FMD Research Center and providing training to the technical staff in modern vaccine production techniques.

These visits provided valuable insights into the advancements and challenges in controlling FMD, further emphasizing the importance of continued collaboration and innovation in combating this disease.

4.3 Findings of Survey of Beef Exporters

4.3.1 Descriptive Analysis of Beef Exporters

Descriptive statistics of socio-economic characteristics of halal beef exporters across three exporting cities of Pakistan are reported in Table 5. Average age of beef exporters is highest in Lahore (55.7 years), followed by Karachi (50.3 years), and Islamabad (48 years). Similarly, beef exporters in Lahore have highest beef export experience (18.3 years) compared to those in Karachi (13.5 years)

and Islamabad (8 years). The higher age and export experience of beef exporters in Lahore reveals that they are more expert and stable in their business. Average years of schooling of beef exporters are fairly consistent across three cities. However, we observe a notable difference in the ownership of slaughterhouses: about 33% of beef exporters in Lahore own slaughterhouses, whereas in Karachi and Islamabad, the ownership proportions are 75% and 100%, respectively. This implies that majority of beef exporters in Karachi and Islamabad can have more integrated supply chains, enabling exporters to better control the quality and activities. Exporters in Lahore have more penetration in international beef markets and exported the highest volume (2,951 tonnes) of beef during the last six months, followed by Karachi (2,275 tonnes) and Islamabad (100 tonnes). The low volume of Islamabad's exports is because this exporter is relatively new to the market.

Table 5: Descriptive stats of halal beef exporters in Pakistan

Characteristics	Lahore (n₁=9)	Karachi (n₂=9)	Islamabad (n₃=1)
Age (years)	55.7	50.3	48
Experience (years)	18.3	13.5	8.0
Education (years)	14.0	14.5	16
Own slaughterhouse (%)	33.3	75.0	100
Export volume during last 6 months (tonne)	2,951	2,275	100
Beef export types (%) ^a	1.33	2.25	2
Beef export destinations (No.)	3.33	5.75	2
Beef supply markets (%) ^b	1.33	1.25	2

Notes: Fresh=1, Fresh and Frozen or Fresh and Boiled=2, Fresh, Frozen and Boiled=3, Fresh, Frozen, Boiled and Marinated=4. b: Foreign=1, Foreign and Local Markets=2

Source: Authors' computations.

Although the exporters in Karachi supplied more diverse (2.25 types) beef in the forms of frozen, fresh, boiled and marinated, while the single exporters interviewed in Islamabad supplied beef in two forms (fresh and boiled) and exported in Lahore mainly supplied beef in fresh and /or frozen forms (1.33 types). Moreover, export destination suggests that exporters in Karachi have broader (5.75 destinations i.e., UAE, Saudi Arabia, Qatar, Kuwait, Bahrain, Iran, Maldives, China) international reach due to its strong strategic position and access to both air and sea routes, compared to their counterparts in Lahore (3.33 i.e., UAE, Qatar, Saudi Arabia, Bahrain, Oman, Kuwait) and Islamabad (2 i.e., UAE and China). Beef supply markets show slight variations, Islamabad exporter is focusing on both local and foreign markets, while Lahore and Karachi exporters have a mix trend, with a stronger focus on foreign market.

4.3.2 Regulations and Preferred Features of Halal Beef Exports

The regulatory requirements of halal beef demanded from Pakistan vary by importers. For instance, three certifications are demanded by importers of Qatar, Kuwait and Oman: Halal Certificate to ensure bovine animal is slaughtered and processed according to Islamic laws issued by Halal International or Punjab Halal Department); Animal Health Certificate to assure high standards of quality compliance issued by Animal Quarantine Department (AQD) in Lahore and Karachi, and Certificate of Origin issued by Chamber of Commerce and Industry. Although UAE, Saudi Arab, Egypt, Iran, Indonesia and Malaysia demand an additional Self Certification of Slaughterhouses (issued to those slaughterhouses who adhere to strict hygiene and safety standards).

Table 6 presents the ratings and rankings of the key features demanded in the international halal beef market, as identified by the exporters during the survey. These ratings and ranking are based on their highest response for each feature. Approximately 88% of exporters indicated that importers

in the Middle East markets prioritize the price of halal beef as the most important feature, highlighting their price sensitivity.

Table 6: Ranking of halal beef features demanded in the international market

Features of halal beef	Rated by respondents	Average ranking of the features (%)
Price	1	88
Age of animal	2	75
Breed of animal	3	63
Pink colour	4	63
Fat layer	5	75
Heavy animal/lean meat	6	63
Tenderness	7	50
Smell	8	50
Packaging	9	63
Gender of animal	10	75

Source: Authors' computations.

The survey also identified other features that influence demand for beef exports from Pakistan. Notably, exporters rated the following features highly: meat from younger animal (1.5-3 years) for better taste, desi breed in particular Sahiwali cow, pink colour of the meat for freshness and quality (also an indicator to differentiate between culled and young stock), a fat layer to protect meat quality and enhance taste, lean meat from heavier animal for fewer bones and fat, tenderness, smell, cloth packaging having a shelf life of 22 days for air travel, vacuum-sealed packaging having a shelf life of 90 days for sea travel, and meat of male cow. Additionally, optimal temperature range of 18-25°C for fresh/chilled beef and -18°C for frozen beef and cuttings of two or four pieces of carcasses, besides deboned or bone-in cuts are demanded.

These features indicate that halal beef importers in the Middle East demand low-cost yet high-quality beef from Pakistani exporters to meet their national food security needs. However, they are not currently prioritizing beef for food safety. If, with rising incomes, there is a shift towards a greater emphasis on food safety, Pakistani exporters will need to adapt to maintain their market position.

4.3.3 Practices in Halal Beef Exports from Pakistan

Table 7 illustrates the sources of live animals utilized by beef exporters, as reported in the survey. Majority of beef exporters (60%) secure live animals from livestock markets, followed by contract farmers (15%), own farms (10%), fattening farms (10%) and middleman (5%). Exporters have engaged technical experts to procure animals from livestock markets, compensating them with a fixed commission of Rs 500 per animal. Furthermore, the majority of exporters exporting beef to Kuwait are purchasing animals predominantly from fattening farms due to demand for lean meat.

Table 7: Sources of live animals for beef exports

Practices in sourcing live animals	Sources of live animals (%)
Own farm	10
Contract farming	15
Middleman	5
Livestock market	60
Fattening farms	10

Source: Authors' computations.

After this, the bovine animals are transported to slaughterhouses, where they are provided with sweet water and feed and allowed to rest for 24-48 hours before slaughtering. Then, the animals are slaughtered by trained personnel and are given a rest of about 5-7 minutes according to the Islamic laws. After removing the skin and cutting the animal from the center, a veterinary doctor at the slaughterhouse inspects the liver, spleen and hearts of slaughtered animals and prepares an antemortem inspection report, which must be endorsed by the Animal Quarantine Department (AQD). Meanwhile, the animals are processed into two or four pieces of carcasses or bone in cut or boneless, after removing offal. After cutting, meat is chilled or frozen in the chiller or freezer of the slaughterhouses, according to the export order. After this, beef is subsequently packed in cloth or vacuum packaging, depending on the mode of travel or type of meat. Finally, the packed beef is transported in the reefer containers via chiller train from the slaughterhouses to the airport.

4.3.4 Profitability Analysis of Halal Beef Exports

To evaluate halal beef exports from Pakistan, it is essential to conduct a profitability analysis and examine the level of profits within this industry. The profitability of exporting fresh/chilled halal beef from Pakistan to GCC countries is detailed in Table 8. The animal buying cost is the largest component of costs, which hampers Pakistan's exporters' ability to compete with the Indian frozen beef products in the Middle East. The second most significant cost component is the air freight charges, which are crucial for the rapid transportation of this perishable product. Among the minor costs are transportation costs of animal from livestock market to slaughterhouse and from slaughterhouse to the airport, animal handling costs, slaughtering costs, the costs of animal health certificate (which is one of the most important international export regulations to ensure beef quality satisfies health standards) and export development charges. In short, 90% of the costs are attributed to raw materials.

Table 8: Profitability analysis of chilled halal beef exports

Items	Value (Rs/animal)	Value (Rs/kg)
Animal buying cost	78,000	975
Livestock market charges	340	4
Transport cost from market to slaughterhouse	1,000	13
One-day feeding + deworming costs	400	5
Slaughtering + packaging + chilling costs	1,000	13
Animal health certificate cost	240+200=440	6
Transport cost from slaughterhouse to airport	500	6
Air freight charges	326.5*80= 26,120	327
Export Development Charges (0.25%)	287	4
Total cost	108,087	1,351
Revenue from beef	1,316*80=105,280	1,316
Skin	1,500	19
Offal earnings	8,000	100
Total revenue	114,780	1,435
Profit	6,693	84

Note: we assume that an average animal has 80 kg of meat production. We used average air freight charges as given in Appendix VI.

Source: Authors' computations.

The revenue from beef export is calculated by multiplying the average meat weight per animal with the average per kg beef price in GCC. A sizeable revenue comes from Offal earnings, which highlights how crucial it is to use every part of the animal in order to maximize profitability. The profit per animal is Rs 10,184, while the profit per kg of beef is Rs 127. This analysis suggests that exporting chilled halal beef from Pakistan to GCC countries is both viable and profitable. Moreover, the beef export industry in Pakistan is a high-volume business, with an average profitability of Rs 24.8 million per month (Rs 84 per kg*(1,775,333 kg/6 months)). In summary, the high-profit margins highlight the potential for further expansion of this export industry, while also emphasizing the need to investigate challenges to boosting the profitability.

4.3.5 Challenges and Opportunities in Halal Beef Exports from Pakistan

Table 9 enlists four major challenges faced by Pakistan's halal beef export industry that impede its expansion. Additionally, it includes possible interventions and their proposed outcomes as suggested by exporters during survey.

Table 9: Challenges and opportunities in halal beef export from Pakistan

Challenges	Consequences	Interventions	Outcome
Regulatory Challenges			
i. Regulation of meat prices	a. Lower the quality of meat b. Disincentive the producer and exporter	• Deregulation of meat prices	- Pull factor for productivity enhancement - Attract investment
ii. Illegal slaughtering of female and young animals	a. Decrease horizontal growth	• Strict enforcement of Animal Slaughter Control Act	- Preservation of breeding female population - Encourage fattening of young calves
iii. Smuggling of live animals to Iran and Afghanistan	a. Difficulty to find healthy animals for beef exports b. Damages local industry of byproducts (casing, bones, gelatin etc.)	• Cut on smuggling of live animals	- Potential to increase formal exports
iv. High electricity tariff and energy crisis	a. Expensive fodder and transport b. High cost of beef production c. Reduce international competitiveness	• Reduce agri-energy tariff on fodder production, livestock farming and meat processing for export	- Enhance international competitiveness - Shift from chilled to frozen beef export - Compete in boneless meat

v. No National FMD Control Programme	a. Huge production losses and trade barriers to high-end markets b. Delay in FMD approval of zone from WOAH	<ul style="list-style-type: none"> • Development of National FMD Control Programme • Development of FMD Control compartments and zones 	- Access to new high-value markets
Logistic Challenges			
i. Limited air space in passenger flights for exports	a. Increase costs of exports	<ul style="list-style-type: none"> • Fix air space in passenger flights or provide cargo flights 	- Enhance export volume
ii. Limited availability of cold vans	a. Reduce export volume	<ul style="list-style-type: none"> • Subsidize import of cold vans 	- Improve export quality
Infrastructure Challenges			
i. Unavailability of cold storehouse at airports/seaports	a. Reduce beef quality and increase cost of export	<ul style="list-style-type: none"> • APMEPA needs space from govt. to build cold store house at the airport 	- Increase international competitiveness
ii. Few breeding farms	a. Difficulty in finding healthy animals	<ul style="list-style-type: none"> • Encourage breeding farms through subsidy or credit 	- Increase beef exports
iii. Few fattening farms	a. Low carcass weight: 196 kg per animal	<ul style="list-style-type: none"> • Effectives awareness and capacity building of farmers 	- Export at high international price
Quality Challenges			
i. Unnecessary inspection at airport	a. Compromise product quality and safety	<ul style="list-style-type: none"> • Efficient and streamlined monitoring 	- Increase competitiveness of exporters in the global marketplace
ii. Expensive and cumbersome process to get animal health certificate	a. Delay in consignment	<ul style="list-style-type: none"> • Online and 24/7 certification 	- Timely delivery of export order
iii. Lack of animal traceability	a. Cannot track disease or breed	<ul style="list-style-type: none"> • Increase the scale of Pakistan Animal Identification and Traceability System (PAITS) 	- Gain trust of importers

Source: Authors' computations.

This table identifies that beef exporters face several challenges related to regulatory, logistic, infrastructure and quality that hinder their profitability and expansion of beef industry. This table also highlights the consequences of these challenges in the beef export industry. Nonetheless, the exporters' proposed interventions provide actionable solutions that can substantially improve the quality, productivity and competitiveness of halal beef exports. By putting these focused interventions—like process simplification, infrastructure development, skill training, and policy reforms—into practice, Pakistan may improve its standing in the international halal beef market,

fostering sustainable growth and providing access to high-value markets. This section highlights that our study significantly contributes to the existing literature (GOP, 2022; Tariq et al., 2022).

RECOMMENDATIONS & POLICY IMPLICATIONS

Based on the study findings, we recommend the following policy recommendations to enhance Pakistan's halal beef exports:

1. Implement an integrated and coordinated regulatory framework that includes enforcing the Animal Slaughter Control Act to preserve breeding females and fattening calves, banning live animal smuggling and developing a national FMD control program
2. Encourage investments in cold storage facilities at airports and imports of cold vans.
3. Ensure dedicated space for beef exports in passenger flights
4. Establish a robust quality control system at the slaughterhouses and airports
5. Promote PAITS to track breed and disease and breed
6. Build the capacity of farmers and exporters through training programs focused on best practices in feedlot management, animal health and export procedures
7. Develop training programs covering biosecurity measures, early disease detection and reporting
5. Encourage public-private partnerships to mobilize resources for infrastructure development, research, and technology adoption
6. Deregulating meat prices
7. Target high-value markets of China by ensuring compliance with their specific requirements
8. Promote the halal aspects of Pakistani beef, particularly in the Middle East and Southeast Asia

CONCLUSION

This study provides a comprehensive understanding of the art of halal beef exports from Pakistan. Specifically, it assesses the features of halal beef demanded by international importers, examines current export practices, identifies existing challenges and explores future opportunities in halal beef export industry. Additionally, the study provides short-term forecasts of the potential for halal beef exports, offering valuable insights for stakeholders. The results of the forecasting model, using secondary time series data, indicate that Pakistan has potential for growing its exports of chilled/fresh bovine meat under past and existing conditions facing the industry. Nonetheless, the findings of beef exporters' survey have highlighted major challenges including infrastructure to logistics issues to regulatory and quality concerns that hinder the country from realizing its full export potential. Key regulatory and logistic challenges include the lack of cold storage facilities at airports, inefficiencies in deboning technology and limited space available in passenger flights. Additionally, significant obstacles exist within the regulatory environment and quality control. These challenges complicate the export process, whether due to inadequate regulation in cases of illegal slaughtering and smuggling, FMD control, or inefficient regulation ensuring animal health, meat quality, meat prices and high export development fees, without supporting exporters in promoting exports or obtaining timely payments. Furthermore, exporters face greater financial risks due to the extended supply chain and on-credit export procedures. These challenges lead to increased expenses and decreased competitiveness in the global market. Accessing high-value markets such as Europe and China is further complicated by the lack of a robust animal traceability system and the incidence of FMD.

Despite these challenges, the study finds modest positive profit margins in the exports of chilled halal beef to Gulf nations, which can support the forecast short-term increases in export. The industry can also improve its competitiveness and profitability through focused interventions. By addressing these complex issues and bolstering its beef export capabilities, Pakistan can improve the economic outcomes for its beef industry and increase its share in the global halal beef market.

REFERENCES

- Aghwan, Z. A., Bello, A. U., Abubakar, A. A., Imlan, J. C., & Sazili, A. Q. (2016). Efficient halal bleeding, animal handling, and welfare: A holistic approach for meat quality. *Meat Science*, *121*, 420-428.
- Ahmed, H. M. (2022, February 12). Almost No Muslim country among top 10 halal product exporters. *The Halal Times*. <https://www.halaltimes.com/muslim-country-among-top-10-halal-products-exporters/>
- Ali, S. (2021, September 16). Pakistan has signed MoU with China to establish FMD free zone for livestock, Food Minister tells CICA event. *Gwadar Pro*. <https://www.gwadarpro.pk/1438389004982403073/pakistan-has-signed-mou-with-china-to-establish-fmd-free-zone-for-livestock-food-minister-tells-cica-event%20by%20Shafqat%20Ali>
- Asfia, N., Usman, M., & Munir, S. (2021). Sustainable supply chain performance of Pakistan's halal meat industry: Intermediating role of global technical standards (GTS) in the framework of quality function deployment (QFD) model. *Elementary Education Online*, *20*(4), 1641-1658.
- Audarya, S. D. (2020). Foot-and-mouth disease in India: past, Present and future outlook - A review. In Y. Shah & E. Abuelzein (Eds.), *Some RNA viruses*. London: IntechOpen.
- Aziz, K. (2023, August 10). Pakistan allows royal cell to export buffalo embryos to China. *Pakistan Defence Forum*. <https://defence.pk/threads/buffalo-farming-in-pakistan.652839/#post-14247706>
- Bhagal, S., & Beillard, M. J. (2023). *India's FMD status and its water buffalo: Carabeef trade update 2023*. United States Department of Agriculture (USDA) Report number IN2023-0044.
- Box, G. E., Jenkins, G. M., Reinsel, G. C., & Ljung, G. M. (2015). *Time series analysis: Forecasting and control*. John Wiley & Sons.
- Chepkwony, E. C., Gitao, G. C., Muchemi, G. M., Sangula, A. K., & Kairu-Wanyoike, S. W. (2021). Epidemiological study on foot-and-mouth disease in small ruminants: Sero-prevalence and risk factor assessment in Kenya. *PloS One*, *16*(8), e0234286.
- Cook, R. (2024, January 09). Ranking of countries with the most cattle. *National Beef Wire*. <https://www.nationalbeefwire.com/ranking-of-countries-with-the-most-cattle>
- FAO (Food and Agriculture Organization of the United Nations), EuFMD (European Commission for the Control of Foot-and-Mouth Disease), & OIE (World Organisation for Animal Health). (2018). *The progressive control pathway for foot-and-mouth disease control (PCP-FMD): Principles, stage descriptions and standards*. 2nd edition. <https://openknowledge.fao.org/server/api/core/bitstreams/117c6cd3-3a59-473f-82a9-19390271b610/content>
- FAO (Food and Agriculture Organization of the United Nations). (2016). *Final evaluation of the project development of a framework for the progressive control of foot and mouth disease in Pakistan*. Rome: FAO. <https://openknowledge.fao.org/server/api/core/bitstreams/a100a412-f8a4-41b1-ae9e-71ddb69baaf7/content>
- FAO (Food and Agriculture Organization of the United Nations). (2018). *OECD-FAO agricultural outlook 2018-2027*. OECD Publishing, Paris/FAO, Rome. https://doi.org/10.1787/agr_outlook-2018-en
- FAO (Food and Agriculture Organization of the United Nations). (2022, September 17). *FAO is*

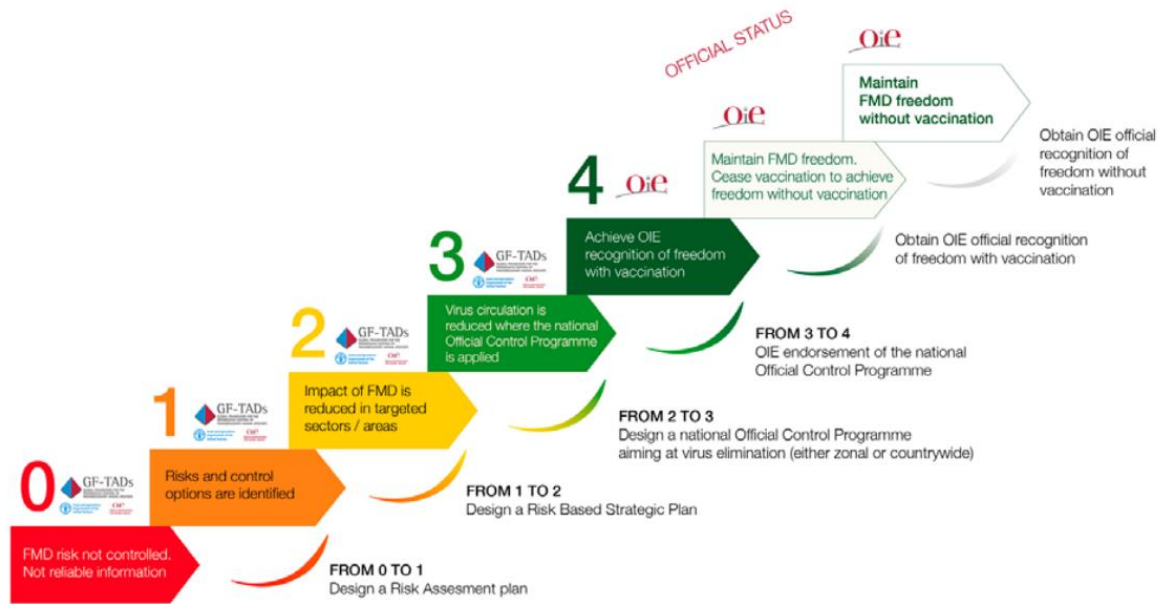
- working with the Government of Pakistan to eradicate foot and mouth disease (FMD)* [Video]. YouTube. <https://www.youtube.com/watch?v=wkrAu6NfqVo>
- Gibson, J., McKenzie, D., Rohorua, H., & Stillman, S. (2019). The long-term impact of international migration on economic decision-making: Evidence from a migration lottery and lab-in-the-field experiments. *Journal of Development Economics*, 138, 99-115.
- GOP (Government of Pakistan). (2022). *Pakistan export strategy meat 2023-2027*. Ministry of Commerce, Ministry of National Food Security & Research and International Trade Centre.
- GOP (Government of Pakistan). (2023). *Pakistan economic survey 2022-23*. Economic Advisor's Wing, Finance division.
- GOP (Government of Pakistan). (2024a). *Exports by commodities and countries*. Pakistan Bureau of Statistics, Islamabad. https://www.pbs.gov.pk/sites/default/files/external_trade/8_digit_level/export/D-10_Export-06-2023.pdf
- GOP (Government of Pakistan). (2024b, July 11). *Export of goods and services*. State Bank of Pakistan. https://www.sbp.org.pk/departments/stats/Annual_Export_Receipt/indexArc.htm
- GOP (Government of Pakistan). (2024c). *Pakistan economic survey 2023-24*. Economic Advisor's Wing, Finance division.
- Government of Punjab. (n.d.). (2023). *Livestock Punjab*. <https://livestock.punjab.gov.pk/directory-dge>
- Govindaraj, G., Krishnamohan, A., Hegde, R., Kumar, N., Prabhakaran, K., Wadhwan, V. M., ... & Habibur, R. (2021). Foot and mouth disease (FMD) incidence in cattle and buffaloes and its associated farm-level economic costs in endemic India. *Preventive Veterinary Medicine*, 190, 105318.
- Gunasekera, U., Biswal, J. K., Machado, G., Ranjan, R., Subramaniam, S., Rout, M., ... & VanderWaal, K. (2022). Impact of mass vaccination on the spatiotemporal dynamics of FMD outbreaks in India, 2008–2016. *Transboundary and Emerging Diseases*, 69(5), e1936-e1950.
- Hassan, M. M., Abbas, F., Ahmad, N., Nadeem, M., & Zia-Ur-Rehman, M. (2016). Challenges faced by the beef industry in Pakistan: A critical analysis. *Journal of Animal and Plant Sciences*, 26(5), 1335-1341.
- ITC (International Trade Centre). (2022). *Trade Maps: Trade statistics for international business development*. International Trade Center, Geneva, Switzerland.
- Jamal, S. M., Ahmed, S., Hussain, M., & Ali, Q. (2010). Status of foot-and-mouth disease in Pakistan. *Archives of Virology*, 155, 1487-1491.
- Javid, M. A., Khan, M. I., Mahmood, S., Mustafa, U., & Yousaf, M. (2019b). Challenges of beef industry in Pakistan: A review. *Journal of Animal and Plant Sciences*, 29(6), 1606-1611.
- Javid, M., Ullah, R., Rashid, A., & Shah, H. U. (2019a). Lack of standardization in grading and certification systems for meat products: A significant challenge for the beef industry in Pakistan. *Journal of Food Protection*, 82(2), 345-352.
- Khalid, M., Iqbal, S., & Haq, M. A. (2019). Challenges and opportunities for beef industry in Pakistan. *Journal of Animal Science*, 97(6), 2417-2424.
- Khan, A. S. (2022, May 22). Meat exports fall 21pc in 10MFY22. *Dawn*. <https://www.dawn.com/news/1690878>

- Khan, S., Nawab, A., Shahzad, K., Ali, A., Ali, I., & Tariq, M. (2019). Challenges faced by the beef industry in Pakistan: A review. *Journal of Animal Health and Production*, 7(2), 67-74.
- OECD (Observatory of Economic Complexity). (n.d). *Frozen bovine meat*. <https://oec.world/en/profile/hs/frozen-bovine-meat>
- PBC (The Pakistan Business Council). (2021). *Scaling-up bovine meat exports of Pakistan: A review of opportunities in the bovine meat sector*. Islamabad: PBC. <https://www.pbc.org.pk/research/scaling-up-bovine-meat-exports-of-pakistan-a-review-of-opportunities-in-the-bovine-meat-sector/>
- Randhawa, A. A., Magsi, H., & Shah, A. H. (2018). Growth performance of meat production and export in Pakistan: An analysis. *Journal of Animal & Plant Sciences*, 28(3), 883-888.
- Rehman, A., Deyuan, Z., & Chandio, A. A. (2019). Contribution of beef, mutton, and poultry meat production to the agricultural gross domestic product of Pakistan using an autoregressive distributed lag bounds testing approach. *Sage Open*, 9(3), 2158244019877196.
- Renub Markets (2023). *Global beef market, size, forecast 2023-2028, industry trends, growth, share, outlook, impact of inflation, opportunity company analysis. research and markets*. Renub Markets. <https://www.researchandmarkets.com/reports/5740671/global-beef-market-size-forecast-industry>
- ReportLinker. (n.d.). *Pakistan poultry meat industry outlook 2022 – 2026: Key market indicators*. <https://www.reportlinker.com/clp/country/1828/726402#introduction>
- Singh, R. K., Sharma, G. K., Mahajan, S., Dhama, K., Basagoudanavar, S. H., Hosamani, M., ... & Sanyal, A. (2019). Foot-and-mouth disease virus: Immunobiology, advances in vaccines and vaccination strategies addressing vaccine failures—an Indian perspective. *Vaccines*, 7(3), 90.
- Sohaib, M., & Jamil, F. (2017). An insight of meat industry in Pakistan with special reference to halal meat: A comprehensive review. *Korean Journal for Food Science of Animal Resources*, 37(3), 329.
- Straits Research. (2022, September 08). Halal meat market size is projected to reach USD 375.05 billion by 2030, growing at a CAGR of 7.1%: Straits research. *Global News Wire*. <https://www.globenewswire.com/news-release/2022/09/08/2512843/0/en/Halal-Meat-Market-Size-is-projected-to-reach-USD-375-05-Billion-by-2030-growing-at-a-CAGR-of-7-1-Straits-Research.html>
- Subramaniam, S., Mohapatra, J. K., Sahoo, N. R., Sahoo, A. P., Dahiya, S. S., Rout, M., ... & Singh, R. P. (2022). Foot-and-mouth disease status in India during the second decade of the twenty-first century (2011–2020). *Veterinary Research Communications*, 46(4), 1011-1022.
- Tariq, M., Ahmad, S., Mustafa, R., Sultan, H., Abdullah, M., Khalid, M.F., Cheema, U.B., Arshad, M., & Qureshi, R. A. M. (2022). Pakistan meat industry: Prospects and challenges for the future meat supply chain potential. *Pakistan Journal of Science*, 74(1), 1-11.
- Trading Economics. (n.d.). *Pakistan exports of meat and edible offal*. <https://tradingeconomics.com/pakistan/exports/meat-edible-meat-offal#:~:text=Pakistan%20Exports%20of%20meat%20and%20edible%20meat%20offal%20was%20US.COMTRADE%20database%20on%20international%20trade>.
- Wariss, H. M., Mukhtar, M., Anjum, S., Bhatti, G. R., Pirzada, S. A., & Alam, K. (2013). Floristic composition of the plants of the Cholistan Desert, Pakistan. *American Journal of Plant Sciences*, 2013.

Warriach, H. M., Ali, M., & Yasin, A. (2020). Beef cluster feasibility and transformation study. In A. Mubarik (Ed.), *Cluster development based agriculture transformation plan vision-2025*. Planning Commission of Pakistan, Islamabad, and Centre for Agriculture and Biosciences International (CABI), Rawalpindi.

APPENDICES

Appendix I: Stages of Progressive Control Pathway for FMD



Source: FAO et al. (2018)

Appendix II: List of Beef Exporters in Pakistan

Sr. No.	Name	Address
1	Nawaz	Abedin International (PVT) LTD. 670 A-II, Sector 4, Township, Lahore
2	Mehar Asghar	Al-Shaiza House No. 1, Street No. 4, Shadab Colony Road 18 Km Ferozpur Road Lahore
3	Abdul Hunnan	Managing Director Tazu Meat & Foods 3.5 Km Raiwind Manga Road Raiwind, Lahore
4	Arif	A & B Corporation 88-A Main Gulberg Lahore
5	Naeem Jandran	Al Mairaj International 4 Manga Road Near Nishat Chonian, Lahore.
6	Muhammad Akmal	Akmal Traders 633-G, Gulshan-e- Ravi, Lahore
7	Syed Hassan Raza	Syed Traders 177-B, Johar Town, Lahore
8	Asif Gias (Director) Tariq Gias (Director)	Zenith Associates 3.5 Km Manga Road Off Raiwind Road Lahore
9	Saith Mehmood Ahmed	Al Iman Trading Co. 231 Small Industrial Estate Kot Lakhpath Lahore
10	Muhammad Arif	Karigar Collection 88-A Main Boulevard Gulberg Lahore
11	Siddique	Green Meadows H No.201, Q Block DHA, Lahore
12	Mubarak	Kashif Traders H. No. 180 54/II Rifle Range Road Iqbal Park main Boulevard DHA, Lahore
13	Malik Fateh Sher	Abdali Traders 444-A Zeenat Block Allama Iqbal Town Lahore
14	Irfan Haider	Halal Meat Processing (PVT) LTD. Plot 1, CTC, Street 09, G-8/2, Islamabad
15	Tariq Butt	PK Livestock & Meat Co. (PVT) LTD. Musa Goth Razaqabad, National Highway, Karachi
16	Bilal Tata	Tata Best Foods LTD. HX - 1, Landhi Industrial Area, Karachi, Pakistan Head Office: 6 th Floor, Textile Plaza, M.A. Jinnah Road, Karachi - 74000, Pakistan.
17	Syed Mahmood Alam	THE Organic Meat Company (PVT.) LTD. First Floor, 66 C -68 C, 25 th Street, Tauheed Commercial, PHASE 5, DHA, Karachi. Pakistan
18	Ghulam Sarwar Sheikh	Pakistan Food Export 29/3-D, Raja Manzil Nursery P.E.C.H.S, Karachi
19	Asif Khannani	FOOD EX 259-H, BLOCK 6, P.E.C.H.S., KARACHI, PAKISTAN
20	Arfeen	Al-Aien Group 43/1, Khayaban-e-Halal, DHA Phase 6, Karachi

21	Faheem Anwar	Zainaib Enterprises Off 205, 2 nd Floor Mashriq Centre Gulshan-e-Iqbal Karachi.
22	Raja Faisal	Al-Barka Traders 29/3-D, Raja Manzil Nursery Commercial Area, P.E.C.H.S Karachi
23	Ghous	G.M Trading Shop No. 2, Dawood Pota Road, Karachi
24	Lieutenant Colonel Amer Hassan (Retired)	Fauji Meat Limited Chak No. 1, Deh Kohistan, Tapo Gharo Mirpur Sakaro, Dist. Thatha, Pakistan

Source: Authors' computations.

Appendix III: Questionnaire Deigned to Interview Beef Exporters

Questionnaire

Questionnaire on Art of Exporting Halal Beef from Pakistan

I, Shahzad Kouser, invite you to take a survey for research project entitled “The Art of Exporting Halal Beef: A Case Study of Pakistan” funded by PIDE-RAST Grant 5.0. This questionnaire is designed to understand the features of and current practices in the Halal beef export of Pakistan, along with major bottlenecks and opportunities for boosting the Halal beef exports. Later, we may share our findings in publications or presentations. This survey is completely voluntary. There are no negative consequences if you don’t want to take it. If you start the survey, you can always change your mind and stop at any time. We will not disclose your personal information to anyone. This survey will take maximum 30 minutes. Here, I would like to take your written consent to start face-to-face interview.

Signature of respondent: _____

A. Exporter’s profile:

1. Name of exporter _____
2. Age of exporter _____ (years)
3. Education of exporter _____ (years)
4. Address of exporter _____
5. Contact of exporter _____
6. Name of company _____
7. No of years in the export business (please tick the appropriate answer)
 - a) Less than 5 years
 - b) 6-10 years
 - c) 11-15 years
 - d) above 15 years
8. Do own the slaughterhouse? _____ (Yes/No)

B. Features and Profitability Analysis of Halal Beef Export:

9. Features of Halal beef and beef products exported during the last 6 months:

N o.	Produ ct name	Sourced from (name of area/slaug hterhouse)	Destinati on country	Quanti ty export ed (tonne)	Value of export (PKR lakh)	Cost of expor t (PKR lakh)	Carcass (full/ha lf) or cuttings	Bone or debo ne meat	Chille d or frozen or fresh	Which quality/s afety certificat e, do you require?
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

10. What exact features are demanded by importers for Halal beef and beef products in your destination market?

No.	Features of beef demanded in your destination market	Ranking of the features of beef demanded by importers in your destination market (1-10)	Do you fulfill those features? (Yes/No)	Constraints in meeting demanded features
1	Colour			
2	Freshness			
3	Tenderness			
4	Smell			
5	Age of animal			
6	Gender of animal			
7	Deboning			
8	Frozen			
9	Chilled			
10	Halal certificate			
11	SPS certificate			
12	Healthy animal certificate			
13	Packaging			
14	Hygiene			
15	FMD free			
16	Animal traceability			
17	Others			
18				
19				

11. What kind of expenditures do you bear to export 1 tonne of beef?

No.	Items	Cost (PKR/tonne)
1	Animal	
2	Feed	
3	Beef	
4	Slaughtering	
5	Cutting	
6	Chilling/freezing	
7	Packaging	
8	Transportation	
9	Air cargo/sea cargo	
10	Animal health certificate	
11	Halal certificate	
12	Livestock market charges	
13	Export Development Surcharge (EDS) (0.25%)	
14	Others	
15	Others	

C. Current practices in the supply chain of live animals or beef and beef products for export:

12. Do you buy live animal or beef or both? _____

13. Sources of supply

No.	Sources of live animals (tick)	Sources of beef or beef products (tick)
1	Own farm	Middleman

2	Farmers without keeping records of animals	Butcher
3	Farmers keeping records of progeny	Own slaughterhouse
4	Contract farming	Other slaughterhouse
5	Middleman	Retail market
6	Livestock market	Others
7	Aggregators at village level	
8	Others	
9		
10		

14. Rank the top five major problems in the supply chain of live animals if you buy live animals.

No.	Problems	Ranking on 1-5 scale
1	Low weight animal	
2	High prices	
3	Slaughtering of female cow	
4	FMD	
5	Animal traceability	
6	Others, _____	
7		

15. Do you also supply beef or beef products in the domestic market? ___ (Yes/No)

16. If yes, then what proportion of total supply do you sell in domestic market? _____

17. Which method of payments is commonly used for procuring live animal or beef and beef products for exports?

a) Advance payment (i) Full _____ (ii) Partial _____

b) Payment after delivery of the product (i) Full _____ (ii) Partial _____

18. Rank the top five major factors you consider in supplier's selection to procure live animal or beef or beef products for export

No.	Factors	Ranking on 1-5 scale
1	Quality of product	
2	Capacity to provide in bulk	
3	Proximity to cargo handling facility/port location	
4	Timely delivery	
5	Flexibility in different arrangements	
6	Affordable price	
7	Ability to provide different products	
8	Capacity to meet urgency	
9	Others (specify) _____	
10	Others (specify) _____	

D. Challenges faced by Exporters in the Halal Beef Export:

19. Ask if the exporter purchased live animals for beef export, then from where they avail the following services, and what are the most important challenges in the service delivery?

No.	Services	Source of services	Challenges in service delivery
1	Slaughtering		
2	Mechanical cutting		
3	Deboning		
4	Freezing		
5	Halal certification		
6	SPS certification		

7	Healthy animal certificate		
8	Testing of lean and fat		
9	Packaging		
10	Cold storage		
11	Cold transportation		
12	Assurance on FMD free beef or beef products		
13			
14			

20. Ask if the exporter purchased beef or beef products from the slaughterhouse, does slaughterhouse provide the following services and what the most important challenges in the service delivery?

No.	Services	Source of services (S=Slaughterhouse, otherwise mention the name)	Challenges in service delivery
1	Mechanical cutting		
2	Deboning		
3	Freezing		
4	Halal certification		
5	SPS certification		
6	Healthy animal certificate		
7	Testing of lean and fat		
8	Packaging		
9	Cold storage		
10	Cold transportation		
11	Assurance on FMD free beef or beef products		
12			
13			

21. Rank the top five major problems in obtaining various licenses for export of beef or beef products?

No.	Problems	Ranking on 1-5 scale
1	High license fees	
2	Lots of unnecessary documentation	
3	Difficulty in understanding requirements	
4	Large number of permission required	
5	Others, specify	
6		

22. Rank the top five major regulatory issues you face in export of beef and beef products?

Ranking on 1-5 scale	Regulatory issues	Consequences	Suggested policy measures
1			
2			
3			
4			
5			

23. Rank the top five major factors you consider in selecting target market for export of beef and beef products?

No.	Factors	Ranking (1-5)
1	Profit margin	
2	Relaxation in FMD free beef or beef products	
3	Relaxation in SPS measures	
4	Relaxation on animal traceability	
5	Export assistance/subsidy available from government	
6	Proximity of destination	
7	Ease in market access	
8	Existing Halal beef market potential	
	Preferential treatment (friendly nations)	
9	Others (please specify) _____	
10	Others (please specify) _____	

24. Rank the top five major channels you use to locate overseas buyers for export of beef or beef products?

No.	Problems	Ranking on 1-5 scale
1	Private sources	
2	Direct contact	
3	Directories of importers	
4	All Pakistan Meat Exporters & Processors of Pakistan (APMEPA)	
5	Export Promotion Bureau (EPB)	
6	Online tenders	
7	International food conferences	
8	Others (specify) _____	
9	Others (specify) _____	

25. How much time generally you take in clearance of your shipment and realization of payment by overseas buyers during the last 6 months? (please specify destination wise)

No.	Destination	Clearance of shipment	Realization of payment
1			
2			
3			
4			
5			

26. Rank the top five major bottlenecks/constraints/challenges in Halal beef or beef product export from Pakistan

Ranking on 1-5 scale	Challenges	Consequences
1		
2		
3		
4		
5		

E. Opportunities for enhancing Halal Beef Export:

27. Rank the top five major possible opportunities/suggestions/interventions for increasing Halal beef or beef product exports from Pakistan

Ranking on 1-5 scale	Opportunities/Suggestions/Interventions
1	

2	
3	
4	
5	

- F. Do you know GoP efforts on the development of FMD free zone in Cholistan and Sheikhpura? _____ Yes/No**
- G. Do you see development of FMD zone in Pakistan as a great opportunity for reaching distance beef export markets? _____ Yes/No**
- H. Information on Beef Importers in the Middle East**

No.	Name	Country	Contact
1			
2			
3			
4			
5			

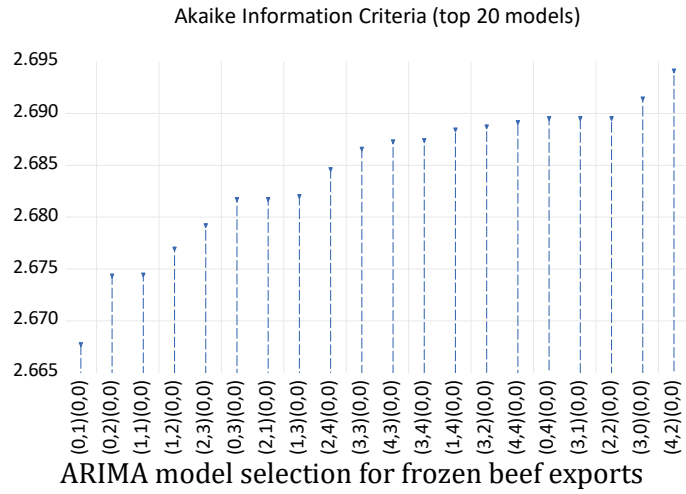
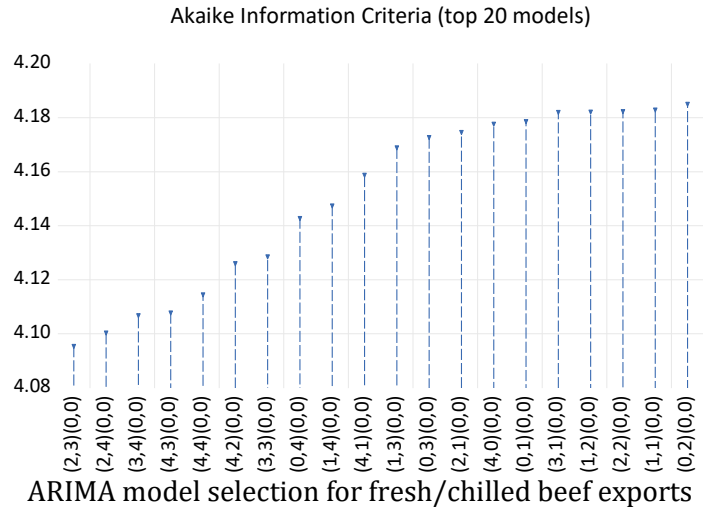
Thank you

Appendix IV: HS Codes for Meat Categories

Sr. No.	HS Codes	Meat categories
1	020110	Meat of bovine animals, carcasses and half-carcasses, fresh or chilled
2	020120	Meat of bovine animals, cuts with bone in (excluding carcasses and half-carcasses), fresh or chilled
3	020130	Meat of bovine animals, boneless cuts, fresh or chilled
4	020210	Meat of bovine animals, carcasses and half-carcasses, frozen
5	020220	Meat of bovine animals, cuts with bone in (excluding carcasses and half-carcasses), frozen
6	020230	Meat of bovine animals, boneless cuts, frozen
7	867	Meat of cattle
8	947	Buffalo meat

Source: GOP (2024a).

Appendix V: Akaike Information Criteria (AIC) for Best ARIMA Model Selection



Appendix VI: Freight Charges on 2nd January, 2024

Sr. #	Country	Average Air Freight Rate
1	Dubai (Emirates)	358
2	Dubai (RKT)	325
3	Sharja	351
4	Jeddah	192
5	Masqat	287
6	Dammam	336
7	Riyadh	329
8	Bahrain	321
9	Kuwait	409
10	Qatar	357
Total Destination Avg.		326.50

Appendix VII: Pakistan Bovine Meat Exports by Types and Countries in 2023

Countries	Fresh/Chilled bovine meat									Frozen bovine meat								
	Carcasses			Cut with bone			Boneless			Carcasses			Cut with bone			Boneless		
	Quantity	Value	Price	Quantity	Value	Price	Quantity	Value	Price	Quantity	Value	Price	Quantity	Value	Price	Quantity	Value	Price
	(tonne)	(m. Rs)	(Rs/kg)	(tonne)	(m. Rs)	(Rs/kg)	(tonne)	(m. Rs)	(Rs/kg)	(tonne)	(m. Rs)	(Rs/kg)	(tonne)	(m. Rs)	(Rs/kg)	(tonne)	(m. Rs)	(Rs/kg)
Bahrain	4,315	4,232	981	393	420	1,068	0.03	0.02	800	-	-	-	-	-	-	-	-	-
Egypt	1	2	1,494	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hong Kong	2	1	767	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Iraq	-	-	-	5	5	1,049	-	-	-	-	-	-	-	-	-	23	18	775
Jordan	12	13	1,017	-	-	-	6	6	925	-	-	-	-	-	-	4	7	1699
Kazakastan	-	-	-	346	196	567	-	-	-	-	-	-	-	-	-	-	-	-
Kuwait	9,629	12,518	1,300	456	513	1,125	-	-	-	-	-	-	59	45	761	-	-	-
Malaysia	0.14	0.2	1,511,111	-	-	-	-	-	-	-	-	-	-	-	-	28	40	1393
Maldives	-	-	-	28	27	-	-	-	-	-	-	-	112	94	-	0.72	0.59	815
Oman	2,790	2,609	935	4	4	1,008	2	2	1,315	11	8	699	59	41	692	4	3	722
Qatar	7,528	7,699	1,023	6	6	991	1	1	1,340	-	-	-	43	32	749	-	-	-
Saudi Arabia	12,864	14,164	1,101	536	471	879	78	79	1,013	-	-	-	481	409	851	26	19	-
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	82	73	891
UAE	43,123	43,795	1,016	681	671	986	13	17	1,252	1	0.48	422	80	64	803	3	4	1103
Uzbekistan	1,116	851	762	21	23	1,118	31	32	1,049	1,664	1,465	880	42	43	1,039	122	121	995
Vietnam	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56	19	337
Total	81,380	85,884	1,055	2,477	2,338	944	130	137	1,048	1,677	1,473	879	876	729	832	349	304	870

Source: GOP (2024a).