



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA
Denkleiers • Leading Minds • Dikgopolo tš'a Dihlalefi

South African market access challenges in the European Union: a case of regulatory compliance and non-tariff measures

by

Khanimamba Hlungwani

For the degree of MSc (Agric) Agricultural Economics and Agribusiness Management
Department Agricultural Economics, Extension and Rural Development

Supervisor: Dr M. Kalaba

January 2023

DECLARATION

I, Khamimamba Hlungwani

Khamimamba Hlungwani

January 2023

DEDICATION

I dedicate this dissertation to all Agricultural Economists who come after me. The journey is fun. The journey can be challenging. However, it is extremely rewarding. Never stop learning – be of a teachable spirit.

ACKNOWLEDGEMENTS

I could never have accomplished this research alone. I would, therefore, like to thank the following individuals:

- The one true God for the grace to conduct this project and the ability to continue, even when I did not want to. I can truly do all things through Christ, who gives me strength.
- My parents, for your patience and accepting the reality of having a ‘professional student’ for a daughter. Thank you for providing the environment to pursue my dreams and for always being there when I needed you.
- My family, for allowing me the space to focus on my studies and understanding when I had to cut my time with you for the project.
- Tatana Baloyi, my husband, for your understanding and support throughout this journey. For allowing me to sneak into the study for one more hour of “masters” at odd hours of the day. Thank you for your encouragement when I thought this was not coming together.
- Dr Mmatlou Kalaba, my supervisor, for the support and advice throughout this process. Thank you for your patience when I did not respond when you wanted me to or in the manner required. Thank you for not giving up on the project. This project is what it is today because of your counsel. Thank you, Sir!
- The Bureau for Food and Agricultural Policy (BFAP) team, for your support and encouragement—I thank you. This includes financial support. Without your assistance, this project would not have been possible. Thank you for an environment to learn and grow as a professional.
- The African Economic Research Consortium (AERC), for funding part of this project.
- All my friends and church members, for your love and support. Thank you for all the phone calls to check how everything is going. I look forward to spending a lot more time with you.
- I thank Elizabeth Marx from Academic and Professional Editing Services (APES) for editing and formatting my report.

I am so grateful to God for having you all in my life and for all the help you afforded me on this journey. God bless you, and I appreciate you so much. May He keep you and shine His

face upon you. I look forward to having free weekends without the guilt of not working on my master's degree.

South African market access challenges in the European Union: a case of regulatory compliance and non-tariff measures

By: Khanimamba Hlungwani

For the degree of MSc (Agric) Agricultural Economics and Agribusiness Management

Department Agricultural Economics, Extension and Rural Development

Supervisor: Dr M. Kalaba

ABSTRACT

The World Trade Organization (WTO) was formed in 1995. Since then, trade liberalisation has been on the agenda, resulting in diverse trade agreements and a subsequent decline in import tariffs. With the decrease in import tariffs, trade is expected to increase. However, despite this trend as well as a great increase in global trade since the 1990s, certain developing countries still struggle to participate in global trade.

South Africa and the European Union (EU) trade agreements have existed since 2000. This is through the Trade, Development and Cooperation Agreement (TDCA)—later replaced by the Southern African Development Community-European Union Economic Partnership Agreement (SADC-EU EPA) in 2016. The expected result of such agreements is an improvement in trade relations and flows between the partners. Thus, it can be expected that South Africa would export more orientated products to the EU.

South Africa became a net beef exporter in 2014. Trade flows for beef between South Africa and the EU, however, reveal the opposite of what was expected. Beef exports from South Africa to the EU have declined since the early 2000s. Trade patterns demonstrate that South Africa increasingly traded with countries with which it had no formal trade agreements, such as in the Middle East and East Asia. South African beef exports to the EU rapidly declined despite trade liberalisation between the two trading partners and South Africa becoming a net beef exporter. Thus, this research investigates South Africa's market access challenges in the EU.

Since the decrease in beef import tariffs did not result in the expected increase in trade between South Africa and the EU, this study focused on investigating whether the observed trends relate to non-tariff measures applied. It further investigated whether the lack of market access concerns non-compliance with EU Non-tariff measures (NTMs) regulations and requirements.

The gravity model of international trade assessed the effects of EU NTMs and South Africa's compliance with these regulations on its beef exports to the EU. This model involved data between 1995 and 2018. Beef exports from South Africa destined for the EU were the dependent variable. Gross domestic product (GDP) per capita in South Africa and the EU, NTMs applied by the EU, beef production in South Africa, tariffs, and a compliance variable functioned as explanatory variables.

A compliance index variable was developed to evaluate South Africa's compliance with EU NTM regulations and requirements. This index was developed from South Africa's policies complying with EU NTMs in a specific year, and NTMs enforced by the EU. The policies and NTMs focused on animal products, particularly red meat products, between 1995 and 2018.

This study established that NTMs applied on beef imports by the EU have harmed South Africa's beef exports to the EU. Furthermore, although trade agreements between South Africa and the EU have reduced tariffs applied in the beef industry, tariffs continue to negatively affect South Africa's beef exports to the EU. In evaluating South Africa's compliance with EU NTM regulations, a divergence was established between EU NTM regulations and requirements on animal products and South Africa's policies on the same products. During the period when South Africa's beef exports to the EU declined, NTMs applied by the EU increased quicker than South Africa's response to them. The divergence between EU NTM regulations and requirements and South Africa's policy response and thus compliance was prevalent between 2010 and 2018. Thus, the study recommends an evaluation of South Africa's policies, affecting beef trade and other animal products such that they respond to the changing trade environment, particularly with respect to the use of NTMs.

Key words: Non-tariff measures, NTMs, market access, standards and regulations, compliance, beef

TABLE OF CONTENTS

DECLARATION	i
DEDICATION	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT.....	v
TABLE OF CONTENTS.....	vii
LIST OF FIGURES	x
LIST OF TABLES	xi
ACRONYMS AND ABBREVIATIONS	xii
CHAPTER 1 : INTRODUCTION AND BACKGROUND	1
1.1 BACKGROUND.....	1
1.2 PROBLEM STATEMENT	3
1.3 RESEARCH OBJECTIVES	4
1.4 HYPOTHESES	5
1.5 RESEARCH DESIGN AND METHODOLOGY.....	5
1.6 JUSTIFICATION OF THE STUDY	10
1.7 STUDY OUTLINE	11
CHAPTER 2 : NON-TARIFF MEASURES IN THE BEEF INDUSTRY	12
2.1 INTRODUCTION.....	12
2.2 UNDERSTANDING NON-TARIFF MEASURES	12
2.3 INTERNATIONAL TRADE STANDARDS AND REGULATIONS	14
2.3.1 The Codex Alimentarius Commission.....	15
2.3.2 The Role of the International Organization for Animal Health.....	15
2.3.3 The World Trade organization’s agreement on applying SPS measures.....	16
2.4 IMPORT STANDARDS AND REGULATIONS IN THE EUROPEAN UNION ..	18
2.4.1 European Union food laws.....	18
2.4.2 European Union import requirements for products of animal origin	20
2.5 SOUTH AFRICAN STANDARDS AND REGULATIONS APPLICABLE TO BEEF EXPORTS	21
2.6 CONCLUSION	23
CHAPTER 3 : SOUTH AFRICA’S COMPLIANCE WITH STANDARDS AND REGULATIONS.....	25

3.1	INTRODUCTION.....	25
3.2	SOUTH AFRICA’S COMPLIANCE WITH INTERNATIONAL ORGANIZATION FOR ANIMAL HEALTH STANDARDS AND REGULATIONS	25
3.3	SOUTH AFRICA’S COMPLIANCE WITH EUROPEAN UNION STANDARDS	28
3.4	FACILITATION OF COMPLIANCE: A CASE OF FOOT AND MOUTH DISEASE	30
3.5	CONCLUSION	32
	CHAPTER 4 : RESEARCH METHODOLOGY	34
4.1	INTRODUCTION.....	34
4.2	THE GRAVITY TRADE MODEL	34
4.2.1	The gravity model equation specification.....	36
4.2.2	Motivation for the gravity model.....	37
4.3	EXPLANATORY VARIABLES	38
4.3.1	The non-tariff measure variable.....	39
4.3.2	The compliance variable	40
4.4	CONCLUSION	42
	CHAPTER 5 : STUDY RESULTS AND ANALYSIS	43
5.1	INTRODUCTION.....	43
5.2	AN ACCOUNT OF THE VARIABLES	43
5.3	ASSESSING THE EFFECT OF NON-TARIFF MEASURES ON SOUTH AFRICA’S BEEF EXPORTS TO THE EUROPEAN UNION.....	44
5.3.1	Model diagnostics	45
5.3.2	Results and analysis of the effect of European Union non-tariff measures on South African beef exports.....	47
5.4	EVALUATING SOUTH AFRICA’S COMPLIANCE WITH EUROPEAN UNION NON-TARIFF MEASURE REGULATIONS	49
5.4.1	The compliance variable	50
5.4.2	Model diagnostics	52
5.4.3	Results and analysis of South Africa’s compliance with European Union non-tariff measures	53
5.5	CONCLUSION	55
	CHAPTER 6 : CONCLUSION AND RECOMMENDATIONS	56
6.1	INTRODUCTION.....	56

6.2	REVISITING THE RESEARCH OBJECTIVES	56
6.3	RESEARCH ACHIEVEMENTS AND LIMITATIONS	58
6.4	RECOMMENDATIONS FOR FUTURE STUDY	58
	REFERENCES	60
	APPENDIX A: NON-TARIFF MEASURES: DEFINITION AND CLASSIFICATION ...	69
	APPENDIX B: EXPORTING TO THE EUROPEAN UNION	73
	APPENDIX C: EUROPEAN UNION APPROVED BUSINESS ESTABLISHMENTS.....	74
	APPENDIX D: PERFORMANCE OF THE VETERINARY SERVICES RESULTS OF SOUTH AFRICA.....	75
	APPENDIX E: LIST OF CODEX REFERENCE STANDARDS	82

LIST OF FIGURES

Figure 1:1: South African beef export destination since 1992	3
Figure 2:1 Non-tariff measures in World Trade in 2018	13
Figure 2:2 Applying sanitary and phytosanitary measures across various industries	14
Figure 3:1: The European Union non-tariff measures affecting beef trade from 1995 to 2018	29
Figure 3:2: South Africa's beef exports to the European Union	30
Figure 3:3 Foot and mouth disease cases reported from 2006 to 2018 in South Africa.....	31
Figure 5:1: Accumulation of the European Union non-tariff measures and South Africa's policies from 1995 and 2018.....	50
Figure 5:2: Representation of South Africa's compliance with European Union non-tariff measures.....	51
Figure 5:3: The difference between European Union non-tariff measures and South Africa's policies	54
Figure A.0:1: SPS notifications by the World Trade Organization members since 1995	71

LIST OF TABLES

Table 1.1: Description of variables used in the study	8
Table 2.1: European Union food laws	19
Table 2.2: South African regulations affecting the production and marketing of animal products	21
Table 4.1: Expected relationships between the independent and the dependent variable	38
Table 5.1: Descriptive statistics of the variables	43
Table 5.2: Results of diagnostics tests	46
Table 5.3: Test for multicollinearity	46
Table 5.4: Gravity model results on the effect of non-tariff measures	47
Table 5.5: Results of the diagnostic tests	52
Table 5.6: Test for multicollinearity results	53
Table 5.7: Gravity model results on South Africa's compliance	54
Table A.1: Classification of non-tariff measures according to the United Nations Conference on Trade and Development	70
Table D.1: Summary of International Organization for Animal Health performance of the veterinary services evaluation results	76

ACRONYMS AND ABBREVIATIONS

AERC	Agriculture Economics and Rural Communities
APES	Academic and Professional Editing Services
ARC	Agricultural Research Council
BFAP	Bureau for Food and Agricultural Policy
BSE	Bovine spongiform encephalopathy
CAC	Codex Alimentarius Commission
DAFF	Department of Agriculture, Forestry and Fisheries
DALRRD	Department of Agriculture, Land Reform and Rural Development
EC	European Commission
EPA	Economic Partnership Agreement
EU	European Union
FAO	Food and Agricultural Organization
FMD	Foot-and-Mouth Disease
FVO	Food and Veterinary Office
GATT	General Agreement on Tariffs and Trade
HS	Harmonised System
IDC	Industrial Development Corporation
IPPC	International Plant Protection Convention
ITC	International Trade Centre
LITS	Livestock Identification and Traceability System
MRL	Maximum Residue Limits
MT	Metric Tonne
NTB	Non-tariff barrier
NTM	Non-tariff measure
OECD	Organization for Economic Cooperation and Development
OIE	International Organization for Animal Health
OLS	Ordinary Least Squares
PVS	Performance of the Veterinary Services
RPO	Red Meat Producers Organization
SADC	Southern African Development Community
SOP	Standard Operating Procedure

SPS	Sanitary and phytosanitary
TBT	Technical barriers to trade
TDCA	Trade, Development and Corporation Agreement
UNCTAD	United Nations Conference on Trade and Development
VIF	Variance Inflation Factor
VS	Veterinary Services
VSF	Veterinary Statutory Body
WHO	World Health Organization
WITS	World Integrated Trade System
WTO	World Trade Organization

CHAPTER 1: INTRODUCTION AND BACKGROUND

1.1 BACKGROUND

The global demand for livestock products evolved in the last two decades leading to 2018. Total meat consumption increased 65% between 1995 and 2018, from 166 thousand tonnes in 1995 to 310 thousand tonnes by 2018 (Organization for Economic and Cooperation Development-Food and Agriculture Organization (OECD-FAO), 2021). This demand for livestock products such as beef is projected to flourish in the coming years (OECD-FAO, 2018; BFAP, 2018). From 1995 to 2018, consumption of high-value meat, such as beef, also increased from 54 thousand tonnes to 70 thousand tonnes (OECD-FAO, 2021).

Increasing populations together with expanding economies contribute to the growing demand for animal products. Growing economies result in high incomes, which further perpetuate increased urbanisation and changes in consumer preferences (Morgan & Prakash, 2006; Scoones et al, 2010; Industrial Development Corporation (IDC), 2018; Latino et al, 2020). According to the World Bank data, the world population increased from 5.7 billion in the early 1990s to 7.6 billion by 2018; urbanisation and GDP per capita increased by an annual average of 2% and 1.5%, respectively. The growing demand for livestock products has been indisputable in developing countries (Latino et al, 2020), causing increased trade, with global beef imports emerging from \$12.7 billion in 2001 to \$46.9 billion in 2018 (Trademap data, 2022).

The increased demand for beef and subsequent rise in beef trade created an opportunity for countries, even developing countries, to participate in the global meat industry (Morgan & Prakash, 2006). According to trade from the International Trade Centre's Trade Map, the share of global beef exports from developing nations, such as Brazil, India, South Africa, and Mexico, heightened from 16% in the early 2000s to 40% by 2020. Despite this increase of developing countries in global trade, some export orientated countries still struggle to gain market access (Grundke & Moser, 2016).

For market access to occur, partners must agree on the trade conditions in which to trade. These conditions include requirements on tariffs applied and non-tariff measures (NTMs) imposed on the traded product (World Trade Organization (WTO), 2022). While tariffs are duties

imposed on the product by the importing country, NTMs are measures other than tariffs, often in the form of policies, standards, and regulations, the product(s) must comply to in acquiring access to a market(s). In their paper, Grundke & Moser (2016) investigated how some countries are denied access to the United States (US) market due to lack of compliance. Thus, exporting countries complying with the applied NTMs are more inclined to gain market access than those that do not comply (Scoones et al., 2010; De Melo & Alessandro, 2018).

Multilateral, regional, and bilateral trade agreements since the World Trade Organization (WTO) formation resulted in a significant drop in import tariffs (Guimaraes, 2012; Kalaba & Kirsten, 2014; Santeramo & Lamonaca, 2019). This, however, did not cause the expected rise in trade among countries (Phaswana, 2018). Several countries still struggle to acquire access to certain markets (especially when trading agricultural products) despite reduced import tariffs because of a lack of compliance with NTMs. Studies (Kalaba & Kirsten, 2014; United Nations Conference on Trade and Development (UNCTAD), 2013; WTO, 2020) indicate that applying NTMs in global trade creates obstacles for exporting countries to access some export markets. According to Kalaba and Kirsten (2013), these NTMs can be more restrictive than tariffs, thus, NTMs may distort trade among countries significantly.

South Africa entered trade agreements with the European Union (EU), starting with the Trade, Development and Corporation Agreement (TDCA) in 2000. This agreement was replaced by the Southern African Development Community - European Union Economic Partnership Agreement (SADC-EU EPA) in 2016. These agreements aim to facilitate trade and increase market access between the members. Trade between South Africa and the EU was, therefore, expected to increase. Although exports to the EU have developed in some industries, this has not been the case in the beef industry. According to data from ITC Trade Map, the value of total exports from South Africa to the EU increased from \$6.8 billion in 2001 to \$17.6 billion in 2018. On the other hand, beef export value declined from \$1.5 million in 2001 to \$249 thousand in 2018.

Trade agreements between South Africa and the EU reduced South African beef tariffs. Import tariffs dropped from about 70% in the 1990s to 12.8% since the signing of the TDCA in 2000. The lack of market access for South African beef in the EU implies that there are other factors influencing the market accessibility of South African beef in the EU besides import duties.

1.2 PROBLEM STATEMENT

South Africa has traded as a net beef importer since the early 1990s; however, this changed in 2014 when South Africa became a net beef exporter, following the decision by the International Organization for Animal Health (OIE) to recognise South Africa’s foot-and-mouth disease (FMD) free zone (DAFF, 2015; IDC, 2018). South Africa could, therefore, access markets previously closed owing to the lack of a favourable health status. A favourable health status, thus, acts as an indicator to trading partners of an exporter’s compliance with international animal health requirements (OIE, 2011).

South African beef exports advanced significantly in several export markets. These markets include countries in Southern Africa, the Middle East, and East Asia. Although this is the case, some trading partners—particularly the EU—refuse beef products from South Africa. In the last two decades, South African beef export destinations changed considerably. In the early 1990s, approximately 80% of South African beef was exported to the EU. From 1992 to 2018, that pattern changed with 10% of South African beef exported to the EU in 2010; 2% in 2013, and almost nothing exported to the region in 2018. Figure 1:1 signifies these changing trade dynamics.

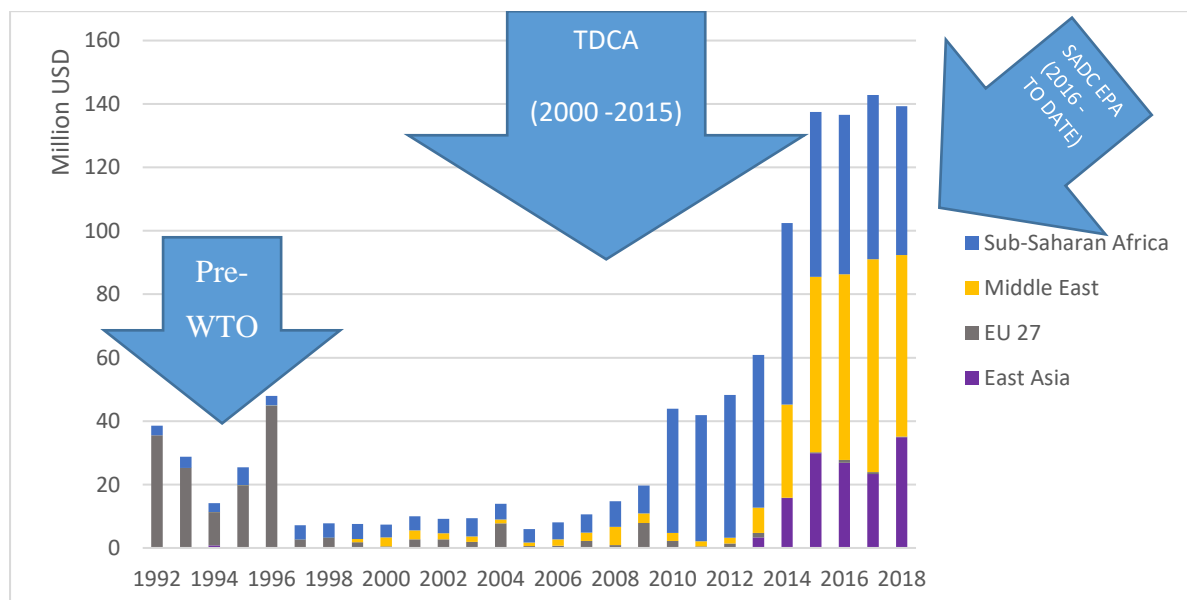


Figure 1:1: South African beef export destination since 1992

Source: WITS Data (2019)

Beef exports to the EU declined, whereas exports to East Asia, the Middle East, and sub-Saharan Africa increased substantially. Before 2000, exports to East Asia and the Middle East were almost non-existent. This changed with the value of South African beef exports to these regions, growing from \$85.6 thousand and \$2.8 million in 2000 to \$34.9 million and \$57.2 million in 2018, respectively. The value of exports to sub-Saharan Africa also increased from \$3.99 million in 2000 to \$29.9 million in 2018. On the other hand, from 2001 to 2018, exports to the EU declined from \$1.5 million to \$249 thousand.

The recent beef trade patterns observed between South Africa and the EU are against expectations. This is considering historic trade patterns, South Africa and the EU's trade agreements and South Africa's net export trade position. The research problem is that South Africa has observed a substantial increase in beef exports since 2014, has reduced import tariffs through the signing of trade agreements with the EU, and has a favourable health status from the OIE, however, South Africa has not grown beef exports to the EU.

1.3 RESEARCH OBJECTIVES

This study evaluates market access challenges in South Africa when exporting beef to the EU. The focus is on the use of NTMs as well as compliance to these NTM regulations. The study attempts to respond to the following questions:

- Do NTMs applied to South African beef exports by the EU influence the decline in beef exports to the EU?
- Does South Africa comply with EU NTM requirements?

To answer these questions, the factors that may contribute to the decline in South Africa's beef exports to the EU are assessed, with a focus on the effect of NTMs. This is followed by an evaluation of South Africa's compliance with EU NTM regulations and requirements. Consequently, this study's research objectives are:

- To assess the effects of EU NTMs on South Africa's beef exports to the EU

- To develop an NTM compliance variable in the form of a compliance index
- To evaluate South Africa's compliance with EU NTM regulations and requirements

1.4 HYPOTHESES

NTMs in the trade of agricultural products, particularly animal products, have become prevalent in the last few decades (UNCTAD, 2013; Kalaba, 2014, De Melo & Alessandro, 2018; Hernandez, 2019). Therefore, it is hypothesised that NTMs and the lack of compliance to these NTM regulations in the South African beef industry resulted in the observed trade patterns between South Africa and the EU.

The study, therefore, assesses the following hypotheses:

- The NTMs enforced by the EU harmed South Africa's beef exports. NTMs, often in the form of strict import regulations and requirements, have significantly influenced South African beef exports to the EU - Such measures limited access to the EU market for South African beef.
- Developing a compliance index will assist in evaluating South Africa's compliance level with EU NTM regulations. The index will help assess the relationship between South Africa's beef exports to the EU and compliance to NTM regulations
- It is hypothesised that South Africa has failed to comply to the EU's NTM regulations and requirements. Furthermore, the lack of compliance with certain NTM regulations has contributed to the declining of South Africa's beef exports to the EU.

1.5 RESEARCH DESIGN AND METHODOLOGY

The gravity model has been employed in global trade studies to analyse trade patterns among countries and the factors influencing those patterns (Kalaba, 2014; Scheltema, 2014). It is for this reason that this study also uses the gravity model of global trade to assess the factors contributing to the declining beef exports from South Africa to the EU.

The gravity model has, since the early 1960s, been used to determine the relationship between the trade patterns (imports and exports) observed among countries (Van Tongeren, 2009;

Beghin et al, 2015; De Melo & Alessandro, 2018). This is conducted by analysing the factors that might increase trade among countries and those factors that might limit it. Tinbergen (1962) was one of the first to use the gravity model in international trade. The gravity equation he used remarks that trade among countries is directly proportional to the size of the countries' economy and inversely proportional to the trade distance among those countries.

$$T_{ij} = \frac{(GDP)_i(GDP)_j}{(Dist)_{ij}} \quad (1.1)$$

Where: T_{ij} is the trade pattern observed among countries i and j ; GDP_i and GDP_j are the gross domestic products of countries i and j , respectively, and $Dist_{ij}$ is the trade distance between the countries. Trade distances constitute barriers or costs to trade (Beghin et al, 2015). The gravity model of international trade, therefore, is a suitable instrument for assessing the effects of EU NTMs on South Africa's beef exports as well as evaluating South Africa's compliance with these NTM requirements.

The gravity model equation has taken various forms over the years (Vollrath et al, 2009). For the purposes of this study, two equations were used. The first equation (Equation 1.2) assesses the effect of EU NTMs on South Africa's beef exports. The second equation (Equation 1.3) evaluates South Africa's compliance with the EU NTMs. The following equation expressions are used:

$$\ln X_{ij} = \beta + \beta PRO_i + \beta GDPPC_i + \beta GDPPC_j + \beta T_{ij} + \beta NTM_j + \varepsilon \quad (1.2)$$

$$\ln X_{ij} = \beta + \beta PRO_i + \beta GDPPC_i + \beta GDPPC_j + \beta T_{ij} + \beta COMIND_i + \varepsilon \quad (1.3)$$

Where:

- X_{ij} represents the volume of beef exports from South Africa to the EU
- PRO_i represents beef production in South Africa
- $GDPPC_j$ represents the gross domestic product per capita of the EU
- $GDPPC_i$ represents the gross domestic product per capita of South Africa
- T_{ji} represents the tariffs imposed on South African beef when exporting to a country
- NTM_{ji} indicates the number of non-tariff measures applied to South African beef by the EU. The study uses sanitary and phytosanitary measures as a measure of the NTMs applied
- $COMIND_{ij}$ is an index representing South Africa's compliance with EU NTMs
- ε represents the error term, a variable that factors in all other variables not included in the equation that may influence the trading relationship between the countries

The study used time-series data between 1995 and 2018 to achieve the study objectives. The period of analysis (1995 – 2018) was chosen because 1995 is the year trade liberalization started taking shape, with the formation of the WTO, while 2018 is the year before South Africa lost its FMD free zone status again, which meant the lack of compliance with OIE standards (OIE, 2011). Table 1.1 explains the variables employed in the study. The dependent variable was South Africa's beef exports to the EU. The independent variables were GDP per capita in South Africa and the EU, the total volume of South Africa's beef production, tariffs applied on beef imports from South Africa, EU NTMs on beef and a compliance variable in an index. These variables influence the beef exported from South Africa to the EU.

Table 1.1: Description of variables used in the study

Variable	Discussion
Dependent variable	
Exports	The volume of South African beef exports to the EU between 1995 and 2018
Independent variables	
South African production	The beef produced in South Africa determines how much can be exported. Therefore, a positive relationship is expected between beef production in South Africa and the volume of beef exported. This implies that, the more beef is produced, the more beef is potentially available to export to other countries
GDP per capita in South Africa and the EU	Gross domestic product per capita, proceeding as a proxy for income, indicates the purchasing power of the consumers in the country concerned. High GDP per capita implies that consumers are most inclined to afford the traded product High GDP per capita in the EU should cause more beef exports from South Africa to the EU. High GDP per capita in South Africa will cause fewer beef exports from South Africa because this will imply that South African consumers have the purchasing power to buy beef in the local market
Tariffs imposed by the EU	These are the import duties South African beef is subjected to when entering the EU market. High import duties reduce trade among countries. Therefore, a negative relationship is expected between South African beef exports and the tariffs imposed on those exports
NTMs imposed by the EU	NTMs are the standards, regulations, and policies subjected to South African beef exported to the EU. The more stringent these are, the less likely it is that the two regions will trade, as this may increase production costs

Compliance index	This index is a proxy for South Africa's compliance with EU NTMs. Therefore, a high index will cause more exports of beef from South Africa to the EU, implying that a positive relationship is expected between the dependent and the independent variables
-------------------------	--

In addition, a comparison between NTMs enforced by the EU and South Africa's regulations and policies on animal products was conducted to develop the compliance index. The number of South African policies complying with EU NTM regulations in a specific year was divided by the number of EU NTM regulations in that same year. A value of less than one (1) meant that South Africa did not comply with EU NTMs, whereas a value equal to one (1) meant full compliance. Where the value was greater than one (1), South Africa not only complied with requirements in that specific year but also in previous years. This was conducted using data from the EU Commission, the Department of Agriculture, Land Reform and Rural Development, South Africa's government portal and other international organisations, such as the OIE and WTO. The study objectives could be achieved by implementing the methodology and data abovementioned.

1.6 JUSTIFICATION OF THE STUDY

The livestock sub-sector is an important part of the South African agricultural sector as the major agricultural GDP contributor. The beef industry is the second largest contributor to agricultural GDP, contributing 13% to the gross production value of the agricultural sector (BFAP, 2020). The industry has experienced vast growth in the last 10 years, is a source of foreign currency through exports, and has the potential to be a vehicle for inclusive transformation and job creation (BFAP, 2020). It is, therefore, important to assess and discuss the factors that can affect the realisation of this potential.

The ability to export to markets, such as the EU, can bring high incomes to the South African agricultural sector in that these are high value markets, with more purchasing power than the local market (Beghin et al, 2015). The EU holds some of the most stringent import standards and regulations, particularly in importing animals and animal products (Santeramo & Lamonaca, 2019). Some countries even use access to the EU as an indication of the high safety and quality of products imported (Stevens & Kennan, 2005). Therefore, gaining access to the EU by complying to their import standards and regulations may open other markets for South African beef exports.

The study revealed that NTMs have harmed South Africa's beef exports to the EU, over the last two decades, with a decline in exports while NTMs imposed rose. Although, the study used the EU to illustrate the effect of these factors on exports, this can be applicable to other export

markets as well. Thus, it is imperative that the South African beef industry takes note of the requirements by different export markets as well as comply with the requirements from markets with which it wishes to trade (Santeramo & Lamonaca, 2019). With these insights, the industry can position itself to meet the requirements established in these NTMs and gain access to more trade markets.

The compliance index developed in this study can also be a useful instrument for policymakers, researchers, and the industry. The index identifies areas where South Africa may lack compliance with international and national import regulations and requirements. Identifying the divergence in compliance can be useful for policymakers, as they can enact relevant policies to ensure compliance. Researchers can use the developed index as a base for additional studies.

This study further highlights the importance of government and policy makers in the growth of the beef industry. It is revealed that policymakers should formulate policies that respond and/or address the changing international trade environment as well as the requirements of trade partners (Morgan & Prakash, 2006). This study can also contribute for the betterment of international trade agreements, improved dialogues, and negotiations.

1.7 STUDY OUTLINE

This study is comprised of the following six chapters:

- Chapter 1 is the introduction, providing a background while remarking on the problem statement and the study objectives.
- Chapter 2 provides a perspective on the international beef regulatory environment by exploring the NTMs, specifically the standards and regulations for beef exports.
- Chapter 3 explores South Africa's compliance with international and national import requirements.
- Chapter 4 provides the method and procedures implemented to achieve the study objectives.
- Chapter 5 describes and analyses the results.
- Chapter 6 provides the conclusion and recommendations from the study.

The rest of the document consists of the abovementioned chapters with the indicated content.

CHAPTER 2: NON-TARIFF MEASURES IN THE BEEF INDUSTRY

2.1 INTRODUCTION

Non-tariff measures (NTMs) in import regulations and requirements became an integral part of trade among countries (Van Tongerene, 2009; Guimaraes, 2012; UNCTAD, 2013; Kinzius et al, 2018). Complying with these measures determine a country's access to an export market (Grundke & Moser, 2016; De Melo & Alessandro, 2018). This chapter describes NTMs applied to agricultural products, particularly beef. The introductory section is followed by one describing NTMs applied in international trade. This section is followed by discussions on standards and regulations established by international standard-setting bodies, the EU, and South Africa in animal food trade. This chapter, therefore, highlights the regulatory environment affecting South African beef exports.

2.2 UNDERSTANDING NON-TARIFF MEASURES

Food scandals with animal disease outbreaks in recent years raised food safety concerns and made consumers more vigilant about their food (Verbeke, 2001; Jayasuriya et al., 2006; Morgan & Prakash, 2006; Van Tongeren, 2009). Food safety standards and import regulations are increasing, becoming more complex. This was evident in the significant increase in applying NTMs since the 1990s (Kirk, 2010; Kalaba & Kirsten, 2014). These food safety standards, regulations, and requirements are classified as NTMs and can be import and export specific.

The United Nations Conference on Trade and Development (UNCTAD) describes NTMs as policy measures other than custom tariffs, influencing the international trade of goods, the quantities traded, prices, or both (UNCTAD, 2013). NTMs can become non-tariff barriers (NTBs) once imposed solely to distort or restrict trade (Kirk, 2010; UNCTAD, 2013). However, to distinguish NTMs from NTBs is challenging, as they are sometimes used interchangeably (De Melo & Alessandro, 2018; Kinzius et al, 2018). APPENDIX A: NON-TARIFF MEASURES: DEFINITION AND CLASSIFICATION provides more detail on diverse types of NTMs.

A study by UNCTAD (2019) employed the frequency index and coverage ratio to draw attention to NTMs in various sectors. The frequency index and coverage ratio are the simplest and most used indicators to summarise NTMs' incidence and prevalence in international trade (UNCTAD, 2017). The coverage ratio measures the percentage of trade subject to NTMs, while the frequency index measures the percentage of products to which NTMs apply (UNCTAD, 2017; De Melo & Alessandro, 2018). According to this study, NTMs are mostly applied in agriculture. The study further reveals that the top three forms of NTMs imposed are sanitary and phytosanitary measures (SPS), technical barriers to trade (TBTs), and export-related measures (Figure 2:1).

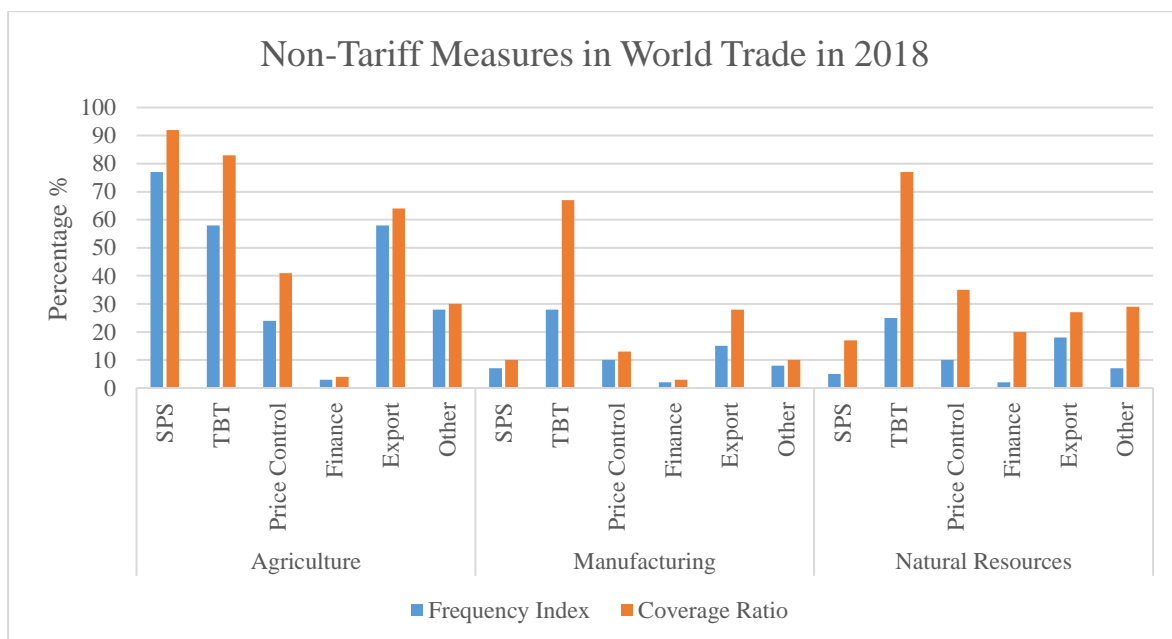


Figure 2:1 Non-tariff measures in World Trade in 2018

Source: UNCTAD (2019)

According to the same study by UNCTAD, the most prevalent form of NTMs in the trade of animal products is SPS measures, followed by TBTs (UNCTAD, 2019). **Error! Reference source not found.** displays SPS measures applied across various industries. These SPS measures are regulations on health conditions related to the public and the protection of livestock, influencing whether a country is provided with a favourable health certificate (UNCTAD TRAINS, 2019). Countries wanting to trade products of animal origin must comply with these requirements (Grundke & Moser, 2016; De Melo & Alessandro, 2018; Ghodsi, 2021).

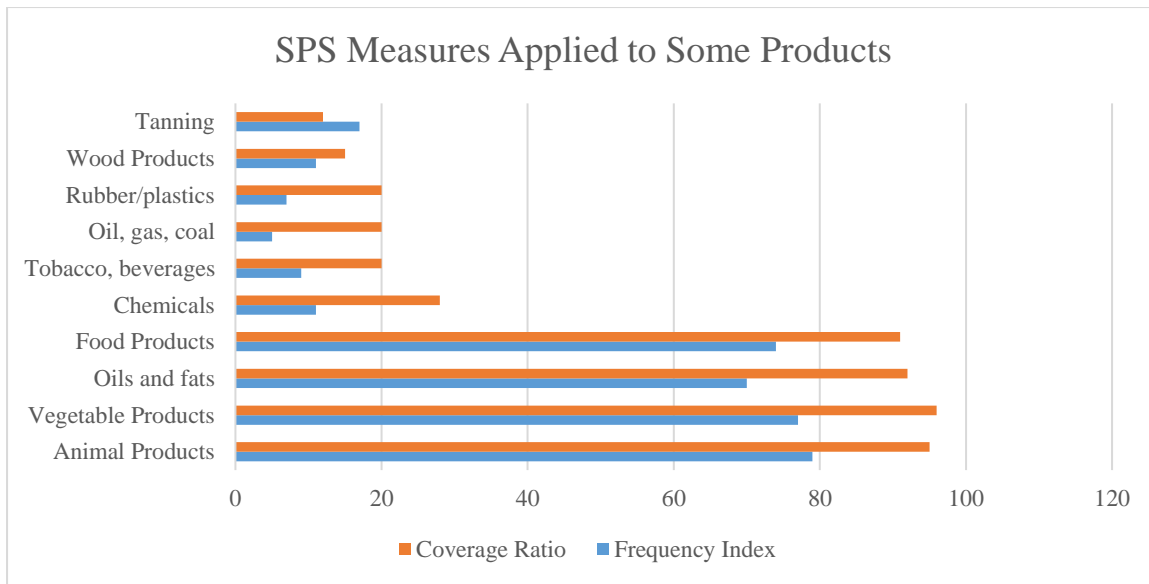


Figure 2:2 Applying sanitary and phytosanitary measures across various industries

Source: UNCTAD (2019)

NTMs may be in standards and regulations influencing the production, processing, and marketing of products (UNCTAD, 2013). Standards can also be the level of product safety and quality ideal for a product but not necessarily crucial for product consumption. Various regulatory bodies at international, national, and retail (private) levels establish these standards (Scoones et al., 2010). The subsequent sections discuss standards and regulations at international and national levels regarding animal product trade.

2.3 INTERNATIONAL TRADE STANDARDS AND REGULATIONS

Three international standards-setting bodies (Sections 2.3.1, 2.3.2 and 2.3.3) influence national import standards and regulations. The Codex Alimentarius Commission determines food safety and hygiene standards applied at the abattoir and during product preparation. Simultaneously, the International Plant Protection Convention (IPPC) is responsible for plant health. Last, the International Organization for Animal Health (OIE) provides standards relating to animal health and animal diseases transmittable to humans (WTO, 2004; Hammami, 2016). In addition, the WTO facilitates trade through certain agreements, such as the Agreement on SPS measures. These organizations provide the benchmark for trade regulation at both international and national level.

2.3.1 The Codex Alimentarius Commission

The Codex Alimentarius Commission (CAC) is one of the global standards-setting bodies, developing food standards, guidelines, and related texts as part of the Food and Agricultural Organization (FAO) and World Health Organization (WHO) food standards programme (Penrith, 2013). It focuses on setting standards and establishing rules for governments to follow when setting national food safety regulations (Henson & Humphrey, 2009). Part of it enhances consumer protection and promotes fairness in the international food product trade. This is conducted by setting standards on food quality and safety, including food standards, hygiene codes, and technological practice.

The Codex also assesses pesticides, food additives and veterinary drugs while introducing limits for pesticide residues and standards for contaminants. The standards, guidelines and recommendations provide direction to governments and function as the point of reference for compliance with obligations under the WTO. In addition, the Codex has three rules based on Codex standards: codes of practice for production, processing, manufacturing, transport, storage, and guidelines (Henson & Humphrey, 2009). APPENDIX E: LIST OF CODEX REFERENCE STANDARDS explains the Codex Alimentarius reference standards.

Founding rules relate to requirements for specific products or groups of products. For instance, the Codex comprises a regulation regarding veterinary drugs in meat. This rule stipulates the recommendation for the maximum residue level allowed in certain veterinary drugs. The second rule provides standards relating to processes, for instance, producing, handling, and processing products before reaching the consumer. These rules affect individuals and groups of foods. The third set of rules provides general guidelines—often discussed with governments. These guidelines provide principles while recommending interpretation principles. Codex ultimately provides standards for the hygiene, food labelling, preventing, and reducing contaminants, managing frozen foods, drug residues (maximum residue levels), pesticide residues and traceability.

2.3.2 The Role of the International Organization for Animal Health

The OIE must establish global agreed-upon standards and regulations for animal health and welfare (WTO, 2004; Bowles et al., 2005; Penrith, 2013). The OIE standards for animal health

and welfare are based on the organisation's Terrestrial Animal Health Code (Terrestrial Code), comprising two volumes, accompanied by the Terrestrial Code Manual. The Terrestrial Code stipulates standards for enhancing animal health and welfare and veterinary public health globally (OIE, 2011; Penrith, 2013). These standards provide guidelines on safe international trade in terrestrial animals and their products, which are implemented by the veterinary authorities in the countries concerned.

The Terrestrial Code provides guidelines on animal disease diagnosis; surveillance; notifications; risk (import) analysis; quality of veterinary services; general recommendations on disease prevention and control; trade measures; import/export procedures and veterinary certification; veterinary public health; and animal welfare (OIE, 2011; Penrith, 2013). The recommendations on disease prevention and control prevent diseases from entering an importing country. They consider the characteristics of the commodity traded and the exporting country's health status (OIE, 2011). The quality of an exporting country's veterinary services is imperative (OIE, 2011).

A country's veterinary services may be evaluated upon request by another member or by the country (self-evaluation), based on the OIE Tool for Evaluation of Performance of Veterinary Services. The state of the veterinary services in the exporting country determines other countries' trust level in the country's veterinary health (OIE, 2011). APPENDIX D: PERFORMANCE OF THE VETERINARY SERVICES RESULTS OF SOUTH AFRICA details these as provided by the OIE.

OIE publications update veterinary authorities on the global state of animal health. Countries can perceive the animal health status, disease occurrence, and control programmes in the trading countries. Based on OIE information, importing countries can allow or forbid a certain exporting country's market access (Hammami, 2016). Compliance with OIE standards and regulations, therefore, establishes and maintains confidence in the exporting country's veterinary certificate by trading partners (Hammami, 2016).

2.3.3 The World Trade organization's agreement on applying SPS measures

In the agreement on applying SPS measures (SPS agreement), the WTO urges members to base their sanitary measures on globally recognised standards, guidelines, and recommendations.

The SPS agreement recognises the OIE as the international standard-setting organisation for animal health and zoonotic standards, guidelines, and recommendations, where applicable (OIE, 2011).

According to the WTO, no member is prohibited from adopting or enforcing measures above those by international standard-setting bodies, essential to protect human, animal, and plant health or life; however, these measures should not constitute arbitrary or unjustifiable discrimination among members (WTO, 2004). According to this agreement, countries may choose the SPS protection level for their citizens, animals, and plants. This, however, should be conducted in a manner that minimises negative effects on trade (WTO, 2004).

Each member state may maintain a protection level for life or health within its territory (an appropriate level of protection, ALOP). According to the WTO SPS agreement, governments should base their SPS measures on:

- Recognised international standards, particularly those of the CAC, World Organization for Animal Health (OIE) and the IPPC, for plant-based products
- Science and assessment of risks, where the approach is consistent, not arbitrary
- A temporary precautionary principle lacking international standards or scientific evidence

The freedom of choice regarding standards and regulations by importing countries/regions resulted in measures (standards) in some countries and regions being above those established by international standards-setting bodies. The following sections focus on the EU's import standards and regulations on animal products, while contrasting them with those of South Africa. This determines the level of alignment between the standards and regulations of the two trading partners while comparing them with the global standard-setting bodies' benchmarks.

2.4 IMPORT STANDARDS AND REGULATIONS IN THE EUROPEAN UNION

The EU experienced a bovine spongiform encephalopathy (BSE) outbreak in the mid-1990s. This outbreak exposed the shortcomings in the EU food law to respond to animal disease outbreaks, affecting consumer health and safety (Van Der Meulen, 2013). The response of the EU was to take a more initiative-taking position in protecting public health and life and consumer interest in the food they consume. This response resulted in the EU's food sector being one of the most regulated sectors globally (Van Der Meulen, 2013). EU consumers are also some of the most conscious consumers regarding food consumption safety, quality, and regulation(s) (European Commission, 2018) resulting in the need for more consumer-focused food laws in the EU.

This section is divided into two sub-sections to understand EU standards and regulations influencing the export of South African beef to the region. The first sub-section focuses on the food laws applied in the EU with a bearing on food imports. The second sub-section focuses on import requirements for animal products.

2.4.1 European Union food laws

The EU has been known as the region with some of the highest food safety and import standards globally since the early 2000s (Dell'aquila & Caccamisi, 2007; Van Der Meulen, 2013; Geghin et al, 2015). This section discusses certain food laws affecting food trade with the EU.

The EU has several laws regulating food product trading and its safety level.

Table 2.1 indicates some of the major laws affecting food consumed in the EU. These laws relate to animal health, public health, and food safety throughout the production, processing, and distribution of the product.

Table 2.1: European Union food laws

Food law	Purpose
The General Food Law, Regulation 178/2002	The main purpose of this law is to ensure a prominent level of protection of food-related public health and life and consumer interests (Van Der Meulen, 2013). It provides general principles relating to food safety, established the European Food Safety Authority and last, provides procedures to approach emergencies
Regulation (EC) No 882/2004	It guides formal controls implemented to ensure compliance with feed and food laws, and animal health and welfare laws. The aim is to create a more comprehensive, integrated, risk-based, EU-wide farm-to-table approach to formal management
Regulations (EC) No 852/2004 and 853/2004	Regulate food hygiene in the EU
Directive 96/23 and Regulation 396/2005	Deal with residue monitoring of products The purpose of Regulation (EC) No. 396/2005 is to protect the health of consumers and animals by setting limits and controls for pesticides in foods and feeds and to facilitate transactions by setting common standards This regulation further sets the maximum permissible level of pesticide residues in plant or animal-derived foods and feeds intended for human or animal consumption
Directive 2002/99	Provides guidelines regarding animal health. It establishes animal health regulations regarding the manufacture, processing, distribution, and market launch of animal-derived products for human consumption
Directive 2000/29	Provides guidelines on plant health

Source: European Commission (2006); European Parliament (2012); Van Der Meulen (2013)

EU import regulations are based on these laws. The following sub-section 2.4.2 focuses on the import requirements and standards for products of animal origin, providing the processes for an exporting country to comply with for market access to the EU.

2.4.2 European Union import requirements for products of animal origin

Besides the food laws governing importing food products into the EU, an exporting country must further comply with certain standards and regulations in the case of the importation of animal products (European Commission, 2009; European Commission, 2018). Trade relations between the EU and an exporting country are through the country's competent authority. This authority is often the exporting country's state veterinary service. The competent authority is also the responsible party for implementing OIE standards and regulations (OIE, 2011).

A country must first be on the positive list of eligible countries permitted to export to the EU. The country's eligibility is based on compliance with standards and regulations as set by the EU or equivalent to them. The veterinary office under the authority of the exporting country must be organised and equipped according to Rule 882/2004 while matching the requirements for animal health and zoonosis set by international standard setting bodies. Furthermore, only business establishments from a country on the EU positive list may export to the region. These businesses also need to be approved based on the established and agreed requirements. Approved exporting businesses are subject to inspection by the EU's Food and Veterinary Office (FVO) if necessary. The production and handling of products are analysed to ensure they meet the standards and regulations. Hazard and Critical Control Points (HACCP)-based controls, under the Codex Alimentarius, are mandatory to ensure businesses meet the EU hygiene requirements.

Following this inspection, a veterinary certificate is issued to the approved business. A business cannot be approved for export without this veterinary certificate. From the initial audit/inspection, the FVO has the prerogative to re-inspect the business establishment on a risk basis. Upon approval, the business must submit a residue monitoring plan annually. This plan assures the EU that animals are not fed unapproved chemicals. Appendix B further provides the process by which a non-EU country can export meat products to the EU.

According to the regulations and guidelines, for a country to import to the EU, several specific EU requirements must be met; however, they can be a hindrance for some exporters, especially those in developing countries with limited resources (Van Tongeren, 2009; Santeramo & Lamonaca, 2019). Although the EU is a desired destination for export products, some countries may choose other markets owing to the prohibitive cost of complying with the standards.

2.5 SOUTH AFRICAN STANDARDS AND REGULATIONS APPLICABLE TO BEEF EXPORTS

To maintain the ability to export beef globally and secure new markets, South Africa must guarantee that production, processing, and marketing standards meet international and national levels (reference). The export standards and regulations must, therefore, correspond with those of importing countries. Thus, the South African regulatory environment must provide assurance to trading partners that their standards and regulations are addressed.

Several laws regulate the South African beef industry. These laws ensure that the products produced and exported are of the highest quality while meeting global food safety standards. The following list of acts provides measures directly affecting beef production, processing, and marketing in the South African context (Spies, 2011; DAFF, 2019).

Table 2.2: South African regulations affecting the production and marketing of animal products

Regulation	Purpose
The Agricultural Products Standards Act (Section 3), 1990 (Act No. 119 of 1990),	This Act provides regulations on the classification, packaging, and labelling of certain raw and processed meat products
The Animal Diseases Act, 1984 (Act No. 35 of 1984),	It engages animal diseases and parasites, animal health promotion activities and related matters. This law prohibits animals from moving without an approved health permit
Animal Health Act, 2002 (Act 7 of 2002)	It promotes animal health and provides measures to combat animal diseases; it gives executive authority to the provinces over certain provisions of this law; it further regulates the

Regulation	Purpose
	import and export of animals and goods; establishes animal health programmes and solves related matters
The Meat Safety Act, 2000 (Act No. 40 of 2000)	<p>It provides for measures to promote meat safety and animal food safety; establish and maintain basic national standards related to slaughterhouses; regulate the import and export of meat, establish meat safety schemes; and solve related matters</p> <p>The law regulates the slaughtering of animals for meat consumed by humans and animals, determines hygiene standards for the handling, storage and transportation of meat and animal products, and prohibits the slaughtering of animals at any place other than an abattoir that complies with prescribed requirements about outlay, structure and fixed equipment and other facilities. The law also regulates meat imports through a permit system</p>
The Agricultural Product Standards Act, 1990 (Act No. 119 of 1990)	Provides regulations regarding the classification and marking of meat intended for sale in South Africa
The Animal Identification Act, 2002 (Act No. 6 of 2002)	Provides scope for marking and identifying animals
Animals Protection Act, 1962 (Act 71 of 1962)	Provides for the care and protection of animals in South Africa
Animal Improvement Act, 1998 (Act 62 of 1998)	Regulates the breeding, identification, and use of genetically superior animals to improve animal production and performance to benefit the Republic, and resolve related concerns

Source: Spies (2011); DAFF (2019)

The standard operating procedures (SOPs) support the above-mentioned regulations, assisting in managing the food safety risk of regulated agricultural products destined for exports (APS, 2014). For instance, a SOP determines the procedures for an analytical laboratory to follow to be recognised, accredited, and competent for agricultural products regulated concerning the

Agricultural Products Standards Act, 1990 (Act No. 119 of 1990), and destined for the export market. It also details the requirements and criteria to be recognised and nominated as an official laboratory (DAFF, 2019).

The regulations assure trading partners and consumers that products produced in South Africa are safe for human consumption and of the highest quality (Santeramo & Lamonaca, 2019; Gourdon et al, 2020). These regulations are, therefore, enacted to ensure that the South African beef industry complies with importing countries' NTMs (standards and regulations) (reference). These regulations also provide confidence in the South African health certificate.

Although it is the importing country that establishes the certificate requirements, the veterinary authority in the exporting country certifies food businesses fit to export meat and other animal products. This process ensures that establishments permitted to export, adhere to South Africa's standards and regulations and those of the importing country. Export certification is a provincial mandate in South Africa, provincial state veterinarians are, therefore, responsible for inspections and determining whether an establishment meets the set requirements (DAFF, 2015). This decentralised system in South Africa has been a cause of unease for some trading partners owing to concerns over the provinces' capacity and ability to adhere to the requirements (Fermet-Quinet et al, 2014).

The requirements are often stated in an import permit or applicable annexe for exports to the EU (DAFF, 2015). These requirements are based on the level of food safety in a country and the prevalence of certain animal diseases (DAFF, 2015). Countries, such as the EU, with an elevated level of food safety consciousness, are more inclined to stricter import regulations; since their consumers are more demanding of the quality of their food (Van Der Meulen, 2013). It is, therefore, the responsibility of South Africa (that is all actors in the value chain) to ensure that the importers' requirements are met. A lack of compliance may cause inaccessible markets for South African exports.

2.6 CONCLUSION

The reduced tariffs in global trade did not yield the expected results of increased trade among some countries and regions. Tariffs decreased in the last few decades, whereas NTMs increased—sometimes more restrictive to trade than tariffs. Food scandals, animal disease

outbreaks, and other dangers associated with infected imported products have influenced the use of NTMs. Changing preferences, concerns, and rising consumer consciousness about the food safety level and quality also fuelled these measures.

NTMs are increasing; therefore, their use should be known and understood at international and national levels to ensure compliance by exporting countries. Although these standards may differ at national level, they are established by international standards-setting bodies and should be used as benchmarks for world trade. These institutions ensure that all countries adhere to the same product standards, facilitating exporting countries to comply with import regulations; they do not have diverse standards imposed by importers.

South Africa must comply with the standards and regulations by the EU to gain access to this market. These standards and regulations are according to the EU food laws and processes to be followed in exporting food of animal origin to the EU. This also accounts for access to the EU beef market.

The subsequent chapter investigates South Africa's compliance with the standards and regulations to determine whether using NTMs harmed the trade of South African beef. The chapter observes compliance with international standard-setting bodies, particularly the International Organization for Animal Health (OIE), including compliance with EU standards.

CHAPTER 3: SOUTH AFRICA'S COMPLIANCE WITH STANDARDS AND REGULATIONS

3.1 INTRODUCTION

The previous chapters reviewed the standards and regulations in the export of animal products at global and national levels. The discussion focused on the requirements for countries to export their products into a market, specifically in the EU. This chapter focuses on South Africa's trade relationship with the EU and international standard-setting bodies. The chapter's objective is to qualitatively assess South Africa's compliance with the standards and regulations.

The chapter is divided into four sections. The introductory part (Section 3.1) is followed by one that focuses on South Africa's compliance with OIE standards and regulations 3.2. Section 3.3 discusses South Africa's relationship with the EU. This section focuses on how NTMs have affected South African beef over time compared to the trade flow between the two trading partners. Section 3.4 observes an FMD case study. FMD has, in the past, hindered South Africa's compliance with international animal health requirements.

3.2 SOUTH AFRICA'S COMPLIANCE WITH INTERNATIONAL ORGANIZATION FOR ANIMAL HEALTH STANDARDS AND REGULATIONS

Three international standard-setting bodies affect beef trading: Codex Alimentarius, OIE and the WTO. Of the three organisations, the OIE's regulations have the most influence on market access for animal products (Penrith, 2013). Based on the animal health status of a country, as provided by the OIE, products can be considered safe or unsafe by trading partners. The general OIE guidelines provide a benchmark for animal health in world trade (Penrith, 2013).

Compliance with these guidelines is based on the state of a nation's veterinary services (OIE, 2011); therefore, OIE determines if an exporting country meets the animal health conditions for global export. This is accomplished by analysing the country's state of veterinary services.

In South Africa, the veterinary authority forms part of the veterinary services. This authority is responsible for enhancing national food security, protecting livestock from diseases, facilitating market access for animals and animal products, and protecting people from foodborne and zoonotic diseases (DAFF, 2012). According to the OIE, the veterinary services must be of high quality, appropriately resourced, technically competent, and independent while collaborating with stakeholders to ensure market access (Fernet-Quinet et al, 2014).

The OIE developed the PVS pathway to help national veterinary services achieve their goals and ensure compliance with OIE standards and regulations (Penrith, 2013). Veterinary services can, therefore, determine performance levels and identify divergences in their ability to comply with these standards. The pathway involves assessing the competence of veterinary services at the national level under internationally agreed standards established in the OIE Terrestrial Animal Health Code. (Fernet-Quinet et al, 2012).

The OIE evaluated South Africa's veterinary services in 2012. This evaluation resulted in observations that might influence red meat product exports, such as beef. Crucial evaluation findings were grouped into the following four categories (Fernet-Quinet et al, 2012):

- Human, physical, and financial resources
- Technical authority and capacity
- Interaction with interested parties
- Market access

The OIE identified that there is a limited number of veterinarians in contact with farms and animals and conducting site inspections in South Africa. This limits the ability to certify products and activities in compliance with OIE and, subsequently, national, and private standards and import requirements or regulations. The limited number of veterinarians in direct contact with farms and animals is a factor that may hamper the veterinary service's certification capacity. This influences export-approved business establishments' ability to comply with certain requirements, owing to the lack of personnel to conduct the inspections for certification (Fernet-Quinet et al, 2014).

Regarding the technical authority and capacity thereof, the South African veterinary services have a wide range of laboratories—public (national) and private—approved by the Department of Agriculture, Land Reform and Rural Development (DALRRD); however, the lack of veterinarians in regular contact with farmers and animals reduces the reliability and sensitivity of surveillance and early detection. Border control and quarantine inspection are effective; however, not regularly audited to assess resources and procedures. The lack of nation-/industry-wide animal identification and traceability systems also reduce disease control, influencing the industry's compliance with some trading partners' import requirements (European Commission, 2009; Fernet-Quinet et al, 2014).

Communication among interested parties is well supported with a formal consultation with stakeholders nationally; however, this communication is less at provincial and district levels. This becomes a problem for South Africa's compliance with certain import regulations if export certification is a provincial mandate. A need, therefore, exists for resolute communication staff at national or provincial levels. The insignificant delegation of private veterinarians delivering official service tasks limits the veterinary services' (VS) efficiency and technical capacity. Most animal health programmes are voluntary, rarely supporting national health outcomes. Joint programmes are not documented or formalised, causing inconsistencies among provinces (Fernet-Quinet et al, 2014).

Regarding access to markets, South Africa has satisfactory legislations and regulations; harmonisation with international standards is well implemented; however, legislation in several acts (as shown in the previous chapter) complicates track-keeping. A need exists to update and simplify regulations, ensuring enforcement and compliance by relevant stakeholders (Fernet-Quinet et al, 2014).

These limitations in the South African veterinary services reduce the country's ability to comply with world trade standards and, therefore, the ability to access certain beef export markets. These weaknesses reduce the confidence of trading partners in South Africa's international health certificate (Hammami, 2016). This includes the processes for exporting establishments to be certified.

3.3 SOUTH AFRICA'S COMPLIANCE WITH EUROPEAN UNION STANDARDS

Beef exports from South Africa to the EU indicate changes in the two regions' trade relationships. The data reveal that in the early 1990s, over 80% of South African beef was exported to the EU. This, however, changed in the early 2000s until only 1% of South African beef was exported to the EU by 2018. A shift from the EU as a destination for South African beef to countries in East Asia, the Middle East, and sub-Saharan Africa was observed (refer to Figure 1:1).

Although the EU is a desirable export destination for several countries, access to this market requires compliance with the most stringent import standards and regulations (Stevens & Kennan, 2005; Van Der Meulen, 2013). In the previous chapter, some processes and laws regulating the import of animal products into the EU were emphasised. This sub-section reflects an investigation of the specific standards and regulations affecting the import of South African beef; to determine whether the NTMs—particularly SPS measures imposed by the EU on beef from South Africa, function as a trade barrier between the two regions.

The EU holds some of the highest veterinary hygiene and animal disease management standards globally (Van Der Meulen, 2013). Countries gaining access to the EU market can better export to other countries with similar standards and regulations. EU certification is, therefore, a 'seal of approval' to maintain adequate SPS standards. Compliance with EU requirements is necessary for market access to the EU while providing opportunities to export to additional high-value markets (European Commission, 2009). Compliance with EU import standards and regulations signals food products' high safety and quality (Stevens & Kennan, 2005).

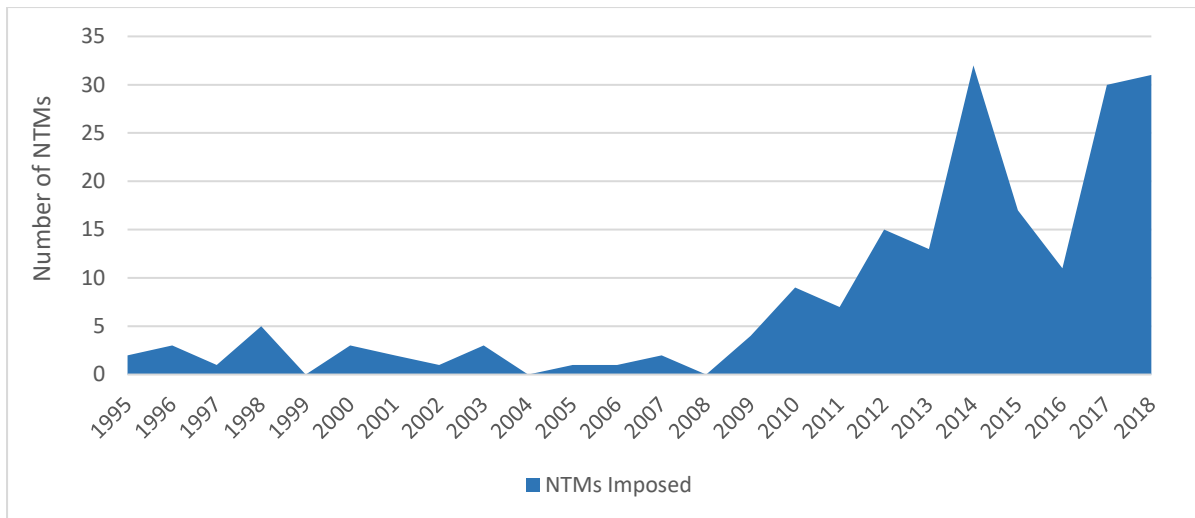


Figure 3:1: The European Union non-tariff measures affecting beef trade from 1995 to 2018

Source: WTO Committee on SPS Measures (2020)

According to data from the WTO Committee on SPS measures (Figure 3:1), the EU’s NTMs increased drastically in the decade leading to 2018. SPS measures increased from an average of two between 1995 and 2008 to an average of 17 between 2009 and 2018. The EU’s NTMs are often requirements on maximum residue levels, product traceability, and animal disease management (European Commission, 2009; WTO, 2020). The drop in NTMs imposed by the EU between 2015 and 2016 corresponds to when the OIE recognised South Africa’s FMD-free zone. This period saw the greatest increase in South Africa’s beef exports. As illustrated in Figure 3:2, beef exports to the EU also increased slightly.

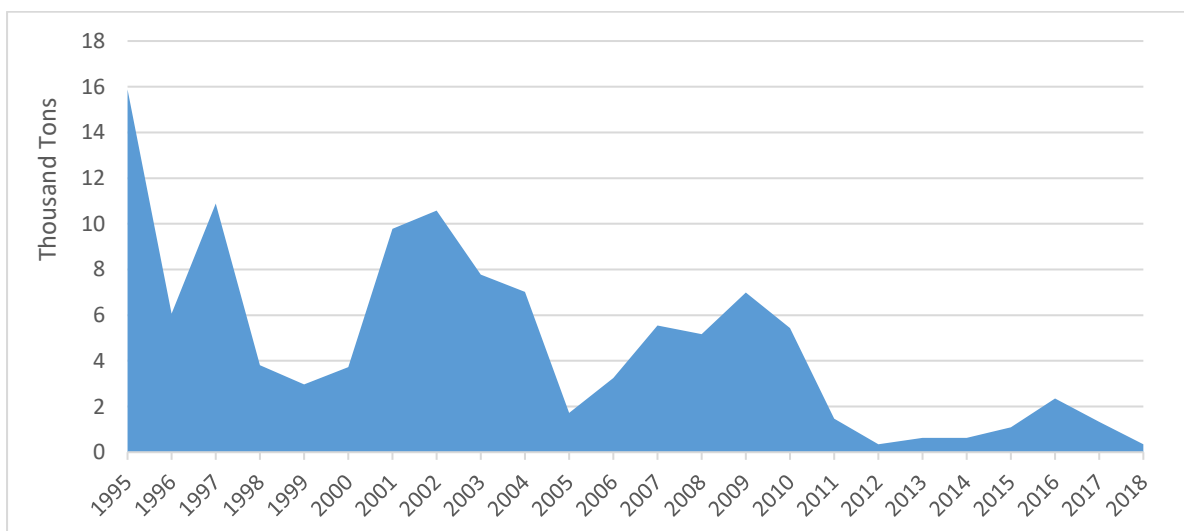


Figure 3:2: South Africa's beef exports to the European Union

Source: Quantec Data (2020)

Figure 3:2 indicates that South Africa's beef exports to the EU declined by 95% between 2009 and 2018, from 7000 tonnes to 350 tonnes in 2018. This decline corresponds with a period of a rapid increase in NTMs imposed by the EU (Figure 3:1). Regular notifications of NTMs to the WTO's committee on SPS measures affecting animal products increased from four in 2009 to 31 in 2018 (WTO, 2020). The increase in EU NTMs means that to ensure access for South Africa to this market, it must maintain the standards and regulations while ensuring compliance.

Owing to animal diseases, the lack of an industry-wide identification and traceability system as an enabler and device to prove compliance, and resource constraints such as a lack of government veterinarians in abattoirs and resolute personnel to facilitate export negotiations – South Africa has encountered challenges in accessing export markets (European Commission, 2009; Fermet-Quinet et al, 2014; DAFF, 2016). These challenges hinder South Africa's compliance with global trade standards and regulations. For instance, the FMD outbreak in 2011 resulted in South Africa losing its free zone status with access to important export markets, such as the EU (Fermet-Quinet et al, 2012).

The trade flows or lack thereof of beef between South Africa and the EU can be blamed on the deficiency of South Africa's compliance with certain EU import requirements. For instance, a factor that affected South Africa's ability to comply with import standards and regulations is animal disease management. FMD outbreaks had a devastating effect on South African beef export in previous years, as observed in the drop of beef exports to the EU following the outbreaks.

3.4 FACILITATION OF COMPLIANCE: A CASE OF FOOT AND MOUTH DISEASE

According to the South African Veterinary Strategy, market access increasingly centres on traceability, animal health, and food safety status (DAFF, 2016). This section presents the case of FMD to illustrate how disease management can assist or hinder a country from market

access. This is because some of the world’s strictest standards and import requirements were enforced because of animal disease outbreaks (Morgan & Prakash, 2006; Scoones et al., 2010; Van Der Meulen, 2013).

The importance of animal disease management in complying with import standards and regulations increased substantially (Morgan & Prakash, 2006). South Africa experienced challenges with animal disease management, particularly FMD. Outbreaks from 2009 and 2011 (**Error! Reference source not found.**) resulted in the OIE not recognising South Africa’s FMD-free zone. The effect of these outbreaks on market accessibility was exacerbated by lacking an identification and traceability system to prove the source and, therefore, South Africa’s red meat products’ safety and quality.

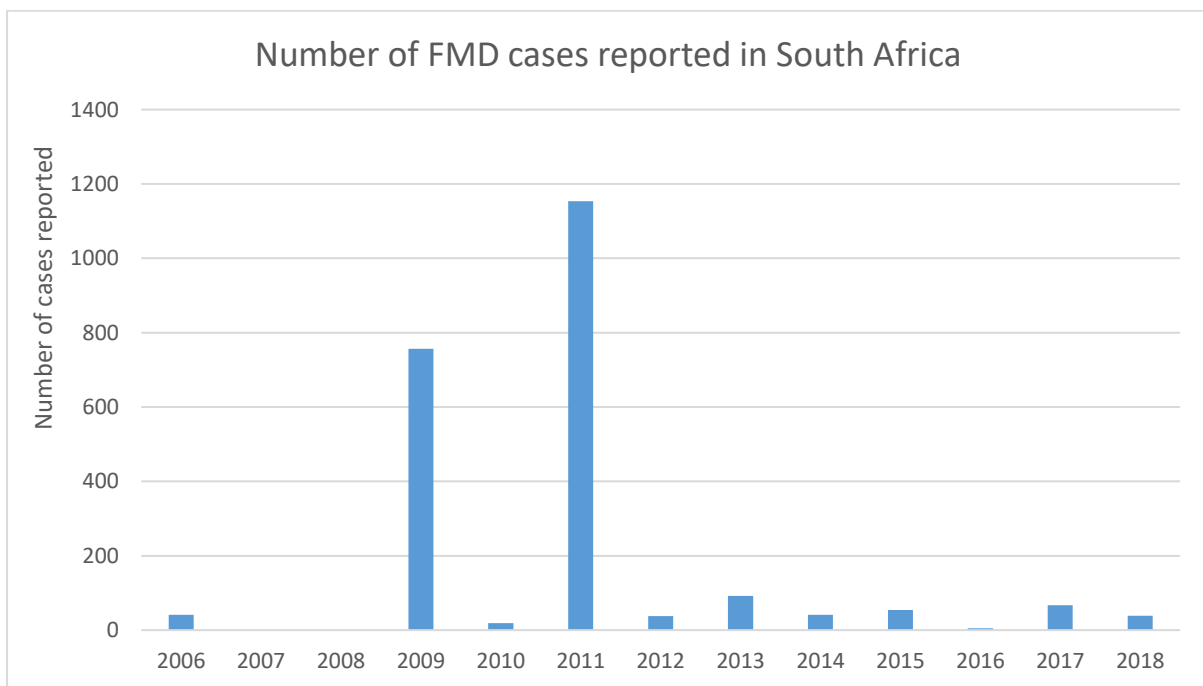


Figure 3:3 Foot and mouth disease cases reported from 2006 to 2018 in South Africa

Source: OIE (2020)

Sanitary demands on export countries intensely increased the prominence of a favourable animal health status to continue existing and create new markets for South Africa (DAFF, 2016). The lack of compliance with the sanitary requirements owing to animal disease outbreaks resulted in trade bans on products from the affected countries (Morgan & Prakash, 2006; Van Tongeren, 2009). Trade bans are primarily owing to the devastation that animal

diseases, such as FMD, can cause to the herd, industry, and economy (Depa et al, 2012). For instance, the 2001 FMD outbreak in the United Kingdom resulted in 4,1 million animals being culled (Junker et al., 2009; Depa et al, 202).

Animal diseases are, however, not only devastating for importing countries but also for exporters because of trade bans. Export bans mean the country cannot export to those markets that closed the trade of the affected product(s). According to the Red Meat Producer's Organization (RPO), South Africa can lose R6 billion annually owing to FMD outbreaks and the resulting export bans (RPO, 2017). Figure 3:2 indicates that South Africa's beef exports to the EU dropped by 95%, from approximately 7000 tonnes in 2009 to 347 tonnes in 2012; this followed the FMD outbreaks between 2009 and 2011.

The EU has the right of safeguarding measures, such as suspending imports from all or part of a third country concerned or taking interim protective measures when products pose a risk to public or animal health, as in dangerous disease outbreaks (UNCTAD TRAINS, 2019). According to the DALRRD (DAFF, 2016), the EU clarified that unless animal health and disease management concerns have been dealt with, there will be no guarantees of continuing exports to the region.

3.5 CONCLUSION

International trade and national import standards and regulations are essential for market access. Countries with more export market access complied with the import/product requirements. These requirements are stated by international standard-setting bodies, such as the OIE and Codex Alimentarius, and national governments or importers. Compliance with import standards and regulations is paramount for South Africa to become a net beef exporter.

The increased health and food safety concerns require that exporting countries structure their production systems, so consumers have enhanced confidence in the product they consume (Gourdon et al, 2020). Countries with certain animal disease outbreaks, such as FMD, often experienced export bans from their trading partners, as South Africa experienced in previous years. Improved animal disease management is required for South Africa to access higher-value markets.

Investigating South Africa's level of compliance with the EU imports standards and regulations for beef reveals a lack in some areas that might cost the industry access to this market. Food safety and human health is often the rationale stated by the EU when imposing certain measures; therefore, South Africa must meet those standards for market access.

Trust is provided to the exporter's veterinary services as the competent authority in South Africa. Importers engage with these services as the issuer of export certification. Veterinary services need to comply with the established trade standards and regulations to ensure continued market access and guarantee the highest product safety and quality. The OIE evaluation of South African veterinary services revealed certain deficiencies (the results are shown in APPENDIX D: PERFORMANCE OF THE VETERINARY SERVICES RESULTS OF SOUTH AFRICA). These limitations harm South African beef market accessibility.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 INTRODUCTION

The gravity model is a popular approach in international trade (Van Tongeren, 2009; Kalaba, 2014, Scheltema, 2014; Anukoonwattaka, 2016; De Melo & Alessandro, 2018). This approach is, consequently, employed to study South Africa's market access challenges in the EU beef market. Researchers have used the gravity model to determine the relationship between trade patterns and the influential factors (Kalaba, 2014; Scheltema, 2014; Phaswana, 2018). These influential factors include GDP per capita, population size, tariffs applied on the traded product, the geographical distance between the trading regions, and institutions that can facilitate or be a barrier to trade (Tinbergen, 1962; Djankov Freund & Pham, 2010; Kalaba, 2014; Scheltema, 2014).

This chapter describes the methodology for achieving the objectives set out in the study. Emphasis is on the influence of EU NTMs on South Africa's beef exports to the region and the effect of South Africa's compliance with EU NTM regulations on the exports. The subsequent sections describe the gravity model, the data used in the model, and an explanation of the variables used.

4.2 THE GRAVITY TRADE MODEL

Trade volumes observed between two countries or regions can be explained by factors capturing the potential of one country to export and another to import (Shang & Tonsor, 2019). The gravity model has been used since the early 1960s to determine trade relations among countries by analysing influential factors. The model is based on Newton's Law of Universal Gravitation, remarking that the gravitational force between two objects is directly proportional to the objects' masses and inversely proportional to the square of the distance between them (Gujarati, 2003; Anukoonwattaka, 2016). The equation is specified:

$$GF_{ij} = G \frac{M_i M_j}{D_{ij}^2} \tag{4.1}$$

Where: GF_{ij} is the gravitational force between two objects, i and j ; M_i is the mass of object i ; M_j is the mass of object j ; D_{ij} is the square of the distance between the two objects, and G represents the gravitational constant.

Equation 4.1 has since been adapted globally to determine the trade patterns between countries or regions and the factors influencing those patterns. Equation 4.2 signifies the intuitive gravity model adapted for trade analysis (Chaney, 2013). Trade between two countries is stated as positively related to the economic sizes of the trading countries and negatively related to the trade costs between them. This equation implies that larger countries (with high GDPs) will trade more with one another than smaller countries; the distance between countries reduces trade (Chaney, 2013; Anukoonttaka, 2016).

$$Trade_{ij} = G \frac{(GDP)_i(GDP)_j}{(Distance)_{ij}} \quad (4.2)$$

Where: $Trade_{ij}$ represents trade from country i to country j ; GDP_i and GDP_j represent the economic size (approximated as the gross domestic products) of country i and j , respectively, G represents the gravitational constant, and $Distance_{ij}$ represents trade costs between the two countries and can be geographical distance, tariffs, and/or NTMs applied.

Equation 4.2 is commonly estimated using the log-log specification of the equation (Vollrath et al, 2009; Krisztin & Fischer, 2014; Anukoonttaka, 2016). The equation then takes on the form:

$$\ln Trade_{ij} = \beta_0 + \beta_1 \ln GDP_i + \beta_2 \ln GDP_j + \beta_3 \ln Distance_{ij} + \varepsilon \quad (4.3)$$

Where ε represents the error term and the gravitational constant (G) becomes part of β_0 (Scheltema, 2014). Equation 4.3 is the version of the gravity model adapted for this study. The

following sub-sections provide the gravity model equation used in the study and the rationale behind this choice.

4.2.1 The gravity model equation specification

Equation 4.3 can be further adapted in global trade studies where other variables may be added. These variables may include GDP per capita, population size, tariffs applied on the traded product, the geographical distance between trading partners, and institutions that can facilitate or be a barrier to trade (Tinbergen, 1962; Djankov Freund & Pham, 2010; Vollrath et al, 2009; Kalaba, 2014; Scheltema, 2014, Anukoonttaka, 2016).

For this study, the dependent variable, beef exports from South Africa to the EU, is stated as $\ln X_{ij}$ instead of $\ln Trade_{ij}$, as in Equation 4.3. The independent variables used in the model are beef production in South Africa, GDP per capita in both South Africa and the EU, tariffs applied by the EU on beef imports from South Africa, and EU NTMs on animal products, particularly beef. The following equation assessed the effect of EU NTMs on South Africa's beef exports to the region:

$$\ln X_{ij} = \beta_0 + \beta_1 PRO_i + \beta_2 GDPPC_i + \beta_3 GDPPC_j + \beta_4 T_{ji} + \beta_5 NTM_j + \varepsilon \quad (4.4)$$

The compliance variable in an index replaces the NTM variable in Equation 4.4, resulting in Equation 4.5 while evaluating South Africa's compliance with EU NTM regulations and requirements.

$$\ln X_{ij} = \beta_0 + \beta_1 PRO_i + \beta_2 GDPPC_j + \beta_3 GDPPC_j + \beta_4 T_{ij} + \beta_5 COMIND_{ij} + \varepsilon \quad (4.5)$$

Where:

- X_{ij} represents the volumes of beef exports from South Africa to the EU
- PRO_i represents beef production in South Africa
- $GDPPC_j$ represents the gross domestic product per capita of the EU

- $GDPPC_i$ represents the gross domestic product per capita of South Africa
- T_{ji} represents the tariffs imposed on South African beef when exporting to the EU
- $COMIND_{ij}$ is an index representing South Africa's compliance with EU NTMs
- ε represents the error term, a variable that factors in all other variables not included in the model that may influence the trading relationship between South Africa and the EU

The variables in the gravity equations were chosen for their expected influence on the trade of South African beef to the EU. The following sub-section provides a rationale for the gravity model in this study.

4.2.2 Motivation for the gravity model

Tinbergen (1962) was one of the first to use the gravity model for studies on global trade. Tinbergen sought to determine the trade among 42 countries should trade barriers be removed. Since then, the gravity model has become a popular device to determine the relationship between trade patterns (imports and exports) and other factors influencing those patterns. Scheltema (2014) provides the following reasons for the gravity model as a popular device for trade analysis and beef trade analysis:

- Gravity models are successful instruments for explaining bilateral trade flow between countries. They are also suitable for studying specific factors influencing beef trade, such as animal diseases and tariffs
- The model is theoretically thorough and successful; international researchers and policymakers accept the estimation results
- Gravity modelling methodologies underwent several improvements over the years, and the results are even more dependable and robust
- Gravity econometric equations are not data sensitive and can be estimated with various data types, such as time-series, cross-section data, and panel data, depending on the question
- Gravity models use raw data without relying on various pre-estimations of elasticity

These reasons constitute the gravity model as an appropriate device for analysing the beef trade relationship between South Africa and the EU, therefore, determining the factors contributing to the diminishing volumes of South African beef exports to the EU. The adaptability of the gravity model equation enabled an analysis of the effect of NTMs and South Africa's compliance with EU NTMs as indicators of the 'trade distance' between South Africa and the EU. The gravity model as an analysis device also enabled time-series data in the study.

4.3 EXPLANATORY VARIABLES

The study explored South African beef exports from 1995 to 2018, employing secondary data from various sources. This section describes the variables in the gravity model and the sources for these variables. The section also provides the expected results of the model based on the relationship between the dependent variable and the independent variable. The variables used are commonly employed in gravity model equations to determine factors that may explain observed trade patterns (Scheltema, 2014). Table 4.1 briefly presents the study variables, focusing on the unit of measurement, the data source, and the expected relationship between the independent and the dependent variable.

Table 4.1: Expected relationships between the independent and the dependent variable

Variable	Unit of measurement	Data source	Expected relationship
South African beef production	Tonnes	BFAP data; DAFF 2019 abstract	Positive (+)
South African GDP per capita	USD/capita	World Bank's World Development Indicators	Negative (-)
EU GDP per capita	USD/capita	World Bank's World Development Indicators	Positive (+)
Tariffs	International Trade Centre, market access map; SADC-EPA	Percentage of value	Negative (-)

Non-tariff measures	Number of NTMs imposed	WTO's SPS Committee; UNCTAD	Negative (-)
Compliance	Index	Developed by the author using data from WTO's SPS Committee; UNCTAD; DALRRD; South African Government	Positive (+)

The study focused on the effect of NTMs on South Africa's beef exports to the EU, and compliance with those NTMs, indicated by a compliance index. The following sub-sections describe how the two variables were developed.

4.3.1 The non-tariff measure variable

There has been increasing use of NTMs in international trade (UNCTAD, 2013; Kalaba, 2014) despite attempts to liberalise trade through trade agreements. NTMs are measures other than tariffs imposed on a product by, commonly, the importing country on its trading partners. These measures comprise policies, regulations, and standards that the product to be imported must comply with before it can be accepted in the importing country. These measures (NTMs) can be more restrictive to trade than tariffs (Kalaba, 2014).

Assessing the effect of EU NTMs on South Africa's beef exports to the region was imperative to understanding South Africa's market access challenges in the EU. NTMs have various sources and may change from one year to another; therefore, the quantification of NTMs is a challenging task (Kalaba, 2014); however, owing to the increasing use of NTMs in international trade, attempts were made to quantify them and provide databases enabling NTM research. These databases were used to develop the NTM variable.

In the study, the NTM variable was developed using a process like the one developed by Kalaba (2014), where NTMs were obtained from several sources. Most NTMs were from the WTO's Integrated- Trade Intelligence Portal (I-TIP), providing a database of NTMs over the years. NTM notifications supplemented these NTMs from the E-Ping SPS and TBT platforms. Regular NTM notifications by the EU, specifically on beef and animal products (harmonised system (HS) codes 0201 and 0202), developed the NTM variable. NTMs imposed annually were assessed to produce a time-series observation of measures.

The study focused on SPS measures as the most prevalent form of NTMs applied to agricultural and animal products (UNCTAD, 2014; UNCTAD, 2019). Chapter 2 with APPENDIX A: NON-TARIFF MEASURES: DEFINITION AND CLASSIFICATION further motivate SPS measures to represent NTMs in the beef trade. The search for SPS measures focused on those affecting animal health, animal welfare, food safety, protection of humans (consumers) from animal/plant pests or diseases and protecting territories from animal diseases.

Since NTMs are trade barrier forms, a negative relationship is expected between the number of NTMs imposed annually and the South African beef exported to the EU. In the years where the number of NTMs was high, fewer beef exports from South Africa to the EU are expected, whereas, in the years where NTMs were low, beef exports are expected to be high.

4.3.2 The compliance variable

NTMs use increased significantly over the last two decades. Consequently, research on the impact of compliance or lack thereof to these NTMs is important. Gillis (2021) defines compliance as the state of accordance or complying with regulations, guidelines, or specifications. In international trade, these regulations are NTMs imposed by one country (often the importing country) on another (often the exporting country). The exporter's compliance with NTMs by the importer also signals the safety level and quality of the product traded (Maskus et al., 2005).

The third objective of this study was to evaluate the level of South Africa's compliance with NTM regulations and requirements established by the EU on beef. A compliance variable in a compliance index had to be developed to achieve this objective. This index compares EU NTMs with South African policies and regulations on animal products complying with these

EU NTM regulations. This comparison was conducted for EU NTMs and South African policies between 1995 and 2018.

EU NTMs on beef were based on the process in Sub-section 4.3.1. Policies and regulations in South Africa used an approach by Kalaba (2014), mentioning five steps. The first step is to identify sources of information; the second identifies documents from each source; the third identifies regulations from each document; the fourth is to identify and classify measures within each regulation; the fifth step identifies the affected products at the HS-4 level.

South Africa's policies/regulations were obtained from various publications and information portals. These portals include DALRRD, the South African Government website, and the Green Gazette, publishing policy notifications by the South African Government. Most policies were obtained from the South African Government website. Policies studied were those affecting animal products, specifically beef, dealing with matters relating to animal health, human health, food safety, animal diseases, and trade. Policies/regulations applied by South Africa between 1995 and 2018 provided a time-series observation of South African policies relating to beef and animal products.

A further analysis was conducted of the NTMs imposed by the EU and the policies applied by South Africa annually to develop the index. This determined that South African policies were complying with EU NTMs. These policies were then divided by the number of EU NTMs annually to yield the compliance index. The following expression indicates the equation.

$$COMIND = \frac{COMPLYING SA POLICIES}{EU NTMs} \quad (4.6)$$

Where COMIND represents the compliance index, SA policies represent South Africa's policies complying with EU NTM requirements annually, and EU NTMs represent EU NTM regulations and requirements. This compliance index indicated South Africa's compliance with EU NTM regulations and requirements annually.

A value of less than one (1) meant that South Africa did not comply with the NTM requirements of the EU. While a compliance index equals to one (1) meant that South Africa complied with the EU NTM requirements imposed that year. Last, a value greater than one (1) meant South Africa over complied with the EU NTMs, with South Africa's policies not only discussing the NTM regulations and requirements in that specific year but also those of previous years. The higher the compliance index, the higher South Africa's compliance with EU NTM regulations. Consequently, the expectation is a positive relationship between the compliance index and the beef exported from South Africa to the EU.

4.4 CONCLUSION

This chapter describes the approach to assessing South Africa's market access challenges in the EU. The chapter describes the approaches to assess the effect of EU NTMs on South Africa's beef exports to the region while evaluating South Africa's compliance with the EU NTM requirements.

The study employed the gravity model of international trade. Based on Newton's Law of gravity, the gravity model is an appropriate device to evaluate trade relations among countries and regions. The gravity model was suitable for this study to accomplish two of the three study's objectives. These include assessing the effect of EU NTMs on South Africa's beef exports to the EU and evaluating South Africa's compliance with these regulations and requirements. The data and data sources of the variables in the gravity model are also explained in this chapter.

Focus is on the NTM and compliance variables, with the last two sub-sections of the chapter explaining how the two variables were developed. To study the effect of EU NTMs on South African beef exports, the NTM variable was developed using various sources, focusing on SPS measures notified to the WTO's SPS Committee between 1995 and 2018. Similarly, to evaluate South Africa's compliance with EU NTM regulations and requirements, a compliance variable in an index was developed. This index compares South Africa's policies on animal products, specifically red meat, and EU NTM regulations. Developing an NTM and a compliance variable followed the process developed by Kalaba (2014).

CHAPTER 5: STUDY RESULTS AND ANALYSIS

5.1 INTRODUCTION

This study investigated South Africa's market access challenges in the EU, focusing on three main objectives. The first objective was to assess the effects of EU NTMs on South Africa's beef exports. The second objective was to develop a compliance variable in an index. The last objective was to evaluate South Africa's compliance with the EU NTM regulations and requirements. This chapter provides the study findings regarding the objectives. Section 5.2 analyses the variables used in the study. Section 5.3 provides the findings from the assessment of EU NTMs on South Africa's beef exports. Section 5.4 provides findings from developing the compliance index and evaluates South Africa's compliance with EU NTM regulations.

5.2 AN ACCOUNT OF THE VARIABLES

In the study of South Africa's market access challenges in the EU, several variables were analysed. Beef exports between South Africa and the EU were analysed as the dependent variable. The independent variables include South African beef production, South Africa's GDP per capita, EU GDP per capita, and tariffs applied on beef imports from South Africa, NTMs imposed by the EU and a compliance variable (index).

Table 5.1 presents the descriptive statistics associated with the study variables. In addition,

Table 5.1 indicates the variables' average values, represented by the mean value, standard deviations, minimum values, and maximum values. The descriptive statistics indicate high variability in the dataset, as revealed by the high standard deviations observed for most variables. South Africa's GDP per capita and compliance index are the only variables indicating low variability.

Table 5.1: Descriptive statistics of the variables

Variable	Description	Mean	Standard deviation	Minimum value	Maximum value
Dependent variable: South African beef exports to the EU					
Independent variables					

Variable	Description	Mean	Standard deviation	Minimum value	Maximum value
SA Beef Production (Thousand tonnes)	South Africa's production of beef	645.5	55.8	560	760
South Africa's GDP per capita (thousand USD)	South African GDP per capita	6.774	0.75	5.62	7.58
EU GDP per capita (Thousand USD)	EU GDP per capita	31.66	2.99	25.81	36.60
Tariff (%)	EU import tariff applied on South African beef	28.96	28.81	13	98
NTMs (Number of NTMs applied)	Non-tariff measures by the EU	8.04	10.11	0	32
Compliance index	Representation of South Africa's compliance with EU NTMs	0.76	0.31	0	1.55

The subsequent sections comprise the study findings categorised according to the objectives. Section 5.3 provides findings in assessing the effects of EU NTMs on South Africa's beef exports to the EU, which was Objective 1 of the study. Section 5.4 focuses on the findings in evaluating South Africa's compliance with EU NTM regulations and requirements, which discusses Objectives 2 and 3.

5.3 ASSESSING THE EFFECT OF NON-TARIFF MEASURES ON SOUTH AFRICA'S BEEF EXPORTS TO THE EUROPEAN UNION

The effect of NTMs on South Africa's beef exports to the EU was estimated through the gravity model Equation 4.4, described in Chapter 4. South Africa's beef exports to the EU was the dependent variable, whereas South African beef production, South Africa's GDP per capita, EU GDP per capita, tariffs applied by the EU on beef imports from South Africa and the EU NTMs on beef and animal products were the independent variables.

5.3.1 Model diagnostics

An Ordinary Least Squares (OLS) regression assessed the effect of NTMs on South Africa's beef exports to the EU. Since the study used time-series data between 1995 and 2018, diagnostic tests were required to ensure OLS assumptions were unviolated. This section provides the OLS assumptions assessed as well as the results obtained from the assessment. Furthermore, solutions are provided in the case where the assumptions were violated.

OLS assumes that the effect of the explanatory variables on the dependent variable is the same across all the values. A linear relationship is, therefore, assumed among the variables. A log transformation of the dependent and independent variables resulted in a log-log regression, to ensure that this assumption is not violated. The rest of the section provides the assessment of the homoscedasticity, omitted variable (autocorrelation), and multicollinearity assumptions.

Homoscedasticity was the first OLS assumption evaluated. OLS assumes that the variance of the error term, which represents all other possible explanatory variables not represented in the model, is the same (constant) across the independent variable values. Violating this assumption would mean that the model estimates the dependent variable well at certain independent variable levels but not at other levels (Torres-Reyna, 2007; UCLA, 2021). For instance, the model can estimate the dependent variable well at levels lower than higher levels or contrarywise. The model would, therefore, be inefficient in estimating the dependent variable providing inaccurate results. This study employed the Breusch-Pagan test for heteroscedasticity. Table 5.2 indicates the test results.

Autocorrelation was the second assumption assessed. OLS assumes that the error term is not correlated with time, indicating a random error term. Violating this assumption would mean omitted variables as a determinant of the dependent variable; the error term would not be random (Torres-Reyna, 2007; UCLA, 2021). The Ramsey RESET test was conducted to evaluate this assumption. This is a general specification test for linear regression models to determine whether non-linear combinations of independent values explain the dependent variable. The test's null hypothesis indicates no omitted variables in the model. Should the null hypothesis be rejected, the exports from South Africa to the EU may be wrongfully associated with the independent variables in the model. Table 5.2 presents the test results.

Table 5.2: Results of diagnostics tests

Test	Null hypothesis	Test statistic	P-value	Conclusion
Breusch-Pagan test	Fitted values have Constant Variance - homoskedasticity	Chi (1) = 1.43	0.2326	Fail to reject the null hypothesis—there is no heteroskedasticity
Ramsey RESET test	Model has no omitted variables	Chi (1) = 0.49	0.6957	Fail to reject the null hypothesis—there are no omitted variables

Multicollinearity was the final evaluated assumption. OLS assumes unrelated independent variables. Violating this assumption would mean that independent variables are correlated, as though there are two similar variables in the same model. For example, with a perfect linear relationship between the independent variables, the regression estimation cannot be calculated clearly. Higher degrees of co-linearity can lead to unstable coefficient estimates in the regression model, which can significantly increase the coefficient standard error (Torres-Reyna, 2007; UCLA, 2021). The variance inflation factor (VIF) test was conducted in Stata. Table 5.3 presents the test results. A VIF value of over ten (10) implies multicollinearity between the independent variable and explanatory variables; therefore, two variables might measure the same factor (Torres-Reyna, 2007; Santeramo & Lamonaca, 2019; UCLA, 2021).

Table 5.3: Test for multicollinearity

Variable	VIF
EU GDP per capita	12.80
SA GDP per capita	8.27
SA beef production	2.97
Tariff	5.42
NTM	2.24
Mean VIF	6.34

The diagnostic results prove that the model is suitable to achieve the study's objectives, and with no violation of OLS assumptions. The subsequent sub-section provides the results from the OLS regression of Equation 4.4.

5.3.2 Results and analysis of the effect of European Union non-tariff measures on South African beef exports

The diagnostic assessments were performed; the subsequent section provides the results from a log-log regression of beef exports between South Africa and the EU from 1995 to 2018, as specified in Equation 4.4. The study observed beef exports from South Africa to the EU from when the bulk (80%) of South Africa's beef exports were destined for the EU to when a small quantity (1%) was exported to the region.

Table 5.4 presents the results from the gravity model. The model was estimated with the dependent variable as South Africa's beef exports to the EU. The R-squared, a measure of the explanatory power of the independent variables, was 0.7588. The F-statistic, revealing the significance of the model, was statistically significant at 0.0000.

The regression of Equation 4.4 was to assess the effect of EU NTMs on South African beef exports, therefore, accomplishing Objective 1. The model estimation from this regression revealed that NTMs play a significant role in determining the South African beef exported to the EU. The model estimated a negative relationship between the number of EU NTMs imposed on beef and the beef exported by South Africa. This projected relationship is expected and follows findings from other studies (Kalaba, 2014; Scheltema, 2014).

NTMs were identified as a huge barrier to international trade in the last few decades (Kalaba, 2014). The results confirm the hypothesis indicating NTMs' negative relationship with the beef exported from South Africa to the EU. The more EU NTMs imposed on South Africa; the less South African beef is exported to the region.

Table 5.4: Gravity model results on the effect of non-tariff measures

Dependent variable	South Africa's beef exports to the EU
---------------------------	--

Independent variables	Model Estimations
Log South Africa GDP per capita	-3.97 (0.235)
Log South Africa beef production	2.03 (0.435)
Log EU GDP per capita	-11.73 (0.022) ***
Log tariff	-1.77 (0.000) ***
Log EU NTMs	-0.97 (0.002) ***
Number of observations	24
Model	(0.0000) ***
R-square	0.7588

*Note: ***, **, * denote the significance of the test statistic at the 1%, 5%, and 10% levels, respectively*

Beef production in South Africa was expected to have a positive relationship with exports to the EU. That is, the more beef is produced in South Africa, the higher the prospect of exports to the EU. The model estimated a positive relationship between South Africa's beef production and EU exports; therefore, it can be concluded that South Africa's lack of market access in the EU does not result from the lack of export products, considering South Africa's beef production increased by 21% during the period of analysis.

Another variable analysed in the study was the GDP per capita in South Africa and the EU. The GDP per capita was a proxy for income and, therefore, the economic size of the countries concerned. A negative relationship would be between the GDPs per capita in South Africa and the beef exported to the EU. The higher the income of consumers in the domestic market, the more the product is consumed locally. A positive relationship was expected between the GDPs per capita in the EU and the beef exported to the region.

South Africa's beef production increased by 21% from 1995 to 2018; there has also been substantial economic growth. South Africa's GDP per capita increased by 32% between 1995 and 2018. With only 5% of the beef exported in South Africa (BFAP, 2021), a substantial amount of the beef produced is consumed locally. Since beef is a normal good, as income increases, more is consumed in the local market (Andjamba, 2017; Delpont et al., 2017). The model, therefore, reveals a negative relationship between South Africa's beef exports to the EU and the country's GDP per capita, following what was expected.

A positive relationship between GDP per capita in the EU and the beef exported to the region was expected; however, the model estimated a negative relationship. South Africa is a minor performer in the global beef industry. In the last decade, South Africa produced only 2% of global beef with a share of 0.5% of beef exports. Therefore, growth in the economic size of the EU does not influence the beef exported from South Africa to the region.

Based on previous studies (Scheltema, 2014; Bestbier, 2016; Piermartini & Yotov, 2016), a negative relationship was expected between EU tariffs on South African beef and those exported to the region. The model followed these studies, revealing a negative relationship between importing South African beef to the EU and the tariffs applied on the product. The model estimation indicates that tariffs significantly determine the South African beef exported to the EU.

With high tariffs, South African beef becomes less competitive in the EU market, as the price would be high on the products. The trade agreement between South Africa and the EU solves this concern. Beef can be imported into the EU at a far reduced rate of 12.8% compared to the period before they were enacted. Trade between South Africa and the EU should, therefore, have developed as tariffs dropped; however, beef trade between the two parties has moved in the opposite direction.

EU NTMs significantly influenced the beef exported from South Africa to the EU, based on the regression model results. It can be concluded that more beef would have been traded between the two regions, in the absence of NTMs. This accomplishes Objective 1 of the study, which assessed the effect of EU NTMs on South African beef exports to the region.

5.4 EVALUATING SOUTH AFRICA'S COMPLIANCE WITH EUROPEAN UNION NON-TARIFF MEASURE REGULATIONS

Section 4.3.2 discusses developing a variable to measure South Africa's compliance with EU NTM regulations and requirements. This variable was developed in a compliance index, achieving the second study objective. A log-log regression was conducted in Stata to evaluate South Africa's compliance with EU NTMs, using the gravity model with the developed index. The succeeding sub-sections present the results.

5.4.1 The compliance variable

An index representing South Africa’s compliance with EU NTMs was developed through the process described in Chapter 4. The number of South Africa’s policies regarding animal products issued between 1995 and 2018 evaluated South Africa’s compliance with EU NTMs. The policies issued by South Africa indicated the country’s responsiveness to NTM regulations and requirements from trading partners. The higher the number of policies issued by South Africa, the higher the likelihood that South Africa complied with NTM regulations and requirements on a policy level. From South Africa’s policies, those that specifically complied with or discussed EU NTMs annually were assessed. These complying policies were used to calculate the compliance index.

NTMs and policies are rarely removed between years but are added or amended. The EU NTMs and South African policies were, thus, cumulated from one year to another. Figure 5:1 indicates how these accumulated EU NTMs with South Africa’s policies and those complying with EU NTMs increased between 1995 and 2018. Figure 5:1 reveals a divergence between EU NTMs, South Africa’s policies, and those complying with the EU NTMs.

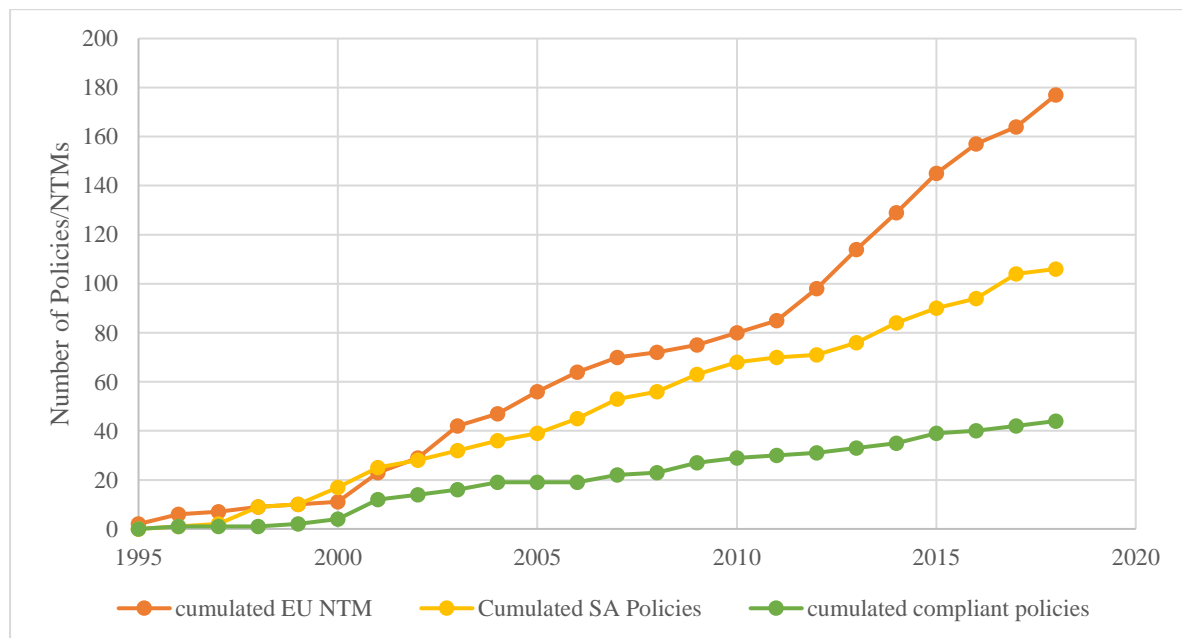


Figure 5:1: Accumulation of the European Union non-tariff measures and South Africa's policies from 1995 and 2018

The developed compliance index further uncovers the divergence between EU NTMs and South Africa’s compliance with these regulations and requirements. Figure 5:2 indicates South Africa’s compliance with EU NTMs as an index. An index of over 100% signifies that South Africa more than complied with EU NTM regulations. This would result from South Africa’s policies discussing EU NTM requirements in that year and previous years.

Figure 5:2 indicates two years where South Africa’s compliance with EU NTM regulations exceeded 100%—in 2000 and 2009. In both years, South Africa addressed animal disease concerns following FMD outbreaks. The policies enacted by South Africa promoted animal health, controlled animal diseases, and were an amendment to the export certification requirements and improvement on veterinary services. These policies addressed EU NTM regulations in those years.

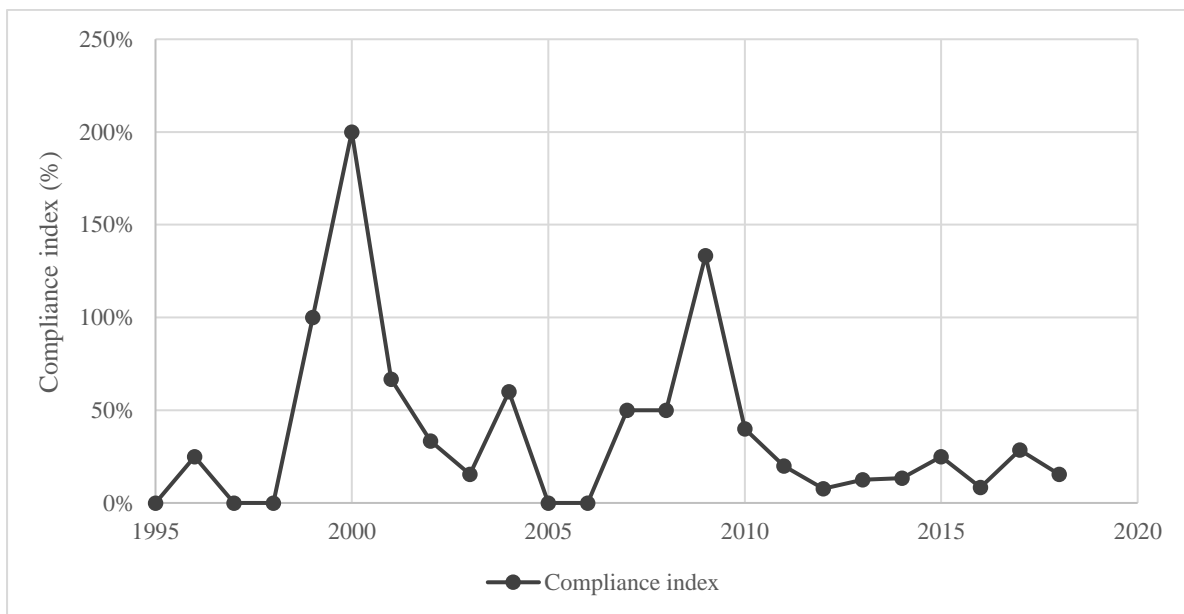


Figure 5:2: Representation of South Africa's compliance with European Union non-tariff measures

An index of less than 100% implies a divergence in the EU’s NTM requirements and South Africa’s compliance. Figure 5:2 confirms that South Africa had two periods of zero compliance—between 1997 and 1998, 2005, and 2007. EU NTM regulations regarded animal health, animal disease management, and veterinary certification between 1997 and 1998. From 2005 to 2006, EU NTMs were concerned with the material used in animal feed. Regulations were specifically on maximum residue levels, contaminants, and other toxins in the feed. South

Africa's policies during these periods unheeded EU regulations. The compliance index was below 100%, with an average of 20% between 2010 and 2018. The low compliance index further uncovers the divergence in South Africa's compliance with EU NTM regulations.

Evaluating EU NTM regulations with South Africa's policies on animal products reveals a divergence in South Africa's compliance. The rate at which EU NTMs increased, especially since 2010, surpassed the rate at which South Africa complies with them. The study attempted to understand further the role and significance of the lack of South Africa's compliance with EU NTMs. The subsequent sections provide the study results.

5.4.2 Model diagnostics

An OLS regression was conducted to evaluate South Africa's compliance with EU NTM regulations. This aimed to understand how compliance with EU NTMs affected trade between the two regions. Diagnostic tests had to be conducted to ensure no violation of OLS assumptions as with the previous model. Three tests were conducted similar to Sub-section 5.3.1. The first test was the Ramsey RESET test, which evaluates for omitted variables in the model. The second test was the Breusch-Pagan test for heteroskedasticity. The final test was for multicollinearity among the independent variables. Table 5.5 indicates the results from the first two tests. Table 5.6 indicates the results of the test for multicollinearity.

Table 5.5: Results of the diagnostic tests

Test	Null hypothesis	Test statistic	P-value	Conclusion
Ramsey RESET test	Model has no omitted variables	Chi (1) = 0.6	0.9818	Fail to reject the null hypothesis – there are no omitted variables
Breusch-Pagan test	Fitted values have constant variance	Chi (1) = 2.46	0.1168	Fail to reject the null hypothesis – there is no heteroskedasticity

Table 5.5 reveals that the OLS assumption of no omitted variables is unviolated, which means there is no autocorrelation between the error term and the dependent variable. The assumption of homoskedasticity is also unviolated, indicating that the independent variables are suitable to estimate the dependent variable.

Table 5.6: Test for multicollinearity results

Variable	VIF
EU GDP per capita	13.79
SA GDP per capita	8.93
SA beef production	2.91
Tariff	4.11
Compliance index	1.12
Mean VIF	6.17

The mean VIF is well below 10, confirming no multicollinearity among the independent variables. The results from this test, with the tests for heteroscedasticity and omitted variables, indicate that OLS assumptions are unviolated. The model is suitable for evaluating South Africa's compliance with EU NTM regulations.

5.4.3 Results and analysis of South Africa's compliance with European Union non-tariff measures

This section provides the results from the regression of Equation 4.5. In this gravity model, the log of South Africa's beef exports to the EU was the dependent variable. The logs of South Africa's GDP per capita, EU GDP per capita, South Africa's beef production, import tariffs applied by the EU on beef, and the compliance index were the independent variables.

Table 5.7 presents the results from the gravity model. The R-squared, a measure of the explanatory power of the independent variables, was 0.6268. The F-statistic, revealing the significance of the model, was statistically significant at 0.0019. The focus of this regression was to evaluate South Africa's compliance with EU NTM regulations. The following analysis

is only on the effect of the compliance index, while that of the other variables used in the model can be established in Section 5.3.2.

Table 5.7: Gravity model results on South Africa’s compliance

Dependent variable	South Africa’s beef exports to the EU
Independent variable	Model estimations
Log South Africa GDP per capita	-2.79 (0.513)
Log South Africa beef production	0.91 (0.78)
Log EU GDP per capita	-12.37 (0.056) **
Log tariff	-1.12 (0.000) ***
Log Compliance index	0.91 (0.143)
Number of observations	24

Note: ***, ** denote the significance of the test statistic at the 1%, and 5% level, respectively

The results demonstrate a positive relationship between South Africa’s exports to the EU and the compliance index. The higher the index, the higher the likelihood of South Africa’s beef exports to the EU. Figure 5:1 and Figure 5:3 indicate a divergence between EU NTMs and South Africa’s compliance.

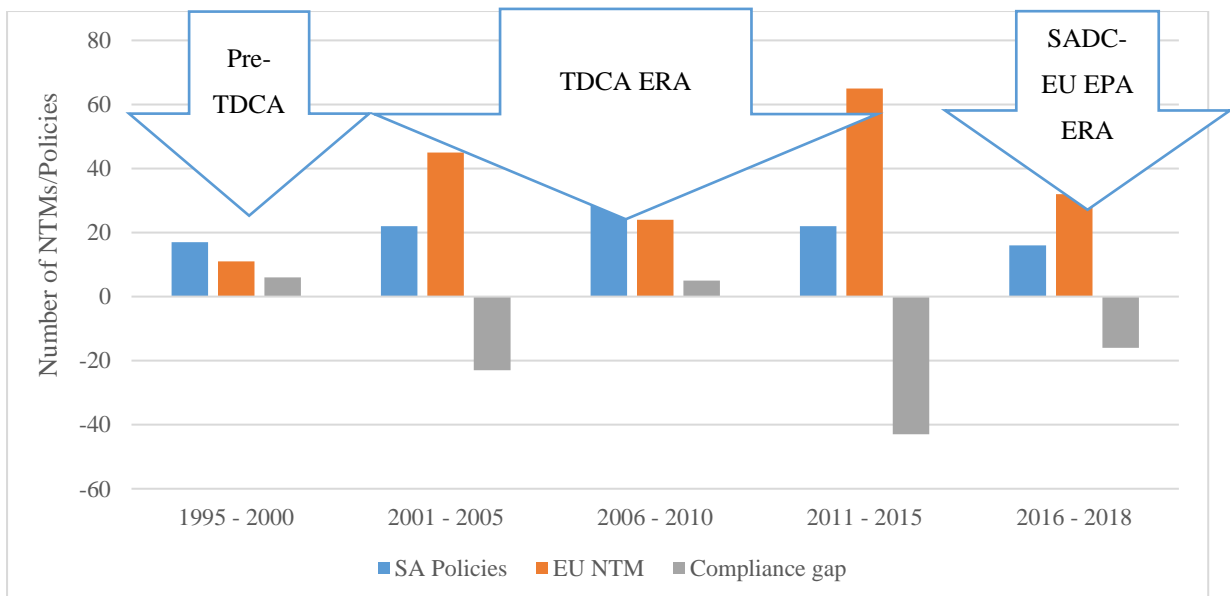


Figure 5.3: The difference between European Union non-tariff measures and South Africa’s policies

South Africa was more responsive to EU NTM regulations and requirements before endorsing trade agreements with the EU between 1995 and 2000. This meant South Africa complied with EU regulations and as such was able to access the EU market. From 2001 to 2018, however, a compliance divergence was shown except from 2006 to 2010, when South Africa had more regulations on the products concerned. From 2000, EU NTMs increased rapidly, with NTMs introduced in a single year growing from one in 2000 to 13 in 2018. South Africa introduced five policies in 2010 and only two in 2018, with an average of five during the same period. This divergence resulted in South Africa losing access to the EU market, as displayed by the decreasing amount of beef exported to the region.

5.5 CONCLUSION

This chapter describes the cause determining the effect of NTMs on South Africa's beef exports to the EU, evaluating South Africa's compliance with EU NTM regulations and requirements. An assessment of OLS assumptions ensured compliance. The validity of the results was economically and statistically analysed.

NTMs with import tariffs on beef are significant in determining the beef exported to the EU. This finding follows recent studies on NTMs in trade. Against expectations, the model further estimated that as the EU GDP per capita increases, beef exports from South Africa decrease. This further illustrates that South Africa's lack of market access in the EU did not result from the EU's lack of purchasing power.

The compliance index as an indicator of South Africa's compliance with EU NTM regulations and requirements revealed a divergence between EU NTM requirements and South Africa's compliance. Before 2000, marking the period before trade agreements between the EU and South Africa, South Africa was more responsive to EU NTM regulations; however, the EU also had the least NTMs applied. After 2000, EU NTMs increased rapidly. South Africa did not follow the EU NTMs growth rate in the last decade; therefore, the trade agreements between South Africa and the EU did not cause increased beef exports from South Africa, owing to the lack of compliance with NTM regulations and requirements.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6.1 INTRODUCTION

This study investigated market access challenges for South African beef in the EU, with a focus on NTMs as well as compliance to the NTM regulations. Although South Africa has had trade agreements with the EU since 2000, through the TDCA replaced in 2016 by the EU-SADC EPA, which have greatly reduced import tariffs and increased trade between the two trading partners in other industries, beef exports from South Africa to the EU have been declining. Furthermore, South Africa became a net beef exporter in 2014, which raised the expectation that more beef would be exported to the EU, as it is the second largest importer of beef after the USA. The study assessed beef trade patterns between South Africa and the EU as well as the factors that have an influence on those trade patterns, for the period 1995 – 2018, with special interest on the NTM as well as compliance variables. This chapter provides the main highlights of the study as well as recommendations for future study.

6.2 REVISITING THE RESEARCH OBJECTIVES

This study was motivated by the observation that South Africa's beef exports to the EU have been declining despite South Africa's beef exports growing to a peak of 39 thousand tons in 2016, from an average of 10 thousand in the early 2000s; South Africa having signed preferential trade agreements with the EU since the early 2000s and South Africa having a favourable animal health status from the OIE, through the recognition of South Africa's FMD free zone. Consequently, the main aim of this study was to investigate South Africa's market access challenges in the EU. Three objectives were evaluated in the study; the first one was to assess the effect of EU NTMs on South Africa's exports to the EU; the second was to develop a compliance index as a measurement for compliance to NTM regulations; and the last one was to evaluate South Africa's compliance to EU NTM regulations.

A gravity model of international trade was employed to assess the effect of EU NTMs on South Africa's beef exports to the region. This model was employed because of its ability to assess trade patterns and the factors that may influence these patterns. For this assessment, GDP per capita in South Africa and the EU, beef production in South Africa, tariffs applied by the EU

on South African beef as well as EU NTMs on beef were considered independent variables, while the volume of South Africa's beef exports to the EU was considered the dependent variable. For the NTM variable, an NTM database was created using the WTO's SPS notifications. NTMs applied by the EU on beef were tallied to provide a value of NTMs imposed each year, between 1995 and 2018. The results of this assessment were consistent with those of other similar studies where a negative relationship was observed between NTMs and exports (Kalaba, 2014; Beghin et al, 2015). As a result of this relationship, as EU NTMs increased in the last two decades, South Africa's beef exports to the region declined.

A process like the one described by Kalaba (2014) was used to develop the compliance variable, in the form of an index. Using this process, different sources were used to create a database of South Africa's policies on beef, between 1995 and 2018. These policies related to animal health, as well as the production, processing, and marketing of beef. Thereafter, EU NTM regulations together with South African policies that complied with these EU regulations were used to create the compliance index.

The evaluation of South Africa's compliance with EU NTM regulations reveals that a positive relationship does exist between South Africa's exports to the EU and the level of South Africa's compliance to the imposed NTMs. Which indicates that the more South Africa complies with EU NTM regulations, the more South Africa can potentially export to the EU. This evaluation, however, further reveals that South Africa has not fully complied with EU NTM regulations. There is a divergence between EU NTM regulations and South Africa's compliance to these regulations. The study reveals that EU NTMs increased faster than South Africa's policies that address the import regulations from their trading partners. Furthermore, the divergence has been most prevalent between 2010 and 2018 where South Africa shows an average compliance index of 20%.

Overall, the study results confirm the hypotheses that NTM regulations applied by the EU on South African beef exports have a negative effect on South Africa's exports to the region, which is observed in the recent trade patterns between the two trading partners. In addition, it was hypothesised that the more South Africa complies with EU NTMs on beef, the more South Africa can potentially export to the region. The study results confirmed that a positive relationship does exist between South African beef exports to the EU and South Africa's level of compliance to the NTM regulations applied.

6.3 RESEARCH ACHIEVEMENTS AND LIMITATIONS

The study achieved the objective of investigating South Africa's market access challenges in the EU. The study results revealed that NTMs have had a negative effect on South Africa's beef exports to the EU, a compliance index was developed using EU NTMs as well as South Africa's policies on beef, which helped in the evaluation of the level of South Africa's compliance to EU NTM regulations. Using this index, it was found that South Africa has not fully complied with EU NTM regulations.

The methods applied in this study were sufficient to achieve the research objectives. However, the results obtained can be improved. The availability and organization of data was a great limitation to achieving the objectives of this study. This was most prevalent in the development of the NTM and compliance variables. In terms of the NTM variable, although great progress has been made in making NTM data available, the organization and clarity of these regulations is still a challenge. For instance, it is not always clear which regulations apply to which products. Furthermore, the South African department of agriculture, DALRRD, does not have a portal where one may find all the regulations relating to the production, processing, and marketing of agricultural products such as beef.

6.4 RECOMMENDATIONS FOR FUTURE STUDY

For the purposes of this study, NTMs were not disaggregated in any way to determine which NTMs specifically have had a negative effect on South Africa's beef exports to the EU. Thus, the results of the study can be improved by further disaggregating NTMs into different categories, for instance, NTMs that apply to the production, processing, or marketing stage of the value chain. This kind of disaggregation may also highlight which part of the beef value chain does not comply with EU NTM regulations.

This study defined beef as products in the 0201 as well as 0202 category of the harmonised system code. This way of defining the product aggregated both frozen and fresh or chilled beef as well as whether the product has bone-in or is boneless. The results on the evaluation of South Africa's compliance to EU NTM regulations may be improved if there can be a study on the

difference between the kind of product exported by South Africa compared to the product imported by the EU. In addition, considering EU NTM regulations on beef as well as the type of product the EU imports, a study on the costs and benefits of exporting to the EU compared to other markets is recommended such that resources are targeted to the most lucrative markets.

REFERENCES

- Andjamba, H.N., 2017, *Econometric estimation of the demand for meat in Namibia* (Doctoral dissertation, University of the Free State).
- Anukoonwattaka, W., 2016, April. Session 2: Introduction to the basic gravity model. In *United Nations ESCAP: ARTNeT-GIZ Capacity Building Workshop on Introduction to Gravity Modelling*.
- Beghin, J.C., Maertens, M. & Swinnen, J., 2015, *Non-Tariff Measures and Standards in Trade and Global Value Chains*. Iowa State University. CARD Working Paper 559. http://lib.dr.iastate.edu/card_workingpapers/559
- Bestbier, R.H., 2016. *Factors influencing trade patterns of South Africa's fresh apple exports, with a focus on non-tariff measures*. (Masters dissertation: Stellenbosch University).
- Bowles, D., Paskin, R., Gutiérrez, M. & Kasterine, A., 2005, Animal welfare and developing countries: opportunities for trade in high-welfare products from developing countries. *Revue scientifique et technique-Office international des épizooties*, 24(2), p.783-790.
- Bureau for Food and Agricultural Policy (BFAP), 2018, *Baseline: Agricultural Outlook 2018-2027*. [Online]. Available at: <https://www.bfap.co.za/bfap-baseline-2018/> [Accessed 23 April 2019]
- Bureau of Food and Agricultural Policy (BFAP), 2021, *Baseline Agricultural Outlook 2021-2030*. [Online]. Available: <https://www.bfap.co.za/wp-content/uploads/2021/09/BFAP-Baseline-2021.pdf>. [Accessed 7 April 2022]
- Chaney, T., 2013, *The Gravity Equation in International Trade: An Explanation*. Working paper 19285. National Bureau of Economic Research. Cambridge.
- Dell'aquila, C. & Caccamisi, D., 2007, *Assessing market opportunities: quality and safety standards. trade policy and food security in the Caribbean*, p.63.

- Delport, M., Louw, M., Davids, T., Vermeulen, H. & Meyer, F., 2017, Evaluating the demand for meat in South Africa: an econometric estimation of short-term demand elasticities. *Agrekon*, 56(1), pp.13-27.
- De Melo, J., & Alessandro, N., 2018, Non-Tariff Measures: Data and Quantitative Tools of Analysis. foundation pour les études et recherché sur le development international. Working Paper (218), Development Policies
- Depa, P.M., Dimri, U., Sharma, M.C., & Tiwari, R., 2012, Update on epidemiology and control of Foot and Mouth Disease - A menace to international trade and global animal enterprise. *Vet World*, 5(11): 694-704, doi: 10.5455/vetworld.2012.694-704
- Department of Agriculture, Forestry and Fisheries, 2015, *South African animal disease management plan*. [Online]. Available: <https://www.dalrrd.gov.za/docs/media/ANIMAL%20DISEASE%20MANAGEMENT%20PLAN%20-%202015.pdf> [Accessed 23 April 2019]
- Department of Agriculture, Forestry and Fisheries, 2016, *South African Veterinary Strategy (2015 – 2020)*. [Online]. available: [https://www.daff.gov.za/vetweb/Animal%20Identification/Veterinary%20Strategy%200%202016-09-08_%20\(Final\).pdf](https://www.daff.gov.za/vetweb/Animal%20Identification/Veterinary%20Strategy%200%202016-09-08_%20(Final).pdf) [Accessed 23 April 2019]
- Department of Agriculture, Forestry and Fisheries, 2018, *Livestock identification and traceability system in SA (LITS-SA)*. Animal Production and Health. Version 3
- Department of Agriculture, Forestry and Fisheries., 2019, *A Profile of the South African Beef Market Value Chain*. [Online]. Available: <https://www.dalrrd.gov.za/daDev/sideMenu/Marketing/Annual%20Publications/Bee%20Market%20Value%20Chain%20Profile%202019.pdf> [Accessed 23 April 2019].
- European Commission (EC), 2018, EU import conditions for fresh meat and meat products. [Online]. Available: https://food.ec.europa.eu/system/files/2018-06/ia_trade_import-cond-meat_en.pdf [Accessed 16 October 2021].
- European Commission, 2009, General guidance on EU import and transit rules for live animals and animal products from third countries. Health & Consumer Protection Directorate-

General. [Online]. Available: https://food.ec.europa.eu/system/files/2016-10/la_guide_thirdcountries.pdf [Accessed 13 November 2019]

European Parliament, 2012, Comparative analysis of EU standards in food safety, environment, animal welfare and other non-trade concerns with selected countries. Directorate-General for internal policies. Policy Department B: Structural and Cohesion Policies: Agriculture and Rural Development. [Online]. Available at: [https://www.europarl.europa.eu/RegData/etudes/etudes/join/2012/474542/IPOL-AGRI_ET\(2012\)474542_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/etudes/join/2012/474542/IPOL-AGRI_ET(2012)474542_EN.pdf) [Accessed 23 April 2019]

Fermet-Quinet, E., Léon, E., Punderson, J. & Stratton, J., 2012, Performance of Veterinary Services (PVS) Evaluation Report: Republic of South Africa. World Organization of Animal Health: France.

Fermet-Quinet, E., Léon, E., Punderson, J. & Stratton, J., 2014, Performance of Veterinary Services (PVS) Gap Analysis Mission Report: Republic of South Africa. World Organization of Animal Health: France.

Ferrantino, M.J., 2006, Quantifying the trade and economic effects of non-tariff measures. *OECD Trade Policy Working Papers*, No. 28, OECD Publishing.

Ghodsi, M., 2021, Exploring "non-tariff measures black box": Whose regulative NTMs on which products improve the imported quality? Working Paper, No. 195, The Vienna Institute for International Economic Studies, Vienna

Gillis, A.S., 2021, Compliance. [online] TechTarget – Search Data Management. Available at: <https://www.techtarget.com/searchdatamanagement/definition/compliance>. [Accessed 24 May 2022]

Gourdon, J., Stone, S., & Van Tongeren, F., 2020, “non-tariff measures in agriculture”. *OECD Food, Agriculture and Fisheries Papers*, No. 147, OECD Publishing, Paris. <http://dx.doi.org/10.1787/81933f03-en>

Grundke, R., & Moser, C., 2016, Hidden protectionism? Evidence from non-tariff barriers to trade in the United States, Working Papers in Economics, No. 2016-02, University of Salzburg, Department of Social Sciences and Economics, Salzburg

- Guimaraes, M.H., 2012, Non-tariff measures in the European Union: Evidence from the Agri-Food Sector. *Agricultural Economics Review*, 2012, Vol 12. No 2.
- Gujarati, D.N., 2003, *Basic Econometrics*, fourth edition. International Edition. New York: McGraw-Hill/Irwin.
- Hammami, S., 2016, OIE standards on animal identification and traceability. Terrestrial Animal Health Standards Commission, World Organization for Animal Health. [Online]. Available: <https://rr-africa.woah.org/wp-content/uploads/2016/12/2-oie-identification.pdf> [Accessed 13 November 2019]
- Haveman, J. & Thursby, J.G., 1999, The impact of tariff and non-tariff barriers to trade in agricultural commodities: A disaggregated approach.
- Henson, S. & Humphrey, J., 2009, The impacts of private food safety standards on food chain and public standard-setting processes. Joint FAO/WHO Food Standards Programme: Codex Alimentarius Commission, Thirty-second Session. FAO Headquarters, Rome.
- Hernandez, M., 2019, The rising importance of non-tariff measures and their use in free trade agreements impact assessments. *Global Development and Environment Institute Working Paper Series; Tufts University: Medford, OR, USA*. [Online]. Available at: http://www.bu.edu/eci/files/2020/01/19-03_Hernandez_NTMs.pdf [Accessed 20 October 2021]
- Hillman, J.S., 1996, *Non-tariff agricultural trade barriers*. International Agricultural Trade Research Consortium. Working Paper No. 92-2.
- Industrial Development Corporation, 2018, A study on the potential product development for the commercialization and value add to beef products. [Online]. Available: <https://www.idc.co.za/wp-content/uploads/2018/11/Beef-Study-Final-Report.pdf> [Accessed 11 June 2019]
- International Organization for Animal Health (OIE), 2009, [Online]. Available at: <http://www.oie.int/en/animal-health-in-the-world/fmd-portal/about-fmd/foot-and-mouth-disease-notified-in-2009/> [Accessed 23 April 2019]

- International Organization for Animal Health (OIE), 2011, Terrestrial Animal Health Code Volume 1: General Provisions. [Online]. Available: <https://www.oie.int/en/what-we-do/standards/codes-and-manuals/terrestrial-code-online-access/> [Accessed 16 October 2021]
- International Trade Centre (ITC), 2015, The Invisible Barriers to Trade: How businesses experience non-tariff measures. International Trade Centre. Purdue CIBER Working Papers. Paper 143.
- International Trade Centre (ITC) & European Commission, 2016, Navigating Non-Tariff Measures Insights from a Business Survey in the European Union. Geneva: ITC/EC, 2016, xi, 53. Doc. No. MAR-16-66. E.
- Josling, T., Roberts, D. & Orden, D., 2004, Food Regulation and Trade: Toward a Safe and Open Global System. Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Denver, Colorado, August 1-4, 2004. Washington D.C.: Institute for International Economics (ISBN 0-88132-346-2)
- Junker, F., J. Komorowska, and F. van Tongeren (2009), “Impact of Animal Disease Outbreaks and Alternative Control Practices on Agricultural Markets and Trade: The case of FMD”, OECD Food, Agriculture and Fisheries Working Papers, No. 19, OECD Publishing. Doi: 10.1787/221275827814
- Kalaba, M. & Kirsten, J., 2014, *Estimating the quantity effects of non-tariff measures on SADC meat and milk trade*. Working Papers 206513, University of Pretoria, Department of Agricultural Economics, Extension and Rural Development.
- Kalaba, M.W., 2014, *The impact of non-tariff measures on SADC agricultural trade* (Doctoral dissertation, University of Pretoria).
- Kirk, R. 2010. Addressing Trade Restrictive Non-Tariff Measures on Goods Trade in the East African Community. Africa Trade Policy Notes: Note (7)
- Kinzius, L., Sandkamp, A.N., & Yalcin, E., 2018, Trade Protection and the Role of Non-Tariff Barriers, CESifo Working Paper, No. 7419, Center for Economic Studies and ifo Institute (CESifo), Munich

- Krisztin, T. & Fischer, M.M., 2015, The gravity model for international trade: Specification and estimation issues. *Spatial Economic Analysis*, 10(4), pp.451-470. Working Papers in Regional Science, 2014/01. WU Vienna University of Economics and Business, Vienna
- Latino., L. R., Pica-Ciamarra., U., & Wisser, D. 2020. Africa: The livestock revolution urbanizes. Elsevier: *Global Food Security* 26 (2020) 100399
- Maskus, K.E., Otsuki, T. & Wilson, J.S., 2005, *The cost of compliance with product standards for firms in developing countries: An econometric study* (Vol. 3590). World Bank Publications. Washington DC. [Online]. Available at: <https://openknowledge.worldbank.org/handle/10986/8961>
- Morgan, N., & Prakash, A., 2006, International livestock markets and the impact of animal disease. Food and Agricultural Organization, Rev. sci. tech. Off. int. Epiz., 2006, 25 (2), 517-528
- Organisation for Economic Co-operation and Development (OECD), 2018, OECD-FAO Agricultural Outlook 1990-2028, by commodity. [Online]. Available at: <https://stats.oecd.org/viewhtml.aspx?QueryId=84948&vh=0000&vf=0&l&i=&lang=en> [Accessed 23 April 2019]
- Organisation for Economic Co-operation and Development (OECD), 2021, OECD-FAO Agricultural Outlook 2021-2030. [Online]. Available at: <https://www.oecd-ilibrary.org/docserver/19428846-en.pdf?expires=1657895987&id=id&accname=guest&checksum=232E1BADC5945C86B416FC87B3493F97> [Accessed 16 October 2021]
- Penrith, M.L., 2013, OIE – Livestock trade international standards. [Online]. Available: https://tis.sadc.int/files/1613/9100/0538/Animal_Health_Workshop_-_OIE_and_Livestock_Trade_by_Mary_Louise_Penrith.pdf [Accessed 13 November 2019]
- Phaswana, P.E., 2018. The impact of non-tariff measures on meat trade between Southern African Customs Union (SACU) and Zambia. (Masters dissertation: University of Pretoria).

- Piermartini, R. & Yotov, Y.V., 2016, Estimating trade policy effects with structural gravity, WTO Staff Working Paper, No. ERSD-2016-10, World Trade Organization (WTO), Geneva.
- Red Meat Producers' Organization, 2017, Overview of the South African red meat industry. [Online]. Available at: <http://www.rpo.co.za/wp-content/uploads/2018/06/Corine-Presentation-AGM-14112017-Read-Only-Compatibility-Mode.pdf> [Accessed 23 April 2019]
- Santeramo, F.G., & Lamonaca, E. 2019. The Effects of Non-tariff Measures on Agri-food Trade: A Review and Meta-analysis of Empirical Evidence. *Journal of Agricultural Economics*: Vol (70)
- Scheltema, N., 2014, *A gravity approach to the determinants of international bovine meat trade* (Doctoral dissertation, University of Pretoria).
- Scoones, I., Bishi, A., Mapitse, N., Moerane, R., Penrith, M.L., Sibanda, R., Thomson, G.R. & Wolmer, W., 2010, Foot-and-mouth disease and market access: challenges for the beef industry in southern Africa.
- Shang, X., & Tonsor, G. T., 2019, *Sanitary and phytosanitary regulations and international red meat trade*. [Online]. Available at: <https://www.emerald.com/insight/content/doi/10.1108/BFJ-10-2018-0663/full/pdf?title=sanitary-and-phytosanitary-regulations-and-international-red-meat-trade> [Accessed 16 October 2021]
- Djankov, S., Freund, C., & Pham, C.S., 2010. "Trading on Time," *The Review of Economics and Statistics*, MIT Press, vol. 92(1), pages 166-173, February.
- Spies, D.C., 2011, *Analysis and quantification of the South African red meat value chain* (Doctoral dissertation, University of the Free State).
- Stevens, C. & Kennan, J., 2005, Botswana beef exports and trade policy. Discussion draft. Institute of Development Studies: University of Sussex, Brighton, UK.
- Tinbergen, J., 1962. *Shaping the World Economy: Suggestions for an International Economic Policy*. The Twentieth Century Fund, New York.

- Torres-Reyna, O., 2007, Linear regression using Stata. *Data and statistical services, Princeton University*. Available at: <https://www.princeton.edu/~otorres/Regression101.pdf>. [Accessed 20 April 2022]
- Trabelsi, I. 2013. Agricultural trade face to non-tariff barriers: A gravity model for the Euro-Med area. *Journal of Studies in Social Sciences: Volume 3, Number 1, 2013, 20-32*
- UCLA, 2021. Institute for Digital Research and Education, Statistical Consulting. [Online]. Available at: <https://stats.idre.ucla.edu/stata/webbooks/reg/chapter2/stata-webbooksregressionwith-statachapter-2-regression-diagnostics/> [Accessed 20 October 2020]
- United Nations Conference on Trade and Development (UNCTAD), 2013, Non-tariff measures to trade – Economic and Policy issue for developing countries: *Developing countries in international trade studies*. [Online]. Available at: https://unctad.org/system/files/official-document/ditctab20121_en.pdf [Accessed 20 October 2020]
- United Nations Conference on Trade and Development (UNCTAD), 2017, Non-tariff measures: Economic Assessment and Policy Options for Development. [Online]. Available at: https://unctad.org/system/files/official-document/ditctab2018d3_en.pdf [Accessed 04 April 2022]
- United Nations Conference on Trade and Development (UNCTAD), 2018, The unseen impact of non-tariff measures: Insights from a new database. [Online]. Available at: https://unctad.org/system/files/official-document/ditctab2018d2_en.pdf [Accessed 20 October 2020]
- United Nations Conference on Trade and Development (UNCTAD), 2019, Key statistics and trends in trade policy: Retaliatory tariffs between the United States and China. [Online]. Available at: https://unctad.org/system/files/official-document/ditctab2022d2_en.pdf [Accessed 31 July 2021]
- Van Der Meulen, B. M. J., 2013, The structure of European food law. [Online]. Available at: https://www.researchgate.net/publication/269762237_The_Structure_of_European_Food_Law. [Accessed 07 April 2022]

- Van Tongeren, F., Beghin, J., & Marette, S., 2009, "A Cost-Benefit Framework for the Assessment of Non-Tariff Measures in Agro-Food Trade", OECD Food, Agriculture and Fisheries Working Papers, No. 21, OECD Publishing, © OECD. doi:10.1787/220613725148
- Verbeke, W., 2001, The emerging role of traceability and information in demand-oriented livestock production. *Outlook on agriculture*, 30(4), pp.249-255.
- Vollrath, T.L., Gehlhar, M.J., & Hallahan, C.B., 2009, Bilateral Import Protection, Free Trade Agreements, and Other Factors Influencing Trade Flows in Agriculture and Clothing. *Journal of Agricultural Economics*, Vol. 60, No. 2, 2009, 298–317 doi: 10.1111/j.1477-9552.2008.00186.x
- World Trade Organization (WTO), 2020, Sanitary and Phytosanitary Information Management System. [Online]. Available at: <https://epingalert.org/en/Search/Index> [Accessed 07 April 2022]
- World Trade Organization. Market access for goods. [Online]. Available at https://www.wto.org/english/tratop_e/markacc_e/markacc_e.htm [Accessed 04 April 2022]

APPENDIX A: NON-TARIFF MEASURES: DEFINITION AND CLASSIFICATION

Over the last few decades, there has been a reduction of tariffs under the support of the General Agreement on Tariffs and Trade (GATT) and later WTO (UNCTAD, 2012). The establishment of these organisations brought about the formation of several regional (multilateral) and bilateral preferential trade agreements (UNCTAD, 2012). However, this reduction has not resulted in the expected increase in trade between countries. As the world saw a decrease in using tariffs in international trade, there was also an increase in using NTMs (Kalaba, 2014).

NTM is defined as a non-tariff policy that can have an economic impact on international trade in commodities, changes in trading volume and / or price (UNCTAD, 2014). Thus, NTMs are often in standards and regulations that influence the production, processing, and marketing of products. NTMs become NTBs when imposed solely to distort or restrict trade (UNCTAD, 2013). Although it is difficult to distinguish NTMs from NTBs, Hillman (1996) defines NTBs as government measures other than tariffs and customs taxes, which restrict or distort international trade. Using NTMs is becoming the norm in international trade and countries need to find ways of dealing (complying) with NTMs, whether they are put in place for trade restriction or facilitation purposes (Haveman & Thursby, 1999).

NTMs are classified into various categories with the most common being TBTs and SPS measures (ITC, 2016). In his paper, quantifying the trade and economic effects of non-tariff measures, Ferrantino (2006) categorises NTMs into three groups: customs and procedures (on exporting and importing), import quotas, prohibitions, and licences. The UNCTAD, however, classifies NTMs according to Table A.1.

Table A.1: Classification of non-tariff measures according to the United Nations Conference on Trade and Development

Import Measures	Technical Measures	A	SPS measures
		B	TBT
		C	Pre-shipment inspections and other formalities
	Non-Technical Measures	D	Contingent trade-protective measures
		E	Non-automatic licensing, quotas, prohibitions, and quantity-control measures
		F	Price-control measures, including additional taxes and charges
		G	Finance measures
		H	Measures affecting competition
		I	Trade-related investment measures
		J	Distribution restrictions
		K	Restrictions on post-sales services
		L	Subsidies (excl. export subsidies)
		M	Government procurement restrictions
		N	Intellectual property
		O	Rules of origin
Export-Related Measures	P	Export-related measures	

Source: UNCTAD (2017)

SPS measures refer to measures affecting the restriction of substances, hygiene regulations, and measures to prevent the spread of other diseases. It also includes all conformity assessment measures related to food safety, such as certification, testing, inspection, and quarantine (UNCTAD, 2014). In this study, emphasis is on SPS measures as the main form of NTMs likely to affect the trade of beef products from South Africa to the EU.

According to the WTO, in the last two decades since 1995, almost 18 000 notifications have been submitted to the SPS committee. Specific trade concerns raised to the SPS committee were 39% animal health, 31% food safety, 25% plant health and 5% other issues, with an increasing share coming from developing countries (WTO, 2014). Based on the trend in **Error! Reference source not found.** below, there should be more trade restriction in developing countries, however, not necessarily observed concerning trade flow patterns.

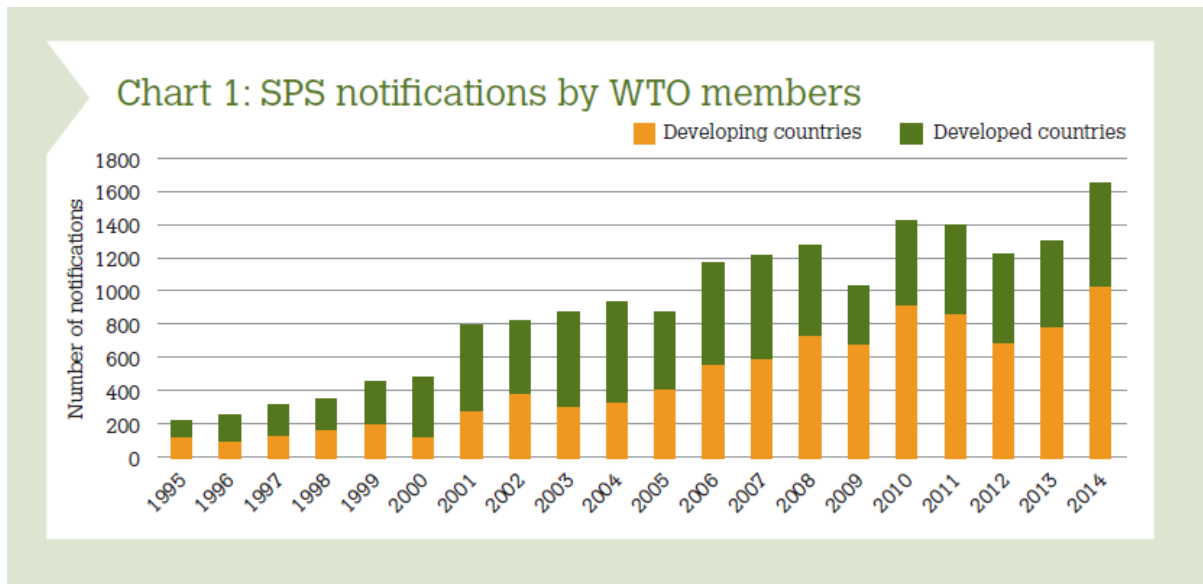


Figure A.0:1: SPS notifications by the World Trade Organization members since 1995

Source: WTO (2014)

For producers and traders to export their products, they need to know what the requirements for that market are to adapt production processes to meet them. Thus, it is important for importing countries to be transparent about the measures or requirements for exporting products into their countries. In Figure A.0:1 above, developing countries have been taking the lead in notifying the World Trade Organization of changes in SPS measures and/or requirements. This begs the question—are developing countries taking the lead in using SPS measures or are they more transparent than their developed nation counterparts?

Countries often state the risk to human life and/or animal or plant health as the reason for imposing certain restrictions on imports. According to the WTO Agreement on sanitary and phytosanitary measures, there are several risks assessed regarding SPS measures. These risks are potential in production or sales losses in the event of introduction, dissemination of pests or diseases, management or eradication costs in the importing country, and the relative cost-

effectiveness of alternatives risk mitigation approaches. As such importers are most likely to impose such standards to secure/safeguard domestic industries.

In as much as using NTMs can have negative economic effects, note, however, that NTMs are not necessarily bad and should not be eliminated (UNCTAD, 2017). NTMs can have positive effects where the objectives of NTMs imposed are to protect human, animal and plant life and health. Such NTMs are necessary and should be encouraged. As such the objective in understanding NTMs should be to increase using NTMs where they have positive effects and reduce or eliminate their use where they have trade distorting or negative effects.

In a world of asymmetric information, setting high product standards can function as a signal to consumers about the level of product safety and quality (Gourdon et al, 2020). Therefore, setting a high product standard can be welfare enhancing for both domestic and international participants in an instance where the domestic consumers are aware of the costs and benefits of certain food safety concerns. Where consumers are aware, they can then decide about their willingness to pay for products of a high quality and standard. This would provide an incentive for foreign producers to change production practices, to meet the standard, as they could charge a higher price for their products (Beghin et al., 2012). NTMs seem more beneficial to consumers when imposed to protect human health and life. Bad production processes using harmful substances can be detrimental to human health and life, therefore, setting certain standards can protect human life (Beghin et al., 2012).

APPENDIX B: EXPORTING TO THE EUROPEAN UNION

The process where a non-EU country can export meat and meat products to the EU is as follows:

1. The competent authorities of countries other than in the EU must submit a written application to the Commission's Directorate of Health and Food Safety to export meat or meat products to the EU. The application must include confirmation that the authorities can comply with all relevant laws to meet EU requirements.
2. The Directorate General of Health and Food Safety will send general and / or product-specific questionnaires to the competent authority. This questionnaire will need to be filled out and returned. The completed questionnaire contains information on relevant national laws on animal health and food hygiene, the structure of competent authorities, and more.
3. A residue monitoring plan from the exporting country must also be submitted to the Commission. The plan should target the species for which meat and meat products are exported to the EU. If the plan is not approved by the European Commission, meat and meat products will not be allowed to enter the EU, regardless of whether the third country meets other public or animal health requirements.
4. After evaluating the information provided, the Commission's Health Food Audit and Analysis Department can conduct an audit to assess the situation physically
5. If the results of the evaluation / audit and the guarantees provide by the exporting country are considered sufficient, the Directorate General of Health and Food Safety will propose the listing of the non-EU country and the specific conditions under which imports from this country will be permitted. At the same time, she creates a list of domestically approved companies. These are then discussed with representatives of all EU member states

If the Member States have a favourable opinion on the proposal, the European Commission will list both the non-EU country and any specific import conditions which apply. Lists of eligible establishments can be amended at the request of the exporting country and are made available for the public on the Internet:

https://webgate.ec.europa.eu/sanco/traces/output/non_eu_listsPerActivity_en.htm

APPENDIX C: EUROPEAN UNION APPROVED BUSINESS ESTABLISHMENTS

List of establishments in South Africa on the European Union's positive list

COUNTRY	South Africa	Validity date from 19/03/2018 Date of publication 19/03/2018 00044				
SECTION	Meat products					
List in force						
Approval number	Name	City	Regions	Activities	Remark	Date of request
ZA 24	Mossstrich Abattoir	Mossel Bay	Western Cape	PP	R	16/01/2013
ZA282	Irvine & Johnson	Paarden Eiland	Western Cape	CS		15/11/2013
ZA 335	Ostriland Meat	Citrusdal	Western Cape	PP	22, R	21/06/2016
ZA 92	Klein Karoo Co-operation Abattoir No. 1	Oudtshoorn	Western Cape	PP	22, R	18/06/2009
Activities Legend : CS Cold Stores PP Processing Plant Remarks Legend : 22 Meat products R Ratites						

Source: European Commission (2019)

APPENDIX D: PERFORMANCE OF THE VETERINARY SERVICES RESULTS OF SOUTH AFRICA

Table D.1 below (Summary of OIE PVS evaluation results) provides a detailed evaluation/scoring of each category and the various competencies within the categories. A score out of five (5) is provided with a description of the allocation of the score.

Table D.1: Summary of International Organization for Animal Health performance of the veterinary services evaluation results

PVS results summary of South Africa	Current level	Expected level	Description of result
I. HUMAN, PHYSICAL AND FINANCIAL RESOURCES			
I.1.A. Staffing: Veterinarians and other professionals	5	5	There are effective management procedures for performance assessment of veterinarians and other professionals
I.1.B. Staffing: Veterinary paraprofessionals and other	4	4	Most technical positions are effectively supervised regularly
I.2.A. Professional competencies of veterinarians	5	5	The veterinarians' practices, knowledge and attitudes are subject to regular updating, or international harmonisation, or evaluation
I.2.B. Competencies of veterinary paraprofessionals	4	4	The training of veterinary paraprofessionals is of a uniform standard that allows the development of some advanced competencies (e.g., meat inspection)
I-3. Continuing education	4	5	The VS have access to CE reviewed annually and updated as necessary, and it is implemented for all categories of the relevant personnel
I-4. Technical independence	3	4	The technical decisions are based on scientific evidence but must be reviewed and modification based on non-scientific considerations
I-5. Stability of structures and sustainability of policies	2	4	Sustainability of policies is affected by changes in the political leadership and/or the structure and leadership of VS
I-6. A. Internal coordination (chain of command)	2	4	There are internal coordination mechanisms for some activities, but the chain of command is not clear
I-6. B. External coordination	3	4	There are formal external coordination mechanisms with clearly described procedures or agreements for some activities and/or sectors
I-7. Physical resources	4	4	The VS have suitable physical resources at all levels, and these are regularly maintained
I-8. Operational funding	4	5	Funding for new or expanded operations is case-by-case, not always based on risk analysis and/or cost benefit analysis

I-9. Emergency funding	4	5	Funding arrangements with adequate resources have been established, but in an emergency, their operation must be agreed through a non-political process case-by-case
I-10. Capital investment	4	5	The VS routinely secures adequate funding for the maintenance and improvement in operational infrastructure
I-11. Management of resources and operations	3	4	The VS have adequate records, documentation and management systems and use these to a limited extent for the control of efficiency and effectiveness

II. TECHNICAL AUTHORITY AND CAPABILITY			
II-1. A. Access to veterinary laboratory diagnosis	5	5	In the case of new and emerging diseases in the region or world, the VS have access to and use a network of national or international reference laboratories (e.g., an OIE Reference Laboratory) to obtain a correct diagnosis
II-1. B. Suitability of national laboratory infrastructures	5	5	The national laboratory infrastructure meets the needs of the VS, and is sustainable and regularly audited
II-2. Laboratory quality assurance	4	5	All the laboratories used by the public sector VS and most or all private laboratories are using formal QA systems.
II-3. Risk analysis	3	4	The VS compile and maintain data and can conduct risk analysis. Most risk management measures are based on risk assessment
II-4. Quarantine and border security	4	4	The VS can establish and apply quarantine and border security procedures which systematically address legal pathways and illegal activities
II-5. A. Passive epidemiological surveillance	3	4	The VS conduct passive surveillance in compliance with OIE standards for some relevant diseases at the national level through appropriate networks in the field, where samples from suspect cases are collected and sent for laboratory diagnosis with evidence of correct results obtained. The VS have a basic national disease reporting system.
II-5. B. Active epidemiological surveillance	4	4	The VS conduct active surveillance in compliance with scientific principles and OIE standards for some relevant diseases, apply it to all susceptible populations, update it regularly and report the results systematically.
II-6. Emergency response	3	4	The VS have the legal framework and financial support to respond rapidly to sanitary emergencies, but the response is not coordinated through a chain of command. They may have national contingency plans for some exotic diseases but not updated/assessed.
II-7. Disease prevention, control, and eradication	2	3	The VS implement prevention, control, and eradication programmes for some diseases and/or in some areas with little or no scientific evaluation of their efficacy and efficiency.

II-8. A. Regulation, authorisation, and inspection of establishments	4	4	Regulation, authorisation, and inspection of relevant establishments (and coordination, as required) are undertaken in conformity with international standards for premises supplying the national and local markets.
II-8. B. Ante and post mortem inspection	4	4	Ante- and post-mortem inspection and collection of disease information (and coordination, as required) are undertaken in conformity with international standards for export premises and for all abattoirs producing meat for distribution in the national and local markets
II-8. C. Inspection of collection, processing, and distribution	2	3	Implementation, management, and coordination (as appropriate) are undertaken in conformity with international standards only for export purposes
II-9. Veterinary medicines and biological	2	3	The VS have some capability to exercise regulatory and administrative control over veterinary medicines and veterinary biologicals to ensure their responsible and prudent use.
II-10. Residue testing	3	3	A comprehensive residue testing programme is performed for all animal products for export and some for domestic consumption
II-11. Animal feed safety	2	3	The VS have some capability to exercise regulatory and administrative control over animal feed safety
II-12. A. Animal identification and movement control	3	4	The VS implement procedures for animal identification and movement control for specific animal subpopulations as required for disease control, under relevant international standards.
II-12. B. Identification and traceability of animal products	2	3	The VS can identify and trace products of animal origin to engage a specific problem (e.g., products originating from farms affected by a disease outbreak).
II-13. Animal welfare	3	4	In conformity with OIE standards animal welfare is implemented for some sectors (e.g., for the export sector)

III. INTERACTION WITH INTERESTED PARTIES			
III-1. Communications	4	4	The VS contact point for communication provides up-to-date information, accessible through the Internet and other channels, on activities and programmes.
III-2. Consultation with interested parties	3	4	The VS maintain a formal consultation mechanism with interested parties
III-3. Official representation	4	4	The VS consult with interested parties and consider their opinions in providing papers and making interventions in relevant meetings
III-4. Accreditation/authorisation/delegation	3	4	The public sector of the VS develops accreditation / authorisation / delegation programmes for certain tasks, but these are not routinely reviewed.
III-5. A. Veterinary Statutory Body Authority (VSB)	5	5	The VSB regulates and applies disciplinary measures to veterinarians and veterinary paraprofessionals in all sectors throughout the country
III-5. B. Veterinary Statutory Body Capacity	4	4	The VSB has a transparent process of decision-making and conforms to OIE standards
III-6. Participation of producers and other interested parties in joint programmes	2	4	Producers and other interested parties are informed of programmes and assist the VS to deliver the programme in the field.
IV. ACCESS TO MARKETS			
IV-1. Preparation of legislation and regulations	4	4	The VS have the authority and the capability to participate to prepare national legislation and regulations, with a relevant formal methodology to ensure adequate internal and external quality, involving participation of interested parties in most fields of activity.
IV-2. Implementation of legislation, regulations, and compliance	3	4	Veterinary legislation is implemented. As required, the VS have a power to take legal action / initiate prosecution in non-compliance in most relevant fields of activity
IV-3. International harmonisation	4	5	The VS are active in reviewing and commenting on the draft standards of relevant intergovernmental organisations
IV-4. International certification	4	5	The VS develop and conduct all relevant certification programmes for any animals, animal products, services, and processes under their mandate in compliance with international standards

IV-5. Equivalence and other types of sanitary agreements	4	4	The VS actively pursue the development, implementation and maintenance of equivalence and other types of sanitary agreements with trading partners on all matters relevant to animals, animal products and processes under their mandate
IV-6. Transparency	4	4	The VS regularly inform interested parties of changes in their regulations and decisions on the control of relevant diseases and of the country's sanitary status, and of changes in the regulations and sanitary status of other countries
IV-7. Zoning	5	5	The VS can demonstrate the scientific basis for any disease-free zones and can gain recognition by trading partners they meet the criteria established by the OIE (and by the WTO SPS agreement where applicable).
IV-8. Compartmentalisation	4	5	The VS collaborate with producers and other interested parties to define responsibilities and execute actions that enable it to establish and maintain disease-free compartments for selected animals and animal products, as necessary.

APPENDIX E: LIST OF CODEX REFERENCE STANDARDS

(The below Codex reference standards are available in multiple languages at: <http://www.fao.org/fao-who-codexalimentarius/standards/en/>)

Hygiene: Codex Committee on Food Hygiene (CCFH)

- General Principles of Food Hygiene (CAC/RCP 1-1969)
- Code of Hygienic Practice for Meat (CAC/RCP 58-2005)
- Guidelines for the Control of Trichinella Spp. in Meat of Suidae (CAC/GL 86-2015)
- Guidelines for the Control of Taenia Saginata in Meat of Domestic Cattle (CAC/GL 85-2014)
- Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food (CAC/GL 79-2012)
- Guidelines for the Control of Campylobacter and Salmonella in Chicken Meat (CAC/GL 78-2011)

Food Labelling: Codex Committee on Food Labelling (CCFL)

- General Standard for Labelling of Pre-packaged Foods (CODEX STAN 1-1985)
- Contaminants: Codex Committee on Contaminants in Foods (CCCF)
- Code of Practice for the Prevention and Reduction of Dioxin and Dioxin-like PCB Contamination in Food and Feeds (CAC/RCP 62-2006)
- Code of Practice Concerning Source Directed Measures to Reduce Contamination of Foods with Chemicals (CAC/RCP 49-2001)

Frozen Foods: Ad Hoc Codex Intergovernmental Task Force on the Processing and Handling of Quick-Frozen Foods (TFQFF)

- Code of Practice for the Processing and Handling of Quick-Frozen Foods (CAC/RCP 8-1976)
- Drugs Residues: Codex Committee on Residues of Veterinary Drugs in Foods (CCRVDF)
- Maximum Residue Limits (MRLs) and Risk Management Recommendations (RMRs) for Residues of Veterinary Drugs in Foods (CAC/MRL 2)
- Guidelines for the Design and Implementation of National Regulatory Food Safety Assurance Programmes Associated with the Use of Veterinary Drugs in Food Producing Animals (CAC/GL 71-2009)
- Pesticide Residues: Codex Committee on Pesticide Residues (CCPR)
- MRLs for pesticides in meat (Codex database)

Traceability: Codex Committee on Food Import and Export Inspection and Certification Systems (CCFICS)

- Principles for Traceability / Product Tracing as a Tool Within a Food Inspection and Certification System (CAC/GL 60-2006)