ANIMAL IDENTIFICATION SYSTEM AND NATIONAL SECURITY

A STUDY OF NORTH-WEST NIGERIA

Elsie Uduak Mbuk-Onwuhafua, mni

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Published, November 2025
Published by National Institute for Policy and Strategic Studies (NIPSS)

ISBN 978 - 978 - 781 - 599 - 1

ISBN 978-978-781-599-1
9 789787 815991

Dedication

This book is dedicated to the Glory of Almighty God and also to the loving memory of my late parents who now live in the stars, Mr Mbuk James Mbuk and Mrs Glory Edem Mbuk; my late siblings who left us too soon, but will never be forgotten, Mr Uwana Franklin Mbuk, Mr Betse Mbuk and Engineer Kingsley Nsima Mbuk.

To my children, whose laughter is my favorite sound and myself, for showing up, pushing through, and finishing what I started.

Acknowledgement

My profound gratitude goes to Almighty God for the privilege and sparing my life to successfully attend the National Institute as a member of Senior Executive Course 44, 2022.

I wish to most sincerely thank the former Commandant, Nigerian Defence Academy, Major General Ibrahim Manu Yusuf for the sponsorship. My gratitude goes to my Research Project Supervisor, the erudite, Dr Razak Olabomi, Senior Research Fellow, for his untiring correction, valuable advice and constructive criticism used in enriching this work. My appreciation also goes to both of my Directing Staff, Brigadier General Sylvester Olumuyiwa Oloyede, mni and Professor Mojubaolu Olufunke Okome for their mentoring and guidance throughout the course period.

My appreciation goes to the Director General, of the Institute, Professor Ayo Chistopher Omotayo, the Secretary and Director of Administration Brigadier General CFJ Udaya (rtd) mni, the Director of Studies Professor Olufunmilayo Josephine Para-Mallam, mni, Air Vice Marshal Clavartrinitas Uchechi Nwagwu, mni who motivated me at critical times and all other members of the Directing Staff for their useful contributions during the course.

My special thanks go to the former Chief of Defence Staff, General Lucky Eluonye Onyenuchea Irabor (Rtd), who despite his busy schedule participated in this study and for his encouragement in many ways towards the success of the course. I also appreciate the entire management and staff of the Institute for their efforts toward creating conducive environment throughout the course. I remain grateful to all the Senior Executive Course 44, 2022 participants, especially members of the Study Group Two for weathering the storm together.

Also, the former General Officer Commanding 1 Division, Kaduna, Major General Kabiru Imam Mukhtar (Rtd), the Commander 17 Brigade, Nigerian Army, Katsina, Major General Ibikunle Ademola Ajose, the 1 Division Garrison Commander, Brigadier General Chibuzor Ogbuabo, the Land Component Commander Operation Hadarin Daji, Colonel Hassan Mohammed Bello, the Commanding Officer 2 Battalion, Lieutenant Colonel Umar Ahmed Mohammed, the Military Assistant to the General Officer Commanding 1 Division, Kaduna, Major Adeyemi James Adeyeye, the former Director Army Public Relations, Brigadier General Jude Texas Chukwu, mni, (rtd), Co-founder/CEO Livestock247 Ibrahim Maigari Ahmadu and Executive Secretary/CEO of the National Agricultural Development Fund (NADF) Mohammed Abu Ibrahim for their invaluable contributions and for granting me interview sessions on the subject matter. I

extend my sincerest gratitude to Mr. Jonathan Okon, who served as my secretary throughout the course period.

I sincerely thank the Honourable Minister of Defence, Mohammed Badaru Abubakar, CON, mni for writing the foreword to this book. To the former Permanent Secretary, Ministry of Defence, Dr. Ibrahim Abubakar Kana, mni, your guidance and support have made all the difference in my growth. I am grateful for the opportunities you have given me to learn and grow. The immediate past Commandant of the Nigerian Defence Academy, Major General John Ochefu Ochai, thank you for being so approachable and understanding. It made a huge difference knowing that I could always go to you with any issue.

Finally, my profound gratitude goes to my nuclear family, for their love, prayers and for coping while I was away on course. I also thank members of my extended family for their emotional support towards successful completion of this all-important course. May Almighty God bless and reward all those I have mentioned and those too numerous that I could not, who have in one way or the other contributed to my success, I thank you all.

Elsie Uduak Mbuk-Onwuhafua, PhD, mni
November, 2025

Foreword

One of the foremost responsibilities of any government is the protection of lives and property, for without security, no nation can flourish in prosperity or peace. The search for sustainable strategies to secure communities has therefore been a central concern of statecraft across the world. In Nigeria, the menace of cattle rustling, particularly in the North-West region has emerged as both an economic and security challenge. It undermines food security, destabilises rural livelihoods and fuels a cycle of violence that threatens national cohesion.

This book, Animal Identification System and National Security: A Study of North-West Nigeria, is both timely and significant. It departs from the familiar terrain of militarised responses and instead interrogates the viability of technology-driven solutions, particularly Animal Identification Systems (AIS), as a means of addressing cattle rustling and enhancing national security. It situates its theoretical foundation and

inquiry within the framework of the Technology Acceptance Theory. The author brings both academic rigour and practical insight to a problem that is as much about human behaviour and cultural practices as it is about policy and security operations.

What makes this work especially compelling is the evidence-based approach adopted. Through careful empirical research, drawing on both quantitative and qualitative methods, the study establishes a positive correlation between AIS and improved security outcomes. Yet it does not recoil from highlighting the barriers: low literacy among pastoralists, the costs of technology, weak legal frameworks and cultural resistance. In doing so, the book provides a balanced and pragmatic analysis which recognises that technology alone is not a panacea.

The recommendations offered are profound. The call for a national policy on Animal Identification, greater awareness among herders and the institutionalisation of AIS through robust legislation, all point towards a vision where innovation, law and governance intersect to secure lives and livelihoods. Ultimately, this book

reminds us that national security is not solely the function of arms and force; it is equally the product of foresight, policy innovation and the willingness to adapt new ideas to local realities.

I commend the author, Dr. Elsie Uduak Mbuk-Onwuhafua, mni for this important contribution to scholarship and policy. It is my hope that this study will not only enrich academic discourse but also influence policy makers, practitioners and stakeholders to embrace more holistic and technology-enabled strategies for peace and security in the North West and Indeed, Nigeria.

Mohammed Badaru Abubakar, CON, mni
Honourable Minister of Defence
Federal Republic of Nigeria

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List of Abbreviations

AFN	- Armed Forces of Nigeria
AIMS	- Animal Identification Management Solution
AIS	- Animal Identification System
BSE	- Bovine Spongiform Encephalopathy Development
CDS	- Chief of Defence Staff
ERGP	- Economic Recovery and Growth Plan
EU	- European Union
FGN	- Federal Government of Nigeria
FMAFS	- Federal Ministry of Agriculture and Food Security
FMARD	- Federal Ministry of Agriculture and Rural Development
FMLD	- Federal Ministry of Livestock Development
GII	- Global Innovation Index
GIS	- Geographic Information System
GOC	- General Officer Commanding
GPI	- Global Peace Index
GPS	- Global Positioning System

GST	- General Systems Theory
ICT	- Information and Communication Technology
IoT	- Internet of Things
ISO	- International Organisation for Standardisation
KII	- Key Informant Interview
LGA	- Local Government Area
MACBAN	- Miyetti Allah Cattle Breeders Association of Nigeria
MTN	- Mobile Telephone Network
NADF	- National Agricultural Development Fund
NAIS	- National Animal Identification System
NAITS	- National Animal Identification and Traceability
NALC	- National Agricultural Law Centre
NAPRI	- National Animal Production Research Institute
NASRDA	- National Space Research Development Agency
NATO	- North Atlantic Treaty Organisation
NITDA	- National Information Technology Development Agency
NLB	- National Livestock Bureau
NLMA	- National Livestock and

	Management Agency
NLTP	- National Livestock Transformation Plan
NPF	- Nigeria Police Force
NS	- National Security
NSCDC	- Nigeria Security and Civil Defence Corps
NSEP	- National Scrapie Eradication Program
NSS	- National Security Strategy
NW	- North West
ONSA	- Office of the National Security Adviser
RFID	- Radio Frequency Identification
SALW	- Small Arms and Light Weapons
SMS	- Short Message Service
SPSS	- Statistical Package for Social Sciences System
TAM	- Technological Acceptance Model
UK	- United Kingdom
USA	- United States of America
USDA	- United States Department of Agriculture
WSAN	- Wireless Sensors and Actuators Networks
WW1	- World War 1

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Preface

The major objective of governments across the world is the protection of lives and properties of citizens whilst ensuring their wellbeing. This is often demonstrated by the resolve to put in place strategies that are capable of protecting human, material and natural resources from any form of threat. In Nigeria, the activities of cattle rustlers especially, in the North West (NW) region remain a major threat to National Security (NS). The Nigerian military and other security agencies have been engaged in various security operations to address the menace for enhanced NS. However, in spite of remarkable feats achieved by this militarised hard power approach, the threat of cattle rustling is still rife. To this end, state governments including those of Katsina and Kaduna have experimented Animal Identification Systems (AIS) such as Radio Frequency, micro-chips and implants. However, its effectiveness has been marred by several challenges.

Thus, this publication appraised the application

of AIS in the NW within the context of underscoring its strategic relevance and viability for improving NS. The objectives of the study were to examine the nature, effect, challenges and prospects of AIS for enhanced security in the NW. To achieve these objectives, the Technological Acceptance Theory espoused by Davis, Bagozzi and Warshaw was adopted as the theoretical foundation upon which the basis of our book was hinged. Cross-sectional survey design was adopted to intensively investigate the nature and relationship of the variables of the study. Using mixed research strategy (quantitative and qualitative) of data collection, we purposively sampled 370 respondents for the administration of the questionnaire instrument. Primary quantitative data collected were analysed using Simple Statistical Tools (SPSS) while the in-depth interview was analysed descriptively. Findings of the study revealed the existence of causal positive relationship between AIS and NS. A major finding of the study is that AIS is a viable strategy for addressing the cattle rustling in the NW for enhanced NS. However, poor literacy level of herders, fear of harm to their cattle, lack of legal frameworks to enforce AIS, the cost of acquiring

the technology and herders' nomadic culture among others dissuade cattle breeders from embracing AIS technologies. The study recommended among others the development of a national policy on AIS and increase awareness for cattle breeders and stakeholders alike. It was also recommended that the Federal Government of Nigeria should as a matter of priority institutionalise AIS through a review and enactment of the Bill for an Act for the establishment of National Livestock Bureau.

1

Introduction and General Overview of Animal Identification System and National Security in Nigeria

The global security landscape is increasingly shaped by violent and criminal activities of non-state actors which undermine the security, peace, stability and prosperity of nations. One of such criminal activities is animal theft, often manifesting in form of cattle rustling. This phenomenon, which has no geographic reference, manifests itself in various scales and dimensions with dire national security implications for even advanced countries of the world.

Animal Identification System (AIS) has over the years evolved as a strategy adopted by most

nation states grappling with animal theft to improve their National Security (NS). According to Ousmane *et al.*, (2017), AIS encompass the various methods adopted to track and locate animals. The technology revolves around Wireless Sensors and Actuators Networks (WSAN), Radio Frequency Identification (RFID), transponders and Big Data. The introduction of AIS that comprise Global Positioning System (GPS) and Geographic Information System (GIS) combined technologies is increasingly applied for tracking and monitoring livestock for enhanced NS. These systems have so far help recover the limits of traditional solutions against cattle rustling.

For instance, In Scotland, over 300 cattle were reported to have been rustled by the end of 2014, leading to the declaration of cattle rustling as a national emergency by the government (Catriona, 2016; Farmers Eye, 2020). In Italy, the cattle rustling phenomena have only recently been limited through the direct control of the herdsmen. In the United States of America, where AIS frameworks are well instituted and functional, the issue of cattle rustling has been curtailed to the barest minimum. Accordingly, AIS in the USA is mainly for animal monitoring

and disease control. For instance, the outbreak of Bovine Spongiform Encephalopathy (BSE) in 2003 resulted in severe economic impacts to the US livestock sector (American Sheep Industry Association, 2006). Accordingly, The National Animal Identification System (NAIS) was set forth in early 2004 by a Working Group including both industry and government officials. The NAIS built on the National Animal Identification Plan initiated in 2002. The goal of the NAIS was nationwide 48-hour trace back of all livestock in the event of a disease emergency (Skaggs, 2011).

In Africa, cattle rustling is on the rise, with the associated number of deaths, both amongst cattle rustlers, security forces and affected populations reaching problematic proportions. In East Africa for instance, cross-border cattle rustling violence is common among the Karamojong community of Uganda and the Turkana people of Kenya. In early 2017, in Laikipia, Kenya, about 10,000 pastoralists armed with automatic rifles raided farms, wildlife reserves, and conservancies, carting away 135,000 herd of cattle and killing over 200 people (Agade, 2018). To address this and improve NS, the government of Kenya developed and adopted an AIS called Chipsafer in 2016. The animal tracking device uses a remote tracking system to identify

and geolocate individual livestock, offering security against theft and disease. Owing to effective implementation of the AIS and related measures, Kenya's ranking in the Global Peace Index (GPI) increased from 131st position in 2017 to 127th in 2025 out of 163 countries (GPI, 2025). Thus, within the African continent, the Chipsafer device of Kenya remains a model for evaluating the efficacy of AIS in addressing the security challenge of cattle rustling.

In Nigeria, cattle rustling has evolved from a largely opportunistic, low-scale predatory activity into an organised criminal economy intertwined with kidnapping, illegal mining and the proliferation of Small Arms and Light Weapons (SALW) (Rufa'i, 2021; Armed Conflict Location & Event Data Project [ACLED], 2024). The phenomenon is particularly prevalent in the North-West (NW) and contributes to the dynamics of insecurity in that region. Empirical indicators from state and independent sources underscore the scale of the problem. Between 2011 and 2019, the activities of cattle rustlers in the NW region resulted in the death of more than 8,000 people and displacement of more than 200,000 persons (International Crisis Group, 2020). Kaduna State's official security reporting

(compiled in 2021) recorded 13,788 animals rustled alongside widespread killings and abductions. This represents one of the clearest single-state snapshots of the rustling economy's magnitude in the NW.

National security indices reflect this ambient risk environment. For instance, Nigeria ranked 144th of 163 on the Global Peace Index (GPI) 2024 (worse end of the scale), while the Global Terrorism Index (GTI) 2024 still placed Nigeria among the top ten countries most impacted by terrorism despite year-on-year improvements while the Fragile States Index (2024) recorded persistently high fragility scores (≈96.4 in 2022; ≈95.8 in 2024), signalling chronic governance pressures that erode deterrence and enforcement in rural space (GTI, 2024; GPI, 2024; Fragile States Index, 2024). Together, these trendlines accentuated the significance of cattle rustling as a fundamental NS problem in Nigeria.

In response, the Nigerian government has deployed various military and paramilitary interventions. Joint Task Forces such as Operation Harbin Kunama ("Scorpion Sting") 2016; Operation Sharan Daji ("Sweep the Bush") in 2017; Operation Hadarin Daji in 2019; Operation Sahel Sanity (July-Dec 2020; supporting OPHD);

and Operation Forest Sanity (2022; Kaduna axis) were launched to dismantle cattle rustling camps, recover stolen livestock and restore security in Zamfara, Katsina, Kaduna, and Sokoto States (Defence HQ, 2020; Crisis Group, 2020; Aina, 2023). The military also initiated Operation Accord in 2020 to consolidate earlier gains, while the Nigerian Air Force has supported ground operations with air surveillance and targeted strikes against armed rustlers (*ThisDay*, 2020). Complementing these are the Nigeria Security and Civil Defence Corps (NSCDC) and local vigilante groups, who have worked alongside the military to safeguard herders and rural communities (Vanguard, 2024).

Additionally, governments and private sector actors have experimented with AIS, including, ear tags and RFID/micro-chips linked to centralised registries to harden supply chains, verify ownership and enable recovery/traceability of cattle from birth to slaughter. However, it must be noted that Nigeria only recently begun adopting AIS as a non-kinetic approach to curb incidents of cattle rustling for enhanced NS. In 2017, the National Animal Identification and Traceability System (NAITS) was launched in Enugu, South-East Nigeria. NAITS is aimed at curbing livestock

rustling and related criminalities as well as assist in identifying and tracking livestock through electronic tags and transponders. This effort is a follow-up to the Federal Government's policy of identifying and tracking livestock from points of birth to slaughter. Additionally, the legislation to establish a National Livestock and Management Agency (NLMA) is also considered among efforts by the Nigerian government to adopt AIS for enhanced NS in Nigeria.

However, despite kinetic and indeed, non-kinetic efforts such as adopting AIS, its application in the NW has remained inadequate. The policy, legal and institutional environment for effective application of AIS to tackle the menace of cattle theft in the NW is considered inadequate. Therefore, the study intends to examine the nature of the application of AIS and its strategic relevance for addressing the root cause of the insecurity in NW region for enhanced NS in Nigeria.

AIS Adoption and Integration Problem in Nigeria

Cattle theft is a recurrent phenomenon in the NW that is observed in many states in the region. In recent years, it has increasingly become the main concern of policy makers and security operatives

in view of its dire implications for NS. The menace has developed from a cultural or survival practice to a, now often, widespread criminal activity. Rural Communities in NW Nigeria have been devastated by banditry, proliferation of fire arms, kidnapping, rape, abduction and indiscriminate killing which has direct bearing with the problem of cattle rustling (Mukhtar, 2020). RSIS International (2023) reported that, between March 2019 and February 2022 alone, approximately 4,180 lives were lost and more than 448,000 people were internally displaced, along-side the theft of thousands of cattle. Continuing into 2024, escalating criminal violence, including cattle theft had resulted in nearly 4,000 fatalities and forced about 700,000 individuals to flee their homes (The Africa Centre for Strategic Studies [ACSS, 2024]). These figures underscore the profound destabilising effects of organised livestock crime in the region which have had adverse effect on the economic base of the region as well as NS.

As part of responses to the insecurity in the NW, the Federal Government of Nigeria (FGN), launched various kinetic and non-kinetic measures. Kinetic efforts include the launch of a specialised Task Force on Cattle Rustling and Associated Crime while northern state governors

attempted to coordinate action between the police, the military and other state security services, but without much effect. Several Military operations such as Operation Sharan Daji which was later renamed Operation Hadarin Daji in May 2019 were also carried out in most affected states in the NW (Aina, Ojob and Oyewole, 2023). The operation since inception till July 2021 neutralised 369 armed gangs and recovered over 8,000 cattle, 2,253 sheep and 168 goats rustled by bandits between January and May 2021 (Adamu, 2021; Aina, Ojob and Oyewole, 2023). Despite remarkable success, cattle rustling in the NW is still on the increase which highlights the need for more robust and pragmatic approaches.

Alongside security operations, federal and sub-national governments have pursued technological and administrative interventions to harden the livestock value chain. The use of Radio Frequency Identification (RFID) tags has been hailed as a potentially useful technology against cattle raids in the NW region (Bashir, Azlizan and Usof, 2018). In 2017, the Katsina State Government in partnership with MTN also launched the Animal Identification Management Solution (AIMS) to check cattle theft in the state (Federal Ministry of Agriculture and Rural Development

[FMARD], 2023).

At Federal level, the Federal Ministry of Agriculture launched the NAITS to assign tamper-resistant ear tags and build a national livestock registry for movement control, disease management and theft deterrence. Pilot projects and private sector solutions (including RFID and micro-chipping pilots in some states in the NW) have demonstrated technical feasibility but also suggest implementation bottlenecks (FMARD, 2023).

Observably, the adoption of AIS in the NW and Nigeria as a whole is relatively poor. Little institutional and policy attention is given to addressing perceived bottlenecks to the adoption of AIS as a veritable tool for enhancing curbing insecurity resulting from cattle rustling in NW. Accordingly, book seek to examine the application of AIS in the NW within the context of underscoring its strategic importance and viability for improving NS.

Significance and Policy Relevance of the Publication

The content and findings of book would be beneficial to the FGN and affected State

Governments in the NW in developing strategies to address security threats posed by cattle rustling. Particularly, the study will be beneficial to the Federal Ministry of Livestock Development (FMLD), Federal Ministry of Agriculture and Food Security (FMAFS), Miyetti Allah Cattle Breeders Association of Nigeria (MACBAN), National Space Research and Development Agency (NASRDA), the Nigerian Military and other internal security agencies. Furthermore, the study would contribute to the existing body of knowledge and serve as a reference for future researchers.

Concept of Animal Identification System

The concept of AIS, according to Congressional Research Service (2010) connotes the entirety of tools to identify and track animals using modern technology. Such technologies include GIS, wireless technologies such as Radio Frequency Identification (RFID) tags and GPS satellite collars. In another context, Shulaw (2010) sees AIS as a mechanism that enable herders monitor their cattle along their allocated grazing routes or reserves, enabling them to remotely check cattle's positions and also curb the threat of theft or wandering into farms. It is a system which serves

as both a tracker and an anti-theft system for cattle. The core of this system is its collar technology which majorly consists of a GPS and GSM module which aids in transmitting the coordinates of the cattle to the user via notifications whenever the user dials to know the position of the cattle. In the context of this study, AIS refers to the use of modern technology and other marking systems to keep records on individual farm animal or group of animals so that they can be easily tracked from their birth through the marketing chain and place of slaughter. It also covers animal health surveillance and disease control.

Concept of National Security

The term NS is a contested concept and widely used by scholars and security stakeholders without a universally accepted definition. Lippmann (1943: 177) sees NS as the ability of a nation to maintain its core values and avoid war, and if challenged, its ability to maintain such core values by victories in war. Pogoson (2013) conceptualises NS as the ability of nations to promote the pursuit and realisation of the fundamental needs and vital interests of their citizens and protect them from all forms of threats

which maybe economic, social, environmental, political, military or epidemiological in nature.

Within the context of this study, NS refers to the capacity of a state to promote the pursuit and realisation of the fundamental needs and vital interests of man and society. In addition, to protect them from threats which may be economic, social, environmental, political, military or epidemiological in nature. These threats are numerous, diverse and complex. It could take the form of pervasive poverty, violent conflict, natural disasters such as flood and earthquake, terrorist attacks, external aggression and infectious disease, among others. This view of NS is comprehensive and apt. It captures the essential attributes required for this study. It is therefore suitable and adopted for this study.

Theoretical Framework

Quite a number of theories can be used to explain how AIS can be applied to improve NS in Nigeria. The study examines the General Systems Theory (GST) and Technological Acceptance Model (TAM).

1. General Systems Theory

The perspective of the GST proposed by Ludwig Von Bertalanffy in 1968 is premised on the position that "systems influence one another within a whole and also respond to the demands and pressures of external forces and conditions" (Hammond, 2003).

The Theory posits an interaction of components to achieve a common objective. Similarly, AIS is a mechanism that if well instituted can serve the purpose of tracking livestock, especially cattle to achieve an output of reduced cattle theft for enhanced NS. In other words, the input component in the Systems Theory is related to the requirements for a functional AIS in the NW which could significantly reduce incidents of cattle rustling.

Several critics of Bertalanffy include Hunter, Kahn and Hudson. Hunter believes that the Systems Theory is based on too much rationality. Kahn also posits that proponents of decentralisation, community and participatory control could find the Systems Theory contradictory. Despite criticisms, the Systems Theory provides an ideal guideline to assist the study in understanding how developing and adopting AIS can improve NS in Nigeria. This

theory, though suitable, it does not provide sufficient basis for understanding how the integration of modern technology such as AIS can improve NS.

2. Technological Acceptance Theory

TAM on the other hand was first espoused by Davis, Bagozzi and Warshaw in 1989 as a framework for the understanding of how the inculcation of modern technologies can induce a change in the way systems respond to emerging complexities. According to Davis, Bagozzi and Warshaw (1989), the perceived "usefulness" and "ease of use" is brought forward in the acceptance of new information systems. Critics of TAM include Legris, Ingham and Collerette (1992), and Benbasat and Chuttur (2000). They criticised TAM for poorly defining the core construct of the theory. These critiques led Davis, Bagozzi and Warshaw to refine their assumptions and arguments, thereby leading to a more precisely detailed formulation of TAM. The areas expanded by the theory include the prediction of users' continuance, perceived speed and a specific acceptance model, among others.

In relation to the study, AIS is a technological tool that could be adopted to assist in curbing

cattle rustling in the NW for enhanced NS in Nigeria. Thus, consistency in usage as a result of instituting a strong framework will invariably lead to "ease of use" which in the long run become "useful" in tracking animals rustled in Nigeria. In line with this, the TAM position that, "when users are presented with new technologies (in this case AIS), they can move from traditional methods to more expedient and effective strategies" is particularly useful to the study. TAM is apt and in line with the basis of this study as it provides a backdrop to investigate the usefulness of AIS and challenges affecting "ease of use" in addressing cattle theft in the NW. Accordingly, the TAM is adopted and used in this study as the theoretical framework.

3. **Research Methodology**

This publication leveraged on the mixed research methods which combined both the quantitative and qualitative methods of data collection and analysis. The rationale for adopting the research strategy was because it allowed the study to examine extensively the various issues and contexts of adopting AIS and NS in Nigeria.

4. Research Design

The study adopted the survey research design. This entailed using both structured and unstructured interviews and questionnaire instruments to gather data. Primary data was corroborated with secondary data obtained from published and unpublished works.

Primary data was collected from respondents drawn from the Nigerian Police Force (NPF), Nigeria Security and Civil Defence Corps (NSCDC) and the Nigerian Military. Others are the Cattle Breeders Associations in the NW, FMLD, FMAFS, NASRDA and the Office of the National Security Adviser (ONSA). The population were selected using stratified sampling technique across the study population. A sample population of about 5000 within the stakeholders mentioned was estimated. The Taro Yamane (1967) formula was employed for the Sample Size calculation (details of the Sample Size calculation is on Appendix I). Consequently, a total of 370 copies of the questionnaire instrument were distributed to ensure that the targeted sample size is achieved. Out of the 370 questionnaires administered, a total of 351 was retrieved and analysed.

The primary data for this book was collected

using the survey method (open and close ended questionnaire and interviews). The questionnaire instrument consists of both multiple and rating questions while the Key Informant Interview (KII) guide comprised of six open-ended questions in line with the objectives of the study. The KII was administered to ten top officials purposively selected from the above institutions. In addition, secondary data was sourced through library research, Internet search, policy documents, books, magazines, journals, newspapers, reports, conference papers and other published works related to the topic.

5. **Methods of Analysis and Data Presentation**

The quantitative data gathered from the survey was analysed using Statistical Package for Social Sciences (SPSS) version 28 which involved percentages and frequency distributions in line with the research questions of the study. The analysis was presented on tables and charts. Equally, the qualitative data obtained from KII was analysed using content analysis in line with the research objectives.

2

Perspectives on Animal Identification and National Security

This chapter reviews perspectives in literature on Animal Identification Systems (AIS) and National Security (NS) in Nigeria. The General Review covers past works and contributions of various authors as well as empirical studies on nature and effect of the application of AIS for improved NS in other climes. The Chapter further covers the specific region of focus which deals with related studies on the subject conducted within Nigeria and more specific to the North West (NW). Finally, the review establishes the gap(s) in literature which the study intends to fill.

General Review

1. Animal Identification System

Across the world, the adoption and use of AIS is increasingly gaining momentum. Although, the concept is not new, National Agricultural Law Centre (NALC, 2021) argued that its application using modern technology mainly began with the advent of the Fourth Industrial Revolution and was predominantly practiced by developed nations. Lending credence to this position of NALC, Blancou (2001) avows that AIS goes as far back as ancient civilisations. The author observed that before the advent and spread of modern technologies, various methods of animal markings were used by Egyptians, Greeks and Romans. Also, nomadic people of Scandinavia, Asia, Africa and Pre-Hispanic Americans for different purposes. For centuries tattooing, ear tags, giving names and branding were used as animal identification techniques.

Dieng *et al.,* (2017) argues that, confronted with the sophisticated nature of cattle rustling in the 21st Century, some AIS such as marking and tagging have become obsolete solutions. Modern day rustlers are now employing sophisticated and smarter techniques to achieve their dreadful objectives. Recovering rustled cattle is now more

difficult and almost impossible as rustlers immediately kill and sell them as meat. Therefore, the use of new technologies including those related to the Internet of Things (IoT) provides new frontiers for the prevention and fight against cattle rustling. Accordingly, present day AIS revolves around modern technology such as Wireless Sensor and Actuator Networks (WSAN), transponder, Global Positioning System (GPS), mobile communication, Unmanned Aerial Vehicles (UAVs), Radio Frequency Identification (RFID) and Big Data (Dieng *et al.*, 2017).

Zeremariam (2008), while assessing the frameworks for the application of AIS in the United States of America (USA) submitted that animal identification had been in practice in the US as far back as 1800's and early 1900's. The study showed that after the outbreaks of rabies and tuberculosis near the end of World War 1 (WW1), AIS became more important for tracking diseased animals. Ear tagging of cattle was one of the first identification systems for the Federal Tuberculosis Eradication Program, which was initiated shortly after the war (American Sheep Industry association, 2006). In April of 2004, the United States Department of Agriculture (USDA) announced the adoption and utilisation of RFID.

The technology was aimed at ensuring universal identification of livestock in the nation with implementation of various databases that enables animal tracking from birth to eventual inclusion in the nation's food supply chain. So far, the country has put in place several policies and institutional frameworks to ensure effectiveness of its National Animal Identification System (NAIS) (Zeremariam, 2008).

Murphy *et al.,* (2018) in their review of Animal Identification Systems in North America evaluated and compared the AIS and traceability systems in North America, Mexico and Canada. They argued that, AIS transcends monitoring and tracking of animal and having a database of livestock. It also improves trade by detecting and controlling diseases. For instance, the mandated animal identification programs, which exist for Canadian and Mexican cattle and sheep, are designed to control and eradicate trade-limiting diseases and to maintain or gain access to international markets. This review indicates that beyond animal monitoring and traceability, AIS could help in eradicating diseases as well as improve trade (Canadian Sheep Federation, 2008).

In Africa, particularly, Sub-Saharan African

countries, various frameworks have been developed to improve food security, address cattle theft, livestock genetics and better flock management as well as manage animal health and diseases (Economic Commission for Africa, 2012). Jobbins, Brottem and McDonnell (2021) corroborated this assertion. They stated that in the Sudan-Sahel, covering Senegal and Sudan where pastoral livestock production and related value chains are central to human survival, the use of AIS is given significant priority. This became necessary due to the persistent nature of cattle raiding especially in Sudan and South-Sudan. According to the author, cattle rustling in the region have become more professionalised and various militia forces backed by political elites have exacerbated cyclical intercommunal conflicts among pastoralist populations and farmers. However, the adoption of AIS in the African continent has been challenged by the literacy level and understanding of its benefits by herders in the region. The authors noted that, aside herding, only few people from prominent nomadic ethnic tribes such as Tuareg, Moors and Saharawi in the Saharan regions, the Toubous in Chad, Sudan, Libya and Niger, seek or have formal education. Similarly, literacy levels of the Baggara in the Sudanese regions of Darfur and

Kordofan as well as the Fulani who are spread from Senegal through Nigeria, the Sahel and into Central Africa is very low. Therefore, they seem not to understand the application and benefits of AIS as well as its strategic importance for addressing cattle rustling.

From a food security and business perspective, Harsdorf (2006) averred that AIS is a critical component of any livestock production system because it helps policy makers develop and plan for the sector with respect to disease control, animal movements and marketing. He argued that, a viable AIS benefits all players in the food chain. Secure and reliable systems contribute to food safety and quality assurance and help prevent and control major disease outbreaks. He insists that AIS and traceability schemes offer huge long term economic benefits to the livestock industry with regards to securing international trade.

Highlighting the importance of AIS in addressing cattle theft, Ekuam (2009) avows that animal tracking tools would enable herders monitor their cattle along their allocated grazing routes or reserves. This will enable them to remotely check cattle's positions and also curb the threat of theft or wandering into farms. The

system serves as both a tracker and an anti-theft system for cattle. For him, the core of AIS is its collar technology which majorly consists of a GPS and GSM module which aids in transmitting the coordinates of the cattle to the user via Short Message Service (SMS) whenever the user dials to know the position of the cattle. He observed that an advantage with the device is that in the event where the collar gets broken or removed or the cattle crosses the earmarked virtual fence, the herder's device gives beeps indicating that there is a breach in security and the need for prompt response. Also, cattle equipped with the collar technology can be easily tracked and followed on google earth maps therefore making the management, security and automation of the herd more efficient.

Dieng *et al.,* (2017) observed that although, the use of these AIS technologies for the prevention and fight against cattle theft has considerable benefits and prospects, their application does not come without constraints. Challenges associated with the application of modern AIS technologies range from complexity of the system, cost of acquisition and application, troubleshooting in the event of hitches, ease of use and maintenance among others. Therefore, for AIS to be effective,

these problems must be addressed in order to have a better prevention system to fight cattle theft in an effective and efficient way.

From the foregoing review of literature on AIS, it could be deduced that countries across the world are adopting animal identification for different reasons. While most countries have adopted AIS to ensure animal traceability, disease monitoring and control, others have adopted it to address the security challenge of cattle rustling. The review also established that the effectiveness of AIS in achieving the objective to which it was instituted largely depends on the policy, legal and institutional frameworks put in place.

2. **National Security**

The concept of security is multifaceted and has been postulated by authors from various perspectives. According to Pati (2014), NS is the capability of a State for self-defence. It focuses on the amassment of military armament, personnel and expenditure. In this context, the traditional conception of security places emphasis on military and defence survival tools of nations to avoid war, adversity or to overcome them. Momoh (2016), however contends with this position of Pati (2014). He submits that a country

may have the best armed forces in terms of training and equipment, the most efficient police force and other internal security operatives, the most active secret service agents and yet, be the most insecure nation in the world. This could be as a result of defence and security problems from within, bad government, alienated and suffering masses, ignorance, hunger, unemployment or even activities of foreign residents or companies that are threats to NS.

Handreder and Buel (2017), captured the imperatives and components of NS in their study and further argued that the position of authors that NS encompasses "the protection of a state against all types of external aggression, espionage, hostile reconnaissance, sabotage, subversion, annoyance and other inimical influences is vague". According to them, in the contemporary world, internal threats such as cattle rustling, banditry and armed robbery are more noticeable as sources of insecurity and hence must be considered in the understanding and measurement of NS. Present day security analysis covers both the external threat aspect and the need to maintain internal cohesion to ensure development, promotion of people's interest and values as well as enhance the well-being of citizens. These conditions are imperative in NS

discourse.

Snow (2018), highlighted the essence of NS for international coalition and prosperity in his study *"National Security for a New Era: Globalisation and Geo-Politics"*. According to him, the dynamic evolution of contemporary conditions of international and NS calls for a new approach to the issues of the unified organisation of the state in order to meet security needs. For him, underlying the thinking about a system of NS that is uniform in its essence is the need to remove many of the shortcomings in the current security strategies of the state in order to improve NS. Such shortcomings may include: poor analysis of possible security threats, lack of uniformity of steering security operatives, duplication of competences and efforts, slow systems for monitoring and assessing threats. Others include, difficulties in coordinating actions in the event of complex security situations, inadequate preparation by organs of power and their auxiliary apparatus for comprehensive control over state security.

Assessing NS from an internal perspective of violent non-state actors, Chome (2019) posits that, the peace of nation states in Africa is increasingly being disrupted by internal security threats. He observes that major NS problems in this region

springs from banditry, cattle rustling, armed robbery, piracy, ethnic crises among others. These internal security challenges have been closely linked to states inability to deploy the right preventive and apprehensive frameworks. He further, observed that causes of insecurity in the region are tied to high levels of marginalisation, underdevelopment, poverty, socio-economic imbalance and religion. This encourages the formation of these violent non-state actors who undermine NS in no small measure.

Todorov and Todorova (2022) wrote on *"Managing Sustainability of National Security: Implications for Ukraine."* In their paper, they postulated that the challenges to Ukraine's NS remains complicated and depicts the need for almost all countries of the world to develop strong military capabilities to strengthen NS. They added that, the NS of Ukraine has been greatly bastardised since it declared its membership to the North Atlantic Treaty Organisation (NATO). Russia's aggressive invasion to what it considers a response against future breach to its NS undermines the socio-political stability and destroys the Ukrainian statehood, disrupting her NS system and depleting her economy. This has resulted to various agitations from the international community with different

perspectives, allegiance and support.

The authors emphasised that, the attack on Ukraine by Russia is a model for understanding the imperative of developing NS systems that is not just strong but capable of repelling external aggression. Regardless of the divergence in opinion, it is profound to submit that, if Ukraine had developed a strong military power which is a critical component of NS, the impact of Russia's attack on its territory would have been repelled accordingly if not subdued. Thus, in spite of extant international laws, it is observable that the country with the weaker NS system and fire power would always be at the mercy of nations with stronger NS and military capabilities. Therefore, while developing NS systems, nations must understand that in the twenty-first century, you can either be the conqueror or the conquered during wars. Hence, the need to place more priority on developing military capabilities in view of defending internal and external aggression for strengthened NS.

Assessing the security architecture of the United Kingdom (UK), Edwards (2019) postulates that, the British government lacks a clear and coherent view of the nature and priority of risks to the UK. According to him, the NS architecture is

flawed in its design and not coherent with NS trends of the twenty-first century. The government remains structured around functions and services with separate budgets for defence, foreign affairs, intelligence and development. Whitehall departments, intelligence agencies and the police forces that make up the security architecture have changed very little in the past two decades, despite lessons from the Cold War and the attack on the World Trade Centre in 2001. He observed that there are growing concerns that the government is becoming too focused on international terrorism, to the detriment of other threats and hazards undermining UK's NS.

Edwards (2019) further criticised UK's National Security Strategy for poor construct of government's security priorities as well as the roles and method of engaging the private sector and strategic partners in strengthening NS. The author insists that, a National Security Strategy (NSS) has the potential to transform the way government approaches issues of NS, but the development of the strategy must be comprehensive and supported across the political spectrum, within Whitehall and by the public. He therefore recommends that, in order to improve NS and effectively respond to the new security paradigm, the UK's security architecture must

adapt, not just in terms of processes and structures but develop close relationships with its strategic partners. It must also engage the private sector and the wider public, which could address challenges of transparency, information sharing and public trust.

In a study titled, *"Model of the National Security System: Selected Problems"*, Kitler (2021) stated that a guaranteed NS is a combination of a system that ensures that all security components are functional and up to date. He insists that effective integration of a security system requires modification of some legal solutions. This would lead to the ordering of its construction, precise definition of the competences of individual components, including governing bodies, the military and other security forces. States must endeavour to enhance the capacity of their security systems to cooperate with the relevant structures of other states and international security structures, with a priority of maintaining the possibility of effective independent action. In turn, the NS system must be organised and equipped in such a way as to guarantee its rapid and efficient operation in all conditions and in response to all types of threats and crises. The NS system should also be subject to periodic reviews

to assess its effectiveness, readiness to act and suitability to deploy war capabilities of the state at any given time.

Recommendations of the study were the need for serious attention to be given to the development of the capacity, capability and operational readiness of the whole system and its individual components to carry out preventive actions and respond to security threats at the earliest possible stage. This according to the author will require strengthening the capacity of relevant institutions and state authorities included in the system to forecast international and internal developments and to detect early any changes that adversely affect security.

The review of literature on NS indicates that threats to NS are dynamic and significantly affects livelihoods and economic activities of people. While some states have adopted various strategies to improve their NS systems and their response capabilities, others are still grappling with how to strengthen their NS frameworks. Thus, the bulk of literature reviewed in this section advocated for cooperation and collaboration among security forces in developing response capabilities for enhanced NS. In line with the objective of the study, it becomes

imperative to establish the relationship between the variables of the study, in doing so, the study reviews empirical and practical evidences of the application of AIS for improved NS in other countries with a view to draw lessons for Nigeria. This is reviewed under the subsequent sub-heading.

Nexus between AIS and NS: Empirical Evidences from Uruguay, USA and Kenya

A. Application of AIS for Enhanced NS in Uruguay

Cattle rustling is no longer a form of rural petty theft or a cultural practice but full-fledged organised crime committed by international drug cartels and criminal networks in Uruguay. As the world's eighth-largest beef exporter in 2020, Uruguay has faced a long and expensive fight against cattle rustling. According to Uruguay's Home Office, in the first half of 2003, 581 rustling cases were reported, which is 13 percent higher than the same period in the previous year.

To combat the crime, in 2006, Uruguay's Parliament voted to establish a mandatory system of individual livestock traceability. The law made it mandatory for any cattle within the national

territory to wear an electronic gadget for their identification, linked to a system of databases managed by the government. With its attendant regulations, institutions and support by the Global System for Mobile Communication (GSM) service providers. This AIS framework in the country was a step towards more effective prevention of animal theft, disease control, assured tax compliance and viable quality certification. This placed the country at par with European Union's (EU) standards and qualified it for access to top quality EU and US import quotas.

Additionally, in the first half of 2013 rustling cases dropped dramatically by 41 per cent compared to 2012. At that time the National Animal Identification System was developed to support the hitherto law. Gleaning from the above analysis, it could be inferred that AIS has helped Uruguay to reduce the activities of cattle rustlers. Therefore, there is a direct positive relationship between AIS and NS (Ford, 2021).

B. **Application of AIS for Enhanced NS in the United States of America**

The application of AIS in the USA reflects other dimensions and relevance of animal

identification. As enumerated in the General Review, AIS are very potent strategies for disease monitoring and control.

The application of AIS in the United States began since the 1940s as part of an extensive program to eradicate bovine brucellosis from the national cowherd. The brucellosis vaccination tag and corresponding ear tattoo provided an effective and very successful animal identification program. Since 2001, the US sheep industry has used the mandatory National Scrapie Eradication Program (NSEP) and the visual-based individual identification tracking system to help eliminate scrapie from the national sheep flock as well as fulfils the traceability needs of the scrapie programme (Wolf, 2006).

To enhance animal disease monitoring, surveillance, control and eradication in the USA, the National Institute for Animal Agriculture created the National Identification Task Force in 2002 as an institutional framework for effective implementation of AIS (USAIP, 2003). Boasting representation from more than 30 livestock organisations, the Task Force developed the National Identification Work Plan, as a guideline for establishing a national AIS (USAIP, 2003). To further ensure that the implementation of AIS is

without significant gaps and set goals achieved, USDA-Animal and Plant Health Inspection Service (USDA-APHIS) established the National Identification Development Team, a joint state-federal-industry group, whose work produced the initial draft of the US Animal Identification Plan in September 2003 which was reviewed in 2006, 2011, 2016 and 2019 respectively. Under these new revisions, producer participation in NAIS is not required, but instead suggested, to protect the health and marketability of their animals. Veterinary Services are now responsible for developing and implementing AIS in the country.

From the review of the Application of AIS in the USA, it could be inferred that the country takes seriously the issue of animal protection and its food security. Observably, the USA paid premium attention to developing the required policy and institutional framework for effective implementation of AIS in disease control. Conversely, Nigeria is still battling with instituting the National Livestock Bureau without a single policy framework to provide guidelines for the application of AIS by herders to address the security challenge arising from cattle rustling. The application of AIS in the USA remains a model for Nigeria to draw lessons from. It

requires government through its relevant agencies to be more deliberate, pragmatic and genuine in their efforts to institute the AIS for enhance NS in Nigeria.

C. **Application of AIS for Enhanced NS in Kenya**

Cattle rustling has been a major threat to Kenya's NS. It has metamorphosed into an organised crime controlled by 'cattle warlords' and is spurred by a rising demand for beef among urban populations in the region and abroad (Kubasu and Wachira, 2010).

To address this and improve NS, the government of Kenya developed and adopted an AIS called Chipsafer in 2016. However, the software became fully operational in the first quarter of 2018. The animal tracking device uses a remote tracking system to identify and geolocate individual livestock, offering security against theft and disease. Owing to effective implementation of the AIS, Kenya's ranking in the Global Peace Index (GPI) increased from 131st position in 2017 to 120th in 2022 scoring 2.303 points (World Population Review, 2022). Thus, within the African continent, the Chip-safer device of Kenya remains a model for evaluating the efficacy of AIS in addressing the security

challenge of cattle rustling for enhanced NS. Although in recent times, gaps in implementation have led to the re-insurgence of cattle rustling. Recently, in July 2021, armed cattle rustlers raided herders around Loiwat area in Baringo County and escaped with more than 1,000 livestock (Mutethya, 2022). Therefore, the need to continually review the implementation of AIS to ensure sustainability.

Specific Review of Perspectives on Animal Identification Systems and National Security in Northern Nigeria

Cattle rustling is one of the critical dimensions of public insecurity in contemporary Nigeria. It poses a serious threat to NS in view of its dire impacts and implications. The latest manifestation of cattle rustling in the fashion of bloodletting community raids in some parts of northern Nigeria, specifically in the NW points to a new dimension to assessing the NS challenge as well as strategies to address it. Although several hard and soft power approaches including Military and Joint Operations, peace building, deradicalization and reconciliation among others have been put in place, the increasing spate of cattle rustling suggest that these efforts are not

sufficient for addressing the menace. Accordingly, various authors and literature have in recent time evaluated the impact of cattle rustling on NS as well as assessed the viability of AIS as a strategy in the fight against it.

The work of Chukwuma and Francis (2014), on "Cattle Rustling and Dialectics of Security in Northern Nigeria" examined the dimensions of the menace, its implications for NS and effectiveness of governments' responses to addressing it. Findings of the study showed that there exists a direct causal relationship between cattle rustling and the security in northern Nigeria. They posit that, the incessant attacks by cattle rustlers on herding communities tend to set them at loggerheads with their ecological neighbours – the settled native farmers. From their research, they found that, clashes between bandits, herders and security operatives have resulted to significant loss of lives, destruction of properties, displacement of settlers and wanton loss of cattle. As the way forward, the paper recommends that the government should place cattle rustling as a national emergency and put drastic measures, such as proactive community policing, in place towards mitigating it.

Bande (2016), evaluated the effect of Cattle

Rustling on Security in the North West Zone of Nigeria: A Study of Zamfara State. The research sampled a total of 200 respondents using stratified random sampling, using mixed research strategy that employed both qualitative and quantitative research methods. The study found that cattle rustling in the region was on the increase as a result of poor measures by governments at state and federal levels. It also found a negative relationship between cattle rustling and NS. The study thus recommends that the government of various states in NW strengthen security structures by supporting the operations with logistics to ensure effective patrol of vast forest areas where these bandits use as hideouts.

Adejoh and Adisa (2018), interrogated the causes of cattle rustling in Nigeria in their study titled *"Cattle Rustling, Herdsmen Violence and National Security in Nigeria"*. The study adopted wholly a qualitative approach. Hence, most of its data were gotten from secondary sources such as books, journals, magazines, newspapers and the Internet among others. The authors argued that cattle theft is fuelled by the rapid build-up of Small Arms and Light Weapons (SALWs) in communities in the Northern region of Nigeria and lack of disarmament programmes. The

authors insist that porous borders and poorly patrolled swaths of forests as well as weak internal security frameworks provide fertile grounds for these bandits. Lack of socio-economic infrastructure, uneven distribution of resources and poverty among others further aggravate the situation. The study concludes that cattle rustling impact negatively on NS as it hinders conditions necessary for entrenching a united, peaceful and virile nation. Recommendations of the study include that the government investigate and address root causes of the menace, effective enforcement of the criminal law and constant security surveillance among others.

Anyasi *et al.*, (2018), worked on *"Design and Implementation of a Cattle Grazing Tracking and Anti-theft Alert GPS/GSM Collar, Leveraging on Improvement in Telecom and ICT Infrastructure."* They observed that in Northern Nigeria, cattle rustling and its associated crimes of banditry, farmer/herder clashes and armed communal conflicts are the major threat undermining NS in the region. Security challenges resulting from cattle rustling have led to significant loss of lives, displacement of thousands, migration and loss of cattle in expansive numbers.

The study examined AIS as a strategy for

addressing the incessant security challenge of cattle rustling. The study utilised quantitative research method and depended on only secondary sources of data. It proposed a cattle monitoring system for tracking cattle, combating rustling in extensive grazing areas, grazing reserves, grazing routes and ranches. The authors recommended collars animal tracking device that consists majorly of a GSM and GPS module. This according to them would not only combat cattle rustling activities but would also serve as an anti-theft system.

Abdulrashid, Saifullahi and Amir (2018), researched on *"The Incidence and Impact of Cattle Rustling in some Rural Communities of Katsina State, Nigeria"*. This study examined the impact of cattle theft on socio-economic wellbeing of rural farmers in Katsina State. A cross-sectional data of 1488 respondent selected from six purposively sampled Local Government Areas (LGAs) (Batsari, Danmusa, Faskari, Kankara, Sabuwa and Safana) was obtained using questionnaire and Focus Group Discussions. The survey data was analysed with inferential statistics using classical independent t-test in which the socio-economic variables of the respondents before the cattle rustling were compared with the socio-economic

variables during the cattle rustling period. It was found that, despite the fact that cattle rustling has led to loss of life and displacement of people to other safe places, there is no significant reduction of the people living in such rural communities. This indicates that, there is no significant reduction of cattle ownership by the people before and after the cattle rustling. However, the study revealed that a significant difference in income level of the respondent exists. Therefore, cattle rustling could further deepen the vicious cycle of poverty in rural areas of Katsina State. The author therefore recommended Community Cattle Ranching and the adoption of Radio Frequency Identifier to address the issue of cattle theft in the State.

Gambo and Gwaza (2018), conducted a study on *"The Use of Radio Frequency Identification as a Security Measure to Control Cattle Rustling in Nigeria"*. The study interrogated security measure put in place to address cattle rustling. Leveraging secondary data and qualitative research methodology, the authors avow that hard power approaches using the military has yielded little result in addressing cattle rustling in Nigeria. Therefore, the research work proposed solutions, which involve the use of Radio Frequency

Identification transponders, readers and software to track and geolocate the animal to address security challenge of animal theft.

Abdulahi, Victor and Binta (2018), assessing the *"Menace of Cattle Rustling and Banditry in NW Nigeria: A Case Study of Katsina State"*, submitted that cattle rustling has continued to threaten public safety and security in the region. The peril has led to loss of lives, human injury, displacements, as well as loss of cattle. This situation goes with repercussions that do not portend well for the collective wellbeing of the herding communities. It creates a sense of insecurity which has the capacity to hamper the productivity of the herding enterprise. Against this backdrop, they examined the menace of cattle rustling and banditry in NW of Nigeria: A Case Study of Katsina. The research methodology used by the study was qualitative. The study found factors aggravating cattle rustling and banditry in the region to include: unwillingness to share grazing land, climate change, rampant drought and famine in the area, poverty and decline in internal discipline and social cohesion among Fulani and farmers. commendations of the study include that; the Federal and State Governments should construct grazing reserves and delineated

stock routes for herders. Also, that resolution and dialogue reached should be maintained.

Abubakar (2019), in his thesis titled *"the Implications of Cattle Rustling to Human and Food Security in the Rural Communities of Kaduna State, Nigeria"* tried to illustrate the nature and effect of cattle rustling on NS in the NW using Kaduna as study domicile. The study utilised Qualitative method of data collection to administer in-depth interview to respondents purposively sampled from six rural communities of Chikun LGA namely; Kuriga, Burku, Udawa, Gwagwalada, Kakura and Kujama. A total of eight informants from the police, security adviser to the State governor, community leaders and herdsmen who are victims were also interviewed. The study found that, cattle rustling in Kaduna State is on the rise and affects the security and economy of the State negatively. It was also revealed that, the preventive approaches adopted by both State and Federal Government are ineffective. Hence, the study recommends that the State Government should see cattle rustling as a security challenge and collaborate with community members to end the menace.

3

Historical and Policy Context of Animal Identification Systems, Cattle Rustling and National Security in Nigeria: The North West in Perspective

Individual identification of livestock has been practiced for centuries. In Nigeria however, animal identification dates back to antiquity, when ancient civilisations placed high value on domestic animals, especially horses (Blancou, 2001). Various local methods were adopted to identify and ascertain the whereabouts of certain animals. The most used methods of animal identification at the time encompassed branding, ear tagging, paint branding, nose printing and

tattooing among others. These methods have been used especially, in the northern region of Nigeria for thousands of years, but typically as a way of proving ownership, rather than as a method of animal identification (Blancou, 2001).

Beginning in the 1940s, animal identification landscape globally began to shift focus from just identification to knowing the whereabouts and movement of certain animals. This change in trends also affected the trends in animal identification models adopted in Nigeria. Progressively, in the wake of the 1970s, several countries began developing their first electronic animal identification systems. These systems were tested on experimental farms. The first systems were all built with technology and attached to a collar around the cattle neck. By the 1980s however, special integrated circuits were developed, minimising the size of the transponders used. During this period, it was recorded that two private firms namely; Umza Farms and Na'Allah Cattle Breeders had experimented the new technology on Nigerian farms (Bello and Abubakar, 2019). Perhaps, due to gaps in operational and maintenance knowledge of the identification system, the farm discontinued with the project.

In the 1990s, corporate organisations and research institutions of most nations, including those in Africa began testing systems for identification and registration of all animals to control movements from birth to slaughterhouse. This innovation and traceability revolution became widely practiced in countries in the Continent with several other tracking mechanisms such as the GIS technology (Sehularo, 2010). Although, not fully functional in all countries in Africa, countries such as Kenya, Botswana and South Africa had at this time begun experimenting and adopting AIS and GIS technologies to protect livestock and animals in the wild. As the challenge of cattle rustling assumed alarming dimensions, national governments in the Continent came together and recommended AIS as the most viable strategy for addressing the menace and improving national and regional security (Food and Agricultural Organisation, 2022).

Accordingly, in April 2015, Sub-Saharan Countries including Nigeria adopted the Declaration in Pretoria, South Africa, on Animal Identification (Food and Agricultural Organisation, 2022). The adoption of the Declaration was expected to address the issue of

animal theft, improve food security as well as monitor and control the health of animals. Nigeria upon signing the Declaration, indicated its commitment to the identification of animals and recording of their movement and health through measures such as surveillance, early detection, tracking and notification of disease outbreaks, rapid response, control of animal movements and zoning. However, it is observed that due to the absence of a functional Animal Identification and Management frameworks in Nigeria, the country has been unable to harness the benefits of the Declaration. As an indicator, Nigeria is yet to be a major player in the export of meat and other dairy products because of its inability to adhere to international standards as laid down by the World Organisation for Animal Health and other regulatory bodies. Also, in recent years, the menace of cattle rustling has continued unabated and has reached catastrophic dimensions, especially in the NW.

Keying into the technological revolution, Nigeria's first ever AIS technology was developed in 2016 with the support of Mobile Telephone Network (MTN), MACBAN and Sponge Analytic (Ibironke, 2017). The AIS called Animal Identification and Management Solution (AIMS) was launched by the Katsina State government in

December 2017 at the Runka Game Reserve, Katsina State (Ibironke, 2017). The MTN AIMS solution utilises microchips, about the size of a grain of rice, embedded in each animal. These chips use passive RFID technology, allowing law enforcement agents, veterinary inspectors, cattle market operators, abattoirs and animal owners to determine animal ownership and origins of animals through the use of handheld RFID scanners and a short code often sent to smart device. The AIS technology has multiple uses including point of sales validation of animal ownership, the identification of owners and the identification of owners of lost or stolen livestock, which will discourage cattle rustling. Also, it will facilitate disease surveillance and control, as well as livestock identification, which is required for international beef export (Ibironke, 2017).

According to Sardauna (2022), the RFID chip is a battery-free, implantable microchip sealed in biocompatible glass covered by a sheath. When in close contact with an animal RFID scanner, a unique, pre-programmed identification number is displayed. The animal RFID chip is passive, meaning it does not send or receive any signals. This makes it safe for both the animal and the consumer of the animal product.

MTN AIMS is administered by an approved veterinary doctor by injecting the cattle with an RFID chip. Thereafter, a profile is created for the cattle on the MTN AIMS platform. This profile contains the animal type, breed, state of health and any other information as may be required. Each animal under the MTN AIS is given a unique identification number which holds information pertaining to that particular animal. An MTN RFID scanner is used to swipe over the animal to read the animal's unique identification number. Sardauna (2022) averred that the MTN AIMS is in conformity with international best practices and the International Organisation for Standardisation (ISO) standards for Animal RFID. The first digits are international ISO codes, the second three codes are the manufacturers ISO code and the rest are the animal's unique identification. This therefore creates a unique identification for an individual animal which is not easily modified.

In 2022, the FGN developed an Animal Identification System called the National Animal Identification and Traceability System (NAITS). It was initiated by theFederal Ministry of Agriculture and Food Security (FMAFS) in collaboration with cattle breeders' associations and other relevant stakeholders as part of the

National Livestock Transformation Plan. This system, which includes Ranch.ID (the technology tool for NAITS), aims to identify and track livestock nationwide, addressing socio-economic and security challenges in the sector. NAITS is designed to address issues like cattle rustling, lack of data for planning and to improve the overall efficiency and competitiveness of the Nigerian livestock sector. The system uses a combination of forgery-proof ear tags, cattle passports and digital technology to identify and trace livestock. It aligns with global standards set by the International Committee for Animal Recording (ICAR). The FMAFS is the implementing body with the Department of Animal Husbandry Services and the Department of Animal Health leading the efforts. The NAITS is expected to provide a more localized solution for managing livestock, simplify animal management and contribute to a more sustainable livestock industry. The NAITS was officially launched in November 2022, with various state governments expected to adopt the system within their respective regions.

To complement efforts of the FGN in animal traceability, the Enugu State Government in collaboration with Megacorp Nigeria Limited keyed into the NAITS (Nwanosike, 2022). The AIS system is a follow up to Federal Government's

efforts of identifying and tracking livestock from points of birth to slaughter. The AIS technology is tagged in the ear of each animal with a unique device that would allow for identification and traceability via internet-enabled devices (Nwanosike, 2022). The main rationale behind the NAITS technology is to help in curbing livestock rustling and related criminalities by assisting herders in identifying and tracking their livestock through electronic tags. Another objective for establishing the NAITS is to identify pastoralists who own livestock and check the use of under-aged children as livestock labourers.

Historical Overview of Cattle Rustling in the North-West and Responses

Cattle rustling in Nigeria is an age long practice that has been prevalent in livestock-rearing and nomadic communities. Some authors have traced its origin to the ninetieth century when bandits riding mostly on horse backs moved from their hideouts to attack villages, steal their cattle and retreat back to their hideouts. Bello and Abdullahi (2021) argued that traditionally, cattle rustling in Nigeria was driven by the criminal intent to expropriate cattle for meat or for sale using less deadly forces. However, in recent times, cattle

rustling in Nigeria has grown beyond mere pilferage of a few animals in nomadic communities to be a more sophisticated and organised crime. In addition, Abdullahi (2019) averred that, cattle rustling in the NW is as a result of nearly four decades of unresolved conflicts between agrarian and nomadic herding communities that wander on the high plains of northern Nigeria. Present-day cattle rustlers operate with modern weaponry and their operations are marked and orchestrated by trans-locational and transnational syndicates and warlords.

As at 2018, there were over 10,000 gangs linked to cattle rustling and banditry in NW region as highlighted in Appendix II (Rufa'i, 2021). This evolving pattern of organised criminal syndicate of cattle rustlers with enough numerical strength and fire power has made cattle rustling in the NW a major NS concern in Nigeria. Following the rise in the violent activities of the non-state armed groups, over 21 million people living in the NW were reported to have been directly affected (Assessment Capacities Projects, 2020).

To address the menace of cattle rustling in the NW, the FGN and State Governments adopted various hard and soft-power approaches. A very

significant landmark in the historical trajectory of government non-kinetic responses against cattle rustling is connected to the Federal Ruga Policy (human settlement policy). In May 2019, the FGN as part of strategies to end the incessant conflict killings of farmers and herdsmen in local communities where Fulani herdsmen take their cattle to graze rolled out the Ruga policy (Ibekwe and Onyewuchi, 2020). The policy, would create reserved communities where herders will live, grow and tend to their cattle, produce milk and undertake other activities associated with the cattle business without having to move around in search of grazing land for their cows. Sokoto, Adamawa, Nasarawa, Kaduna, Benue, Kogi and Taraba amongst other States were listed as pilot states.

The Ruga policy of the FGN was however, received with heavy criticisms by citizens who opined that cattle rearing is and should be treated as private business. Hence, some of the pilot states refused to implement the scheme. In the case of Attorney General of Benue State & Anor versus the Attorney General of the Federation (AGF), the Federal High Court sitting in Makurdi nullified the Ruga policy of the FGN as illegal and unconstitutional. The nullification was on the

basis and construction of section 44 (1) and (2) of the 1999 Constitution of the Federal Republic of Nigeria (as amended) and section 1 of the Land Use Act, of 1978. After due consideration it was found that the Federal Government's proclamation to establish Ruga or cattle colonies in all the states of the federation and in Benue State in particular constituted a gross violation of the constitution (Ibekwe and Onyewuchi, 2020). The policy is currently suspended.

Thereafter, FGN launched combat operations such as Operations Hadarin Daji and Sharan Daji to clear the forests in the NW region of all criminals. These joint operations involve the Nigerian Army, Nigerian Air Force, Nigerian Police Force, Department of State Services (DSS) and other relevant security agencies, which is aimed at combating cattle rustling in the NW region and Niger State. Operation Sharan Daji (formerly known as Operation Restore Peace II) has so far achieved commendable strides in curbing the menace.

Additionally, in September 2021, troops of the Nigerian Army destroyed hideouts of livestock rustlers and armed bandits. The feat was in continuation of a clearance operation against all suspected livestock rustlers and destruction of

their camps and hideouts in the NW region. In Gusau LGA of Zamfara State, troops of 223 Battalion, One Brigade of 1 Division of Nigerian Army on September 24 raided suspected livestock rustlers' camps at Tofa forest in Zamfara State, where various arms and ammunition were recovered. Their camps were equally destroyed in line with established procedure. Additionally, On 1 October 2021, troops of 1 Division, Nigerian Army conducted clearance operations within Kaduna and Katsina States in continuation with the operations against cattle rustlers, armed bandits and kidnappers within their area of operations. Earlier in 2016, Troops of the Nigerian Armed Forces had carried out a joint patrol at Nashambe village near Karoki in which two suspected cattle rustlers, Lawali Nakaduna and Yahuza Suleiman were arrested in Jibia LGA of Katsina State and handed over to the Police. The troops also arrested a notorious livestock rustler and armed bandit, Gide Maikwasara, who was shot while attempting to escape (Channels Television, 2016).

However, in spite of the security response which reduced attacks on civilians, destroyed hideouts, neutralised and arrested hundreds of bandits, the activities of cattle rustlers continued

unabated. This therefore, highlights AIS technologies as a factor to be considered towards curbing the activities of cattle rustling in the NW for enhanced NS in Nigeria. The subsequent subsection will thus appraise the existing application of AIS in the NW with a view to ascertaining its current state and adequacy.

Application of AIS in the North West Nigeria

The application of AIS to curb cattle rustling is relatively a new concept and strategy for addressing cattle rustling in the NW of Nigeria. In 2017, Katsina State government collaborated with MTN to develop the State's AIMS technology to fight the age long menace of cattle rustling. The AIS technology which is perhaps the first of its kind in the NW, was officially launched at the Runka Game Reserve, Safana LGA of Katsina State on 2 December 2017 by MTN Nigeria (Eberu, 2017). The launch of the MTN AIMS in Katsina followed extensive consultation and live demonstrations conducted with leaders and members of the MACBAN in other affected northern states such as Kano and Kaduna. With the launch of the AIMS, animal owners across the 34 LGAs of the State were expected to visit their local veterinarian to get their animals

microchipped (injected) with an MTN AIMS RFID (Sardauna, 2022).

However, despite the existence of the MTN AIMS, rustling of cattle, sheep, goats and other domestic animals in the state by marauding bandits remained a daily occurrence. According to Sardauna (2022) MTN, security agencies, animal owners and the Katsina State Government are unable to track microchipped rustled animals carted away by bandits within the period under review despite billions of naira reportedly expended on the execution of the project in the State. For instance, between 2017 and 2019, *ThisDay* reports revealed that no fewer than 10,000 cows, including sheep and goats, have been rustled by the hoodlums in different deadly attacks on farming communities in Batsari, Safana, Faskari, Jibia, Kankara, Dutsin-ma, Sabuwa, Dan-musa and Dandume LGAs of the State. The State Government also confirmed that between July and August, 2021 alone, 141 cases of animal rustling were reported with 1,347 cows, 345 sheep, 119 goats and 13 donkeys rustled in frontline LGAs of the State by the bandits (*ThisDay*, 2019).

The Secretary to Katsina State Government, Mustapha Mohammed Inuwa, while reviewing

the State's Security Containment Order at a press conference held at the Government House had affirmed this position of *ThisDay.* He added that between September and October 2021, 676 cows, 109 sheep and 160 goats were rustled by the hoodlums and the animals are nowhere to be found despite the existence of the MTN AIMS in the State (Sardauna, 2022).

Similarly, in January 2021, bandits, armed with AK-47 rifles, riding on motorcycles attacked Gidan-Dukar village in Kankara (Yamadi, 2022). According to residents, the bandits rustled 63 cows, sheep and goats. Hoodlums numbering over 50 launched fresh onslaughts on the village on 14 November 2021, where they carted away an unspecified number of cows but police operatives were able to recover 38. In the same vein, on 6 October 2021, the bandits rustled over 40 cows and sheep in an attack on Yasore community in Batsari LGA of the State and killed 10 villagers. Bandits also attacked Barawa community in Batagarawa LGA on 21 November, 2021 and rustled 300 animals (Yamadi, 2022). As of the time of this report, the rustled animals were yet to be recovered. This trend is a clear indication that the AIS technology in the NW is still at experimental stages. Moreover, the required strategic environment and frameworks to ensure effective

and functional application of AIS system is observed to be inappropriate. This therefore requires that the study interrogates the existing policy, legal and institutional frameworks with a view to identifying issues and challenges thereto.

Policy Frameworks

1. National Livestock Transformation Plan, 2019

The FGN in 2019, inaugurated the National Livestock Transformation Plan (NLTP) 2019-2028 as an alternative to open grazing of cattle so as to prevent deadly conflicts between herders and farmers as well as cattle rustling. NLTP is a N179 billion 10-year initiative that champions ranching as the way forward for cattle rearing in the country. Under the policy, cattle herders are expected to be registered with cooperatives for the purpose of the ranching scheme. These cooperatives will then be able to get rental agreements for land from state governments and also benefit from ranch resources on several terms including loans, grants and subsidies. The funding of the plan from the FGN and State Governments is expected to last for the first three years in the pilot phase for a total of N70 billion while private sector interests and investments

between the fourth and tenth year is expected to be in excess of N100 billion (Ibekwe and Onyewuchi, 2020).

The Plan was coherent with addressing the issue on open grazing and the Economic Recovery and Growth Plan (ERGP) 2017-2020 which places agriculture at the centre of the government's economic diversification strategy. The plan also had the objective to improve small-scale production methods and supply chain inefficiency as well as improve nomadic livestock production in Nigeria which is facing major crises due to declining availability of pasture and grazing land, overgrazing and most importantly, the recurrent and fatal conflicts between pastoralists and crop farmers, among others.

The NLTP strategy also identifies five main pillars as priority areas, including conflict resolution, justice and peace, humanitarian relief and human capital development issues. According to the plan, strategic priorities for ranch development include securing natural resources such as land, water and feed (Ibirogba, 2019).

The policy recommended three options for addressing the farmer/herders'conflict in Nigeria. Option one was the establishment of corridors for

migrating cattle, with established points for watering and feeding the cattle to avoid them leaving the corridor, with animal health and breed improvement services provided (Ibirogba, 2019). The second option is for improved feed and water provision in the northern states through infrastructure improvement and fodder trade from the middle belt states. The production and marketing of feed needs to be developed to ensure that cattle stay near their home-base during the dry season. The third option is to improve cattle market systems, moving the market places for cattle closer to the home-base so they can be sold off and brought to their final destination by truck or railway. In phase one, the policy document states, the NLTP would initially support the development of pilot ranches in each of the seven pilot States of Adamawa, Benue, Kaduna, Nasarawa, Plateau, Taraba and Zamfara (Ibekwe and Onyewuchi, 2020).

A major obstacle to the implementation of the policy was poor political will on the part of the Federal and State governments who keyed into the project. Critics hold the position that the policy was merely a political show off amid widespread rejection of the Ruga policy which was highly criticised. Again, the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2 or

COVID-19) pandemic and dwindling revenue of the Federal and State governments have made the plans a non-priority scheme in the face of other national needs (Ibirogba, 2019; The Guardian, 2019).

The policy implementation phase was halted by opposition, partly among herders but predominantly from farmers who resent the plan's emphasis on pastoralists. Currently, the policy is ineffective as most states are yet to commence the NLTP while the Federal Government is yet to complete up to 30 percent of proposed projects.

2. **National Information and Communication Technology Policy 2012**

The National Information and Communication Technology Policy came into force following the establishment of the Ministry of Communication Technology to ensure better coordination of ICT activities and development in Nigeria. This National ICT Policy lays out the inputs required to strengthen all productive sectors and ultimately transform Nigeria into a knowledge based and globally competitive country, in alignment with the National Vision 20:20 objectives. It establishes a comprehensive framework for the ICT sector

that will encourage and stimulate investment and also enable rapid expansion of ICT networks and services that are accessible to all at reasonable costs (National ICT Policy, 2011).

The National ICT policy addresses 23 thematic areas that are of critical importance, including Policy and Regulatory framework, Internet and Broadband development, Local content, Coordinated ICT development across all sectors, NS and safety amongst others. Arising from the foregoing, it could be inferred that the National ICT policy provides regulatory support for the effective adoption and application of AIS technology for addressing cattle rustling prevalence in the NW for enhanced NS in Nigeria.

Legal Framework

1. Constitution of the Federal Republic of Nigeria 1999 (As Amended)

Section 14(2)(b) of the 1999 constitution (as amended), states that *"the security and welfare of the people shall be the primary purpose of government, and the participation by the people in their government shall be ensured in accordance with the provisions of this constitution."* The right to life is also amply provided for in the 1999 Constitution. Section 33 clearly states that *"every person has a right to life and*

no one shall be deprived intentionally of his life, except in execution of the sentence of a court in respect of a criminal offence of which he has been found guilty in Nigeria". From the foregoing, it can be deduced that the State has the responsibility to develop a practical framework to promote, protect and fulfil the right to life of its citizens and must be seen to take deliberate steps towards the sustainability of such frameworks. It is therefore, within the constitutional obligation of the Nigerian government to adopt the AIS technology to proactively curb the menace of cattle rustling in view of ensuring the safety of lives and properties.

Bill for an Act to Establish National Livestock and Management (Protection, Control and Management) Bureau

The Bill to establish a National Livestock and Management Bureau was initiated in 2016 by Senator Muhammad Enagi Bima. The legislation under consideration seeks to solve the challenge of animal identification and management in Nigeria by establishing an institutional framework. The Bill contains Twenty-Six (26) clauses with a schedule. Clauses 1-6 deals with the establishment, objectives and functions of the Bureau. Clauses 7-8 provides for appointment of

staff and pension matters while clauses 9 -12 contains provisions for funds of the Bureau, annual estimates and report. Clauses 13-17 deals with the establishment and functions of Zonal offices.

The Bureau when established would be responsible for livestock identification, traceability, registration, cattle rustling control, livestock disease control, among others. The Bill has the following objectives including to: ensure management, traceability and control of movement of livestock, ensure livestock health and disease management through disease surveillance, prevention and quick response to disease outbreaks and food safety through the traceability of animal products. Others are to: enhance transparency and information in the food chain, deter animal theft, especially as it affects the incessant cattle rustling crisis, aid intelligence gathering by security agencies towards mitigating the incessant conflicts between herders and farmers, cattle rustling and international market access and trade, thereby diversifying the economy.

However, after much consideration, the Bill was referred to the Committee on Agriculture and Rural Development to look into it and report back

within four weeks. Although the report of the Committee has been submitted since 2019 with six clauses deleted, five clauses renumbered and 25 clauses amended, the Bill is yet to be passed into law (Nwosu, 2021).

Institutional Framework

1. Federal Ministry of Livestock Development

The Federal Ministry of Livestock Development (FMLD) is Nigeria's first independent ministry for the livestock sector, established in July 2024 by President Bola Ahmed Tinubu. The FMLD's mandate is to modernise and transform Nigeria's livestock industry into a sustainable, globally competitive sector through strategic policies, infrastructure development, innovation and private-sector engagement. Key goals include boosting food security, resolving farmer-herder conflicts, creating jobs, improving livelihoods and attracting investment. The Ministry has passed through a series of modification, mergers and demergers with other ministries of related sectors. In accordance with this mandate, the Ministry has the vision to *"transform Nigeria's multi-billion-dollar livestock potential into actual economic prosperity, ensuring*

food security and improved livelihoods for its citizens". In view of the foregoing, the FMLD remains a strategic institution responsible for ensuring that Nigeria's meat production capacity is not undermined by the persistent cattle rustling in the NW. Therefore, it behoves on the Ministry to develop workable strategies including the adoption of AIS to improve its functions of livestock disease control, livestock monitoring and enhanced meat production in Nigeria. It was on this premise that the Katsina State House of Assembly in 2016 urged the then Federal Ministry of Agriculture and Rural Development (FMARD) to formulate a policy that would include Electronic Animal Identification System. The Lawmakers at that time believed that the identification system will help eradicate the problem of cattle rustling in the Northern region of the country. In 2019, the FGN through the FMARD initiated a process of animal census, traceability and identification to help in tackling issues of cattle rustling as well as help get accurate data on livestock (Alimi, 2019). The FMARD was also involved in creating awareness for herders in Nigeria about the benefits of the NAITS and its benefits for addressing the cattle rustling menace in the NW.

2. National Information Technology Development Agency

The National Information Technology Development Agency (NITDA) was created in April 2001 to implement the Nigerian Information Technology Policy and coordinate general information technology development in the country. The Agency is mandated by its Establishment Act to create a framework for the planning, research, development, standardisation, application, coordination, monitoring, evaluation and regulation of Information Technology practices, activities and systems in Nigeria. Overall, the role of NITDA is to develop, regulate and advise on Information technology through regulatory standards, guidelines and policies. Additionally, NITDA is the clearing house for all Information Technology (IT) projects and infrastructural development in the country. It is the prime Agency for e-government implementation, Internet governance and general IT development in Nigeria. In view of the foregoing, NITDA remains the overarching institutional framework for the effective integration and adoption of AIS in the NW for enhanced NS in Nigeria.

3. **National Space Research Development Agency**

The National Space Research and Development Agency (NASRDA) under the auspices of the Federal Ministry of Science and Technology was established in May 1999 with a broad objective to pursue the development and application of space science technology for the socio-economic benefits of the Nation. The agency utilises airspace technology and Global Positioning System (GPS) for real time tracking and identification. NASRDA's capabilities have been used in the Northeast of Nigeria in the fight against insurgency. Consequently, the agency can assist security agencies to track cattle rustlers and their activities using Satellite capacities such as the Nigeria SAT-1, SAT-2 and Nigeria SAT-X among others (Malu, 2015). The application of tracking technology using the services of NASRDA and individual chips for cattle offers good prospects for mitigating cattle rustling for enhanced NS in Nigeria.

4. **National Animal Production Research Institute**

The Decree No 35 of August 27, 1973 and the

Research Institutes (Establishment) order of November, 1975 gave birth to the National Animal Production Research Institute on July 1, 1976. The Institute is funded by and financially accountable to the Federal Government but administratively under the Ahmadu Bello University. The mission of the Institute is to *"conduct demand-driven research and training in animal production and dissemination of technologies to animal producers, processors and marketers in an integrated value chain system to achieve sustainable employment generation, poverty alleviation and improved livelihood in Nigeria"*. It is mandated to conduct research for: Genetic and reproductive improvements of livestock species which include: cattle, sheep, goats, swine, poultry, rabbits, donkeys, horses, camels among others. It also has the mandate for the introduction, selection, propagation and utilisation of natural and sown pastures for livestock production as well as the development of animal nutrition packages for maintenance and production of all classes of food animal species. The mission of the institute indicates that NAPRI is a strategic institutional framework for effective implementation of AIS in Nigeria.

Challenges Undermining the Effectiveness of AIS in Addressing Cattle Rustling in the North-West for Enhanced National Security in Nigeria

1. Inadequate Policy, Regulatory and Institutional Frameworks for Effective Implementation of the Animal Identification System in Nigeria

In a democratic State, getting things done is effectively driven by a robust and coherent policy, regulatory environment hinged on strong institutional frameworks. However, it is observed that in Nigeria, the necessary institutional capacity, legislative acts and government policies required to support the identification, traceability and management of livestock are still not consolidated as at the time of this research endeavour. As a consequence, efforts by State Governments of Katsina, Kaduna and Enugu to institute AIS have been limited in terms of effectiveness. In the case of Katsina, not even one cattle rustled was retrieved by the MTN AIMS technology since launched and yet cattle theft has remained a constant reoccurrence in the State. The country is not yet deliberate about instituting the required environment to ensure that AIS technologies are functional. For instance, since

2016, Nigeria has been struggling with passing into law the Bill to establish a National Livestock and Management Bureau. Moreso, the roles of various stakeholders in the implementation of an AIS regime in Nigeria is not clear cut which constitute a huge challenge. There is therefore a compelling need for a national policy and legislation on AIS that is synonymous with what is obtainable in other climes with similar challenges of cattle rustling. Nigeria could draw lessons from Uruguay where there is a law that makes it mandatory for any cattle within the national territory to wear an electronic gadget for identification, linked to a system of databases managed by the government.

2. **Poor Political Will**

The political will to institute AIS mechanisms in Nigeria is yet to be satisfactorily demonstrated by the Government. There is no deliberate effort by policy makers to explore possible strategies that can be best adopted in effectively implementing AIS as a panacea for cattle rustling in the country. Even the effort to establish the National Livestock Bureau has been mired with ambiguity and controversies. The Government has the primary function to put in place best

workable strategies to achieve their constitutional obligations. Today, cattle rustling which has its roots in the persistent farmers/herders' conflict has become Nigeria's gravest security challenge, claiming far more lives than the Boko Haram insurgency. It has displaced thousands and sharpened ethnic, regional and religious polarisation (Ibrahim, 2018). In spite of the wanton loss of lives, the political institution at all levels is rather slow to explore innovative solutions such as AIS. They have thus depended on high power approaches involving various military operations that have yielded little results in actually curbing the menace of cattle theft in the NW.

3. **Herders Nomadic Cultural Affection for their Cattle**

A major challenge to the effectiveness of AIS in addressing cattle rustling in the NW is the primitive nomadic cultural affection for cattle. The cultural affection nomadic farmers in the NW have for their livestock hinders them from tagging or chipping their livestock. The belief that putting a device into their cattle will be harmful to their health is not a risk many of them are willing to take. Moreover, chipping their cattle may restrict

their nomadic lifestyle which serves as a discouragement for adopting AIS frameworks (Gambo, 2020). As such, continuous enlightenment and awareness about the benefits of AIS in tackling cattle rustling is required to change the perspective of herders and increase acceptability of the technology.

4. **Poor Technological Environment of AIS in Nigeria**

The technological environment in Nigeria is strategic to the effective adoption and administration of AIS technologies in addressing cattle rustling in the NW. Unfortunately, the country's technological prowess is still abysmally low. For instance, on the Global Innovation Index (GII), Nigeria has consistently ranked low in the last seven years. In the 2021 GII, Nigeria ranked 118th out of 131 economies. A year earlier, it ranked 117th (Global Innovation Index, 2021). As at 2022, Nigeria is still missing among the innovation achievers in Africa, whereas five countries, which emerged in terms of innovation relative to their level of development, from sub-Saharan Africa included Kenya, Rwanda, Mozambique, Malawi and Madagascar. Nigeria's poor technological advancement is a major

constraint to the effective adoption and implementation of AIS as a strategy for curbing cattle rustling in the NW. The technological infrastructure in Nigeria is yet to be at par with what is obtainable in other countries where similar systems as NAITS have been deployed and are currently in effect such as Kenya. For example, the database Centre for AIS in Nigeria is likely to crash, experience a reduction of services or even a complete system blackout during unexpected power fades or power failures which are common in Nigeria. This epileptic electricity situation further compounds Nigeria's technological challenges.

5. **Inadequate Animal Identification and Traceability Frameworks**

Nigeria has one of the largest livestock markets in Africa. For instance, the over 150 years old Maigatari market in Jigawa State, Nigeria, trades about $2.6 million worth of livestock every week at peak periods. However, most of the animals being sold or butchered in livestock markets and abattoirs across Nigeria are usually unlabelled or unidentified. As a result, their sources and ownerships cannot be ascertained or verified. This gross lacuna allows animals obtained from

weaponised banditry and rustling to be easily sold and slaughtered for cash without any consequence. Consequently, this encourages cattle rustling and makes it attractive as a profitable venture. Moreover, allegations exist that rustled cattle reach point of slaughter without being identified because rustlers operate in connivance of security agents and outfits (Bello and Abubakar, 2019). Therefore, Nigeria needs effective implementation of the current NAITS by borrowing ideas particularly from countries like Botswana, Namibia, South Africa, Kenya and Tanzania who have either piloted or fully deployed a livestock identification and traceability system.

6. Prospects of Instituting AIS Mechanism in Nigeria

In spite of the above highlighted challenges, prospects still abound for the effective adoption and implementation of AIS in the NW. Apart from the vivid mitigation of rustling and curbing the sales of stolen livestock in Nigeria, AIS will offer the Nigerian government a robust digital platform for the monitoring and evaluation of livestock farming and production in the country. As a result, the livestock markets which are

currently limited to Nigeria and her neighbours will ultimately become open for global or intercontinental trade. This is because AIS captures the health and vaccination information of the livestock which is a prerequisite for global trading of meat and milk. AIS will also allow for better control and management of influenza and other diseases common to livestock. For example, even though trypanosomiasis is no longer a prevalent public health problem in Nigeria, most of the livestock in Nigeria are still at the risk of the disease. Reduced livestock production because of diseases such as trypanosomiasis directly leads to decreased availability of milk and meat and subsequent national malnutrition as well as food insecurity which may hinder socio-economic development.

Most importantly, the NW of Nigeria will become more peaceful if AIS is properly integrated and managed as a panacea for cattle rustling. Government would have partly fulfilled its constitutional obligation of protecting the lives and properties of Nigerians which would ultimately improve its ranking in the Global Peace and Security Indices. AIS will help in the quick identification and isolation of affected livestock via the health and vaccine information (Akinsolu, Sangodoyin and Adeyemi, 2021).

4

Animal Identification System and National Security in Nigeria: The North West in Perspective - Data Presentation, Interpretation and Analysis

This chapter appraises the adoption and application of AIS in Nigeria and its strategic relevance to improving NS by addressing the menace of cattle rustling in the NW region of the country. It presents and analyses data obtained through the administration of questionnaires and Key Informant Interviews (KII). The Chapter also discussed and summarised the findings from the analysis of the primary data.

Data Presentation and Interpretation

We adopted field survey, which involved the collection of data from primary sources using questionnaire and KII. The analyses of data were done using simple frequency analysis. This method is precise, direct and unambiguous. The data were presented in tables and charts with a view to drawing inferences to the concerns of the study. The findings of the field survey are buttressed with the data from secondary sources.

The author administered questionnaire to personnel from Nigerian Police Force (NPF), Nigeria Security and Civil Defence Corps (NSCDC), and the Nigerian Military (Army, Navy and Air Force). Farmers, Cattle Breeders Associations in the NW, National Animal Production Research Institute (NAPRI), Federal Ministry of Agriculture and Rural Development (FMARD), States Ministry of Agriculture, National Space Research Development Agency (NASRDA), National Information Technology Development Agency (NITDA) and Office of the National Security Adviser (ONSA) were also sampled. A sample of the questionnaire is at Appendix III while the sample of Key Informant Interview Guide is at Appendix IV.

A total of 370 questionnaires were administered, out of which 351 were retrieved. Figure 4.1 presents a graphic representation of the 94.9 per cent response rate. The retrieved questionnaires are sufficient to provide the data required to arrive at a logical conclusion.

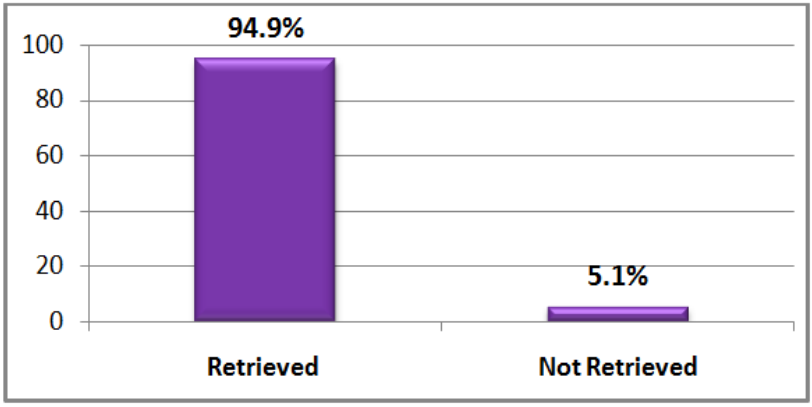

Figure: 4.1 Response Rate of Administered Questionnaires

Demographic Analysis of the Respondents

This section presents the socio-demographic profile of the respondents, which included their gender, age, educational qualification, category and length of service. These criteria are vital to this study as they provide credibility to the source of the information while validating the opinions of the respondents.

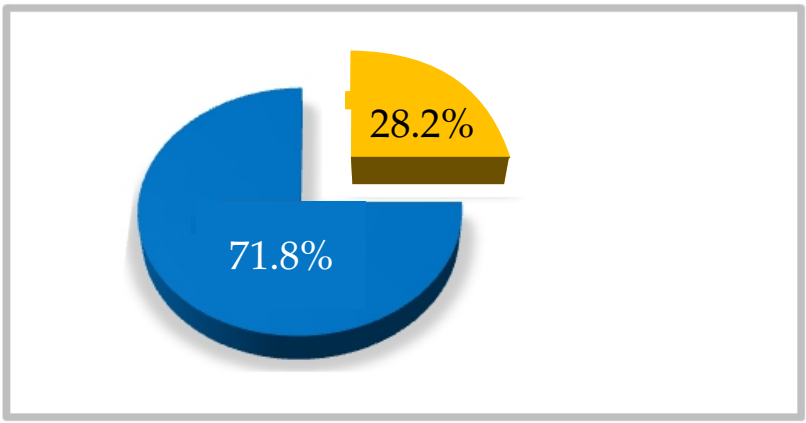

Figure: 4.2 Gender Distribution of Respondents

Figure 4.2 shows that male respondents stood at 71.8 per cent (252), while 28.2 per cent (99) of the respondents were female. This ratio disparity could be as a result of the dominance of male respondents amongst cattle breeders and most of the security agencies sampled for the study. However, this disparity in the ratio of male to female does not in any way alter the outcome of the result. Moreover, the questions used in eliciting the views of respondents on the subject were not gender-biased.

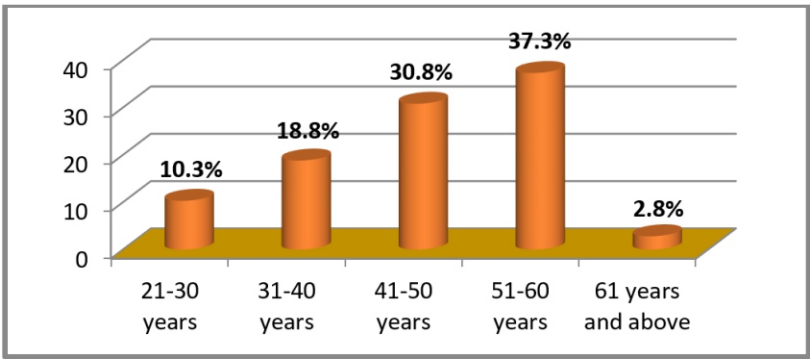

Figure: 4.3 Age Distribution of Respondents

Figure 4.3 shows the age distribution of respondents. The foregoing reveals that 131 (37.3%) respondents are between the ages of 51-60 years and comprised the majority. Followed by 108 (30.8%) respondents aged between 41-50 years while, 66 (18.8%) respondents are aged between 31-40 years. Also, 36 (10.3%) respondents are between the age of 21-30 years while, 10 (2.8%) respondents are aged 61 years and above. Cumulatively, 239 (68.1%) of the respondents in this study fall within the age bracket of 41-60 years. This implies that respondents in this study are old enough to comprehend the issues under investigation and to contribute meaningfully to the overall aim and objectives of the research.

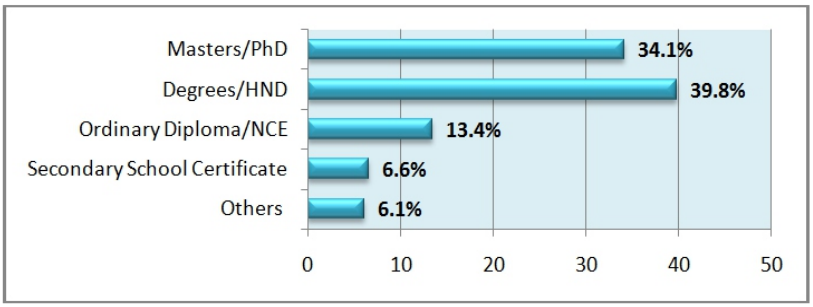

Figure 4.4: Educational Qualification of the Respondents

Figure 4.4 shows the educational status of respondents. Masters/PhD Degree represented 34.1 per cent of the respondents while Degree/HND are 39.8 per cent. Ordinary Diploma/ NCE holders comprised 13.4 per cent and those who had Secondary School Certificate as their highest qualification are 6.6 per cent. Cumulatively, 87.3 per cent of the respondents are educated beyond secondary school level. The distribution, therefore, reflects a highly enlightened study sample that is sufficiently literate and knowledgeable about the phenomenon under investigation.

Table 4.1: Respondents' Distribution by Organisation

Organisations	Frequency	Percentage (%)
Military	77	21.9
Para-Military	71	20.2
Veterinary Institutions	35	10.1
Cattle Breeders Association	29	8.3
Federal/State Ministry of Agriculture	43	12.3
National Information Technology Development Agency	37	10.5
National Space Research Development Agency	31	8.8
National Animal Production Research Institute	18	5.1
Others	10	2.8
Total	**351**	**100.0**

Source: Field Survey 2022

Table 4.1: shows that all the respondents within the sample population are well represented with the Military in the majority as 77 (21.9%) respondents. This was closely followed by the Para-Military agencies with 71 (20.2%) respondents, Ministry of Agriculture 43 (12.3%), Veterinary Institutions 35 (10.1%), NITDA 37 (10.5%), NASRDA 31 (8.8%) and Cattle Breeders Association 29 (8.3%). While, 18 (5.1%) respondents were from NAPRI and 10 (2.8%)

from other institutions/organisations. The foregoing implies that all the respondents within the sample population are represented which gave a true reflection of the situation under investigation.

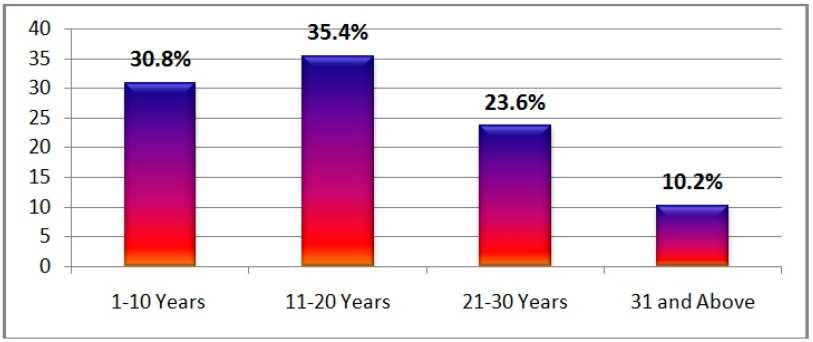

Figure 4.5: Respondents' Years in Service

Figure 4.5 shows that the respondents with 11-20 years in service constituted 35.4 per cent while, those with 1-10years in service closely followed with 30.8 per cent. Others were respondents with 21-30 years in service as 23.6 per cent and a minority of the respondents with 31 and above years in service as 10.2 per cent. It can therefore, be inferred that majority of the respondents have enough working experience based on their length of years in service which qualifies them to share their experience as a true reflection of the situation under investigation.

Empirical Analysis of Field Data

This section presents analysis of the field data generated to provide answers to the research questions posed by the researcher in assessing the efficacy of AIS in tackling cattle rustling in the NW for enhanced NS in Nigeria.

Relationship between Animal Identification System and National Security in Nigeria

This section addresses the first research question in this study which sought to determine whether or not there exist any correlation between AIS as an alternative solution for cattle rustling and NS in Nigeria. The analysis presented in the subsections below were generated from responses of the respondents based on indices (awareness of AIS and knowledge of correlation) used by the study.

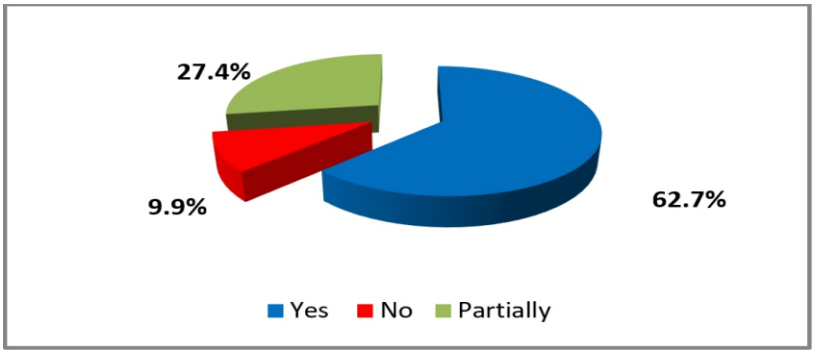

Figure 4.6: Respondents' Familiarity with Animal Identification System and National Security in Nigeria

The study sought to know if the respondents are familiar with AIS and NS in Nigeria. As highlighted in Figure 4.6, majority of the respondents representing 220 (62.7%) were familiar with AIS and NS in Nigeria. While, 96 (27.4%) respondents were partially aware and 35 (9.9%) respondents were not aware. This indicates that majority of the respondents are conversant with the concept of AIS and NS and can make informed contributions to the study to arrive at logical and valid findings.

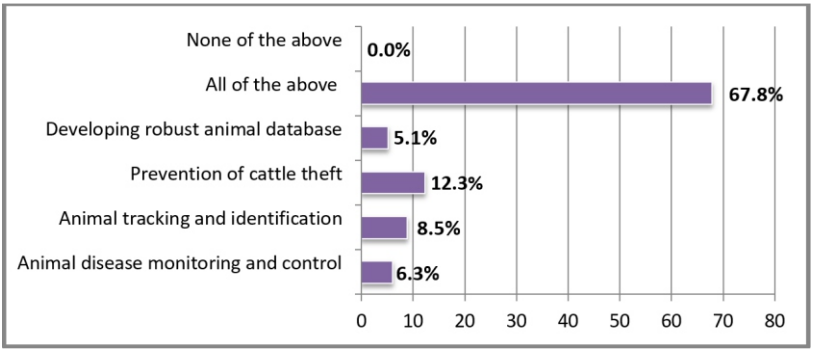

Figure 4.7: Deliverables of Animal Identification System

To establish the validity of respondent's position on the relationship between AIS and NS, the study deliberately interrogated their knowledge of what AIS is meant to achieve. Accordingly, Figure 4.7 shows that 238 (67.8%) respondents had good knowledge of what AIS is meant to achieve. The submission of respondents

in the figure indicates that AIS is meant to prevent cattle theft, track and identify animals, monitor and control animal diseases in addition, develop a robust animal database. Deducing from the foregoing, it would be inferred that respondents in this study are knowledgeable about the deliverable of AIS.

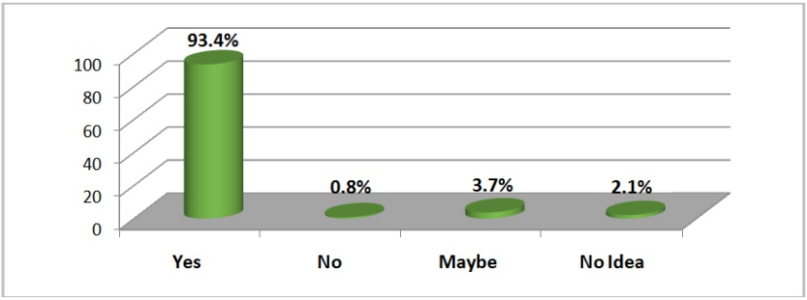

Figure 4.8: Relationship between AIS and National Security

An analysis of the correlation between AIS and NS in Figure 4.8 shows that majority of the respondents ranking 328 (93.4%) believe that there exists a direct relationship between AIS and NS. However, 13 (3.7%) were not sure and 8 (2.1%) had no idea while, a paltry 3 (0.8%) respondents contend that there is no relationship between AIS and NS. Deducing from these responses, the study established that there is a direct positive relationship between AIS and NS in Nigeria.

The former Chief of Defence Staff (CDS) in a

KII also, alluded to the fact that there exists a direct causal relationship between AIS technologies and NS. The former CDS observed that the Nigerian Military has for long adopted GIS technologies for generating geospatial intelligence for operations in the northern region of the country. This according to him has helped in various Counter Insurgency Operations. Therefore, if AIS is well instituted, it presents prospects for enhanced NS by complimenting operations in the region.

Assessment of the Current State of AIS and National Security in Nigeria

This section presents respondents' opinion on the current state of the implementation of AIS as well as NS in Nigeria. This is with a view to providing answers to the second research question of the study.

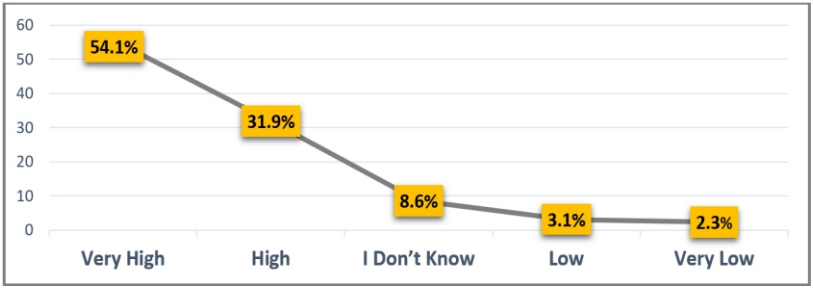

Figure 4.9: Respondents' Opinion on the Prevalence of Cattle Rustling in the NW

The study sought to appraise the current state of cattle rustling in the NW. Accordingly, respondents were asked to rate the prevalence of cattle rustling within the last 10 years. The responses as presented on Figure 4.9 shows that majority of the respondents cumulatively (very high and high) representing 302 (86%) adjudged the prevalence of cattle rustling in the NW to be high. Only a very insignificant cumulative minority of the respondents (5.4%) held a contrary view. Therefore, it is instructive to infer those cattle rustling in the NW within the last 10 years has been relatively high and has severely undermined NS. This finding of the study was corroborated by the former General Officer Commanding 1 Division (GOC 1 Div) and the Commanding Officer 2 Battalion, during their respective interview sessions at their offices in Kaduna. According to the former GOC 1 Div, the level of cattle rustling in the NW is assuming catastrophic dimensions. However, the Nigerian Military through various operations such as Operation Hadin Kai has been able to capture and arrest some cattle rustlers and bandits. Regardless, he adds, there is need for such operations to be intensified using both hard and soft power approaches for effectiveness.

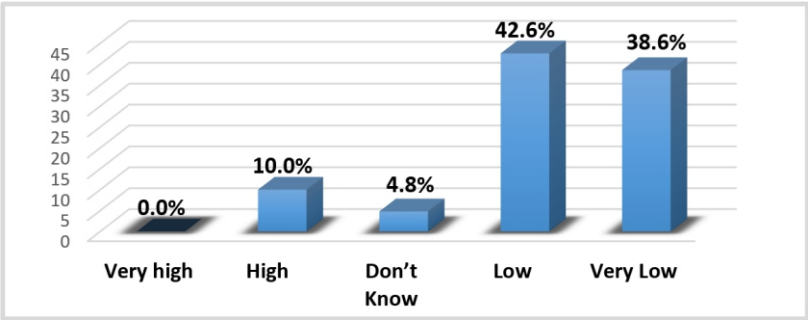

Figure 4.10: Assessment of the Level of Awareness about the Benefits of AIS among Stakeholders

Figure 4.10 is indicative of respondents' opinion on the level of awareness about the benefits of AIS among stakeholders in Nigeria. Out of 351 respondents sampled by the study, a cumulative 285 (81.2%) averred that the level of AIS awareness and its benefits among stakeholders is low. Only 35 (10%) of the respondents opined that it was high while 17 (4.8%) did not give their rating. Arising from the foregoing, it can be deduced that the level of AIS awareness and by extension its viability to address the persistent cattle theft in the NW is very low. This was corroborated by the Co-founder/Chief Executive Officer (CEO) Livestock 247, the 1 Division Garrison Commander and the Military Assistant to the GOC 1 Division, during separate interview sessions with the researcher in

their offices in Abuja and Kaduna. They noted that among stakeholders fighting against cattle rustling, including the Military, little is known about AIS. Thus, it is imperative for government to develop capacity for stakeholders on AIS for effective implementation and enhanced NS.

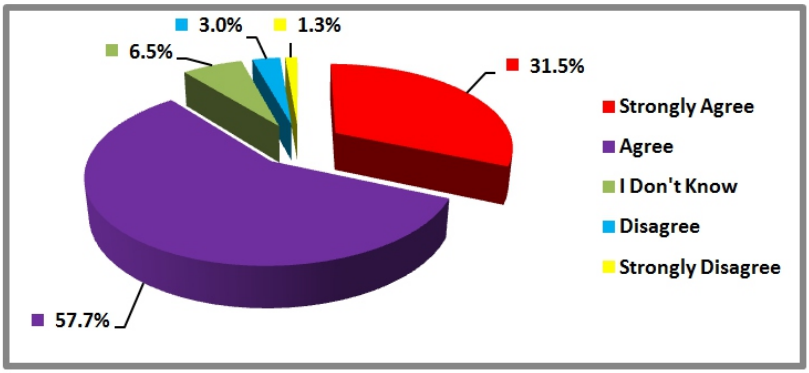

Figure 4.11: Assessment of the Willingness of the FGN to Explore AIS as an Alternative Strategy for Addressing Cattle Rustling in the NW

Figure 4.11 shows responses from respondents on whether or not they agree with submissions of some existing literature that the FGN has not considered AIS as an alternative response to the persistent cattle rustling in the NW. The foregoing established that the Nigerian government has not effectively considered adopting AIS as a non-kinetic approach to tackling cattle rustling in the NW for enhanced NS. This deduction was arrived

at considering the response of an overwhelming cumulative majority of 313 (89.2%) respondents. In reference to the statement of the research problem of this study, the above analyses justify earlier claim that the FGN has not effectively explore AIS as an alternative response to the persistent cattle rustling in the NW.

A former Director Army Public Relations posited during an interview session that government has invested so much in tackling activities of cattle rustlers and bandits in the NW. He notes that the various operations in the NW have recorded milestones. However, if the government considers developing AIS under the relevant institutions, the military will work closely with such institution to totally flush out cattle rustlers and other violent non-state actors from the NW. Lending credence to this assertion, Commander 17 Brigade, Nigerian Army, Katsina noted that they are aware of local methods used by herders to identify cattle. The introduction of AIS is however new. For the government to make it effective in providing intelligence to the military, there is the need for a database and a digital platform for effective monitoring of the animals.

Assessment of the Impact of AIS in Addressing Cattle Rustling in the NW for Enhanced NS

The study sought to know the extent to which the application of AIS has helped to curb cattle rustling in the NW for enhanced NS. This section of the study therefore presents the opinion of respondents in line with this objective of the study.

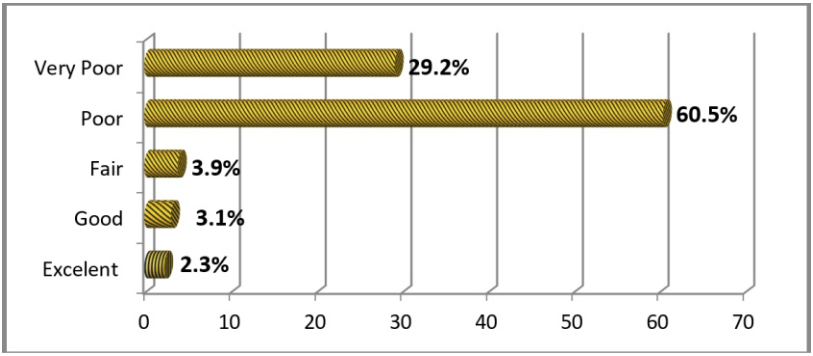

Figure 4.12: Respondents' Opinion on the Application of AIS in Tackling Cattle Rustling in the NW

Figure 4.12 shows that a cumulative majority (poor and very poor) of the respondents representing 318 (89.7%) opined that the application of AIS as part of strategies for tackling cattle rustling in the NW is poor. Conversely, 14 (3.9%) respondents opined that it was fairly applied while, 11 (3.1%) submitted that it was good and 8 (2.3%) noted that it was excellent. This

finding shows that AIS technology has not been effectively adopted as part of non-kinetic strategies by the Nigerian government to curb the persistent cattle rustling in the NW. This assertion was corroborated by all ten Key Informants interviewed in this study. According to the Executive Secretary/CEO of National Agricultural Development Fund (NADF)as well as the former CDS, AIS has not been properly institutionalised in Nigeria. Therefore, its adoption as part of non-kinetic responses against insecurity is still underway. The former CDS added that the Nigerian Military is not unaware of the technology. However, the Force is still developing capacity on the application and management of the technology. This was also the position of Land Component Commander, Operation Hadarin Daji, Zamfara State.

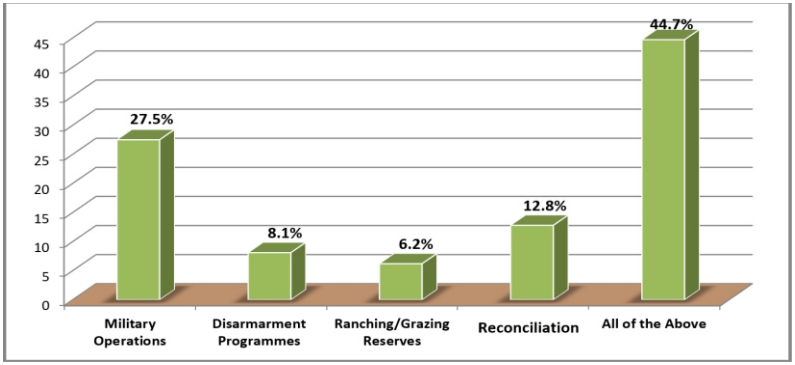

Figure 4.13: Assessment of Measures put in Place by the Nigerian Government to Address Cattle Rustling in the NW

Respondents were asked to identify some of the measures taken by the FGN to curb cattle rustling in the NW for enhanced NS. The results on Figure 4.13 shows that the FGN has deployed various military operations to address cattle rustling in the NW as opined by 27.5 per cent of the respondents. The analyses also show that measures such as reconciliation (12.8%), disarmament programmes (8.1%) and ranching/grazing reserves (6.2%) were also adopted in a bid to address cattle theft in the region. All ten Key Informants interviewed in this study alluded to the fact that the FGN has adopted various soft and hard power approaches towards fighting insurgency and other forms of armed violence. Regardless, the use of AIS could be well integrated to complement those efforts of the government to tackle cattle rustling in the NW for enhanced NS in Nigeria.

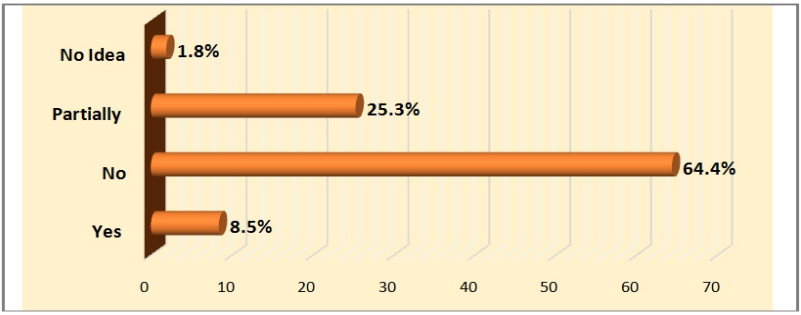

Figure 4.14: Assessment of the Effectiveness of Responses by Nigerian Government to Address Cattle Rustling in the NW

The opinion of respondents was sought on the effectiveness of government responses against cattle rustling in the NW. According to the analyses in Figure 4.14, thirty (8.5%) respondents are of the opinion that responses by the FGN against cattle rustling in the NW is effective while 25.3 per cent of the respondents opined that it is partially effective. Conversely, an overwhelming majority of the respondents representing 226 (64.4%) opined the contrary while, 1.8 per cent of the respondents had no idea.

Gleaning from this mixed response, it can be deduced that although, militarised responses to cattle rustling in the NW has achieved notable feats, it has not been able to curb the prevalence of cattle rustling in the region. This deduction is in agreement with the earlier position of this study that although military responses are integral, AIS provide more expedient opportunities for winning the fight against cattle rustling in the NW for enhanced NS.

Table 4.2: Assessment of Animal Identification System Currently Being Applied in the North West

Response	Frequency	Valid Percentage	Cumulative Percentage
Radio Frequency Identification (RFID)	13	3.7	3.7
GPS Satellite Collars	9	2.6	6.3
Wireless sensors and actuators network	11	3.1	9.4
Implants/Chips	36	10.3	19.7
Marketing System	109	31.1	50.8
Ear Tags	78	22.2	73.0
I don't Know	59	16.8	89.8
None of the Above	32	9.1	98.9
All of the Above	4	1.1	100
Total	**351**	**100.0**	

Source: Field Survey 2022

From Table 4.2, 109 (31.1%) respondents posited that the most adopted form of animal identification in use by animal owners in the NW is the marking system while, 78 (22.2%) respondents submitted ear tags. Conversely, 59 (16.8%) respondents claimed ignorance of any form of AIS in use and 32 (9.1%) respondents posited that none of these AIS were being adopted in the NW. Additionally, respondents who identified other forms of AIS in use in the NW were; 10.3 per cent for chips and implants, 3.7 per

cent for RFID and 3.1 per cent for wireless sensors and actuators. Consequently, the study established from this mixed response that the use of AIS technology in the NW is relatively poor.

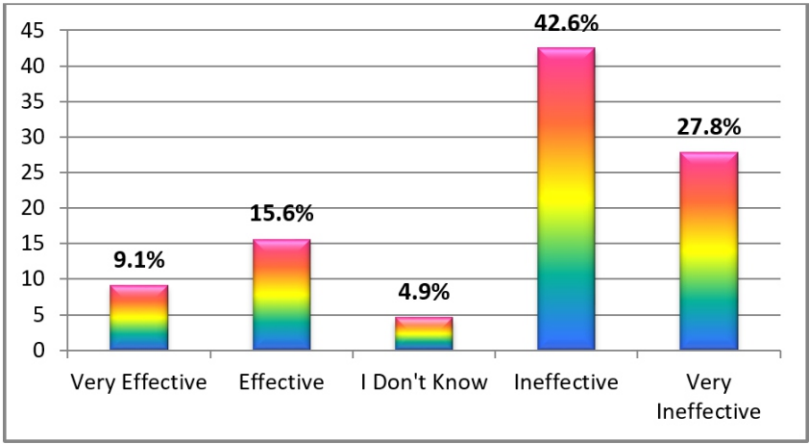

Figure 4.15: Assessment of the Effectiveness of AIS Technologies Currently Being Applied in the NW

In determining whether or not the current MTN AIMS and other forms of AIS being implemented in the NW is effective in recovering rustled cattle, the responses in Figure 4.15 were obtained. As evident in the figure, cumulatively majority of the respondents representing 70.4 per cent indicated that AIS currently adopted in the NW is either ineffective or very ineffective. Conversely, 24.7 per cent of respondents

adjudged AIS use in the NW to be effective while, 4.9 per cent of the respondents were not sure.

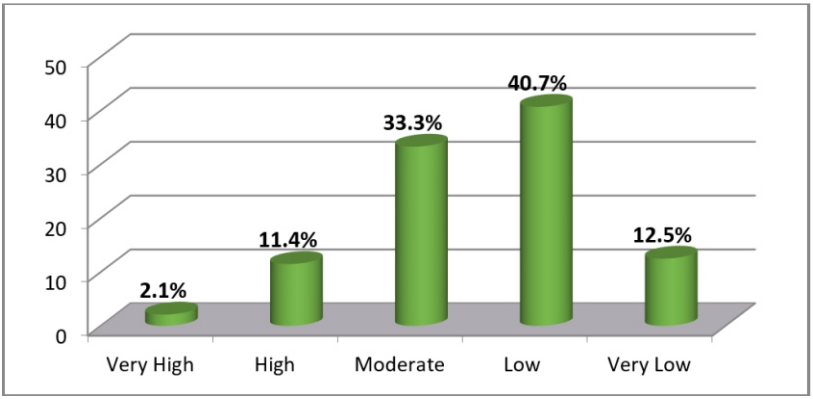

Figure 4.16: Respondents' Opinion on the Level of Willingness to Adopt AIS among Herders

To further interrogate the effectiveness of AIS in improving NS, the study appraised the understanding of AIS among herders as well as their willingness to adopt and experiment such modern animal identification techniques. Figure 4.16 depicts that the vast majority of respondents cumulatively representing 155 (53.2%) opined that the willingness was either low or very low. However, 117 (33.3%) averred that it was moderate, 40 (11.4%) respondents inferred that it was high whereas, 7 (2.1%) respondents said that it was very high. It can therefore, be deduced from the analysis that, the understanding and

willingness to adopt modern AIS among herders in the NW is low. This finding underscores the need for more education and awareness for herders to understand the benefits of AIS in addressing cattle theft. This would improve their readiness to explore and experiment AIS technologies which will in turn improve NS.

To justify their response, respondents were further asked to give reasons for their answer to the question in Figure 4.16. Accordingly, respondents who opined that the understanding and willingness of herders to adopt AIS was poor alluded the following reasons: lack of awareness, illiteracy, fear of harm to their cattle, herders are not technology inclined, lack of legal frameworks to enforce AIS and the high cost of acquiring the technology. Other reasons were; lack of ranches, poor knowledge of the system and benefits thereof, poor political will, cattle breeders' attachment to their age long traditional practices and ignorance among others.

The respondents who answered in the affirmative were equally requested to adduce reasons for their response. As such, respondents gave the following reasons: that some cattle breeders have tried the MTN AIMS, herders are tired of losing their cattle and are in dire need of

solutions. Others are that: cattle breeders associations have conducted sensitisation campaigns to herders on the benefits of AIS and that the implementation of ranches can improve willingness of herders to adopt AIS.

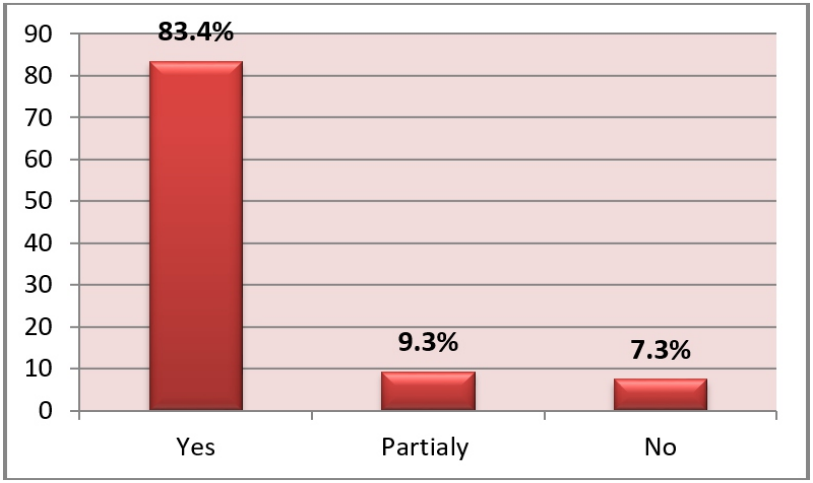

Figure 4.17: Respondents' Opinion on the Existence of a National AIS Policy

The question on Figure 4.17 sought to find out if the respondents were aware of any national AIS Policy in Nigeria. The foregoing shows that majority of the respondents ranking 83.4 per cent are not aware of any existing national policy framework regulating the implementation of AIS in Nigeria. A minority of the respondents representing 7.3 per cent claimed knowledge of a policy framework while 9.3 per cent of the

respondents were not sure of the existence of any national policy framework.

Respondents who noted that there exists a national policy on AIS were further asked to identify any of such policy they knew. Accordingly, the respondents identified internal policies of the National Animal Production Research Institute (NAPRI), the Animal Control Act and the Ruga policy. Analysing these responses, it is clear that there is no national policy on AIS in Nigeria. Therefore, the need for NAPRI in collaboration with FMLD and other relevant stakeholders to develop a national policy on AIS for effective implementation.

Assessment of Challenges and Prospects Associated with the Implementation of AIS in the NW and NS in Nigeria

In fulfilment of the fourth research objective, the study established the challenges militating against the effective application of AIS for enhanced NS in Nigeria. Table 4.3 presents the analysis of responses in this regard.

Table 4.2: Assessment of Challenges undermining the effectiveness of Animal Identification System in addressing Cattle rustling in the North West for enhanced national security in Nigeria

S/N	Challenges	Yes (%)	No (%)	NR	Total (%)
1.	Poor awareness of AIS and its benefits among cattle breeders and herders	78	7	15	100
2.	Lack of legal framework requiring all cattle breeders to adopt various forms of AIS to address menace of cattle theft	78	7	15	100
3.	Poor political will	64	18	13	100
4.	Poor literacy levels of cattle breeders	72	18	10	100
5.	Lack of an institutional framework for implementing AIS	48	28	24	100
6.	Cost of acquiring, installing and maintaining AIS technology	55	29	16	100
7.	Lack of a Policy Framework regulating the implementation of AIS	77	14	9	100
8.	Poor awareness of the benefits of AIS among security operatives	73	7	20	100
9.	Nomadic culture of herders in Nigeria	63	23	14	100
10.	All of the above	96	0	4	100
11.	None of the above	0	0	0	100

Source: Field Survey 2022

The study also reviewed prevailing challenges undermining the effectiveness of AIS in addressing cattle rustling in the NW for enhanced NS. Some of the prominent challenges highlighted by respondents from Table 4.3 are: poor awareness of AIS and its benefits among cattle breeders and herders; lack of a policy framework and poor awareness of the benefits of AIS among security operatives. Others, in particular order of consistence include: poor literacy levels of cattle breeders; lack of legal frameworks requiring all cattle breeders to adopt various forms of AIS; nomadic culture of herders in Nigeria and the cost of acquiring, installing and maintaining AIS technology among others.

Respondents in this survey were also required to identify challenges beyond those listed. Some of the challenges that featured the most are: poor media reportage, delay in enacting the law to establish National Livestock Bureau, the excessive use of the military in internal security issues and poor enlightenment campaign. Others are: the refusal to implement ranching initiative, poor implementation of the MTN AIMS, government is not even knowledgeable about AIS and so cannot implement among others.

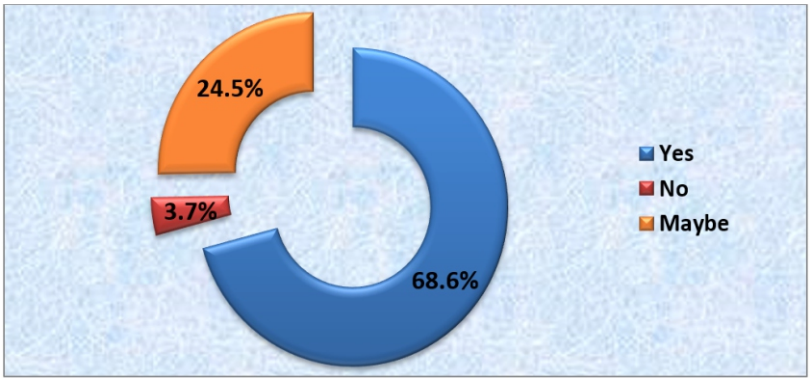

Figure 4.18: Respondents' Opinion on the Viability of AIS in Curbing Cattle Rustling in NW

The study also sought the opinion of respondents on the prospects of AIS. To this end, the respondents were asked whether the effective application of AIS using modern technologies can actually end the menace of cattle rustling in the NW. As indicated in Figure 4.18, majority of the respondents representing 241 (68.6%) responded in the affirmative. Conversely, 86 (24.5%) respondents opined that perhaps it could whereas, 13 (3.7%) opined the contrary by rating "No". It can be inferred from the above analysis that, AIS, if effectively implemented could help curb cattle rustling in the NW for enhanced NS in Nigeria. This finding was corroborated by former Director Army Public Relations in his interview where he noted that effective tracking of cattle will definitely bring to an end the menace of cattle

rustling in Nigeria. Similarly, the 1 Division Garrison Commander during an interview in his office in Kaduna also, opined that if AIS becomes a common use in cattle, sheep and goats as it currently is in dogs then, animal theft will reduce drastically.

Discussion of Findings

The study set out to find answers to some research questions and achievement of the research objectives, based on which the questionnaire instrument was administered, data collected and analysed appropriately. This section therefore articulates the discussion of findings with a view to answering the research questions asked by the study.

Assessment of the Relationship between Animal Identification System and National Security in Nigeria

The first research objective sought to determine if there exist a relationship between AIS and NS in Nigeria. It was established that majority of the respondents are familiar with the variables under investigation which provides validity for their opinions and submissions. The analysis of the correlation between AIS and NS shows that the

use of AIS to track and identify cattle will lower the rate of cattle rustling which will improve NS. This finding is in line with position of literature in the study. For instance, Ford (2021) in his work proved that when Uruguay implemented its National Animal Identification System in 2012, cattle rustling in the country dramatically reduced by 41 per cent in the first half of 2013.

Therefore, the study establishes that there is a direct positive correlation between AIS and NS. This further confirms the postulation of the Technological Acceptance Theory that the inculcation of modern technologies can induce a change in the way systems respond to emerging complexities.

Assessment of the Current State of AIS and National Security in Nigeria

The study also set out to examine the current state of AIS as well as NS with a view to strategically analyse gaps therewith. Findings of the study indicates that the prevalence of cattle rustling is very high (Figure 4.9) and has severely undermined NS. This finding is supported by the work of Abdullahi, Victor and Binta (2018), where they assessed the "Menace of Cattle Rustling and Banditry in NW Nigeria: A Case Study of Katsina

State". They found in their study that cattle rustling has continued to threaten public safety and security in the NW. The peril has led to loss of lives, human injury, displacements, as well as loss of cattle and income together with creation of sense of insecurity which has the capacity to hamper the productivity of the herding enterprise.

One of the AIS as opined by respondents in use in the NW is the Radio Frequency Identification (RFID) technology developed by MTN in collaboration with states in the NW (Table 4.2 and Figure 4.15). The study found that the effectiveness of AIS in improving NS is being undermined by poor application, weak legal and institutional frameworks (Figure 4.12 and Figure 4.15).

Another major finding of the study is that the FGN is yet to demonstrate the will to adopt AIS as an alternative response to cattle rustling in the NW (Figure 4.11). This is perhaps a reason why private entities such as MTN are beginning to develop AIS technology for herders in the NW; almost at the point of exploitation.

The analysis in Figure 4.10 also established that currently, in the NW and by extension Nigeria, there is poor knowledge about AIS and benefits

thereof among stakeholders. Also, poor literacy level of herders, fear of harm to their cattle, lack of legal frameworks to enforce AIS, the cost of acquiring the technology and herders' nomadic culture among others dissuade cattle breeders from considering to adopt AIS technologies. Therefore, Figure 4.16 concludes that the willingness of herders to adopt AIS technology is generally poor. There is therefore need for the FGN to commence awareness campaigns on the benefits of AIS and safety thereof to herders whilst developing a robust AIS platform.

Assessment of the Effect of AIS on Addressing Cattle Rustling in the NW for Enhanced NS

The third research objective sought to assess the effect/contributions of AIS in addressing cattle rustling for enhanced NS in Nigeria. The findings of this study revealed that the FGN has relied more on the use of military hard power capability without considering AIS as an alternative to ameliorate cattle rustling in the NW (figure 4.13). It was also revealed that in spite of various notable achievements by the military, hard power approach using the military has not been effective enough in addressing the menace of cattle rustling in the NW.

The study also revealed that the existing AIS technologies used experimentally in the NW (such as, MTN AIMS) has not been effective in addressing cattle rustling. This finding of the study is supported by the work of Sardauna (2022). He posits that due to poor management and regulatory frameworks, the efforts by State Governments of Katsina, Kaduna and Enugu to institute AIS have been limited in terms of effectiveness. In the case of Katsina, not even one cattle rustled was retrieved by the MTN AIMS technology since its launch and cattle theft has persisted in the State.

This outcome resonates the position of Davis, Bagozzi and Warshaw in their Theory of TAM. They postulated that the perceived "usefulness" and "ease of use" is brought forward only when there is a general knowledge and acceptance of the new technology. The framework for which the MTN AIMS was situated was defective. Herders were not properly educated about the application of the technology which would have led to "ease of use". Thus, the herding community depended on MTN whose institutional capacity was more on telecommunications. As such the perceived "usefulness" of the system was undermined. This underscores the need for the relevant government

institutions to collaborate and develop a robust AIS framework that will have the required institutional backbone for effective implementation.

The study showed that, there is no national AIS policy which could provide strategic guidelines for effective coordination and application of AIS in the NW. Accordingly, there is need for Nigeria to formulate a National AIS policy to enhance effectiveness of AIS in improving NS in Nigeria. This was also the position of the former CDS, former GOC 1 Division, Kaduna and former Director Army Public Relations.

Challenges Associated with the implementation of AIS in the NW and NS in Nigeria

Research objective four was targeted at unravelling the challenges and prospects of AIS and NS in Nigeria. The challenges identified by the study are: Poor awareness of AIS and its benefits among cattle breeders and herders, lack of a policy framework and poor awareness of the benefits of AIS among security operatives. Others, in particular order of consistence include: poor literacy levels of cattle breeders, lack of legal frameworks requiring all cattle breeders to adopt various forms of AIS, nomadic culture of herders

in Nigeria and the cost of acquiring, installing and maintaining AIS technology among others.

The Land Component Commander Operation Hadarin Daji further stated that some of the challenges faced by security forces in addressing cattle rustling in the NW included inadequate manpower, lack of modern tracking equipment and weak synergy among sister security agencies among others.

Prospects of Effective Implementation of AIS for improved NS in Nigeria

Majority of respondents believe that the implementation of AIS could eradicate incidents of cattle rustling in the NW, curb the sales of stolen livestock in Nigeria, improve livestock tracking and monitoring, improve NS as well as offer the FGN a robust digital platform for the monitoring and evaluation of livestock farming and production in the country.

Consequently, it is therefore suggested that the best way the FGN can harness this prospect of AIS for enhanced NS is to institute AIS with the right policy and legal frameworks. This was also the position of the former CDS, the former GOC 1 Division, Kaduna, the Commander 17 Brigade,

Nigerian Army, Katsina, the 1 Division Garrison Commander, the Land Component Commander Operation Hadarin Daji, the Commanding Officer 2 Battalion, Kaduna, the Military Assistant to the GOC 1 Division, Kaduna, the former Director Army Public Relations, the Co-founder/CEO Livestock247 and the Executive Secretary/CEO of the National Agricultural Development Fund (NADF) during separate interview sessions with the researcher in their offices.

Summary of Key Findings

This section presents a summary of the research findings on AIS and NS in Nigeria. The research findings are presented as follows:

1. Nigeria has no national policy on AIS or legislation providing strategic guidance for the adoption and application of AIS technologies in the NW for enhanced NS in Nigeria.
2. The FGN has relied more on the use of military hard power capability without considering AIS as an alternative to ameliorate cattle rustling in the NW.
3. There is poor knowledge about AIS, its application and benefits among stakeholders in Nigeria.

4. There is no Agency of Government superintending over the application of AIS; this has hindered effectiveness of experimented AIS in the NW.
5. The effective application of AIS to track and identify cattle will lower the rate of cattle rustling which will improve NS.
6. The existing AIS technologies being experimented in the NW (such as, MTN AIMS) has not been effective in addressing cattle rustling due to poor management and regulatory frameworks.
7. The prevalence of cattle rustling in the NW is very high and has severely undermined NS.
8. There is a direct positive correlation between AIS and NS.
9. The challenges identified by the study include: poor awareness of AIS and its benefits among cattle breeders and herders; and poor awareness of the benefits of AIS among security operatives among others.
10. Poor literacy level of herders, fear of harm to their cattle, lack of legal frameworks to enforce AIS, and the cost of acquiring and maintaining AIS technology as well as herders' nomadic culture hamper effectiveness of AIS in Nigeria.

11. The willingness of herders in the NW to adopt AIS technology is generally poor which has undermined the spread and effectiveness of AIS technology.
12. The study also revealed some prospects of AIS to include: tackling cattle theft thereby improving NS; curb the sales of stolen livestock in Nigeria; improve meat and dairy production; provision of a robust digital platform for the monitoring and tracking of livestock among others.

5

Conclusion, Recommendations and Implementation Strategies

Increasing the effectiveness of the fight against animal theft is closely related to the need for a critical study of the circumstances and most viable solutions. With over 13.9 million cattle, the livestock industry in Nigeria is an important economic sector. However, cattle theft in the last two decades or thereabout has become a common occurrence in Nigeria undermining NS, particularly in the NW. The Federal Government's approach to the menace has centred more on military hard power. Although, the military operations in the NW have achieved remarkable feats in apprehending and repelling

rustlers, the menace is still rife in the region which suggests the need to explore alternative solutions to compliment these military efforts. Thus, this study appraised AIS as an alternative strategy for addressing cattle rustling in the NW. The objectives of the study were to examine the relationship, current state and impact of AIS on NS in the NW Nigeria. It also identified challenges and prospects of AIS in improving NS. To achieve these objectives, the study adopted the survey research design combining both quantitative and qualitative methods of data collection and analysis. The quantitative data gathered from the survey was analysed using percentages and frequency distributions while qualitative data obtained from KII was analysed descriptively.

The outcome of the study revealed that cattle rustling in the NW is high and has significantly undermined NS. The FGN has relied more on the use of military hard power capability without considering AIS as an alternative to ameliorate cattle rustling in the NW. The findings also revealed that the current MTN AIMS that is currently being experimented by some states in the NW has not been very effective due to poor application, lack of institutional, policy and legal frameworks. Knowledge about AIS and its

benefits among stakeholders was revealed by the study to be generally low. Also, poor literacy level of herders, fear of harm to their cattle, lack of legal frameworks to enforce AIS, the cost of acquiring the technology and herders' nomadic culture among others dissuade cattle breeders from considering to adopt AIS technologies. As a result, the willingness of herders to adopt AIS technology is generally poor. In the light of these challenges and findings of this study, the following recommendations and implementation strategies are proffered.

Recommendations and Implementation Strategies

1. **Recommendation One**

The Federal Government of Nigeria should develop a National Policy on Animal Identification Systems.

Implementation Strategies

i) The Minister of Livestock Development to constitute Technical Drafting Committee comprising of the Ministry of Science and Technology, NITDA, NASDRA and NAPRI as members to develop a draft National Policy on AIS.

ii) Technical Committee to take into account the contributions of all stakeholders in the policy formulation stage and conclude final draft of policy.

iii) The Minister of Livestock Development to forward draft Policy to the Federal Executive Council for approval and onward submission to the National Assembly for legislation.

iv) The Minister of Livestock Development to operationalise approved National AIS Policy.

2. **Recommendation Two**

The Armed Forces of Nigeria (AFN) should integrate modern AIS technologies such as Global Positioning Systems (GPS) in tackling the insecurity in the NW.

Implementation Strategies

i) The Chief of Defence Staff to request the FGN to acquire a satellite dedicated for military Geospatial Intelligence and real time monitoring of hotspots in the NW.

ii) Defence Space Administration to explore public-private partnership alternative for

developing a dedicated satellite for the AFN.

iii) Defence Space Administration to review the cost implication of subscribing to US satellites as proposed by Digital Globe.

3. **Recommendation Three**

State Governors of NW states should create awareness among cattle breeders about AIS, its application and benefits.

Implementation Strategies

i) The Commissioners of Livestock of the NW states to organise sensitisation programmes to access the literacy needs of cattle breeders towards appreciation of AIS.

ii) The needs to be articulated into workable framework and presented to individual state executive council for consideration and approval.

iii) The execution of AIS Appreciation training to commence in collaboration with the military and technical resource persons in the NW.

iv) Governors of NW states to support the awareness programmes of Miyetti Allah

Cattle Breeders Association in awakening the consciousness of its members on the benefits and opportunities of embracing AIS.

4. **Recommendation Four**

The Federal Government of Nigeria should institutionalise the application of AIS in Nigeria.

Implementation Strategies

i) The National Assembly to review and include management of AIS in the functions of the proposed Bill establishing the National Livestock Bureau.

ii) The National Assembly to expedite the enactment of the Bill for an Act to provide for National Livestock Bureau.

iii) The Minister of Livestock Development in collaboration with the Federal Ministry of Science and Technology to develop a Central Digitised Database for AIS to ensure effective tracking and monitoring of cattle in the country.

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Appendix I

Details of the Calculation of the Sample Size

Using Taro Yamane Formula to calculate the sample size from a total population of 5000. The formula is given as:

$$n = \frac{N}{1 + N(e)2}$$

N = Total Population Size,
n = Sample Size,
e = Margin of Error

Thus;

$$n = \frac{5000}{1 + 5000\,(0.05)2}$$

$$n = \frac{5000}{1 + 5000 \times 0.0025}$$

$$n = \frac{250{,}000}{1 + 12.5}$$

$$n = \frac{250{,}000}{13.5}$$

$$n = 370.4 = 370$$

Source: Researcher's Sample Size Calculation, 2022.

Appendix II

Gangs Linked to Cattle Rustling & Banditry in NW Region

S/N	Gang Leader	Location	No of Members	Remarks
(a)	(b)	(c)	(d)	(e)
1.	Sama'ila	Bayan Dutsi	150	
2.	Jimmo Fadama	Bayan Ruwa	80	
3.	Simoli Jaya	Bayan Ruwa	65	
4.	Sahabi	Bayan Ruwa	250	
5.	Na'akka	Bayan Ruwa	180	
6.	Aminu Jajani	Bayan Ruwa	120	
7.	Sani Ba-rwanka	Dagwarwa	135	
8.	Uban Kafirai	Dagwarwa	250	
9.	Maibokolo	Dajin' YarTunniya	300	
10	Haruna Zango	Dammaka	280	
11	Muntari	Dudduɓi	31	
12	'Boyi	Dudduɗi	210	
13	Turji	Fakai	500	
14	Nakyalla	Filinga	213	
15	Najana	Gidan Bisa	96	
16	Sitanda	Gwari	156	
17	Dullu	Sububu	138	
18	Hailu Sububu	Sububu	1,200	
19	Maiduna	Tankyalla	216	
20	Gwaska	Tundar Kolo	76	
21	Kabiru 'Yankusa	SafrarKaɗe	185	
22	Karamin Gaye	Tungar Miya	242	
23	Dan Sa'adiya	Tsakanin Dagwarwa da	310	

(a)	(b)	(c)	(d)	(e)
24	Badako	Safrar Kaɗe	48	
25	Dan Shehu	Kudo	140	
26	Mati	Kudo	165	
27	'Dan Bello	Kudo	98	
28	Dan Makaranta	Arewa ga Madaka	460	
29	Dogo Gyaɗe	Arewa ga Madaka	460	
30	Damana	Dajin Babar Doka	2,000	
31	Ali Kacanla	Dajin Ceɓi	1,500	
32	Malm	Madada	1,600	
33	Bulaki	Yammacin Ceɓi	900	
34	Ciyaman	Gabas ga 'Yargaladima	1,200	
35	Dahe	Gabas ga 'Yargaladima	900	
36	Kawu	Gabas ga 'Yargaladima	257	
37	Ado Lalo	Gabas ga Dansadau	723	
38	Bulak	Gabas ga Dansadau	350	
39	Janburos	Gabascin Ceɓi	520	
40	Sani Bica	Gabascin Madada	800	
41	Dan Bagobiri	Gabascin Madada	180	
42	Nagala	Yamma ga CeɓI	235	
43	Ali ƙanen Nagala	Yamma ga Mairairai	750	
44	Zahiru	Gabas ga Mairairai	220	
45	Mai Gariyo	Tsakanin Gandaya da M	175	
46	Yalo	Kudu ga Burwaye	76	
47	Kachalla	Close to Burwaye	85	
48	Maidaji	North of Labunde	1,500	
49	Danƙarami	North of Mayasa	1,200	
50	Bello Turji	North of Labunde	1,500	
51	Alhaji Zaki	Tsanu	750	
52	Yalo	Fakai	2,500	

(a)	(b)	(c)	(d)	(e)
53	Hassan	Rugu	85	
54	Maidaji	Rugu	60	
55	Kachalla	Rugu	28	
56	Atarwatse	Rugu	40	
57	ƊanMaƙwado	Rugu	58	
58	Nagona	DajiMashema	200	
59	Idi	Kamarawa & Bafarawa	550	
60	Baba Yayi	BafarawazuwaSurduƙu	200	
61	Juuli	Guga	100	
62	Tukur	Guga	100	
63	Alhaji Ado Aleru	Kwankwanba	100	
64	Mabi	Munhaye	90	
65	Dan ‘Ibiro	Munhaye	2,500	
66	Guntu	Munhaye	100	
67	Karki	Munhaye	100	
68	Lawali Bunka	Munhaye	65	
69	Total		31,051	

Source: Defence Headquarters, 2022

Appendix III

NATIONAL INSTITUTE FOR POLICY AND STRATEGIC STUDIES

PMB 2024, Bukuru, Jos
Plateau State
May, 2022

Dear Respondent,

RESEARCH QUESTIONNAIRE

I am **Dr. Elsie Uduak Mbuk-Onwuhafua,** a Participant of the Senior Executive Course 44, 2022 of the National Institute for Policy and Strategic Studies, Kuru-Jos. As part of the requirements for the award of Member, National Institute (mni), I am conducting research on, **"Animal Identification System and National Security: A Study of North-West Nigeria"**.

You have been identified as a probable respondent. This interview guide is designed to elicit relevant information on the topic. Kindly, assist us to provide objective and reliable answers to the attached questions. Please be assured that all information provided shall be treated in strict confidence and restricted only for academic pursuit.

Thank you for your cooperation in spite of your tight schedule.

Yours sincerely,

Elsie Uduak Mbuk-Onwuhafua
Participant, SEC 44, 2022

PART II: RESEARCH QUESTIONS

(Please, tick as appropriate and respond where necessary)

SECTION A: CURRENT STATE OF THE APPLICATION OF ANIMAL IDENTIFICATION SYSTEMS (AIS) & INSECURITY IN NORTH WEST, NIGERIA

1. Are you familiar with the concept of Animal Identification Systems in Nigeria?
   a) Yes ☐
   b) No ☐

2. Which of the following is the Animal Identification meant to achieve?
   a) Animal disease monitoring and control ☐
   b) Animal tracking and identification ☐
   c) Prevention of cattle theft ☐
   d) Developing robust animal database ☐
   e) All of the above ☐
   f) None of the above ☐
   g) Others, please specify .....

3. Within the last 10 years, how would you rate the prevalence of cattle rustling in the North West
   a) Very High ☐
   b) High ☐
   c) I don't know ☐
   d) Low ☐
   e) Very Low ☐

4. How would you rate the application of AIS technologies in tackling cattle rustling in the North West?
   a) Excellent ☐
   b) Good ☐
   c) Fair ☐
   d) Poor ☐
   e) Very Poor ☐

5. Which of the following Animal Identification Systems is currently being applied in the North West to tackle cattle rustling for enhanced national security?
   a) Radio frequency identification tags ☐
   b) GPS satellite collars ☐
   c) Wireless sensors and actuators networks ☐
   d) Implants ☐
   e) Marking system ☐
   f) Ear tags ☐
   g) All of the above ☐
   h) None of the above ☐
   i) Others, please specify .....

SECTION B: EFFECTS OF THE APPLICATION OF ANIMAL IDENTIFICATION ON NATIONAL SECURITY IN NIGERIA?

6. How would you rate the level of public awareness about animal identification systems?
   a) Very High ☐
   b) High ☐
   c) Don't Know / Not Sure ☐
   d) Low ☐
   e) Very Low ☐

7. Commentators opine that Nigeria has concentrated more on Military response to cattle rustling in the North West without really considering the use of modern Animal Identification System as an alternative response. Do you agree with this assertion?
   a) Agree ☐
   b) Strongly Agree ☐
   c) Don't Know ☐
   d) Disagree ☐
   e) Strongly Disagree ☐

8. Do you agree that effective application of Animal Identification Systems using modern technologies can actually end the menace of cattle rustling in the North West?
   a) Yes ☐
   b) No ☐
   c) I Don't Know ☐

9. How would you rate the level of understanding and willingness to adopt modern Animal Identification techniques among cattle breeders in Nigeria?
   a) Very High ☐
   b) High ☐
   c) Don't Know / Not Sure ☐
   d) Low ☐
   e) Very Low ☐

10. Please kindly state the reason(s) for your answer in (9) above if any. Write freely .....
    .....
    .....

11. Are you aware of any National Policy or law supporting the application of Animal Identification Systems in Nigeria?
    a) Yes ☐
    b) No ☐
    c) I Don't Know ☐

12. If yes to the question above, please mention any policy or law you know. Please write freely.....
    .....
    .....

SECTION C: CHALLENGES AND PROSPECTS ASSOCIATED WITH THE IMPLEMENTATION OF AIS IN THE NORTH WEST FOR ENHANCED NATIONAL SECURITY IN NIGERIA

13. Which of the following challenges do you think is affecting Animal Identification Systems in improving national security in the North West?

S/N	Challenges	Yes	No
1.	Poor awareness of AIS and is benefits among cattle breeders and security operatives		
2.	Lack of legal frameworks requiring all cattle breeders to adopt various forms of AIS to address menace of cattle theft		
3.	Lack of an institutional framework for implementing AIS		
4.	Poor political will		
5.	Literacy levels of cattle breeders		
6.	Cost of acquiring, installing and maintaining AIS technology		
7.	All of the Above		
8.	None of the Above		

Other challenges (please itemize).....
.....
.....
.....
.....

14. What measures has the Nigerian Government put in place to mitigate the challenges identified in question (15) above (please write freely).....
.....
.....

15. Do you agree that the effective application of AIS in support of anti-cattle rustling operations can improve national security?
    a) Agree ☐
    b) Strongly Agree ☐
    c) Don't Know ☐
    d) Disagree ☐
    e) Strongly Disagree ☐

16. How best do you think Nigeria can improve the application of Animal Identification System for enhanced security in the North West?.....
    .....
    .....
    .....

SECTION D: POLICY RECOMMENDATIONS FOR IMPROVED APPLICATION OF AIS IN THE NORTH WEST AND ENHANCED NATIONAL SECURITY

17. What policy recommendation(s) would you proffer for effective application of AIS in the North West for enhanced national security in Nigeria? .....
    .....
    .....
    .....
    .....
    .....
    .....
    .....

Thank You!

Appendix IV

NATIONAL INSTITUTE FOR POLICY AND STRATEGIC STUDIES

PMB 2024, Bukuru, Jos
Plateau State

Dear Respondent,

RESEARCH QUESTIONNAIRE

I am **Dr. Elsie Uduak Mbuk-Onwuhafua,** a Participant of the Senior Executive Course 44, 2022 of the National Institute for Policy and Strategic Studies, Kuru-Jos. As part of the requirements for the award of Member, National Institute (mni), I am conducting research on, **"Animal Identification System and National Security: A Study of North-West Nigeria"**.

You have been identified as a probable respondent. This interview guide is designed to elicit relevant information on the topic. Kindly, assist us to provide objective and reliable answers to the attached questions. Please be assured that all information provided shall be treated in strict confidence and restricted only for academic pursuit.

Thank you for your cooperation in spite of your tight schedule.

Yours sincerely,

Elsie Uduak Mbuk-Onwuhafua
Participant, SEC 44, 2022

KEY INFORMANT INTERVIEW GUIDE

Name of Respondent (Optional).....
Position .....
Organisation .....

1. Sir/Ma, drawing from your wealth of experience and knowledge, what is your assessment structures put in place by the Nigerian Government to track and identify cattle to address the rising incident of cattle rustling?
2. Are you familiar with the concept of Animal Identification Systems? and what in your opinion is the level of its application Nigeria, especially for disease control, animal monitoring and animal tracking, speaking from a perspective of a veterinarian?
3. Cattle theft in the North West has increasingly become a major security challenge undermining Nigeria's national security. What is your opinion on the efficacy of AIS in curbing the menace for improved national security?
4. As you know, the legislation to establish a National Livestock and Management Bureau has scaled third reading. Several contentions have been raised against its establishment, what is your take on this issue?
5. Are there other issues and challenges with the implementation ofAIS as a strategy for improved National Security you want to highlight? (Probe for legal and institutional factors)
6. Lastly, as a contribution to policy formulation on the subject, how best do you think Nigeria effectively integrate AIS as a strategy for curbing the challenge of cattle rustling in Nigeria?

Thank you for your invaluable time. It is hoped that your contributions and suggestions will greatly enrich this research as well as influence policy recommendations of the study.

Appendix V

KEY INFORMANT INTERVIEW SESSIONS

Appendix VI

AIS INJECTING DEVICE

HANDHELD RFID SCANNER

NATIONAL ANIMAL IDENTIFICATION AND TRACEABILITY SYSTEM (RANCH ID)

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About the Book

Animal Identification System and National Security: A Study of North-West Nigeria is a hands-on book on how to manage cattle rustling, which fuels banditry and violent conflict. An animal identification system helps track livestock ownership and movement, making theft more difficult and recovery more feasible. Stolen livestock is often used to fund armed groups and criminal enterprises. An identification system reduces the economic base of such groups, contributing to national and regional security. Disputes between pastoralists and farmers over grazing routes often escalate into violent clashes. A traceable system allows for accountability, mediation, and legal resolution of disputes. The region has a high concentration of pastoralists making animal identification a practical tool for integrating mobile communities into the national security and economic framework.

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When she is not lost in dusty security books or busy typing up battle scenes, you will find her hiking up mountains – with a security book in her backpack, of course.

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ISBN 978-978-781-599-1
9 789787 815991