NATIONAL VETERINARY RESEARCH INSTITUTE (NVRI) VOM

OUR MANDATE

A) Conduct research into all aspects of animal diseases, their treatment and control.
B) Develop and produce animal vaccines, sera and biological to meet the national demand.
C) Provide surveillance and diagnosis of animal diseases.
D) To introduce exotic stock for improving egg, meat and milk production.
E) Provide extension services and publications to poultry and livestock farmers.
F) Train Intermediate manpower in Veterinary and Medical Laboratory Technology and Animal Health and Production Technology

OUR MISSION

To conduct research, disease surveillance, diagnosis, development and production of vaccines and biological for the control of animal and zoonotic disease, applying modern technology based on international best practices.

OUR VISION

To be the Apex Veterinary Research Institute in Africa driven by excellence in Research, Diagnosis, Vaccine Development and Production.

OUR Core Values

Excellence: Products and services that meet international standard and customer satisfaction.

Integrity: Good conduct and character in service delivery

Networking & Collaboration: To establish good working relationships, sharing information and resources with Institutions and Organisations.

Accountability: Responsibility and Commitment.

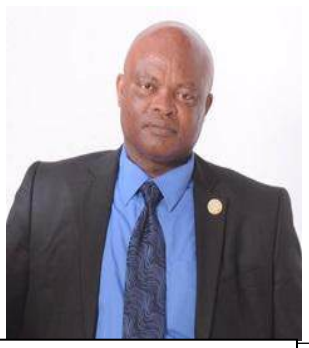
Publications and Seminar Committee members

Dr. NI Ogo	Chairman
Mr. J Gotep	Member
Mrs. P Madu	Member
Dr. SI Tekki	Member
Mr. AU Samme	Member
Dr. AR Jambalang	Member
Dr. MB Bolajoko	Member
Dr. EI Leo	Member
Dr. G Forcados	Member
Dr. K Anyika	Member
Dr. B Dogonyaro	Member
Dr. AJ Adedeji	Member
Dr. Dorcas Gado	Member
Mr. Hussaini Isa N	Member
Dr. L Igah	Assist. Secretary
Dr.LChabiri	Secretary

TABLE OF CONTENTS

Reports from Outstation

INSTITUTE MANAGEMENT COMMITTEE (IMC) 2023



Dr. Nick Nwankpa
Director Production

Dr Ocholi, R.A.
Director

Dr Ngulukun S.S.
Dir Bacteriology, Parasitology & Virology

Dr Dr. Monusola Ogedengbe
Director Planning

Dr. Bitrus Yakubu
Director Biochem & DD

Dr Maryam Muhammad
Director/Chief Executive

Dr. Yakubu Dashe
Extension Services

Mrs Abiayi, E.
Director SS

Mr Danboyi, A. W.
Ag Head Internal Audit

Mrs. Hauwa Bassi
Director Finance & Acct

Dr. Manasa Sugun
Director Biotechnology

Dr Kamani, J.
Director LS

Dr. Muhammad Bashir B.
Director Diagnostic Services

Dr. Meseko Clement Director LS
Infectious & Transboundary Animal Diseases

Dr. Ogo Isa'ac Ogo
Director Quality Assurance & Control

Major Activities and Events in the Institute

Picture 1: Supported by FAO and USAID, we are on a 3-day retreat to review the five-year strategic plan for NVRI. We came together as "Team NVRI" in November 2020 and developed the NVRI Strategic Plan which we have been implementing for the past three years in our various Departments/Divisions/Units.

This Mid Term Review (MTR) is to evaluate the Strategic Plan 2021-2025 implementation approach, progress and results achieved to date against the agreed results framework indicators, with a focus upon relevance, efficiency, and effectiveness.

Key aspects of the plan include the upscaling of vaccine production, research into all aspects of animal diseases and zoonoses with revamping disease surveillance and diagnosis, developing and maintaining a dynamic, comprehensive animal disease database, and establishing a quality management system. The plan was designed to be measurable within specific timelines and spur innovation, with the aim of putting NVRI at par with other international research institutions.

Picture 2: The African Education Initiative (NEF), is a US based NGO with a mission to improve the quality of education among African Youths.

The NEF-NVRI Toxicology Internship Program is one of the programs of NEF in partnership with NVRI that trains young African Graduates in the field of Toxicology.
This year, eight Interns participated.
1 is from Ghana, 1 is from Cameroon and 6 are from Nigeria.
They presented a seminar on the anti coccidial potential of two plants they studied.
They then received their certificates.
We wish them safe trip as they return to their various destinations.

Picture 3: The National Veterinary Research Institute Vom (NVRI) in partnership with the Bill and Melinda Gates Foundation (BMGF) is currently executing the project "Enabling Public Private Partnership for Vaccine Access and Delivery".
The project will contribute to animal health goals such as the production of healthy livestock, improved disease detection, prevention, and control as well as support towards ensuring food security.
This project encompasses the development by the NVRI of a model that would facilitate downstream delivery mainly through the training of a targeted number of Community Animal Health Workers (CAHWs) in some states in the Northern region of the country. The project also incorporates the training of women in aspects of Animal health disease management and vaccination. NVRI has trained about 3 sets and is now on the 4th set from the 7 gates State.

Picture 4: The National Veterinary Research Institute (NVRI) in conjunction with ARPEXAS (Scotland) Limited convened "An Advocacy and Sensitization Workshop on Foot and Mouth Disease (FMD) Control in Nigeria".

The convening which held in Abuja-Nigeria, 21-23 August 2023, brought together researchers, scientists, industry stakeholders, developmental agencies, and policy makers to jointly brainstorm on the current national, regional and global control efforts of FMD with the aim to identifying investment opportunities that will ensure sustainable control of the disease in Nigeria.

Picture 5: The National One-Health Antimicrobial Resistance Coordinating Committee (AMRCC) in collaboration with the World Health Organization (WHO) organized a training titled “Effective Leadership and Multisectoral Collaboration Skills Workshop” for Nigeria’s One-Health AMR stakeholders. It was facilitated by a team of AMR leadership experts from WHO and the United States of America. The workshop provided practical tools and skills for building trust, managing difficult conversations, understanding interests of other partners, conducting effective negotiations, managing conflicts, and building consensus. The workshop also provided an opportunity to use the new skills for supporting joint planning and decision-making needed for developing NAP-2.0 and enhanced its implementation across all sectors. It was held at Continental Hotel (former Sheraton) Abuja from 2-4 May 2023 and was fully residential.

The Executive Director NVRI Dr Maryam Muhammad was in attendance with Dr Sati Ngulukun and Alexander-Ray Jambalang.

Picture 6: Supported by FAO and USAID, we are on a 3-day retreat to review the five-year strategic plan for NVRI. We came together as "Team NVRI" in November 2020 and developed the NVRI Strategic Plan which we have been implementing for the past three years in our various Departments/Divisions/Units.

This Mid Term Review (MTR) is to evaluate the Strategic Plan 2021-2025 implementation approach, progress and results achieved to date against the agreed results framework indicators, with a focus upon relevance, efficiency, and effectiveness.

Key aspects of the plan include the upscaling of vaccine production, research into all aspects of animal diseases and zoonoses with revamping disease surveillance and diagnosis, developing and maintaining a dynamic, comprehensive animal disease database, and establishing a quality management system. The plan was designed to be measurable within specific timelines and spur innovation, with the aim of putting NVRI at par with other international research institutions.

Picture 7: NVRI Enabling Private-Public Partnerships for Vaccine Access and Delivery (INV-036760), The grant is funded by the Bill & Melinda Gates Foundation.

2023 ANNUAL REPORT

Preface

Dear friends and partners,

It is with great pleasure that we present to you our annual report for the year 2023. This report highlights the progress and achievements of the National Veterinary Research Institute, Vom, over the past year, as well as our plans for the future.

The year 2023 brought a "renewed hope" for mankind following the containment of Covid-19 pandemic through the adherence to all bio-safety measures and vaccination. Having been fully prepared on how to navigate the challenges of the pandemic the previous year, staff were given the impetus to breathe without nose-masks and the confidence to undertake institutional activities with vigour. This on its own was a significant milestone since it allowed staff to strengthen existing bonds and also build new ones through physical interactions. Our researchers have worked tirelessly to advance our understanding of the disease pathogens in our country and the world around us, and we are proud to share their progress with you.

Diagnostic and extension activities, meetings, teaching and research, vaccine production, seminars and workshops were all carried out. Progress were made on major projects, research and surveillance activities initiated by the Institute, especially those bordering on emerging and re-emerging zoonoses including but not limited to Crimean-Congo Hemorrhagic Fever Virus (CCHFV), Bovine tuberculosis, Covid-19, Dengue fever, Influenza, Lassa fever, Monkey pox, tick and tick-borne diseases and Zika virus. Scientific reports and publications that emanated from these researches are evidenced in several journals and other scientific repositories.

There was a considerable increase in the production of vaccine batches per cycle due to the resuscitation and upgrading of the Lyofast freeze drying machine and its software. Also, the NVRI played a significant role in the adoption of the mRNA vaccine technology thus positioning it as the vaccine production hub in the country. Alongside these laudable achievements, the Institute has secured ISO/IEC-17025 accreditation in line with international standards. This is the first international certification since the inception of the Institute.

The NVRI achieved a milestone in its digitalisation programme by the successful deployment of the Pathogen Asset Control System (PACS) in collaboration with the United States Defence Threat Reduction Agency (DTRA), and this has helped the national reference laboratory on AMR by ensuring its smooth operation in online and real-time processing of samples and data analysis.

As the foremost veterinary research Institute in the country, NVRI has been in the forefront of providing a conducive environment for the next generation of researchers by offering opportunities to students to learn from notable scientists using world class equipment and tools. This year unlike others, witnessed a surge in the number of students on internship, training and laboratory placement.

The Institute welcomed several dignitaries during the year, notable amongst them were the Ministers of Agriculture, and Health including delegations from FAO-ECTAD, USA-DTRA, USA-CDC amongst others.

We will continue to be open to collaborations as we invite individuals and organizations to visit, appreciate the beautiful environment and explore possible areas for collaboration.

Dr. Maryam Muhammad (PhD)
Director/Chief Executive

REPORTS FROM DIVISIONS

1. BACTERIOLOGY RESEARCH DIVISION

Functions/mandates:

1) Conducting research and diagnosis of referral samples for bacterial diseases of economic and public health importance which include but not limited to:
   a. *Mycoplasma* infections
   b. *Pasteurella* infections
   c. *Brucella* infections
   d. *Campylobacter* infections
   e. *Salmonella* infections
   f. *Escherichia coli* infections.
   g. Other Bacterial infections as the need arise.
2) Antimicrobial susceptibility Testing and AMR pattern of isolated bacteria.
3) Production of sera and biologicals and diagnostics kits for bacterial infections
4) Development of vaccine for economically important bacterial diseases.
5) To participate in internationally recognized proficiency testing and other external quality assessment (EQA) programs.
6) Participating in National and International Networks and Surveillance for Bacterial diseases.
7) Training and provision of bench space for researchers and students from universities and allied institutions on industrial attachments /fellowship (Local and International).

Activities:

A. Brucella Research laboratory

1) Routine Laboratory activities.

i. Serology

S/N	Animal Species	Sample type	No of samples	Test	Number Positive
1	Bovine	Serum	123	RBPT	0
2	Caprine	Serum	18	RBPT	0
3	Ovine	Serum	23	RBPT	0
4	Equine	Serum	11	RBPT	0
5	Human	Serum	8	RBPT	1
6	Porcine	Serum	38	RBPT	5
7	Canine	Serum	4	RBPT	0
TOTAL			**225**		**6**

Table 1: Animal species and number of sample tested by Rose Bengal Precipitation test

ii.Culture and isolation:

Routine cultural diagnosis was also carried out on 23, vaginal swabs from pigs. No Brucella was isolated.

iii. Student's Research Samples analysed in the laboratory

Table 2: Various types of students' samples analysed in laboratory

S/N	Educational Level	Animal Species	Sample type	No of samples	Test	Number Positive
1	HND	Bovine	Serum	89	RBPT	6
2	HND	Caprine	Serum	70	RBPT	6
3	ND	Caprine	Serum	50	RBPT	2
4	ND	Ovine	Serum	50	RBPT	3
5	ND	Bovine	Serum	100	RBPT	12
6	ND	Canine	Serum	50	RBPT	5
7	ND	Canine	Serum	100	RBPT	4
8	HND	Bovine	Serum	100	RBPT	8
9	MSc	Bovine	Serum	406	RBPT	21
10	HND	Caprine	Serum	50	RBPT	1
11	HND	Ovine	Serum	50	RBPT	7
12	BSc	Porcine	Serum	100	RBPT	9
TOTAL				**1,215**		**84**

B. Pasteurella Research Laboratory

2) Routine laboratory activities: Samples processed are indicated in the table below

Table 3: Overall details of samples processed are indicated in the laboratory

S/N	Animal Species	Sample type	No of sample	Diagnosis	Result(Bacterial Isolated).
1	Bovine	lungs	100	Pasteurellosis	Mannhemiarumi nalis, Actinobacillus porcinus, Pseudomonas fragis and Clostridium spp.
2	Calves	Nasal swabs	200	Pasteurellosis	Aeromonas spp, Staphylococcus aureus, Bacillus spp, Proteausspp and Pseudomonas spp
3	Laprine	Lungs	2	Pasteurellosis	Manhemiavarige na
5	Laprine	Livers	2	Pasteurellosis	Staphylococcus spp
6	Laprine	Heart	1	Pasteurellosis	Actinobacillus succigenes
Total			**305**		

C. Mycoplasma Research Laboratory

i. Routine Laboratory Activities

A total of six hundred and thirty-three samples were processed. Find below, the break-down of the samples.

Table 4: Breakdown of the number of samples analysed by tissue type and animal species

S/N	Sample type	Species	Quantity
1	Nasal Swab	Bovine	290
2	Nasal swabs	Caprine	200

3	Sera sample	Bovine	60
4	Nasal swabs	Avian	50
5	Lung tissue	Bovine	3
6	Nasal swab	Porcine	1
7	Nasal swabs	Ovine	30
		Total	**633**

2) Research Activities

a. Bench space was provided for a PhD student (Dr Habu Kalshingi) to conduct his research work.
b. Collaborative work with CIRAD, France on CCPP is ongoing.

D. Salmonella/AMR Laboratory

Summary of specific notable activities

i. Diagnostic samples analysed in the laboratory.

- Total number of 64 samples were received from diagnostic division for Salmonellosis and bacterial identification.
- 35 human feacal samples for Salmonellosis and 4 were positive for Salmonella.
- Five avian faecal samples for Salmonellosis and one positive for Salmonella.
- One avian liver sample for Salmonellosis and the result was negative.
- Three porcine faecal sample for Salmonellosis, no Salmonella was isolated.
- Four well water samples for Salmonellosis, no Salmonella was isolated.
- 15 eggs (the content) for bacterial identification, no bacteria was isolated.
- One irish potato flour for bacterial identification, no bacteria was isolated.

Table 5: Over number of research samples analysed in the laboratory

ii. Research Samples analysed in the laboratory for students

S/N	Educational Level	Animal Species	Sample type	No of sample	Diagnosis	Result
1	PHD	Pigs	Feaces	650	Salmonellosis	56 Salmoellaspp isolated
2	MSc	Fishes	Intestines	154	Aeromonas	4 Aeromonas spp isolated
3	HND	Cattle	Tissue and intestine	100	Commensal E.coli	35 E.coli isolated
5	HND	Environment and poultry farms	Water	251	Commensal, ESBL and pathogenic E.coli	114 commensal, 8 ESBL and 3 pathogenic E.coli isolated.
6	ND	Poultry	Feaces	100	Salmonellosis	4 Salmonella spp isolated
7	ND	Human	Feaces	12	Salmonellosis	No Salmonella isolated
Total				**1,267**		

Achievement:

One cycle (5 swab samples) of proficiency testing from EQuAFRICA was conducted using conventional method.

Research Highlights:

Use of automated machine (Vitek MS and 2 Compact) for confirmation of bacterial isolates stored in the laboratory bio repository and writing of publication to that regard.

Challenges:

1) Biometric access control (door) to AMR laboratory yet to be repaired.
2) Lack of consistent running tap water..
3) Technical breakdown of Vitek MS and Vitek 2 compact.
4) Inadequate laboratory equipments such as UPS, stabilizers and functional refrigerators and deep freezers.
5) Inadequate media and reagentsand for bacterial isolation.
6) Lack of office space for staff.
7) Insufficent laboratory space for Pasterralla and Brucella Laboratories.

2. BACTERIAL VACCINE PRODUCTION DIVISION

Function/mandates:

1) Production of vaccines for prevention of livestock and poultry bacterial diseases of economic and/or public health importance in Nigeria and other West African countries.

In line with the above mandate, the division produced the under listed veterinary bacterial vaccines:

i. Contagious Bovine Pleuropneumonia Vaccine CBPPV.
ii. Blackquater Vaccine BQV
iii. Hantavac Vaccine HV
iv. Anthrax Spore Vaccine ASV
v. HaemorhagicSepticaemia Vaccine HSV
vi. Brucella Vaccine BV
vii. Fowl Typhoid Vaccine FTV
viii. Fowl Cholera Vaccine FCV

Activities:

The division produced **16,539,164 million doses** of the various veterinary bacterial vaccines to meet up with market demands. The details of vaccine production for the year are given in tables 1.

Table 1: Vaccine Production Figures in doses on monthly basis

Month	ASV		BQV	CBPP	FCV	FTV	HANTA VAC	HSV	TOTAL
January	398, 800		-	1, 205, 100		1,553,900	-	46, 400	3,204,200
February	-		724, 000	-	36, 000	-	-		760,000
March	-		-	1,169,100	-	-	-		1,169,100
April	381, 200 402, 400		- -	39, 8300 38, 7900	79, 600 -	- -	- -	74, 000 -	1,723,400 -
May	-		-	-	-	8, 157, 00	62, 360	53, 840	931,900
June	832, 784		-	-	-	-	-	-	832,784
July				7,47000 379, 100 401, 600 397, 200					1,924,900
August	396, 400 400, 400 394, 000			762, 200	32, 000			61, 480 48, 000	2,094,480
September	382, 000 384, 000								766,000
October			1,457000	731900		816900	82, 080		3,087,880
November								44, 520	44,520

December	720, 000								
Total	**4, 691, 984**		**2,181,000**	**6,579,400**	**147,600**	**3,186,500**	**144,440**	**328,240**	**17, 259, 164**

KEY: ASV-Anthrax Spore Vaccine; BV-Brucella Vaccine; BQV-Black Quarter Vaccine; CBPPV-Contagious Bovine Pleuropneumonia Vaccine; FCV-Fowl Cholera Vaccine; FTV-Fowl Typhoid Vaccine; HSV-HaemorrhagicSepticaemia Vaccine; HV-Hantavac Vaccine.

Achievements:

1) The Division acquired new and well characterized ASV, CBPP Vaccine Master seed cultures from PanVac Ethiopia. These acquisitions further improve the quality of our end products to international standards.

2) The Division has improved on the shelf life of Fowl Cholera Vaccine from the present four months to twelve months

Challenges:

1) There is also the challenge of inadequate staff as personnel should not to be involved in producing more than one type of vaccine to minimise cross over contamination.
2) Shortage of water supply to the Division that always affect production of vaccine.
3) The need to increase the number of production laboratories as it is expected that one vaccine should be produced in a laboratory.
4) There is also the challenge of adjuvanting both HSV and FCV, perhaps using a friendly adjuvant as sodium alginate.
5) There is also the challenge to bring to fruition the experiment on the production of freeze-dried anthrax spore vaccine ASV, to possibly replace the bulk liquid ASV currently being used. The pilot experiment conducted showed some good promises although its potency in guinea pigs and sheep/goat were yet to be conducted.
6) All the production laboratories don't have funtional Biosafety Cabinets needed to reduce contamination of vaccines
7) Training of vaccine producers in a vaccine production laboratory on the relevant techniques to improve vaccine quality in the institute.

8) Training is required on One Health Vaccinology Strategy Workshop

9) NVRI to carryout continuous Improvement Training Agenda -NVRI

Future Plans:

1) The Division intends to build on capacity by acquiring more canisters for vaccine

2) production in the short term

3) While in the long term the Division intends to adapt the

4) use of fermenters in Vaccine production which will increase vaccine production figures
5) geometrically.

6) Research will soon commence research on the possibilities of the production of

7) multivalent vaccines by the Institute

Research highlight:

1) Validation Hanatavac Vaccine Strain *Clostridium novyi* (Oedematiens type B) alpha toxin Anthrax Spore Vaccine ASV safety test in guinea pig.

2) Molecular Isolation and Identification of *Escherichia coli* from Cattle feaces in Jos South LGA

3. BIOCHEMISTRY DIVISION

Functions/Mandates:

1) To conduct research into all aspects of animal diseases, their treatment and control
2) Provide commercial, nutritional, toxicological and water analysis services to farmers and researchers.

Activities:

1) Hosted the 2023 NEF-NVRI Toxicology Internship Program in-person for the first time since COVID-19. Eight Interns from Nigeria, Cameroon and Ghana were trained and graduated
2) Analysis ofanimal feed samples brought in from Dagwom farm to determine the nutritional quality of feeds obtained by the Institute for the farms.
3) Analysis of over 300 commercial samples brought to our laboratories by farmers and researchers which generated four hundred and eighty thousand naira (N480,000.00) that was remitted to the Institute's account

Achievements:

1) The Nutrition Section of the Division carried out inter-laboratory comparisons which lead to a successful proficiency test
2) There was a 25% increase in the number of commercial samples analyzed by the Division compared to 2022

Challenges:

1) Uninstalled Gas Chromatography Mass Spectroscopy (GCMS) andAmino acid analyzer. The GCMS can analyze volatile drug residues, phytocompounds and pesticides
2) Nonfunctional Atomic absorption spectrophotometer used for analysis of heavy metals.
3) Non-calibration of the UV spectrophotometers in the Division in the past three years.

Note: These equipment in the Division if installed and regularly calibrated will greatly enhance research and routine sample analysis as well as generate more revenue for the Institute.

Research highlights:

1) Research is currently on-going in collaboration with the Livestock Investigation Department on developing a data base of Clinical Parameters in animals using NVRI Farms

2) Development of a phyto-anticcocidial compound is being carried out along with Drug Development Division.

4. BIOTECHNOLOGY CENTER

Functions/Mandates:

1) Research on the development of biological (recombinant vaccines, proteins, antigens) for control of animal diseases.
2) Diagnosis of animal diseases using biotechnology techniques for quarantine and international trade certification of animals and animal products.
3) Serves as a centre for biotechnology collaborative research with national and international research institutions and universities.
4) Development and validation of biotechnology techniques for national use in diagnosis & research.
5) Detection & characterization of animal disease pathogens using biotechnology techniques.
6) Investigation of emerging & re-emerging infectious diseases and other zoonotic agents using biotechnology techniques.
7) Conducting national and international trainings on biotechnology methodologies for diagnosis & research.
8) Serves as a centre for DNA Barcoding of animals, disease vector insects, invasive pests and insects.
9) Serves as one of the centres of research for the National Animal Genetic Resource.

Activities:

Research/Laboratory Diagnosis

1) Identification of Mites by PCR analysis
2) Identificationof *Cryptosporidium*spp PCR analysis
3) *Trypanosomaisis*(*T. brucei*, *T. vivax* and *T. evansi*) PCR analysis
4) *Plasmodium falciparum* PCR analysis
5) Antimalarial drug resistance genedetection by PCR analysis
6) Identification of *Eimeria*spp by PCR analysis
7) Purification of excised bands from agarose gel.
8) Sporalution/Culturing of *Eimeria* and *Cryptosporidium* oocysts.
9) Purification of *Eimeria* and C*ryptosporidium* oocyst from faecal samples.
10) PCR detection of virulence genes in *Salmonella* spp.
11) PCR detection of antimicrobial resistance genes in *Salmonella* spp.
12) PCR detection of virulence genes in *E. coli*
13) PCR detection of antimicrobial resistance genes in *E. coli*

Table 1 below shows on-going projects in the division

Table 1: On-Going activities the division

S/No.	Total samples screened	Analysis carried out	Conventional-PCR	Real time PCR
1.	308	LASSA Rodent	Yes	
2.	143	LASSA Clinical	Yes	
3.	27	LASSA Clinical	Yes	
4.	10	Yellow fever optimization	Yes	
5.	112	Pancov human contact with camel		Yes
6.	189	SarsCov-2 in feline and canine		Yes
7.	17	Pan Cov in Bat	Yes	
8.	60	CCHF in Human	Yes	
9	75	Ebola/Marbok	Yes	
10	5	Rift Valley Optimization	Yes	
11.	90	TSSUV A Species		Yes
12	90	TSSUV ABSpecies		Yes
TOTAL	**1,226**			

Achievements:

1) Networking with International and Reference Laboratories on special pathogens.
2) Molecular detection and characterization of various disease pathogens of livestock both for research and diagnosis; identification of novel strains of some disease pathogens (eg Campylobacter).
3) Assisting research students as well as staff members conduct analyses using molecular techniques to identify disease pathogens, gene fragments of biological interest, as well as analyses of sequence data.
4) Provided technical support for other trainings in collaboration with other divisions within the Institute
5) Publication of scientific articles in journals.
6) All PCRs protocols were adopted, validated and optimized for the various parasitic pathogens analysed by the unit.
7) Establishment of working protocols for various parasites analysed by the unit.
8) Three members of staff are on training at the University of Jos for their MSc (Hafsat, Mark and ThankGod), while Mrs.Anvou, Dr. Shola and Mrs. Ebere are away for their PhD. Dr Emmanuel Obishakinis away for a post doc training.

Challenges:

1) Broken down camera for the BioRad Gel documentation system needs to be fixed.
2) An autoclave is urgently needed for sterilization of prepared reagents and consumables as well as decontamination of samples before disposal.
3) General maintenance of biosafety cabinets and calibration of pipettes are needed.
4) PCR reagents and consumables for routine diagnosis and training are required for optimal diagnostic work.
5) Health challenge posed by prolonged use of ethidium bromide for electrophoresis. The institute should consider a less toxic gel staining dye.
6) Power fluctuation and lack of stabilizers leading to breakdown of equipment such as freezers.
7) Limited cold storage facilities for samples and reagents.
8) Lack of adequate water supply into the laboratories to enable proper cleaning/sanitation and other emergencies.
9) Non-functional air-conditioners to maintain the laboratory and equipment.

Future Plans

1) To procure Nanopore MinION for sequencing of viral genomes
2) The student under the project to complete her studies
3) Develop and screen for more pathogens.
4) Training on Real-time PCR, protein analysis, bioinformantics.
5) Collobration with inter-laboratories, Universities and agency for research.

6) Grant writing
7) Development of research projects focussing on antimicrobial resistance in commonlyidentified pathogens such as *Salmonella* and *E. coli*.
8) Ecological studies of the reservoir for viruses of the family Arenaviridae (Lassa virus, Lymphatic choriomeningitis virus, Mopeia virus, Luna virus, Gairo virus etc.) and genetic diversity of Lassa viruses.

5. DRUG DEVELOPMENT DIVISION

Functions and Mandates

The Division is primarily a research division saddled with the responsibility of conducting research for the discovery of substances that can be used for the prevention, diagnosis, treatment, and mitigation of diseases. These research activities include projects initiated by the division staff or projects conceived by clients outside the institute but requiring the services and expertise of the division personnel. Thus, the mandate of the division is outlined as follows:

- Research and develop substances from natural and synthetic sources for the prevention, treatment, and control of diseases
- Research into the safety of substances from natural or synthetic sources used in the prevention, treatment, and control of diseases
- Provide services to researchers/scientists from other establishments/institutions working in the area of drug development and related research
- Establish and maintain a herbarium for archiving medicinal plants
- Training of students on industrial attachment and laboratory posting

Activities

Initiated the *in-silico* screening dimension to drug development.

Published an article on the medicinal plants found within the NVRI environment.

Achievements

As a result of the activities carried out, the achievements recorded were:

1. Initiated project on the *in-silico* evaluation of compounds isolated from *Euphorbia hirta* against some Antimicrobial Resistant Bacteria.
2. Continued research project of the division titled “Isolation of antimicrobial compounds from *Euphorbia hirta*.
3. Published an article on medicinal plants found within the NVRI environment.

Challenges

1. Lack of basic equipment such as:
    a. Sensitive weighing balance: This slows down work and makes it more cumbersome because we have to go to another laboratory every time.
    b. Large soxhlet extraction apparatus: There is usually a need to extract large quantities of materials which requires a large extraction setup.
    c. Rotary evaporator: After extraction, there is a need to evaporate solvent and dry extract as soon as possible. This will be enhanced when a rotary evaporator is available.
    d. Chromatography accessories: There is a need to isolate phytocompounds from crude extracts of medicinal plants therefore basic equipment such as columns, a TLC development tank, and an ultra-violet viewer are required.
    e. Broken down water distiller and freeze dryer.
2. Lack of laboratory space: The division has one laboratory only; thus, every activity is carried out within the same laboratory including animal experiments, chromatography, and drying plants and extracts.
3. Inadequate office accommodation and furniture: There is no office for the Head of Division and some staff thus making the administrative aspect of the work suffer.
4. Inadequate staff: There is no technician in the division and no divisional secretary; this poses a challenge to the research staff because they have to engage in other duties that interfere with their core duties.

Future plan

The Division plans the following for 2024 and beyond:

1. Establish a monthly seminar presentation that will see all staff of the Division present seminars to ensure the dissemination of knowledge.
2. Intensify the research on the isolation of antimicrobials from plants to tackle the scourge of antimicrobial resistance.
3. Develop protocols for quantification of phytochemicals from plants.
4. Organize a workshop on *in silico* evaluation of compounds isolated from medicinal plants and other sources, and thereafter use the technique to screen libraries of compounds for various pharmacological actions.
5. Formulate products using the antimicrobial plants as active ingredients.
6. Pursue wider collaboration with other researchers within and outside the institute to increase productivity.
7. Seek and apply for grants as external sources of funding to improve the activity and productivity of the division.

Research highlights

1. Continuation of the research project of the division titled "Isolation of antimicrobial compounds from *Euphorbia hirta*.
   Within the period under review, the plant sample was harvested, dried, pulverized, and extracted. The sourcing of bacterial and fungal isolates is ongoing. Protocol for the fractionation and isolation of compounds from the plant is being developed.
2. Published One (1) article from survey activities of the division. In addition to articles published by staff of the division in collaboration with other researchers.
3. Participated in the 2023 NEF Toxicology Internship program. The staff of the Division played key roles in lecture delivery, Supervision of Interns, and the research project.
4. Extracted and carried out phytochemical screening for 13 clients

6. EXPERIMENTAL ANIMAL MANAGEMENT DIVISION

The Division is made up of two sections:

1. Large Animal Experimental Section
2. Small Animal Experimental Section

❖ Large animal experimental section

The section was established in the year 2002 with the primary objectives of maintenance and management of livestock of various species for research and experiments.

A. Achievements

The breakdown of research activities carried out in the station during the period under review is as follows:

S/N	EXPERIMENT	RESEARCHERS
1	Carcass characteristic of the broilers fedwith a diet containing Irish potato peel in Nigeria	a) Mabur Jacob b) Davou Pwajok
2	Effect of avocado seed meal inclusion in diet on the growth performance of broiler chickens.	a) Aondoava Solomon b) Emmanuel Gloria
3	Effects of feeding diet containing bakery waste (bread) on the growth performance and heamatological value of broiler chickens	a) Kwaghbdo Barnabas Ande

Challenges

1. Inadequate water supply
2. Lack of electrical fittings and general wiring of the experimental houses.
3. Lack of toilets and bathrooms for staff.
4. Inadequate tools such as rain boots, raincoats, wheelbarrows, and rakes.
5. Inadequate consumables such as syringes and needles, hand gloves, and disinfectants.
6. Lack of security guards.
7. Roofs and walls falling.

❖ SMALL ANIMAL EXPERIMENTAL SECTION

The section was established to rear small experimental animals (Albino mice, Albino Rats, Rabbits, guinea pigs, and grass cutters) for research in the Institute laboratories and research by other clients within and outside the Institute. It also serves as an on-the-job training station for subordinates and students on industrial attachment.

Achievements

i. Supplied 348 Albino mice to the Rabies Diagnostic Research Division
ii. Supplied 3 Albino mice to the Bacterial Vaccine Production Division.
iii. Supplied 351 mice to other laboratories and researchers at the rate of ₦600 per mouse thus earning ₦210,600.
iv. Reintroduced Rabbits to the section
v. Sold 3 Rabbits at a total cost of ₦15,500.
vi. Taught students on industrial attachment
vii. The species and number of Animals in the section as of the time of writing this report are as follows:
   - Albino mice - 1332
   - Albino Rat - 278
   - Rabbits - 63

Challenges

1. Inadequate cages and drinkers.
2. Lack of office space for members of staff.
3. Staff not vaccinated against zoonotic diseases like rabies
4. Training of staff for capacity building
5. Wild rodents enterthe animal house through gaps between roofing and walls.
6. Falling and leaking roof.

7. FINANCE AND ACCOUNTS DEPARTMENT

Introduction

The Finance & Accounts Department is saddled with the responsibilities of ensuring compliance with financial regulations and adequate supervision and the disbursement of funds and proper monitoring and accounting for revenue.

The department presently have 51 staff out of which 7 are in the Institute's Outstation Laboratories. There are 12 functional units in the department as follows:

- Cash office
- Salaries and wages
- Other charges
- Revenue and sales
- Final accounts
- Reconciliation
- Advances
- Asset management
- Internal checks
- Budget
- Information technology
- Outstation staff

Functions

i. Ensuring that proper records are maintained manually and electronically of all revenue and expenditure in accordance with the prescribed Accounting System of National Veterinary Research Institute, Vom.

ii. Ensure that all payments of the Institute are covered by proper documentation, payment vouchers raised, as well as ensuring such payments are properly authorised.

iii. Liaise with the Federal Ministry of Agriculture & Food Security, Ministry of Finance, Budget & National Planning Accountant General's office, Central Bank of Nigeria (CBN) National Assembly, Office of Auditor General of the Federation in all finance and accounts matters.

iv. Preparing Management and Financial Reports comprising Trial Balance, Income and Expenditure Statements and Balance Sheet in accordance with IPSAS Accrual system of Accounting

v. Verify monthly Bank and Cash reconciliation and maintain up-to-date list of all Fixed Assets of the Institute.

vi. Ensuring that Revenue, Capital and Recurrent Subvention due to the Institute are collected and accounted for under the correct Heads and Sub-heads.

vii. Preparation and defence of the Institute's Annual Budget and preparing the consolidated budget of the Institute.

New development

The year 2023 under review witnessed the promotion of Mrs. Hauwa Amos Bassi to the rank of Director, Finance & Accounts, following the retirement of Mr. Anebi Idoko on 1st June, 2022. There existed a vacancy in the directorate level until her promotion that filled the vacancy. The year also witnessed the retirement of Mr. David Abimaje in November, 2023.

Achievements

- Training of staff on IPPIS by a Consultant
- The personnel emolument of the Institute's staff were paid as at when due without any shortfall from the budget allocation.
- All revenue generated in the year under review was accounted and proper books of accounts were kept
- A visit from the Federal Ministry of Agriculture and Food Security on our capital budget shows proper utilization of the lean budget for the year.
- Appointment of new External Auditors for the Institute
- Various visits by personnel from Office of Auditor-General for the Federation, Ministry of Finance, Budget and National Planning, Abuja
- An on the spot assessment of the Institute's budget tracker by the Budget Office commended the Accounts Department and Management for financial prudency even through the budget allocation was very small in recent years.
- There was no case of fraud or any disciplinary action on an accounts staff during the year.
- The Accounts staff are part of the commercialization team that drafted the vision, mission and mandate of vaccine commercialization. This give rise to the awareness seminar in the Institute.
- Four (4) Accounts staff attended Budget Training in Abuja in September, 2023
- Accounts staff were part of the follow up strategic plan review retreat for the Institute's five (5) years strategic plan.

Challenges

The department is a sensitive one and also the life wire of the Institute because everything center on finance. Some of the challenges faced by the department are:

i. Shortage of personnel
ii. Inadequate office accommodation in which a very senior officer sharing office with his junior counterpart
iii. The furniture in most of the offices are outdated and in bad shape
iv. In 2023, there was no any form of internal training
v. Office equipment such as laptops, printers and desktop computers and accessories are needed urgently.

8. FOOT-AND-MOUTH DISEASE LABORATORY DIVISION

Functions and Mandate

To conduct research and undertake surveillance and diagnosis of economically important Transboundary livestock diseases and Zoonoses in Nigeria.

To develop vaccine and biological (antiserum) with reference to African swine fever, Foot and mouth disease, African horse Sickness, and other Transboundary livestock diseases.

Activities

During the period under review, a total of 2,333 samples were collected in the Laboratory out of which 2,210 were sera, 69 were epithelial tissues, 32 were whole blood, 21 were swabs and one was vesicular fluid samples.

A total of 606 sera samples were analyzed using the 3ABC non-structural protein (NSP) ELISA against the foot and mouth disease virus (FMDV). 333 sera samples were positive for the 3ABC ELISA and 273 were found to be Negative. Further tests for serotyping of the NSP-positive sera were not done due inadequate supply of reagents and consumables.

A total of 53 epithelial tissues and 3 whole blood samples were analyzed using the real-time reverse transcriptase polymerase chain reaction (RRT-PCR) and were all found positive. Using lateral flow devices (LFD) all positive epithelial tissue samples were serotyped and the results were recorded as 29 for serotype A and 24 were serotype O. The positive whole blood samples were not serotyped due to insufficient reagents and consumables. Furthermore, all 4 swabs samples tested using RRT-PCR werenegative.

The epithelial tissue samples were subjected to virus isolation using a continuous cell line(ZZR-127 cell line) and seven (7) isolates were generated of which 3 are serotype A and 4 serotype O.

Samples received based on animal species revealed that 2171 were cattle, 70 were sheep, and 92 were goats samples.

The year under review also witnessed the commencement of FMD vaccine immunogenicity studies in naive cattle at the FMD experimental animal station.

The laboratory also participated in the 2022 World FMD Diagnostic Proficiency testing.

Achievements

- ❖ The laboratory performance during the 2023 proficiency testing was category 4 which indicated 100% capability of having consistent testing in accordance with Progressive Control Pathway (PCP) stage 2.
- ❖ The Laboratory is undertaking FMD vaccine immunogenicity studies on-station.
- ❖ Seven isolates were generated by tissue culture.

- ❖ The Division published five (5) articles in a peer-reviewed journal.

Challenges

- ❖ Inadequate diagnosticreagents and consumables for diagnosis and research activities.
- ❖ Insufficient funds for sample collection and surveillance activity
- ❖ Epileptic power fluctuations
- ❖ Insufficient water supply in the laboratory

9. HUMAN RESOURCES MANAGEMENT

The Department is charged with the responsibility of the general administration of the National Veterinary Research Institute. It oversees all administrative matters including advising, coordinating and handling of policy issues of the Institute.

Functions

The functions of the Department include the following:

i. Recruitment, confirmation of appointment, promotion, discipline and exit of staff
ii. Preparation and up-dating of nominal roll
iii. Interpretation of government rules, regulations, policies and circulars
iv. Liaising with the Office of the Head of Civil Service of the Federation and other agencies on establishment matters;
v. Staff welfare matters;
vi. Responsible for management and maintenance of the Institute's security matters;
vii. Serve as secretariat of the Institute's standing and ad-hoc committees;
viii. Coordinating training and development of staff;
ix. Management of NVRI Stores
x. Maintenance of the physical structures of the Institute; and
xi. Maintenance of utility vehicles of the Institute

The Department has three (3) divisions which include:

1. **Appointment, Promotion and Discipline**

   This Division is headed by an Assistant Director, and it deals with the appointment, promotion and discipline of both senior and junior staff, establishment matters and records of staff in the Institute.

   The Division has two (2) sections namely:

   i. Establishment section
   ii. Records section

Establishment Section

Establishment Section is saddled with the responsibility of handling appointments, promotions and disciplinary cases for both senior and junior staff and is the custodian of staff records. It also coordinates general duties and activities in the open and secret registries, liaises with the records

section to update staff nominal roll and preparation of quarterly/annual reports. The Section interprets government circulars and regulations and assists in implementing the Institute policies.

Records/Documentation Section

The Records/Documentation Section handles schedules which include maintaining staff record of service, processing of staff leave and compiling documents for both senior and junior staffgraded files. The Section also keeps records of employment, retirement, deaths, dismissal and termination of both Senior and Junior Staff as well as updating nominal roll as at and when due.Compilation and processing of documents for both junior and senior staff graded files.

Staff Welfare and Training Division

This Division is headed by an Assistant Director, and it is saddled with the responsibility of welfare and training of senior and junior staff of the Institute.The Sections under this Division includes:

Pension Section

The Pension Section is responsible for handling the Institute's pension matters/plans, ensuring timely processing of staff retirement, death other exit benefits.

National Health Insurance Scheme (NHIS) Section

The National Health Insurance Scheme (NHIS) Section of the Departmentis saddled with the responsibility of handling all issues relating to the good health care services of Staff /enrolees. This includes; registration of new Staff into the Scheme, keeping custody of NHIS various formsandassist Staff in the completion of same for submission to NHIS, obtaining periodically updated list of NHIS enrolees (Staff) in liaison with the Health Maintenance Organization (HMO) and NHIS Plateau State Office.

NYSC, SIWES & Industrial Attachment Section

This Section coordinates students on industrial training, National Youth Service Corps (NYSC), members posted to the Institute, graduates on National Directorate of Employment (NDE) as well as those on internship training. The Section also conducts students/participants from various institutions who come for educational visits to the Institute.

Training Section

The Training Section advises on training needs of staff, recommends staff for appropriate training in accordance with the Institute's training policy and process staff requests for training. The Section also recommends appropriate refund of monies paid in respect of staff on completion of course of study as well as liaising with the Records Section in keeping records of Staff on training.

Security Unit

The Security Unit is headed by a Chief Security officer and is charged with the responsibility of providing overall security of lives and properties of staff, students and visitors to the Institute. The Unit is also responsible for advising the Management on security matters as well as liaising and collaborating with other security agencies to ensure safety of lives and property.

The fundamental function of the Security Unit is the protection of lives and properties. The Unit has been working round the clock alongside with other private security outfitsthat complement its functions. These private security outfits include, Pahek and Executive Guards Limited. In addition to these private security guards are the Nigerian Police Force, Nigerian Security and Civil Defence Corps and Professional Hunters that are authorised to operate in the Institute.

General Services Division

This Division is headed by an Assistant Director and it has two sections and one unit as follows:

1. **Workshop Section**

This section is saddled with the general maintenance of the Institute's physical structures, plants and equipment, plumbing, mechanical, electrical, generating machines etc. The Division also provides transport facilities and handles vehicles maintenance.

2. **Stores Section**

This Section is responsible for accepting into and issuing out all items of store. This includes keeping for safety and issuance of vaccines, stationery, equipment and machineries, laboratory equipment, diesel etc.

3. **Environmental and Sanitation Unit**

The Environmental Unit is responsible for landscaping of the Institute's environment as well as daily cleaning of the entire environment including offices/laboratories.

Activities

During the year under review (2023), the Department handled the following activities:

1. Promotion
   - Senior staff - 102
   - Junior staff - 15
2. Advancement/conversion
   - Senior staff - 10
   - Junior staff - 10
3. Disciplinary cases
   - Senior staff - 5
   - Junior staff - 4

   Confirmation -
   - Senior staff - Nil
   - Junior staff - Nil

4. Retirements - 17
5. Deaths - 3
6. Employment/recruitment - Nil
7. Dismissal - Nil
8. Termination of appointment - Nil
9. Resignations - 1
10. SIWES - 200
11. NYSC - 25
12. Educational visits - 71
13. Training
    - Junior staff - Nil
    - Senior staff - Nil

Achievements

1. Successful enrolment of staff scheduled for retirement between January to December, 2023
2. Successful processing and payment of staff retirement, death other exit benefits.
3. Successful conduct of promotion exercise for the year 2023.
4. Successful defence and implementation of manpower/workforce budget at the Office of Head of Civil Service of the Federation, Abuja in the year under review.

Challenges of the Department

1. Insufficient provision of working equipment e.g. computers (Laptops and Desktops), printers and photocopiers
2. The Department is in dire need of an overhaul of her cabinet system which are obsolete
3. The Department is aback in staff training and workshops to meet up with effective and optimal performance and productivity.

10. LABORATORY SERVICES DIVISION

Functions and Mandates

- Disease diagnosis and surveillance involving all animal diseases
- Ambulatory services based on farmer's request
- Laboratory investigation of disease agents involving all animaldiseases
- Serving as a referral centre for the States and outstation laboratories for disease diagnosis
- Providing diagnostic training for other agencies and laboratories

Achievements

i. The sections were able to meet up with the institute's mandate as it relates to the division and the department

ii. The sections were able to reduce the turnaround time for results based on the availability of consumables/reagents.
iii. There has been an improvement in staff training on basic areas of development as it relates to current techniques
iv. There is a cordial working relationship between the staff of the units and the division.
v. The Division is imparting knowledge to students posted to the division for industrial attachment and excursions.

A. Bacteriology Unit

Samples Received at the Bacteriology Laboratory in 2023

S/No.	Source of Sample	No. of Samples Received
1.	Avian	165
2.	Bovine	16
3.	Caprine	6
4.	Equine	3
5.	Feed	6
6.	Human	1
7.	Canine	36
8.	Laprine	17
9.	Ovine	7
10.	Porcine	15
11.	Plates	6
12.	Water	9
13.	Feline	6
14.	Flour	1
15.	Milk	3
16.	Potatoes	1
17.	Research	1
Total		**300**

Isolates Generated in the Microbiology Lab in 2023

S/No.	Isolate	No. of Isolates generated
1.	*Aeromonas* spp	3
2.	*Citrobacter*spp	1
3.	Enterobacter	2
4.	*Escherichiacoli*	142
5.	*Bacillus*spp	35
6.	*Klebsiella*spp	13
7.	*Micrococcus*spp	2
8.	*Proteus* spp	15
9.	*Providencia*spp	1
10.	*Pseudomonas*spp	19
11.	*Salmonella*spp	15
12.	*Shigella*spp	1
13.	*Staphylococcus*spp	21
14.	*Streptococcus* spp	5
15.	*Yersinia*spp	1
16.	*Seratia*	1
17.	*Yeast*	2
18.	*Mucor*	2
19.	Coagulase-negative *Staphylococcus*	5
Total		**286**

B. Parasitology Unit

Achievements

1. The mandate of the laboratory was met during the period with the turnaround time highly improved upon
2. The laboratory handled 699 coprology and 59 haemoparasitic samples

Samples analyzed in the Parasitology Division

S/N	Species	Blood samples	Faecal samples	Liver samples	Total samples/specie
1.	Canine	17	11	-	28
2.	Avian	34	94	1	132
3.	Bovine	136	107	-	243
4.	Caprine	15	32	-	47
5.	Equine	-	1	-	1
6.	Laprine	10	15	-	25
7.	Ovine	4	2	-	6
8.	Porcine	4	8	-	12
9.	Feline	-	5	-	5
TOTAL		**220**	**278**	**1**	**499**

C. Haematology Unit

i. Handled hematological samples successfully.
ii. Taught students on industrial attachment.

Hematology tests conducted

S/No.	Specie	Suitable	Not suitable	Total
1.	Avian	70	1	71
2.	Bovine	20	0	20
3.	Canine	63	0	63
4.	Laprine	303	0	303
5.	Ovine	19	0	19
6.	Caprine	6	0	6
7.	Equine	3	0	3
8.	Caprine	6	0	6
9.	Porcine	24	0	24
TOTAL		**536**	**1**	**537**

D. Clinical pathology Unit

Clinical chemistry

The unit has not performed any diagnostic work this year due to lack ofreagents for the auto-chemistry equipment.

Challenges

- Many pieces of laboratory equipment need servicing and calibration.
- Theauto-chemistry analyser, auto-haemoanalyser, and 2 spectrophotometers have been down for years.
- Lack of reagents for both chemistry and haematological analysis.
- Lack of regular supply of consumables for laboratory use e.g. microscopic slides, cover slips, cotton wool, andplastacine.
- Inadequate laboratory assistants.

- ❖ The laboratory requires a UPS to protect against equipment breakdown due to power fluctuation.
- ❖ No office accommodation for many staff members
- ❖ Inadequate power gadgets/expansion in the unit that can accommodate some equipment.
- ❖ Lack of good microscopes.
- ❖ There is a need for polyvalent and monovalent antisera for serotyping of identifiedbacteria isolates.
- ❖ There is the need for a mini molecular laboratory in the unit to enhance specific confirmation of some important bacteria and viruses before proceeding further in other research laboratories.

Research highlights

Antimicrobial Resistance (AMR) research group working on finding out the residues of antibiotics in ruminants.

11. LIVESTOCK INVESTIGATION DIVISION

A. Function/Mandate

The Livestock Investigation Division (L.I.D) was established with the primary purpose of producing quality animals for vaccine production and research. A section (Lab cattle section) is dedicated to producing cattle for vaccine production. The division is also involved in the production of animal species (Bovine, Equine, Ovine, Caprine, and Swine) for vaccine production and testing of biological research in all aspects of disease diagnosis, prevention, and control. Furthermore, the development of pasture grasses for livestock feeding, consultancy services, and training of middle manpower for the Nigerian livestock industry.

Achievements

1. Preparation and cultivation of 34 hectares of land for hay and silage production
2. Improvement of indigenous breeds of cattle via artificial insemination with semen of Friesian breed processed in the A.I. section of the farm
3. Proper maintenance of the institute tractor for efficient running of farm operations
4. Harvest of over 2000kg fresh weight of *Cassia alata herbarium* and submission to the Dermatophilosis division for the production of Lamstreptocide
5. Supervised research students in different sections of the farm e.g.the Artificial insemination section, and the health section.
6. Maintenance of the health status of all the animals on the farm via routine procedures such as; vaccination, deworming, ectoparasite control, etc.

Challenges

1. Inadequate feeding and watering troughs in the holding pens and the grazing field
2. Inadequate protective wear for the workers (Rain boots, cover-all,etc)
3. Inadequate provision of feed concentrate for the animals on the farm
4. Security challenges in the farm (e.g. vandalization and theft of metal fences and roofing sheets.
5. Inadequate supply of Liquid nitrogen for semen preservation
6. There is a need for a new silage harvester**.**

Research Highlights

1. Pregnancy rate of indigenous cattle following artificial insemination using NVRI, Vom cryopreserved semen, and imported cryopreserved semen.
2. Fertility and hatchability trial of poultry eggs following artificial insemination.
3. Fertility and seminal characteristics of Friesian bulls raised on the Jos, Plateau.

12. PARASITOLOGY DIVISION

Functions/mandates

To conduct research and diagnosis of all economically important parasitic diseases of livestock and poultry and to proffer treatment and control strategies.

Specific (notable) activities

1) Divisional seminars for divisional staff and students on Industrial Attachment.
2) Collaborationwith some postgraduate students for molecular analysis on ticks and insects identification, amplification of various zoonotic pathogens such as Cryptosporidium spp., Spotted Fever Group *Rickettsia* agents etc, from different animals including pathogens from bats with interesting findings

Challenges:

1. Breakdown of refrigerators, centrifuges and stabilizers in protozoology and helminthology laboratory.

2. Irregular water supply for diagnosis in our laboratory.

3. Inadequate funding for research activities in the Division.

4. Insufficient binocular light microscopes, reagents and consumables for molecular analyses.

Recommendations

Research activities will be facilitated if these are provided in the Division.

Research highlights:

Survey of ecto- parasites of veterinary and medical importance in domesticated and wildlife in Nigeria.

Samples ranging from blood, fecal, worms, ticks etc., from different animal species were received and analyzed within the year as presented on the Tables below.

Protozoology unit

S/N	**Animal Species**	**Type of sample**	**Number of Samples**	**No. of +ve samples**	**Parasites Found**
1	*Avian*	Blood	47	2	*Babesia spp.*
2	*Bovine*	Blood	653	239	*Babesia spp., Trypanosoma spp., Theileria spp.,*
3	*Canine*	Blood	125	32	*Babesia canis*
3	*Caprine*	Blood	288	72	*Babesia spp.*
4	*Equine*	Blood	10	1	*Babesia spp.*
5	*Laprine*	-	-	-	-
6	*Ovine*	Blood	634	91	*Babesia spp.*
7	*Porcine*	-	-	-	-
	TOTAL		**1,757**	**437**	

A total of one thousand seven hundred and fifty seven (1,757) samples from *Avian, Bovine, Canine, Caprine, Equine and Ovine* species were processed and analyzed in the Protozoology unit with the above stated results.

Within the year under review, a number of students from various institutions came for their Industrial Attachment. Project samples from students ranging from OND, HND, BSc, MSc. and PhD were collected, processed and analyzed.

Helminthology unit

S/N	Animal species	No of samples	Type of specimen	Parasites found
1	Avian	125	Intestine/faecal/worms	*Coccidia oocysts, Ascaid worms,Trichiuris, Heterakisgalliae,Ascaridiagalliae*
2	Bovine	160	Faecal	*Haemonchus spp., Fasciola gigantica, Eimeria bovis, Oesophagustomum, Bonustomum, Strongyloides, Paramphistomum, Moniezia, Schistosoma bovis*
3	Canine	23	Intestine/Faecal	*Isosporacanis*
4	Caprine	2	Faecal	*Haemonchus spp., Coccidia oocysts, Oesophagustomum*
5	Equine	1	Faecal	NPF
6	Feline	1	Intestine	NPF
7	Laprine	11	Intestine/Liver	*Coccidia oocysts, Trichostrogylus, graphidium egg, passalurus egg*
8	Ovine	20	Intestine/Worm/Faecal	*Taenia ovis, Coccidia oocysts, Oesophagustomum, Haemonchus spp.*
9	Porcine	9	Intestine/Faecal	NPF
	TOTAL	**352**		

A total of three hundred and fifty two (352) samples from various animal species were processed and analyzed in the Helminthology unit with the above stated results.

Within the year, a number of students from various institutions came for their Industrial Attachment. Some students brought project samples for analyses which include; (1) National Diploma (ND) = 2 (2) Higher National Diploma (HND) = 6 and (3) Bachelor of Science (BSc.) = 4

ENTOMOLOGY LABORATORY UNIT (January-December)

S/N	Animal Species/ Traps	Type of Sample	Number Of Samples	Results
1	*Bovine*	Ticks, flies	440	*Amblyomma variegatum48, Rhipicephalus(Boophilus)spp.112* Green bottlefly 19, *Musca domestica*196, *Sarcophaga* (flesh fly) 6, *Hematopotaspp* 1, *Stomoxysspp* 22, *Anthomyia* 1, *Hyalommatruncatum* 22, Bot fly 13
2	*Canine*	Skin scraping, Ticks and Fleas	15	*Demodex canis*
3	*Caprine*	Ticks	35	*Rhipicephalus(Boophilus)spp, 9 Rhipicephalus spp. 20,* Immature stage of ticks 6.
4	*Equine*	Ticks	2	*Amblyoma variegatum*
5	*Laprine*	Ticks	2	*Rhipicephalus spp.2*
6	*Ovine*	Ticks	53	*Amblyoma variegatum 4, Hyalommatruncatum* 3, *Rhipicephalus spp. 21, Boophilus spp. 25*
7	*Ruminants*	Ticks	272	*Amblyoma variegatum 43, Rhipicephalus sanguineus 195, Hyalommatruncatum* 18, *Rhipicephalus spp. 16*
8	*Traps*	Flies	811	Green bottlefly 3, *Musca domestica* 288, *Sarcophaga* (flesh fly) 1, *Tabanusspp* 98, *Stomoxysspp* 402, *Anthomyia* 2, Robberfly 1, Bot fly 14, Wasp 2
	TOTAL		**1,630**	

Ethnoveterinary/ Production Unit

ANNUAL REP.	**PRODUTS**			**TOTAL**
Jan-Sept.	**Soap**	**Ointment**	**Lotion**	
	1,910	635	146	**2,691**

Within the period under review (January-December, 2023), a total number of **2,691 Scabicur® products** comprising Soap (1,910), Ointment (635) and Lotion (146) were produced and supplied to the Consultancy Department of the Institute as presented on the Table above.

13. PLANT AND LABORATORY EQUIPMENT MAINTENANCE DIVISION

Mandates Division

1. To ensure routine calibration and validation with proper documentation of equipment in vaccine production process and research activities that is in conformity with ISO 17025:2017 standard
2. To ensure an overall equipment effectiveness time (OEET) of 99% during the production process and research activities via proper maintenance schedule (planned preventive maintenance, Corrective maintenance and emergency maintenance)
3. To ensure an equipment uptime of 100% during the vaccine production cycle and research activities in the Institute
4. Establish a system for tracking and trending planned and unplanned equipment maintenance activities.
5. Rapidly responds to unplanned maintenance activities and performs or oversees required servicing.
6. Responsible for preventive maintenance to ensure schedules are maintained, planned and performed in a timely manner.
7. Recommend, implement and evaluate laboratory equipment maintenance policies, procedures, methods and standards to increase overall reliability and uptime of laboratory equipment.
8. Maintain an up to-date library of required service manuals and technical update sheets.

Specific activities

1. Certification and Validation of biosafety cabinets across various Divisions in the Institute
2. Calibration of micropipettes in the Institute
3. Fabrication and installation of a broken sash od a biosafety cabinet in Rabies diagnostic laboratory
4. Installation of water distiller, weighing balance and water bath in Rabies diagnostic laboratory
5. Repair and replacement of a faulty circuit board of a biobase biosafety cabinet in FMD division
6. Periodic intermediate checks of laboratory measuring equipment
7. Operation, servicing and maintenance of BSL3 of the Institute
8. Carried out a comprehensive and detailed equipment inventory in the Institute

9. Developed a Google sheet for equipment tracking in the Institute
10. Developed an equipment maintenance plan for the year 2023

Achievements

i. Organized a one-day training on 'Equipment maintenance, repairs and management' for Equipment Officers in the Institute
ii. Certification and Validation of biosafety cabinets across various divisions in the Institute
iii. Operation, servicing and maintenance of BSL3 of the Institute during the outbreak of Anthrax in the country
iv. The division successfully trained the first batch of IT student who was posted to the division

Challenges

i. Inadequate maintenance tools for effective and optimal maintenance activities
ii. No internet facility to enable the division establish contact with manufacturers for technical assistance
iii. Lack of office accommodation for staff
iv. Lack of maintenance workshop in the Division
v. Lack of calibration laboratories in the Division
vi. Lack of file jackets for safe keeping of calibration certificates and equipment manuals
vii. Lack of cupboard for keeping files jackets and other relevant documents in the division
viii. Lack of computer, printer and stationaries

12. POULTRY DIVISION

Functions /mandate

1. To produce fertile eggs for various vaccines production.
2. To produce chicks for vaccine testing and research purposes.
3. Investigate diseases of poultry that may hamper productivity.
4. Investigate nutritional and management aspects of all classes of poultry and their effects on disease management.
5. Introduction, adaptation, and disease management of exotic breeds of poultry.
6. Teaching/Training of students from tertiary institutions, colleges and universities.

Activities

1. Production of fertile eggs /birds for Vaccine production and research.
2. Production of birds for research (ducks, guinea fowls, quails, Layers Birds, geese etc.)
3. Divisional seminars/Publications
4. Training of Students on Industrial Training.

5. Supervision of Students Project from Federal College of Animal health and Production Technology, Vom.
6. Hatching and sales of Noiler and Quail chicks

Achievements

1) Staff members (3) attended a 3-week training on Artificial Insemination in chickens and turkeys to improve production.
2) Raising birds as replacement for vaccine birds.
3) Supply of fertile eggs for the vaccine production laboratories.
4) Provision of fertile eggs for the Research and Quality control laboratories.
5) Production of quails and other species of birds in the farm.
6) Revenue generation from the sales of poultry and poultry products.
7) Hatching of quails and other exotic birds for undergraduate and post graduate studies/research.
8) Provision of fertile eggs for postgraduate research.
9) In this years' report, Biosecurity optimization formed the fulcrum of our efforts towards the prevention, mitigation, and control of diseases in the farm. This principle yielded significant reduction in the number of disease incidents during the year under review.
10) The frequent training of all cadre of staff on Biosecurity as it relates to management practices and productivity helped in no small measure.
11) Strict reprimand and punishment for erring staff ensured that the concept of Biosecurity took root quickly leading to its quick acceptance and application.
12) Similarly, we employed early prophylaxis as a tool in mitigating production losses due to disease. This was possible with our early and accurate prediction of disease signs and trends.

Challenges

1. Biosecurity of the farm is compromised due to lack of perimeter fence**.**
2. Inadequate junior staff strength.
3. Lack of offices/conveniences for junior staff
4. Dilapidated hatchery due to damage by rainstorm.
5. Old and obsolete incubators that need urgent replacement.
6. Lack of mini-Poultry processing plant.
7. Dilapidated administrative block/staff offices with insufficient tables and chairs.
8. There was an outbreak of Gumboro disease in newly purchased pullets. This may be due to break in biosecurity measures.

13. PRINTING AND PUBLICATION DIVISION

Functions/Mandates

To handle all the printing requirements of the Institute

To formulate new concept, design and code for printing the Institute's vaccines labels.

To publish/print all Scientific and Technological Research Journals that will be sent to the Divisions.

Printing of Official Sales Invoices, Officials Receipts, Yearly Calendar, Official headed papers, envelops and File Jackets, Examination answers booklets for the colleges, Annual Report, etc.

Activities

Below are the vaccine labels printed and their numbers:

NDV-I2	-	85,230 pieces
PPR	-	60,250 pieces
Black quarter	-	4,473 pieces
Hantavac	-	3,600 pieces
Lumpy skin	-	3,900 pieces
Sterile diluents	-	13,920 pieces
Fowl cholera	-	200 pieces
LSD	-	250 Pieces
ARV	-	9,550 pieces
FTV	-	15,700 pieces
Pity cash books	-	200 booklets
Letter head Papers	-	6000 copies
Official receipts	-	800 booklets
Strategic plan	-	100 books
Roll up Banners	-	11 copies
Discovering NVRI	-	25 books
NVRI profile	-	10 books
Staff school files	-	100 copies

Challenges

- Shortage of Technical staff
- Lack of modern printing equipment
- Renovation /creation of additional offices through partition
- Creation of an independent entry/exit into the Division
- Creation of toilet convenience for the Division
- We need a modern machine for printing of synthetic vaccine labels compare to other non-tire able water proof labels.

14. QUALITY CONTROL DIVISION

Functions/mandate

Standardization of services and products to ensure conformity to customer and regulatory requirements.

Enhancing customer satisfaction through the effective implementation, and continuous improvement of a Quality Management System (QMS) in the production of veterinary vaccines, biologicals and general laboratory procedures in the institute.

Routine quality control tests on various vaccines produced by the Institute to ascertain suitability for use in the field and issue certificates of compliance for each batch of vaccines produced.

Periodic assessment and auditing of institute laboratories in conjunction with the NVRI QMS implementation team, to ensure cGMP and Good Laboratory Practice.

A. Specific activities

a. Vaccines Quality Control

i. **Bacterial Vaccines:**Forty Nine (49) batchesof 7 different bacterial vaccines (Table 1) were received from Bacterial Vaccines Production Division for the period under review, for quality control.

Table 1: Bacterial vaccines submitted to the Quality Control Laboratory in 2023

S/N	Vaccine	Number of Batches
1	Anthrax Spore Vaccine (ASV)	16
2	Black Quarter Vaccine (BQV)	2
3	Contagious Bovine Pleuropneumonia Vaccine (CBPP)	16
4	Fowl Typhoid Vaccine (FTV)	4
5	Fowl Cholera Vaccine (FCV)	3
6	Haemorrhagic Septicaemia Vaccine (HSV)	6
7	Hanta Vaccine (HV)	2
Total		**49**

ii. **Viral Vaccines:** Similarly, 58 batches of 8 different types of viral vaccines (Table 2) were submitted for routine quality control and certification.

Table 2: Viral vaccines submitted to the Quality Control Laboratory in 2023

S/N	Vaccine Type	Number of Batches
1	Anti-Rabies Vaccine (ARV)	21
2	Fowl Pox Vaccine (FPV)	1
3	Infectious Bursal Disease Vaccine (IBDV)	5
4	Lumpy Skin Disease Vaccine (LSDV)	1
5	Newcastle Disease Vaccine I_2(NDV I_2)	12
6	Newcastle Disease Vaccine Komarov (NDVK)	3
7	Newcastle Disease Vaccine Lasota (NDVL)	9
8	Peste Des Petits Ruminant Vaccine (PPRV)	6
Total		**58**

b. **External quality control:** Eight batches of 8 different vaccines (Table 3), including both bacterial and viral, were sent to the African Union-Pan Africa Veterinary Vaccine Centre (AU-PANVAC), DebreZeit, Ethiopia for external quality control (EQA) during the year being reported.

Table 3: List of vaccines submitted to the AU-PANVACfor external quality control in 2023

S/N	Vaccine Type	Number of Batches
1	Anti-Rabies Vaccine (ARV)	3
2	Newcastle Disease Vaccine Lasota (NDVL)	3
3	Newcastle Disease Vaccine I_2(NDV I_2)	2
4	Newcastle Disease Vaccine Komarov (NDVK)	1
5	Lumpy Skin Disease Vaccine (LSDV)	1
6	Anthrax Spore Vaccine (ASV)	1
7	Haemorrhagic Septicaemia Vaccine (HSV)	1
8	Hanta Vaccine(HV)	1
Total		**13**

B. Achievements

a. Vaccines testing and certification

i. Quality assessment was completed for44out of the 49 batches of bacterial

vaccinessubmitted during the period of this report and certificates have been issued to the producers. Work is currently on-going on the remaining batches.

ii. Quality assessment was completed for40out of the 58 batches of viral vaccines submitted during the period of this report and certificates have been issued to the producers. Work is currently on-going on the remaining batches.

b. Conferences/Seminars Attended

i. Dr. Laleye attended the 3rd Annual ECOWAS Regional Reference Laboratories (of the West African Health Organization) Network Meeting, 18th to 20th April, 2023in Praia, Cape Verde.

ii. Dr. Laleye represented the Institute in the FAO-ECTAD Regional Annual Workshop on the Quality Assurance program within RESOLAB-WCA member veterinary diagnostic laboratories, 12thto 15th, September 2023 in Yaoundé, Cameroon

iii. Drs, Laleye A. T., and Ankeli P. I.attended the 59th National Congress and AGM of the National Veterinary Medical Association from 30th October to 3rd November 2023. Lagos, Nigeria.

c. Staff Training

i. Dr Laleye attended the Regional training and certification workshop on Bio-risk management, 19th to 23rd June 2023, Ouagadougou, Burkina Fasoand became IFBA certified.

ii. Dr Laleye A.T.andMr. Swomen L. N. attended a 3-Day Awareness Workshop on Strengthening Bio-risk Management from 24ndto 26thJuly, 2023. NVRI, Vom.

iii. All staff of the Division attended a 3-Day Awareness Training on Implementation of ISO/IEC 17025: 2017 from 31st July to 2nd August 2023. NVRI, Vom.

iv. Dr. Egbuji A. N. attended a 5-Day West African Health Organisation (WAHO) in Conjunction with African Society for Laboratory Medicine (ASLM) and German Development Bank Organised ISO 15189: 2022 Regional Training Workshop from 18th to 22nd September 2023. Accra, Ghana.

C. Challenges

i. Inadequate supply of laboratory materials such as media, reagents and glass wares,

ii. Inadequate availability of equipment, as well as poor access to maintenance/repair of faulty equipment and other facility fittings

iii. Need for equipping of Divisional Molecular Biology laboratory for effective testing.

iv. Experimental house needs to be re-furbished for potency and safety assay.

15. RABIES DIAGNOSIS & RESEARCH DIVISION

Functions/Mandate:

i. Conduct research on rabies and rabies-related Lyssaviruses that cause neurological disorders that are clinically indistinguishable from rabies.
ii. Confirmatory laboratory diagnosis of animal rabies infections caused by *Lyssaviruses*, using *in vitro* and *in vivo* methods
iii. Development and production of rabies antigens and anti-sera for research and diagnosis.
iv. Assessment of antigenicity of rabies vaccine and vaccine viruses by *in vitro* and *in vivo* methods
v. Clinical trials and field evaluation of NVRI rabies vaccines and sero-monitoring of dogs vaccinated with the vaccine
vi. Participation in national surveillance of rabies and rabies-related viruses in domestic animals and wildlife.
vii. Participation inrabies proficiency test administered by the Nancy laboratory for rabies and wildlife, France and the IstitutoZooprofilatticoSperimentale Delle Venezie(Izsve), FAO Reference Centre (RC), Italy.
viii. Training Interns and students provided with bench space and capacity building of personnel.

Activities

i) Routine Laboratory Diagnosis

From January 1st to December 31st 2023, a total of 268 specimens from seven (7) animal species (dog, cat, goat, cow, sheep, pig and horse) were received and routinely tested for rabies (table 1). Of these numbers, 251 (93.6 %) were from domestic dog, 12 (4.4%) from cat, 1 (0.4%) from Sheep, 1 (0.4%) from goat, 1 (0.4%) from cow, 1(0.4%) from pig and 1 (0.4%) from horse. A total of 192 (71.6%) of all samples submitted were confirmed positive, while the remaining 76 (28.4%) were negative. Of the 192 positive samples, 182 (94.8%) were from domestic dogs and 7 (3.6%) from cats and 3 (1.6%) from other animals. Also, of the 76 negative samples, 69 (90.8%) were from domestic dog, 5 (6.6%) from cat while the rest 2 (2.6%) were from, cow, sheep, goat, pig and horse.

Table 1: Distribution, by species, of Animal Samples submitted for Rabies routine Diagnosis from 22 States

STATE	ANIMAL SPECIES/STATUS OF SAMPLES														TOTAL
	Canine		Feline		Bovine		Caprine		Ovine		Porcine		Equine		
	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	
Plateau	79	43	0	2	0	1	0	0	0	0	0	1	0	0	**126**
Gombe	20	4	1	0	0	0	0	0	0	0	0	0	0	0	**25**
Kano	16	2	5	2	0	0	0	0	0	0	0	0	0	0	**25**
Bauchi	27	6	1	0	0	0	0	0	0	0	0	0	1	0	**35**
Kaduna	12	4	0	0	0	0	1	0	0	0	0	0	0	0	**17**
Ogun	1	2	0	0	0	0	0	0	0	0	0	0	0	0	**3**
Ondo	2	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
FCT, Abuja	2	0	0	0	0	0	0	0	0	0	0	0	0	0	**2**
Oyo	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Kwara	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Kogi	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Kebbi	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Delta	5	1	0	0	0	0	0	0	0	0	0	0	0	0	**6**
Cross-River	5	0	0	0	0	0	0	0	0	0	0	0	0	0	**5**
Ekiti	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Zamfara	5	0	0	0	0	0	0	0	1	0	0	0	0	0	**6**
Ebonyi	1	3	0	1	0	0	0	0	0	0	0	0	0	0	**5**
Yobe	1	1	0	0	0	0	0	0	0	0	0	0	0	0	**2**

Lagos	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Niger	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Jigawa	1	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**
Benue	0	1	0	0	0	0	0	0	0	0	0	0	0	0	**1**
TOTAL	**182**	**69**	**7**	**5**	**0**	**1**	**1**	**0**	**1**	**0**	**0**	**1**	**1**	**0**	**268**

Key: +ve – Positive
-ve – Negative

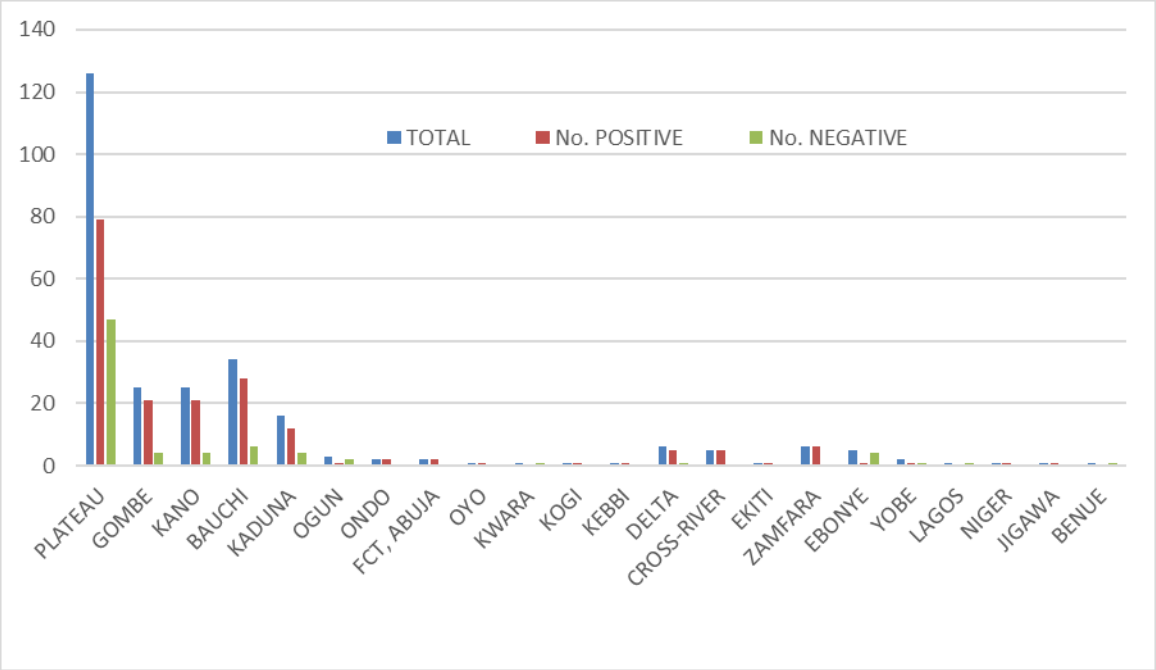


Figure 1: Overall distribution and status of samples submission for rabies confirmatory diagnosis nationwide in 2023

Figure 1 above, depicts the overall distribution of total samples received and tested in the three sample categories (total tested, number positive and number negative). Plateau state accounted for 126 (47.0%) of the submissions followed by Bauchi 35(13.0%), Gombe 25 (9.3%) and Kano 25(9.3%) and Kaduna 17(6.3%) states.Figures 2 and 3 below depict the breakdown of number and percentages respectively, of the 268 samples tested within the year under review. As usual, domestic dog dominated the data followed by cats. Figures 4 and 5 depict distributions of cases

with human exposure and corresponding PEP and Percentage PEP administration among cases with human exposure in twelve states.

In addition to the 268 routine samples tested, a total of 640 dog head or brain samples submitted by students for research purposes. Of this number, 109(17.0%) were positive for rabies while 531 (83.0%) were negative. Comparative analysis of the two categories of samples showed that majority of the routine samples (71.6%) had higher percentage of positivity while majority of the students' samples (83.0%) tested negative.

A total of 68 mice were used for inoculation of 10samples submitted for either routine diagnosis with history of human bite, but turned out to be negative for rabies or for research.The MIT was done as a back-up test considering that the samples were from animals that have bitten some people.

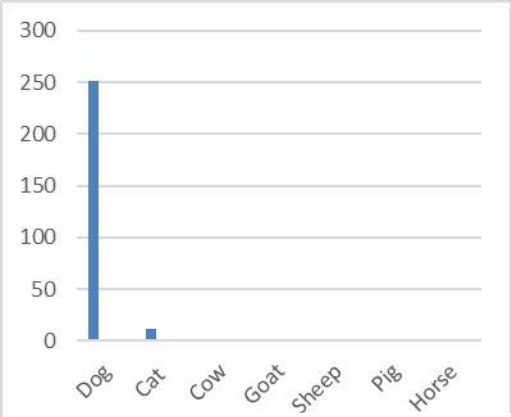


Figure 2:Overall distribution of cases tested by animal species

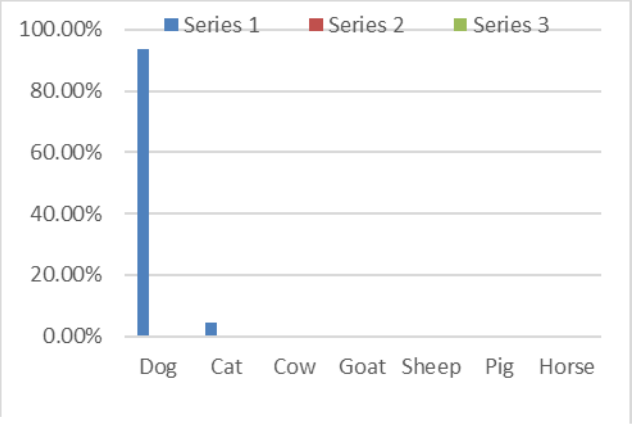


Figure 3: Distribution by Percentage of animal species submitted for test

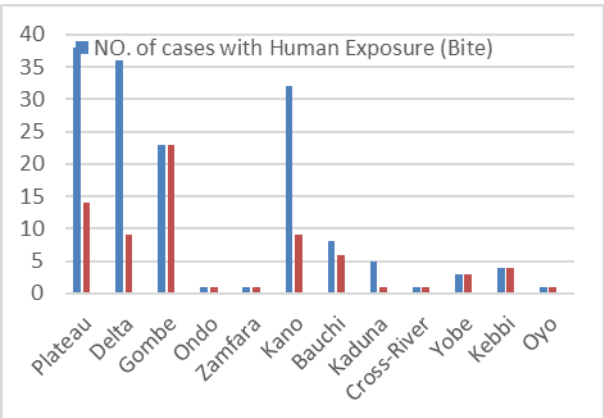


Figure 4:Distribution of cases with human exposure and corresponding PEP in twelve states

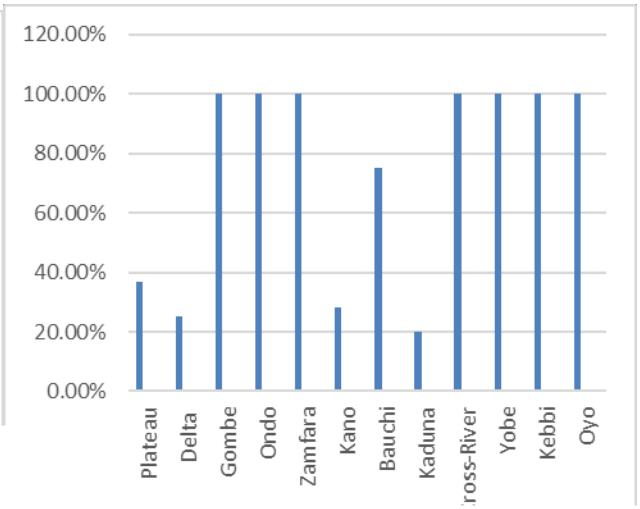


Figure 5: Percentage PEP administration among cases with human exposure in twelve states

Some staff of the division actively participated in the World Rabies Day, 2023 which started with anti-rabies campaign to NVRI Vom staff school and GSS Du all in Jos south LGA. Later there were both radio and television programmes to create more awareness on rabies, it was later climax on 28th September, 2023 with anti-rabies vaccination at Veterinary Teaching Hospital University of Jos and Chugwi, Jos south LGA.

Ten (10) plates were brought from Quality Control Division on two separate days for Proficiency Test (PT).

iii) Collaboration/Bench Work Activities

The laboratory hosted two (2) Post Graduate students (a Masters and a PhD) and four (4) HND students. The PhD student was from the ABU Zaria while the HND students were from the Federal College of Animal Health and Production Technology, Vom. They carried out diagnosis of rabies virus antigen in 690 dog brain samples by fluorescent antibody test (DFAT) and other techniques, using rabies laboratory bench space.

1. Achievements

I) Collaborative study on rabies sero-survey in dogs vaccinated against rabies:

The collaborative with our collaborator, Dr Claude Sabeta in the University of Pretoria, South Africa and Animal and Plant Health Agency, United Kingdom study on sero-survey of domestic dogs vaccinated against rabies is still on-going. Preliminarily, we have analyzed 157 of the 500 serum samples. A staff of the division, Mr Joseph Alex Davou, who is currently on study leave at

the University of Nigeria Nsuka, is carrying out his MSc project on the collaborative study.

II) Number of samples analysed:

The laboratory analysed a total of 908 samples from dog, Cat, Goat, Cow, sheep, pig and horse (268for routine and 640 for students' research). The specimens came from only 22 states of Nigeria and a few from the Republic of Cameroon.

III) Relocation to renovated laboratory and installation of Biosafety cabinet Class II:

The division finally relocated to the permanent building and installed a biosafety cabinet class II in laboratoryin July, 2023. Since then, manipulation of samples is carried out in the cabinet.

2. Major Challenges

- **A.** Non-availability of furniture such as stools in the recently renovated rabies laboratory building, as well as office Chairs and tables in the same building
- **B.** Non-availability of Ceramic sink, water pipes, waste pipes (in the mouse room)
- **C.** The wash-up room requires to be tilled for easy cleaning
- **D.** Non-availability of washing and drying machines for laundering laboratory coats
- **E.** Non-availability of window blinds (required in 13 rooms)
- **F.** Non-availability of six (6) energy saver electric lamps and holders (required in the passage in middle of the building)

- **G. Non-availability of the following equipment:**
  i. Ultra-Low freezer (-80^{o}C)
  ii. Refrigerated centrifuge (+4^{o}C)

- **H. Short supply of the following equipment:**
  i. Biosafety cabinet class II
  ii. Carbon dioxide (CO_2)
  iii. Incubator (+37^{o}C)
  iv. Deep freezers (-20^{o}C)

- **I.** Non-availability of panel of monoclonal antibody to Nigerian isolates of rabies virus
- **J.** Non-availability of baby Hamster Kidney (BHK)or Murine neuroblastoma cell lines for virus propagation and isolation

3. Research Highlights

The process of collaboration with Dr Claude Sabeta at the University of Pretoria and Animal and Plant Health Agency in UK on sero-survey for rabies virus neutralising antibody in dogs

vaccinated against rabies, which commenced in 2021 continued in 2023.A total of 500 aliquots of the 1, 566 serum samples collected from domestic dogs post vaccination was sent to animal and plant health agency, United Kingdom for analysis. Preliminary results (of 157 samples) have been received while the results of remaining samples are being awaited.

16. REGIONAL LABORATORY FOR ANIMAL INFLUENZA AND OTHER TRANSBOUNDARY ANIMAL DISEASES (TADs)

Mandate:

1. Diagnosis and research into animal diseases notably Avian influenza virus, Newcastle disease, Equine influenza virus, Swine influenza virus, Infectious bursal disease virus, Infectious bronchitis, Monkeypox (Mpox), African horse sickness, coronaviruses and other transboundary animal diseases of viral origin
2. Preparation of viral transport media, antisera and antigens
3. Field assessment of NVRI avian viral vaccines through sero-monitoring of vaccinated flocks
4. Participating in national surveillance of avian influenza.
5. Participating in national and international networks and surveillance for Emerging infectious/zoonotic/transboundary diseases
6. Rendering support to other West African Laboratories, as the Regional Reference Laboratory
7. Reference lab for West Africa Health Organization (WAHO)

Activities

Routine diagnosis, passive surveillance of avian influenza, Newcastle disease, Infectious bursal disease, fowl pox African horse sickness, and equine influenza.

The table below shows thesummary of samples received for diagnosis/laboratory confirmation in 2023 for routinelaboratory diagnosis.

Summary of tissue samples received for diagnosis in 2023

Months	Number of Samples (tissues)			Number positive (tissues)			
	AIV*	NDV$	IBDVΦ	AHS	AIV	NDV	IBDV	AHS
January	35	35	3	2	16	1	0	0
February	20	16	1	0	8	1	0	0
March	24	23	1	0	3	3	0	0
April	21	20	1	0	1	3	0	0
May	7	8	1	2	1	1	0	0
June	10	10	1	4	0	0	0	1
July	23	23	3	0	2	0	0	1
August	19	20	2	0	3	0	0	0
September	13	14	1	0	0	0	0	0
October	11	11	2	1	0	0	0	0
November	10	10	2	0	0	0	0	0
December	8	8	1	1	0	0	0	0
Total	201	198	19	10	34	9	0	2

Summary

Total Number of Samples (tissues) Analyzed	Total Number of Samples (tissues) positive

AIV* NDV$ IBDVΦ AHS AIV NDV IBDV AHS

201 198 19 10 34 9 0 2

Total= 428

*=avian influenza virus $=Newcastle disease virus Φ= infectious bursa disease virus
AHS=African Horse Sickness

The division also conducted field assessment of NDV vaccines through seromonitoring of vaccinated flocks. A total of 864 sera samples were screened for sero conversion. In addition, 1115 samples were screened for AI antibodies. The results were communicated to the farmers for necessary action either to administer a booster dose or treat for ongoing infection in the farm.

Other Notable Activities

Grant Projects Agent s Number of

specimens

Mpox -USA Mpox -

Mpox - FAO Mpox 1310

Mpox - WHO Mpox 1479

Mpox -UK Mpox -

NEOH/NACOH II coronaviruses/zoo

noses

1250

LIDISKI Newcastle disease 720

FLI-NVRI PPR PPR 980

PhD Scholar project

Dr.Nanbet Avian influenza 152

Mr. Olawuyi Avian influenza 420

Mr. N. Mkpuma Equine Influenza 280

General student

research

Newcastle disease 420

Total 7011

1. Student's Research and Surveillance

In the period under review, the division supported one PhD students in the analysis of his samples collected from wild birds at the Hadejia-Nguru wetlands. A total of 420 swab samples were analyzed. Others are described in the table above

2. Monkeypox surveillance

The division continued the second phase of the collaboration with CDC Atlanta/Nigeria and NCDC, FELTP on ecological surveillance of monkeypox disease in Animals (figure above)

3. Immunologic testing of selected highly pathogenic avian influenza (HPAI) vaccines for Nigerian market (pilot research)

As a component of the research and development efforts, the division embarked on field trial/immune responses to avian influenza virus by chickens. This is aimed towards the development of in- country avian influenza vaccines.

Achievements

1. Detection and diagnostic report for animal influenza and other avian diseases.

2. Staff of the Laboratory published over 15 research articles in peer review journals and also made conference presentations within and outside the Country

3. The division sustained the ISO17025 accreditation status

4. Division attracted research grants and equipment

Challenges

1. Power: The batteries of the inverter can no longer hold charges for long time; hence this affects the PCR runs once there is power outage especially before the institutional generator comes on.

2. Security: There is need for the presence of security personnel in the division.

Future Plan

1. Active surveillance for highly pathogenic avian influenza virus in live bird markets

continues. This on-going collection, collation and analysis of data from live bird market will help in the prevention of future outbreaks as suspected cases will be properly handled.

2. The monkeypox surveillance in animals will continue in 2024

3. Research and development of vaccine for the control of rabbit hemorrhagic disease

4. Strengthening national and international networks and collaborations

5. Expansion of other R & D products and services including antivirals

17. VETERINARY EXTENSION SERVICES (DVES)

Functions/ mandate

The Veterinary Extension Services which is saddle with the responsibilities to generate, provide, disseminate demand driven, coordinated and decentralization of knowledge and technology based livestock extension services, for sustainably, increased productivity, profit optimization and wellbeing of stakeholders through the decrease of animal diseases impact and the best husbandry practices to livestock farmers; in order to ensure food safety from the animal source(s). Propagation of proven veterinary health technologies to livestock/poultry farmers within the catchment areas in particular and the nation at large to ensure improvement in animal production, food security and the living standard of the animal holders.

Specific (Notable) activities

- Carried out vaccination in the Institute's adopted villagein Ganawuri, Riyom Local Government on August, 10th and 31st 2023 respectively.
- Carried out Train the Trainers on Dairy and Silage production under the sponsorship of Norwegian Refugee Council (NRC) in three centres (Riyom, Mangu and Shendam) of Plateau Statefrom January 9th through February 10th, 2023.
- Participated in the training of Community Animal Health Workers (CAHWs) under the sponsorship of Bill and Melinda Gates Foundation covering Seven States (Adamawa, Bauchi, Gombe, Kano, Yobe, Jigawa and Borno) of Nigeria between January to September 2023 in 4 different batches.
- Attended first quarter Zonal Steering Committee Meeting held at National Centre for Agricultural Mechanization, Ilorin (NCAMO) Kwara State, from 11th – 12th April, 2023.

- ❖ LIDISKY field work in B/Ladi/Kanke/Bauchi/Toro/Dass/Tafawa Balewa from 11th to 14th December 2023
- ❖ Attended retreatforMid -Term Review Of Strategic Plan 17th -20th September 2023 in Abuja
- ❖ Report of workshopof evaluation of theLIDISKI project impacts by LIDISKI held at NVRI quality control conference hall on the 17th to 19th October 2023.
- ❖ Attended a meeting termed Committee on sustainable business in Animal health services provision through the training of veterinary para professionals held in Ikeja Lagos 6th - 8th December 2023
- ❖ Participated in a three day training on Bisotatistics and Data management from 7th – 9th December, 2023 held at the Institute's library boardroom organized by LIDISKI
- ❖ Participated in MCDPA Training date from 8th -10th January 2024, at Dermatophilosis organized by LIDISKI
- ❖ Participated in LIDISKI stakeholders' feedback meeting is scheduled for the 16th - 17th January 2024 at the QC conference room NVRI Vom

Achievements

Successful vaccination of sheep, goats and village chickens against PPR and Newcastle diseases at Ganawuri District of Riyom Local Govt. Area of Plateau State. This activity was carried twice in this District of Riyom Local Govt. Area.

Challenges

1. Lack of color separation machine to enable production of extension publications
2. Lack of studio for production of electronic materials
3. Lack of audio-visual equipment

18. VETERINARY PATHOLOGY DIVISION.

The Veterinary Pathology Division serves as the major driver in fulfilling the institute's mandate on animal disease diagnosis and also a player in the Institutes role as a National and Regional Laboratory for Avian Influenza and other trans-boundary animal diseases for West and Central Africa.

Functions:

1. Receive and document all cases / samples coming into N.V.R.I. Vom and give an identification /tracking number to each sample and dispatch of same to appropriate laboratory for action.
2. Conduct diagnosis and Surveillance of diseases (emerging and re-emerging) within the nation and sub region as the situation may demand.

3. Report all notify able diseases diagnosed immediately to the Director and CEO of N.V.R.I., Director Diagnostic Services NVRI, Public health and epidemiology division, NVRI and Chief Veterinary Officer of the nation.
4. Constitute a team for field outreach on any animal disease outbreak.
5. The division is also saddled with ambulatory services to Livestock and poultry farms and wild life parks.
6. Giving advice to livestock and poultry farmers based on cases /complaints received.
7. Training of manpower to cater for the division and other agencies.

The under-listed units help the division in achieving the functions above.

1. **Reception Unit:**

- ✓ All samples/carcass for diagnosis or research in the Institute are received and documented at the reception unit in Veterinary Pathology Division where a tracking number is assigned and documented.
- ✓ Disseminate results to appropriate bodies/ units for action.

2. **Necropsy Unit:**

- ✓ Diagnoses of domestic, wild and laboratory animals via ante and post-mortem examination of animals/carcass using pathology, microscopy and immunohistochemical tools.
- ✓ Produce interim reports of diagnosed cases within 24 hours of examination and a final report as soon as possible upon receipt of ancillary laboratory results.
- ✓ Advice farmers/clients on possible treatment and control measures for diagnosed diseases.

3. **Histopathology Unit:**

- ✓ Produces histological slides for viewing to give a microscope view of the gross lesion observed during postmortem examination. The production of slides takes minimum of 6 days to produce to and diagnosis.

4. **Incinerator Unit:**

- ✓ This is the waste disposal unit that serves the necropsy unit, all laboratories in the Institute and Plateau state Ministry of Health/world health organization.

5. **Laundry Unit:**

- ✓ This unit washes all scrub suites and laboratory coats used for necropsy and other laboratories.

Activities/Achievements

1. **Reception Unit:**
   This unit has received a total of 1121(One thousand one hundred twenty one)cases between 1st January 2023 to December 2023. See table 1 below. From these cases **11773 samples** were sent to various laboratories for processing**.**
2. **Necropsy Unit:** has conducted necropsy on cases referred above and sent tissue samples to various laboratories for isolation, culture, characterization or PCR as the case may be. And the laboratory results are compiled and a final diagnostic report issued to the client and other stake holders as demanded by the reporting channel. In July this year we diagnosed Anthrax from samples sent from Niger and LagosState. See table 2 below.

3. **Histopathology unit:** this unit runs daily activities in terms of reagent preparation, tissue sample reception, documentation, fixation, processing, sectioning, mounting and the release of histopathology slides for the diagnosis and research.
4. **Incineration unit**: this unit has incinerated waste generated within the institute from different divisions and laboratories. The estimated total weight of the waste is **32,167.1 kg**. See table 3 below.

LIST OF TABLES.

Table 1. NUMBER OF CASES RECEIVED FROM JANUARY TO DECEMBER

S/NO	ANIMAL SPP/SAMPLE TYPE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEPT	OCT	NOV	DEC	TOTAL
1.	Avian	39	21	17	22	13	9	12	10	18	14	12	9	196
2	Bovine	8	11	2	8	7	2	1	4	14	9	11	11	88
3	Canine	19	13	20	19	24	20	22	14	27	28	33	25	264
4	Caprine	1	3	195	2	2	20	0	4	5	5	4	3	244
5	Crustaceans (crab)	0	0	0	0	2	0	0	0	0	0	0	0	2
6	Equine	1	0	0	0	2	3	0	0	1	1	2	0	10
7	Feline	7	2	0	0	1	0	0	1	0	0	1	1	13
8	Humans	42	1	1	3	1	4	2	2	4	7	2	4	73
9	Laprine	0	2	0	4	3	4	7	11	7	2	0	3	43
10	Ovine	2	1	85	2	2	3	4	4	1	7	2	4	117
11	Porcine	6	3	4	4	3	2	2	2	5	4	2	1	38
12	Pisces (fish)	1	0	0	0	1	1	0	1	0	0	1	0	5
13	Plates	0	2	0	1	1	0	0	0	0	0	1	0	5
14	Water	10	0	0	1	0	1	1	1	1	1	1	1	18
15	Wildlife	0	0	0	0	0	1	1	0	0	0	1	1	4

16	Feeds	1	1	2	1	0	6	0	1	0	0	0	0	12
17	Eggs	0	0	0	0	1	0	0	0	0	0	0	1	2
18	Vaccines	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Broths	0	1	0	0	0	0	0	0	0	0	0	0	1
20	Soil	0	0	0	0	0	0	0	0	2	1	0	1	4
21	Drugs	0	0	0	0	0	0	0	0	0	0	0	0	0
22	Wall scapping/cob webs	1	0	0	0	0	0	0	0	0	0	0	0	1
23	Grasses	0	0	0	1	0	0	0	0	0	0	0	0	0
24	Plants	0	0	0	0	0	0	0	0	1	1	0	0	2
25	Potatoes	0	0	0	0	1	0	0	1	0	0	0	0	2
26	Flour	0	0	0	0	0	0	0	0	0	0	0	1	1
27	Camel	0	0	0	0	0	0	0	0	1	0	0	0	1
28	Donkey	0	0	0	0	0	0	0	0	1	0	0	0	1
29	Insects	0	0	0	0	0	0	0	0	0	0	4	0	4
	Grand total													**1121**

Table 2. SAMPLES RECEIVED AND SENT TO LABSBASED ON ANIMAL SPP FROM JANUARY TO DECEMBER

S/NO	Animal spp/samples	Jan	Feb	Mar	April	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Total
A	**AVIANS**													
1	Intestines	79	40	14	36	26	24	40	18	49	50	35	23	434
2	Spleen	45	25	11	27	15	0	28	9	20	21	2	11	214
3	Heart	39	19	10	33	17	0	30	25	28	21	21	12	255
4	Lungs	62	26	12	37	18	26	34	18	31	21	21	13	319
5	Liver	51	20	13	44	17	26	36	25	35	21	21	13	322
6	Trachea	33	13	6	18	10	12	17	9	17	11	2	0	148
7	Faeces	1	0	0	0	0	0	0	0	0	0	0	0	1
8	Pancreas	1	0	4	0	0	0	0	0	0	0	0	0	5
9	Sera	1	10	0	49	20	0	32	0	90	25	88	136	451
10	Cloacal Swabs	1	12	0	20	0	0	0	0	0	0	88	272	393
11	Tracheal swabs	0	17	0	20	0	0	0	0	0	0	88	7	132
12	Caeca	0	0	0	12	0	0	0	0	0	0	0	0	12
13	Bursae	0	0	0	1	0	0	0	0	0	0	0	0	1
14	Bile	0	0	0	2	0	0	0	0	0	0	0	0	2
15	Kidneys	0	0	0	1	0	18	2	0	36	21	2	0	80

16	Gizzard	0	0	0	0	0	0	2	0	6	0	0	0	8
17	Ovaries	0	0	0	0	0	0	0	0	6	0	0	0	6
18	Testes	0	0	0	0	0	0	0	0	6	0	0	0	6
19	Blood	0	0	0	0	0	0	100	11	24	0	60	0	195
20	Egg yolk	0	0	0	0	0	0	0	0	1	0	0	0	1
21	Intestinal content	0	0	0	0	0	0	0	0	1	12	0	0	13
22	TOTAL													**2866**
B	**CANINE**													
1	Vaginal swabs	2	1	2	1	0	0	1	1	2	0	2	0	12
2	Blood	1	2	0	0	9	1	3	0	8	4	6	3	37
3	Sera	1	1	0	1	3	1	13	2	1	8	2	1	34
4	Brain tissues	17	12	3	16	6	15	21	7	273	21	24	17	432
5	Lungs	2	2	0	0	4	3	1	0	0	0	0	0	12
6	Heart	2	0	0	5	4	3	1	0	0	0	0	0	15
7	Intestines	2	3	0	0	5	0	0	0	0	1	1	0	12
8	Aspirates	1	0	0	0	0	0	0	0	0	0	0	1	2
9	Livers	0	2	0	5	5	3	1	0	0	0	1	0	17
10	Spleens	0	2	0	5	2	2	1	0	0	0	1	1	14

11	Kidneys	0	0	0	5	2	0	0	0	0	0	1	0	8
12	Tumuor	0	1	0	0	0	0	0	0	0	0	0	0	1
13	Faeces	0	0	0	0	1	0	0	0	1	0	0	1	3
14	Urine	0	0	0	0	0	0	0	0	2	0	1	1	4
15	Ecto-parasite	0	0	0	0	0	0	0	0	0	1	0	0	1
16	Growth	0	0	0	0	0	0	0	0	0	0	0	1	1
17	TOTAL													**605**
C	**OVINE**													
1	Intestines	1	0	0	1	0	3	0	3	0	3	0	0	11
2	Spleens	1	0	0	2	0	2	0	3	0	2	0	0	10
3	Hearts	1	0	0	2	0	2	0	3	0	2	0	0	10
4	Livers	2	0	0	2	2	0	0	3	0	3	0	4	16
5	Lymph nodes	1	0	0	0	0	0	0	0	0	2	0	0	3
6	Lungs	1	0	0	2	3	2	0	3	0	5	0	0	16
7	Blood	0	2	0	1	0	50	15	2	3	17	0	4	94
8	Kidneys	0	0	0	1	1	2	0	0	0	2	0	4	10
9	Skin scabs	0	0	0	1	0	0	0	0	0	0	0	0	1
10	Nasal swabs	0	0	6	6	0	0	6	7	0	0	0	8	33

11	Sera	0	0	81	6	0	0	1	0	0	0	60	92	240
12	Pox lesions	0	0	0	0	0	0	0	0	0	1	0	0	1
13	Faecal	0	0	0	0	0	42	0	0	0	3	0	0	45
14	Vaginal swabs	0	0	0	0	0	0	0	0	0	0	0	1	1
15	Rectal swabs	0	0	0	0	0	0	2	0	0	0	0	2	4
16	TOTAL													**495**
D	**EQUINE**													
1	Tracheal swabs	1	0	0	0	0	0	1	0	0	0	0	0	1
2	Nasal swabs	0	0	0	0	3	6	0	0	1	0	0	0	10
3	Rectal swabs	0	0	0	0	0	0	0	0	1	0	0	0	1
4	Faeces	0	0	0	0	0	0	0	0	1	0	0	0	1
5	Lungs	0	0	0	0	0	0	1	0	0	1	1	0	3
6	Liver	0	0	0	0	0	2	1	0	0	1	1	0	5
7	Spleen	0	0	0	0	0	2	1	0	0	1	1	0	5
8	Intestine	0	0	0	0	0	2	0	0	0	2	0	0	4
9	Kidney	0	0	0	0	0	0	0	0	0	1	1	0	2
10	Heart	0	0	0	0	0	2	1	0	0	1	1	0	5
11	Stomach content	0	0	0	0	0	0	0	0	0	1	0	0	1
12	Donkey brain	0	0	0	0	0	0	0	0	0	0	1	0	1

13	Lymph nodes	0	0	0	0	0	2	1	0	0	0	1	0	3
14	Blood	0	0	0	0	19	10	0	0	0	0	0	0	29
15	Sera	0	0	0	0	14	10	0	0	0	0	0	0	24
16	TOTAL													**95**
E	**WATER**													
1	Water	6	0	0	1	0	1	1	1	20	1	0	0	31
2	Sewage	0	0	0	0	0	0	0	0	0	0	0	1	1
3	TOTAL													**32**
F	**COB WEBS/WALL SCRAPPING**													
	Cob web	1	0	0	0	0	0	0	0	0	0	0	0	**1**
G	**FEEDS**													
	Feeds	1	1	1	1	1	6	3	1	1	0	0	0	**16**
H	**PORCINE**													

1	Livers	2	2	1	8	0	100	10	50	1	4	2	0	180
2	Lungs	2	2	0	5	0	1001	9	52	0	3	2	0	1076
3	Kidneys	2	2	0	1	0	1001	9	50	0	0	2	0	1067
4	Lymph nodes	2	0	1	1	0	1	3	0	0	4	0	0	12
5	Sera	5	3	1	50	2	0	7	0	14	55	0	0	136
6	Feaces	1	1	0	0	8	0	0	0	0	0	0	80	90
7	Intestines	2	3	1	1	0	1	1	54	0	4	3	0	70
8	Spleens	0	1	0	5	0	0	2	54	1	0	2	0	65
9	Hearts	0	2	0	5	0	1	3	4	0	0	0	0	15
10	Blood	0	0	0	11	2	0	12	0	8	1	3	0	37
11	Stomach contents	0	1	0	0	0	0	0	0	0	0	0	0	1
12	Nasal swab	0	0	0	0	0	0	1	0	5	0	0	0	6
13	Rectal swab	0	0	0	0	0	0	1	0	0	0	0	0	1
14	Ear notch	0	0	0	0	0	0	1	0	0	0	0	0	1
15	TOTAL													**2757**
I	**HUMAN**													
1	Sera	2	1	1	5	1	1	1	2	0	2	1	0	17
2	Feaces	41	0	0	0	3	0	0	0	0	0	0	0	44

3	Blood	0	1	0	0	0	1	0	0	3	6	0	3	14
4	Urine	0	0	0	0	0	1	0	3	0	0	0	1	5
5	Saliva	0	0	0	0	1	6	0	0	0	0	0	1	8
6	Cerebrospinal fluid	0	0	0	0	0	0	0	0	0	0	0	1	1
7	TOTAL													**89**
J	**SOIL**													
1	Soil	0	0	0	0	0	0	0	0	2	40	0	5	47
2	Farm dust	0	0	0	0	0	0	0	0	0	0	0	1	1
3	TOTAL													**48**
K	**BOVINE**													
1	Blood	10	27	10	61	25	34	36	8	17	49	68	57	402
2	Urine	1	0	0	0	0	0	0	0	0	0	0	0	1
3	Feaces	4	21	10	43	0	35	5	5	10	53	69	32	287
4	Sera	11	33	0	21	54	0	5	2	66	0	53	43	288
5	Tracheal swabs	11	0	0	0	0	0	0	0	0	2	0	1	15
6	Nasal swabs	6	57	0	0	2	0	13	6	0	168	58	0	310
7	Lungs	0	3	0	4	6	0	20	0	2	0	0	1	36

8	Spleens	0	0	0	4	2	0	1	0	2	0	0	1	10
9	Livers	0	3	0	2	3	0	4	0	2	0	0	1	15
10	Kidneys	0	2	0	1	0	0	1	0	2	0	0	1	7
11	Intestines	0	4	0	2	0	6	0	0	0	0	0	0	12
12	Rumen contents	0	0	0	1	0	0	0	0	1	0	0	0	2
13	Brain tissues	0	2	0	0	0	0	0	0	0	1	0	0	3
14	Vaginal swabs	0	0	0	0	0	0	0	1	0	0	0	0	1
15	Heart	0	0	0	0	1	0	50	0	0	0	0	0	51
16	Lymph nodes	0	0	0	0	0	0	3	0	0	0	0	0	3
17	Oesophagus	0	0	0	0	0	0	50	0	0	0	0	0	50
18	Rectal swab	0	0	0	0	0	0	4	0	0	0	0	0	4
19	Skin	0	0	0	0	0	1	8	0	0	0	0	0	9
20	TOTAL													**1504**
L	CAMEL													
1	Blood	0	0	0	0	0	0	2	0	0	0	0	0	**2**
M	**GRASSES**													
1	Grasses	0	0	0	1	2	0	0	0	0	0	0	0	**3**

N	**FELINE**													
1	Brain tissues	5	2	0	0	2	0	0	0	0	0	1	1	11
2	Livers	6	0	0	0	1	0	0	0	0	0	0	0	7
3	Intestines	4	0	0	0	3	0	0	1	0	0	0	0	8
4	Lungs	3	0	0	0	1	0	0	1	0	0	0	0	5
5	Hearts	5	0	0	0	0	0	0	1	0	0	0	0	6
6	Kidneys	5	0	0	0	1	0	0	1	0	0	0	0	7
7	Spleens	5	0	0	0	1	0	0	1	0	0	0	0	7
8	TOTAL													**51**
O	**PISCES**													
1	Livers	6	0	0	0	1	2	0	3	0	0	7	0	19
2	Spleens	3	0	0	0	1	2	0	3	0	0	0	0	9
3	Gills	3	0	0	0	1	2	0	3	0	0	7	0	16
4	Kidneys	0	0	0	0	1	3	0	3	0	0	7	0	14
5	TOTAL													**58**
P	**CAPRINE**													

1	Sera	3	16	87	2	6	0	1	0	0	83	55	136	389
2	Blood	0	4	0	1	0	0	13	4	5	96	20	22	165
3	Nasal swabs	0	4	3	1	4	0	0	0	0	0	0	0	12
4	Skin scrapings	0	0	0	1	2	0	0	0	0	0	0	0	3
5	Livers	0	0	2	0	0	0	2	7	0	0	0	0	11
6	Lungs	0	0	2	0	0	0	2	7	0	0	0	0	11
7	Spleens	0	0	2	0	0	0	1	7	0	0	0	0	10
8	Kidneys	0	0	2	0	0	0	0	0	0	0	0	0	2
9	Hearts	0	0	1	0	0	0	41	7	0	0	0	0	42
10	Brain tissue	0	0	0	0	1	0	0	0	1	1	0	0	3
11	Faecal	0	0	0	0	0	0	0	0	2	0	0	0	2
12	Intestines	0	0	2	0	0	0	1	0	0	0	0	0	3
13	Lymph nodes	0	0	1	0	0	1	0	0	0	0	0	0	2
14	TOTAL													**655**
Q	**PLATES**													
1	BA	0	0	0	1	1	0	0	0	0	0	0	0	2
2	TSA	0	0	0	1	0	0	0	0	0	0	0	0	1
3	Broths	0	2	0	0	0	0	0	0	0	0	2	0	4

4	TOTAL													**7**
R	**LAPRINE**													
1	Faeces	0	0	0	2	0	0	0	0	0	0	0	0	2
2	Livers	0	5	0	6	0	0	404	0	7	1	0	2	425
3	Lungs	0	1	0	6	0	0	15	0	3	1	0	2	23
4	Hearts	0	0	0	6	0	0	394	0	3	1	0	1	405
5	Tracheae	0	0	0	1	0	0	1	0	0	0	0	0	2
6	Intestines	0	2	0	7	0	8	23	0	4	1	0	1	46
7	Spleens	0	1	0	2	0	8	11	0	0	1	0	0	23
8	Testes	0	4	0	0	0	0	0	0	0	0	0	0	4
9	Kidneys	0	5	0	0	0	8	399	0	9		0	1	422
10	Blood	0	0	0	0	0	0	62	0	55		0	8	125
11	Stomach	0	0	0	0	0	0	10	0	0	0	0	0	10
12	Uterus	0	0	0	0	0	7	9	0	0	0	0	0	16
13	Pancreas	0	0	0	0	0	0	10	0	0	0	0	0	10
14	Testes	0	0	0	0	0	14	20	0	0	0	0	0	34
15	Brain	0	0	0	0	0	0	10	0	0	0	0	0	10
16	Ovaries	0	0	0	0	0	7	0	0	0	0	0	0	7

17	TOTAL													**1564**
S	**PLANTS**													
1	Ginger	0	0	0	0	0	0	0	0	1	0	0	0	1
2	Leaf	0	0	0	1	2	0	0	0	0	1	0	0	1
														2
T	**MILK**													
1	Milk	0	0	0	0	0	0	0	7	11	0	0	0	**11**
U	**WILD LIFE**													
1	Tiger prawns	0	0	0	0	0	0	0	0	0	0	0	1	1
2	Blood (bats)	0	0	0	0	0	0	0	0	0	0	50	0	50
3	Bats faeces	0	0	0	0	0	0	0	0	0	0	50	0	50
4	Bats ectoparasites	0	0	0	0	0	0	0	0	0	0	50	0	50
5	Sera	0	0	0	0	0	0	2	0	0	0	0	0	2
6	TOTAL													**153**

V	**FLOUR**													
1	Maize	0	0	0	0	0	0	0	0	0	0	0	1	1
2	Soya beans	0	0	0	0	0	0	0	0	0	0	0	1	1
3	Tiger nuts	0	0	0	0	0	0	0	0	0	0	0	1	1
4	TOTAL													**3**
W	**EGGS**													
	Eggs	0	0	0	0	6	0	0	0	0	0	0	15	**15**
X	**MOSQUITOES**													
	Mosquitoes identification	0	0	0	0	0	0	0	0	0	0	135	0	**135**
Y	**TICKS**													
1	Caprine ticks	0	0	0	0	0	0	0	0	0	0	19	0	19
2	Ticks	0	0	0	0	0	6	1	0	0	0	18	0	25
3	Ovine ticks	0	0	0	0	0	0	0	0	0	0	30	0	30
4	Bovine ticks	0	0	0	0	0	0	0	0	0	0	50	0	50

5	TOTAL													**124**
Z	**LICE**													
	Lice identifications	0	0	0	0	0	0	0	0	0	0	484	0	**484**
	GRAND TOTAL													**11773**

Tables 4: INCINERATION WASTE REPORT FROM JANUARY – DECEMBER, 2023

LABORATORY/UNIT	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
NECROPSY	517.6	810.8	201.2	875.1	445.1	1023.1	688.8	923	1131.2	899.4	646.5	515.5	8677.3
RABIES LAB.	117.1	55.4	71.6	129.8	89.4	41.7	108.3	67.9	50.3	52.4	61.3	39.5	884.7
VIR. VAC. PROD	0	2,394	1575	1024	869	693	341	1045	1452	1331	1254	946	12924
BACT, RES. DIV.	60.6	11.6	88.2	91.1	93.2	73.8	125.9	45.1	117	63.9	58	60.5	888.9
LAB, SERVICES DIV.	177.3	72.4	45	182.3	177.5	217.7	288.4	258.5	227.1	149.3	111	116.9	2023.4
DRUG DEV	0	3.9	7.2	11.3	6	4.8	16	12	11.1	15.3	14.8	35.6	138
REGIONAL LAB.	22.6	36.6	32.6	39.1	17	36.7	33	15.8	44.3	41.3	180.5	59.8	559.3
VIRAL RES. DIV.	35.8	7.2	28.5	80.3	15.5	8.9	6.3	27.1	54.3	41.3	32.8	24.8	362.8
DERMATOPH.	27.8	11.3	10.8	29.6	16.4	9.6	13.6	16.1	12.6	23.4	21.7	19.5	212.4

HISTOPATHOLOGY	2.9	3.4	2.7	5.7	7.8	4.1	2.9	6.6	5.2	8.1	2	5	56.4
Q. CONTROL LAB.	0	0	11.4	117.6	112.7	6.2	27.2	11.7	28.5	10.2	17.8	23.5	366.8
BIO-TECHNOLOGY	74.2	13.6	57.6	62.1	55.7	58	29.8	77.7	35.4	42.8	67.8	60	634.7
UNKNOWN	305.8	197.1	199.3	298.8	259.4	179	262.1	237.9	271.3	247.9	135.6	180.1	5074.3
CDL ENV. WASTE	34	30	28.7	65	27.9	44.6	47.6	35.9	51	78	43.8	45.8	532.3
FMD LAB.	0	0	0	0	0	0	0	0	0	0	0	0	0
BIO-CHEMISTRY	8.9	39	22.9	37.7	20.6	13.7	6.8	17.8	16.2	43.2	74.8	27.1	328.7
FIELDWORK	0	0	0	0	0	0	0	0	0	0	0	14.8	14.8
VET CLINIC	13	7	0	76	0	0	0	0	78	8.9	6.9	0	189.8
BSL LAB	0	0	8.2	18.4	76	8.6	31.2	0	138.3	33.7	31.1	17.6	363.1
LEPTOSPIRAL LAB	10.3	6	2.3	0	8.6	6.8	3.6	2.7	6.0	16.6	7.7	3.2	73.8
MEDICAL CENTRE	0	0	0	0	0	0	11.4	4.2	0	4.2	0	0	19.8
SIDE LAB	13	0	0	8.3	0	8.7	0	0	8.9	10.3	14.3	6.2	69.7
STORE/AUDIT	0	0	0	0	108	0	0	0	0	0	0	0	108
TOTAL	1420.9	3699.3	2393.2	3152.2	2405.8	2439	2043.9	2769.1	3738.7	3121.2	2782.4	2201.4	**32,167.1**

All figures in kilogram's (Kg)

Challenges

1. The staff of this division work sometimes late into the night but have not received any reward or letters of commendation to encourage them despite the risk of kidnapping.
2. With the new creation of new divisions, the work force of the division has greatly reduced, there are ONLY 5 veterinarians in this division to carryout necropsy. The division is in need of at least 8 veterinary pathologists and 5 Livestock attendants.
3. Laboratory Consumables: None availability of consumables such as samples bottles, Universal bottles, hard gloves, nose mask, (protective kits) detergents, absolute alcohol, formalin, zylene, Hematoxylin and Eosin stains etc affects good sample collection and sample processing hence thisleads to delay in sending samples to the laboratories.
4. Frequent breaking down of the incinerator has caused a lot of health challenge to the staff in the division. As materials awaiting incineration especially vaccine eggs get piled up because the incineration machine has broken down and awaiting finance to get it fixed.
5. Non availability of a cold room (+2 - +5^{o}C) as part of the Post-Mortem facility for the preservation of carcasses and tissue samples.
6. We face a lot of problems collecting samples sent from other states through the various car parks/ transport systemsinto the institute as there is/are no dedicated vehicle for sample collection. This is more serious during weekends, as the drivers and vehicles are not available.
7. Samples received at close of work on Fridays are not received by other laboratories servicing the diagnostic laboratory because there is nobody to receive and process those samples during weekends.

Recommendations

1. Provision of industrial microscopes with camera to ease histological reading of histopathology slides in line with international practices.
2. Provision of laboratory consumables and laboratory protective wares.
3. Installation of cold room (+2 - +5^{o}C) as part of the postmortem facility for the preservation of carcasses and tissue samples.
4. The incinerator need to be replaced with a new one as the current one is old (over 40years) and is gulping so much money for maintenance and an operation.
5. Cooperation of other laboratories to reduce turnaround time by making staff available during weekends.
6. A dedicated vehicle be made available for sample collection.

19. VETERINARY PUBLIC HEALTH AND PREVENTIVE MEDICINE DIVISION

The division has 3 sections: Disease Notification and Reporting, Field work/Outbreak Investigation, and Animal Disease Data Collation and Database Maintenance.

Functions/Mandates

Mandates of the division include:

1. Organizing and conducting disease surveys
2. Organizing and conducting disease surveillance
3. Organizing and conducting disease monitoring and instituting control where and when needed
4. Monthly disease data collection submitted to CDL
5. Disease data cleaning and presentation
6. Submission of monthly disease data collated/collected to appropriate authorities
7. Creation of a sustainable Animal Disease database of all animal diseases diagnosed in all the laboratories of the National Veterinary Research Institute, Vom.
8. Disease modelling and forecasting.
9. Designing disease control and prevention strategies
10. Outbreak investigations.
11. Providing direction for future studies on animal diseases and
12. Provision of evidence-based information to policy makers on animal disease control.

Activities

In the outgoing year, the division was able to carry out the following activities:

1. Survey of Newcastle Disease in birds in Bauchi and Kano States.
2. Survey of Peste des Petits Ruminants (PPR) in small ruminants in Pl Bauchi and Kano States.
3. Participated in immunosurveillance for seroconversion in small ruminants vaccinated against PPR Kano State.
4. Collated and cleaned disease information submitted to CDL
5. Submitted on monthly basis disease reports to appropriate authorities
6. Trace back of records of disease diagnoses at the central diagnostic laboratory
7. Investigations on the distribution and spread of diseases of different animal species
8. Strategies for further disease investigations by states in the coming year.

In the outgoing year, the division was able to achieve the following:

1. Prompt submission of monthly diseases reports.
2. Creation of structures that make yearly data entry and access easier.

3. Investigation-based evidence for research focus next year.

Challenges

1. Lack of dedicated vehicles for the diseases survey activities.
2. Lack of dedicated data collecting equipment and materials such as GPS readers, tablets/iPads, laptops, specialized epidemiological software etc
3. Lack of sufficient dedicated laptops and desktops.
4. Late release of laboratory reports on disease investigation and analysis
5. Shortage of staff as five staff are currently undergoing their postgraduate studies.

Research Highlights

1. Collecting relevant specimens in the field, effectively transporting same to the relevant laboratories, analysing samples and publishing findings.
1. Collation and presentation of disease investigation and analysis in formats for easy interpretation and publication.

In the coming year, the division hopes to embark on the following research activities:

i) Further investigations on specific diseases common to each state down to the LGA level
ii) Further investigations on the risk factors associated with disease findings
iii) Disease mapping, modelling, and forecasting
iv) Disease mitigation strategies.

REPORTS FROM OUTSTATION

1. ABUJA OUTSTATION LABORATORY

Functions/Mandates:

1) Vaccine sales/reconstitution/storage
2) Post mortem findings, Sample Collection, Sample Storage and Transportation
3) Farm visitation
4) Disease surveillance/monitoring
5) Vaccination and supportive therapy

Activities:

1) Monthly zoom meetings with DDS and VIOs
2) Filling and submission of composite monthly reports capturing and reporting major diseases treated and activities in the outstation.
3) Working in collaboration with Federal Capital Territory Veterinary Clinic, Ministry of Agriculture and Rural development- Research department and the University of Abuja to determine the causes of certain outbreaks in different species of animals as well as proffering effective solutions.
4) Frequently sending samples to Vom from certain unknown outbreaks in order to produce relevant vaccines and biological
5) Collaboration with the FCT Veterinary clinic in carrying out major treatments and surgeries as well as vaccination campaigns on contagious bovine pleuropneumonia and rabies.
6) Attending monthly and weekly clinical conferences
7) Vaccine sales and utilization of the proceeds for the maintenance of the office.

Achievements:

1) Liaised with John Wen-Assistant managing Director, China-AfricaCo-operationandpartnerforAfrica'sdevelopment.ChinaCompany requesting for linking up with veterinary outlets within Abuja and Nigeria in general in November,2023

2) Had a discussion in December, 2023, with Ramkumar Rajagopolan ITC and Switzerland at the instance of the Director/Chief Executive, for discussion on NVRI-Vaccines marketing in Nigeria and problem encountering (Thermostable Vaccines).
3) Dr. Adache Director with the military H/Q Abuja collaborating and coordinating the NGO/World Bank participating in promoting Climate smart Livestock System with

emphasis on Animal health. Dr. Fatima Hambagdaa female Vet from Abuja was enlisted.

4) Visited the Farm of the Former Chief of Air staff, late Alex Badeh's Farm in Nasarawa State, consisting of 120 crossed Friesians were treated for the following;

i. Contagious bovine pleurapneumonia (treated and vaccinated)
ii. Tick infestation (treated and controlled)
iii. Trypanosomiasis (treated)

5) Visited the farm of Alhaji Umar Tela for the following treatments;

i. Contagious bovine pleuropneumonia vaccinationfor110 crossed Friesian cattle at Lenguwa Kada, Lugbe Abuja.
ii. Performed peste de petits ruminants (PPR) vaccination to his Balami sheep which were about 80 in number.
iii. General inspection of the farm

6) Visited Damsy Farms Deidei; A sixthousand (6,000) capacity farm of layers and broilers as well as a herd of sheep. Inspection for out breaks was carried out in which Newcastle disease and coccidiosis were discovered. The sheep were routinely dewormed and given antibiotics.
7) Alhaji Afolabi Sokade Dutse at the Bwari Area Council of the FCT; Owns three adult Rottweilers which are routinely dewormed and given tick
8) Blood and urine samples from a herd of cattle belonging to Alhaji Bamanga Umar of Ruga village Gwarimpa and diagnosis of Fascioliasis, Leptospirosis and Trypanosomiasis. Skins crapings were also collected from Alhaji Bamanga Umar and sent to the Dermaphilosis laboratory at NVRI, Vom.
9) Sales of Vaccines and Biologicals
10) Correspondence with Aso Villa, National Assembly and other federal government establishments a good partnership with the FCT Veterinary clinic in all services such as routine disease surveillance activities and treatment.
11) Procured some chairs and stationeries as well as hire a cleaner to improve the working environment.

Challenges:

1) An urgent need for a standard independent laboratory building.
2) The NVRI Laboratory sign board is yet to be placed due to the unwillingness of the host establishment, (the FCT vet clinic) to permit its installation. This is as result of possible issues of rivalry.
3) Lack of basic laboratory equipment, office furniture and reagents.
4) Lack of a vehicle for routine laboratory surveillance and ambulatory services to meet

up with pressures and demands.

5) Frequent Power outage and a non-functional generator
6) Lack of internet facilities to work with for E-filing of reports and virtual meetings

Research Highlight:

1) Evaluation of the effect of ***MomodicaBalsaminaLinn***, Selenium and Lamivudine for the treatment of Newcastle Disease in pullets in Kaduna state Study population; and pullets in Ibadan, Oyo state
2) Multi-Locussequencetypingof*Pasteurellamultocida*IsolatesfromBovinesinMararabatownofNasarawaState

2. AKURE ZONAL LABORATORY

Functions/Mandates:

1) Diseases surveillance and monitoring
2) Vaccine sales
3) Disease reporting

Activities

1. Administrative and professional services and oversees the other laboratories as the need arises.
2. Diseases surveillance and monitoring activities in conjunction with both the State department of Veterinary Services and Private Veterinary Service Providers.
3. Vaccine sales only on request as we do not have source of power due to huge backlog debts incurred by the then investment company.
4. Empowering and development of mostly Ondo State AVMA colleagues, youths and public on apiculture and fisheries.

Challenges

1) No Lab for bench work
2) No water
3) No electricity
4) No Security guards
5) No permanent office, sharing Ondo State Investment Company who are now packing out after their out of Court case settlement with the State Government.
6) The quality of NVRI Vaccine e.g NDVK cloudiness on constitution is questioned by practicing Vets; the purchasing source is not through the Akure lab.

7) During the NVMA monthly meeting, a Vet raised observation why most Vets do not buy or get the NVRI Vaccines through the Akure Lab because someone gets the vaccines directly from Vom at the same price Akure VIO gets.
8) Our diagnoses are mainly on sport assessment by visitations, collaboration with the State Vet, Hospital and by consultancy services.
9) No official Vehicle, the Zonal Veterinary Investigation Officer's Personal Car is used.

Achievements

1) Monthly Disease reporting
2) Farm visitations in collaboration with the State Veterinary Services.
3) Workshop on Beekeeping empowerment for Ondo State NVMA Chapter and the Community.
4) Abattoir Visitations
5) Training on Fish Production and disease management.
6) Co-resource person on Beekeeping empowerment during Ondo State Agricultural and Food Shows.
7) Member Ministerial Technical Committee on Bee honey Health and EU export on Bee honey Products.
8) Consultations to livestock and beekeeper farmers across the country such Yobe, Ondo, Plateau and Zamfara States.
9) Seminar presentation on honey residues/contaminants for EU Export organized by Fed. Ministry of Agric.
10) Seminar presented on Pharmaceutical Importance of Bee Venom as vaccine trial and therapeutic organized by Raw Material Research and Development Council.

3. BAUCHI OUTSTATION LABORATORY

Functions/Mandates:

i. Animal Disease surveillance
ii. Vaccine sales
iii. Laboratory Diagnostic Services (Parasitology, Bacteriology, Haematology)

Activities:

i. Clinical examination and management of sick animals and apparently healthy animals (Disease management, surgeries, vaccination etc)

ii. Laboratory diagnosis of samples presented for disease investigation (Bacteriology, parasitology and basic haematology)

iii. Postmortem examination of carcasses presented for disease investigation

iv. Sale of vaccines

v. Animal disease surveillance on important reportable diseases through samples collection, storage, packaging for referral of samples to Diagnostic Division NVRI Vom.

vi. Ambulatory services in poultry, nomadic and institutional farms

vii. Training of students from higher Institutions on industrial attachment (SIWES)

viii. Collaboration with EKORE, REDISSE, WAC-EID, LIDISKI projects, and Bauchi and Gombe State Governments on Research projects, Training of CAHWs, vaccines procurement and sales to rural farmers and animal disease surveillance.

Achievements:

i. Maintenance of solar panels/accessories installed by LIDISKI project.

ii. Procurement of Laboratory equipment and reagents for Parasitology and Bacteriology

iii. Procurement of 75 AM Battery for Generator.

iv. Maintenance of generator and other office and laboratory equipment

v. Constant payment of water and light bills

vi. Temporarily secured collapsed portions of office complex perimeter fence with zinc

Challenges:

i. Collapsed portions of office complex perimeter fence
ii. Lack of autoclave and other laboratory reagents
iii. One staff quarter and 2 boys' quarters not in good condition, still having asbestos roof with leakages
iv. Lack of water storage facility.

Research Highlights:

i. Wildlife conservation research activities including population survey, disease surveillance and health management
ii. Collaboration with researchers from Abubakar Tafawa Balewa University Teaching Hospital Bauchi on one health approach to research activities on Lassa Fever
iii. Collaboration with WAC-EID and FAO on MPOX surveillance in rodents and bush meat markets.
iv. Active participation in LIDISKI Research Project in Bauchi State

4. BENIN OUTSTATION

Functions/Mandates:

1) Disease surveillance/Investigation
2) Routine laboratory analysis and Diagnosis of diseases
3) Vaccine sales and Routine vaccination activities

Activities:

1) Furnishing the DDS and Dr. Mohammed Bolajoko with monthly reports through email.
2) Routine farm visits and sample collection/transportation to designated laboratories at the institute for diagnosis.
3) Joint participation and continuation of Anti rabies campaign across Edo State.

Achievements:

1) Collaboration with the Federal Ministry of Agriculture state office on sensitization programs on piggery to farmers in Edo state.
2) Participation in numerous online training programs on One Health and Zoonosis.

Challenges:

1) Lack of standard laboratory building, hence the need for building of a permanent office accommodation for the Outstation.
2) The outstation is understaffed
3) The poor power situation in the building hosting the temporary office space has made it near impossible to power the deep freezer thus affecting grossly vaccine sales.
4) Lack of basic laboratory equipment and reagents.
5) Lack of a vehicle for routine laboratory surveillance activities.
6) Lack of inclusion of staff in routine training programs and grants domiciled in the institute.

5. BIRININ-KEBBI OUTSTATOPM LABORATORY

Mandate/Activities:

1) To conduct research into all aspects of animal diseases, their treatment and control.
2) Collection and sending of animal samples to the central diagnostic laboratory at the headquarter (NVRI, VOM) for confirmation of diagnosis.
3) Enlighten thefarmers, livestock owners and other stakeholders and the general public on some products especially vaccines and their uses
4) Disease diagnosis and treatment through clinical signs and post-mortem lesions
5) Extension services to poultry and livestock owners

6) Sales, distribution and administration of vaccines produced by NVRI to farmers, livestock and poultry owners.

Activities:

1) Awareness campaign on animals diseases such as rabies
2) Mass vaccination of animals against rabies, CBPP, PPR and others.

Achievements:

1) The outstation collected the following number of vaccines for sales distribution and administration (Table 1). In addition, solar panel was installed in the out station to boost electricity supply.

Table 1: vaccine sale and distribution in 2023

S/No.	VACCINES	QUANTITY
1)	CBPP	1,800
2)	NDVI 2	1,500
3)	HSV	40
4)	ASV	400
5)	FPV	40
6)	KUMOROV	500
7)	1BDV	800
8)	LASOTA	1,200
9)	FTV	30
10)	BQV	20
11)	**TOTAL**	**6,330**

2) The outstation sent 6 samples to the central diagnostic laboratory in Vom for confirmatory diagnosis.
3) Sixteen (16) numbers of students were received for industrial training from some schools.
4) Render some basic clinical and laboratory services to the public i.e. ambulatory and extension services to livestock owners and poultry farmers on biosecurity, in collaboration with the state sister ministry.
5) Within this period under report, the table 2, below shows some of the cases that were handled.

Table 2: Monthly distribution of cases received and attended to by animal species

Month	Ovine	Caprine	Bovine	Equine	Avian	Canine	Feline
Jan	20	15	5	-	15	3	-
Feb	15	7	3	-	20	2	-
Mar	7	15	5	-	22	5	-
April	6	12	14	-	8	4	-
May	3	13	6	2	-	3	-
June	5	7	3	-	14	1	2
July	9	11	4	1	13	-	-
Aug	17	-	4	1	18	2	1
Sept	15	2	1	-	12	1	-
Oct	19	3	-	-	6	-	3
Nov	7	2	1	-	3	2	-
Dec.	12	2	2	1	7	2	1
Total	**135**	**89**	**48**	**5**	**138**	**24**	**7**

Challenges:

1) The laboratory has two deep freezers and a fridge but they are all leaking with bad compressors, despite the efforts made to repair them several times.
2) The only microscope in the laboratory is bad and needs repair or replacement
3) The laboratory is also in dear need of some chemicals, reagents and others, all of which are non-available.
4) The office building was completely blown off at the onset of 2020 raining season and up till now still in that state.
5) Presently, there are only two of us, an accountant and myself as the only NVRI staff in the office. We need more staff, including especially, a laboratory scientist.

Research highlights:

There is an ongoing research work on Pasteurellolis, Avian influenza virus and monkey pox virus in collaboration with the State Ministry of Animal Health.

6. CALABAR ZONAL LABORATORY

Functions/Mandates:

1) Surveillance activities
2) Diagnostic work
3) Disease outbreak investigation and reporting
4) Sample collection and transportation
5) Vaccine storage and sales
6) Laboratory tests
7) Research project implementation.
8) Implementation of laboratory quality assurance standards.
9) Implementation of biorisk management.

Activities:

1) We carried out blood sample collection from abattoir.
2) We introduced RBPT test for brucella antibodies from sera collected.
3) We introduced faecal sample test by simple floatation and sedimentation methods for identification and diagnosis of intestinal parasites.
4) We carried out disease outbreak investigation.
5) We carried out farm visits
6) We carried out post mortem diagnosis
7) Vaccine sales was continued during the year.
8) The office was involved in World Rabies Day celebration jointly organized by NVMA and Dept of Vet. Services, CRS Ministry of Agriculture and Rural Development.
9) I participated in the public enlightenment discussion at Hit FM radio station in Calabar on livestock and poultry diseases of economic and public health importance.
10) We participated in the flag -off ceremony for the 2023 sensitization on Anthrax disease along with the Department of Veterinary Services, CRS Ministry of Agriculture and Natural Resources.
11) I participated in a training on Animal Disease Reporting and the use of NADIS app organized by FMAFS
12) I also carried out blood sample collection from cattle in cattle market and the sera sent to FMD lab in our HQ, Vom. This was done through 'Animal Mobility Project' sponsored by ECTAD FAO and FMAFS.

Achievements:

1) Installation of a10 kva Solar power in June 2023 and since then steady power supply and sustained cold chain was achieved from which the State Ministry of Agriculture is benefitting.
2) Farm visits and surveillance activities helped build our client base.
3) Sustenance of Post mortem Diagnostic work in the laboratory.
4) Staff received training on sample collection, processing and testing and storage
5) Staff gained knowledge on basic lab biosafety and biosecurity
6) Repair of the broken down microscope which has been put it to use in the laboratory.
7) Preparation and provision of job description and schedule of duty for every staff in the laboratory based on their cadres.
8) Development of SOPs for the lab tests I introduced in the lab and kept copies in the laboratory.
9) Introduction of door signage or labels as implementation of lessons learned during LMT and Biorisk management workshops.
10) Development of laboratory result forms for issuance of results to clients.
11) Procurement of some packs of sample tubes both plain and those with EDTA.
12) Maintenance of sustained security surveillance in the laboratory premises by personnel from Santana Company.
13) Introduction and implementation of testing for Brucella antibodies by RBPT; which is now a routine test in the laboratory.
14) More awareness created on the availability of various NVRI vaccines in our Laboratory.
15) We continued with our collaboration with public and private veterinarians and poultry farmers.
16) Diagnosis of some common poultry and livestock diseases were achieved. E.g coccidiosis, Helminthosis, Newcastle disease, egg peritonitis, typhoid and mycotic infection.
17) Repair of the broken down HP Laser Jet P2055d Printer which is now serving us very well with secretarial work.
18) Procurement and replacement new battery for the NCC laptop computer to replace the old one which was already dead. Now the computer is working well.
19) Vaccine sales: Below are types and quantity of vaccines sold within the quarter under review:

S/No.	Vaccine Type	Quantity (vials)
1)	IBDV	179
2)	NDVL	190
3)	NDVK	95
4)	FTV	99
5)	FPV	70
6)	ARV	20
TOTAL		**653**

Challenges:

1) Lack of vehicle for mobility for farm visits and surveillance.
2) No water supply
3) No incubator
4) No biosafety cabinet
5) No gas cylinder,
6) No agar for media preparation
7) No reagents and wire loops for basic microbiological work.

Research Highlights:

We started diagnosis on routine blood/serum samples collected and tested for Brucella antibodies by RBPT.

7. IBADAN DIAGNOSTICS AND EPIDEMIOLOGY LABORATORY

A. Activities:

- ❖ Vaccine sales/distribution,
- ❖ Diagnostic Services
- ❖ Extension services.
- ❖ Diseases surveillance/Sample collection
- ❖ Consultancy
- ❖ Veterinary Research

1. **Total quantity of vaccines sold**

S/No	Type Of Vaccine	Quantity (Vial/Bottle)
1.	Newcastle Disease Vaccine Lasota (200)	280
2.	Newcastle Disease Vaccine Lasota (500)	100
3.	Newcastle Disease Vaccine Komorov(200)	70
4.	Infectious Bursa Disease Vaccine - Gumboro (200)	115
5.	Fowl Pox Vaccine	2
6.	Peste des Petits Ruminants (PPRV) (50)	100
7.	Contagious Bovine Pleuropneumonia (CBPP) (100)	10
8.	Foot and Mouth Disease Vaccine (FMDV) (50)	11
9.	Lumpy Skin Disease (LSDV)- (50)	6
10.	Haemorrhagic Septicemia Vaccine	5
11.	Anthrax Spore Vaccine	10
12.	BSV	1
13.	Anti rabies Vaccine (1)	2
14.	Lamstreptocide (1L)	6

2. **Diagnostic services:**

Necropsy/Extension services: Our Laboratory performed clinical and diagnostic services (especially Necropsy) for poultry farmers in the year 2023. Farm visits were also made based on farmer's request.

Disease surveillance/Sample collection: These were done in collaboration with the Oyo State Epidemiology Unit. Samples collected were sent to Vom for confirmation. Samples brought directly by farmers were also sent to Vom for confirmatory diagnosis.

Achievements:

1. Conducted surveillance and awareness campaign of rabies in collaboration withthe Oyo State epidemiology unit.
2. Participation in Radio and Television interviews on Anthrax disease.
3. Lecture of FGBMFI members on Anthrax disease and IPC.

Challenges

1. Inconsistent power supply making available facilities to be under-utilized.
2. Lack of requisites reagents and Lab. technical staffhave deterred any form of microbiological work/services at the laboratory.

8. ILORIN OUTSTATION LABORATORY

Functions/Mandates

- Diagnoses of livestock diseases
- Investigation of livestock disease
- Vaccine collection and distribution
- Extension services to farmers

Activities

Diagnosis

The laboratory diagnosed the following diseases by Necropsy and farm visits in Aves and rabbits:

Avian: CRD, Fowl typhoid, Heat stress, Increased fat deposit, Tapeworm infection, Infectious bursal disease, Septicemia, Colibacillosis, Egg peritonitis, Mixed infection and nutritional insufficiency, CoccidiosisRodents infestation.

Rabbit: Snuffle

Vaccine distribution

The following vaccine was distributed:

Poultry

NDVK	350 Vials
NDVL	150
FTV	1350
NDV I/2 50 D 400	

Bovine

CBPP	300
ASV	165

Achievements

- Vaccine supplies greatly improved
- Diagnosis and investigation of livestock diseases were carried out

Challenges

The diagnostic capacity of the laboratory needs improvement

Dilapidation of the laboratory infrastructure

Laboratory scientist staff is needed

Water supply

Land encroachment

Persistent burglary attack

Lack of security guard

Fire outbreak incidence

9. KADUNA OUTSTATION LABORATORY

Function/Mandates

The Laboratory is tasked with the mandate to conduct disease surveillance and investigation, disease diagnosis, research animal diseases, provide extension services to farmers within the areas of jurisdiction, and distribute and sell N.V.R.I vaccines and other products to local farmers and clients.

Activities:

- Active surveillance on anthrax was conducted in collaboration with the FMARD, where over 100 samples from cattle, sheep, and goats collected in selected local government areas in Kaduna State were sent to the Headquarters in Vom for laboratory testing.
- An investigation on African swine fever was also embarked on in different local government areas of Kaduna State, and about 36 samples were sent to Vom for definitive diagnosis in which 2 cases of ASF were diagnosed.
- Investigation of cases of Foot and Mouth Disease incollaboration with an NGO (LIVESTOCK 24) based in Abuja. 16 suspected samples were sent to the FMD lab in Vom for definitive diagnosis and 3 confirmed cases were diagnosed and reported.

Achievement

1. Successful active surveillance of Anthrax in Kaduna State
2. Active investigation of cases of ASF and FMD in Kaduna state yielded positive results.
3. Thirty cases of animal diseases were diagnosed from 5 species of animals with 15 different animal diseases diagnosed (Table 1).
4. Sales of Vom vaccines worth **N5,252,000**(See Table 2 for the quantities of vaccines sold)
5. Routine farm visitations and extension services were carried out in the period under review.

Table 1: Cases diagnosed

S/No.	Animal specie	Disease diagnosed	Number of cases diagnosed and or reported
1.	Bovine	Foot and mouth disease	3
2.	Caprine	PPR	1
3.	Caprine	Rumen impaction	1
4.	Caprine	Coccidiosis	1
5.	Canine	helminthosis	2
6.	Canine	Canine rabies	5
7.	Canine	Babesiosis	5
8.	Canine	Myiasis	2
9.	Canine	Organophosphate poison	1
10.	Canine	Fleas infestation	1
11.	Porcine	African swine fever	2
12.	Porcine	Erysipelas	1
13.	Avian	Chronic respiratory disease	2
14.	Avian	Aspergillosis	1
15.	Avian	Ascariasis	2
TOTAL	**5**	**15**	**30**

S/No.	Recipient specie	Type of vaccine	No. of vials/bottles	No. of doses
1.	Bovine	HSV	194	7,760
2.	Bovine	BQV	250	125,000
3.	Bovine	CBPPV	550	55,000
4.	Bovine	ASV	335	134,000
5.	Bovine	HTV	150	6,000
6.	Caprine/Ovine	LSD	1	50
7.	Caprine/Ovine	PPRV	695	34,750
8.	Avian	NDVi/2 (50 doses)	3000	150,000
9.	Avian	NDVL	1,030	206,000
10.	Avian	IBDV	230	46,000
11.	Avian	FPV	100	20,000
12.	Avian	FTV	1,650	165,000
13.	Avian	FCV	5	1,000

14.	Avian	Ndi/o	1,000	200,000
15.	Avian	NDVK	124	24,800
TOTAL	**3**	**15**	**9,314**	**1,175,360**

Table 2: Vaccine's sales in 2022 at the Kaduna Lab

Challenges:

1. Lack of water supply to the office: Water supply to the entire neighborhood where the office is located has been cut off by the Kaduna State Water Board.
2. Lack of a utility vehicle forfieldwork.
3. The security challenges especially banditry and kidnappings in the State are at an alarming rate, thus affecting routine disease investigation, farm visitation, and other fieldwork activities.
4. Lack of office furniture for staff.

Research highlights:

Specific research work is ongoing by various staff through their various postgraduate trainings. One of such is trying to look at the effects of some trace elements in the modulation of certain diseases in poultry. Also, there are collaborative research works with some researchers in the Headquarters in bovine and avian species, majorly on prevalence studies.

10. **KATSINA OUTSTAION LABORATORY**

Mandate/Activities

- Collection/sending of animal samples to the Central Diagnostic Laboratories for confirmatory diagnosis.
- Enlightens the farmers, pet owners, veterinarians, and general public on the use of NVRI vaccines and other products produced by the institute.
- Animal disease research.
- Disease diagnosis and Treatment through clinical signs and post-mortem lesions.
- Offer veterinary services to poultry and livestock farmers.
- Handling and training IT students from various institutions.
- Sales of vaccines produced by NVRI to the farmers and VeterinaryMedicine stores.

Achievements

Vaccine sales

S/No.	Type of Vaccine	Quantity
1.	CBPP	700 Bottles
2.	NDVI2 (50)	2235 Vials
3.	HSV	300 Bottles
4.	ASV	100 Bottles
5.	Fowl pox	1,067 Vials
6.	NDV k	1,800 Vials
7.	BQV	20 Bottles
8.	IBDV (200)	5,200 Vials
9.	NDV Lasota (200)	2,000 Vials
10.	NDV Lasota (500)	250 Vials
11.	FTV	1,070 Vials
12.	PPRV	500 Vials
13.	Hantavac	10 Bottles

- ✓ Handled 74 students from various institutions who were on industrial training.
- ✓ Sent 12 samples to Central Diagnostic Laboratories for confirmatory diagnosis.
- ✓ Handled 175 postmortem cases in poultry, and 23 postmortems in animals despite the challenges encountered with the state veterinary clinic.
- ✓ Visited 16 farms and trained some farmers on how to reconstitute NVRI vaccines.

3. Challenges

- ✓ Lack of a laboratory and laboratory equipment
- ✓ Lack of mobility.
- ✓ Inadequate staff (currently, there are only two staff in Katsina outstation)

4. Research activities

- ✓ Research on contagious ecthyma, Foot and mouth, and avian influenza virus in poultry is currently ongoing in Katsina

11. LAGOS OUTSTATION LABORATORY

Functions/Mandate

The function/mandate of the Outstation Laboratory, Lagos include

- To carry out Diagnosis, treatment, and control of animal diseases in households and on farms in Lagos and environs.
- Collect tissue samples of cases that cannot be carried out at the laboratory and send them to the Central diagnosis laboratory in NVRI Vom for confirmatory diagnosis.
- Carry out administrative and/or scientific responsibilities as directed by the Director/Chief Executive

Activities

1. The following diseases (as cases) were attended to at the clinic section of the laboratory for the year 2023.

S/No.	Cases	Subtotal
1.	Anti-Rabies vaccination	153
2.	DHLPP vaccination	37
3.	Helminthosis/Deworming	69
4.	Parvo Viral Enteritis	18
5.	Myasis in dog	52
6.	Tick fever in dog	17
7.	Poisoning	2
8.	Cystitis	1
9.	Skin infection	37
10.	Urinary tract infection	11
11.	Contagious ecthyma	1
12.	Allergy	2
13.	Mange	16
14.	others	15
Total		**431**

KEY: Others- Septicaemia, Canine Cough, Abcess, Mechanical injuries, Inflammations etc

2. Samples from suspected cases were collected from animals in some affected farms and animals in Lagos and Ogun states and for onward transportation to the central diagnostic lab at headquarters (NVRI, VOM) for confirmatory diagnosis.

Below is the summary of samples that were collected and sent to NVRI, Vom.

MONTH	DISEASE SUSPECTED	SPECIE	TYPE OF SAMPLE	LOCATION		TOTAL
				LAGOS STATE	OGUN STATE	
JAN	ASF, PPR	PORCINE OVINE CAPRINE	BLOOD (139) NASAL SWAB (28) BLOOD (34)	201	-	201
FEB	-	-	-	-	-	-
MAR	RABIES, PPR	CANINE, CAPRINE	HEAD (1) SERUME (30) NASAL SWAB (5)	36		36
APR	-	-	-	-	-	-
MAY	-	-	-	-	-	-
JUN	-	-	-	-	-	-
JUL	AI, AHS	AVIAN, EQUINE	SERUM (2), TRACHEAL SWAB (2), CLOACAL SWAB (2), LIVER (2), LUNG (2), HEART (2), SPLEEN (2), LIVER (1), LUNGS (1), SPLEEN (1), TRACHEA (1), MUSCLE (1), INTESTINE (1), HEART (1)	19	-	19
AUG	-		-	-	-	-
SEP	PPR	OVINE, CAPRINE	SERUM (30), SERUM (20)	50	-	50
OCT – DEC	-		-	-		-

3. We made some sales of NVRI vaccines and products. The table below summarizes the different types of vaccines and other NVRI products that were sold.

S/No.	Vaccine/Product	Quantity
1.	Newcastle disease virus (LaSota strain)	3590 Vials
2.	Dog shampoo	52 Bottles
3.	Damasol Cream	480 Tablets
4.	Dermatocide 3M soap	120 Tablets
5.	Lumpy Skin Disease (LSD)	12 Vials
6.	Lamstreptcide 2L	5 Bottles
7.	Contagious Bovine Pleuropneumonia (CBPP)	220 Vials
8.	Peste des Petits Ruminants (PPR)	521 Vials

4. We liaise with the Department of Veterinary Services through the director of Veterinary Services (DVS Lagos) on Active and Passive surveillance of animal diseases in Lagos and environs.
5. We collaborated with the Lagos State Veterinary Department in conjunction with FMARD/OIE/REDISSE in organizing a free statewide Anti-Rabies vaccination exercise in all five divisions of the state from the 13th to 16th of June, 2023.

Achievements

We successfully reactivated the previously inactive vaccine sales section of the office. Through our extensive engagement with the public and collaboration with the Director of Veterinary Services, Lagos State, we have significantly enhanced awareness about the presence of NVRI in Lagos. NVRI Lagos has now become an essential component of the Epidemiology Unit within the Lagos State Department of Veterinary Services.

Challenges

Ambulatory services – most (about 90%) of our epidemiological responses take place in the outskirt areas of the state. These areas are located far from the office (Oke-Aro for example spans about 78km), with bad road networks. The availability of a rugged ambulatory vehicle will ameliorate this.

Research highlights

MPox Surveillance activities which include sampling of rodents, wildlife, and primates in some selected towns in Lagos state.

12. YOLA OUTSATION

Functions/Mandates:

Conducting research on animal diseases.

Carrying out disease surveillance and diagnosis.

Distribution and sale of NVRI products tolivestock and poultry farmers.

Provision ofextension services to livestock and poultry farmers.

Collaborating with relevant stakeholders in the field of animal health and production.

Activities

1. Disease Surveillance and Diagnosis

ANIMAL SPECIES	NUMBER OF SAMPLES	DISEASED DIAGNOSED	DIAGNOSTIC METHOD
AVIANS	6	NEWCASTLE DISEASE, INFECTIOUS BURSAL DISEASES	NECROPSY

Four hundred and three (403) samples were summited to NVRI Vom headquarters for NACOH Project collaborated with Regional Lab, NVRI in 2023. The samples included serum,nasal swabs, ectoparasites and tissue samples.

Vaccines sales report for 2023

In collaboration with Borno State Ministry of Agriculture and ICRC, wecarried out mass vaccination against PPR, ASV and CBPP in some selected local government area of Borno State during the year. There was also installation of Solar inverter in the Lab for sustainable power supply by REDISSE.

S/N	MONTH	IBDV (500D)	IBDV (200D)	NCDV (L)	ARV	FPV	FTV	CBPP	NDV (K)	FCV	BQV	PPR	NDV I2 (50D)	NDV l2 (200D)	BRUCELLA V	H SV	ASV	HANTAVAC
1	JANUARY	-	-	-	-	-	-	13	-	-	-	-	59	-	-	-	7	-
2	FEBUARY	-	-	-	-	-	-	20	-	-	-	-	-	-	-	-	14	-
3	MARCH	-	-	-	-	-	-	39	-	-	100	-	-	-	-	-	-	-
4	APRIL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	66	17	-
5	MAY	-	-	-	-	-	-	-	-	-	-	-	-	-	-	34	83	-
6	JUNE	-	-	-	-	-	-	-	-	-	-	62	-	-	-	-	-	-
7	JULY	-	12	2	-	-	-	-	-	-	-	18	-	-	-	-	46	-
8	AUGUST	-	11	6	-	-	-	-	-	-	-	-	-	-	-	50	4	-
9	SEPTEMBER	-	17	6	-	-	-	-	-	-	-	-	-	-	-	55	-	-
10	OCTOBER	-	-	4	-	-	-	40	-	-	-	-	-	-	-	5	-	-
11	NOVEMBER	-	-	6	-	-	-	-	-	-	75	-	-	-	-	-	-	155
12	DECEMBER	-	-	12	-	-	-	-	-	-	8	-	-	-	-	-	-	28
TOTAL NO_ VACCINES SOLD		-	40	36	-	-	-	112	-	-	183	80	59	-	-		171	183

Challenges:

A. Due to the long time closure of laboratories, some roofs have been destroyed by termites.
B. Lack of proper fencing.
C. Erosion created a large ditch in the laboratory premises due to proximity of the office structure to the stream of River Ngadda.
D. Lack of water reservoir.
E. Lack of Staff Quarters.
F. Lack of access to rural areas due to insecurity.
G. Lack laboratory consumables

13. MAKURDI OUTSTATION

Functions/mandates

Disease surveillance/monitoring

Vaccine sales/reconstitution/storage

Farm visits

Post mortem, sample collection, sample storage and transportation of samples

Vaccination and treatment of sick animals

Activities

a. A week seminar on Laboratory mapping tool.
b. A member of a Research group on a Grant from WAC-EID in collaboration with NVRI. So far we have collected 600 blood samples/nasal swabs from sheep/ goats as well as 600 blood samples/nasal swabs from pigs in Benue state. Also we have set traps to capture 130 domestic as well as wild rats and organs such as heart, lungs, liver, spleen, intestines, head, oral and rectal swaps have been taken for Analysis.
c. A member of a research grant group. PPR IN PIGS. Where about 150 serum samples were taken from pigs as well as sheep and goats staying together to establish the presence of PPR in pigs
d. We worked in collaboration with Benue State Government, private veterinary clinics and veterinary practitioners in the state to promptly collect samples from sick animals, most especially pigs to assist in diagnosis and supportive therapy to minimize losses to farmers.
e. We sold vaccines to vendors, veterinary clinics in Benue State and neighboringNasarawa and Cross rivers States.
f. We bought 4plastic chairs to replace the broken ones.
g. Upto date with payment of adhoc staff(security and cleaner)

h. A 10KVA Solar inverter, durable dry cell battery was installed at our station to address the problem of power and cold storage of vaccines and samples.

Challenges

a. No functional laboratory,mostequipment are obsolete with expired reagents
b. No water source and a functional toilet

14. ORJI RIVER OUTSTATION LABORATORY

Functions/Mandates

Provision of surveillance and diagnosis of animaldiseases
To conduct research into all aspects of animal diseases, their treatment and control.
Provide extension services to poultry andlivestock farmers.

Activities:

Provision of postmortem services and extension servicesto farmers.
We participated in the Animal Mobility studyfor North Central Trans humance route of Nigeria. The survey took off on 22nd November 2023 and ended 22nd January, 2024.

Vaccines Requested/Supplied

1. New castle disease vaccine (Lasota) 2600/1900
2. Infections bursal disease vaccine 2000/1500
3. New castle disease vaccine - -
4. New castle disease vaccine kamorov 100/0
5. Fowl Typhiod vaccine 200/200
6. Fowl pox vaccine - -
7. Anti Rabies vaccine - -
8. Pestes des Petit Ruminant - -

Total 4900/3600
In summary, we requested for four thousand nine hundred vials of vaccines while three thousand six hundred vials of vaccines were supplied to us.

Challenges

We could not achieve much because of upward review of our prices and the country's unplanned Redesign of currency (naira).
Our Laboratory is still non-functional since we lack the basic tools to operate as a Laboratory; freezers refrigerators, basic laboratory tools and equipment.
Insecurity in South East aggravated
High cost of vaccines, feed and birds which has discouraged many farmers

15. PORT HARCOURT OUTSTATION

Functions/Mandates:

Necropsy, Epidemiology,Bacteriology, clinical pathology, histopathology, Rabies diagnosis, among others.
Conducting ambulatory services to farmers and surveillance activities.

Activities

Workshop on Laboratory equipment and Instruments use was done in collaboration with the Veterinary department of the Rivers State Ministry of Agriculture; a training of Veterinary doctors and other animal handlers on sample collection and processing was facilitated.

Achievements

1. Improved surveillance of trans-boundary diseases as Foot and Mouth disease in Cattle, Peste des petit Ruminants(PPR) and African Swine fever (ASF).

2. More Veterinary doctors and animal handlers in Rivers State are now more aware of strict adherence to routine sample collection and processing.

3. Through public education, more pet owners now want to vaccinate their pets against Rabies infection. Also, more farmers are now open to discontinue the use of proliferated and unsafe avian influenza vaccines in the market.

Research highlights:

We collected and submitted samples on FMD in cattle and PPR in sheep and goats during the Animal Mobility and transhumance study for North central route in collaboration with Food and Agriculture Organization (FAO).

We have also contributed towards One health approaches by working with Rivers State Ministry of Health in developing strategies towards Avian influenza prevention and control.

Challenges:

Our outstation laboratory lacks the most basic laboratory equipment such as functional microscopes, reagents and other diagnostic tools
We are faced with security challenges within the premises of ADP, Rumuodomaya where our office is located. There’s continual theft of office fittings such as window louver and plumbing pipes even after replacements.

16. SOKOTO ZONAL LABORATORY

The Sokoto, was established since 1972/73. The Laboratory occupies an area of 1.4 hectares and comprises16 offices/laboratories and 4 rooms linear residential accommodation.

Activities:

Activities in the lab during the period under review are as follows:

1. Post mortem examination of dead poultry for disease agents (Gumboro, Fowl typhoid, Fowl pox and New castle diseases).
2. Ambulatory services and Extension: Two calls were received for extension services/guide on vaccines usage. Four (4) ambulatory services were rendered to 2 poultry farms in Kebbe, Sokoto State (1400 layers) and Geseme, Niger Republic (1641 layers), were administered NCD Komorov vaccination and fowl typhoid medicationrespectively.
3. Vaccine sales were as follows:
   - Large animal vaccines:250 vials [CBPP (205), PPR (35), BQV(10), HSV (10), ASV (10)]
   - Poultry and ARV vaccines:755 [Lasota (27), Gumboro (30), NCD i2 (576), Komorov (75), Fowl pox (10), Fowl typhoid (10) and ARV (27)]

Renovation of the laboratory and installation of solar panel/light was completed in the laboratory in the year 2023.

Training: The officer in charge attended one training workshops and his subordinate twice both in Jos between February and July, 2023.

Challenges:

1. Lack of furniture and laboratory equipment in the lab.
2. Shortage of staff - there are only 2 veterinarians in the lab,one laboratory technologist and one Admin officer. More staff are needed as we look forward to the supply of more lab equipment. The Sokoto laboratory is in need of more technical staff most especially now that the second veterinarian is on study leave.

Future Plan: Our laboratory has a vast land space; the future plans are that after having furniture and laboratory equipment. We propose to broker partnership with a private firm to have a Veterinary Clinic attached to our laboratory which certainly will boost our presence and services to the state residence. We further propose to have demonstration poultry house to be built in the laboratory space where broilers and quails can be raised regularly and sold to generate revenue for the lab and the Institute.

Epidemiological Laboratory Jalingo, Taraba State

Activities

In the year under review we carried out the following activities:

1. Vaccine sales
2. Conducted farm visits to Mararraba Kunini farms to investigate suspected cases of Trypanosomiasis and Babesiosis. Samples were collected and sent to the Central Diagnostic Laboratory for testing.
3. Carried out Animal Mobility Studies in the North East Zone, sponsored by FAO/ECTAD in partnership with the Federal Ministry of Agriculture. This involved sample collection and administering questionnaires for Foot and Mouth Disease (FMD) surveillance. Over 200 blood samples were forwarded to the FMD Laboratory.
4. Visited poultry farms to provide expert advice and administer treatments/vaccinations.
5. Engaged in monthly Zoom meetings with the Director of outstations.

Challenges

We continue to operate from the remains of our laboratory, which was severely damaged during the 2020 #EndSars protests, resulting in widespread looting and destruction. Today, only the skeletal structure of the building stands. Unlike our state counterparts, who have benefited from a new veterinary clinic, we have received no assistance or upgrades to our facility. Despite these challenges, we remain committed to our mission and objectives. We urge the Institute's management to address our situation and provide support.

1. Non-operational laboratory facilities
2. Insufficient availability of vaccines
3. Limited customer engagement due to absence of a laboratory
4. Shortage of qualified staff

Conclusion

To overcome the challenges faced by the Jalingo outstation Laboratory, it's crucial for the Institute's management to focus on addressing them. Meanwhile, we are committed to upholding NVRI's reputation and presence in Taraba.

17. UMUDIKE OUTSTATION LABORATORY

Activities carried out

1. Distribution and sales of vaccines produced by NVRI.
2. Diagnosis and treatment of animal diseases with the aid of our laboratory and technical know-how.
3. Offer veterinary services to poultry and livestock farmers.
4. Enlightenment of farmer, veterinarians, pet owners and general public on the efficacy and use of NVRI vaccines and products.
5. Offer professional advice on animal disease control.
6. We obtain feedbacks from farmers on our biological and services.

Achievements

1. We carried out monkeypox training and sensitization in Abia state.
2. In conjunction with the ministry of agriculture we carried out mass antirabies vaccination in Abia state.
3. We offered extension services to several farms.
4. We sold NVRI vaccine and made it the most sort after vaccine in Abia state.
5. We diagnosed and treated many animal diseases.

Challenges

1. In need of casual staff.
2. An upgrade of our laboratory with a Real-time polymerase chain reaction machine and reagents and modern laboratory equipment.
3. Renovation of our laboratory building.

18. UYO OUTSTATION LABORATORY

No.	ACTIVITIES	PERIOD
1.	Purchase of CBPP Vaccines from NVRI Vom.	March
2.	Vaccination of herds of cattle with CBPP Vaccines in some suburb of Akwa-Ibom state.	March - April
3.	Surveillance of Anthrax in some selected abattoirs in Akwa-Ibom state during the nation-wide Anthrax out-break.	June - July

Publications:

Edgardo Moreno, Earl A. Middlebrook, Pamela Altamirano-Silva, Sascha Al Dahouk, George F. Araj, Vilma Arce-Gorvel, Ángela Arenas-Gamboa, Reuben Ocholi, **Amahyel Gusi** , Wilson J. Bertu, Ignacio Moriyón et al ., (2023). If You're Not Confused, You're Not Paying Attention: *Ochrobactrum* Is Not Brucella.J Clin Microbiol 2023 Aug 23;61(8): e0043823. DOI: https://doi.org/10.1128/jcm.00438-23

M.Y Sugun; E.Y Igomu; I. Suleiman (2023). Antibiogram of Commensal Escherichia coli isolated from Cattle in Some Selected Commercial Farms in Jos South Plateau state, Nigeria. European Journal of Theoretical and Applied Sciences 2786-7447.

Atuman, Y.J., Kudi, C.A., Abdu P.A., Okubanjo, O.O. and Abubakar, A-Baju (2023). Haematologic and Biochemical Reference Values for some Wild Animals in Yankari Game Reserve and Sumu Wildlife Park in Bauchi State, Nigeria, Nigeria Tropical Biology Association nad Nigeria Society for Conservation Biology, 8th Biodiversity conservation conference, Book of Abstracts Pp47.

Omoniwa, D.O.; Meki, I.K.; Kudi, C.A.; Sackey, A.K.; Aminu, M.; Adedeji, A.J.; Meseko, C.A.; Luka, P.D.; Asala, O.O.; Adole, J.A.; Atai. R. B., **Atuman, Y.J.,** Settypalli, T T.B., Cattoli, G. and Lamien, C.E (2023). Poxvirus Infections in Dairy Farms and Transhumance Cattle Herds in Nigeria. *Viruses*, (15): 1051. https://doi.org/10.3390/v15051051

Azubuike Raphael Nwaji, Onikisateinba Arieri, Annabel Sharon Anyang, Kaze Nguedia, Etomi Barbara Abiade, **Gilead Ebiegberi Forcados, Olusola Olalekan Oladipo, Sunday Makama, Ishaku Leo Elisha, Nonyelim Ozele, Jurbe Gofwan Gotep** (2023). Natural toxins and One Health: a review. *Science in One Health*. doi.org/10.1016/j.soh.2023.100013.

Ede, S. O., **Gotep, J.,**Ior, L., & Dalang, J. S. (**2023**). Anticonvulsant and Hypnotic Actions of An Aqueous Extract oF*Ganoderma lucidum* (W . CURT.: FR) (GANODERMATACEAE)inExperimental Mice, *World Journal of Pharmacy and Pharmaceutical Sciences* 12(6), 1803–1816.

Gotep, J. G., Sabo, S. Y., Makama, S., Gyang, J., Pwajok, T. P., Uguru, M. O., &Okwuasaba, F. K. (2023). Effect of oral administration of *Fadogiacienkowskii* Shweinf. (Rubiaceae) ethanol root extract on some semen parameters, testes, epididymis, liver and kidney of male albino rats. *Scientific African*, *20*, e01637. https://doi.org/10.1016/j.sciaf.2023.e01637.

Dawurung, C. J., **Usman, J. G., Gotep, J. G.,** & Pyne, S. G. (2023). The Roots of *Neorautanenia mitis* (A. Rich) Verdcourt: Further Evidence of Its Antidiarrhoeal Activity. *Molecules*, *28*(2), 1–9. https://doi.org/10.3390/molecules28020673

Barde, I. J., Elisha, I. L., Andrew, C. F, Barde, D. J., Makama, S., Shedua, L. N., Suleiman, I., Shekaro, A., Logyang, E. L., Umaru, N. J. H., Benson, M. N., Sati, N. M., Chabiri, L. A., Ugbe A. D., Budaye J., Oche C., Olabode, M. P., Bakam, J.D., Emennaa, P.E.,& Muhammad, M. (2023). Biochemical and haematological profiles, gross and histopathological lesions associated with the parenteral administration of fixed dose of ketamine in albino rats model. Journal of Drugs and Pharmaceutical Science 6(1):1-7.

Makoshi, M. S.,Elisha, I. L., Bisi, O. A.,&Arowolo, R. O. A. (2023). Ethno-botanical survey: Exploring indigenous remedies for African animal trypanosomosis in Nigeria. International Journal of Biochemistry Research and Review 32(10):45-55.

Barde, I. J., Elisha, I. L., Ibrahim, E. A., Abubakar, S. A., Kantiyok, D., Budaye, J., Makama, S., Habibu, H., Oguche, M. O., Leo, S. N., Bakam, J. D., Makoshi, M. S., Dashe, Y., Ngulukun, S. S.,& Muhammad, M. (2023). *Mucuna pruriens* (karara) leaf extracts enhance certain haematological parameters in albino rats. Acta Scientific Veterinary Science 5(9):8-14.

Azubuike Raphael Nwaji, Onikisateinba Arieri, Annabel Sharon Anyang, Kaze Nguedia, Etomi Barbara Abiade, **Gilead Ebiegberi Forcados, Olusola Olalekan Oladipo, Sunday Makama, Ishaku Leo Elisha, Nonyelim Ozele, JurbeGofwan Gotep** (2023). Natural toxins and One Health: a review. *Science in One Health*. doi.org/10.1016/j.soh.2023.100013.

Dauda, G. B., Elisha, I. L.,Makama, S.,& Muhammad, M. Vaccine and Agro-terrorism: An analysis. In Agro-terrorism: Villains, Victims and Counter-measure, **2023**. (Book Chapter).

Barde Israel Joshua, Ishaku Leo Elisha, Andrew Chechet Faith, Barde Dorcas Jummai, **Makama Sunday, Leo Shedua Nyam, Isa Suleiman, Shekaro Audu, Logyang Emmanuel Lot,** Umaru Nendir John Haruna, **Benson Mercy Namang, Sati Nancy Milton, Chabiri Ladi Amos, Ugbe Aondona Dominic, Budaye James, Oche Charity, Olabode Mayowa Peter, Bakam Judith Dizot, Emennaa Paulinus Ekenedilichukwu and Muhammad Maryam** (2023).Biochemical and haematological profiles, gross and histopathological lesions associated with the parenteral administration of fixed dose of ketamine in albino rats model.

Joshua Kamani, ThallithaSamih Wischral, Jayme Vieira, Rafael Felipe da Costa Vieira, **Audu Shekaro**, Yaarit Nahum-Biala, **Toyin Olubade**, Moses Samuel Abasiama, Umar A. Gajibo, Laminu Bukar, Mike Shand, Shimon Harrus, Gad Baneth (2023). Molecular detection of *Theileria annulata*, *Theileria mutans* and *Theileria velifera* but no evidence of *Theileria parva* infected or vaccinated cattle in Nigeria despite extensive transboundary migrations. Veterinary Parasitology: Regional Studies and Reports. 41, June 2023, 100887

Joshua Kamani, Mike Shand, **Audu Shekaro**, Bukar Laminu, **Olubade Toyin**, Moses Samuel Abasiama, Juliane Schaer, Shimon Harrus (2023). *Mycoplasma wenyonii* and Candidatus Mycoplasma Haemobos in Pastoralists Cattle in Nigeria. *Acta Parasit.* **68**, 430–438 (2023). https://doi.org/10.1007/s11686-023-00683-0.

Dennis Kabantiyok, Moses D. Gyang, Godwin O. Agada , Alice Ogundeji, Daniel Nyam, Uchechi G. Uhiara , Elmina Abiayi , Yakubu Dashe , Sati Ngulukun , Maryam Muhammad , Oyelola A. Adegboye, and Theophilus I. Emeto (2023) Analysis of Retrospective Laboratory Data on the Burden of Bacterial Pathogens Isolated at the National Veterinary Research Institute Nigeria, 2018–2021. Veterinary Sciences, 10, 505. https://doi.org/10.3390/vetsci10080505 https://www.mdpi.com/journal/vetsci

Kabantiyok., LE Logyang., AO. Ogundeji., J. Budaye., I. Adonyikwu., GDA. Agada., GD. Moses and AA. Masdooq (2023). Peri-urban wildlife as sentinels for antimicrobial resistance in sights from owlets (Tyoto alba) in Jos, Nigeria (short communication). *Sokoto Journal of Veterinary Sciences* 21(3, 151-154).

Yohanna Iliya, Jacob KwadaPaghi Kwaga, Grace Sabo Kia, Yakubu Gunya Dogonyaro Dashe, Godwin Ojonugwa Agada, Muhammad Balogun, Charles Michael Akatobi (2023). Occurrence and risk of human infection and antimicrobial susceptibilities of Escherichia coli isolates from beef sold for human consumption in Jos metropolis, Plateau State Nigeria, September 2018 – June 2019. *Journal of interventional Epidemiology and Public Health* (JIEPH), Volume 6, Article 6. https://www.afenet-journal.net/content/article/6/6/full

Guluwa, L.Y., **Agada, G. O. A**., Wumnokol, D. P., **Damter, S. A**, Gulukun, E. Z. and Latu, M. Y. (2023). Microbiological Quality Assessment of Cooked Meat Sold At Garkawa Market of Mikang Local Government of Plateau State, Nigeria. *International Journal of Veterinary Science and Agriculture Research* Volume 5 Issue 4. ISSN: 2582-4112, Available at www.ijvsar.com

Guluwa, L.Y., **Agada, G. O. A**., Wumnokol, D. P., Dalokom, D. Y., Agbu, C. S., Dastu, A. J. (2023). Evaluation of Fungal Contamination on Livestock Feed Ingredients of Plants origin Stored for Five Years. International Journal of Life Science and Agriculture Research ISSN (Print): 2833-2091, ISSN (Online): 2833-2105 Volume 02 Issue 08. https://doi.org/10.55677/ijlsar/V02I08Y2023-02 Page No: 213-215.

Meseko, C., Inuwa,B., Mkpuma, N.,Chinoyerem, C., Olubade, T., Lawal,R., Rufai, N., Ahmed, J., and Muhammad, M. African Horse Sickness Outbreak In Nigeria: A presentation at the AHS & BT Workshop, 7-8 November, 2023, Madrid, Spain.

Ambagala A., Goonewardene K, Lamboo L, Goolia M, Erdelyan C, Fisher M, Handel K, Lung O, Blome S, King J, Forth J. H, Calvelage S, Spinard E, Gladue D. P, Masmbe C, **Adedeji A J, Olubade T, Maurice N.A, Ularamu H.G. and Luka P. D.** (2023). Characterization of a Novel

African Swine Fever Virus p72 Genotype II from Nigeria.*Viruses*,15,915. https://doi.org/10.3390/v15040915

Luka, S. A., Kogi, E., Ndams, I. S., Kogi, A.C., Yaro, C.A., Yakubu, R., Kase, S. N., Bello, R., Yusuf, B., Haruna, J.S., Mohammed, A.T., Mohammed, S. J., Ibrahim, Z., Gwalaba, J., and Oladeji, I.O. (2023) Prevalence of Hydatid Cysts in Liver and Lungs of Cattle Slaughtered in selected Abattoirs in Northern Nigeria. *FUDMA Journal of Science (FJS) Vol. 7 No. 3, pp 93-101*.

Henry E. Nnabuife, Bernard Matur, **Ndudim I. Ogo**, Obed Goselle, **Ismaila Shittu, Nicodemus Mkpuma, Emmanuel Obishakin, Nneka Chima, Joshua Kamani** (2023). *Rickettsia africae* and *Rickettsia massiliae* in ixodid ticks infesting small ruminants in agro-pastoral settlements in Plateau State, Nigeria. *Experimental and Applied Acarology*. https://doi.org/10.1007/s10493-022-00769-w.

Henry E. Nnabuife, Bernard M. Matur, **Ndudim I. Ogo,** Obed N. Goselle, **Joshua Kamani,** Georgina S. Mwansat**, Rebecca Weka, Yinka Adedeji, Henry Osemeka, Jolly Amoche, Oko K. Egwu** (2023). Knowledge, Attitude and Practices among Pastoralists and Animal Health Workers on Tick-Borne Spotted Fever Group Rickettsiosis in Plateau State, Nigeria. *Folia Veterinaria*, 67, 2: 78—88. DOI: 10.2478/fv-2023-0019.

Anthony Nwachinaemelu Egbuji, Paschal Ugochukwu Umeakuana, Jonas Anayo Onah, Emmanuel OlojaEjeikwu, **Ishaya Sini Tekki**, **Banenat Bajehson Dogonyaro**, Dalton Samuel, Simon Ikechukwu Enem (2023). Canine Rabies with Short Incubation Period in an UnvaccinatedNigerian Indigenous Breed of Dogs: "Case Report". ARC Journal of Animal and Veterinary Sciences; 8 (1): 12 -17 ISSN No. (Online) 2455-2518 https://doi.org/10.20431/2455-2518.0801003www.arcjournals.org

Tekki, I. S., Odita, C. I., Ifende, V. I., Meseko, C. A., Bala, A., Konzing, L., Aneke, E. T., Ezekiel, P. and Muhammad, M. (2023). Assessment of Perception of Rabies Infection Risk among Dog Handlers and Dog Meat Consumers in Plateau State, Nigeria.*Sahel J. Vet. Sci.,* 20 (2): 22-28 *http://dx.doi.org/10.54058/saheljvs.v20i2.363*

Konzing L, Kwaga JKP, Kia GSN, Kazeem HM, **Mkpuma N, Tekki IS and Muhammad M.** (2023). Molecular characterization of rabies virus in trade dogs from Plateau state, Nigeria. *Sokoto Journal of Veterinary Sciences*, 21(1): 32-42. http://dx.doi.org/10.4314/sokjvs.v21i1.4

MP Olabode, UA Rayyanu, LE Logyang, H Haliru, D Bwala & MB Bolajoko (2023). Awareness and management practices against rabies among dog owners in livestock farming communities, Plateau State: A preliminary report. *Sokoto Journal of Veterinary Sciences*, **21**(4): 222 - 225. http://dx.doi.org/10.4314/sokjvs.v21i4.8

Abubakar, A. T., Al-Mustapha, A. I., Oyewo, M., Ibrahim, A., Abdulrahim, I., Yakub, J. M., Elelu, N., Nguku, P., Balogun, M. S., Awosanya, E. J., Kia, G. S. N., Kwaga, J. K. P., Okoli, I., **Bolajoko, M. B**., Alimi, Y., Mbilo, C., & Dacheux, L. (2023). Prospects for dog rabies elimination in Nigeria by 2030. *Zoonoses and Public Health*, *00*, 1–17. https://doi.org/10.1111/zph.13084

Rayyanu, U. A., Olabode, M. P., Haliru, H., Logyang, L. E., Bwala D., and Bolajoko, M. B (2023). Biosecurity and Economic Impact of Major Diseases of Livestock Among Rural Farmers in Plateau State, Nigeria: A Pilot Study. *Journal of Veterinary and Biomedical Sciences Vol. 5 (1). PP 74 - 86, July 2023*. 10.36108/jvbs/3202.50.0190

Oluwaseun A. Ogundijo, Oladipo O. Omotosho, Ahmad I. Al-Mustapha, John O. Abiola, Emmanuel J. Awosanya, Adesoji Odukoya, Samuel Owoicho, Muftau Oyewo, Ahmed Ibrahim, Terese G. Orum, Magdalene B. Nanven, **Muhammad B. Bolajoko, Pam Luka**, Olanike K. Adeyemo (2023). A multi-state survey of farm-level preparedness towards African swine fever outbreak in Nigeria. *Acta Tropica 246 (2023) 106989.*https://doi.org/10.1016/j.actatropica.2023.106989

Logyang LE., MP, Olabode., H, Haliru., UA, Rayyanu., MB, Bolajoko. (2023). Epidemiologic Survey Around Dog Bites in Plateau State, Central. Nigeria. *Biomed Sci Clin Res, 2*(2), 207-210. https://doi.org/10.21203/rs.3.rs-2053558/v1

Adefolake A. Bankole, Bersissa Kumsa, Gezahegne Mamo, **Ndudim I. Ogo**, Nusirat Elelu, Winston Morgan and Sally J. Cutler (2023). Comparative Analysis of Tick-Borne Relapsing Fever Spirochaetes from Ethiopia and Nigeria. **Pathogens, 12, 81**. https://doi.org/10.3390/pathogens12010081.

Ndudim Isaac Ogo, Rebecca Weka, Nnabuife E. Henry, Chidebere Uchendu, Sylvester Obeta, Maxwel Opara (2023). Knowledge, Attitudes, and Practices of Pastoralists towards Tick-bites, and Tick Control in Plateau State, Nigeria. **Acta Parasitologia. *https://doi.org/10.1007/s11686-023-00670-5***

Dieter J. A. Heylen, Bersissa Kumsa, Elikira Kimbita, Mwiine Nobert Frank, Dennis Muhanguzi, Frans Jongejan, Safiou Bienvenu Adehan, Alassane Toure, Fred Aboagye Antwi, **Ndudim Isaac Ogo**, Nick Juleff, Dionne Crafford, Josephus Fourie, Michel Labuchange and Maxime Madder (2023).Tick-borne pathogens and body condition of cattle in smallholder rural livestock production systems in East and West Africa. **Parasites & Vectors** : 16:117. https://doi.org/10.1186/s13071-023-05709-0.

Dieter J. A. Heylen, Bersissa Kumsa, Elikira Kimbita, Mwiine Nobert Frank, Dennis Muhanguzi, Frans Jongejan, Safiou Bienvenu Adehan, Alassane Toure, Fred Aboagye-Antwi, **Ndudim Isaac Ogo**, Nick Juleff, Josephus Fourie, Alec Evans, Joseph Byaruhanga and Maxime Madder (2023). Tick communities of cattle in smallholder rural livestock production systems in sub-Saharan Africa. **Parasites & Vectors:** 16:206. https://doi.org/10.1186/s13071-023-05801-5.

Mahmud Usman, Audu Joseph Natala, Isa Danladi Jatau, **Ndudim Isaac Ogo**, Ghulam Jeelani, Yasuyuki Goto, Tomoyoshi Nozaki, James H. McKerrow and Emmanuel Oluwadare Balogun (2023) Molecular identification of phlebotomine sand flies and the harbored Leishmania spp. in Sokoto State, Nigeria. **Frontiers in Cellular and Infection Microbiology**. 13:1219629. doi: 10.3389/fcimb.2023.1219629.

Ukonu, C.E., **Ogo, I. N**., Daniel-Igwe, G., Innocent, I.N. and Okereke, C.O. (2023): Pathology, Haematology and Biochemistry of Coccidiosis in Broiler Chickens. **Nigerian Agricultural Journal.** *ISSN: 0300-368X***.** Volume 54 Number 2 December 2023 Pg. 310-323. http://www.ajol.info/index.php/naj.