PREFACE

The yearly publication, Annual Report, is a chronicle of activities of the Institute during the year under review. It is a source of authentic information on research and related activities of the Institute. Each year ushers in new opportunities and with it new challenges. The year 2018 is not an exception. Although, the mandate of the institute has not changed, pathogens and environmental factors are in constant flux, necessitating regular rethink and review of diagnostic and vaccine production methodologies in order to control endemic, emerging and re-emerging diseases. Therefore, the main thrust of the Institute is in deploying innovative cutting edge approach in research and development in order to come up with products, services and strategies that will enhance livestock and public health. Specially, our aim is to develop cost effective and timely control measure for economically important animal and zoonotic diseases. The threats of Ebola, Lassa fever, Monkeypox etc. are realities attesting to the magnitude of the challenges around us. This calls for multidisciplinary multi-sectorial approach to disease control as currently being advocated by the One Health paradigm.

The Institute sought to achieve her goals through local and international collaboration with experts in veterinary research and vaccine development. This has improved the quality of our research and vaccine development in no small measure. Currently some laboratories in the Institute are undergoing twining programmes with international reference laboratories in order to achieve accreditation to reference laboratory status. To this end, new equipment / facilities were provided or old ones upgraded to enhance performance. In addition, staff of the institute were routinely trained/ retrained in various specialties in order to keep abreast with current trend in research and vaccine production.

Adequate funding of research has been increasingly difficult over the years and it has become apparent that exploring alternative means of research funding is the best approach. In this regard, the Institute has established a Grants Management Office (GMO) in line with what is obtainable in the developed climes. This, we hope will assist the research staff by facilitating access to funding agencies, calls/announcements for submission of grants proposals and other funding opportunities. The GMO will also explore avenues for research funding by local and foreign organizations/enterprises operating in the country.

The activities reported herein attest to the resolve of management and staff of the Institute in fulfilling its mandate. Therefore, credit goes to the entire staff of the Institute for the spirit of teamwork, self-motivation, diligence and dedication that made possible the achievements recorded during the period under review. It is my honor therefore to invite you to read through the account of our modest accomplishments in 2018.

Dr David Shamaki

Director/Chief Executive

RESEARCH HIGHLIGHTS

Grants Management Office

The establishment of the Grants Management Office (GMO) is a strategic act and a landmark achievement in the history of funding for research in the Institute. It is a boost for a new dawn, where the dogma of **sit and wait** for research funding is being supplanted by **arise and seek** for funds to bolster your research ideas. Therefore, the GMO is meant to provide a platform and the necessary support needed by staff to access information and favorably compete for research grants. The office is also expected to ensure transparency, accountability and judicious use of research grants awarded to recipients without undue bureaucratic bottle necks of the public service. Currently, the office is being headed by a technical director who is being supported by three other staff; a researcher, accountant and a lawyer. Institute staff have been briefed on the establishment of this office and activities have gradually commenced with the GMO circulating notices on calls for submission of grant proposals to concerned staff by emails.

Surveillance for emerging Transboundary Animal Diseases (TADs)

As part of a national emergency preparedness plan, the Institute in collaboration with national and international organizations embarked on surveillance of emerging diseases. Ecological surveillance of Monkeypox virus in animals was conducted in collaboration with Centre for Disease Control (CDC) Atlanta, USA/ Nigerian Centre for Disease Control (NCDC) and the Field Epidemiology and Laboratory Training Programme (FELTP). Samples were collected and preserved. Analysis of the samples will be held jointly between the collaborating partners. Similarly, surveillance of Avian Influenza viruses was carried out at high risk areas across the country. Results generated were communicated to the appropriate authorities and necessary actions were taken to either control or prevent outbreaks. Surveillance activities on Rift valley fever virus and Lassa fever viruses were also conducted during the period under review. Preliminary results showed that 11% of cattle screened in northcentral Nigeria were seropositive to RVF antibodies.

Twining projects

Several Divisions in the Institute were involved in technical activities geared towards capacity building and skills acquisition under various twinning projects with international reference laboratories. A workshop on the implementation of technical, biosecurity and quality control skills for the diagnosis and control of Foot and Mouth Disease (FMD) virus under the OIE FMD Twinning Project and facilitated by Sciensano, Belgium took place from 12th to 16th March 2018 in the Institute. Similarly, four staff of the Institute were trained under the OIE twinning project on avian influenza in collaboration with IZSVe, Italy. The training module covered biosafety and biosecurity measures for avian influenza control. Other components of the twining project include the application of classical and molecular techniques for the diagnosis of avian influenza as well as the use of geographical information systems for the monitoring of animal diseases.

ADMINISTRATION DEPARTMENT

The general administration of the Institute's activities is the prerogative of the Administration Department. For maximum efficiency the department is structured into units each saddled with specific responsibilities.

During the year under review the **Records and Documentation Unit** recorded the following:

- Appointments - 4
- Retirement (Voluntary & Statutory) - 44
- Deceased - 8
- Transfer of Service from the Institute - 1
- Transfer of Service to the Institute - 2
- Resignation/Withdrawal of Service - 2
- Dismissal/Termination - Nil
- Staff Training - 38

Issues related to health of staff were handled by the National Health Insurance Scheme (NHIS) Unit, where 5, 5 and 8, new registration, change of Healthcare Providers and addition of dependents, respectively, were processed.

In line with its core responsibilities, **the Establishment Unit** handled the promotion of 145 senior staff and 18 junior staff. Similarly, the advancement / conversion of 8 and 9 junior and senior staff, respectively, were processed. Disciplinary cases involving 2 senior staff were handled by the Unit.

The Legal Unit serves as adviser to the Institute on various litigations. It also handles criminal and civil cases involving the Institute in liaison with the external solicitors and the legal department of the Federal Ministry of Agriculture and Rural Development. Five cases were handled by the Legal Unit in 2018 and they are at various stages of hearing while two has been disposed of. For details on these cases and other Institute's landed properties in Lagos State, the Ikorodu Land and the Triangular Land in Vom, contact the Legal Unit.

Relatedly, having paid the total purchase price for the acquisition of Madara Limited, the legal ownership of Madara is now vested with the National Veterinary Research Institute, Vom. However, Certificate of Occupancy No. 80 which covers the Madara Intermediary Quarters deposited at First Bank of Nigeria Plc for safe custody is yet to be handed over to the Institute and efforts are still on to retrieve same.

The Training Unit working in collaboration with the Training Committee recommends qualified staff for appropriate training in accordance with the Training Policy Guidelines for Institute and Colleges. The Unit also processed refund of school fees and other study leave allowances incurred by staff from their training up on completion of study. A total of 26 staff resumed duty in 2018 after successful completion of their academic programs.

During the year under review, the Unit processed and granted approval to 38 staff to proceed on various academic training within and outside the country as presented:

PhD	-	10
MSc	-	13
HND	-	15

The major challenge facing the Training Unit is lack of computer and external hard drive for proper record keeping and lack of effective means of communication with staff on training and those intend to go on training.

The Internal Security Unit of the Institute is saddled with the responsibility of the protection of lives and properties. Due to priority given to security of lives and properties in the Institute, a combined team of the Internal Security Unit, Pahek and Executive Guards, conventional policemen, Civil Defense Corps and local hunters are all involved in maintaining security of the Institute.
In the year 2018, the Institute received as visitors high profile personalities both nationally and internationally. This Unit provided adequate security coverage during such visits. In addition, the Internal Security Unit also monitored and provided security during various activities of students of the two colleges (FCAH&PT& FCVMLT) and the staff schools. Student's activities are being closely monitored to prevent any possible breakdown of law and order.

The Institute generally witnessed peace in the year 2018, even though there were series of reported cases of theft and vandalization of JED installations and borehole pipes.

The Security Unit has put in place mechanism to forestall any ugly incident and to also expose miscreants through intelligence gathering. The unit hoped that with the review in the security strategies the in-coming year will usher in grace and safety of lives and properties. This will be the focus of the Unit in collaboration with other relevant stakeholders and the general public.

APPLIED BIOTECHNOLOGY DIVISION

In line with the Mission, Vision and Mandate of the Institute, the Division undertook the following activities during the year under review:

1) Research on the development of biologicals (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) Served as a centre for biotechnology collaborative research with national and international research institutions and universities.
4) Developed and validated 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) Conducted national and international trainings on biotechnology methodologies for diagnosis & research.
8) Served as a centre for DNA Bar coding of animals, disease vector insects, invasive pests and insects.
9) Served as one of the centres of research for the National Animal Genetic Resource.

Specifically, in collaboration with other Divisions, over 400 samples were analyzed for molecular detection and characterization of pathogenic organisms as outlined in the table.

Table of samples investigated for various pathogens by molecular methods

Animal Disease/Pathogen	Number of Samples	Division
ASF	142	CDL + Biotech
Rabies virus	17	CDL
PPR virus	100	VRD/VVPD/CDL
Leptospira spp.	30	CDL
Salmonella spp.	27	Bacteriology
Rift valley fever virus	20	ABD
*Plasmodium*spp.	29	VRD
IBD virus	50	VRD/VVPD
RotaA virus	29	ABD
Total	**444**	

In addition, the Division provided bench space and assist graduate students to analyzed some samples for *Salmonella* spp. virulence genes (n=27), characterization of *Plasmodium* spp. (n=98) and the detection of environmental bacteria (n=10) by Polymerase Chain Reaction technique.

The Division was also involved in networking with international and reference laboratories on special pathogens for skills acquisition and capacity building.

CHALLENGES

i. Broken down camera for the BioRad Gel documentation system is yet to be fixed.
ii. Lack of autoclave for the sterilization of reagents and consumables as well as decontamination of samples before disposal.
iii. Lack of routine maintenance of biosafety cabinets and calibration of pipettes
iv. There is need to repair the broken down inverter in the division.
v. Inadequate and irregular supply of PCR reagents and consumables for routine diagnosis and training.
vi. Perceived toxicity reactions to ethidium bromide by staff due to prolonged use. The use of a less toxic gel staining dye for electrophoresis should be explored.

FUTURE PLANS

The Division plans on a collaborative project with researchers from a specialized P4 laboratory in Canada on "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 in northern Nigeria". It is envisaged that the study will unravel the natural hosts/reservoirs for these viruses. The homogeneity or otherwise of *Mastomys nataliensis* in Nigeria will also be determined. The immediate outcome of this project will be the selection of a candidate Lassa fever virus vaccine strain candidate specific to Nigeria from the field isolates to be collected.

Another project planned for the future is the use of molecular techniques in the evaluation of genetic insertions into the genome of Fowl Pox vaccines produced in the Institute.

BACTERIAL RESEARCH DIVISION

The Bacterial Research Division has the mandate to conduct research on the diagnosis, treatment and control of economically important bacterial diseases of animals in Nigeria. The Division has four specialized research units namely, Brucella, Mycoplasma, Pasteurella and Salmonella laboratories. Each of these laboratories engages in the isolation, identification and characterization of bacterial pathogens. New and improved techniques for the diagnosis of listed bacterial diseases in animals are being deployed by the staff of the Division to ensure that prompt and accurate results are obtained from our analysis. This has ultimately assisted in the control of bacterial diseases. The division is also responsible for the production of antigens for diagnosis and research and the preservation of isolates for future research and possible vaccines development.

In collaboration with our research partners; University of Jos Biological conservatory, Jos zoological garden, AP Leventis Ornithological Research Institute (APLORI), the Division conducted several research on the isolation and diagnosis of bacteria in animals.

The Division also hosted an International Atomic Energy Agency (IAEA) fellow from Sierra Leone for a three (3) months training programme in bacteriology.

Several postgraduate and undergraduate students were provided with bench space in the Division and assisted with the necessary technical expertise to carry out their research projects.

Students on industrial work experience scheme posted to the Division were given practical training on the various microbiological techniques.

As part of the Division's routine work, several samples were received by the various sections from different animal species including cattle, sheep, goats, pigs, birds (domestic/wild), crayfish, organs, tissues, swabs, water, blood, serum for the isolation and diagnosis of bacterial infections. The results obtained from the various samples are summarized in the table below:

Table 1: Number of samples analyzed and the type of bacteria isolated

Section/Laboratory	Sample received	Positive samples	Isolations
Brucella	4652	0	0
Mycoplasma	673	105	63
Pasteurella	294	19	19
Salmonella	1185	141	141
Others pathogens isolated in Pasteurella laboratory			
E.coli			36
Salmonella spp			8
Bacillus spp			14
Pseudomonas spp			24
Staphylococcus spp			4
Campylobacter spp			26

Some of the bacterial isolates from 46 samples were subjected to antimicrobial susceptibility test in the Salmonella research laboratory in order to determine the most cost effective and efficacious drug for treatment of the conditions.

CHALLENGES

Some of the challenges faced by the Division include; lack of or late supply of some essential equipment/reagents required for prompt analysis of samples. The functional efficacy of the Bio safety cabinet in the Division cannot be guaranteed since it has not been checked for routine maintenance and servicing, thus constituting a risk to the users and the general public.

The laboratory and office accommodation is not conducive. This is due to the lack of proper demarcation between laboratory work space and staff offices resulting in poor ventilation and exposing the staff to health hazards.

FUTURE PLANS

The Division plans to intensify efforts on the field collection of samples to determine the epidemiology and true status of economically important bacterial pathogens of poultry and livestock. Viability test will be conducted on the isolates obtained from field samples before freeze drying them. Avenues for their characterization using molecular methods will be explored and hopefully whole genome sequencing will be done on some of the Nigerian isolates in collaboration with some friendly international laboratories.
The Division intends to embark on the production and standardization of *Brucella* antigens for disease diagnosis and research
The Division will explore sources of external or internal funding to conduct a proposed project entitled "The use of innovative approach to develop and apply Bacteriophage cocktail for the biocontrol of Avian Pasteurellosis (Fowl cholera) and other diseases of poultry and livestock in Nigeria".

The Division will seek for avenues for collaborations with vaccine development institutions in order to build capacity in various aspects vaccines research and development.

BACTERIAL VACCINE PRODUCTION DIVISION

The Division is charged with the responsibility of developing and producing bacterial vaccines for the control of economically important bacterial diseases of livestock in Nigeria.

Therefore, in line with this mandate, the Division produced about 20 million doses of assorted bacterial vaccine during the period under review (see table for details). This was made possible due to the installation of the 12,000 vials capacity freeze dryer and the continuous availability of media, vials, bottles and other ingredients required for vaccines production.

2018 BACTERIAL VACCINES PRODUCTION FIGURES

Type of Vaccine	Total batches produced	Total bottles produced	Total doses produced
ASV	5	4,625	1,850,000
BRUCELLA S19	4	25,953	2,595,300
BQV	3	4,547	2,273,500
CBPPV	12	87,211	8,721,100
FCV	3	2,166	433,200
FTV	6	35,552	3,555,200
HANTAVAC	4	4,687	187,480
HSV	8	9,452	378,080
TOTAL	45	174,193	19,993,860

Key:

ASV: ANTHRAX SPORE VACCINE; BV: BRUCELLA VACCINE; BQV: BLACK QUARTER VACCINE; CBPP: CONTAGIOUS BOVINE PLEURO PNEUMONIA;

FCV: FOWL CHOLERA VACCINE; FTV: FOWL TYPHOID VACCINE; HSV: HAEMORRHAGIC SEPTICAEMIA VACCINE; HV: HANTAVAC VACCINE

CHALLENGES

- Multiple industrial actions embarked by Labour unions some lasting for months.
- Frequent break down of Cold rooms, freeze-drying and labelling machines.
- Inadequate number of staff to man the activities of Vaccine Production.

FUTURE PLANS

- Research on improving the shelf life of FCV.
- Research on production of freeze dried ASV
- Research on multivalent vaccine production

BIOCHEMISTRY DIVISION

Activities conducted during the period under review were guided by the mandate of the Division which is "To conduct research into all aspects of animal nutrition, veterinary toxicology, chemical pathology and drug development for the prevention, treatment and control of animal diseases". The Division through the four sections, namely: Clinical Biochemistry, Nutrition, Toxicology and Drug Development conducted the following research projects during the period under review.

1. Antimicrobial evaluation of selected medicinal plants in NVRI Vom and environment.
2. Safety evaluation of *Bauhinia thonningii* (pods) and *Crotolaria retusa* (leaves) on Wistar rats.

Findings from these projects were presented as seminars, in conferences or published in peer review journals (See list of publication by NVRI staff).

Furthermore, staff of the Division successfully trained and mentored the 2018 interns of the NEF/NVRI Toxicology Internship Program as well as participated in the training of students on Students Industrial Work and Experience Scheme (SIWES) from various tertiary institutions across the nation.

As part of routine activities, the Division analyzed a total of 598 samples across the various sections. The samples analyzed include, 447 from outside the Institute and 151 as NVRI internal samples for research and diagnosis. The Drug Development Section produced about six hundred (600) litres of distilled water for use in the Divisional labs and other Departments of the Institute.

Five staff were posted to the Division in 2018 to meet up with the increasing workload.
In order to keep abreast with developments in the various fields of Biochemistry, staff training and manpower development was accorded priority. As such, staff of the Division attended various training programs/workshops/conference within and outside the country.

CHALLENGES

Our inability to achieve maximal results during the period under review can be attributed in part to some of the under-listed challenges:

1. The new auto amino acid analyser procured for the Division since 2009 is still awaiting installation and training of personnel to man it.
2. There are leakages in some tubes of the newly installed high performance liquid chromatography (HPLC) machine, thus affecting its use despite the training received by staff on its operation.

3. The Atomic Absorption Spectrophotometer (AAS) earlier installed was reported broken down and is yet to be fixed, thus hindering micro and macro mineral elements analysis.
4. Fluctuations in power supply affect work efficiency and causes damage to electric cables.
5. Lack of constant water supply to the labs.
6. Inadequate office space and furniture.

FUTURE PLANS

We hope that the challenges outlined will be adequately addressed and we plan in the future:

1. To introduce new analysis parameters when the high performance liquid chromatography (HPLC) and amino acid analyzer are installed and are fully functional.
2. To vigorously pursue some uncompleted research projects to logical conclusion.
3. To develop an *in vitro* cell and tissue culture toxicity laboratory to reduce the need and use of lab animals.

CENTRAL DIAGNOSTIC DIVSION

Central Diagnostic Division is organized into seven sections namely; Necropsy/Histopathology, Large Animal Experimental Station, Small Animal Experimental Station, Microbiology, Epidemiology, Clinical Pathology, Serology/Parasitology. This is to promote specialization and ultimately enhance performance and productivity.These units functions interdependently to achieve the Mandate and Vision of the Institute.

Primarily, the Division is saddled with the responsibility of:

1. receipt and processing of all animal specimens for disease diagnosis and recommend treatment and control measures for diseases of economic and public health importance across the country.
2. Carry out surveillance of all animal diseases nationwide.
3. Training of intermediate manpower in veterinary laboratory technology and animal health and production technology.
4. Provides extension services to livestock farmers.

In this regard the Division was able to:

1. Receive and process a total 1584 samples including poultry (1005), cattle (176), dogs (180), goats (14), horses (9), cats (2), rabbits (132), sheep (135), pigs (37) and wildlife (4).
2. Incinerate (safe disposal through controlled burning) of 8,940 and 24,948 kilograms of waste materials generated from measles and yellow fever vaccination campaigns, respectively, in Plateau State.
3. Incinerate 10,497 kilograms of carcasses and waste generated within the Institute.
4. Collected data, sorting them and their quick appraisal for timely inference based on cases that were diagnosed and confirmed by the Institute (Central Diagnostic Laboratory and Regional Laboratory).
5. Report to designated authorities on the outcome of analysis of confirmed avian influenza outbreaks/cases for the year 2018.
6. Prepare and supply of reagents to the post mortem room and other laboratories.
7. Train staff, students and interns on modern techniques of histopathology.

Ultimately, the division was able to reduce the turn-around time for disease diagnosis during the review period.

CHALLENGES

Despite the remarkable achievements recorded by the Division in the year 2018, it is noteworthy to state that the division is also confronted with a lot of challenges such as:

1. Inadequate consumables (sample containers, detergents, disinfectants) for necropsy use.

2. Breakdown of equipment in the lab i.e automatic tissue processor, embedding centre, laboratory microwave and hot air oven.
3. No epidemiological and statistical software (such as SPSS, STATA, Arc GIS-Redland USA) for data analysis.
4. No printer for the printing and display of reports and updates on disease trend.
5. Lack of personal protective gears and simple sanitation tools.
6. Biochemistry analyser, haemo-analyser and spectrophotometer need repairs and servicing.
7. Inadequate reagents for chemistry and hematology analysis.
8. Lack of training and re-training of staff on basic and modern techniques in microbiology and histopathology.
9. Inadequate light microscopes.

FUTURE PLANS

As part of our unwavering effort to achieve the mandate of the Institute, the division plans to:

1. Develop capacities for the analysis and modelling of possible disease spread/outbreak scenarios based on the data generated and analyzed from our laboratories and ambulatory services.
2. Increase revenue generation through the production of diagnostic reagents and kits for various pathogens to meet the need of researchers, hospitals and postgraduate students.
3. We intend to create subunits such as Histology, Histochemistry, Immunohistochemistry, Forensic histopathology, Museum and production units which will help in professional development of staff.
4. Train staff on servicing and maintenance of equipment
5. Organizing monthly presentation on current techniques in the laboratory and current trend around the world.
6. Introduction of electron microscopy technique for efficient histopathology.

DAGWOM FARM

Dagwom Farm is a Division under the Livestock Department of the National Veterinary Research Institute. It comprises of four sections namely; the Feed Mill, Rabbitry, Store and Fabrication that are known for excellence in productivity and research. The Division engages in activities that are relevant to the Institute's mandate and mission. Accordingly, our main activities in 2018 revolved around the following:

a. Production of standard quality livestock feeds to support vaccine production and research activities.

b. Research into alternative sources of feed ingredients for the formulation of cost effective high quality livestock feeds for optimal performance.

c. Breeding and multiplication of rabbits for replacement and extension to interested organizations, institutions and individuals.

d. Investigation of common diseases of rabbits and their control measures to improve performance.

e. Fabrication of kerosene incubators with high efficiency to meet the needs of small scale farmers.

RABITTRY SECTION

The following categories of rabbit were produced for research, replacement and sales in 2018

S/N	Categories of rabbits	Opening stock	Closing Stock	Production	Sales	Amount ~~(N)~~
1	Does	121	97			
2	Bucks	38	24			
3	Growers	2	7			
4	Weaners	35	50			
5	Litters	202	62	346	115	155,400
6	TOTAL	398	240	346	115	155,400

STORE SECTION

In 2018 no materials were received by the store section, all transactions were done on direct purchase.

FEED MILL SECTION

A. Brands of feed produced and distributed in the year 2018

	Divisions/institutions							
Feed type	Poultry	D/f	Diag	Qc	Bio chem	RAI& TADs	Rabies lab	Total (tons)
Qlm	19.725							19.725
Lm	10.250					0.525		10.775
Gp		8.296	3.950	0.525	2.275	0.597	0.797	16.440
Gm						0.025		0.025
Cm	16.125							16.125
Total (tons)	46.100	8.296	3.950	0.525	2.275	1.147	0.797	63.090

B. Soya beans processed in the year

PERIOD	QTY OF SOYA BEANS RECEIVED (KG)	QTY OF SBC PROD (KG)	QTY OF FF PROD (KG)	QTY OF SBC USED (KG)	QTY OF FF USED (KG)	QTY OF OIL PROD (LITRES)	QTY OF OIL SOLD/USED (LITRES)	AMOU
JAN-DEC	15,215.50	10,723.08	2,942.405	12,100.56	2,853.732	1,170	764.75/5	

C. Carry forward from fourth quarter 2018 in to first quarter 2019

SOYA BEANS CAKE = 178kg
SOYA FULL FAT = 80kg
CRUDE SOYA OIL = 481.875Litres
OIL SLUDGE = 49kg

FABRICATION SECTION

The two units (i.e metal and wooden units) of this section are directly involved in the fabrication and improvement of the kerosene incubator developed by the Institute. They also conduct research on all types of incubators with the view on improving on the existing ones. They equally provide extension services to customers in areas of installation, repairs, maintenance and seminars on topics related to the effective use of our products.

Activities/sales of kerosene powered incubators from (January – December, 2018)

	No. sold	No. constructed	No. under construction
1st quarter	-	-	-
2nd quarter	-	-	-
3rd quarter	6	6	-
4th quarter	3	3	2
TOTAL	9	9	2

CHALLENGES

The challenges being faced by the Division includes;

- Low productivity and intermittent breakdown of some oilseed processing unit machines (Extruder, Expeller and Auger) due to ageing.
- Lack of good storage facilities of feed materials/ ingredients.
- Lack of a weigh bridge to determine actual quantity of raw materials (feedstuffs) received from suppliers.
- Lack of a stationed vehicle for feed mill operations.
- Lack of grains pre-cleaning machine.
- Lack of water supply to the feed mill for extruding and pelleting of feed.
- Lack of protective clothing for staff and visitors in the feed mill in line with Bio-safety requirements.
- Lack of raw materials for feed production.
- In-sufficient tools and machines leads to poor result of set target, some of these machines includes Guillotine machine, folding machine, Rolling machine and wood work multi-purpose machine (3d machine).
- Delay in release of funds lead to the set back of our set target.
- Need for an additional fifty units cages (250 hutches) to enable us expand our production to meet the increasing demands for weaner and meat rabbits.
- Acquisition of pure gene breeds of rabbits for gene expansion line. This could be sourced within the neighboring countries such as Niger Republic, Ghana, Togo and Cameroon.
- Need for additional 250 feeders/drinkers each to be added to the existing once

FUTURE PLANS

It is hoped that in the future, internet services will be provide in farm to aid in accessing information. We propose that a “Feed Stuff procumbent committee” should be constituted to ensure accountability and standards in procurement of grains and premixes. Renovation of the store houses and the old grains silo in order to provide a conducive environment for the storage of grains and to minimize wastage.

DERMATOPHILOSIS RESEARCH DIVISION

S/No.		
1.	**Functions/Mandate**	i. To conduct research on the bacteria *Dermatophilus congolensis* of livestock. ii. Production of Ethno-veterinary products.
2.	**Specific(Notable) Activities**	1. **Microbiology Lab.** Human samples processed - 760 Animal samples processed - i. Bovine Scabs - 8 ii. Avian samples - 17 **2. Production Unit** i. Soap - 1560 tablets ii. Lotion - 120 bottles iii. Ointment (120g) - 360 pcs Ointment (40g) - 190 pcs iv. Lamstreptocide - 320 liters
3.	**Achievements**	i. Various fungal and bacterial species diagnosed from 760 human samples. ii. Revenue generated through sales of: a. 2230 Dermatocide 3-M products produced. b. 320 liters of Lamstreptocide produced.
4.	**Challenges**	i. Inadequate reagents for work in Microbiology laboratory. ii. Inadequate reagents/materials for mass production of Ethno-veterinary products. iii. Lack of reagents for Immunology work.
5.	**Future plans**	i. Undertake surveillance, sampling and isolation of *Dermatophilus congolensis* in cattlein Plateau State. ii. Test different plant extracts against *Dermatophilus congolensis* and fungal isolates. iii. Develop Dermatocide 3-M ointment containing Sulphur 10%, Shea butter and Lam-B powder.

INTERNAL AUDIT DEPARTMENT

The Formal instrument for the establishment of Internal Audit units in Ministries/Extra-Ministerial Departments is the Financial regulations which states that "an Internal Audit Units is established to provide a complete and continues audit of the accounts and records of revenue and expenditure, plants, allocated stores and unallocated store…." Therefore, the department routinely performs the following functions among others;

i. Ensuring compliance with rules, regulations and procedures in the conduct of governments business
ii. Ensuring that adequate and accurate books of accounts and records of all activities of the Institute are kept in accordance with standard operation.
iii. Examine the procedures and processes of all major operations of the Institute with the aim of identifying areas where efficiency and effectiveness can be improved
iv. Ensuring that errors/frauds are prevented or detected as early as possible
v. Ensuring that proper internal control, checks and balances are put in place and operational so as to ensure that activities and resources are channeled towards the overall goals of the Institute
vi. Liaising with External Auditors in ensuring that Accounts are prepared in accordance with international accounting standards.

Pursuant to the aforementioned, the department carried out the following activities during the period under review,

i. We carried out monthly post-payment checks of staff salaries and ensured that staff who retired or transferred their services were promptly deleted from the payroll.
ii. We maintained an up to date query register and followed up on Audit queries raised
iii. We ensured that contracts were executed according to the stipulated agreed terms and that necessary tax deductions were effected
iv. We interacted with the Accounts Department on ways and means of improving internal control.

The department recorded the following achievements during the period under review:

i. We attained 100% prepayment audit on all transactions sent to the Audit
ii. Post-payment Audit: Careful reviews of paid vouchers were done to ensure that proper retirements were done with adequate supporting document
iii. Observations and recommendations were made to the chief executive on strengthening of internal control and improving efficiency.

However, the following were some of the challenges the department encountered in the course of the year

i. Due to paucity of funds we were unable to cover all our Audit routine to the outstation laboratories
ii. Staff of the department have not participated in workshops/seminars in the field of Auditing and ICT in the last 3 years.

We plan to widen our scope of operations to cover operational Audit and Risk assessment in line with modern Auditing Systems.

LIBRARY AND DOCUMENTATION DIVISION

The library is a vital arm of the Institute serving as a store house of information and resource centre for the acquisition of knowledge. It reflects the diversity, character and the needs and expectations of the community. Organized into four sections; Serial, Circulation, Technical and E-library, the library ensures that researchers have access to the right quality and current information in the right form at the right time.

Activities of the library were carried out via the 4 sections as listed below.

SERIAL SECTION

This section provides journal retrieval services to users. About 115 queries were attended to from staff and students on referral. Four journals of ''The Japanese Journal of Veterinary Research'' was received as gratis and were added to the collections.

CIRCULATION SECTION

The circulation unit is the first entry point of the library. It is fashioned to serve the clientele in the following capacities; charging and discharging of library materials, to maintain inter-library cooperation among other libraries, maintenance of the central catalogue, shelving and shelf reading at regular intervals, and head count of clientele who patronized the library within a period of time.

In the period under reviewed, lending services stood at 184 to library users which comprises of staff of the institute and students on referral for the purpose of their research work.

TECHNICAL SECTION

The main function of this section is the acquisition and processing of books and other information materials for the library users. During the reporting period, there was an in-flow of 22 publications as donations from the Australian Center for International Research (ACIAR). Addition of 13 staff projects and theses and 3 books purchased by the management were processed and made available for the library users. The retrospective conversion of library holdings and bar-coding is still ongoing.

E- LIBRARY SECTION

Easy access to high quality content is key foundation for good research; hence the E-library section was created to provide scientific information from CD-ROMs and internet services to researchers and students on referral. It also provides information in a timely fashion. However, activities in this section have been at its lowest due to lack of functional internet connectivity to the library.

CHALLENGES

Some of the challenges of the library include non-functional computers for internet browsing, lack of internet services and current journals which resulted to low patronage of the library by research staff.

FUTURE PLANS

The library hopes to raise its capacity for service delivery in line with the global practice in order to function effectively as a support system to the research community. However, this aspiration will be made possible with the provision of new computers and functional internet connectivity.

PARASITOLOGY DIVISION

The Division is saddled with the responsibility of research and diagnosis of economically important parasitic diseases of livestock in Nigeria and to formulate appropriate control measures in line with the mandate of the Institute. Structured into sections and units, the Division during the year under review performed the following diagnostic activities.

The protozoology unit received and processed a total of 180 blood and brain samples out of which 30 (17%) were positive for various blood parasites as contained in table 1.

Table 1. Samples analyzed for haemoparsites in protozoology laboratory

S/N	Animal Species	No. of samples	No. positive	Parasite type detected
1	Bovine	111	22	*Babesia bigemina, B. bovis, B. divergens, Ehrlichia ruminantium, Microfilaria, Theleiria mutans, Trypanosome spp.*
2	Canine	45	8	*Babesia canis*
3	Caprine	07	-	Nil
4	Equine	05	-	Nil
5	Laprine	01	-	Nil
6	Ovine	08	-	Nil
7	Porcine	03	-	Nil
	Total	180	30	

For the detection of gastrointestinal parasites, a total of **379** fecal and intestinal samples were analyzed during the year under review. Of this number, **188** representing approximately 50% of processed samples were positive for various intestinal helminthes and protozoan eggs and cysts as detailed in table 2.

Table 2. Type of samples analyzed for GIT parasites

S/N	Animal species	Type of sample	No. of sample	No. Positive	Parasites egg/ova/oocyst detected
1	Avian	Intestine/ Faecal	236	105	*Ascaridia galli*, *Eimeria* spp., *Syngamus trachea, Coccidia oocysts, Strongyle* spp., *Heterakis galli*
2	Bovine	Faecal	78	45	*Strongyle eggs, Eimeria spp., Monezia, Ancylostoma* spp., *Oesophagustomum radiatum, Trichostrongylus* spp., *Strongyloides* spp., *Paraphistomum,cervi, Haemonchus* spp., *Fasciola* spp.
3	Canine	Faecal	09	02	*Monezia* spp.,Mite eggs,
4	Caprine	Faecal	03	03	*Eimeria* spp., *Haemonchus* spp., *Strongyloides* spp.
5	Equine	Faecal	04	02	*Strongyle* spp., *Strongylus* spp.
6	Laprine	Faecal	41	26	*Eimeria* spp., *Strongyle* spp., *Haemonchus* spp., *Hymenolopis* spp.
7	Ovine	Faecal	05	03	*Strongyle* spp., *Strongyle larvae, Oesophagustomum* spp., *Haemonchus* spp.
8	Porcine	Faecal	03	02	*Eimeria* spp., *Strongyle* spp.
	Total		379	188	

In the Entomology Unit, 220 samples including ticks, larvae and skin scrapings were received and processed for identification. The results are presented on table 3.

Table 3. Ectoparasite types identified from samples submitted to the Entomology Unit in 2018

S/N	Sample source	Type of Sample	No of Samples	Parasite type (number)
1	Avian	Skin scrapings	1	No Parasite Found (NPF)
2	Bovine	Ticks	194	*Amblyomma variegatum* (512), *Hyalomma truncatum* (78), *Rhipicephalus* (*Boophilus*) *decoloratus* (38)
3	Canine	Ticks/ skin scrapings	16	*A. variegatum* (5), *R.*(*Boophilus*)species(7), *R. sanguineus* (3)
4	Caprine	Ticks	2	*A. variegatum, R. (Boophilus)* spp.
5	Equine	Skin scrapings	2	NPF
6	Ovine	Ticks/Fly larvae	5	*R. (Boophilus)* spp. (5) Larva of *Oestrus ovis (3)*
		TOTAL	**220**	

Within the year under review, Ethnoveterinary/ Production Unit produced a total of 2,026 Scabicur® products comprising soap (1,431), ointment (390) and lotion (205) were produced and supplied to the Consultancy Department of the Institute as presented on table 4.

Table 4. Range of scabicur products produced in 2018

Period/Quarterly	Products produced			
	Soap	Ointment	Lotion	
Jan. & Feb.	Research Institutes' Industrial Action			
March	56	-	-	56
Second	235	80	45	360
Third	480	150	55	685
Fourth	660	160	105	925
Total	1,431	390	205	**2,026**

Apart from the diagnostic services, the Division also assisted with analysis of academic research projects at various levels, ranging from, ND, HND, BSc, MSc and PhD from different Universities, Polytechnics, Mono-technics, in Nigeria.

CHALLENGES

The following are some of the limitations of the Division

The number of technical staff in the Division is grossly inadequate.

Lack of reagents to run more specific and sensitive tests on samples sent to the laboratory.

Available microscopes in the laboratories have become obsolete and inadequate for use and as such will require replacement.

The experimental animal house attached to the Division has become dilapidated and requires renovation.

Lack of desktop computer, printers and stationeries for the Division to function effectively.

FUTURE PLANS

There is need to provide a NAFDAC registration number for the Scabicur product being produced in the Division.

PLANNING, MONITORING AND EVALUATION DIVISION

The Planning, Monitoring and Evaluation Department serves as the DATA BANK of the Institute. It is charged with the responsibility of coordinating the overall programs of the Institute in line with her mandate. This is achieved by regularly collecting, collating and analyzing all kinds of data and by monitoring & evaluating Institute's projects and programs for the smooth running and effective implementation of the institute's mandate.

During the year under review, the Division processed several data relating to research, staff identification card, skill-gap analysis, Institute's land, nominal roll update, budget, cyber cafe and vaccine production and sales.

Vaccine production and demand and supply data were compiled and analyzed for the year under review by the statistics unit. These include data collected primarily from Bacterial and Viral Vaccine Production units as well as vaccine demand and supply data from vaccine sales units.

The following figures show bacterial and viral Vaccine production as well as vaccine demand, supply and excess demand charts and graphs.

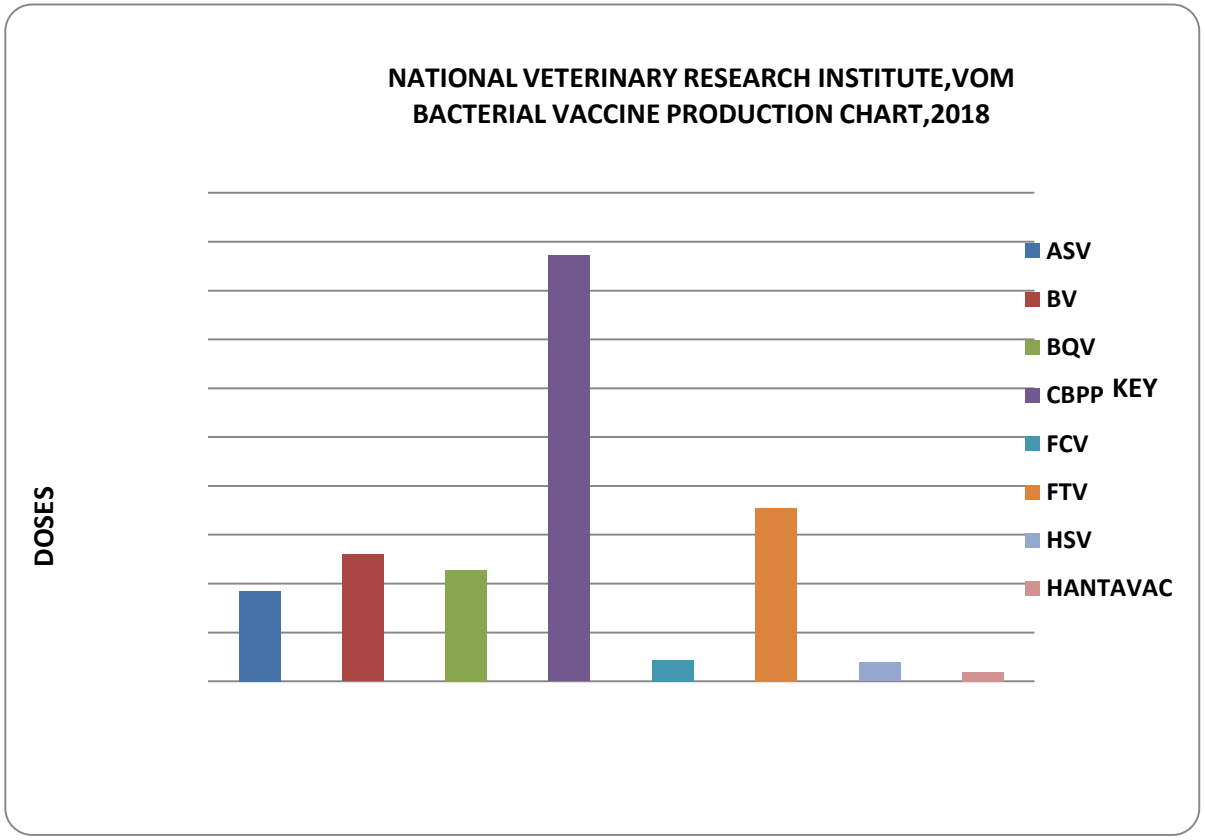

Fig. I. Bacterial Vaccine production chart

ASV=Anthrax Spore vaccine, BV=Brucella vaccine BQV=Black Quarter vaccine, CBPP=Contagious Bovine Pleuropneumonia vaccine, FCV=Fowl Cholera Vaccine, FTV= Fowl Typhoid vaccine, HSV= Hemorrhagic Septicemia Vaccine

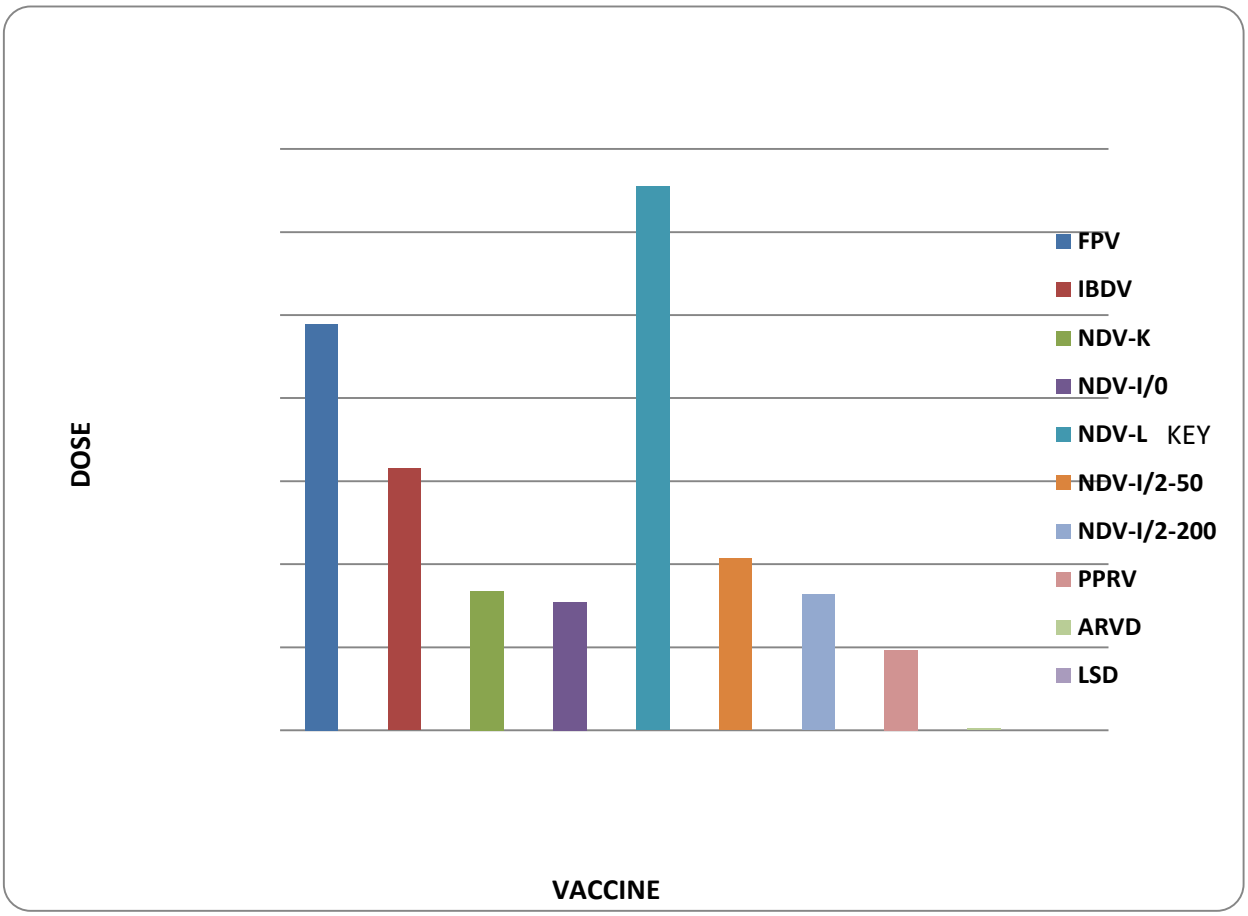

Fig. II. Viral Vaccine production chart

FPV=Fowlpox vaccine, IBDV=Infectious Bursal Disease Vaccine, NDV-K=Newcastle Disease Vaccine-Kamorov, NDV-L=Newcastle Disease Vaccine-Lasota, NDV-I/2-50=Newcastle Disease Vaccine-intra ocular -50 doses, NDV-I/2-200=Newcastle Disease Vaccine-intra ocular -200 doses, PPRV= Peste des petit ruminants Vaccine, ARVD=Anti rabies vaccine for dogs, LSDV= Lumpy Skin Disease vaccine.

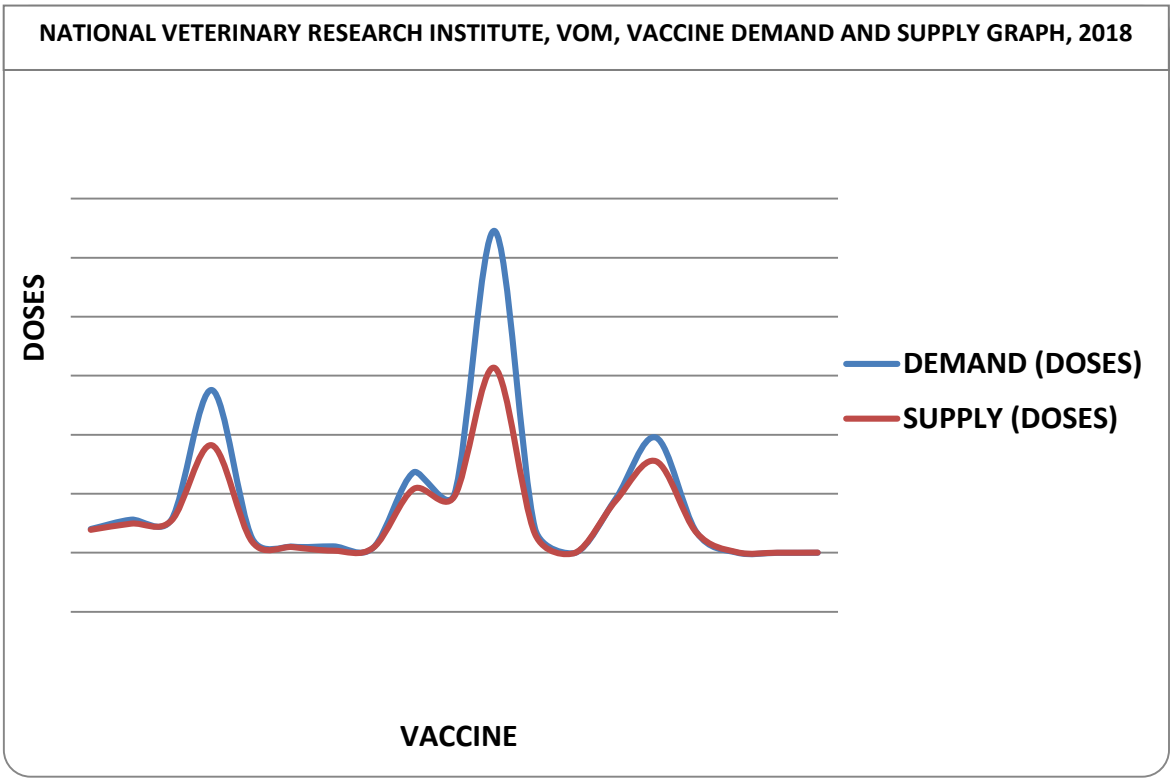

Fig. III. Vaccine demand and supply chart 2018

The Human Resources Information System (HRIS) Unit carried out the following activities:

- Production of one hundred and thirty (130) PVC identity cards for staff who were promoted and for the replacement of lost ID cards.
- 2018 Nominal Roll was updated for the Institute's statistical purpose.
- The skill gap analysis conducted for all the Divisions in the Institute was concluded and the report presented to management.

The Land Unit carried out inspection of the Institute's landed properties in Vom and its environs and documentation of the properties are on-going with Plateau State ministry of Land and survey.

The information unit where the Institute's publications are domiciled served visitors to the Institute with the Institute's publications. The unit has proposed digitalization of these publications to be package in CDs.

A staff of the Planning unit attended a training workshop on budget preparation in Abuja. Similarly, 4 staff of the unit were co-opted by Veterinary Extension Research and Liaison

Services (VERLS) Division to attend a training workshop organized for Community Animal Health Workers sponsored by International Committee of the Red Cross (ICRC).

Information Technology & Communication unit updated and managed the Institute's website, upgraded & installed software, troubleshoots hardware and maintained IT equipment within the institute. The Institute's intercom network was maintained and new lines were fixed.

CHALLENGES

- Difficulty in obtaining data from the Departments/Divisions.
- Inadequate office space
- Staff training, seminars and workshops are required.

POULTRY DIVISION

The mandates of the Division includes but are not limited to; the production of fertile eggs for vaccines production, hatch and raise chicks for vaccine testing and research, introduce and manage exotic breeds of poultry and to conduct research on diseases that affects the health and productivity of poultry.

Specific activities carried out during the year include;

1. Production of fertile eggs /birds for vaccines production, quality control and research (Table 2 & 3).
2. NVRI/Grand Cereal Limited (GCL) collaborative research projects on production parameters.
3. Production of various poultry species for research (Ducks, guinea fowls, quails, black bantam, geese etc.) as presented on table 4

ACHIEVEMENTS

The Division introduced several varieties of poultry into the farm during the year under review in order to offer diversity of species of poultry for research. The varieties introduced are:

a) Naked Neck
b) FUNAAB Alpha
c) FRIZZLE feather
d) Tiv ecotype
e) Fulani ecotype

In addition, the Division also introduced exotic turkey and guinea fowl breeds into the farm and conducted practical training on artificial insemination in chickens and turkeys.

Quail birds and other species of birds with their eggs were produced in the farm. These with their products (egg and meat) were sold.

STUDENT PROJECT SUPERVISION

Staff of the Division were involved in the supervision of student's projects. Some of the research topics supervised includes;

1. Effect of *Carica Papaya* leaf meal on control of coccidiosis in broiler chicken.
2. The effect of different preservation methods on meat quality indices of broiler chickens.
3. Assessment of turkey meat preservation using different methods of preservation.
4. Effect of *Grewia mollis* on growth performance and carcass characteristics of broilers.
5. Effect of *Moringa olifera* on growth performance and carcass characteristics of broilers.
6. Isolation of *Salmonella* spp. in indigenous birds in Jos North L.G.A of Plateau State.

Findings from these projects were presented as seminars or published in journals.

In the area of health management of the Institute's flock, there was a significant improvement in their general health status during the year under review. This is attributed to the improved methods of early and accurate diagnosis of common poultry diseases currently practiced on the farm. Also the adoption of current methods of prophylaxis for control of common poultry diseases assisted in the wellbeing of the flock.

The Division also explored the use of locally sourced ethno-veterinary products for the control and treatment of common poultry diseases and the results were encouraging.

Therefore, with these measures in place, record of diseases diagnosed and treated on the farm is presented on table 1

Table 1: Diseases recorded in birds in the Poultry Division in 2018

S/No	Disease	Numbers Affected	Percentage
1	Newcastle Disease	6	17.7
2	Salmonellosis	14	41.2
3	Coccidiosis	4	11.8
4	Collibacillosis	7	20.6
5	Chronic Respiratory Disease	1	2.9
6	Infectious Bursal Disease	2	5.8

Table 2: Vaccine birds egg production and disposal in 2018

Month	**Total production**	**Broken**	**Hatching**	**Virology Setting**	**B/factory**	**DEA**	**Infertile**	**Dead embryo**
Jan	19,719	607	5104	1150	11520	1338	-	-
Feb	18,549	1,540	1054	1515	11520	2920	10	65
March	20,295	2,972	2,325	4,108	7,200	3,690	174	201
April	19,236	613	3,192	7,586	6,150	1,695	109	297
May	18,822	5,327	-	60	6,090	7,345	-	-
June	17,635	4,605	-	390	2,490	10,150	-	-
July	17,770	2,214	-	10,338	2,160	3,058	276	1101
August	15,995	1,369	-	8,026	4,980	1,620	486	1199
Sept	40,786	6,188	6,500	15,268	7,380	5,450	763	1606
Oct	65,645	10,923	7,060	23,870	9,990	13,802	654	1520
Nov	63,283	5,184	10,200	20,420	21,315	6,164	614	1836
Dec	67,850	7,241	4,000	3,510	33,630	19,469	292	843
Total	385,585	48,783	39,435	96,241	124,425	76,701	3,378	8,668

Table 3: Vaccine eggs supplied to production and research laboratories 2018

MONTH	NDV	IBDV	AI	Q/C	V/R	FPV	RES	ARV
Jan	-	-	-	-	-	-	-	-
Feb	850	-	-	-	1,150	-	165	-
March	3,447	-	-	-	130	531	-	-
April	2,032	-	-	420	-	-	-	-
May	-	-	-	-	60	-	90	-
June	-	-	-	-	-	-	-	300
July	7,012	-	-	420	-	2,906	-	-
August	3,797	300	-	420	-	3,511	-	-
Sept	6,722	1,200	-	450	-	3,000	-	3,948
Oct	14,202	2,400	-	210	-	4,000	-	3,000
Nov	12,000	3,000	-	420	-	5,000	-	-
Dec	3,000	-	600	210	-	-	-	-
Total	53,062	6,900	600	2,550	1,340	18,948	255	7,248.

Table 4: Egg production from other species of birds in 2018

Month	Quails A	Quails B	Black Bantam	Naked Neck	Turkey	Duck	Guinea fowl	Geese
Jan	9,146	7,796	56	-	-	22	22	14
Feb	2,473	12,020	72	-	-	80	80	9
March	3,473	8,367	141	-	-	148	158	8
April	5,725	26,204	104	30	-	104	104	14
May	7,017	37,632	74	50	7	82	82	11
June	5,259	36,700	44	25	13	67	67	-
July	5,435	29,769	41	-	13	60	60	-
August	3,839	20,039	86	-	44	79	79	-
Sept	1,603	11,765	60	-	13	67	67	7
Oct	655	13,928	77	7	25	118	17	6
Nov	1,509	12,215	71	7	29	108	38	14
Dec	1,000	12,366	97	27	36	97	3	4
Total	47,134	228,801	923	146	180	1032	777	87

CHALLENGES

1. Dilapidated hatchery due to damage by rainstorm.
2. Old and obsolete incubators that need urgent replacement.
3. Lack of mini poultry processing plant.
4. Dilapidated administrative block/staff offices.
5. Inadequate staff strength (junior).

FUTURE PLANS

1. To stock layers (brown eggers) for table eggs.
2. To produce turkey broilers for table meat.

PRINTING AND PUBLICATION DIVISION

The Division is charged with the responsibility of all the printing requirements of the Institute and to formulate new concept, design, code and printing of all the Institute vaccines labels.

The following items were printed by the Division during the period under review;

Vaccine labels

NDV (Komorov)	-	22,620 pieces
IBDV	-	131, 0560 pieces
NDV-I2	-	103,190 pieces
NDV (lasota)	-	56,624 pieces
Fwol typhiod	-	27,822 pieces
CBPP	-	40,480,528 pieces
Newcastle disease I0S	-	15,930 pieces
PPR	-	51,520 pieces
ASV	-	11,640 pieces
FPV	-	10,550 pieces
FCV	-	2,215 pieces
HSV	-	86,787 pieces
Hantavac	-	4,048 pieces
ARV	-	19,900 pieces
Brucella	-	14,658 pieces
BQV	-	4,600 pieces

Cards and stationaries

ED/CEO Complementary cards	-	900 books
ED/CEO headed paper	-	1,000 books
NVRI Official File	-	3,000copies
Official letter headed paper	-	2,500 copies
APPER FORMS	-	3,000copies

CHALLENGES

Some of the constraints being faced by the Division include;

- 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
- provision of toilet convenience for the division

FUTURE PLAN

At the moment, there are several printing technologies evolving with benefits and value. The Division will want to pursue a printing technology that will best suit the need of the Institute in these modern times where exciting quality products of good standard will be produced. The technology will also include the protection of the Institute's numerous brands and other benefits such as:

i. Revenue generation; the technology will serve the Institute and customers with similar needs
ii. Speed and efficiency; usually, long production process is cut short and saves time.
iii. Producing at the cheapest price possible will attract more customers
iv. Deliver goods of the right quality and quantity at the right time, and at the right price.
v. It motivates and boost the morale of staff

Therefore we are appealing to the Institute Management Committee (IMC) to consider the procurement of modern printing equipment. When this is done it will enable us to print synthetic vaccine labels which are superior to the present vaccine labels being produced. Equally we are pleading for sponsorship to attend conferences, Book Fairs and International Printing Exhibitions for capacity building and skills acquisition which will enhance our job performance.

QUALITY CONTROL DIVISION

The Quality Control Division ensure the implementation of quality management system in the Institute for the production of veterinary vaccines, biologicals and general laboratory procedures to meet international standards. The Division conducted quality control tests on the vaccines produced by the Institute to ensure that they have been appropriately prepared, packaged, labelled and stored in line with the Mission of the Institute. Furthermore, vaccines are evaluated for purity, sterility, viability, safety, potency and absence of foreign bodies and only batches certified by the Division are released for field use. Periodic assessment and auditing of all the institutes laboratories was performed to ensure Good Laboratory Practice measurable to international standards.

Specifically, during the year under review, vaccine quality checks were performed on 12 batches of 8 bacterial vaccines and 22 batches of 8 viral vaccines. All the tested vaccines passed the quality check. Some vaccines produced by the Institute were also sent to the Pan Africa Veterinary Vaccine Centre (PANVAC), DebreZeit, Ethiopia for Quality Control Test as part of international quality control mechanism.

An experimental animal house comprising of mice, albino-rats, guinea pigs and rabbits was established for the Division. These animals have since been used for the various safety tests on all vaccines produced in the institute as stipulated by the OIE guidelines.

CHALLENGES

- Lack of laboratory materials such as distilled water, media, reagents and glass wares.
- Lack of essential equipment such as Moisture Analyzer for the analysis of moisture content of freeze dried vaccines
-Lack of centrifuge for the cell culture laboratory.
-Lack of equipment in the molecular biology laboratory.
-Inadequate gas, water and power supply
-Experimental house needs to be re-furbished for potency and safety assay of institute vaccines.
-Faulty Biosafety cabinets, refrigerators, autoclave and air conditioners

FUTURE PLANS

-Equipping the molecular biology section of the Division.
-Equipping the experimental animal house.

RABIES LABORATORY

Rabies Laboratory is charged with the following specific mandates: -

i. Conduct research on rabies virus and rabies-related Lyssaviruses that cause clinically indistinguishable neurological disorders.
ii. Confirmatory diagnosis of animal rabies infections caused by rabies and rabies-related *Lyssaviruses*
iii. Development and production of rabies antigens and antisera for research and diagnosis.
iv. Assessment of the 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 vaccinated dogs
vi. Participation in national surveillance of rabies and rabies-related viruses
vii. Participation in rabies proficiency test administered annually by the Nancy laboratory for rabies and wildlife, France, alongside other reputable laboratories in the world
viii. Training and capacity building of personnel.

In line with our mandate, the Rabies laboratory received and analyzed175 specimens from six (6) animal species from 12 states across the nation. A total of 97 (55.4%) of the samples submitted were confirmed positive. Most of the positive samples were from domestic dogs (Table 1).

Table 1: Distribution of animal samples submitted for rabies diagnosis

State	Dog		Cat		Cattle		Sheep		Goat		Wild		Total
	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve	
Adamawa	1	1	-	-	-	-	-	-	-	-	-	-	2
Bauchi	3	-	-	-	1	-	-	-	-	-	-	-	4
Benue	2	2	-	-	-	-	-	-	-	-	-	-	4
Delta	-	2	-	-	-	-	-	-	-	-	-	-	2
Kaduna	4	-	-	-	-	-	-	-	-	-	-	-	4
Kano	8	1	-	-	2	-	-	-	-	-	-	-	11
Katsina	1	-	-	-	-	-	-	-	-	-	-	-	1
FCT Abuja	1	1	-	-	-	-	-	-	-	-	-	-	2
Nasarawa	1	-	-	-	-	-	-	-	-	-	-	-	1
Plateau	69	66	2	1	-	1	-	1	-	1	1	1	143
Yobe	1	-	-	-	-	-	-	-	-	-	-	-	1
Total	91	73	2	1	3	1	-	1	-	1	1	1	175

Key: +ve – Positive
-ve – Negative

The rabies laboratory is continuing with the work on raising rabies hyper-immune serum in rabbits. It is anticipated that when this is successfully accomplished the hyper-immune serum will be used for research and diagnosis. This project has a good prospect for large scale production for commercial purposes.

New staff posted to the laboratory were given orientation and intensive training to acquaint them with the methodologies for research and diagnosis of rabies virus.

The laboratory also provided bench space and expertise to four post graduate students (two MSc and two PhD) who were conducting various research projects on rabies virus as part of their theses. Our staff assisted the scholars with various technical aspects of the research such as mice inoculation with rabies virus and rabies diagnosis using fluorescent antibody test (DFAT) and mouse inoculation test (MIT). During the course of the research work, 190 samples were analysed by DFAT and/or MIT.

To protect our staff especially those at high risk of exposure to rabies virus, 11 persons received the routine biannual pre-exposure prophylaxis and 18 staff who were exposed to a wild animal that invaded a sheep pen at the Livestock Investigation Division were vaccinated against rabies.

CHALLENGES

The immediate challenges of the laboratory include;

A. Non-availability of the following equipment:

i. Biosafety cabinet class II
ii. Ultra-Low freezer (-80^{o}C)
iii. Refrigerated centrifuge

B. Inadequate supply of the following equipment:

i. Carbon dioxide (CO_2)incubator
ii. Deep freezers

C). Non-availability of panel of monoclonal antibody to Nigerian isolates of rabies virus

FUTURE PLANS

The laboratory plans to;

1. replace the MIT with rabies tissue culture isolation test (RTCIT) using BHK cell line for isolation of rabies and related viruses, in order to conform to international standards; hence the need for the equipment listed above.
2. seek the Institute's approval for funds to acquirea panel of monoclonal antibody (MAb) to Nigerian isolates of the rabies virus. This is intended for antigenic typing of available rabies and related virus isolates in the archive of our laboratory.
3. submit a proposal to the institute on a survey of rabies and/or related viruses in bats, rodents and wildlife that are incriminated in the epidemiology of rabies in Nigeria.
4. submit aconcept note to the institute on the need to aassess theimmunogenicity of NVRI low egg passage (LEP) flurry dog rabies vaccine against circulating strains of rabies virus in domestic dog in Nigeria.

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

The Regional Laboratory is saddled with the following responsibilities: -

1. Diagnosis and research into avian diseases notably, Newcastle Disease, Avian Influenza, Infectious Bursar Disease and Infectious bronchitis.
2. Preparation of viral transport media, antisera and antigens.
3. Quality control assessment of avian viral vaccines.
4. Field assessment of NVRI avian viral vaccines through sero-monitoring of vaccinated flocks
5. Participating in national surveillance of avian influenza in suspected flocks.
6. Participating in national and international networks and surveillance for emerging infectious/Transboundary diseases.
7. Rendering support to other West African Laboratories, as the Regional Reference Laboratory

Laboratory Activities from January to December, 2018

The Laboratory was involved in the diagnosis and confirmation of Highly Pathogenic Avian Influenza Virus (H5N8) in the country. The table below shows the summary of the samples received for the diagnosis of avian influenza and other viruses.

Summary of tissue samples received from January to December, 2018

	Number of Samples (tissues)				Number positive (tissues)			
	AIV*	NDV$^{\$}$	IBDV$^{\Phi}$	Fowl pox	AIV	NDV	IBDV	Fowl pox
Total	235	226	73	4	1	5	20	3

*=avian influenza virus $^{\$}$=Newcastle disease virus $^{\Phi}$= infectious bursa disease virus

In the drive to fulfill our mandate, the Laboratory conducted field assessment of NVRI NDV vaccines through seromonitoring of vaccinated flocks. A total of 247 sera samples were screened for sero-conversion. The results were communicated to the farmers for necessary action either to administer a booster dose or treat for ongoing infection in the farm.
Also 86 sera samples were screened for swine influenza antibodies.

Other Activities

1. The division was involved in OIE twinning project on avian influenza with IZSVe, Italy. This was aimed at improving NVRI laboratory capacity for a better control of the Avian Influenza virus at National and Regional level. Four members of staff were trained in; biosafety and biosecurity measures for avian influenza, classical and molecular techniques applied in the diagnosis of avian influenza and epidemiology

and the use of geographical information systems for the monitoring of animal diseases.
2. Collaboration with CDC Atlanta/Nigeria and NCDC, FELTP on ecological surveillance of Monkeypox disease in animals.

CHALLENGES

1. Inadequate supply of reagents and consumables.
2. Electricity power fluctuations and consequent damage on our equipment and biologicals

FUTURE PLANS

1. The twinning project will continue in 2019 with capacity building for other members of staff
2. Active surveillance for highly pathogenic avian influenza virus in live bird markets will be conducted. 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.
3. Strengthening national and international networks and collaborations
4. Expansion of our R & D products and services.

NVRI STAFF SECONDARY SCHOOL, VOM

In addition to normal classroom academic and non-academic teaching, the school organized other activities geared towards creating a near ideal learning environment for students and capacity building for staff. Such programs include;

- Orientation and counselling session for the JSS 1 students and other new students admitted into the school.
- Organized career day for the SS1 students in order to guide them in choice of subjects.
- Carried out sporting activities as well as other extra-curricular activities in the school to promote mental and physical fitness and development. In the year under review the inter-house sports competition was held on the 23rd November, 2018. Yellow House emerged as the overall winner. To this end, with the help of the Institute's management, the school was able to construct a Basket Ball Court and other sporting facilities in an attempt to add variety to our sporting activities.
- Embarked on educational tours and excursion visits to relevant establishments.
- Encouraged membership of and participation in Clubs and Society to promote team work.

During the year under review, the school graduated Fifty-three (53) students who sat for both WAEC/SSCE and NECO examinations. Overall, the school recorded an impressive performance of 95.2% and 98.6% credit passes in the WAEC/SSCE and NECO examinations respectively, as presented in the tables. Similarly, 74 students sat for the BECE examination and recorded 100% pass enabling them to proceed to senior secondary level.

We appreciate the support of the Institute in meeting our needs and parents for their cooperation which has gone a long way in boosting our moral.

Performance of JSS 3 students in the 2018 Basic Education Certificate Examination (BECE)

S/N	SUBJECT	GRADE				% PASS
		A	C	P	F	
1	Mathematics	3	9	62	-	100
2	English Language	15	28	31	-	100
3	National Value Education	-	8	66	-	100
4	Basic Science Technology	1	36	37	-	100
5	Hausa Language	19	40	15	-	100
6	Cultural & Creative Arts	2	34	38	-	100
7	Business Studies	3	50	21	-	100
8	Pre-Vocational Studies	26	43	5	-	100
9	French Language	10	35	29	-	100
10	Christian Religious Studies	-	-	71	-	100
11	Islamic Religious Studies	1	2	-	-	100

Tally of grades scored by students in the various subjects in the 2018 West African Senior School Certificate Examination

S/N	SUBJECT	GRADE									% PASS
		A1	B2	B3	C4	C5	C6	D7	E8	F9	
1	Data Processing	-	1	4	3	1	8	15	13	8	84.9
2	English	-	-	1	5	6	23	8	8	2	96.2
3	Commerce	-	2	2	1	1	1	-	-	-	100
4	Food & Nutrition	-	-	-	1	2	4	-	-	-	100
5	Mathematics	1	1	10	5	9	13	8	3	4	92.5
6	Chemistry	-	-	10	8	5	8	1	-	-	100
7	Physics	1	1	4	9	7	10	1	-	-	100
8	Technical Drawing	-	-	4	-	-	-	-	-	-	100
9	Computer	9	2	1	-	-	-	-	-	-	100
10	Agric. Science	1	2	2	-	2	7	2	-	-	100
11	Civic Education	-	1	13	9	7	19	3	1	-	100
12	Economics	-	-	7	3	3	11	6	-	1	96.8
13	C R S	-	-	9	2	5	3	-	-	1	95
14	Geography	-	-	1	1	1	4	9	8	2	92,3
15	Biology	-	-	2	-	4	12	10	3	1	96.9
16	Literature in English	-	-	-	-	-	1	5	4	2	83.3
17	History	-	-	3	-	2	1	-	-	-	100
18	Government	-	-	3	3	2	3	1	2	-	100
19	Home Management	-	-	1	5	1	2	-	-	-	100
20	Further Mathematics	-	1	1	-	-	-	-	-	1	66.7

Scoresheet of student in the 2018 National Examination Council (NECO)

S/N	SUBJECT	GRADE									% PASS
		A1	B2	B3	C4	C5	C6	D7	E8	F9	
1	English Language	-	1	17	20	13	3	-	-	-	100
2	Mathematics	-	2	-	1	9	24	9	6	2	96.2
3	Civic Education	-	2	6	8	25	8	4	-	-	100
4	Biology	-	-	1	-	8	18	3	2	-	100
5	Chemistry	-	1	-	2	9	20	1	-	-	100
6	Physics	-	-	4	15	12	2	-	-	-	100
7	Further Mathematics	-	-	-	2	-	-	1	-	-	100
8	Agricultural Science	-	1	-	-	3	9	2	-	-	100
9	Computer Studies	-	-	-	3	9	-	-	-	-	100
10	Technical Drawing	-	-	-	1	3	-	-	-	-	100
11	Home Management	-	-	-	-	7	2	-	-	-	100
12	Food & Nutrition	-	-	-	1	6	-	-	-	-	100
13	C R S	-	-	-	1	4	11	3	1	-	100
15	History	-	-	-	-	2	3	-	1	-	100
16	Geography	-	-	-	2	13	10	1	-	1	96.2
17	Government	-	-	-	-	-	2	4	5	3	78.6
18	Economics	-	-	-	-	3	14	6	7	-	100
19	Literature	-	-	-	2	9	1	-	-	-	100
20	Commerce	-	-	-	1	2	3	-	1	-	100
21	Data Processing	-	-	-	-	5	29	18	1	-	100

It is noteworthy to report that most of our diplomates from the year under review have secured admission into various tertiary institutions of learning across Nigeria.

The Speech and Prize Giving Day for the 2017/2018 academic session was held successfully on the 26th July, 2018 during which the 7thedition of our schools magazine "THE VOICE OF THE FUTURE" with the theme: Sustainable Education was launched.

The success story of the school during the year under review wouldn't have been possible without the harmonious working relationship we received from the Parent Teachers Association (PTA) and the Institutes School Board.

CHALLENGES

Some of the immediate challenges of the school include; lack of laboratories, an Art Studio, library facilities, examination hall and a school bus. The school also desires to have a central staffroom/offices, a messenger, cleaner and some funding to aid her operations.

STORES DIVISION

The Stores Division ensures uninterrupted flow of working materials to the production and services departments of the Institute thereby contributing to the attainment of the overall mandate of the Institute. The Stores is structured into several Units and Sections viz; Drugs, Chemicals & Reagents, Glass Wares, Expendable and Non–Expendable and Consumable, Vaccine Despatch, Receiving, Workshop and Maintenance, Dagwom Farm, LID, Furniture, Ledger and Scrap, which are currently being manned by 12 senior staff and 2 casual laborers.

During the year under review, the main Stores Unit carried out the following tasks:-

(a) Maintains, keeps and receives all incoming expendables, Non- Expendables, Consumables, Glass-wares, Drugs, Chemicals and Reagents supplies of the Institute and releases same for use by all the research, laboratory services Units, Divisions and Departments.
(b) Ensured the proper documentation of all materials records and their physical correctness.
(c) Undertook the continuous reconciliation of the record of all stockable items in shelves, Bin cards, fridges, cupboards, bulk stores, warehouse, containers and cold room.
(d) It ensured that all Expendable, Non- Expendables, Consumables, Glass-wares, Drugs, Chemical and Reagents released are back up by approved stores transferred vouchers (STR)
(e) It ensuredthe posting of receipts, issues and costing of material using (FIFO) and material valuation as at when due.

The main store has a stock in hand worth **653,704,983.82** as at December, 2018 as detailed below.

Drugs, Chemicals and Reagents	= 75,672,773.95
Glass wares	= 109,652,711.14
Consumables	= 40,633,939.13
Expendables	= 292,542,239.25
Non- Expendables	= 135,203,320.35

Record of vaccine dispatch in 2018

	BALANCE B/F		RECEIPTS		ISSUES		BALANCE C/F	
DESCRIPTION OF VACCINE	Vials/ Bottles	Doses	Vials/ Bottles	Doses	Vials/ Bottles	Doses	Vials/ Bottles	Doses
PPR – 50	7	350	50,336	2,516,800	50,343	2,517,150	-	-
ARVD – 1	4,500	4,500	23,810	23,810	16,787	16,787	11,523	11,523
NDVI/O – 200	-	-	4,005	801,000	4,005	801,000	-	-
NDV ½ -50	-	-	85,074	4,253,700	84,439	4,221,950	635	31,750
NDV ½ 200	1	200	21,145	4,229,000	21,146	4,229,200	-	-
NDVL – 200	14,297	2,859,400	54,624	10,924,800	68,921	13,784,200	-	-
NDVL – 500	-	-	-	-	-	-	-	-
NDVK – 200	10,582	2,116,400	17,647	3,529,400	23,383	4,676,600	4,846	969,200
NDVK – 500	-	-	-	-	-	-	-	-
FPV – 200	940	188,000	10,108	2,021,600	11,048	2,209,600	-	-
FPV - 500	-	-	-	-	-	-	-	-
IBDV – 200	11,120	2,224,000	22,682	4,536,400	30,916	6,183,200	2,886	577,200
IBDV – 500	-	-	3,654	1,827,000	-	-	3,654	1,827,00
LSD -500	1,342	67,100	2	100	1,344	67,200	-	-
FTV – 100	1	100	27,504	2,750,400	27,504	2,750,400	1	100
BSV – 200	-	-	14,455	1,445,500	14,455	1,445,500	-	-
CBPPV – 100	2	200	78,181	7,818,100	78,184	7,818,300	-	-
FCV – 200	964	192,800	2,106	421,200	2,906	581,200	164	32,800
HSV – 40	2	80	7,696	307,840	7,696	307,840	2	80
HANTAVAC -40	224	8,960	3,944	157,760	4,168	166,720	-	-
BQV – 500	978	489,000	4,472	2,236,000	4,637	2,318,500	813	406,500
ASV - 400	12	4,800	3,603	1,441,200	3,615	1,446,000	-	-

Record of various items received in 2018

S/N	Description	1st Quarter (₦)	2nd Quarter (₦)	3rd Quarter (₦)	4th Quarter (₦)	Total (₦)
1.	Diesel	13,545,000.00	16,809,800.00	10,606,000.00	18,241,500.00	59,202,300
2.	Feeds, Grains & Concentrates	3,142,232.00	3,299,400.00	7,878,285.00	13,183,274.00	27,503,191
3.	Lab/Chemicals, Drugs & Reagents	48,787,280.77	48,000.00	-	1,041,473.08	49,876,753
4.	Office Equipment/ Stationery	-	-	-	980,000.00	980,000.00
5.	Laboratory Consumable	189,426,539.25	-		282,540.00	189,709,07
6.	Laboratory Equipment	53,749,324.86	-	-	-	53,749,324
7.	Plumbing Equipment	-	-	-	13,500.00	13,500.00
8.	Environmental unit	-	-	-	789,300.00	789,300.00
9.	Generator	89,850,001.00	-	-		89,850,001
10.	Vehicle/Truck	90,552,005.81	-	-		90,552,005
11.	Dispensing pump & Installation	-	-	-	1,345,000.00	1,345,000.0
12.	Printing Press	-	-	-	140,000.00	140,000.00
	Total	₦489,052,383.69	₦20,157,200.00	₦22,869,635.00	₦34,671,587.08	₦563,710,4

During the period under review the Workshop/Maintenance Section issued out 260,509 liters of diesel to various Division as follows:

Generator Workshop = 191,813
Furnace in Diagnostic Division = 10,546
Poultry = 33,000
Boiler in Bacterial Vaccine production = 13,420
Dagwom Farm = 3,960
Vehicles = 2,510
L.I.D = 5,040
Others = 220

For proper documentation, the Ledger/Documentation Section received all incoming store receives (SRV) vouchers, and store issue vouchers (SIV) for non-expendables, consumables, Glass-wares; Drugs, Chemicals and Reagents, Plants, Furniture and its Documentation. This has assisted in the timely posting and filing of these documents for future references. Receipts and other security documents of the Institute maintained on the ledger are issued to Accounts and other Departments following formal request and approved.

Overall, the Store Division was able to; improve on the cleanliness within the stores, reconcile physical items with the bin cards and ledgers, reorganize items in the store according to their classes and ensured timely documentation of all receipts and issues. The Division ensured regular up to date records of all transactions in a cordial working relationship with other departments of the Institute resulting in improved production of vaccines and sales. All the offices and laboratories have been inventoried and coding of all Institute assets is near completion.

CHALLENGES

Some of the challenges/constraints experienced by the Division during the year under review includes; decentralize purchases which make documentation difficult. Furthermore, the lack of appropriate software for digitalizing our activities has negatively affected our efficiency.

The working environment within the Stores house lacks adequate ventilation due to scores of outdated or obsolete materials/items (Expendables, Consumables and Glassware), slow moving items and some expired drugs, chemicals and reagents, which are occupying the limited space available.

The broken down vaccine cold room is yet to be repaired thereby affecting our ability to maintain cold chain for our freeze fried vaccines.

Lack of protective gears exposes our staff to hazard during the course of their duties.

FUTURE PLANS

The Stores Division looks forward to discharging her duties with greater efficiency in the coming years. To this end, renovation of the dilapidated Store house and the provision of handling equipment such as fork lift should be accorded priority. Manpower development through intensive training/workshops specifically on the use of software in inventory control is needed.

VIRAL RESEARCH DIVISION

Research, diagnosis and surveillance activities and the development of vaccines and biologicals with references to economically important viral diseases of animals were the main activities of the Division during the year under review. Consequently, some trainings/workshops and collaborations were undertaken to equip the staff of the Division to efficiently accomplish these tasks. Some of the landmark events in the Division in 2018 are;

- Workshop on implementation of technical, biosecurity and quality control skills for diagnosis and control of Foot and Mouth Disease (FMD) virus took place from 12th to 16th March 2018 in the Institute. This was an arrangement for capacity building via a technical and scientific collaboration between Sciensano, Belgium and the institute, under the OIE FMD Twinning Project.
- Visit of three research staff of the Division to Sciensano, Belgium for capacity building for FMD based on quality control and diagnosis took place from 15 to 26 October 2018.
- Regional workshop for FMD Diagnostics was held from 10th -14th December, 2018 at the National Veterinary Research Institute, Nigeria, under the OIE FMD Twinning Project.
- The take-off of Rapid on-site diagnosis of FMD and safe cost effective shipment of samples using Lateral Flow Devices (LFD) project. The project is a collaboration between the Institute and the French Agency for Food, Environment and Occupational Health & Safety (ANSES), for the purpose of "Evaluation and validation of the performance and safety of a LFDs-based protocol for the shipment of FMD samples in real situation through application under field conditions (EUFMD activities contributing to FAO Strategic Objective 5)".

In recognition of the availability of expertise in the Institute, the Division was selected by the African Union (AU) to investigate a suspected outbreak of *Peste des petits ruminants* (PPR) in Sierra Leone. The assignment was successful accomplished which led to an immediate commencement of control measures for not only the suspected PPR, but for other viruses, for example, Rift Valley Fever virus. Investigations of several similar cases in Nigeria were equally carried out with success.

Routinely, the Division receives samples from private farmers for diagnosis in addition to samples from Integrated Dairy Farm (IDF), Livestock Investigation Department (LID) and the Central Diagnostic Division (CDL) of the Institute. Furthermore, staff of the Division collected samples from Jos North, Kanke, Jos South, Jos East, Bokkos and Riyom in Plateau State as well as from Bauchi State as part of passive surveillance activities.

Over 600 doses of the NVRI Lumpy Skin disease (LSD) vaccine were administered to animals in a pilot study preparatory to large scale field trials of the vaccine.

The Division also rendered molecular and serological diagnostic services and virus isolations to individuals who brought externally sourced samples. Within the country, the timely and accurate diagnoses of viral diseases from samples submitted to our laboratory have assisted in the successful control of several outbreaks. This has helped to stymie the deleterious progress of livestock disease scourges.

The breakdown of the samples received and analyzed for FMD

Sample type	Number analyzed	Number positive	FMDV identified	Serotype
Epithelial tissues	29	24	O, 5, SAT 2	
Vesicular fluids	2	2	O	
Piglets heart muscles	10	1	O	
Swine sera sample	346	20	3ABC NSP	
		10	O	

Number and type of samples analyzed for pox virus infections in 2018

Disease agent	Number of samples received	Number tested by PCR	Number positive
Lumpy Skin Disease (LSD) virus	26 tissues/scab	11	7
	5 blood	Nil	Nil
	42 sera	Nil	Nil
Goatpox virus	2 tissue/scab	Nil	Nil
	29 sera	Nil	Nil
Sheep poxvirus	8 tissue/scab	3	Nil
Orf virus	2 tissue/scab	Nil	Nil
	29 sera	Nil	Nil
Bovine papiloma virus	5 tissue/Scab	Nil	Nil
	27 sera	Nil	Nil
Total	43 tissue/scab	14	7
	5 Blood	Nil	Nil
	127 sera	Nil	Nil

The Division also provided bench space and supervision to graduate students from various universities in Nigeria. During the year under review, the Division hosted PhD students from University of Nigeria, Nsukka, Ondo State University, Akure and Federal university of Technology, Owerri for their sample analysis. Relatedly, A Fellowship student (Veterinary Council of Nigeria Fellowship) and two (2) Master's students from Ebonyi State university and Federal college of Agriculture, Akure were hosted respectively. In addition, over 200 students from several higher institutions of learning were equipped with hands-on molecular diagnostic techniques training by the staff of the laboratory during their SIWES program.

CHALLENGES

Some of the challenges of the Division include;

- Lack of reagents and consumables for routine work in the laboratory.
- Broken down ultralow freezer and - 20 ^{0}C freezers.
- Lack of cells for isolation, mass production and titration of viruses/vaccines.
- Lack of media and other necessities for cell culture.
- Lack of water supply in the labs.
- Faulty electrical sockets.

FUTURE PLANS

These challenges notwithstanding, the Division plans to;

1. Aggressively seek for and apply for grants in order to compliment the dwindling government funding of research.
2. Maintain a bank of field isolates of variety of field strains of viruses from different regions of the country for research and vaccine development.
3. Standardize the laboratory to attain regional laboratory status.

VIRAL VACCINES PRODUCTION DIVISION

The Division has the primary responsibility of producing vaccines for prevention of livestock and poultry viral diseases of economic and/or public health importance in Nigeria and other West African countries.

In addition, the Division produces distilled water and cell cultures for use by other Divisions in the institute. Also the freeze drying and labeling Sections render services to other Divisions involved in the production of lyophilized vaccines and other biologics.In line with this mandate, the Division has been producing the following viral vaccines

IBDV (Gumboro) vaccine
Fowl Pox vaccine
Newcastle disease vaccine (La Sota)
Newcastle disease vaccine (Hitchner B1-Intra-ocular)
Newcastle disease vaccine (Komarov)
Newcastle disease vaccine (NDV I-2)
PPR vaccine
Rabies vaccine for dogs

The newly developed vaccine for the control of Lumpy skin disease and sheep/goat pox are being produced for field trials and are available to farmers on request. The Division also produces sterile diluents for vaccines to avoid contamination of vaccine during reconstitution.

During the period under review, the Division produced **37,579,451**doses of the various viral vaccines. The reduction in the number of freeze-drying cycles currently being practiced was partly responsible for the improvement in the vaccine production figures. The details of vaccine production per vials and doses for the period are given in Tables 1 and 2 respectively.

Furthermore, the Division produced about 6000 litres of distilled water and various cell culture media (GMEM, DMEM, EMEM, RPMI, F-12, HBSS) for use in various divisions of the Institute and the two colleges. In the same vein, Cell culture section prepared cell cultures in monolayer and suspension including Vero R133, ZZR 2, CHS-20 and BHK-21 for research as well as quality control of viral vaccines, and culture bank of same is being maintained in liquid nitrogen.

Table 1: Viral Vaccines Production Figure (vials) January - Dec 2018

MONTH	ARV	IBDV(200)	IBDV(500)	FPV	NDV-K	NDV-L	NDV- $^{i}/_{o}$	NDV- $I_{2\,(50)}$	NDV- $I_{2\,(200)}$	PPRV	LSD	TOTAL
January	0	0	0	0	0	0	0	0	0	11,843	**0**	**11,843**
February	0	0	0	5,851	0	0	0	5,676	0	0	**0**	**11,527**
March	4,509	0	0	0	0	10,137	0	5,735	0	0	**0**	**20,381**
April	0	0	0	0	0	4,803	0	10,989	0	0	**0**	**15,792**
May	0	11,156	0	0	0	0	4,060	0	0	0	**0**	**15,216**
June	0	0	0	0	0	3,921	0	0	0	0	**0**	**3,921**
July	4,493	0	0	0	5,057	4,771	0	24,038	0	0	**0**	**38,359**
August	0	0	0	0	0	0	0	11,729	0	3,189	**0**	**14,918**
Sept	15,024	11,436	3,720	4380	0	20,114	0	0	4,660	0	**0**	**59,334**
Oct	0	0	0	0	11,873	11,427	0	13,255	11,838	23,745	**0**	**72,138**
Nov	14,925	0	0	0	0	0	11,530	11,469	0	0	**0**	**37,924**
Dec	0	0	0	0	0	10,955	0	0	0	0	**0**	**10,955**
Total	**38,951**	**22,592**	**3,720**	**10,231**	**16,930**	**66,128**	**15,590**	**82,891**	**16,498**	**38,777**	**0**	**312,308**

Table 2: Viral Vaccines Production Figure (doses) January – December 2018

MONTH	ARV	IBDV(200)	IBDV(500)	FPV	NDV-K	NDV-L	NDV- $^{i}/_{o}$	NDV- I_2	NDV- $I_{2\,(200)}$	PPRV	LSD	TOTAL
Jan	0	0	0	0	0	0	0	0	0	592,150	0	**592,150**
Feb	0	0	0	1,170,200	0	0	0	283,800	0	0	0	**1,454,000**
March	4,509	0	0	0	0	2,027,400	0	286,750	0	0	0	**2,318,659**
April	0	0	0	0	0	960,600		549,450	0	0	0	**1,510,050**
May	0	2,231,200	0	0	0	0	812,000	0	0	0	0	**3,043,200**
June		0	0	0	0	784,200	0	0	0	0	0	**784,200**
July	4,493	0	0	0	1,011,400	954,200	0	1,201,900	0	0	0	**3,171,993**
August	0	0	0	0	0	0	0	586,450	0	162,750	0	**749,200**
Sept	15,024	2,287,200	1,860,000	876,000	0	4,022,800	0	0	932,000	0	0	**9,993,024**
Oct	0	0	0	0	2,374,600	2,285,400		662,750	2,367,600	1,187,250	0	**8,877,600**
Nov	14,925	0	0	0	0	0	2,306,000	573,450	0	0	0	**2,894,375**
Dec	0	0	0	0	0	2,191,000	0	0	0	0	0	**2,191,000**
Total	**38,951**	**4,518,400**	**1,860,000**	**2,046,200**	**3,386,000**	**13,225,600**	**3,118,000**	**4,144,550**	**3,299,600**	**1942,150**	**0**	**37,579,451**

CHALLENGES

- Inadequate incubation capacity for vaccine egg
- Inadequate/poor freezer storage capacity for harvested liquid vaccines
- Inadequate containers for vaccine storage
- Delay in supply of critical reagents for vaccine production
- Faulty automated Newman labeling machine
- Unavailability of potent master seed for vaccine production to increase vaccine dosages and potency.

FUTURE PLANS

- Increase dose/vial of critical vaccines in order to drive down cost of vaccines and compete favorably in the market
- Installation of 10,000 capacity egg incubator
- Installation of dedicated water tanks for autoclave to avoid breakdown.

STAFF TRAININGS APPROVED IN 2018

S/No	Name	Gender	Rank	Division	Institution	Program	Duration (Years)	Start	Completion
1	Tanko TJ	M	PVRO	Parasitology	UniJos	PhD	5	2018	2023
2	Choji TP	M	ACMLS	CDL	Nmadi Azikiwe Uni	PhD	5	2018	2023
3	Awulu SJ	M	PVRO	LID	UNN	PhD	5	2018	2023
4	Dayo AO	F	CMLS	Akure Lab	UniBen	PhD	5	2016	2021
5	Agang I	M	PVRO	Abuja Lab	ABU Zaria	PhD	5	2018	2023
6	Shekaro A	M	PVRO	Kaduna Lab	ABU Zaria	PhD	5	2017	2022
7	Odita CI	F	PVRO	CDL	Uni Pretoria, SA	PhD	3	2018	2021
8	Sada A	M	PVRO	Kano Lab	ABU Zaria	PhD	5	2018	2023
9	Benso MN	F	PVRO	QC	ABU Zaria	PhD	5	2018	2023
10	Bitiyon RW	F	RO	Bact Res	ABU Zaria	PhD	5	2017	2022
11	Zhakon PN	F	SMLS	Rabies Lab	NDA	MSc	2	2018	2020
12	Ishaku NG	F	RO	VERLS	ATBU Bauchi	MSc	2	2018	2020
13	Gukut MK	M	RO	VERLS	ATBU Bauchi	MSc	2	2018	2020
14	Pwajok D	M	PSLT	BVP	ATBU Bauchi	MSc	2	2018	2020
15	Maxwell IK	M	ACML	VVP	Fed Uni Lafia	MSc	2	2018	2020
16	Gyang VJ	M	SEO	Admin	Nas State Uni Keffi	MPA	2	2018	2020
17	Usman Y	M	RO	Biochem	UniJos	MSc	2	2018	2020
18	Jik AW	M	SMLS	VVP	Fed Uni Lafia	MSc	2	2018	2020
19	Chima NC	F	RO	AMB	Western Australia	MSc	2	2018	2020
20	Ogbu JM	M	ACAO	Admin	UniJos	MSc	2	2018	2020
21	Pwajok PP	M	RO	Parasitology	UniJos	MSc	2	2018	2020
22	Wumbuet C	M	IO	Admin	UniJos	MSc	2	2018	2020
23	Ocheche A	M	ACAO	Admin	UniJos	MSc	2	2018	2020
24	Dashon TS	F	SMLT	Regional Lab	PlaPoly	HND	2	2018	2020
25	Goji RI	F	PMLT	BVP	PlaPoly	HND	2	2018	2020
26	Garba DU	F	CMLA	VVP	PlaPoly	HND	2	2018	2020
27	Pam BS	M	MLT	BVP	PlaPoly	HND	2	2018	2020
28	Haruna DK	M	MLT	QC	PlaPoly	HND	2	2018	2020
29	Daluwa LS	M	EO	Admin	PlaPoly	HND	2	2018	2020
30	Samson DC	M	ACSA	Admin	PlaPoly	HND	2	2018	2020
31	Oluigbo PC	M	HMLT	VVP	PlaPoly	HND	2	2018	2020
32	Dalyop JP	M	WS	Workshop	PlaPoly	HND	2	2018	2020
33	Dalyop A	F	SLT	CDL	FCAH&PT Vom	HND	2	2018	2020
34	Pam MD	M	SF	Dagwom	PSP BLadi	HND	2	2018	2020
35	Hong JN	M	HMLT	Biochemistry	FCAH&PT Vom	HND	2	2018	2020
36	Agada PG	M	CCO	Guest House	PSP BLadi	HND	2	2018	2020
37	Nyam C	F	CS	Viral Res	PSP BLadi	HND	2	2018	2020
38	Chuga AP	F	HMLT	Biochemistry	PSP BLadi	HND	2	2018	2020

LIST OF DECEASED STAFF OF THE INSTITUTE IN 2018

The Governing Board, Institute's Management Committee and the entire staff of NVRI, Vom condoles with the families and relations of the under listed staff who died during the year under review. May the Almighty God comfort the families and grant the deceased eternal rest.

S/NO.	NAME OF STAFF	DESIGNATION	DATE OF DEATH
1.	Musa Salisu	Prin. Exec. Officer I	20th May, 2018
2.	Yohanna Pam	Livestock Attendant	11th April, 2018
3.	Datong Emmanuel	Chief Livestock Overseer	1st January, 2018
4.	Ademoke Henry	Printing Asst.	6th March, 2018
5	Chukwuma Chinedu	Agric Field Attendant	13th February, 2018
6.	Dakut Dorothy	Chief Clerical Officer	7th March, 2018
7.	Adamu Abdulahi	Agric. Field Attendant	5th June, 2018
8.	Abubakar Christiana	Asst. Chief Livestock over.	3rd August, 2018

LIST OF RETIREES OF THE INSTITUTE IN 2018

The Governing Board, Institute's Management Committee and the entire staff of NVRI, Vom, felicitates with the under listed staff who retired during the year under review. Wishing them happy retired life.

S/NO.	NAME OF STAFF	DESIGNATION AS AT RETIREMENT	DATE OF RETIREMENT
1.	Taper Deshi	Livestock Attd.	1/1/2018
2.	Ahmed Yusuf	Chief Tech. Officer	15/7/2018
3.	Onovoh Emmanuel	Chief Med. Lab. Sci.	24/1/2018
4.	Gwandi Haggi Mele	Chief Librarian	23/3/2018
5.	Gyang Luka Davou	Asst. Chief Work Supt.	24/1/2018
6.	Echeonwu Chinwe B.	Chief Tech. Officer	6/6/2018
7.	Adashos Maria	Head Lab. Attd	9/9/2018
8.	Tukur Istifanus Y.	Executive Officer	8/9/2018
9.	Istifanus Martha	Head Lab. Attd.	2/11/2018
10.	Baso Alfred Ardel	Chief Accountant	11/11/2018
11.	Gabi Vou N.	Chief Me. Lab. Asst.	1/11/2018
12.	Jatau Pam Samuel	Snr. Editor. Proof. Reader	3/8/2018
13.	Ubong Canice J.I.	Chief Social Welfare Off.	12/10/2018
14.	Adekunle Esther	Chief Med. Lab. Tech	18/10/2018
15.	Mokogwu Mary O.	Chief Livestock Supt.	18/10/2018
16.	Nanza Margaret A.	Chief Med. Lab. Tech	18/10/2018
17.	Gwong Garos	Chief Med. Lab. Asst.	2/11/2018
18.	Enurah Leonard U	Director	16/12/2018
19.	Ngyal Godfrey Dagap	Chief Confidential Sect.	31/12/2018
20.	Kigbu Sunday	Chief Med. Lab. Tech.	29/11/2018
21.	Adamu Audu Vom	Prin. Tech. Supt.	31/10/2018
22.	Akaludi Yawande	Chief Vet. Res. Officer	1/6/2018
23.	Jatau Monday	Chief Motor Driver Mech.	2/5/2018
24.	Benjamin John O.	Chief Med. Lab. Asst.	30/11/2018
25.	Zinkat Joseph N.	Director	6/6/2018
26.	Bature Lyop	Chief Stores Officer	21/3/2018
27.	Osawe Lucy	Prin. Med. Lab. Tech.	1/2/2018
28.	Vongmu Mary J.	Asst. Chief Accountant	9/2/2018
29.	Jinia Sati	Chief MedLab. Asst.	5/4/2018
30.	Gyang Rose	Chief Med. Lab. Asst.	7/6/2018
31.	Jatau Jonathan	Asst. Chief Livestock Supt.	2/2/2018
32.	Sale Ladi	Asst. Chief Med. Lab. Tech	11/4/2018
33.	Chuks Comfort	Snr. Sec. Asst.	26/5/2018
34.	Olorunisola Idayat	Confidential Sec. I	11/3/2018
35.	Odunola Abiodun	Higher Med. Lab. Tech.	26/2/2018
36.	Maisaje Samuel	Higher Med. Lab. Asst.	27/6/2018

37.	Itodo Adamu Micheal	Asst. Chief Graphic Arts/officer	10/11/2018
38.	Danbiong Pam Mancha	Higher Med Asst.	9/5/2018
39.	Baba Suleiman	Chief Clerical off. (Admin)	30/6/2018
40.	Di Vou	Higher Med. Lab. Asst.	11/6/2018
41.	Yilkorah K. Gobel	Chief Livestock Overseer	31/12/2018

List of Journal publications by NVRI staff in 2018

Gotep JG., Oladipo OO., Makoshi MS., Doku ET., Asala TM., Eki MM., Yusuf HB., Akanbi BO., **Isa S., Dogonyaro BB., Okewole PA., Atiku AA., Ahmed MS.**, Nduaka CI. (**2018**). Toxicological evaluation of *Euphorbia hirta* on Baby Hamster Kidney (BHK-21) cells and in Albino rats. *European Journal of Medicinal Plants*, 25 (2): 1-12.

Muraina IA., Oladipo OO., Akanbi BO., Shallmizhlli JJ., **Gyang MD.**, Ijale GO., Govwang FP., **Atiku AA**. (**2018**). Phosphine poisoning in free-range chickens: a case report. *Veterinary Medicine and Science*, 4: 262-268.

Gotep JG., Gbise DS., Makama S., Okwuasaba, FK. (**2018**). Effects of *Vernonia amygdalina* Del. (*Asteracea*) on glycemia and mating behavior of male albino rats. *European Journal of Medicinal Plants*, 22(4): 1-12.

Agida G.O., …et al (**2018**). Chemical Evaluation of *Faidherbia albida* pods as a potential feed for livestock. *Vom Journal of Veterinary Sciences,* 13: 57-64

Kumari Asha, Prashant Kumar, Melvin Sanicas, **Clement A. Meseko**, Madhu Khanna and Binod Kumar (2018). Advancements in nucleic acid based therapeutics against respiratory viral infections. Journal of clinical medicine. 8(1):6. DOI: 10.3390/jcm8010006

Meseko,C. A., A. Globig, **J. Ijomanta** et al. (2018).Evidence of exposure of domestic pigs to Highly Pathogenic Avian Influenza H5N1 in Nigeria. Scientific Reports 8(1). DOI: 10.1038/s41598-018-24371-6

Meseko,C. A.,D. Ehizibolo, C. Vakuru (2018). Migratory waterfowls from Europe as potential source of highly pathogenic avian influenza infection to Nigeria poultry. Nigerian Veterinary Journal 39 (1): 1-5. DOI: 10.4314/nvj.v39i1.1

Sharma P, Killmaster LF, Volkening JD, Cardenas-Garcia S**, Shittu I, Meseko CA, Sulaiman LK, Joannis TM**, Miller PJ, Afonso CL. (2018). Draft genome sequences of five novel *Ochrobactrum* spp. isolated from different avian hosts in Nigeria. Genome Announc. 6:e00063-18. https://doi.org/10.1128/genomeA.00063-18.

Alhaji, N. B., O. O. Babalobi, **Y. Wungak, H G Ularamu** (2018). Participatory survey of Rift Valley fever in nomadic pastoral communities of North-central Nigeria: The associated risk pathways and factors. PLoS Neglected Tropical Diseases 12(10):e0006858. DOI: 10.1371/journal.pntd.0006858

Ogo, N I Okubanjo, O.O., Inuwa, H.M., Agbede, R.I.S. (2018) Morphological and molecular characterization of *Amblyommavariegatum* (Acari: Ixodidae) ticks from Nigeria. Nigerian Veterinary Journal. Vol 38 (3): 260-267.

Ducrotoy, M. J., A. O. Majekodunmi, A. P. M. Shaw, H. Bagulo,**W. J. Bertu, A. M. Gusi, R. Ocholi** and S. C. Welburn (2018). Patterns of passage into protected areas: Drivers and outcomes of Fulani immigration, settlement and integration into the Kachia Grazing Reserve, northwest Nigeria. Pastoralism: Research, Policy and Practice (2018) 8:1 DOI 10.1186/s13570-017-0105-1

Beylefeld, A., Wambulawaye, P., **Bwala, DG**., Abolnik, C et al. (2018). Evidence for multidrug resistance in nonpathogenic *Mycoplasma*species isolated from South African poultry. Applied and Environmental Microbiology 84(21).DOI: 10.1128/AEM.01660-18

Adeyemi, M., **Bwala, DG**., Abolnik C (2018). Comparative evaluation of the pathogenicity of *Mycoplasma gallinaceum* in chickens. Avian Diseases 62(1) DOI: 10.1637/11743-081717-Reg.1

Bwala DG., Ponman. S., Duncan, N et al (2018). Assessment of *Mycoplasmagallisepticum* vaccine efficacy in a co-infection challenge model with QX-like infectious bronchitis virus. Avian Pathology 47(3):1-28. DOI: 10.1080/03079457.2018.1440064

NA Maurice, **Pam DL**, Magdalene NM, Emmanuel ON, **Ponfa NZ**, Philip PM, **Ishaya ST**, Utibe-Abasi HU, Udoh AI, Nsika JE, Okon JI, **Philip AO., Shamaki D**, Lombin LH (2018). Rabies in a set of eight-week old puppies in Nigeria: The need for review ofcurrent dog anti-rabies vaccination schedule. African Journal of Infectious Diseases 12(2):72-77 DOI:10.21010/ajid.v12i2.12

Enurah, L. U., C. l. Nwosuh, D. O. Ehizibolo, N. M. Sati, P. E. Emenna, I. Shittu, E. T. Obishakin and I. O. Nwagbo (2018). Genetic analysis of Infectious Bursal Disease virus (IBDV) from a farm in Vom, Plateau State, Nigeria. Journal of Advances in Microbiology 12 (4):1 Article no. JAMB. 44386 ISSN:2456-7116

Kia GSN, Y Huang, M Zhou, Z Zhou, CW Gnanadurai, CM Leysona, JU Umoh, HM Kazeem**, DO Ehizibolo**, JKP Kwaga**, CI Nwosu**& ZF Fu (2018).Molecular characterization of a rabies virus isolated from trade dogs in Plateau State, Nigeria. Sokoto Journal of Veterinary Sciences16 (2):54-62

Frank Vandenbussche, Elisabeth Mathijs, **Hussaini G. Ularamu** et al. (2018).Complete genome sequences of five Foot-and-Mouth Disease viruses of serotype A isolated from cattle in Nigeria between 2013 and 2015.Genome Announcements 6(7):e00039-18 DOI: 10.1128/genomeA.00039-18

Fagbamila I O., Mancin M., Barco L. et al. (2018). Investigation of potential risk factors associated with Salmonella presence in commercial laying hen farms in Nigeria. Preventive Veterinary Medicine 152 DOI: 10.1016/j.prevetmed.2018.02.001

Dalis JS., Kazeem H., Kwaga, J., CN Kwanashi, **Bitrus Yakubu, Owolodun A O., Jambol A R** (2018). Molecular characterization of dermatophytes isolated from cattle in

Plateau State, Nigeria. Veterinary Microbiology 219
DOI: 10.1016/j.vetmic.2018.04.022

Kamani, J., G. Baneth, R. Gutiérrez, Y. Nachum-Biala, K. Y. Mumcuoglu, S. Harrus (2018). *Coxiella burnetii* and *Rickettsia conorii*: Two zoonotic pathogens in peridomestic rodents and their ectoparasites in Nigeria. Ticks and Tick-borne Dis. 9: 86–92

Kamani, J., S. Harrus, Y. Nachum-Biala, H. Salant, K. Y. Mumcuoglu, G. Baneth (2018). Pathogenic and endosymbiont apicomplexans in *Ctenocephalides felis* (Siphonaptera: Pulicidae) from cats in Jerusalem, Israel. Comparative Immunol, Microbiol Infect Dis. 57: 29–33

Kamani, J., Gad Baneth, Shimon Harrus (2018). An annotated checklist of tick-borne pathogens of dogs in Nigeria. Vet Parasitol. Reg Stud. and reports, https://doi.org/10.1016/j.vprsr.2018.12.001

Kamani, J., Harrus, S., Nachum-Biala, Y., Gutiérrez, R., Mumcuoglu, KY., Baneth, G (2018). Prevalence of *Hepatozoon* and *Sarcocystis* spp. in rodents and their ectoparasites in Nigeria. Acta Tropica 187: 124–128. https://doi.org/10.1016/j.actatropica.2018.07.028

Wang T., Vineer HR., Motrison AA.,Van WyK JA., **Bolajoko MB**., Bartley DJ., Morgan ER (2018). Microclimate has a greater influence than macroclimate on the availability of infective Haemonchus contortus larvae on herbage in a warmed temperate environment. Agriculture Ecosystems & Environment 265:31-36
DOI: 10.1016/j.agee.2018.05.029.

Idachaba SE., Bolajoko MB (2018).The need for one health approach towards rabies control in Plateau State, Nigeria. Sokoto Journal of Veterinary Science DOI: 10.4314/sokjvs.v16i2.13

Adedeji, JA., Gamawa, AA., Nneka Chineze Chima, NC., et al. (2018). First report of camel contagious ecthyma in Nigeria. Open Veterinary Journal Vol. 8(2): 208-211

Abolnik C., Piertese R.,Peyrot BM., Choma P., Phiri TP.,Ebersohn K.,van Hardeen CJ., Vorster AA., van Der Zeel G.,Geerstma PJ., **Oladokun AT.,** Govindasamy K., Rauff DL (2018). The incursion and spread of Highly Pathogenic Avian Influenza H5N8 Clade 2.3.4.4 within South Africa. Avian Diseases 63(1):149 DOI: 10.1637/11869-042518-Reg.1

Mantip SE, Paulinus Emennaa and **Ishaya Sini Tekki** (2018). The possible effect of *Momodica balsamina* in the management of Newcastle disease. Vom Journal ofVeterinary Science Vol. 13, 2018: 88 – 96.

Danmallam F.A, Pimenov, N.V, **Ngulukun S.S, Mwankon S.E** (2018). Prevalence and bacterial etiology of mastitis in small ruminants in Toro Local Government Area, Bauchi state, Nigeria. RJOAS, 7(79): 341 – 345

God's power R. Okoh, Haruna M. Kazeem, Grace S.N. Kia and **Zhakum N. Ponfa** (2018). Heat induced epitope retrieval for rabies virus detection by direct fluorescent antibody test in formalin fixed dog brain tissues. Open veterinary journal, Vol.8 (3):317