TABLE OF CONTENTS

INTRODUCTION

The past year has been a very busy and eventful one for the Institute. The Institute continued to pursue its programmes of infrastructural and human capacity development to enable it meet its mandate of livestock research and vaccine production

In an effort to ensure sustainability, quality research and effective service delivery, the Institute embarked on the employment of young research officers from the veterinary and basic sciences. This recruitment exercise in addition to future exercises will enable the Institute put in place a durable succession plan that will maintain the tradition of research excellence for which the Institute is known.

The Institute has continued to build capacity for research and vaccine production through postgraduate and short-duration training for staff at various Institutions of learning and research both in the country and abroad. The fellowship training for the Institute's staff at overseas research laboratories has broadened the horizon of such staff and boosted their morale. This has translated to change of attitude and greater commitment to work and improved quality of research activities. Continuing education training programmes were also mounted for staff of the Institute and were facilitated by Professors from the Veterinary Faculties in the country.

The Diagnostic Department of the Institute continued to provide support services to farmers and the Nigeria PACE Programme for Rinderpest eradication and the control of other epizootic diseases in the country.

The demand for vaccines and other products from the Institute is on the increase. In order to cope with these demands and also improve on the quality and quantity of products, the Institute initiated the process of acquiring a new Freeze-Dryer and a Labelling machine. The acquisition of these equipments will accelerate the process of achieving quality assurance and current Good Manufacturing Practices (c-GMP).

During the year, in addition to the various scientific research publications by staff of the Institute, 57.20 million doses of viral vaccines and 8.96 million doses of bacterial vaccines were produced.

The Institute looks forward to 2004 with great expectations as it prepares to host scientists within and outside the country during the 80th Anniversary Celebrations of the Institute.

Dr (Mrs) L. H. Lombin,
Director/Chief Executive.

SCIENTIFIC REPORTS

Project Title:
Application of PCR and Southern Hybridization in the Detection of *Pasteurella multocida* and *Brucella* species.

Introduction

Pasteurella multocida is the causative agent of fowl cholera (in poultry), haemorrhagic septicaemia (in cattle & buffalo) and pneumonia (in rabbits, pigs, cats & dogs). *Brucella* (genus) made up of six species, causes brucellosis that can result in abortion in animals. The focus of the project was the establishment of PCR and Southern hybridization analysis to facilitate the identification and rapid detection of the organisms, determine their taxonomic position and investigate any intra species genetic relationships. PCR and Southern hybridization analysis are powerful tools in the screening of diagnostic samples, differentiation of vaccine strains and identification of organisms. The techniques are useful tools for the diagnosis of pasteurellosis and brucellosis and for the production of diagnostic reagents that will improve the sensitivity and accuracy of diagnosis.

The Objectives of the study were to develop a technique to accurately detect and characterize *Pasteurella multocida* and *Brucella* in clinical samples. It was also to establish a hybridization technique and adapt a DNA labelling technique suitable for the available equipment and materials in the laboratory. The project was also aimed at the development of an on-the-field hybridization kit for the detection of *Pasteurella multocida* and *Brucella* in clinical samples.

Thirty-nine samples were collected, made up of four *Pasteurella multocida* reference samples, seven *Brucella* samples and twenty-eight *Pasteurella multocida* clinical samples. The group specific PCR assay was done with 35 samples. Template DNA isolation and purification was carried out using PCR. PCR was also used to obtain templates for probe design for Southern Hybridization analyses. The 460 bp group specific amplicons for *Pasteurella multocida* and 650 bp amplicons for *Brucella* were accessed from gels. Agarose gel DNA Extraction kit (Roche) was used to extract and purify the templates from agarose gels.

Probe Design

The Random Prime Labelling technique was used in probe design and DIG High Prime DNA labelling and detection starter kit I (Roche) was used in labelling.

Southern Hybridization: E.CoRI, SacI, HinfI, SspI, MboI, BamHI, and PstI were used for restriction of DNA extracts. Southern hybridization was also used as a confirmatory technique. Hybridization analysis of six *Pasteurella multocida* and seven *Brucella* samples were carried out. Dot-blot hybridization was attempted using seven *Brucella* samples.

Results

Group specific PCR detection of 28 samples was carried out, 21 were *Pasteurella multocida* and seven *Brucella* samples. *Pasteurella multocida* and *Brucella* reference samples were positive, establishing positive controls for both *Pasteurella multocida* and *Brucella.*

Two hundred micro litres (200ul) each of the *Pasteurella multocida* and *Brucella* templates (460 bp & 650 bp respectively) were isolated and purified for probe design. A total of 200ul of both *Pasteurella multocida* and *Brucella* probes were made and had been used in Southern hybridization analysis. Southern hybridization was used to confirm the six positive *Pasteurella multocida* and the seven positive *Brucella* samples successfully.

Objectives Achieved

PCR has been successfully applied to detect *Pasteurella multocida* and *Brucella* in clinical samples to group specific level. Southern hybridization as a confirmatory assay for PCR has been successfully applied and PCR and Southern hybridization assay of *Pasteurella multocida* and *Brucella* have been established.

Plans are the optimization of the techniques and the analysis of more samples to establish the techniques fully. Diagnostic kits for dot-blot/colony hybridization for on-the-field diagnosis will be developed.

Contact: Bitrus Yakubu
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Project Title:
Estrogens in Pasture Plants and Their Possible Effects on Milk Secretion

Introduction

Studies have shown that when lactating cows are turned out to grass in the spring they often show an increase in milk yield greater than the amount ascribable to the extra nutrients ingested. Attempts were made to simulate galactopoietic effects of spring grass on milk yield and composition. This was through the liberal supplementation of carbohydrate, protein or vitamin. Some indigenous plants have also been reported to have mamogenic or galactopoietic effect after a short term feeding experiment on mice.

The objectives of the study were to conduct an intensive survey of the estrogenic activity of different species of commonly found wild pasture and those grown by the pasture development section of the Institute with the aim of investigating indigenous plants claimed to have galactogenic properties in animals. Also to study the effect of organic solvent extracts of the plants or pasture and evaluate the possible scope of use on a pilot scale for improved milk production. The stage during the growing season when oestrogen content is highest in the plants was also to be determined.

Some grasses and plant materials were identified and collected for this study. These included Pangola grass (*Digitaria Decumbens*), Centro (*Centrosema pubensces*), Stylo (*Stylo santhusguinensis*), Alfalfa (*Meddicago sativa*), Kikuyu grass (*Pennitum da destum*), Spanish clover (*Dosmodium unicentum*), Goats rue (*Galega Officinatis of Leguminosae family)* and *Costus spectabilis* (family *Zingiberaceae*)

The samples were extracted with petroleum ether for 48 hours. To each test group of rats, 0.1ml of the extract was administered. 0.1ml of pure groundnut oil and 0.1ml of oestrogen standard were administered to control group rats. The experiment lasted for 5 days. Results indicated that the increase in weight (size) of the two reproductive organs used as a parameter might have been due to the stimulatory effect of oestrogen-like substances in the extracts. The plan is to extract the samples using another method.

Contact: Ann L. Samuel
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Project Title:
Modulation of Immune Response of Chickens to Vaccination by *Zizyphus spina-cristi* Saponin Extract

Introduction

Zizyphus spina-cristi (*Rhamnacea*) is a common plant in Nigeria. It is found especially in the northern parts of the country. In traditional medicine, the plant is used in the treatment of different types of diseases. The major constituents of the plant extract have been shown to be saponin glycosides. Saponin glycosides are known, to have immuno-stimulating properties and have been used as adjuvants to increase the effectiveness of both injected and oral vaccines. For example, saponin is required in the preparation of living anthrax spore vaccine to increase vaccine efficacy. Studies on the adjuvant effect of saponins and their derivatives on Bovine Ephemeral Fever vaccine have also been reported. Research is being conducted around the world on saponins. One of such studies is the evaluation of saponin-based immuno-stimulating complex in the development of an experimental vaccine against HIV and Herpes Simplex Virus.

The objectives of the study were to extract and purify n-butanolic saponin extract of *Zizyphus spina-cristi*, to determine the haemolytic activity of the relatively purified extract on avian Red Blood Cells (RBCs) and to assess the influence of the saponin extract on the immune response of chickens to vaccination against Newcastle disease. It was also aimed at determining the stability of modulated immune response if any, to identify the component(s) of the saponin mixture with immuno-modulating properties and to assess the toxicity of the saponin extract.

The extraction and relative purification of extract have been achieved. Studies on the haemolytic effect of extract on avian RBCs have been completed and the effect of the extract on Newcastle disease vaccine virus (Lasota) has been conducted. Studies on the adjuvant effect of the extract on Newcastle disease vaccine (Komarov) is still in progress. Objectives achieved include extraction, purification of *Zizyphus spina-cristi* saponin extract and the determination of haemolytic activity on avian red cells.

The continuation of studies of adjuvant effect of extract on NDV (Lasota) vaccine and the fractionation of the saponin (reactions) with adjuvant effect are planned and the assessment of toxicity of the extract will be determined.

Contact: Maikidi G. H
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Project Title:
Determination of Biochemical Parameters in Serum of Diseased and Apparently Healthy Dogs in Jos and Environs

Introduction

The liver has important synthetic and metabolic functions. It also detoxifies and excretes products of metabolism. Liver diseases occur because of damage to the liver by toxins, or other infectious agents as well as metabolic, immune-mediated or neoplastic problems. The final pathway of chronic liver disease regardless of the cause is liver cirrhosis. This interferes with blood flow leading to the inability of the liver to perform its many different functions. Abnormal biochemical function may lead to a drop in protein concentrations like albumin and clotting factors. Production decreases, concentrations of serum enzymes and their activities and other metabolic products in the blood would change. Liver cirrhosis can also cause problems in other organ systems such as the brain and kidneys due to the accumulation of catabolic products like ammonia in the blood stream.

The objectives of the study were to assess the health status of the liver using enzymes as markers, to provide baseline values for some biochemical parameters (protein, albumin, bilirubin, uric acid cholesterol, urea, Creatinine, blood glucose level etc) and to provide information on the prevalence of liver and kidney associated diseases.

The main parameters routinely utilized for diagnosis are the determination of liver enzyme activities in serum and the synthetic, secretory, and excretory capacities of the liver. The aim of this study was to assess the health status of the liver using cellular enzymes as biomarkers, and to establish baseline values of some Biochemical parameters.

One hundred samples collected from three veterinary clinics within Jos Metropolis were assayed for serum ALT, AST, ALP, TSP and albumin using the methods of Reitman and Frankel, (1957), King Armstrong, (1964), Biuret reaction, and Bartholomew and Daloneg (1968) respectively.

Results

Sixty samples were above the reference range values, for the parameters analysed. Increase in the activities of cellular enzymes is an indication of hepatic disorders in dogs.

Plans

Other biochemical parameters for estimation of some cations and anions such as Na+, K+, HCO32-, Ca+2, Cl-, phosphorus etc will take place. Hormonal parameters such as, estradiol, thyroxin, insulin, glucagon etc will be determined. Haematological tests such as full blood counts RBC count, PCV Haemoglobin percentage measurement, coagulation time, Blood typing etc and MCV, MHCV etc are also to be determined.

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Project Title:
Phenotypic and Biological characterisation of *Brucella* strains isolated from livestock in Nigeria.

Introduction

Brucellosis is caused by six species of a Gram-negative, facultative, intracellular bacteria *Brucella.* The disease is recognised as an important Zoonotic diseases world wide resulting in economic losses and serious human health hazard. In order to formulate policies and strategies for the control of brucellosis, knowledge and understanding of the biotypes affecting animals are crucial. An important step in establishing the prevailing species is to undertake widespread isolation of *Brucella* among the various livestock species. There is also a need to establish the involvement of *Brucella* in cases of abortion in animals. The technical problems associated with the use of S19 have prompted the search for local *Brucella* isolates that can be used as vaccine candidates. The focus of this project was to undertake the characterisation of such isolates by conventional typing methods.

The objectives of the study were to isolate *Brucellae* from Nigerian livestock and establish their species and biotypes and to undertake testing for their virulence in mice with a view to using them for vaccine production.

Work done so far

Eight hundred and fifty samples of milk, aborted foetuses, hygroma fluid, blood and vaginal swabs were collected from cattle, sheep, goats, dogs, pigs and horses in Adamawa, Bauchi, Borno, Kaduna, Kano, Kogi, Nassarawa, Plateau, Taraba and Sokoto States. The samples were cultured for Brucella by standard techniques and biotyped according to conventional methods. Immune and pathological responses were measured for twenty weeks after infection of mice with both *B. abortus*, S19, S 544, S3, S5 and S8. Evaluation of the virulence of isolates was based on pathological lesions in the spleen and spleenic clearance of the organism over time.

Results

Twenty-five strains of Brucella were isolated from culture samples. 48% of isolates were obtained from milk highlighting the Zoonotic implications of this finding. All isolates were *Brucella abortus* Biotype 1 and indicated a wide

geographical spread of infections. Pathological lesions were more severe in mice infected with field isolates than in mice infected with S 19 and S544. While S19 was cleared from the spleen by twelve weeks and S544 by sixteen weeks, field isolates were still present in the spleen by twenty weeks indicating that they were highly virulent. All isolates induced significant production of antibodies in mice comparable to S19.

Objectives achieved include successful isolation of *Brucella* from aborting animals and the establishment of their species and biotypes. The prevailing *Brucella* species in Nigeria appears to be *Brucella abortus* biotype 1 and the virulence of the filed isolates has been established.

Plans
Plan is to undertake molecular characterisation of the isolates.

Contact : Dr. R. A. Ocholi
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Project Title:
Isolation of Newcastle Disease Virus from Feral Birds in Three Central States of Nigeria.

Introduction:
Free range and feral birds have been implicated as acting as carrier and transmitter of NDV to commercial flock. The Central States of Nigeria have various forms of feral birds from carnivores to herbivores and omnivores. These birds usually pick the virus from contaminated carcasses and become subclinically infected. They may infect commercial flock when in contact and this poses a serious danger to the poultry industry.

Wild birds were trapped from various locations and euthanised. Sample collection was done in the laboratory. The samples were prepared and underwent egg inoculations, spot testing, HI test and biological characterization.

The objectives of the study were to determine if feral birds are carriers of NDV, to determine the correlation between NDV found in feral birds and outbreaks in commercial flocks, to determine if feral birds are the main source of NDV infection in commercial farms and to identify appropriate interventions.

Work Done So far:
One hundred and twenty one wild birds of various species were trapped, samples collected and eggs inoculated. Positive and negative samples were determined and the characterization by MDT in embryonating eggs was done.

Results
22 (18.2%) out of 121 samples were positive for NDV
Objectives Achieved So Far:
Establishment of feral birds as carrier of NDV

Plans:
Comparative studies of characteristics of NDV isolates from feral birds and outbreaks in commercial chickens and further characterization by IVPI and ICPI.

Contact: Dr. J. O. Ibu
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Project Title:
Prevalence Studies of NDV Antibodies in Apparently Healthy Local Chickens, Turkeys and Ducks.

Introduction:
Newcastle disease (ND) is caused by a virus known as avian paramyxovirus type I (APMV-I).Almost all avian species are affected with the chicken being the most susceptible. Nigeria has a local poultry resource worth about N1, 262 million (1996 estimate) and forms a large share of the poultry kept by the rural population. Local scavenging poultry are hardly vaccinated or treated and may act as a source of infection for commercial flocks.

One thousand four hundred and twenty four local unvaccinated birds including (chickens, turkeys and ducks) were sampled from various locations in Jos South and B/Ladi L.G. C of Plateau State. The birds were bled for serum production. Sera were tested by Haemagglutination Inhibition (HI) test in the laboratory using standardized controls.

Objectives:
To determine whether apparently healthy local birds can be carriers of NDV and to determine the level of infection in local birds.

Work Done So Far:
Collection of samples and the completion of Haemagglutination Inhibition (HI) test.

Results:
Local Turkeys have the highest Geometric Mean Titre (GMT) range of 3.5-48.5 followed by Ducks (0-14.9) and local Chickens (1.7-3.7).

Significance of Result:
Results indicate that the GMT must have resulted from infection since the birds were not vaccinated.

Objectives Achieved:
Local birds have been confirmed to be carriers of NDV
Level of infection was found to be low as very ill birds are usually slaughtered while recovered birds have low levels of immunity

Contact: Dr. T. M Joannis
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Project Title:
Influence of Age on the Development of IBDV Antibodies in Chicks Susceptible to the Virus

Introduction:
Infections Bursal Disease (IBD) is a viral disease that affects chicks less than 6 weeks, causing high morbidity and mortality. Routine vaccination schedules against the disease have been fashioned out in time past, which is still in use today. However, the current challenge of high mortality in vaccinated birds necessitates a more in depth study into antibody development following challenge.

One thousand (1000) day-old chicks (DOC) with no Maternally Derived Antibodies were divided into 5 groups of 200 each to reflect real farm situation. They were vaccinated at different ages and monitored for antibody development.

Objectives:
To determine the best age for vaccination against IBDV and the protective level of immunity in young chicks.

Work Done So Far:
Vaccination at Day 3, 10, 14, 21 and 28.
Seromonitoring at day 5, 7, 9, 11, 14, 21, 26, 30

Results:
Birds vaccinated at Days 21 and 28 seroconverted 5 days later while those vaccinated on days 10 and 14 seroconverted 14 days later while those vaccinated on day three seroconverted 21 days later.

Plans:
To repeat of the experiment and challenge of birds' once immune status is established.

Project Title:
Seroprevalence Studies on Egg Drop Syndrome '76 in Local Chickens.

Introduction:
Egg Drop Syndrome '76 is one of the viral diseases affecting the poultry industry all over the world especially the laying stock. The endemicity of the disease in Nigeria has been a source of argument among scientists. While some opine that it is a resident disease, others believe that the uncontrolled importation of EDS vaccine may be a potential source of introducing the disease. This study was conducted to explore the endemicity of the disease through serosurveillance in unvaccinated local poultry populations.

Objectives:
To determine the presence of EDS in local poultry Nigeria and the degree of susceptibility in each species considered. The possible source of the EDS if present was also to be determined.

Summary:
Three Local Governments Jos North, Jos South and Barikin Ladi were considered for the study with visits made to different locations within each L.G. Blood was collected for serum from local chickens, turkeys and ducks. The sera were tested using standard laboratory procedures.

Work Done So Far:
Serum samples were collected from 686 chickens, 26 ducks and 23 turkeys and tested by Haemagglutination.

Results:
Antibodies to EDS were found in 6.8% of the chickens, and 15.4% of the ducks sampled. These antibodies must have resulted from infection since the flocks were not vaccinated.

Significance of Results:
Ducks are more susceptible than chicken that are in turn more susceptible than turkeys. Results confirmed the presence of infection in local poultry.

Objectives Achieved So Far:
The determination of the presence of EDS in Nigeria.

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DEPARTMENTAL REPORTS

BIOCHEMISTRY AND APPLIED MOLECULAR BIOLOGY DEPARTMENT

The Biochemistry and AMB Department is a research and service Department of the Institute. It has the following sections Nutrition Section, Clinical Biochemistry Section, Toxicology Section, and Molecular Biology Section. All the Sections are involved in research, routine chemical analysis and training of students.

Nutrition Section

Research into animal nutrition in relation to animal diseases, Chemical analysis of feeds, feedstuffs, foods and foodstuffs, Training of Students on Industrial Training from various Institutions of higher learning and Consultancy services on feeds and feedstuffs to farmers and feed-millers.

Clinical Biochemistry Section

Research into the chemical pathology of diseased animals and biochemical diagnosis, Chemical water analysis and Biochemical tests.

Toxicology Section

Research into mycotoxins, phytotoxins and environmental toxicants. Research into herbs of medicinal value, Routine analyses of toxin levels in feeds, foodstuffs and water and Mineral elements analyses and routine alkalinity tests.

Molecular Biology Section

Research into the application of molecular biology techniques in the diagnosis of animal diseases. Genotyping and characterization of animal disease pathogens and cloning and genetic engineering in relation to animals and animal diseases. Clinical samples were received in 2003 for routine PCR analysis. PCR analysis for *Brucella*, African Swine Fever (ASF) and *Helicobacter pylori* were carried out as shown in Table.

BACTERIAL RESEARCH DEPARTMENT

The Department currently has five research sections, Mycoplasma, *Pasteurella*, *Brucella*, Haemophilus/Listeria and Dermatophilus. The current objective of the department is to carry out Research and Development (R & D) on the above agents, which cause bacterial diseases, considered as important threat to the economic development of the Nigerian livestock industry. The department also conducts generic bacterial research and fosters collaboration with universities, polytechnics, colleges of education and the private sector.

***Mycoplasma* Research Laboratory**

Work done in the Mycoplasma Research Laboratory in the year 2003 include routine examination of specimens for Mycoplasma, screening of sera samples for CBPP using the competitive ELISA (c-ELISA) Technique, collection of Mycoplasma isolates for molecular identification and storage and routine diagnostic services.

Between January and June 2003, a total of 279 sera samples were analysed by the c-ELISA technique, while eight tissue and four vaccine samples were analysed by the cultural isolation and identification methods. Of these, 39 specimens were positive by c-ELISA while four were positive by culture and isolation. Under the TCP programme, 720 samples from different parts of the country were screened by the c-ELISA method and 18 of them were found positive. 160 of the same samples were also screened by the Complement Fixation Test (CFT) only three were positive. Samples were screened by Latex Agglutination Test (LAT). The c-ELISA technique appears to be an effective tool for the detection of antibodies against CBPP.

***Pasteurella* Research Section**

From diseased animals, *Pasteurella multocida* was isolated from 20 lung and liver samples from cases of Fowl cholera outbreaks in a quail flock. *Pasteurella* haemolytica was isolated from pneumonic lungs of one calf and one goat. Bordetella avum (a related bacterium to *Pasteurella*) was isolated from 7 chickens and 10 quail respectively in an outbreak of avian bordetellosis

From apparently healthy animals, three species of *Pasteurella*, *P. multocida*, *P. haemolytica* and *P. gallinarum* were each isolated from three cloacal swabs out of 25 samples obtained.

The Institute's current *Pasteurella* vaccine strains used for the production of vaccines were validated using the Carter-Heddleston classification as follows:
FCV strain – *Pasteurella multocida* A: 15
HSV (Standard strain) – *Pasteurella multocida* B: 3, 4
HSV (Obudu strain) – *Pasteurella multocida* E: 2

***Brucella* Research Section**

A total of 87 milk samples, 22 vaginal swabs, 27 blood samples, one aborted foetus and one hygroma fluid were obtained from cattle, sheep, goats and horses in Plateau, Adamawa, Sokoto, Kano and Borno States. The field samples were cultured for *Brucella*. *Brucella* abortus was isolated from five milk samples and one aborted foetus from cattle, and two vaginal swabs and one hygroma fluid from horses. All the isolates were biotyped and were found to be of biotype 1.

On routine diagnosis, 124 serum samples obtained from cattle, sheep, goats and dogs. 34 were positive for *Brucella* antibodies by RBPT and SAT. Out of 64 milk samples obtained from cattle, sheep and goats, 18 were positive by MRT for *Brucella* antibodies.

***Haemophilus and Listeria* Research Section**

The preparation of Haemophilus paragallinarum HA antigen was carried out in order to determine HA titres. Haemagglutination Inhibition Test was conducted on eighty-four samples from local chickens, turkeys & ducks. Results indicate that poultry (ducks, chickens, turkeys) are carriers (92% chickens & 75% turkeys). So far, bacterial isolation has not been possible due to reagent constraints.

Samples were collected from ruminants and poultry for isolation of Listeria species. Each sample was processed using the CDC isolation procedure, direct culture and cold enrichment followed by a secondary selective enrichment and further culture on Selective Oxford Listeria Agar (Oxoid Formulation). Out of 158 samples examined 39 (24.7%) were positive for L. monocytogenes. Poultry (15.9%) & other livestock (35.7%). So far, the presence of L. monocytogenes has been confirmed through isolation. Possible sources of infection from animals have been identified and isolation from food and clinical samples improved upon.

The laboratory also conducted routine bacterial isolations. Fifty-one (51) samples were processed. Of this number 45 were avian, one bovine, three lapine, one ostrich and one chimpanzee.
Various organisms were isolated from 96.1% of samples. Thirty vaccine and broth samples were also tested for contamination as shown in the tables below.

Table 1: Number of Samples and Animal Species Examined

Animal species	No. of Samples	No. Positive	No. negative
Avian	45	43	2
Bovine	1	1	-
Lapine	3	3	-
Ostrich	1	1	-
Chimpanzee	1	1	-
	51	49(96.1%)	2(3.9%)
Vaccines & Broth	30	15(50%)	15(50%)

Dermatophilosis Research Section

The laboratory conducted experimentation on the pathogenicity of Dermatophilosis in rabbits using *Dermatophilus. congolensis* and *S. aureus* with the aim of mimicking the natural infection in rabbits. Infected rabbits had slightly higher temperature, averaging 39C (38.8C for controls) with atypical lesions of cracking, flaking, pin point papules and thin scabs at the area of infection at day 12 post-infection. Typical clinical signs indicative of field infection were absent. However, trials using sheep are being planned.

Table 2 Types of organisms isolated

Organism	Number isolated	Percentage
Staphylococcus aureus	4	15.40%
Haemophilus species	1	3.85
Escherichia coli	4	15..40
Listeria species	2	7.70
Salmonella species	2	7.70
Pasteurella gallisepticum	4	15.40
Proteus species	1	3.85
Klebsiella species	1	3.85
Candida albicans	1	3.85
Bacillus cereus	3	11.58
Pseudomonas species	1	3.85
Citrobacter species	1	3.85
Clostridium species	1	3.85
Total	**26**	

PARASITOLOGY DEPARTMENT

The Parasitology Department was created with the sole aim of conducting research and diagnosis of all economically important parasitic diseases of livestock and poultry and the development of control strategies against such disease. Routine diagnosis of parasitic diseases of animals was carried out. Approved research projects were pursued and field trips were undertaken to Kaduna in response to a reported outbreak of trypanosomosis.

The Parasitology Department consists of the following sections: Helminthology section, Protozoology & Haemoparasitic diseases section, Entomology section, Immunodiagnostic and Ethnopharmaceutical sections.

Routine analysis of faecal samples for parasites

During 2003, faecal samples were collected and analysed from Bovine, Ovine, Caprine and Avian species. Although human parasites are not the primary mandate of the Department, it was thought necessary to add some parasitic findings in humans in order to evaluate their Zoonotic importance.

Figure 1: Ostrich chicks at the Poultry farm

Haemoparasitic Diseases Project- an Assessment of the status of Babesiosis in Nigeria

This project is aimed at assessing the status of bovine babesiosis in Nigeria including vectorial distribution and identification. Samples were collected from Jos and Maiduguri abattoirs and NVRI laboratory cattle. Out of 566 blood samples analysed from Bovine the following results were observed. For *Anaplasma marginale* 144[20.5%] cases were positive while *Babesia bigemina* showed 84[10.2%] positive cases and *B. bovis* was found in four [1.2%] cases. For trypanosomes seven [2.2%] were positive for *T. vivax* while two [0.6%] were positive for *T. congolense.*

Cryptosporidiosis project

The Department is focusing on this project because of the probable contribution of the genus *Cryptosporidium* as a pathogen and as part of disease complexes. Samples were collected from Dagwom farm, Poultry farm and L.I.D. from rabbits, quails and geese. Out of the 127 rabbits sampled in Dagwom farm 39(30.7%) were positive for *Cryptosporidia.* Of the 102 samples collected from quails 26(25.49%) were positive for the parasite. The quail is reported to be an important host of ***Cryptosporidia***. Out of the 28 samples collected from geese, none was found positive for oocysts. 54 faecal samples were collected from L.I.D. out of which none was found positive for cryptosporidium oocysts.

Control of Coccidiosis Project

Five hundred samples have been collected so far from various animal species. Out of these numbers, 127 samples were from Rabbits, 117 from Quails, 229 samples from Chickens and 29 samples from Geese. Out of the 127 samples collected from Rabbits 17[13.39%] were positive for *Coccidia* oocysts while 46[65.71%] of the 70 grower, chickens were positive for oocysts. Neither the Quails nor Geese were found positive for oocysts. Out of the 52 layer birds sampled 8[15.38%] were positive for oocysts while 2[4.65%] out of 43 naked necks were positive for oocysts. Out of the 44 samples collected from the Gaffe breed 17[38.64%] samples were positive for oocysts and 15[75%] were positive from 20 samples collected from the Black Bantam breed. It was observed that hygiene; medication regime and age are significant in the prevalence of coccidiosis in poultry. The younger birds tend to shed more oocysts and most of the carcasses examined were those of young poults [growers] and they were kept on deep litter. Most of the birds kept in cages did not shed oocysts nor did so very minimally. Previous studies have shown no isolation of *Eimeria* oocysts from Quails even though they are known to harbour about 5 species. The oocysts identified from Chickens include the important *E. tenella* and *E. acervulina* and the relatively mild *E. mitis.* Those from Rabbits include *E. intestinalis* and *E. perforans.* An interesting development was observed in guinea fowls at the NVRI poultry farm recently, where heavy coccidial infections were seen at post-mortem in dead birds. These oocysts were isolated and purified and suspected to be *E. numidae* (Pellerdy, 1902) or *E. grenieri* (Yvore and Aycardi, 1967). These two species are thought to occur in Africa. Work on coccidiosis of guinea fowls is about to commence. Isolates have been sporulated and are being multiplied so that speciation, histopathological and pathological studies can be carried out.

***Anaplasma* and *Babesia* Vaccine Development**

The Department has recently initiated research into the development of *Anaplasma* and *Babesia* vaccine.

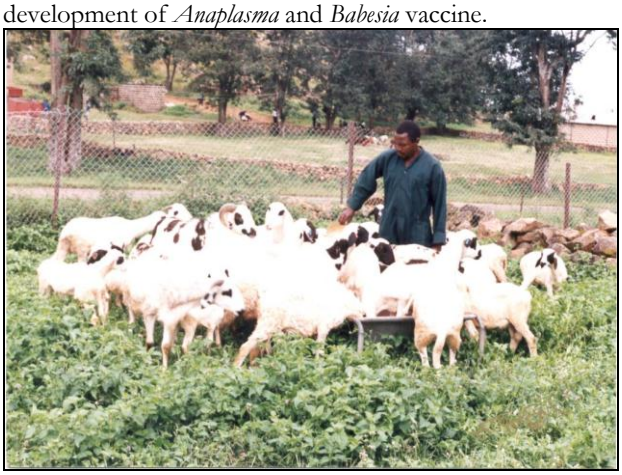

Figure 2: Sheep grazing at LID

Table 3 Occurrence of Parasites in various animals and humans

	Bovine	No. of samples	No. Positive	Percentage positive	Parasites identified
1.		217	32	14.7	*Oesophagostomum* spp
			6	2.8	*Moniezia benedeni*
			4	1.8	*Moniezia expansa*
			29	13.4	*Bunostomum* spp
			4	1.8	*Ascaris* spp.
			8	3.7	*Paramphistomum* spp.
			5	2.3	*Srongyloides* spp.
			23	10.6	Oocysts of Coccidia
			11	5.1	*Faciola* spp.
2.	Ovine	22	10	55.6	Coccidia oocysts
			2	11.1	*Haemonchus* spp
			2	11.1	*Strongyloides* spp
			2	11.1	*Oesophagostomum* spp
			2	11.1	*Trychostrongylus* spp.
			4	22.2	*Cysticercus* spp.
3	Caprine	13	2	15.4	*Strongyloides* pp.
			2	15.4	*Moniezia* spp
			6	46.2	*Oesophagostomum* spp.
4	Poultry	17	8	47.1	Oocysts of coccidia
5	Rabbits	102	21	20.6	Oocysts of coccidia
6	Canine	31 [Faecal]	4	12.9	*Ancylostoma* spp.
			6	19.4	*Toxocara canis*
		29 [Blood]	13	44.8	*Babesia canis*
7	Human	3 [Faecal]	1	33.3	*Enterobius vermicularis*
			1	33.3	*Ancylostoma* spp.
		5 [Blood]	2	40	*Plasmodium vivax*

DIAGNOSTIC DEPARTMENT

The primary functions of the Diagnostic department among others are Laboratory Diagnosis of Livestock and poultry diseases, Investigation into Livestock Diseases of Zoonotic importance, Research into Livestock and Poultry Diseases, Ambulatory/Consultancy/Extension Services, Autopsy of all carcasses brought for exam. Units in the Department include: Bacteriology unit, Histopathology unit, Clinical pathology Unit, Virus diagnostic unit, Autopsy unit, Epidemiology unit, Ambulatory/consultancy unit and the Laboratory animal unit.

Bacteriology Unit

The unit worked on 352 specimens during the year under review. Out of these, 237 were Avian, 20 Bovine, 16 ovine, 10 Caprine, 65 Laprine, one porcine and three canine: of the isolates made, 83 were *Escherichia coli*, 50 *Klebsiella*;14 *Pseudomonas* four *Aeromon*as 23, *Salmonella*, two *Citrobacter*, three *Morexella*, four *Staphylococcus*, five *Streptococcus*, eight *Proteus*, two *Pasteurella*, one *Corynebacterium*, four *Baccilus*, one *Bordetella*, two *Clostridia*, one *Yersinia* one *Enterobacter*. The following were parasites 28 *Eimeria*, one *Anaplasma*, one *Oesophagustomum*, and two *Trichuris* 10 *Ancylostoma*.

Virus Diagnostic Unit.
For now, only Rabies Cases are handled and processed, as other viral infections cannot be confirmed due to lack of facilities and reagents. In 2003, 217 canine heads were received; 112 cases were positive, 100 were negative and five were putrefied and therefore not suitable for processing.

Ambulatory/Consultancy unit
This unit handled cases from Nassarawa and Kaduna States, and the major problems encountered were Haemoparasitism. There was one case of Tuberculosis diagnosed using Acid-fast staining technique in two animals from a private farm in Keffi. On the same farm, a case of organo-phosphate poisoning was also confirmed. A similar case was reported and confirmed at another cattle ranch. An unconfirmed case of FMD was also reported in Ginjere in Bassa LGA; at the same time, a similar case of FMD was reported in Barkin-Ladi LGA.13 sera samples were also received from pigs for ASF screening and all were positive for ASF by I-ELISA. Major constraint in this unit is the lack of mobility and finance.

Laboratory Animal Unit
This unit raises laboratory animals for the institute mainly for research and students project. Laboratory animals such as rabbits, mice, guinea pigs, rats are raised by the unit

Autopsy Unit
Nine hundred and thirty five cases of Livestock and Poultry origin were received, processed and appropriate recommendations made. Cases were mostly from Nassarawa, Kano, Adamawa, Niger, Kaduna and Plateau States and were from the following species:

Avian
Out of the five hundred and seventy nine cases received and processed, the following Diseases were confirmed. New Castle Disease (9), Mareks Disease (49), Coccidiosis (76) Fowl Typhoid (96) Helminthosis (8) Chronic Respiratory Disease (14), Collibacillosis (85) and fungal infection (1). Other cases recorded within the period under review include cannibalism, stampede, and malnutrition.

Bovine
Two hundred and thirty three bovine specimens were received in the period under review out of which the following Diagnosis was made. CBPP (6), Liver flukes (1), Pneumonia (1), Tuberculosis (1), Poisoning (1) Helminthosis (200), Trypanosomosis (80). Most of the cases were treated through ambulatory services.

Porcine
four samples were received by the department for African Swine Fever (ASF) screening (two blood samples and 2-swab sample). Two of the samples were diagnosed for ASF by I-ELISA.

Feline
One (1) feline carcass was handled and the cause of death was found to be Traumatic Injury.

Ovine
22 ovine carcasses were recorded within the period under review, and the following conditions were confirmed. Helminthosis (12), PPR (4), Pneumonia (2) Pasteurellosis (2) Colibacillosis (2).

Caprine
Eighteen (18) caprine carcasses were received and treated for Helminthosis (8), Coccidiosis (1), Collibacillosis (1) PPR (6) Dermatophilosis (1).

Canine
Nine (9) canine carcasses were received and the following conditions diagnosed Babesiosis (6), suspected cases of Parvo Virus Enteritis (2), suspected case of Poisoning (1).

Zoo Animals
Six Zoo animal samples from Eland, Buffalo, Chimpanzee were received for necropsy and Laboratory examination and they were found to have died of Tuberculosis (2), Klebsiella pneumonia (4).

Laboratory Animals
Sixty four (64) Laboratory animals (mostly Guinea pigs, rabbits and mice) were handled involving mainly cases of pneumonia, Colibacillosis, Toxicosis, Coccidiosis and Helminthosis.

VIRAL RESEARCH DEPARTMENT

The department has four sections, Poultry Viral Diseases, PPR/PI3, Capripoxes, ASF/FMD, and two units Wash-up and Cell culture.

ASF Diagnostic Report
The unit tested a total of 217 sera and 14 suspected tissue samples during the year under review. The samples came from different part of the country and the laboratory tests carried out include I-ELISA (for sera) and PCR (for tissue samples). Out of the 217 sera tested, 95 were positive for ASFV antibodies and out of the 14 tissue samples tested, 11 were positive. Field investigations were also carried out in outbreak sites.

Pestes Des Petits Ruminants: Studies on the Duration of Immunity of a Homologous PPR Vaccine Produced in Vom.

A study was conducted to determine if a homologous PPR vaccine will stimulate immunity and to determine the duration of the immunity.

Pestes de Petits Ruminants (PPR) is a seasonal disease of small ruminants in Nigeria. It causes reduce growth, high mobility and sometimes mortality in these animals. PPR homologous vaccine being produced in Vom is targeted at controlling this disease and this study tend to look at the effectiveness of the vaccine as a control measure.

Sera collected from goatherds in four locations within Plateau State were tested using C-ELISA for pre-vaccination seromonitoring. Two repeated visits were made to the same herds after vaccinating the goats with the PPR homologous vaccine for subsequent bleeding for sera to be tested for antibodies.

The unit also produced 500ml of PPR Hyper Immune Serum for purposes of continuing diagnostic works by passaging in sheep. Twenty-three tissues/lesions were also tested for PPR by Counter Immuno-Electrophoresis and 19 were positive.

Reactivation of Existing Lumpy Skin Disease (LSD), Sheep Pox (SP) and Goat Pox (GP) Virus Vaccines

Capripoxes (LSD, SP and GP) are recurrent viral diseases in Nigeria caused by poxviruses. It causes loss of hide value and reduced growth rate. It has high morbidity but low mortality and can predispose to other diseases. The diseases can be controlled by vaccination and this work investigated the possibility of reactivating the vaccine strains of the LSD, SP and GP towards vaccine production. Lamb testis were Cultivated and used to reactivate the LSDV, SPV and GPV. The reactivated viruses were freeze dried and stored for further work.

Table 4 PPR diagnosis in field tissue samples by CIE

Lab No.	Specimen Tested							
	Oral lesion	Lymph Node	Lungs	Trachea	Spleen	Liver	Heart	Intestine
C7	+	+	NT	NT	NT	NT	NT	NT
C9	-	+	+	+	NT	NT	NT	NT
C11	NT	+	+	NT	NT	NT	NT	NT
C12	NT	+	+	NT	NT	NT	NT	NT
C13	NT	+	+	-	NT	NT	NT	NT
C14	+	NT	+	NT	+	+	-	-
C15	NT	+	+	+	+	NT	NT	NT

VETERINARY EXTENSION & RESEARCH LIAISON SERVICES

The Department conducts all extension activities, packages technologies and answers farmers' queries. These are achieved through the following components:

- OFAR (On-farm-Adaptive-Research Trials)
- Technology Review Meetings
- Surveys
- Training Workshops
- Publications
- WIA (Women in Agriculture)

Fifty-five radio programmes on different aspects of livestock health, management and production were produced and aired on the Muleka Rugage Hausa programme on Federal Radio Corporation of Nigeria (FRCN) Kaduna. Twenty-five similar programmes of Itojun oho osin Yoruba programme were produced and aired on FRCN Ibadan.

QUALITY CONTROL DEPARTMENT

The objectives of the Department are to maintain quality standards of production processes and products. The Department is yet to be fully equipped. The tests did therefore only complement the in-process quality checks by the producers. A total of 65 batches of both viral and bacterial vaccines were tested for proper labelling, sterility, consistency, colour and pH of suspension, , purity, viability and viable count where appropriate and freedom from toxicity. The test were carried out with the assistance of staff from both the Viral and Bacterial Research Department as follows

FTV	4 batches	NDV/L	8 batches
CBPP	8 "	NDV/K	7
BQV	5 "	NDV/i.o	1batch
ASV	1 batch	HSV	14 batches
FCV	9 batches	HANTAVAC	8 batches

Vaccine	Production	Despatched To stores
Anthrax Spore Vaccine	1,016,400	1,002,000
Brucella Vaccine	255,700	254,700
Black Quarter Vaccine	1,730,500	1,700,500
Contagious Bovine Pleuropneumonia	3,043,600	3,032,400
Fowl Cholera Vaccine	1,083,200	1,052,000
Fowl Typhoid Vaccine	1,360,100	1,347,300
Hantavac	195,720	191,400
Haemorrhagic Septicaemia (Standard)	142,920	138,440
Haemorrhagic Septicaemia vaccine (Obudu)	133,800	129,720
Total	**8,962,140**	**8,848,460**

Table 5 Bacterial Vaccines produced in 2003

BACTERIAL VACCINE PRODUCTION DEPARTMENT

The Department produces bacterial vaccines for the control of livestock diseases of bacterial origin. Eight vaccines are currently being produced. 8,962,140 doses of vaccines were produced as indicated in Table 5. A draft Dossier for bacterial vaccine production is being prepared in compliance with NAFDAC requirement for application for drug registration. Vaccines were passed for field use based on few tests, repeated tests and based on past batch performance while some were queried.

VIRAL VACCINE PRODUCTION DEPARTMENT

Vaccines were produced and issued to the Store as indicated in Table 6. Various vials of vaccine seed culture, extracts and life organisms were also freeze-dried for the Research and Production Departments.

Media Production

The following media were produced and distributed:

PBS	-	1185 litres
H/MEM-	-	220 "
Stabilizer-	-	400 "
Gelatin	-	26 "
Tryptose broth	-	10 "

VACCINE	PRODUCED		ISSUED	
	Vials	Doses	Vials	Doses
NDV-i/o	13,585	2,717,000	13,480	2,696,000
NDV-Lasota	89,978	17,995,600	88,970	17,794,000
NDV-Komarov	58,321	11,664,200	57,685	11,537,000
NDV_4	2,032	203,200	1,992	199,200
IBDV	93,952	18,790,400	88,734	17,746,800
FPV	24,514	4,902,800	24,301	4,860,200
ARV	41,235	41,235	36,242	36,242
PPR	16,770	838,500	16,273	813,650
TOTAL	**340,387**	**57,152,935**	**327,677**	**55,683,092**

Table 6 Viral Vaccine Production Figures for 2003

POULTRY DEPARTMENT

The main functions of the Department are to produce fertile eggs for the production of various poultry vaccines, to produce chicks for vaccine testing and research purposes and to investigate diseases of Poultry that may hamper productivity. Other activities are the investigation of the nutritional and management aspects of all classes of poultry and their effects on disease management, the introduction, adaptation and disease management of exotic breeds of poultry and the establishment of the nutrient status of locally available feed ingredients for ration formulation.

The Objectives of these studies include:

- To adapt the quail to all agro-ecological zones in Nigeria.
- To identify diseases that may hamper productivity and how to control them.
- To determine nutrient requirements for optimum health and productivity.
- To encourage quail farming in village, backyard and commercial farms.
- To encourage the use of quail for biomedical research.
- To increase animal protein intake in the diets of Nigerians.

Studies on the adaptability and disease management of quail species (*coturnix coturnix japonica*) in Nigeria

The determination of optimum protein level for breeding Japanese quail (*Coturnix coturnix japonica*) in Nigeria is in progress. The determination of the optimum calcium levels for quail chicks and the hatchability studies of ostrich eggs are also in progress. Other studies are performance of quails fed graded levels of pigeon pea meal (*Cajanus cajan*) diets.

Achievements

The foundation stock is still being maintained in Vom. Mortality pattern of quail birds from day old to adult stage has been identified. Research on protein and energy requirements of Japanese quail has been completed and the hatchability performances of quail eggs incubated at different positions have been studied.

Management practices, disease surveillance and management of ostrich

- To study the most economic method of managing ostrich under intensive condition of management.
- To determine the nutritional requirement for growth and egg production.
- To identify common disease problems affecting ostriches.
- To determine rate of egg production, peculiar laying pattern and hatchability of ostrich eggs.
- Hatchability studies and management of ostrich chicks.

Achievements

Ten eggs were and more are being expected. Two ostrich chicks were hatched out of the ten eggs laid. Proper housing of adult ostriches was completed. No disease has been recorded and chicks have reached grower stage.

Disease Surveillance in Guinea Fowls.

Objectives

To identify common diseases affecting guinea fowls under intensive management systems and to find ways of preventing and controlling such diseases for improved productivity.

Achievements

Egg production and hatchability has increased to 150% from the previous year and more guinea fowl keets, growers and adults were sold to public for consumption, rearing and for research.

Adaptation and production of a gene pool of various ornamental birds for disease resistance and production

Various ornamental birds have been multiplied and crossed with local birds to determine their resistance to diseases. These include Naked neck [SK 88), Black Bantam, Millie Fleur Arancana and Phoenix.

Management and disease surveillance of ducks

Work is presently on going or has been completed in the Multiplication of khaki Campbell ducks and the identification of common causes of mortality and feed efficiency of khaki Campbell ducks when compared to local ducks.

Achievements

More khaki Campbell and local ducks were multiplied and sold to farmers for rearing, egg production has increased and less mortality was recorded. Proper housing for adults and ducklings is nearing completion.

Species	Stock Position	Total Egg Production	Total Eggs set	Chicks Hatched
Chicken layers	2684	39760		-
Quails	6415	24,586		
Ducks	449	1,103		2721
SK 88	264	1,844		696
Guinea Fowl		15,212		5277
Black Bantam	101	3932		1861
Geese	29	206		22
Ostrich	3	18		4
Research Layers	28	0		-
Pea Fowls	2	26		-
Table Egg Layers	2326	42,598		-
Broilers	2809 (sold)	-		
Hatchery Vaccine Birds		477114	120,113	-
Hatchery Quail Egg		295036	110,940	69385

Table 7 Stock Position of Birds kept on the Poultry Farm

DAGWOM FARM

The Department serves as a service arm and is made up of a Feed mill, Fabrication, Rabbitry and Pasture development.

Feed mill Section

The Feed mill unit produced 425 tons, in six categories, of high quality mash feed for egg vaccine birds during the 2003 year. Highest feed category (45%) was 192 tons of Breeder mash. The Oil mill unit extruded approximately 6,304 litres of crude soybean oil. All the Soya cake required for feed production was derived internally. Crude oil sales to the public were a source of revenue generation.

Fabrication Section

Forty-two (42) kerosene incubators were produced in 2003. These comprised 30 of 150 and 12 of 300 chicken egg capacities. This feat generated N1, 440,000 (One million, four hundred and forty thousand Naira) cash for the Institute. Factory research resulted in increased efficiency for the new incubators. The modifications reduced both kerosene consumption and heat losses and stabilized temperature. The metal unit produced over 300 high quality galvanized steel drinkers and feeders for the Institute's livestock and poultry. Production constraints are as result of lack of tools and equipment.

Rabbitry Section

During 2003, the major emphasis of the section was rapid multiplication through phenotypic selection and crossbreeding. Stock balance at year-end was 807 Rabbits, which comprised 290 Does, 50 Bucks, 179 Weaners and 288 Growers.

Pasture Development Section

In 2003, the Pasture Development Section centred its activities on Pasture management for Hay production, vegetable gardening for rabbit and poultry requirements, and medicinal gardening for leaf foliage for the Dermatophilosis Programme and Pasture establishment. 1,859 bales of Signal, Pangola and grass/legume hay were produced for ruminant livestock consumption. 2,018 stands of lettuce were also produced. The Dermatophilosis unit utilized a record harvest of *Cassia alata* leaves. *Stylosanthes guinensis* was established in paddock 2 (1.3 hectares) of the lab cattle range. Lack of ready access to Tractor and machinery usage is a major constraint to the section.

LIVESTOCK INVESTIGATION DEPARTMENT

This Dept is charged with the following responsibilities; adaptation of exotic animals, provision of livestock animals for vaccine and experimental purposes,

production of forage for livestock feed and feed formulation.

Health Section
This section maintains the health of the animals in the Dept. During the 2003, cattle, sheep, goats, pigs and horses were treated for various parasitic, bacterial, fungal and non-infectious disease conditions. They also vaccinated animals against endemic diseases such as CBPP, BQ, and HSV. Apart from maintaining the health of the animal in the Dept, some of the Departmental Veterinarians conducted consultancy services for some farms in the environment.

Dairy Section
This section had 40 animals at the beginning of the year but had an increase of 18 animals and losing 2 calves. 56 dairy animals were recorded by the end of 2003.A 3, 648.81 litres of milk was realized from 8 lactating cows in the year. Out of these, 924 litres were fed to calves, lambs, kids, piglets and kittens of the farm. The remaining 2, 724.81 litres were sold and
₦109, 464.30 realized.

Beef Section
The beef section had 39 animals including calves. In the course of the year, 2 calves died and 9 bulls were culled. Out of the 9, 3 were utilized for bacterial vaccine production and 6 for other services.

Piggery Section
There were 24 pigs comprising of 13 boars and 11 sows in the piggery. 47 piglets were farrowed making 71. Many of the pigs were sold at ₦150, 000.00

Cultivation Section
The mandate of this section is that of pasture development and management, production of grains (Soya beans and maize) for animal feed and ration formulation. In 2003, the section produced 755 metric tons of silage, 1239bales of hay, 1.5 tons of Soya bean grains and 1.2 tons of maize grains. The section also rehabilitated some paddocks for pasture development

Feed Mill Section
This unit is responsible for producing quality feed for all the animals in the Institute. In 2003, feed produced and supplied is as follows; milking herd (19,800 kg), beef herd (9,396 kg), sheep and goats (10,174 kg), pigs (16,135 kg), lab cattle (7,439 kg), calf section (8,932kg) and horses (4,850 kg).

Calf/Equine Section
This unit has 5 horses made up of 2 stallions, 2 mares and 1 foal. Apart from horses, the unit also has 3 bulls kept in preparation for artificial insemination work. Calves from the dairy and beef sections are received and raised to weaning weight in this section. Sixteen were raised in the year under review.

Small Ruminant Section
The section had 265 ruminants comprising of 75 sheep and 190 goats in 2003. Out of the above, 78 goats and 13 sheep were sold while 29 sheep and 33 goats were lost to various conditions. The high mortality recorded was due to the poor state of the pens especially during the rainy season. This encouraged respiratory conditions. Lack of prompt provision of drugs did not allow for quick intervention and control of diseases.

Laboratory Cattle Section
This section started the year with 57 animals. In the course of the year, 16 calves were born, 2 animals died, 4 were culled, 5 sold and 10 bulls given to Bacterial Vaccine Production Department for vaccine work. By the end of the year, the section had a closing stock of 62 animals.

Liquid Nitrogen Unit
This unit of the Department provided 445 litres to other Departments of the Institute and 3,070 litres to establishments outside the Institute that were in need.

LIBRARY AND DOCUMENTATION DEPARTMENT

The relevance of the library to the success of research and development makes the library a formidable department in the Institute. To this end, the library has served as a veritable source of information that facilitates access to literature by the research scientists and other clientele. To realize the goal and objectives of the library to the Institute, the Library is organized in various sections to provide services at professional and sub professional levels. These are the technical services, circulation services, reference and serial sections.

Technical Services
The core duty of this section is to catalogue and classify books and other information materials for the Library. During the year, technical reports from donor agencies like F.A.O, Australian Centre for International Agricultural Research (ACIAR) etc. dominated the list of materials received and processed. 50 technical reports and 32 textbooks were catalogued and classified.

Circulation Section
The library was well patronized by the readers during the year. 625 students registered as members of the library. Lending services was impressive with 2350 loan records of books. The clientele record was maintained at 3780.

Serial Section
This section received 2460 reference queries from the various categories of clientele. Materials consulted were journals, abstracts, and indexes.

Computer Section
The automation exercise of the library resources and services is in progress

PRINTING AND PUBLICATIONS DEPARTMENT

The Printing and Publications Department, was established as a service unit of the Institute in 1990 with the aim of meeting the Institute's numerous printing requirements such as Vaccine labels, sales invoices, official receipts, yearly Calendars, Scientific Journals, file jackets and official letterheads and examination answer booklets for the colleges. All these were printed in 2003. The Department generated revenue of one million six hundred and fifty seven thousand, six hundred and fifteen Naira (₦1, 657,615.00) from diverse jobs printed for other customers from outside the Institute.

AUDIT DEPARTMENT

The department carries out operational and financial audit and ensures that internal control systems are put in place and properly maintained. During the year ended 31st December 2003, the department was able to carry out Internal Audit functions at some of the revenue points of the Institute. These include Poultry, Printing Press, Dagwom Farm, Parasitology, Biochemistry, Library and Documentation, Dermatophilosis and Auditorium canteen. The various observations and recommendations on each department have been forwarded to the Director while some have been discussed with the respective officers in charge. As part of its Operational Audit function, the department also submitted a memorandum to the Director on the need to further strengthen vaccine sales. The need to properly write out the headings of each category of payments on pay slips and pay record/roll was observed.

The activities of the department were restricted to Vom. The outstations could not be visited due to lack of departmental vehicle and other financial constraints.

ADMINISTRATION DEPARTMENT

The Department is charged with the responsibility of assisting the Management in the day-to-day administration of the Institute. This includes matters relating to establishments, Staff Welfare, maintenance of records, appointments, retirements and security. Forty-eight new staffers were offered appointments according to the stated ranks and dates while others were retired after having served the statutory period or having reached the retirement age. The Institute also lost some staff members during the period (see staff report).

STORES

This Department dispatched Fifty Million, Nine hundred and Twenty Two Thousand, Four Hundred and Two (50,922,402) doses of viral vaccines and Eight Million, Eight hundred and Sixty Three thousand, Three hundred (8,863,300) doses of bacterial vaccines.
There has been improved communication between the Stores and the production departments. Therefore production has improved according to demand. However, the Department requires the following: improved packaging system, a vehicle to convey vaccines from production points to the Store and a freezer for storing bacterial vaccines.

The Posting of S.I.V and S.R.V in the Ledger, Inventory and Security document units have reached advanced stage. Security documents are promptly received and the postings in the ledger and issues are now made serially. Inventory of Offices and Laboratories have started. The indexing and coding of all inventories have reached 70% completion while 80% of reconciliation has been achieved.

ACCOUNTS DEPARTMENT

The Department is charged with the efficient and effective operation and control of government revenue collected at revenue points, record- keeping of all finances and transactions, maintenance of adequate accounts with Banks, supervision of the preparation of the annual accounts for audit and management purposes and the procurement and custody of government assets.

The monthly remittance from Government was N27, 526,053.00**,** while the actual expenditure was 30,768,774.38 leaving a shortfall of N3, 242,721.38. Other Charges also fell to N6.6 million. The running cost of the Institute therefore rested squarely on the internally generated revenue.

Internally Generated Revenue

N91, 857,413.00 was generated which served as backup for Vaccine Production and other Over Head Expenditures (running cost).

Table 8 Details of Income and Expenditure by Bank

No.	Bank	Income	Expenditure	Balance
1	Afribank B Salaries	140,161,675.66	140,155,450.25	6,225.40
2	Afribank B Other Charges	4,036,516.46	3,207,878.56	828,637.90
3	Afribank B NARP	722,818.87	525,220.72	197,190.46
4	UBA B Vaccine Production Revenue	736,601.36	336,214.08	400,387.28
5	Zenith Bank - Revenue	16,708,251.46	12,577,592.92	4,130,658.54
6	African Int. Bank B Press Revenue	404.00	0.00	404.00
7	Lion Bank B Dagwom Farm Revenue	1,782,478.24	303,983.78	1,478,494.46
8	Central Bank B Capital	310,082,317.22	41,583,995.56	268,498,321.66
9	Bank of the North B Housing	20,352.32	0.00	20,352.32
10	Afribank B Deposit	4,407,250.00	0.00	4,407,250.00
11	City Bank Account, Kano	$19,889.14	0.00	$US19,889.14
12	Afribank Revenue	7,917,503.48	7,070,388.80	847,114.68
13	First Bank Jos	1,198,878.67	758,220.72	440,657.95
14	NVRI Staff School	4,246,606.89	4,227,167.34	19,439.55
		492,041.543.77	**210,746,520.42**	**281,295,023.35**

FEDERAL COLLEGE OF ANIMAL HEALTH AND PRODUCTION TECHNOLOGY

The Federal College of Animal Health and Production Technology was established in 1941. In accordance with the National Science and Technology decree No. 46 of 30th Dec. 1990, the college is mandated to train middle-level human resource in the area of Animal Health, Animal Production and Agric/Livestock Extension Services.

The College runs the following courses:

Certificate course in Beef Production – 6 months
Certificate course in Poultry Production –6 months
Pre-ND (Science and Technology) - 1 year
National Diploma (Animal Health & Production)-2 years
Higher National Diploma (Animal Health) - 2 years
Higher National Diploma (Animal Production) - 2 years
Higher National Diploma (Agric. Extension and Mgt) - 2 years.

The National Diploma and Higher Diploma programmes are accredited under the National Board for Technical Education (NBTE). The courses are National Diploma (Animal Health and Production), Higher National Diploma (Animal Production), Higher National Diploma (Agric. Extension and Mgt)

Number of Trainees in 2003

Certificate Course in Beef Production	97
Certificate Course in Poultry Production	115
Pre-ND (Science and Technology)	44
National Dip. (Animal Health & Prod I)	101
National Dip.(Animal Health & Prod II)	69
Higher National Dip. (Animal Health I)	35
Higher National Dip. (Animal Health II)	50
Higher National Dip .(Animal Production I)	42
Higher National Dip. (Animal Production II)	58
Higher National Dip. (Agric. Exten.& Mgt I)	29
Higher National Dip. (Agric. Exten.& Mgt II)	64
Total	**704**

Other Achievements

The college completed the construction of a new library complex and classrooms, through the assistance of the Education Tax Fund (ETF) programme. The Vet Clinic is run by the Dept. of Animal Health of the College. One thousand three hundred and eleven cases comprising 1,233 canines, 60 ruminant and 18 avian species were handled during the year. Of this, 456 cases were handled as Helminthosis, 308 attributed to various Haemo-parasites, 292 Ectoparasitism and 102 cases of confirmed Canine rabies.

FEDERAL COLLEGE OF VETERINARY & MEDICAL LABORATORY TECHNOLOGY

The College currently runs the following courses:
A three-year veterinary and Medical Laboratory Technician Course (M L T)
A two-year Veterinary and Medical Laboratory Assistant Course (MLA)

Intake stands at eight hundred and eighty (880) students undergoing various courses. There are One Hundred and Twenty (120) academic and administrative staff comprising, Medical Laboratory Scientists, Technologists, Laboratory Technicians and Assistants. For effective management and qualitative teaching, the College has various laboratories and departments.

Number of entries in 2003 by Course :

- Graduate Studentship (Part III Interns) 74
- Bachelor of Medical Laboratory Science (BMLS Direct entry)
- Medical Laboratory Technician (ML T) 64
- Medical Laboratory Assistant (MLA) 32

Total **176**.

For effective management and qualitative teaching, the College is into Laboratories and Departments

Bacteriology Department
The Department has the responsibility of processing all clinical samples of human and animal origins for the purpose of isolating bacteria and fungal pathogens and determining their susceptibility to antibacterial agents. It is also charged with the effective training of all students of the College and others from tertiary Institution on ITF attachment for acquiring knowledge in practical Laboratory diagnosis.

Chemical Pathology Department:
The Chemical Pathology department is involved in the training of students and rendering of laboratory services in the area of analysing body fluids to determine the functional state of organs of the body. The tests carried out include, blood glucose analysis, urinalysis, pregnancy tests, occult blood test, uric acid test, urea test. Students trained are those specialising in Chemical Pathology in their final levels. Other levels of AIML T and BMLS courses on posting such as Part III internees, 300 and 400 levels are also trained. In addition, students acquiring certificates in Assistant and Technician courses are trained.

Histopathology Department
Histopathology laboratory of the College is mainly for the training of students. Routine diagnosis does not form part of the work schedule. From inception, the department aided the training of, medical Lab. Assistants, Medical Lab. Technicians for their certificate examination with the Medical Laboratory Council. It also prepares Associate members at the level of intermediate diploma. Last year with the BMLS program, seven candidates were trained for the bachelor degree of the Medical Laboratory Council of Nigeria. Five students are undergoing the training at the Medical Laboratory Assistant, Technicians, Graduate and BMLS levels.

Haematology & BGS Department
The Haematology Department/Laboratory is set out to diagnose blood related disease in man and animal. Patients and animal specimens from within and outside of the Institute. The laboratory also participates in the teaching different categories of students in laboratory techniques and diagnosis.

Parasitology Department,
Parasitology Laboratory Department is involved with the laboratory diagnosis of parasitic infections of man and the teaching of students of all cadres trained by the college and students from other tertiary institutions posted to the laboratory for the purpose of acquiring knowledge and diagnostic skills in Parasitology.

Virology Department
The Department is very young and started being functional for teaching in July 2003, although the laboratory space has since been provided it could not be used because of lack of materials and inadequate personnel.

PLANNING DIVISION

The Department is under the Strategic Planning & Development Division and was established to mobilise and allocate resources for efficient production. It prepares long term projects and programmes of the Institute and ways of implementing the Institute's mandate. The Department is divided into Planning, Statistics, Monitoring & Evaluation and Hospitality Units.

The Activities of the Department in 2003 included the collation of vaccine data and Project performance Data. The Department also collected & collated data related to projects in the Institute, sent to the relevant agencies, and coordinated the Publication of the Institute's Publications. These include the Mission and Mandate Booklet, which contains the objectives of the various Departments in line with the Mission Statement and Mandate of the Institute.

The production of the Institute's Advert & Promotional items was also undertaken to create an awareness of activities and products. This promotional advert has been used in the ITF TRADEV Journal and Achievers' (who's who in Plateau State) among others. The format for the compilation of the Institute's nominal roll was improved upon for statistical purposes. The reactivation of the Institute's Intercom facilities and the installation of the rural wireless telephone system were coordinated and are now operational. All the Departments are connected with the intercom facilities and the Institute is now linked to the outside world through three external NITEL land lines. The personnel strength of the Department increased with the posting of three officers; Dr. R.N. Chizoba to the statistics Unit, Miss Mary Madu as Planning Officer II and currently undergoing training as the secretary Tenders Board and Mr. Patrick Adeleye as Data Processing Assistant.

Director, Dr. (Mrs) Lami Lombin (center) with Institute's Management team (Left) addressing ITF delegates led by Mr. I. M. Mshelia (right) during a meeting on industrial training for veterinary students of Nigerian Universities

Director, Dr. (Mrs) Lami Lombin(Center) addressing participants during the opening ceremony of a two weeks in-house training on Veterinary Diagnostics Pathology.

Figure 3

NVRI STAFF SCHOOLS, VOM

In line with the national Policy on Education, the Staff Schools were established to provide the increasing number of pupils and students with the opportunity for education of a higher quality, irrespective of sex, social, religious and ethnic background. They also ensure a stable, uniform and high standard of discipline and assist in the proper and all round development of the students physically, morally and socially so that they grow up to become useful and law abiding members of the society.

Secondary School Structure

This is made up of Junior Secondary 1 - 3 (nine arms of three each), Senior Secondary 1 - 2 (Six), Senior Secondary 3 (Two arms of one each of Science and Arts classes) and a teaching Staff Strength - 31 Staff. Total number of students - 814

Yearly intake:
JS 1, 135 students, SS 1 30 students
JS II and SS II 15 students each
The West African Senior School Certificate Examination (WASSCE) results for May/June, 2003 were 79%. The

Figure 4: NVRI Staff Secondary School students

National Examination Council (NECO) results of June/July 2003 were 92% and The Junior School Certificate Examination 86%. The result of investments in the establishment of the secondary school will take time to manifest.

Co-Curricula Activities include the Junior Engineers, Technicians Scientists (JETS) programme which aims at harmonising co-curricula students activities bridging the gap between theory and practice. It=s activities include acquisition and improvement of basic manipulative skills, designing and executing projects that increase awareness in science and technology. The school competed with other secondary schools in the state in projects Exhibition and presented two projects:

Free choice
The school constructed an electronic organ and competed with other schools in the state. The best three projects were selected and the school's project placed second.

National theme
The school fabricated a local weaning machine for sustainable economic use. Since this was a National theme project and our school emerged the overall best. With this achievement, the school was selected to represent Plateau State at the 2003 National JETS competition, which was scheduled to hold at Sokoto in December 2003. The competition was postponed to hold in February 2004.

Computer Literacy Programme
The programme started in the school in January 2003. It promises to get the students fully computer literate before they leave secondary school. It provides training on the basic parts of the computer, computer literacy/appreciation, systems operations/analysis and training on all categories of software Application.

Figure 5: NVRI Staff Primary School Pupils

The impact of this programme is fast gaining ground as students attend both theory and practical lessons with great enthusiasm.

Sports
The School competed in a number of sporting activities and won certificates and prizes. At the 2003 Plateau State all Secondary schools games the school won 1st and 2nd prizes in 4x100M race girls and boys respectively and 1st positions in 800M and 500M race girls. Maltina sports 2003 - 3rd position in 4x400M relay boys. The school played 5 inter-schools friendly football marches won three, drew one and lost one.

Staff Training
Staff training is yet to be approved for staff of the schools. Staff attend long vacation programmes only.

Conferences
The staff attended various educational conferences and workshops both within and outside the state. These have translated into quality teaching and learning:

Infrastructural Development
Repainting of all Classrooms and improved Canalization of waterways, replacement of broken louvers and ceilings, planting of flowers, electrification of classrooms and the provision of a school clinic and employment of a qualified Nurse have been achieved. The introduction of computer appreciation and Technology programme and the provision of facilities for student=s participation in JETS competitions were all achieved in 2003

STAFF REPORTS

TRAINING

Approval was granted to Mrs. Lily Ezeala to proceed on training for a PhD at Delta State University, Effurun. Mrs. Florence Adeola, Mrs. Margaret Nwachukwu, Mr. Gregory, Mrs. Ngozi Onuh, and Mrs. Justina J. Hong have also been granted approval to proceed on training in various Nigerian institutions.

Dr. Manasa Sugun, Dr (Mrs.) Y. Akalusi, Mr. A.B. Suleiman, Dr. Yahaya Kabiru, Dr. S. J. Shaibu and Dr. (Mrs.) L. Ta'ama are undergoing post-graduate training at Masters Level in various Nigerian Universities.

Miss Bako, Mrs. Hong and Mr. Kwatjel are undergoing various courses at the Federal College of Medical and Veterinary Laboratory Technology, Vom.

Dr. J. U. Molokwu and Dr. N. Nwankpa attended a workshop on the Diagnosis and Monitoring of CBPP in Bamako, Mali between 10th & 15th February 2003

Dr. D. Shamaki attended the third Pan African Programme for the Control of Epizootics (PACE) Regional Annual Coordination meeting in AICC-Arusha, Tanzania between June 23rd and 27th 2003

Dr. N. Nwankpa and Mr. Bitrus Yakubu attended a PCR Biotechnology workshop at the Onderstepoort Veterinary Institute, Pretoria, South Africa, in March 2003

Dr. P.A. Okewole attended an International Workshop on Veterinary Public Health, in Shefayim, Israel from 19th March to 9th April 2003.

Dr. A. E. Itodo attended a National Workshop on Current General Manufacturing Practice Trends: Building Capacity for Proactive Compliance, Kano, August 2003.

Mrs. S. Ekundayo and Mrs Elmina Abiayi attended Association of Medical Laboratory Scientist of Nigeria annual conference held at Abeokuta, Ogun State, and August 17 – 22, 2003

Drs. I.L. Oyetunde and P.R. Kumbish attended an International training course on Inspection Techniques for Food Safety in China from August 8th to Sept 26th 2003.

Dr. D. Shamaki attended the FAO/IAEA International Symposium on the Application of gene Based Technologies for Improving Animal Production & Health in Developing countries, in Vienna, Austria from 6th to 10th October 2003

Dr M. Odugbo and Mr. Aliyu Atiku attended the Biotechnology Society of Nig annual conference held at Akure, Ondo State between September 18 and 21, 2003

Mr. Garba H. Maikidi and Mr. Daniel Bott attended the third International Conference of the African Society for Toxicology Sciences in Abuja.

Pharmacist Bott attended 76th National Conference of Pharmaceutical Society of Nigeria, held in Abuja.

Pharmacist Bott attended 26th International Conference of the Chemical Society of Nigeria, Makurdi.

Mr. Bitrus Yakubu attended a workshop in Bioinformatics organised by NABDA-UNESCO

Mrs. Ann. L. Samuel attended the Biochemical Society Conference at Ilorin, 2003.

A Workshop on Laboratory Quality Assurance was organised at NVRI, Vom, under the Pan-African Programme for the Control of Epizootics (PACE) in collaboration with OIE/IAEA from 16th – 22nd Jan 2003 and was attended by several staff of the Institute.

A workshop on Veterinary Diagnostic Pathology was organized by NVRI in June 2003 and was attended by twenty-five staff from various Departments of the Institute.

A training Workshop in Participatory Rural Appraisal (PRA) was conducted in the Institute for staff from various departments between30th June – 3rd July 2003.

The Federal College of Animal Health & Production Technology organised a one-day Workshop on Articulated Human Resources Management for all senior staff of the College on 3rd October 2003.

The Nigerian Veterinary Medical Association Annual Congress took place between 13th & 17th October 2003, at the Inst. of Agricultural Research and Training, Moor Plantation, Ibadan and was attended by several Veterinary Research Officers.

Dr(Mrs) M. Muhammad, Dr. E. Irokanulo, Mr T. H. I. Spencer, Mr J. Ngbede, Dr. N. Nwankpa and Mr. Aliyu Elayo attended the Annual General Meeting and Scientific Conference of the Microbiology Society of Nigeria at ATBU Bauchi; 2nd – 6th Dec. 2003

Mrs. Mary Vungmo is training at the Plateau State Polytechnic.

Mr. Joseph Banwar attended a training programme on Dairy Husbandry and Milk Processing in the Netherlands from January to July 2003

Dr. I Durbi attended a training programme on Artificial Insemination and Embryo transfer in Seoul, South Korea between 22nd August and 18th September 2003

Mrs Garos Gwong attended the National Convention for National Association of Technicians and Assistants Students/Workers arm: School of Medical Laboratory Sciences, ABU Teaching Hospital, Kaduna 30th Oct. – 2nd Nov. 2003.

Mrs. Elizabeth Payi attended a course on Meat Processing Techniques in China between November 1st and December 7th, 2003.

Mr. Waziri M.L., Solomon I.A. Gabi, Mrs. Rose Esilonu and Miss Ann Azu are on training for the professional qualification of Association of National Accountants of Nigeria (ANAN) at the Nigeria College of Accountancy Jos on evening classes.

STAFF APPOINTMENTS

Veterinary Research Officers

	Name	Rank	Dated Of Appointment
1.	Dr Luka D. Jwander	VRO II	3/2/2003
2.	Dr. Isaa Atanda Muraina	VRO II	3/2/2003
3.	Dr. Sati Ngulukun Samuel	VRO II	3/2/2003
4.	Dr. Alexander Ray Jambalang	VRO II	3/2/2003
5.	Dr. Sani Ishaya Tekki	VRO II	3/2/2003
6.	Dr. Isaac Ndudim Ogo	VRO II	3/2/2003
7.	Dr. Dauda Bwala Garba	VRO II	7/2/2003
8.	Dr. Tafarki Agbadu Eneme	VRO II	10/2/2003
9.	Dr. Shedua M. Leo	VRO II	14/2/2003
10.	Dr. Garba Ahmed	VRO II	14/2/2003
11.	Dr. Davou Gyang Moses	VRO II	14/2/2003
12.	Dr. Isa Suleiman	VRO II	14/2/2003
13.	Dr. (Mrs.) Mariam Florence Joseph	VRO II	17/2/2003
14.	Dr. John Francis Antiabong	VRO II	17/2/2003
15.	Dr. Aliyu Abdullahi Masdooq	VRO II	17/2/2003
16.	Dr. James Saidu Ahmed	VRO II	20/2/2003
17.	Dr. Clement A. Meseko	VRO II	20/2/2003
18.	Dr. (Miss.) Edelokun Ighodalo	VRO II	7/3/2003
19.	Dr. Kabir C. Ladan	VRO II	10/3/2003
20.	Dr. Anthony N. Egbuji	VRO II	1/7/2003
21.	Dr. Olatunde Hamza-Olabode	VRO II	1/7/2003
22.	Dr. Solomon J. Abdullahi	VRO II	1/7/2003

23.	Dr. James S. Dalis	VRO II	1/9/2003
24.	Dr. Olajide Adewole Owolodun	VRO II	1/9/2003
25.	Dr. Yakubu G. Dashe	VRO II	1/9/2003
26.	Dr. Hussaini Gulak Uluramu	VRO II	2/10/2003
27.	Dr. Nahson Mishikir Yerima	VRO II	1/12/2003

Research Officer

1.	Mr. Daniel Nyam Bott	R.O. II	3/3/03

Technical Staff and Others

	Name	Rank	Date of Appointment	HATISS
1.	Mrs. Lami E. Balat Haruna	School Nurse	1/1/03	9
2.	Miss Mary Madu	Planning Offr II	18/3/03	7
3.	Mr. Peter D. Ladon	Snr. Sec. Asst.	21/1/03	6
4.	Miss Bilhatu Shangle	Conf. Sec. IV	13/1/03	4
5.	Mr. Godfrey Gulek	Med. Lab. Asst.	9/1/03	3
6.	Mr. Musa John	Motor Driver.	1/3/03	3
7.	Mr. Lawrence Paul Ogbe	Clerical Officer	29/9/03	3
8.	Mr. Patrick Adeleye	Data Proc. Asst.	14/10/03	3
9.	Mr. Ephraim Irechukwu	Motor Driver	1/4/03	2
10.	Mrs. Tabitha Gyang	Cleaner	7/3/03	1
11.	Mr. Levi N. Uke	Security Guard	1/4/03	1
12.	Mr. Yakubu Dahwol	Plumber	1/5/03	1
13.	Mr. Musa Pam	"	1/5/03	1
14.	Mr. Joseph Dung	"	1/5/03	1
15.	Mr. Dung Yohanna	"	1/5/03	1
16.	Mr. Bay Julius	Asst. Craftsman	1/6/03	1
17.	Mr. Musa D. Ahmed	" "	1/6/03	1
18.	Mr. Idi Mohammed	" "	1/6/03	1
19.	Mr. Mwantep Badung	Cleaner	1/6/03	1
20.	Miss Chundung Gyang		9/12/03	1

Staff Retired

S/No.	Name	Rank	HATISS	Date of Retirement
1.	Mr. Joseph Gyang	Snr. Med. Lab. Techn.	8	5/11/03
2	Mr. Musa Jurte	Snr. Sec. Guard	2	1/1/03
3	Mr. Pam Davou	Snr. Animal Supr.	6	1/1/03
4	Mr. Ibrahim Usman	Hd. Sec. Guard	3	1/1/03
5	Mr. Pam G. Dong	Hd. Sec. Guard	3	1/1/03
6	Mr. Eza Kwol	Health Asst.	3	1/1/03
7	Mr. Musa Davou	Hd. Landryman	4	1/1/03
8	Mr. Umaru Maidawa	Snr. Sec. Guard	3	3/6/03
9	Mr. Auta Musa Dorowa	Snr. Sec. Guard	3	3/6/03
10	Mr. Aboki Dayi	Security Guard I	3	3/6/03
11	Mr. John N. Tangtur	Higher Sec. Guard	7	6/6/03

12	Mr. Musa Pam I	Chief Liv. Overseer	6	1/10/03
13	Mr. Pam Maisaje	P.T.O. II	9	2/8/03
14	Dr. N.N. Shidali	Provost	14	7/10/03
15	Mrs. Elizabeth Ebajemito	Sec. Asst. II	6	18/12/03
16	Mr. R.K. Adeyeye	Ag. Provost	13	10/12/03
17	Mr. AT.H. Mokogwu	Prin. Med. Lab. Sc.	11	8/9/03

	Deceased Staff	Designation	HATISS	Date of Death
1.	Mr. Lander Lohnap Lahnim	Education Off. I	9	14/3/03
2.	Dr. A. Adewuyi	C.V.R.O.	13	21/10/02
3.	Mr. Pam Christopher	Store Officer	5	25/4/03
4.	Mr. Yohanna Danboyi	Chief Driver/Mech.	6	1/5/03
5.	Mr. Danladi Pam	Snr. Foreman	6	19/3/03
6.	Mr. Hamza Kwol	An. Supervisor	4	6/7/03
7.	Mr. Dung K. Pwol	Snr. Foreman	3	2/10/03
8.	Mrs. Kangyang Bulus	Med. Lab. Asst.	12	6/10/03
9.	Mr. Samuel O. Ochai	Chief Sec. Asst.		30/10/03
10.	Mr. Maimako Suwa	Snr. Med. lab. Attd.		31/10/03

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Odugbo M.O, Odama L.E, Umoh J.U, **Makinde A.A** (2003). Serotypes of *Pasteurella* haemolytica from pneumonic lungs of sheep in northern Nigeria**. Small Ruminant Research 48(3): 239 – 243**

Shaibu S. J., Suleiman A. B., Ta'ama L. and Makinde A. A. (2003). Sodium Dodecyl Acrylamide Gel Electrophoresis on some Bacteria Associated with Dermatophilosis (In Press. **Journal of Natural Sciences**).

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J.U. Molokwu, N. Nwankpa, J.C. Chima, L.H. Lombin and K.A. Majiyagbe (2003). Field Validation of a Monoclonal antibody-based competitive ELISA for the detection of antibodies to Contagious Bovine Pleuropneumonia. A paper presented at the final meeting of the FAO/IAEA Programme on the sero-monitoring of CBPP antibodies in Nigeria.

Nwankpa, N.D. (2003). Nigeria: The continuing battle against Contagious Bovine Pleuropneumonia and the need for a 'Nuclear' solution. Paper presented at a seminar at Onderstepoort Veterinary Institute, Pretoria, South Africa.

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Zainab, M; **Bitrus, Y., Ann, S.L**. and Ali, U. D. (2003). A chemical study of an indigenous knowledge system of

milk preservation in Adamawa State. **Nig. Journal of Biotechnology Vol.14, No.1 P.25.**

Dr. P.R. Kumbish (2003). General principles, diagnostic methods and Disease treatment in Traditional Chinese Veterinary Medicine - (Staff Seminar)

P.R. Kumbish S.J. Shaibu (2001) Salmonella infection in Tantalus (Black faced) Monkey and the public health importance - A case report NVJ.

Double monster/siamese Twins in piglets (Veterinary medical records) - Dr. P.R. Kumbish (2002)
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Odugbo, M.O; Okpara, J.O; Abechi A.S., and Kumbish P.R. (2003). An outbreak of Pneumonic Pasteurellosis in sheep due to *Mannheimia (Pasteurella) haemolytica* serotype 7 (Submitted: The veterinary Record)