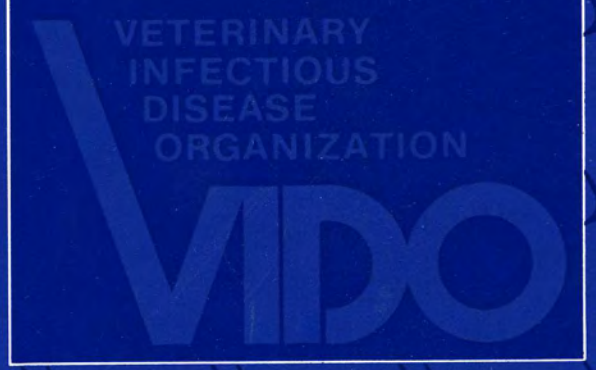
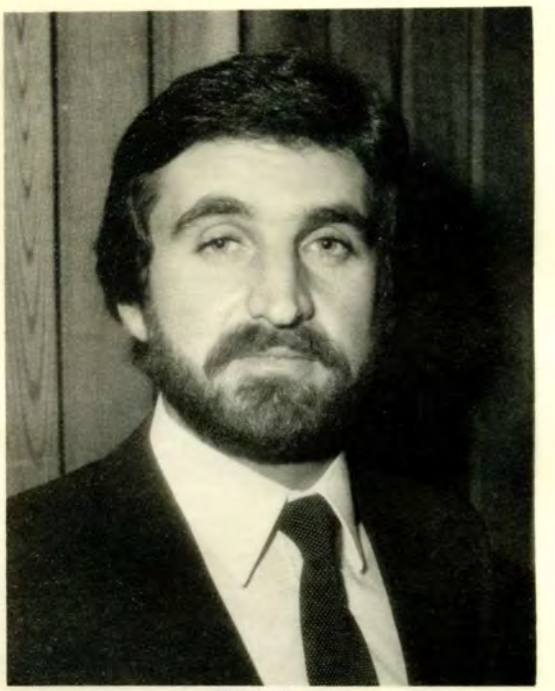
ANNUAL REPORT 1982-1983





P.V. Riese
Chairman, VIDO Board of Directors
1982-83

(Left to Right - Top Row) R. Christian, B. Peterson, B. Tinker, C. L'Ecuyer, D. Maplesden, S.D. Acres (Deputy Director - Research)
(Bottom Row) S. Kramer, P.G. Hodgman (Executive Officer), P. Riese (Chairman), P. Moncrieff (Vice-Chairman), C.H. Bigland (Director)
(Missing) G. Altwasser, C. Teichrob, N.O. Nielsen, B. Anderson

REPORT FROM THE BOARD OF DIRECTORS

P.V. Riese

September 30, 1983 marked the end of yet another productive and eventful year for VIDO. VIDO's eighth year, like other years in the past, has been highlighted by continued scientific progress and advancement in research on infectious diseases of food-producing animals and poultry.

VIDO's progress and success in finding solutions to the common infectious diseases that have for years plagued the livestock industry, can only be attributed to a very competent, resourceful and dedicated team of individuals.

The VIDO Board of Directors would like to acknowledge the research scientists and their support staff at VIDO for yet another year of hard work and overall strong commitment to serving the livestock industry.

VIDO has undertaken to do research in four very difficult problem areas:

1) Neonatal Diarrhea
2) Bovine Respiratory Disease
3) Porcine Respiratory Disease
4) Avian Adenoviruses

Solutions to these common infectious diseases have not and will not come easily. We recognize our research team as being dynamic and aggressive. We give them our full support and wish them much success.

The Board again commends and recognizes the efforts of VIDO Management. Dr. Chris Bigland, Dr. Stephen Acres and Mr. Paul Hodgman have once again ensured the smooth performance and effective functioning of all of VIDO's research programs and initiatives. Their guidance and direction as well as their perseverance, action and dedication has allowed them to create and develop a disease research center which is becoming known and respected worldwide. Their common commitment to progress and productivity has made the work of the Board far easier and more enjoyable.

VIDO has earned the high profile it enjoys in the professional community. VIDO has been viewed and accepted by all as being accountable, responsible and responsive. Its research initiatives and consequent target areas are perceived to be, without doubt, the areas that cause the most concern to the livestock community.

Task Force

In 1982, the Board of Directors felt it was time to obtain an independent appraisal of the scientific work carried out by VIDO. The Scientific Program and Advisory Review Committee (SPARC) that was established to conduct this review confirmed the Board's view on the quality and efficiency of the research programs and the scientific staff conducting the research. This year, the Board felt a review of a slightly different purpose and nature should be undertaken.

The VIDO Board of Directors and Management constantly strive to ensure VIDO's success and future progress. They realize that money must be spent prudently and that budgets and research must best reflect the needs of the industry today and in the future. Therefore, the Board and Management decided it would be an appropriate time to review the structure and function of VIDO and to either reaffirm or alter the aims and objectives of the Organization.

The VIDO Constitution states: "The purpose of VIDO will be to conduct research on indigenous infectious diseases and preventative medicine of farm livestock and poultry. This work will include basic and applied research and development with the aim of making scientific discoveries and advancements and developing these for practical application by the livestock industry."

A Task Force comprised of Management, research scientists and Board Members concluded and reaffirmed that the existing mandate, aims, objectives and driving force of VIDO were appropriate and necessary. As in the past, they will provide the integral components for a strategic research framework over the next three to five years. We thank all members of the Task Force for the extra time and effort they devoted to this very worthwhile and constructive initiative.

BIOSTAR Inc.

BIOSTAR Inc. was officially incorporated and open for business on February 16, 1983. BIOSTAR is a federally-incorporated, profit-seeking company designed to assist with marketing technology and products developed at VIDO to national and international biological production companies and markets. As a taxable corporation, BIOSTAR will be able to access funds through grants and contracts previously unavailable to VIDO. Much thought and effort went into the structure and design of the Company. No doubt BIOSTAR will prove to be a tremendous asset and opportunity not only for VIDO and the University of Saskatchewan, but also Western Canada to further develop, produce and market indigenous technology and products.

The Future

Reflecting on the past and looking ahead to the future, funding and, in particular, adequate guaranteed core funding, continues to be a real problem and threat to VIDO's future. Securing core funding is vital to the long-term stability and viability of VIDO. Disease has, and will continue to play a major role or be a major factor in the profitability of any livestock operation. Disease accounts for millions of dollars of losses each and every year. Not only livestock producers, but all of society feels the burden of these losses. Therefore, we hope and expect that VIDO will continue to attract support from individuals and groups in all sectors of society.

Thanks

The Board acknowledges all contributions and donations made to VIDO by the livestock industry, foundations, governments, University and private individuals and firms. We encourage them to continue to support VIDO in order to ensure VIDO's continued success in efforts to find practical solutions for these plaguing and costly diseases.

The Board also acknowledges the departure of Dr. Ole Nielsen. Dr. Nielsen served VIDO as Chairman of the Governing Committee during VIDO's formative years and more recently as a highly respected member of the Board of Directors. Ole brought tremendous expertise, experience

and rational perspective to the Board. His input, energy and enthusiasm were a respected and valued commodity.

I would like to welcome new Board Members — Dr. Gavin Hamilton, Dean of the Western College of Veterinary Medicine and Richard Klassen, of Sanford, Manitoba. I am confident that they will bring to the Board experience, energy and enthusiasm that will greatly assist VIDO in meeting the challenges that lie ahead.

As I leave VIDO, I would like to extend thanks and express my personal gratitude to the members of the Board of Directors, the Management and staff of VIDO. The Board Members generously gave of their time, expertise and energy to VIDO. My personal thanks for the guidance and support they extended to me as Chairman of the Board.

A sincere personal thank you also to Dr. Bigland, Dr. Acres and Paul Hodgman for an eventful, informative and challenging five-year affiliation with VIDO. I have learned to appreciate the challenges and complexities associated with veterinary medicine and research. I wish you and your research team continued success in the future.

REPORT FROM THE DIRECTOR

Dr. C.H. Bigland

Financial

VIDO suffered from the financial recession of 1982-83 along with many other organizations, but is surviving remarkably well despite the widespread problem. With the expanding research commitment and enlarging staff, VIDO has spent more money than has been donated each year for three years — averaging approximately $200,000 per year. The "draw-down" on the VIDO Research Trust Fund over the past three years has reduced this Fund from approximately $1.9 million to approximately $1.3 million in 1982. In view of this, and the requirement of the Board of Directors to hold the Trust at no less than $1 million, the budget of $1.7 million previously planned for the 1982-83 year was reduced to $1.55 million.

The cut-back was especially difficult as the elective "fat" had already been excised in preparing the $1.7 million budget. As a consequence, this necessitated cutting into vital areas. Along with the traumatic cuts in research and support budgets, two employment contracts that had reached term, were not renewed — those of Ms. Bonny Beswick, Executive Assistant, and Dr. Leo Filion, Research Immunologist. All staff additions were stopped and summer employment reduced from six to one. The effect has been extremely unsettling on the whole staff of VIDO who were all working together at what was considered an optimal size. The initial reaction is now over, but it is recognized that there are "holes" in our overall research capability that will eventually have to be filled. Until more core funding can be assured, the next year's budget will also remain at $1.55 million.

Commercial Initiatives

In the past year VIDO has been very active with various commercial companies to help facilitate the marketing of our products, inventions, and technology. Contacts have been made with over 15 commercial companies and confidentiality agreements have been signed by most.

The major initiative undertaken by VIDO to help market our products has been the incorporation of its own commercial arms-length, profit-seeking company, BIOSTAR Inc. BIOSTAR was incorporated in early 1983 and has become active over the past few months. VIDO is very pleased that BIOSTAR Inc. has been set up as it will greatly assist us with business activities and commercial thrusts. In addition it will provide access for funds to which VIDO is not now eligible. A further elaboration of BIOSTAR and its activities are found elsewhere in this report.

Farm Facilities

The University of Saskatchewan, on behalf of the Western College of Veterinary Medicine and VIDO, placed a bid for the purchase of the property now rented by VIDO at the Dundurn Feedlot. This was unsuccessful. VIDO will continue to rent the feedlot from the new owners P.R. Developments Ltd. of Saskatoon.

Future Concerns

1) Financial — With the salary budget approaching $1 million per year, the need for uncommitted or core funding is paramount. This is because many of the salaries of the scientists, some technicians, the animal support staff and the administrative support staff cannot be incorporated into grant funds. This because grants are for specific projects and presuppose that such salaries are paid, the laboratory equipment is in place, and the "doors are open". Such core funds come from governments and from the livestock industry. New approaches to the governments of Saskatchewan, Alberta, Manitoba and British Columbia and extended approaches to the livestock industry will be pursued in the next year.

The Federal Government unfortunately, provided no core funding. Two small Department of Supply and Services Contracts which terminate in 1983, were received. However, $10,000 was donated to help support the Fourth International Symposium on Neonatal Diarrhea. We will continue to appeal for Federal core monies.

2) Transition — I have notified the Board of Directors that I will be retiring June 30, 1984. The Board will be announcing the appointment of a new Director in the near future. The new Director may suggest to the Board new directions and operations of VIDO.

3) Biotechnology — It is believed that biotechnology will open new vistas in the production of animal health care products. These may make some of our present vaccines, antisera and diagnostic tests obsolete in five to ten years.

C.H. Bigland, DVM, DVPH, MSc
Director

BIOSTAR

VIDO is in the forefront of biotechnology in animal health in Canada. Six person-years of effort are devoted to work on recombinant DNA vaccines and to hybridomas for the production of monoclonal antibodies. This small team should be expanded with several other disciplines that are necessary to complete the cloning, expression, fermentation and purification of genetically engineered products for animal health care. To support such a team properly, the cost is estimated at approximately $2 million per year. Since this amount is well above VIDO's present budget for all areas, VIDO has to elect one of three options:

a) find additional money to expand our genetic engineering team,
b) link-up with a biotechnology company which is already successful (the majority of these are in the United States), or
c) terminate the genetic engineering research.

VIDO will investigate choices "a" and "b" during the next year.

Thanks — I would like to express my thanks to the dedicated and hard-working staff at VIDO who strive their utmost to fulfill VIDO's mandate of "serving the livestock industry through research on the common infectious diseases of food-producing animals". I would also like to thank the Board of Directors of VIDO who bring their expertise in many areas to focus on the direction of VIDO, again with the same aims in mind.

My thanks to the administrative staff of the University of Saskatchewan for day-to-day help rendered to VIDO. Thanks also to the staff of the Physical Plant Department for the help in maintaining the VIDO building in such excellent condition.

I would also like to express my sincere thanks for the exceptional support of Dr. Stephen Acres and Mr. Paul Hodgman, who with me serve as the VIDO Executive Committee.

Summary

Despite difficult economic times, VIDO has survived with minimal reductions in research budgets. However, this also involved a regrettable reduction in staff. Although VIDO is functioning at approximately 75% capacity now, I am confident that in the near future, additional funding will become available to bring staffing and research functions back to 100% capacity. The incorporation of BIOSTAR to access funds not available to VIDO will be helpful in this financial recovery.

BIOSTAR Inc.

The Veterinary Infectious Disease Organization (VIDO) and the University of Saskatchewan have established a new arms-length commercial company called BIOSTAR Inc. in order to better facilitate the development and marketing of VIDO products. BIOSTAR is a federally incorporated profit making corporation designed to give VIDO's vaccines and other commercial products better exposure to national and international biological production companies and markets.

Products which are under development and which have been assigned by agreement from VIDO to BIOSTAR include:

1) A subcellular *E. coli* vaccine for prevention of enterotoxigenic colibacillosis in calves.
2) An inactivated rotavirus-coronavirus vaccine.
3) Rota and coronavirus vaccines developed by biotechnology.
4) A vaccine for *Pasteurella haemolytica.*
5) An *Hemophilus pleuropneumoniae* vaccine.
6) A live attenuated purified spleen extract vaccine for hemorrhagic enteritis.
7) A tissue culture produced hemorrhagic enteritis vaccine.
8) Monoclonal antibodies.

VIDO also plans to participate with BIOSTAR in contracts for the testing of selected animal health products for international manufacturers and a Science Council of Canada study on biotechnology in animal health.

The Board of Directors of BIOSTAR are Mr. Willard Kallio of Dinsmore, Saskatchewan (Chairman), Mr. Paul Riese of Selkirk, Manitoba (Vice-Chairman), Mr. Ben Thorlakson of Airdrie, Alberta, Mr. Malcolm Sheppard of Saskatoon, Dr. Howard Tennant of Saskatoon and Dr. Chris Bigland of Saskatoon. The major shareholder of the Company is the University of Saskatchewan with the balance of the shares held in a Trust and in the BIOSTAR Treasury.

Officers of BIOSTAR are Dr. Chris Bigland (President), Mr. Paul Hodgman (Executive Vice-President), and Mr. Malcolm Sheppard (Secretary-Treasurer).

BIOSTAR will be issuing its own Annual Report in 1984.

REPORT FROM THE EXECUTIVE OFFICER

P.G. Hodgman

The past year has been a most demanding but interesting one for VIDO. A tremendous amount of time and effort has been taken with the creation of BIOSTAR Inc.; however, VIDO still is very active in the pursuit of funds to operate the facility and carry out its research programs.

Financial and "In-Kind" Support

VIDO acknowledges and thanks all those organizations, governments, foundations, individuals and others who have supported us in the past year.

University of Saskatchewan

We continue to be exremely indebted to the University of Saskatchewan for their contribution to the operation and maintenance of the VIDO building and the many ancillary services provided to VIDO.

Livestock Industry

VIDO has continued its close association with the livestock industry and has received tremendous support from most organizations, boards and commissions, particulalry in Western Canada. There have been some inroads made into Ontario this year, with a contribution from the Ontario Pork Producers' Marketing Board. The Alberta Cattle Commission must be thanked specifically for its most generous donation to VIDO. Continued efforts will be maintained with the livestock industry, both to ensure funds and to carry out a major VIDO mandate of being accountable by reporting its activities and research results to the industry.

Foundations

Charitable foundations have always played an important role in the life of VIDO. Without the seed money from the Devonian Group of Charitable Foundations of Calgary, Alberta, there would be no VIDO. The Max Bell Foundation of Toronto, Ontario, has contributed in a major way to the shipping fever research project over the past three years and funding for this project will be continued in the coming year with support from the Kahanoff Foundation of Calgary, Alberta. The McLean Foundation of Toronto, Ontario has also supported research on neonatal diarrhea using germ-free calves.

Government

The four western provincial governments are vital contributors to VIDO. The Province of Saskatchewan has supported VIDO with operating funds since its inception in 1975. The Province of Alberta, through a direct operating allocation and through the Farming for the Future program, also provides a major amount of essential support. Although to a lesser extent, the provinces of British Columbia and Manitoba both contribute towards VIDO. VIDO will continue its dialogue with the Western Provinces regarding increased long term support for the core operating funds of VIDO.

Although the Federal Government has not yet contributed core operating funds to VIDO, we have held many discussions with the various representatives in the past year. We continue to hope that a breakthrough will be made in the next year regarding core funding.

New Tax Status

One new light in the funding horizon is VIDO's newly acquired tax status received from Revenue Canada. VIDO has now been designated as an "approved research institution". Eligibility has been received for farmers, ranchers, veterinarians and commercial companies involved with animal biologics and pharmaceuticals, to contribute to VIDO and receive a tax credit rather than a deduction as a charitable donation. The details of this new status are yet to be worked out, however, this will form part of our fund-raising plan for the next year.

Extension and Communications

In the area of extension and communications, VIDO has been moderately busy this year. Many scientific papers were published and research presentations have been made to scientific gatherings. Elsewhere in this report is a listing of these presentations and publications.

No new fact sheets on disease for the livestock industry have been completed this year, but hopefully there will be two or three new ones forthcoming soon. Many radio, T.V. and newspaper interviews have been given over the last twelve months.

VIDO Building

The VIDO building has undergone some modifications. The developmental work in the basement includes a new conference room and initial development of approximately one-quarter of the basement area.

There have been some problems with snow and ice buildup on the roof, particularly in the areas over the entrances to the building. These were studied by the Physical Plant of the University of Saskatchewan, along with their consultants, and plans to correct this situation are being developed.

P.G. Hodgman, BSc (Agr)
Executive Officer

P.M. Moncrieff
Chairman,
VIDO Board of Directors
1983-84

G. Altwasser
Vice-Chairman,
VIDO Board of Directors
1983-84

THE OBJECTIVES OF VIDO

1) To serve the livestock industry through research on the common infectious diseases of farm animals and poultry.
2) To fill the gap between scientific discoveries in the laboratory and their application on the farm.
3) To increase the world's supply of animal protein by reducing loss and wastage from livestock disease.
4) To have a higher quality food available to consumers through research on biological (non-residue forming) vaccines and improved production and management techniques.
5) To improve the public health by reducing diseases that are directly transmissible to man and through spin-off of the research of VIDO to provide better human health products.
6) To reduce the suffering of animals caused by disease.
7) To study the economics of livestock disease.

VIDO RESEARCH TRUST FUND

The VIDO Research Trust Fund was originally established April 1, 1978. Its purpose is:

1) To ensure continuity of research funding as a guarantee of security for scientific personnel.
2) To serve as a vehicle into which all donations to VIDO could be placed until the eventual release by the VIDO Board of Directors.
3) To serve as a source of additional research income through interest accumulation.
4) To serve as a guarantee to the livestock industry to complete research projects initiated on its behalf.

In order to meet these purposes, the objective is to have in the VIDO Research Trust Fund a maximum of $5 million with a minimum of $1 million.

RESEARCH SUPPORT

VIDO would like to acknowledge research grant support which has been received from the following:

Granting Agencies

a) Agricultural Research Council of Alberta — Farming for the Future
b) Saskatchewan Horned Cattle Trust Fund
c) Natural Sciences and Engineering Research Council of Canada

Research Contracts

Agriculture Canada — Department of Supply and Services

Charitable Foundations

a) Max Bell Foundation
b) McLean Foundation

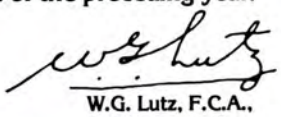
AUDITOR'S REPORT

To the Board of Directors of the
Veterinary Infectious Disease Organization

I have examined the balance sheet of the Research Trust Account and the Capital Trust Account for The University of Saskatchewan — Veterinary Infectious Disease Organization as at September 30, 1983 and the statements of income, expenditure and unexpected funds for the year then ended. Except as explained in the following paragraph my examination was made in accordance with generally accepted auditing standards and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In common with many non-profit organizations, the Veterinary Infectious Disease Organization derives part of its income in the form of grants and donations which are not susceptible to complete audit verification. Accordingly, my verification of income from these sources was limited to the amounts recorded in the records of the Organization.

In my opinion, except for the effect of adjustments, if any, had grants and donations been susceptible to complete audit verification, these financial statements present fairly the financial position of the University of Saskatchewan — Veterinary Infectious Disease Organization as at September 30, 1983 and the results of its operations for the year then ended in accordance with stated accounting principles applied on a basis consistent with that of the preceding year.



Regina, Saskatchewan,
December 6, 1983

W.G. Lutz, F.C.A.,
Provincial Auditor.

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION (V.I.D.O.)
RESEARCH TRUST
BALANCE SHEET

As at September 30

	1983	1982
ASSETS		
Cash and short term deposits	$1,464,143	$1,389,580
Accrued interest	12,794	17,115
Accounts receivable		
— royalties	—	14,920
— donors	58,850	78,703
Inventory (note 1(c))	37,085	5,067
	$1,572,872	$1,505,385
LIABILITIES		
Due to University of Saskatchewan — Operating fund	$ 113,337	$ 139,324
Unearned grant revenue	7,477	—
	120,814	139,324
EQUITY		
Unexpended funds (statement 2)	1,452,058	1,366,061
	$1,572,872	$1,505,385

(See accompanying notes)

Statement 1

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION (V.I.D.O.)
RESEARCH TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPECTED FUNDS

Year Ended September 30

	1983	1982
INCOME		
Grants and donations:		
Livestock industry	$ 118,393	$ 92,655
Provincial Governments:		
— Alberta	200,000	—
— Saskatchewan	227,700	210,000
— Manitoba	20,000	20,000
— British Columbia	6,700	7,850
Agricultural Research Council of Alberta "Farming for the Future"	354,300	314,000
Kahanoff Foundation	150,000	—
Max Bell Foundation	130,000	190,000
Natural Sciences and Engineering Research Council of Canada	82,245	—
Agriculture Canada	33,381	73,097
McLean Foundation	30,000	—
Sask. Horned Cattle Trust	19,500	—
Other individuals, companies and foundations	21,403	2,990
Saskatchewan Agricultural Research Fund	—	35,179
	1,393,622	945,771
Interest income	145,773	274,639
Animal services	32,557	76,841
Royalties	9,710	92,719
	1,581,662	1,389,970
EXPENDITURES		
University of Saskatchewan		
Salaries and fringe benefits	939,959	860,920
Materials and supplies	219,576	278,343
Animal services	100,040	158,397
Equipment (note 1(b))	47,643	131,801
Other	93,925	114,114
Travel	94,523	108,420
	1,495,665	1,651,995
Excess of income over expenditure (expenditure over income)	85,997	(262,025)
Unexpended funds, beginning of year	1,366,061	1,628,086
Unexpended funds, end of year (statement 1)	$1,452,058	$1,336,061

(See accompanying notes)

Statement 2

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION (V.I.D.O.)
CAPITAL TRUST
BALANCE SHEET
As at September 30

	1983	1982
ASSETS		
Current:		
Cash and short-term deposits	$ 94,571	$ 96,427
Accrued interest	653	1,040
Total current assets	95,224	97,467
Capital Assets (note 1(b))		
Site and improvements	133,765	133,765
Furnishings, fixtures and equipment	382,130	346,352
Buildings	3,916,728	3,916,728
Total capital assets	4,432,623	4,396,845
	$4,527,847	$4,494,312
LIABILITIES		
Due to University of Saskatchewan — Operating Fund	$ 25,000	$ 1,441
EQUITY		
Equity in capital assets	4,432,623	4,396,845
Unexpended funds (statement 4)	70,224	96,026
	4,502,847	4,492,871
	$4,527,847	$4,494,312

Statement 3 (See accompanying notes)

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION (V.I.D.O.)
CAPITAL TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
Year Ended September 30

	1983	1982
INCOME		
Interest	$ 9,976	$15,873
EXPENDITURES		
Furnishings and fixtures	35,778	15,838
Buildings	—	3,617
	35,778	19,455
Excess of expenditure over income	(25,802)	(3,582)
Unexpended funds, beginning of year	96,026	99,608
Unexpended funds, end of year (statement 3)	$70,224	$96,026

Statement 4 (See accompanying notes)

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION (V.I.D.O.)
Notes to Financial Statements
September 30, 1983

1. Summary of Significant Accounting Policies

(a) Fund Accounting

The accounts of the Organization are kept in accordance with fund accounting principles. This enables presentation of restrictions placed upon resources by contributions. Those principles require classification of resources into 'funds' to reflect the various designated uses. Two funds are presented: The Research Trust and the Capital Trust. Funds are transferred from the Research Trust as approved by the Board of Directors and from the Capital Trust as expenditures are incurred.

(b) Capital Assets

Capital assets are expenses as Capital Fund expenditures when purchased. The same assets are included in the Capital Fund balance sheet as assets offset by the 'equity in capital assets' account.

Equipment purchased with Research Trust monies is expenses as purchased, but is not included in the Capital Fund balance sheet as assets.

The Constitution referred to in note 2 states that all buildings and facilities constructed for the Organization shall be used by it in accordance with the agreement and upon termination of the Organization, the buildings, facilities and equipment therein shall remain the absolute property of the University of Saskatchewan.

(c) Inventories

Inventories of animals, materials and supplies are maintained by the Organization for research purposes. These inventories are valued at cost.

2. Establishing Agreement

The Organization was established by an agreement dated August 11, 1975, between the Devonian Foundation, the Province of Alberta, the Province of Saskatchewan and the University of Saskatchewan to conduct research on indigenous infectious diseases of food producing animals.

Effective April 1, 1980 the above agreement was replaced by a Constitution which provides for a Board of Directors to assume the responsibilities formerly performed by the Board of Advisors and the Governing Committee.

3. Administrative Services

The accompanying financial statements do not include expenditures for administrative services provided by the University of Saskatchewan.

4. Commitments

As at September 30, 1983 the Organization had commitments of $39,822 in the Research Trust.

5. Comparative Information

The 1981/82 comparative figures have been restated to conform with changes made during the current period financial statements.

REPORT FROM THE DEPUTY DIRECTOR (RESEARCH)

Dr. Stephen Acres

During the past year, research at VIDO has continued to be focussed on four diseases being given priority. These are: neonatal diarrhea, shipping fever in cattle, respiratory diseases in pigs, and the avian adenoviruses which cause hemorrhagic enteritis of turkeys and related diseases. Active research programs have been on-going in each of these areas for at least three years, with the exception of the Neonatal Diarrhea Program which has extended over the past seven years. The continued emphasis on these clearly specified disease problems is the result of VIDO's commitment to focus research technology on a few priorities at any given time and to continue working on them until practical objectives have been reached.

Neonatal Diarrhea Program

The long-term objectives of this Program are to develop and test practical methods of preventing and controlling diarrhea (scours) in newborn calves. Studies at both VIDO and the Western College of Veterinary Medicine indicate that the most common etiologic agents isolated from diarrheic calves by routine diagnostic methods are enterotoxigenic *E. coli* (ETEC), rotaviruses, coronavirus, and a parasite known as Cryptosporidia. While it is likely that other micro-organisms, which are more difficult to identify, also contribute to the "calf scours complex", these four appear to be incriminated in most scour outbreaks. Mixed herd infections with combinations of two or more of these enteropathogens are also common.

During the past year, Dr. C. Crouch developed sensitive diagnostic assays, known as enzyme-linked immunosorbent assays (ELISA's), to detect coronavirus and coronavirus complexed with antibody in feces. These assays are based on several neutralizing monoclonal antibodies to bovine enteric coronavirus produced by he and Dr. T.J.G. Raybould. Examination of feces from scouring calves submitted to the Western College of Veterinary Medicine indicated that 20 to 30% were infected with coronavirus. When manure samples of 121 cows were examined using the ELISA's, six (5%) were shedding free virus and 85 (70%) were shedding coronavirus complexed with antibody. These results illustrate that cows shed free virus or virus-immunoglobulin complexes for long periods of time and are probably the main source of contamination for newborn calves. Studies are underway to follow the shedding pattern over longer periods of time and to determine whether the virus-immunoglobulin complexes are infectious to newborn calves. Similar studies are also being conducted on rotavirus shedding patterns. Since cows are probably the main reservoir for these viruses, the excretion of viruses in their manure contaminates the calving area and ultimately leads to outbreaks of scours. Therefore, it is important to learn more about this epidemiological aspect of disease transmission. These studies may ultimately suggest new ways in which cows can be managed during the calving period to reduce the possibility of scour outbreaks caused by these viruses.

Progress has also been made towards developing and testing an inactivated vaccine which combines protective antigens of enterotoxigenic *E. coli*, rotaviruses and coronavirus. The ETEC component is comprised of bacterial subunits of K99 and F41 fimbriae. Several media have been tested to identify those which promote expression of large quantities of both attachment factors. Different doses of the bacterial and viral antigens have been combined with a variety of adjuvants to select the combination which stimulates the highest antibody titer in cow's milk following vaccination at various times prior to calving. In addition, a system of reproducing rotavirus diarrhea in germ-free calves was established and used to determine the milk antibody titer necessary to protect against challenge. Similar studies are also underway with coronavirus. All of the above factors must be established prior to field testing a vaccine in commercial herds which may be done in 1984-85.

Bovine Respiratory Disease Program

This continues to be the largest research program at VIDO and includes both field epidemiological studies as well as laboratory studies on microbiological and immunological aspects of shipping fever.

In collaboration with the Alberta Department of Agriculture, an epidemiological study entitled "Bovine Respiratory Disease in Alberta Feedlots" was started in 1980 and is continuing under the direction of Dr. S. Wilson. This study was designed to provide an indepth analysis of the environmental and managemental "risk factors" which affect the occurrence of shipping fever as well as other diseases in feedlots. A data collection technician was hired in each of three different geographical locations of Alberta. Each technician is responsible for collecting, verifying, and summarizing detailed information on every lot of cattle entering three feedlots in their area. To date, data has been collected on 1,045 "lots" of calves. Emphasis in the project is now being shifted from collecting data to entering it into a computer. Hence, data collection will be phased out in one area (3 feedlots) early next year, but will continue in the other two (6 feedlots) until 1984. A data entry clerk has been hired in Edmonton to assist Dr. Susan Wilson with entering the large volume of data into the computer.

One of the major objectives of the project is to develop a data analysis system which will allow us to "link-up" or interrelate various management events to which cattle are exposed from prior to arrival in feedlots until they have reached market weight. The first steps towards developing the analytical system are underway and some small-scale "pilot" analysis has been done. The results of one of these preliminary anaylses is shown in Figure 1, which showns an epidemic curve indicating the occurrence of respiratory disease in a pen of cattle which was made up of four separate processing groups. The solid line traces the pen incidence rate, or number of new cases of shipping fever which occurred each day after arrival in the feedlot. The dotted and dashed lines show the incidence rates for calves in two of the four processing groups which make up the pen. As can be seen, the pattern of occurrence of respiratory disease in the two processing groups are distinctly different. Feedlot managers normally see and react to the epidemic curve for the entire pen, but in most cases they will not be aware of the different pattern of disease within the different

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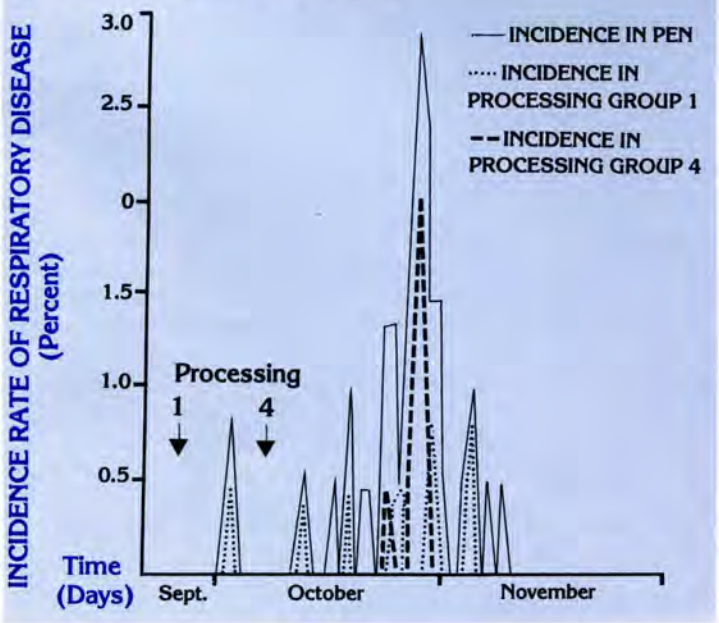
processing groups. This study makes such detailed analysis possible and will help identify factors responsible for the different disease patterns.

Immunochemical studies on *Paasteurella haemolytica*, the most common bacterial pathogen involved in shipping fever, is also continuing. Extracts of the bacterium have been shown to protect calves against experimental pneumonia and efforts to identify the "protective components" in these extracts are on-going. Monoclonal antibodies against several bacterial components have been prepared by Dr. T.J.G. Raybould and will be used to separate some of the main bacterial antigens. In addition, Drs. H. Bielefeldt-Ohmann and L. Babiuk are continuing to examine the immune mechanisms which protect the lung against respiratory pathogens.

Figure 1

Epidemic curve illustrating the number of new cases of respiratory disease as a percentage of all calves in a feedlot pen (— = incidence). Four lots of calves from different sources and with different backgrounds were used to "build" this pen of 229 calves starting in late September. Respiratory disease occurred throughout October and early November. The dotted (....) and dashed (--) lines show the incidence of respiratory disease in processing groups 1 and 4 respectively. The dates on which these groups of calves arrived at the feedlot and were processed are shown by the arrows. Calves in both processing groups contributed to the outbreak of shipping fever; however, cases in processing group 1 occurred at fairly regular intervals throughout the first 45 days, whereas those in processing group 4 occurred in a cluster about 21 days after arrival. Detailed analysis of the history of different groups of calves placed into a single pen will provide information about the "risk" factors which effect the occurence of pneumonia in feedlot calves. (For simplicity, the epidemic curves for the other two processing groups in the pen are not shown).



Porcine Respiratory Disease Program

The most important respiratory diseases of swine are enzootic pneumonia, caused by Mycoplasma species, atrophic rhinitis, and Haemophilus pneumonia. During the past two years, the emphasis at VIDO has been on the latter disease which is caused by *Haemophilus pleuropneumoniae*. This disease is now the most important respiratory problem of feeder pigs in several areas of North America and is increasing in importance in the western provinces. It can occur in several forms including acute pneumonia in which pigs die very suddenly, often without showing clinical signs, chronic infection in which pigs develop lung abscesses and pleuritis which increases the number of days taken to reach market weight, and inapparent infection in which the bacterium is present in a herd without producing obvious clinical signs. All of these various forms can occur concurrently within a single herd. Research projects to provide more information about treatment, prevention, and control are being done by Drs. P. Willson at VIDO and D. Osborne and J.R. Saunders at the Western College of Veterinary Medicine.

Several experiments were done to evaluate the use of various antibiotics for prevention of acute disease, and to treat acute and chronic pneumonia. When given 24 hours prior to experimental challenge, injectable long-acting oxytetracycline prevented all clinical signs of Haemophilus pneumonia. When treatment was started immediately after the first signs of disease appeared, injectable antibiotics (oxytetracycline, chloramphenicol, procaine penicillin) significantly reduced death, but did not improve average daily gain or prevent pigs from becoming chronically infected. None of the antibiotics tested (long-acting injectable oxytetracycline, oxytetracycline in the drinking water, and spiromycin in the drinking water) reduced the number of chronically infected pigs or improved average daily gain during the feeding period. Hence, it appears that producers should not invest in antibiotic treatment as a means of eliminating chronic carrier pigs or of improving performance.

The most common way in which this disease spreads from herd-to-herd is by the introduction of infected pigs into "clean" herds. To help prevent this type of spread, more sensitive serological diagnostic tests are required so that pigs can be screened prior to placing them in clean herds. A sensitive and serotype specific ELISA assay to detect antibodies to *H. pleuropneumoniae* was developed by Drs. L. Filion and P. Willson and is approximately 100 times more sensitive than the previously used agglutination test. This assay is now being used to screen serum from field herds so that serological response can be correlated with presence or absence of the bacterium within herds.

Several vaccines for Haemophilus pneumonia are available and, while some appear to reduce death losses from the disease, none has been shown to reduce the proportion of infected pigs which eventually become chronic carriers. In addition, some commercial vaccines cause abscesses at the injection site which restricts their use. Therefore, work is underway to develop a vaccine which not only prevents death, but also reduces the development of chronic carriers and which does not cause abscesses. Protective extracts have been developed and studies are in progress to identify suitable adjuvants for use with these extracts.

Reports from swine producers and veterinarians suggest that environmental stress such as transportation,

dramatic fluctuation in temperature, and mixing, play an important role in precipitating outbreaks of Hemophilus pneumonia. Drs. Osborne and Willson are continuing to evaluate the effect of these types of stress on the occurrence of experimentally induced Hemophilus pneumonia in an attempt to more clearly identify those factors which may precipitate acute outbreaks of disease.

The VIDO Swine Technical Group, comprised of swine producers, veterinarians, agricultural engineers, nutritionists and economists from the four western provinces is continuing to work on some of the multidisciplinary problems faced by the swine industry. This Group previously designed and published the "Swine Nursery Design Bulletin" which is being widely used by swine producers who are building new post-weaning nursery systems. The Group is now developing a similar detailed booklet containing construction plans for swine farrowing barns which we anticipate will be published in 1983-84. In addition, various members of the Group have submitted informative articles on a variety of topics which have been published in the Western Hog Journal under the heading of "Helpful Hog Hints".

Poultry Adenovirus Program

This Program, which is coordinated by Dr. J. van den Hurk, is focussed on type II avian adenoviruses which include the causes of Hemorrhagic Enteritis of turkeys, Marble Spleen Disease in pheasants, and splenomegaly in chickens. The most common of these diseases appears to be hemorrhagic enteritis and it has been estimated that this problem costs the Canadian turkey producers in excess of $9 million annually due to deaths, reduced feed conversion, down-grading, and increased susceptibility of infected birds to other secondary diseases. This project was started in 1980 with a grant from the Canadian Turkey Marketing Agency and additional funds have since been obtained from other sources.

The objective of this Program is to develop and test improved vaccines for hemorrhagic enteritis. While crude vaccines prepared from spleens of infected turkeys have been used for many years, they have not been licensed for general distribution because there are several problems associated with their production and use, including the danger of spreading other infectious agents, poor stability because of the presence of high levels of tissue enzymes, and inconsistent potency. More sophisticated vaccines have not been produced because, with the exception of one cell developed in the United States, a system for growing a virus outside of the host animal has not been developed.

Within the past year, significant progress has been made towards providing better vaccines. As an interim measure, a method of purifying hemorrhagic enteritis virus from spleen extracts was developed. The purified virus was incorporated into a vaccine which performed well when tested both experimentally and in field trials. The purification procedure reduces the risk that the vaccine will contain other organisms, and also removes most tissue enzymes so that stability is improved, thereby simplifying storage. Potency tests have shown that it is possible to produce approximately 10,000 doses of vaccine from the spleen of one infected turkey. Field tests are continuing and have been expanded in some provinces.

In addition, Dr. van den Hurk is continuing to explore possible methods of growing hemorrhagic enteritis virus in tissue culture. Extremely sensitive diagnostic assays which will detect small quantities of the virus are being used to evaluate these systems and some tests are providing promising results. This work will continue during 1983-84.

Biotechnology

In 1980, VIDO made a commitment to apply some of the new types of biological technology to research on the common diseases of food-producing animals and poultry. While the term "biotechnology" applies to a broad range of techniques currently being used in many different disciplines, those which are most useful in veterinary medical research are hybridoma technology for production of monoclonal antibodies, gene splicing to produce "genetically engineered" organisms which may produce new antigens (vaccines), and synthesis of artificial peptides which may also be useful as vaccines. Work is underway in each of these areas. Monoclonal antibodies are being used in all of the Programs for identification and purification of antigens and development of sensitive diagnostic systems such as ELISA's. They are also being explored as therapeutic agents for some of the common causes of neonatal diarrhea. Drs. G. Hudson, M. Sabara, and L. Babiuk are also working on developing genetically engineered and synthetically produced antigens for bovine rota and coronaviruses. These approaches are providing a much clearer understanding of the structure and function of the viruses and they may eventually lead to the development of improved antigens for immunization against these enteric infections.

Fourth International Symposium on Neonatal Diarrhea Planned

Plans to host the Fourth International Symposium on Neonatal Diarrhea in Place Riel Theatre on the University of Saskatchewan Campus are well underway. This meeting will be held October 3-5, 1983 and is expected to attract over 100 researchers and veterinary scientists from a dozen countries. Previous meetings in this series were held in 1976, 1978, and 1980. This is one of the mechanisms by which VIDO helps to disseminate the most recent information on important diseases of livestock. A grant of $10,000 was provided by Agriculture Canada to help host this meeting. Additional support was provided by biological manufacturers, the City of Saskatoon, and the Province of Saskatchewan.

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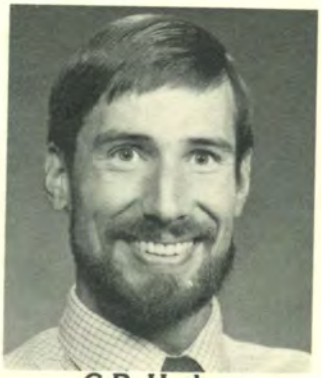

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LIST OF PUBLICATIONS AND PRESENTATIONS

A. Research Publications in Scientific Journals

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