ANNUAL REPORT 1984-85
10TH ANNIVERSARY EDITION

VIDO

Veterinary Infectious Disease Organization

A DECADE AND BEYOND

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Front Cover
Left: *In December 1976 construction was underway on the first of the VIDO buildings.* ***Right:*** *Today we enjoy a complex that is one of the finest of its kind anywhere in the world.*

Veterinary Infectious Disease Organization

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Saskatoon, Saskatchewan
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(306) 966-7465

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 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.

REPORT FROM THE CHAIRMAN OF THE BOARD OF DIRECTORS—P.M. MONCRIEFF

"VIDO is in sound financial and scientific shape to enter the second decade of service to the Canadian livestock industry."

P.M. MONCRIEFF, Chairman, 1984-1985

Increased productivity is a key. Given the current stage of the agriculture cycle, it has become realized by a larger and larger proportion of the agricultural community that increased livestock productivity is the key to Canadian farm and agricultural prosperity. It is ironic that the recognition of the need to continually improve productivity occurs not when the industry is prosperous and with funds to invest, but at the time when the on-farm application of productivity-enhancing mechanisms is so urgently required.

VIDO has recognized that control of livestock infectious disease is an essential requirement of increased productivity and livestock industry prosperity. This recognition has superseded the recognition of infectious diseases as a death risk. VIDO has always recognized that, while the causes and effects of infectious diseases occur in varying degrees, all impact on productivity.

Just as the recognized role of improved livestock productivity through control of infectious diseases has grown, so has VIDO grown as a practical instrument to address the infectious disease challenge. In 1985, VIDO celebrated a Tenth Birthday. I am pleased to report that VIDO is in sound financial and scientific shape to enter its second decade of service to the Canadian livestock industry. VIDO has truly grown to become a unique and valuable Canadian resource.

Financially, VIDO is in a strong position as a non-profit voluntary association, funded in large part by the public and industry. VIDO's financial objective is to operate on a break-even basis over a period corresponding to major research program time frames. VIDO's financial strength and stability is provided by a debt-free physical facility and a Research Trust Fund. To ensure stability, and with the recognition that annual funding may not always cover necessary annual research project requirements, VIDO attempts to ensure that contributions to the Trust are such that the Annual Research Budget and Trust Fund are in a proportion of two to one.

Scientifically, in 1985 VIDO significantly increased core scientific staff, especially in the area of biotechnology. VIDO scientific staff now number twelve, and these scientists are supported by seventeen technical and administrative staff. Your Board is very pleased by the quality of the new staff recruited, and there exists no question that VIDO is on the cutting edge of science. Increased scientific success and credibility will follow. This growth in staff and associated research programs in 1985 has resulted in full utilization of the VIDO building. VIDO is now operating at full capacity and is utilizing the unique research facilities at maximum capacity.

The first ten-year research plan is coming to conclusion and an active planning process to develop the next ten-year plan is underway. Questionnaires have been distributed across Canada to many Canadian livestock farmers with the cooperation of their Associations and Boards. Results of these questionnaires, which are

G. ALTWASSER,
Vice-Chairman, 1984-1985

BOARD OF DIRECTORS — 1984-85

Front Row — left to right:

Dr. Chris Bigland, Past Director; Mr. Pat Moncrieff, Chairman, Senior Manager, Agriculture Department, Bank of Montreal; Mrs. Carol Teichrob, Livestock Producer, Saskatchewan; Dr. Boyd Anderson, Livestock Producer, Saskatchewan; Mr. Paul Hodgman, Executive Officer.

Back Row — left to right:

Mr. Stuart Kramer, Assistant Deputy Minister, Saskatchewan Department of Agriculture; Mr. Richard Klassen, Livestock Producer, Manitoba; Dr. Gavin Hamilton, Dean, Western College of Veterinary Medicine; Dr. Doug Maplesden, Past Dean (until February, 1985), Ontario Veterinary College; Mr. Barrie Peterson, Livestock Producer, British Columbia; Dr. S.D. Acres, Director; Mr. Garnet Altwasser, Vice-Chairman, Livestock Producer, Alberta; Dr. Brian Tinker, Vice-President (until June, 1985), University of Saskatchewan; Dr. Ralph Christian, Director, Animal Health Division, Alberta Agriculture; Mr. Rod Bailey, Assistant Deputy Minister, Regional Development Branch, Agriculture Canada.

Not Pictured: Dr. Robert Church, Associate Dean (Research), Faculty of Medicine, University of Calgary and Livestock Businessman.

BOARD OF DIRECTORS
1984-1985

designed to identify livestock disease research requirements, will help not only in identifying priority needs but also in ensuring that VIDO remains in close touch with the true needs of the Canadian livestock farmer.

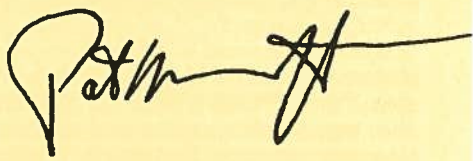
The first ten-year plan has been a very real success. The world's first calf scours vaccine — VICOGEN — has been followed by an improved product, Ecolan, and will soon be followed by a trivalent vaccine that will control a still higher percentage of scours. The conventional trivalent vaccines will be followed by a vaccine produced by biotechnological methods. These vaccine successes are complemented by a large Alberta feedlot study which is aimed at understanding the management factors involved in the feedlot and the handling of cattle. Publication of data from this work will be seen in 1986.

In the poultry research area, imminent licensing of a hemorrhagic enteritis virus vaccine for turkeys will occur. Of perhaps larger productivity-improving significance is the discovery that this disease is rather widespread in chicken flocks. It does not cause a high incidence of death but, at least preliminarily, it does inhibit efficiencies.

Reviewing the research plan and successes within the first decade, the only conclusion possible is that VIDO has made a significant contribution to the management of infectious disease in Canadian livestock.

The next ten years will bring many challenges and opportunities. One of the emerging trends is the increase in commercial activity within VIDO. Much of this activity is due to the growing success of BIOSTAR, VIDO's commercial arm. BIOSTAR's successful collaboration with the University of Saskatchewan and VIDO is very apparent with the establishment of two NSERC-assisted biotechnology chairs within the Western College of Veterinary Medicine. Other commercial endeavors in areas of livestock research and product testing will grow as VIDO's unique facilities and capabilities develop, especially as VIDO and BIOSTAR move toward the establishment of a unique, modern, field research station.

In closing, I would like to reflect personally upon my four-year term as an outside-the-industry Director on VIDO's Board and my past two years as Chairman of this Board. Our industry is composed of many sound and capable people. I have very much appreciated being associated with the VIDO Board Members over the past five years and I know that the current and future Boards will play a significant role in VIDO's success in the second decade. One of the roles of any Board is to ensure that executive management is capably in place. As an understatement, I wish to acknowledge that VIDO management, through Dr. Acres, Dr. Babiuk and Mr. Hodgman, is world class. The livestock industry of Canada is indeed well served by this team.



P.M. Moncrieff

"Our research involves several steps: identifying diseases of major economic importance, building a research team, and maintaining a focused effort for three to five years to ensure that progress is made."

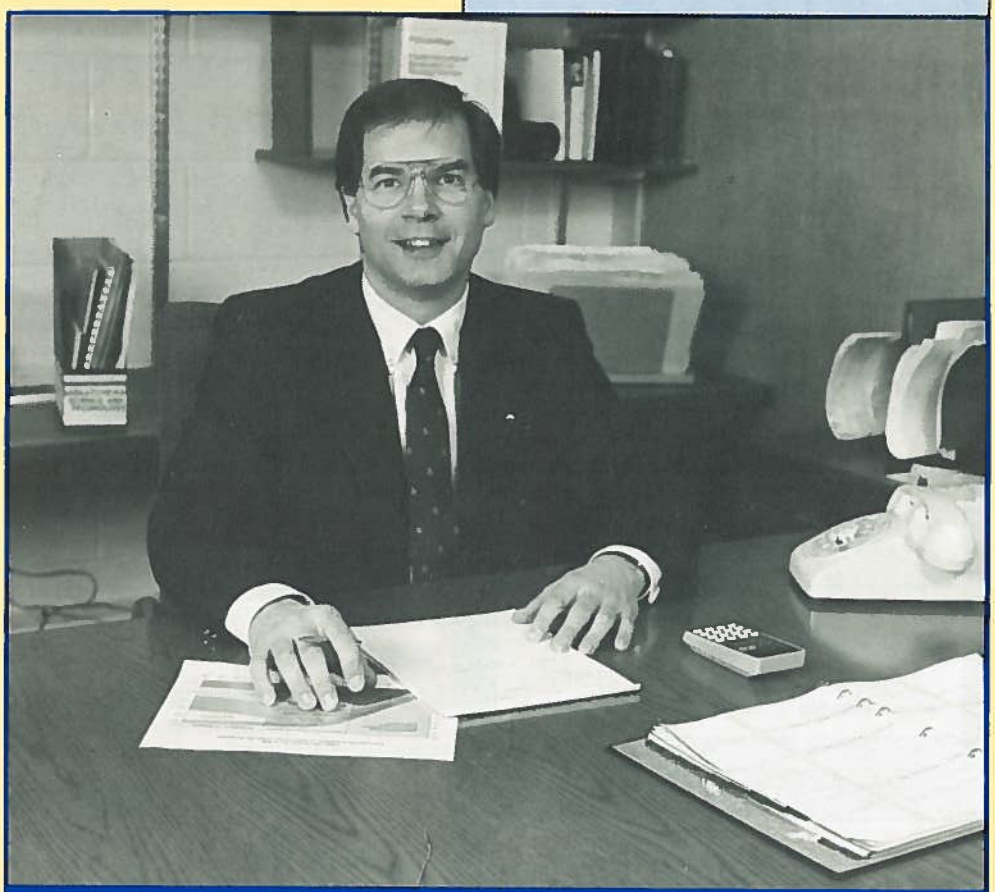
Historical Perspective — The First Decade

On September 24, 1985, the Veterinary Infectious Disease Organization management, staff, and guests celebrated our tenth anniversary. It was September 1975 when the original Agreement establishing VIDO was signed by J.R. Fish, Vice-President of the Devonian Group of Charitable Foundations, the Honorable Edgar Kaeding, Minister of Agriculture for the Province of Saskatchewan, the Honorable Marvin Moore, Minister of Agriculture for the Province of Alberta, and Dr. R.W. Begg, President of the University of Saskatchewan. That cooperative agreement established the principles on which the Organization has grown and developed into the success that it is today.

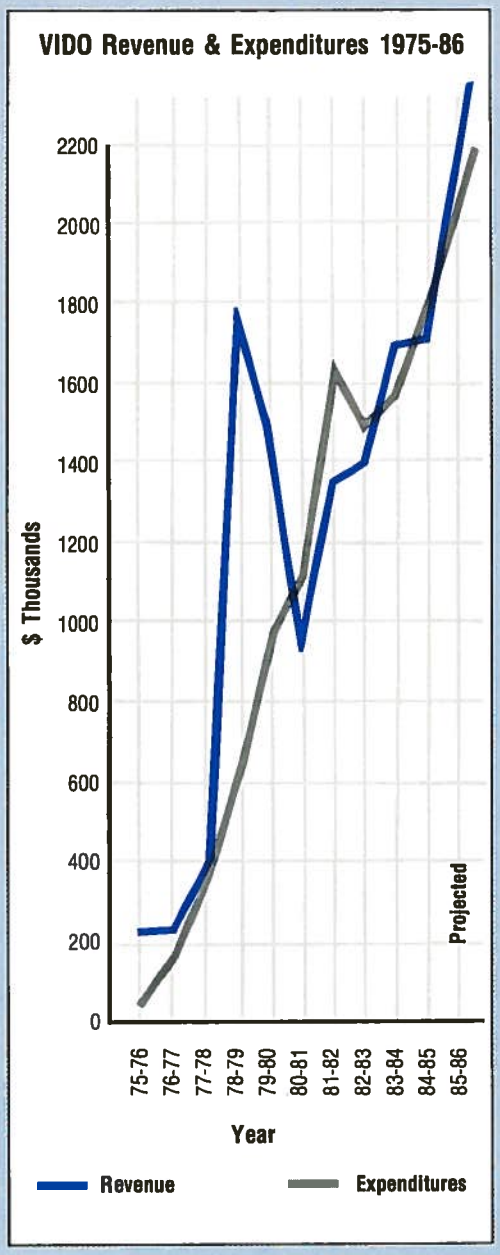
VIDO started in 1975 with three employees, housed in two construction trailers located on the north-east corner of the University of Saskatchewan Campus. Since then, it has grown to be an organization with 40 full-time employees, housed in one of the most modern and up-to-date animal disease research laboratories in the world. The facility is comprised of a main laboratory building and one isolation outbuilding. Together they contain office and laboratory space, a glassware media preparation laboratory, animal isolation rooms, and a germ-free animal area.

At the end of our first decade, it is timely to review some of the founding principles incorporated into the Organization by the Devonian Foundation. Their philosophy in establishing VIDO at the University of Saskatchewan, as well as two sister organizations, The Center for Cold Ocean Resources Engineering (C-CORE) at Memorial University, and The Center for Frontier Engineering Research (C-FER) at the University of Alberta, is best summarized in the following quote from a letter written by the Foundation in 1984.

> "Our basic approach in creating these initiatives followed an in-depth appraisal of the economic and scientific strategies of Canada — as enunciated by various bodies such as MOSST, NRC, the Science Council of Canada, NSERC, and DRIE; and line departments such as Agriculture, and EMR. From this synthesis, we identified specific 'gaps' in Canadian research activity relative to unique Canadian needs. Then, we identified strong competence and leadership in certain of the fields and provided funds in support of university-generated proposals to establish consolidated efforts to seize these opportunities. Rather than provide minor support for numerous ventures, we contributed major funding to a few.
>
> While a financial contribution was vital in bringing various parties together and launching new centers, our participation went beyond this to include policy guidance and



S.D. ACRES. DVM. MPVM. PhD



The C.H. Bigland Fellowship Fund in Veterinary Microbiology & Epidemiology

This Fund was started by the VIDO Board of Directors in conjunction with the University of Saskatchewan in September 1984. The purpose of the Fund is to raise $150,000, which will be used to support Canadian veterinarians wishing to take advanced training in veterinary microbiology and epidemiology.

I am pleased to report that during the past year donations of just over $100,000 have been received from over 40 donors. This is significant progress towards the target set for the Fund. However, another $50,000 must still be raised before the Fund can become operational. We hope that this can be achieved by July 1, 1987. Contributions are tax deductible and will be gratefully received.

management during the start-up period. This was particularly important since the objective of the organizations was to not only address the research requirements, but to do so as the single national centers of excellence in highly focused specialties, with joint participation by university, governments, and industry.

To add to this idealism was the acceptance of a mandate of communication and collaboration to integrate past achievements of others and to disseminate all new developments in support of technology transfer to those who can apply the findings to the interests of Canada.

We consider that this rationalized approach has proved to be the correct one for Canada in meeting international competition. Our contributions as a Foundation have resulted in the establishment of three organizations which illustrate what can be done if there is a catalytic party dedicated to linking all of the elements.''

Some of the most important operating principles introduced into the Organization by the Devonian Foundation appear below and in the Reports of the Executive Officer and Associate Director (Research). They are preceded by this symbol (*) to designate their source. We have included them because they are the basis of the Organization's success.

**** Dedicated leadership is the most significant element of successful performance.***

**** Research facilities are located on a university campus in order to maintain academic and infrastructure support. The research institution receives financial and in-kind support from the University, but is financially self-reliant and self-governed.***

**** The needs of the private sector are identified and industry representatives are active in setting policy and research plans.***

**** The role of the center is to engage in basic and applied research, development, and demonstration.***

In summary, the Devonian Foundation not only provided important financial stimulus for development of the Organization, but also infused many critical operating principles which have been a key to VIDO's development. The importance of this aspect is highlighted in the following quote from Dr. A.E. Pallister, an Associate of the Devonian Foundation and the first Chairman of VIDO's Board of Advisors and, more recently, Board of Directors.

''In retrospect, Devonian's greatest contribution will likely be seen as demonstrating that new approaches to the organization of research are necessary, practical, and can be productive.''

Overview of the Past Year

Just as the previous year was one of transition, the past year has been one of development and growth at VIDO. We were fortunate in being able to access several new sources of research funding, particularly through federal government agencies. These have supplemented our traditional sources of support and allowed us to fill three positions which became vacant through attrition during the previous year, as well as to hire three new research scientists. These include Michael Lawman (BSc, PhD) to work in the area of immunology, Patrick Frenchick (BSc, PhD) in immunochemistry, Andrew Potter (BSc, PhD) in bacterial genetics, Michael Parker (BSc, MSc, PhD) in recombinant DNA technology, and Sylvia van Drunen Littel-van den Hurk (BSc, MSc, PhD) and Kerry Ready (BSc, PhD) in molecular virology.

I am pleased to report that, for the first time in VIDO's ten-year history, the laboratory building is filled to 100% of capacity. This has allowed us to increase the level of activity in all of our research programs. Ultimately it will lead to an increased rate in the discovery of new information and the development of practical solutions to disease problems.

Financial Review

Total revenues for the year were $1,712,381, up slightly from the previous year. Expenditures were $1,839,070, which resulted in a decrease in the unexpended balance in the VIDO Research Trust of $126,689. This operating deficit occurred because of the expansion of the research staff and the fact that two laboratories had to be equipped to accommodate the new research personnel. While several new sources of revenue were found, most of these did not begin to provide funding until late in the year. However, they will extend into the next two or three years, and therefore we do not expect this operating deficit to continue.

Acknowledgements

VIDO is a non-profit research organization. While the University makes significant contributions in the form of maintenance, custodial, and financial services, and pays the salary of the Director, VIDO must raise all of its operating and capital funds independently. Revenues are derived from a variety of sources, which are summarized in the bar chart on page 8.

During the past year, new sources of funds became available to VIDO through two federal government agencies. The first of these is the Natural Sciences and Engineering Research Council (NSERC). Previously, VIDO research scientists were not eligible for NSERC grants; however, I am pleased to report that early in the

year the Executive Committee of NSERC recognized VIDO as "an institution eligible to authorize applications for NSERC grants by qualified members of its research staff". This is an exciting and welcome development, which will allow our scientists to compete in national grant competitions. Several members of staff will be submitting proposals to NSERC in the coming year.

NSERC also made a second announcement of major importance to VIDO. In May the Council confirmed that they would fund two research chairs in biotechnology. This funding was awarded under the University-Industry Interface Program introduced by NSERC in 1984 to encourage closer cooperation between universities and Canadian industry. The duration of the research chairs is five years, during which time NSERC will contribute approximately $800,000. The other $200,000 will be provided by BIOSTAR Inc., VIDO's industrial partner.

Dr. Lorne A. Babiuk, Associate Director of Research at VIDO and a Professor in the Department of Veterinary Microbiology in the Western College of Veterinary Medicine, was appointed to the Senior Research Chair. His studies will involve work on subunit vaccines for bovine herpesvirus-1 also known as infectious bovine rhinotracheitis (IBR). This virus is one of several respiratory viruses which predispose calves to Pasteurella pneumonia or shipping fever. It also causes abortion as well as a number of other diseases in cattle.

Dr. Marta I. Sabara, a Research Scientist at VIDO and an Adjunct Professor in the Department of Veterinary Microbiology, was appointed to the second chair. Her studies will involve development of subunit vaccines against enteric rota and coronaviruses, which are common causes of neonatal diarrhea in young animals.

Within the arrangement, the University of Saskatchewan also agreed to appoint two new research associates in biotechnology. These positions have been filled by VIDO Professional Research Associates Drs. Andrew Potter and Michael Parker. They also hold adjunct appointments in the Department of Veterinary Microbiology in the Western College of Veterinary Medicine.

The National Research Council also contributed significantly to VIDO during the past year. In April 1985, they approved the contract entitled "The Development and Use of Monoclonal Antibody Technology to Identify and Characterize Important Antigens of Pathogenic Micro-Organisms". This contract extends over two years and is integral to our research in the area of biotechnology and disease pathogenesis. We consider this another significant contribution by the Federal Government to our on-going development.

The awarding of the two NSERC research chairs and the NRC contract are major steps for VIDO and have allowed the Organization to develop a critical mass of scientists to work in the area of biotechnology. On behalf of VIDO, I extend thanks to NSERC, the NRC, the University of Saskatchewan, the Department of Veterinary Microbiology, and BIOSTAR. This type of cooperation will promote manpower training, research excellence, and eventual industrial developments for Canada.

VIDO has also submitted proposals in both Saskatchewan and Manitoba under various Economic Regional Development Assistance Programs. We hope to have some word early in the next year regarding funding from these sources.

Long-Range Research Plan

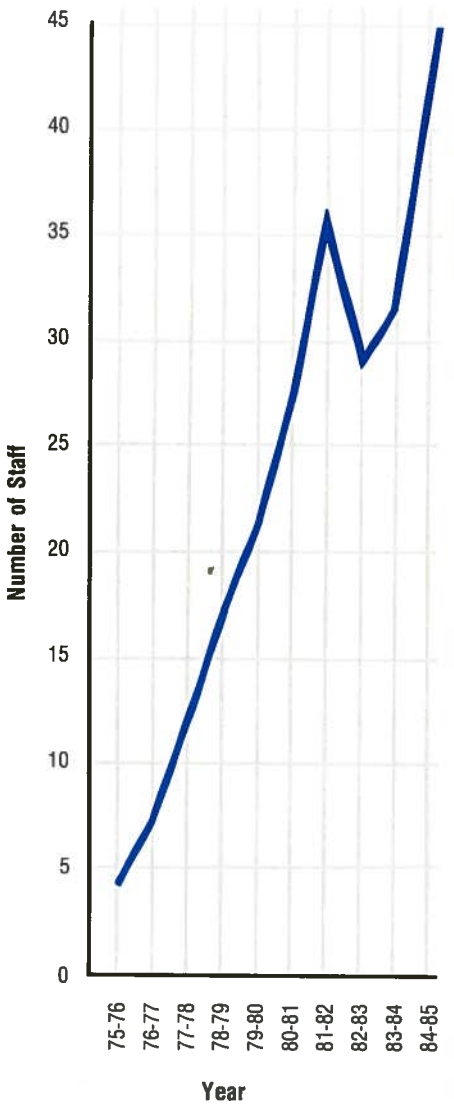
Part of our research philosophy at VIDO is to concentrate on only a few research problems at any one time. We feel this is necessary to prevent our research resources from being diluted to the point that real progress cannot be made in any area. To achieve this, our research planning involves several steps. These include identifying diseases of major economic importance to the livestock and poultry industries, building a research team to focus on each problem area, and maintaining a focused effort for three to five years to ensure that progress is made.

Research targets are established by the Board of Directors after discussions with the livestock and poultry industries, practicing veterinarians, diagnostic laboratories, and others involved in agriculture. The current research plan was developed in 1980-81 and identified four major areas:

1) Neonatal Diarrhea
2) Bovine Respiratory Disease
3) Respiratory Disease in Pigs
4) Hemorrhagic Enteritis of Turkeys

We are currently revising this research plan with a view to refocusing the research effort for the next three to five years. As part of this exercise, questionnaires were sent to livestock and poultry producers, veterinarians, diagnostic laboratories, and feed companies. The results will be analyzed and combined with information from other surveys, condemnation statistics, and diagnostic reports to identify the most important diseases. When selecting the specific research targets, we will also evaluate the amount of research underway internationally so as to avoid duplication, and we will also assess whether progress can be made in a specific area with the available technology.

A revised plan of action is being developed which will focus VIDO's research resources on the most important problems. This plan will be presented to the Board of Directors next spring. It will be implemented October 1, 1986, the start of our next fiscal year.



Research Achievements

The Associate Director (Research) has provided a detailed review of the research programs in his Report. Significant advances have been made in all programs.

One of the most notable achievements was the development of a tissue culture-grown vaccine for hemorrhagic enteritis (HE) of turkeys. We can now grow the HE virus in cell culture. VIDO scientist Jan van den Hurk has used this system to produce and test a vaccine. Field trials are currently underway in turkey flocks in five provinces, and we anticipate licensing the commercial rights for the vaccine within the next year. A patent on this technology and its use to produce vaccines has been filed in Canada, the U.S.A., Japan, and the European Economic Community.

Research Collaborators and Visitors

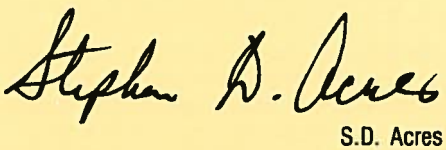
Each year, VIDO research scientists interact and collaborate with a large number of groups and individuals involved in agricultural research. Many of these are listed elsewhere in this Report. Several of these collaborations deserve special mention.

We were pleased during the past year to allow researchers at the Western College of Veterinary Medicine working under a contract with Agriculture Canada to carry out studies on Anaplasmosis in several of our isolation rooms. An outbreak of this reportable disease occurred in cattle in southern Saskatchewan in 1983, and research is underway to establish whether or not the parasite can over-winter in Canadian conditions. This will help determine whether Canadian cattle could be a permanent reservoir for the parasite.

We were also pleased to have Mr. Greg Tiffin, a technician from Agriculture Canada's Animal Disease Research Institute at Lethbridge, Alberta, join our monoclonal antibody unit for eight months. Greg is learning a variety of monoclonal techniques which he will transfer to the Lethbridge laboratory. In addition, Dr. Donna Hutchings, an Agriculture Canada Research Officer, has enrolled in a graduate program at the University of Saskatchewan and will be conducting some of her research project at VIDO.

We were also fortunate to collaborate with the Health Management Branch of Alberta Agriculture in carrying out a field trial of a commercial vaccine for Pasteurella pneumonia. These studies are on-going and will be completed in the near future.

Finally, I would like to again thank all members of VIDO's staff for their performance during the past year. They are the most critical resource in the Organization. Without their talents, dedication, and hard work, not even the most generous budgets and modern facilities would make VIDO a success. My thanks to each and every one. I would also like to thank all members of the Board of Directors for their guidance, counsel, and support.



S.D. Acres

GUESTS TO VIDO BOARD FUNCTIONS — 1984-85

Honorable John Wise
Minister of Agriculture

Honorable Ray Hnatyshyn
Government House Leader

Dr. Maurice Foster, MP
Standing Committee - Agriculture

Mr. Bob Porter, MP
Standing Committee - Agriculture

Mr. Jim Caldwell, MP
Standing Committee - Agriculture

Mr. Felix Holtmann, MP
Standing Committee - Agriculture

Mr. Jack Scowen, MP
House of Commons

Mr. George Minaker, MP
House of Commons

Mr. Don Ravis, MP
House of Commons

Dr. Lorne Greenaway, MP
House of Commons

Mr. Simon deJong, MP
House of Commons

Adrian Morrison
Executive Assistant to Simon deJong

Dr. Jan Gavora, Geneticist
Agriculture Canada

Dr. Lloyd Spencer
Animal Diseases Research Institute

Dr. Barry Stemshorn, Director
Animal Diseases Research Institute

Dr. Conrad L'Ecuyer
Director General, Operations Directorate
Agriculture Canada

Dr. L. Karstad
Animal Pathology Division
Agriculture Canada

Dr. V. Ivan Reed
Veterinary Inspection Directorate

Dr. Doug Alexander, Chief
Veterinary Biologics
Agriculture Canada

Mr. Peter Connell
Deputy Minister - Agriculture Canada

Dr. G.A. Mitchell
Bureau of Veterinary Drugs
Health and Welfare Canada

R. Bouchard
representing Dr. E. LeRoux
Agriculture Canada

Dr. Janet Ferguson
National Biotechnology Advisory Committee (MOSST)

Dr.D.B. Shindler
National Biotechnology Advisory Committee (MOSST)

Dr. Ian Ferguson
NSERC

Dr. C. Lajeunesse, Director
Targeted Research - NSERC

Dr. Louis P. Visintin, Co-ordinator
Biotechnology Program, NRC

Dr. Alain Albagali
Project Manager, Biotechnology, PILP, NRC

Dr. Terry Walker
PILP, NRC

Dr. George Fraser
IRAP, NRC

Dr. David Bundle
Division of Biological Sciences, NRC

Dr. Malcolm Perry
Division of Biological Sciences, NRC

Dr. Vern Seligy
Division of Biological Sciences, NRC

Dr. Bill Smith
Science Council of Canada

Dr. Don Knoerr, Chairman
Canadian Federation of Agriculture

Mr. Richard Meeghan
Canadian Cattlemen's Association and Ontario Cattlemen's Association

Mr. Martin Rice, Secretary
Canadian Pork Council

Ms. Renee Beland
Dairy Farmers of Canada

Mr. Gordon Garlough
Ontario Federation of Agriculture

Mr. Eli McKhool
Gowling and Henderson

Mr. Jean-Claude Carisse
Canadian Veterinary Medical Research Trust and Canadian Veterinary Medical Association

Mr. Peter Munsche
Canadian Institute for Advanced Research

Dr. Don Landry
Canadian Veterinary Medical Association

Dr. Omand M. Solandt
The Wolfe Den

Mr. Ken Fisher
Vice-President, Marketing
Armitage-Carroll Ltd.

Ms. Cindy Nicholas
Max Bell Foundation

Mr. Bert Hargrave
Walsh, Alberta

Mr. Randy Goodfellow
Regional Agrologist
Bank of Montreal — Ottawa

Ken Snarzik
Regional Agrologist
Bank of Montreal — Kingston

Ms. Patricia Ward
Bank of Montreal

Ms. Karen Davidson
Cattlemen Magazine

Mr. Harold Leiken
CJOH - TV

Mr. John Cross
Philom Bios

Dr. Bernard Laarveld
Department of Animal Science
University of Saskatchewan

Mr. Mac Sheppard
Controller's Office
University of Saskatchewan

Dr. Howard Tennant, Dean
College of Graduate Studies & Research
University of Saskatchewan

Mr. Willard Kallio, Chairman
BIOSTAR Inc. Board of Directors

Dr. Bruce Schnell
Vice-President, University of Saskatchewan

Mr. Jim Morris, General Manager
Saskatchewan Pork Producers Marketing Board

Dr. Dudley Osborne
Department of Veterinary Microbiology
University of Saskatchewan

Mr. Jim Hutch, President
Saskatchewan Research Council

REPORT FROM THE EXECUTIVE OFFICER — P.G. HODGMAN

"It is desirable to have two or three other participants involved in the initial funding and to have evidence that funds will be available from a wider group of contributors in the future." — Devonian Group of Charitable Foundations (1975).

All four of the original founding partners could see clearly the long-term benefits of a unique research concept and facility such as VIDO. The Devonian Group of Charitable Foundations and the Province of Alberta agreed to fund the capital cost of the VIDO facility. The University of Saskatchewan agreed to donate the land and provide utilities, security, maintenance, and other ancillary services on a continuing basis. The Province of Saskatchewan committed funds to the operating research budget over a five-year period. With these provisions in place, the dream of Dr. Christopher H. Bigland, Founder and First Director of VIDO, became a reality . . . VIDO was born.

**** "Fund-raising is an ongoing and healthy endeavor."***

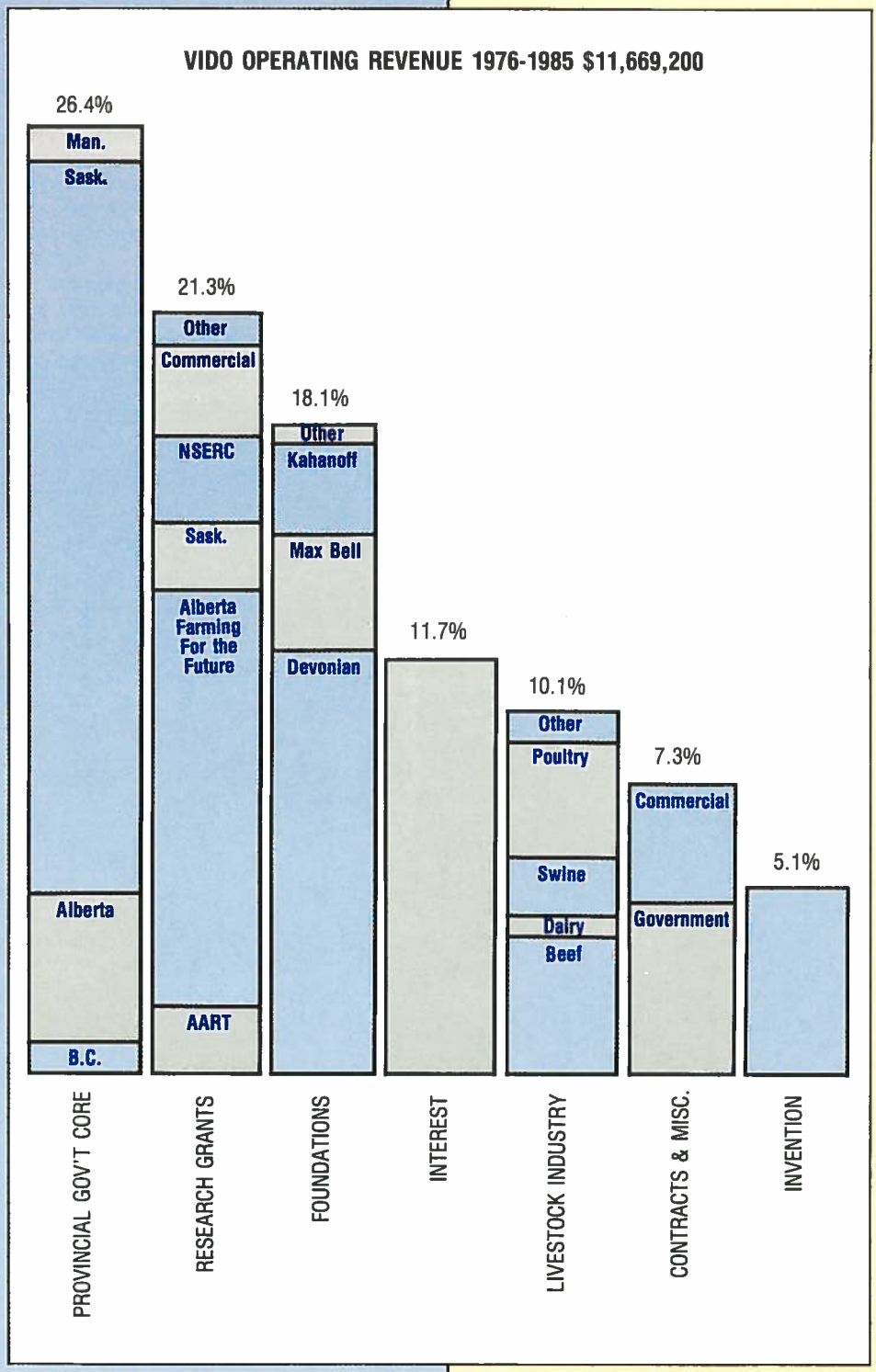
A unique goal of VIDO was to attract financial contributions from as broad a base as possible. Governments and traditional granting agencies were not to be the sole source of funding. All segments of society, from primary livestock and poultry producers to secondary processors and consumers, were to play active roles in the financial support of VIDO. Another important part of this concept is for the Organization to be accountable on a continuing basis to all of its supporters.

It has taken a substantial effort to obtain the funds necessary to develop and sustain the Organization during the last ten years. From VIDO's initial, limited financial base, a broad "funding mosaic" has been developed. A well-planned fund-raising effort backed by a strong reputation at the research and industry levels has helped VIDO reach financial stability.

P.G. HODGMAN, BSc. (Agr.)

**** "Funds raised shall be placed in a Research Trust and released to the Centre on recommendation of the Board of Directors following their approval of an annual and long-range budget and a master research plan."***

As Devonian outlined many years ago, the Board of Directors continues to ensure accountability and financial responsibility by following this principle.



The Funding Mosaic bar chart shows the main sources from which VIDO has derived its revenue over the past ten years. To date, $11,669,200 has been raised for research operating funds. An additional $4.25 million was raised from the Devonian Group of Charitable Foundations of Calgary and the Province of Alberta for the capital cost of the facility. This is not included in the chart.

A Review of Revenue from 1976 to 1985 – VIDO's Funding Mosaic

Government

Core funding is essential to VIDO. It represents funds which are not allocated to a specific research project or objective and which can be used to pay for items that grants and contracts do not cover. More importantly, it provides the flexibility necessary to pursue new and promising research leads.

The Provinces of Saskatchewan and Alberta have taken the lead in providing core funds for VIDO's research and development. With contributions also from the provinces of British Columbia and Manitoba, a solid funding base has been established.

In the past, significant funding has been obtained from the Federal Government through grants and contracts, as described elsewhere in this Report. However, we still have not been able to obtain core funds from Federal Government sources.

Research Grants

Research grants represent an increasing source of funding for VIDO. The Province of Alberta, primarily through the Farming for the Future Program, and to a lesser extent, the Alberta Agricultural Research Trust (AART), has contributed a significant amount in the form of grants. The Province of Saskatchewan, through a variety of mechanisms such as the Horned Cattle Trust Fund and Agricultural Research Fund has also provided several grants. This year, VIDO's research staff became eligible for Natural Sciences and Engineering Research Council (NSERC) grants, which has expanded their opportunities to obtain funding in support of research.

Foundations

The Devonian Group of Charitable Foundations (Calgary), one of the founding partners of VIDO, fulfilled their financial commitment in 1980. They provided a total of $2,180,000 for capital construction and $1,370,000 in operating funds. Since then, other charitable foundations have continued to play an important role in the development of VIDO. The Max Bell Foundation (Toronto) and the McLean Foundation (Toronto) have also concluded their commitments with VIDO. Research in the area of shipping fever is now supported by the Kahanoff Foundation (Calgary). VIDO will continue to pursue various Canadian and international foundations with an interest in funding advanced research.

Interest

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

1) To provide the mechanism into which all donations to VIDO can be placed until their eventual release by the VIDO Board of Directors.

2) To ensure continuity of research funding and to act as a guarantee of security for key scientific personnel.

3) To serve as a guarantee to the livestock and poultry industries that research projects initiated on their behalf will be completed.

4) To serve as a source of additional research income through interest accumulation.

Interest has and will continue to provide a major source of operating funds. Interest is earned on core funds which do not require specific financial reporting back to the contributing source.

Livestock Industry

The financial support received from the livestock and poultry industries is of paramount importance to VIDO. Their contributions are directly applied to fund research projects. More impor-

tantly, their involvement demonstrates to governments, private foundations, and individuals that the primary industry has a financial stake in the research. This concept has enabled VIDO to attract funds from many other sources. Over time, significant contributions have been made by the following groups:

— the Alberta Cattle Commission
— the cattle producers of Saskatchewan, through their Check-Off Fund
— the Canadian Turkey Marketing Agency and its affiliated Provincial Boards
— the Manitoba Milk Marketing Board and
— the Manitoba Hog Producers Marketing Board

Although their contributions have not been as large as the groups mentioned above, an additional 50 livestock and poultry groups from across Canada have supported VIDO financially.

Contracts and Miscellaneous

"Some contract research shall be conducted where it falls within VIDO's established research plan priorities."

Until recently, contracts for specific research projects played a minor role in the overall funding of VIDO. In the past two years, however, governments and commercial companies have shown an increased recognition of VIDO's expertise in the areas of research, product testing, and technology development. As a result, contract research has evolved into a high growth activity at VIDO.

Inventions

Invention revenue is derived from royalties or other returns generated from the sale of products or technology that VIDO has licensed to commercial companies. After some significant royalties from the sale of VICOGEN in the late 1970 s, the past few years have seen a decrease in invention revenues as a proportion of the VIDO funding mosaic. Over the past 10 years, invention revenue represents only 5% of total operating revenue. Several products will be developed in the next few years, and invention revenue is expected to increase. However, because the biological market is generally a low margin business, it is unlikely that VIDO will ever return a major portion of its operating needs from invention revenue.

University of Saskatchewan

The University of Saskatchewan also played a key role in founding VIDO and has continued in its commitment to VIDO by providing the Director's salary, utilities, security and maintenance of the building, and ancillary services such as accounting, investments, payroll, and personnel administration. While these contributions are not as visible as those shown on the bar chart, they are vital to VIDO's survival and success.

Extension and Communications

"A principal objective of VIDO is to transfer technology to the Canadian private sector."

In addition to research and development, two other aspects of VIDO's mandate are to:

1) provide management information not generally available from other sources
2) report on its research activities to supporters and other interested parties

Toward these goals, VIDO has produced three Fact Sheets in the past year:

1) "Haemophilus Pleuropneumonia of Swine"
2) "Bovine Virus Diarrhea of Cattle" (BVD)
3) a revision of "ITEME in Cattle"

Many groups and delegations have toured the VIDO facility, including businessmen, livestock producers, educators, researchers, and visiting delegations from China and West Germany.

In 1985, for the first time, VIDO participated in the Ottawa High Technology Show, a venue for exposing our technologies to government and others interested in technology. I also participated in the Alberta Advanced Technology Mission to Colorado.

In addition to keeping in constant contact with the Canadian livestock and poultry industries, I have been appointed to the Board of Directors of the Livestock Industry Institute in Kansas City, Missouri and serve as Vice-Chairman on the Board of the Canadian Veterinary Research Trust Fund.

Also, the last two VIDO Annual Reports have won awards of excellence from the Canadian Farm Writers Federation. Our thanks go to Roberts & Poole Communications for their assistance again this year on our anniversary report. In recognition of VIDO's first decade, Dr. Christopher Bigland is writing a book on the history of the Organization.

Summary

VIDO has gone through a very interesting ten-year period. The Organization has matured and is receiving the recognition and support needed to achieve the scientific breakthroughs required by the livestock and poultry industries. Although VIDO's operations depend on the ability to access a variety of funding avenues, the opportunites for obtaining operating funds are better than they have ever been in the past. This is largely attributed to the solid reputation VIDO has developed over the past 10 years as a center of research excellence.

P.G. Hodgman

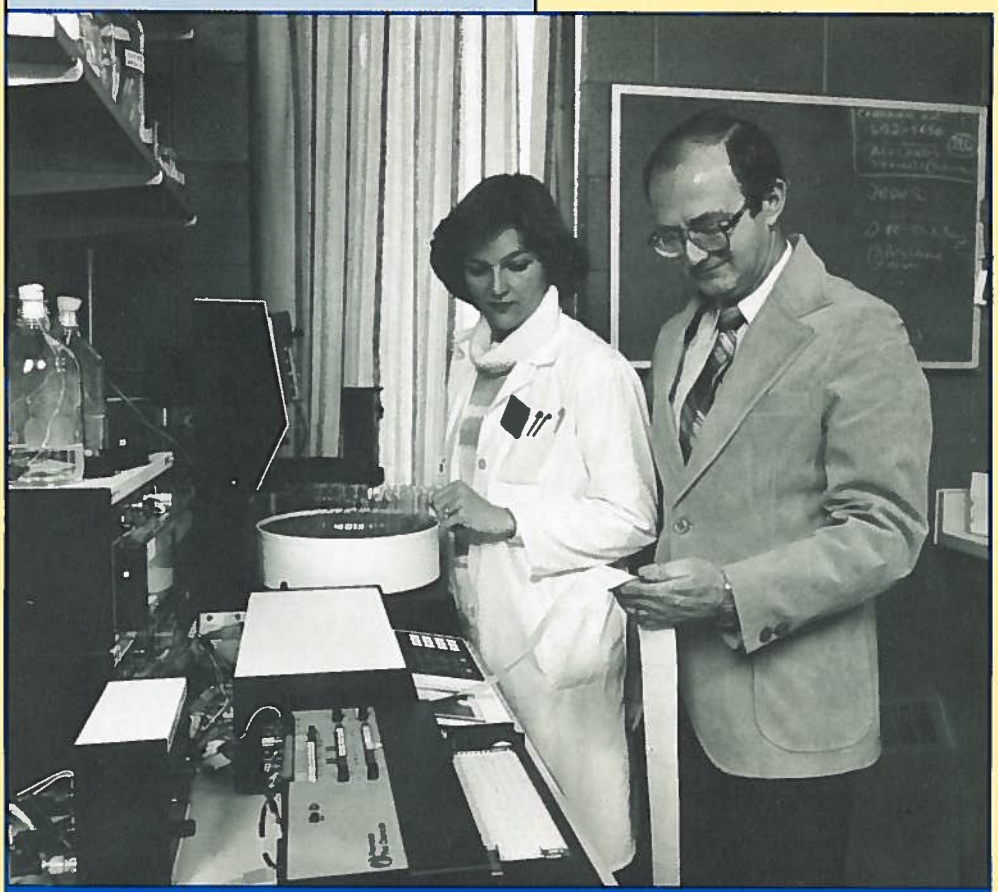
BIOSTAR Inc.

As the corporate marketing arm of VIDO, BIOSTAR, Inc. has had a very successful year. It has continued to negotiate with interested third parties for the rights to manufacture and develop several of VIDO's technologies and products. Additionally, BIOSTAR is responsible for negotiating contracts with parties interested in accessing VIDO's services and facilities. In the past six months, the number of requests and agreements has increased dramatically. This growing volume of contract work provides a benefit to VIDO and BIOSTAR, as the two organizations work together to develop complementary areas of expertise.

I would like to thank Charlene Nicholls, Executive Assistant, for her help throughout the past year. Charlene works with both VIDO and BIOSTAR on a wide range of projects and operations.

C.L. NICHOLLS
B.Comm., MBA, Executive Assistant

REPORT FROM THE ASSOCIATE DIRECTOR (RESEARCH) — DR. L.A. BABIUK



DR. L.A. BABIUK, BSA, MSc, PhD

"***All the staff, professional, technical and clerical alike, have the spirit of cooperation and dedication that makes VIDO very dynamic.***"

VIDO's research activities began 10 years ago with one program designed to reduce economic losses due to neonatal calf diarrhea. As a result of a focused effort and novel approaches, the world's first effective vaccine (VICOGEN) against *E. coli*, the major bacterial cause of neonatal calf diarrhea, was developed in 1978. In addition, new recommendations on the management of cow-calf herds were developed and promoted. These have led to a significant reduction in the incidence and severity of calf scour epidemics.

Since those initial successes, VIDO has remained committed to the research philosophy introduced into the organization by the Devonian Foundation. This is summarized in the following principles.

**** Through dialogue with the livestock and poultry industries, veterinarians, governments and others involved in agriculture identify the most serious infectious diseases.***

**** Focus a major portion of VIDO's research sources on a few of the most important problems at any one time.***

**** Attract top quality research scientists and provide them with a level of funding and resources where significant new achievement can be expected.***

**** Relieve researchers from teaching and administrative responsibilities so that they can concentrate on making research progress.***

These principles have allowed VIDO to become a dynamic research organization working to benefit one of Canada's most important primary industries — agriculture.

Since VIDO's humble beginnings with one research program and three employees, the research effort has expanded in the last decade to include four programs and 40 individuals. These programs include: 1) neonatal diarrhea, 2) bovine respiratory disease, 3) pneumonia in pigs, and 4) avian adenoviruses.

All of these diseases occur as a result of the interaction between various factors including specific infectious agents of pathogens, the host animal, and the environment. Due to the complex nature of these diseases, solutions will not be easy, and indeed, many investigators have spent a considerable amount of time and financial resources in each of the areas VIDO is investigating. It is hoped that VIDO's unique multifaceted approach will yield useful results. In all programs, improved methods of diagnosis, treatment, prevention, and control are being developed.

To maintain its focus, VIDO has developed a long-term strategic plan and built research teams in each of the four target areas. Individual researchers possess expertise complementary to that of others on the team and therefore provide the overall skills required to achieve the objectives of each specific program.

Projects underway in each program involve a spectrum of approaches and disciplines, including molecular biology, biotechnology, immunology, virology, bacteriology, epidemiology,

T.C. WATTS
DVM, Co-ordinator, Animal Support Services

and veterinary science. The most modern equipment and techniques such as computers, monoclonal antibodies, gene cloning, and peptide synthesis are being utilized. This is leading to the development of improved methods of diagnosing, treating, preventing, and controlling the identified targets.

While serving Canada's livestock industry, VIDO has developed an international reputation and now receives many requests to participate in collaborative research projects, conduct contract research, train visiting scientists and report on research findings at scientific meetings. We hope to continue and expand this development during the next 10 years.

Neonatal Diarrhea Program

Studies to identify the causes of scours and the patterns of herd outbreaks (epidemiology) of neonatal calf diarrhea was the initial research project undertaken at VIDO. These were focused on developing methods of preventing the *E. coil* form of calf scours. This led to the development of VICOGEN. The commercial rights to the vaccine were sold to Connaught Laboratories Limited of Toronto, Ontario who had it on the market and available to cattle producers by the fall of 1979. This vaccine is still recognized by cattlemen as an effective prevention of *E. coil* scours. A "second generation" subunit *E. coli* vaccine (Ecolan) containing several additional protective antigens was licensed in 1984 and is presently marketed by Langford Laboratories Ltd. of Guelph, Ontario. To complement the vaccines, research conducted by VIDO at the University of Saskatchewan's Termeunde Farm near Lanigan, Saskatchewan led to the development of new management recommendations for calving cows. The use of vaccines like VICOGEN and Ecolan along with improved management procedures have helped reduce the incidence and severity of calf scour outbreaks caused by *E. coli*.

Now the emphasis has shifted from the bacterial to the viral forms of scours. Specifically, VIDO is now developing methods of preventing scours caused by rotavirus and coronavirus, which are the most common causes of viral scours in Canada.

Initial studies were directed at developing a conventional rota/coronavirus vaccine. This conventional vaccine is presently being field tested, and if the results are favorable, it will be licensed in combination with the *E. coli* (Ecolan) vaccine within the next year.

In parallel, attempts are being made to improve and develop second generation rotavirus and coronavirus vaccines which will be even better than the conventional vaccine. This is being done by modern biotechnological methods, using both synthetic peptide methodology and recombinant DNA technology. This aspect of the program is being supported by a NSERC Chair in Biotechnology.

In order to use biotechnology for vaccine production, it is important to determine the molecular structure of the viruses. This must be done to identify which viral components are essential to the infection process in animals. These are the structures against which immunity must be developed in order to protect the animal from disease.

Defining the critical virus structures has been done by developing monoclonal antibodies which react with the various proteins of rotavirus and coronavirus. Using these monoclonal antibodies, the specific proteins which allow the viruses to infect the cells lining the small intestine have been identified. The specific amino acid sequences or "epitopes" within the rotavirus protein which stimulate protective immune responses have also been identified. Some of these specific amino acid sequences have been synthesized and injected into animals as experimental vaccines. Several of them caused the development of antibodies which neutralize the virus. More importantly, one specific synthetic peptide appears to induce neutralizing or protective antibodies against the wide variety of mammalian rotaviruses, including those found in man. This observation has tremendous implications for developing a universal rotavirus vaccine.

In addition to identifying the protective proteins of rotavirus, the genes coding for these proteins have also been located, and two out of the three important genes have been cloned. We are now attempting to express these genes in various systems as well as to clone the third important gene. Similar studies are in progress with coronaviruses.

Monoclonal antibodies are also being tested in calves to determine whether they could be used as a means of preventing diarrhea. These monoclonal antibodies are also being used in the development of rapid diagnostic tests to aid in the differentiation of the pathogens causing scours. Since mature cattle seem to be the major source of infection of neonates (newborn), it is hoped that the application of these assays may assist in detecting carrier cows, which would allow culling or isolation of them from the herd before calving. This could help lower the level of virus contamination in the environment and presumably reduce the rate of infection of newborn calves.

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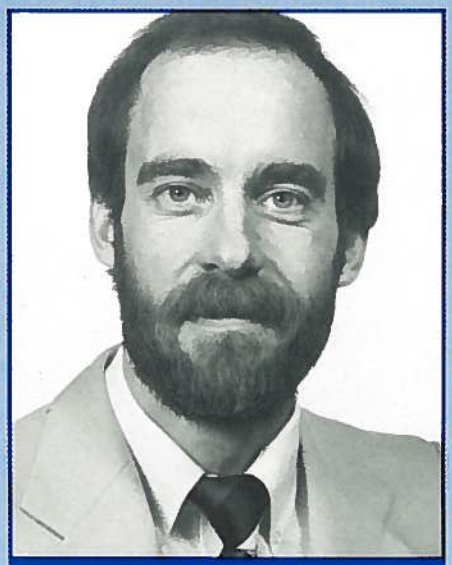
BSc, MSc, PhD, Molecular Biology

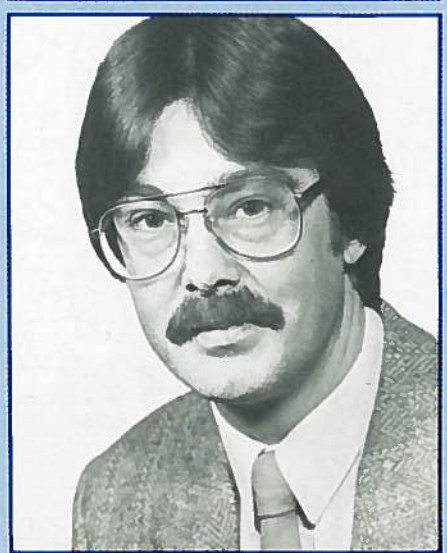
K. READY
BSc, PhD, Molecular Virology

P.J. FRENCHICK
BSc, PhD, Immunochemistry



M.D. PARKER
BSc, MSc, PhD, Recombinant DNA Technology

A. VERBEEK
BSc, MSc, Graduate Student



D. DEREGT
BSc, DVM, Graduate Student

Bovine Respiratory Disease Program

In 1978 VIDO started a second research program on shipping fever. Many producers feel that this continues to be the most economically important infectious disease in the cattle industry. Shipping Fever is an etiologically complex problem in which stress, environmental conditions, management factors, and infection by a variety of viruses and bacteria result in pneumonia.

VIDO has concentrated on attempting to identify the epidemiological "risk factors" which promote the occurrence of the disease in feedlots and to understand the role of *Pasteurella haemolytica* and bovine herpesvirus or IBR in causing the disease. In 1985 the program was expanded with the awarding of an NSERC Chair in Biotechnology for studies designed to help develop a vaccine for IBR virus and a commercial contract to study the protective effects of interferon.

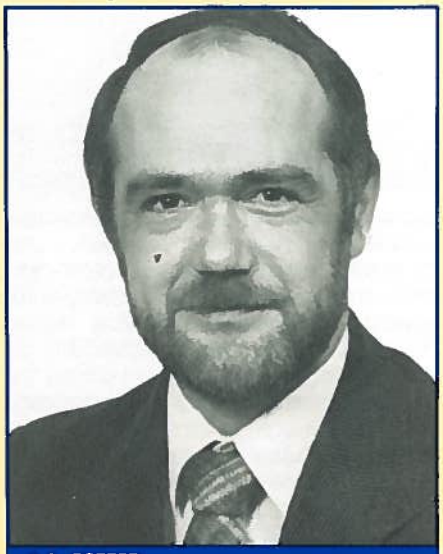
Epidemiology

S.H. WILSON
PVM, DVM, MPVM, Epidemiology

In 1980 Dr. Susan Wilson initiated studies designed to identify the "risk factors" which effect the occurrence of bovine respiratory disease in Alberta feedlots. Since that time, over 2,000 lots of cattle entering seven feedlots have been carefully monitored, not only with respect to morbidity and mortality rates, but also to try and correlate processing procedures with disease incidence. Data collection was completed last year, and the large mass of information is now being entered into a computer. In-depth data analysis will begin within the next year and is expected to be completed by March 1987. The epidemiological studies have been conducted in conjunction with the Alberta Department of Agriculture, funded by a grant from Farming for the Future.

Pasteurella Vaccine Development

Since *Pasteurella haemolytica* is the major organism responsible for causing pneumonia and death, attempts were initially made to determine whether it was possible to protect calves by immunizing against Pasteurella. Using extracts of *P. haemolytica* we demonstrated that a certain degree of protection could be provided by vaccination with crude antigens. These initial experiments provided the impetus to attempt to more clearly identify the various protective antigens on the bacteria. Since there is



A.A. POTTER
BSc, PhD, Bacterial Genetics

very little background information regarding the chemical structure of Pasteurellae, a considerable amount of research is presently being devoted to the characterization of *P. haemolytica* and identification of the various factors present in the organism which determine its virulence. This will help identify antigens involved in inducing protection against bacterial infection in the lung. In this regard, monoclonal antibodies and recombinant DNA techniques are being employed, first to identify the important proteins and virulence factors of the bacterium, and then to alter the bacterium in such a way that its virulence is reduced but the production of protective proteins is enhanced.

During this past year we identified pili or fimbriae on the surface of *P. haemolytica* (Figure 1). These hair-like structures are a potential virulence factor which could be important in disease pathogenesis. In many other organisms, fimbriae are important in initiating infection by allowing the bacteria to attach to animal cells and in frustrating the body's defence mechanisms. This allows bacteria to grow and cause disease directly or by releasing various products which are toxic to the animal. During the coming year additional resources will be added to exploring the role of Pasteurella fimbriae in shipping fever.

Pasteurella haemolytica also produces a poison or cytotoxin which kills white blood cells and thereby prevents the removal of the bacterium from the lung. An assay has been developed to detect the production of this

cytotoxin. This will be very useful for isolating and characterizing the genes which control its production. It will also help to identify bacterial mutants which produce large quantities of the cytotoxin. These will be developed by recombinant DNA technology and may be useful as vaccines.

Figure 1 — Electron micrograph of Pasterella haemolytica, the main bacterial cause of shipping fever. Note hair-like structures projecting from the surface (arrow).

Immunology

One of the major reasons why animals are susceptible to *Pasteurella haemolytica* infection is that in many cases virus infection coupled with the stress of weaning and transportation reduces the animal's ability to fight infection (immunosuppression). As a result animals die or become unthrifty.

During the past three years, investigations have been conducted to determine the mechanism whereby viruses cause immunosuppression and whether it would be possible to prevent or reverse immunosuppression by using various compounds. Interferon is one of the substances that may have the potential to reverse immunosuppression. Under contract, using recombinant DNA technology, we have tested alpha interferon, produced by Genentech Inc., for its efficacy in preventing immunosuppression and reducing morbidity and mortality as a result of bovine respiratory disease. At present the results are extremely favorable, indicating that it is possible to reduce morbidity and mortality by immunomodulatory methods. Investigations are continuing in collaboration with CIBA-GEIGY to test both alpha interferon and a variety of other compounds and lymphokines which may be capable of modulating immune responses.

Infectious Bovine Rhinotracheitis (IBR)

One of the major viruses involved in the bovine respiratory disease complex is bovine herpesvirus-1 or infectious bovine rhinotracheitis (IBR). Although there are several vaccines available, they have not proven to be successful in eliminating viral infections under feedlot conditions. Thus attempts are being made at improving these vaccines so they will be more effective under field conditions.

Using monoclonal antibodies, three important proteins which are involved in attachment of the virus to cells and initiation of infection have been identified. These three proteins have been purified using monoclonal antibodies and tested for their ability to induce immunity and protection in cattle. All three proteins induced high levels of protective antibody, and vaccinated animals resisted a virulent challenge with bovine herpesvirus-1 and Pasteurella in an animal-model system designed to simulate shipping fever. More importantly, protection with the subunit vaccines was much better than provided by some of the vaccines which are currently being used. Thus, we feel that it is feasible to provide protection against bovine herpesvirus-1 using subunit vaccines. Work is progressing on developing these subunit vaccines by recombinant DNA technology.

As is the case with rotaviruses and coronaviruses (neonatal diarrhea program), attempts are being made, using monoclonal antibodies, to identify the specific regions of the proteins involved in inducing a protective immune response, so that synthetic peptides can also be produced against IBR virus.

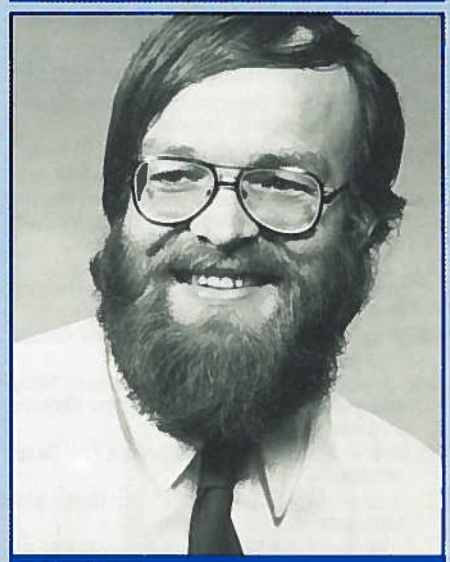
Porcine Respiratory Disease Program

Research in swine diseases started at VIDO in 1979 and is now focused on the common causes of pneumonia in pigs. Since 1982 the emphasis has been on *Hemophilus pleuropneumoniae*. This organism is one of the major causes of respiratory disease in young feeder pigs in North America. Losses occur as a result of acute pneumonia, as well as due to chronic disease.

VIDO's team of investigators has been investigating methods of controlling this disease by: (a) developing sensitive techniques to diagnose infection, especially in carrier animals, so that infected pigs can be culled, (b) evaluating immunization procedures which would prevent both acute and chronic forms of the disease, and (c) identifying the best adjuvants for stimulating lung immunity. A sensitive ELISA assay was developed and used to test sera from hundreds of pigs in dozens of herds. Using this test it is possible to identify infected herds and individual pigs within herds. Thus it should be possible to adapt this test to field situations, which would help prevent the introduction of infected animals into clean herds.

M.J.P. LAWMAN
BSc, PhD, Immunology

S. VAN DRUNEN LITTEL-VAN DEN HURK
BSc, MSc, PhD, Molecular Virology



P.J. WILLSON
BA, MS, DVM, Clinical Medicine—Epidemiology

J. VAN DEN HURK
BSc, MSc, Virology

Research Collaborators

It is again a privilege to acknowledge scientists at other universities and institutions who have collaborated with the VIDO research staff. These include the following:

V.E. Baracos — Department of Animal Science, University of Alberta, Edmonton.

E. Barber — Department of Agricultural Engineering, University of Saskatchewan, Saskatoon.

T.L. Church — Head, Preventive Medicine Branch, Animal Health Division, Alberta Department of Agriculture, Edmonton.

J.W. Costerton — Department of Biology, University of Calgary.

E. Janzen — Department of Veterinary Clinical Studies, Western College of Veterinary Medicine, Saskatoon.

M. Makarechian — Department of Animal Science, University of Alberta, Edmonton.

D. McCartney — Agriculture Canada's Animal Disease Research Institute, Melfort, Saskatchewan.

J.M. Naylor — Department of Veterinary Internal Medicine, Western College of Veterinary Medicine, Saskatoon.

A.D. Osborne — Department of Veterinary Microbiology, Western College of Veterinary Medicine, Saskatoon.

M. Perry — National Research Council of Canada, Ottawa.

J.R. Saunders — Department of Veterinary Microbiology, Western College of Veterinary Medicine, Saskatoon.

M. Stear — Agriculture Research Service, Clay Center, Nebraska.

T. Zamb — Molecular Genetics Inc., Minnetonka, Minnesota.

We would also like to thank the managers and staff of the University of Alberta Kinsella Ranch and the nine feedlots in the "Alberta Feedlot Study" for their enthusiastic help and cooperation.

Vaccine Development

In addition to developing effective vaccines to prevent acute disease, VIDO is attempting to develop vaccines and vaccine-adjuvant combinations which will also prevent the development of carrier states. Scientists are in the process of characterizing the structure of *H. pleuropneumoniae* in an attempt to determine the virulence factors of this organism as well as those involved in maintaining persistence. Modern biotechnological approaches are being used to identify the important antigens on the bacterium as well as the genes coding for those particular antigens. Once these are identified, it is hoped that it should be possible to develop more effective vaccines against *Hemophilus pleuropneumoniae*.

Swine Technical Group

The VIDO Swine Technical Group is comprised of swine producers, veterinarians, agricultural engineers, nutritionists, and others interested in swine production. They identify common problems faced by the swine industry and attempt to develop practical solutions using input from the various disciplines. As a result of their collective input, they have produced a series of helpful booklets, which are considered to be extremely valuable in management of swine operations. In 1982 "Swine Nursery Design" was published. During the past year, the Group's main project has been to write a booklet entitled "Farrowing Barn Design and Management". This booklet will be published and available to producers in the coming year.

Poultry Adenovirus Program

This program was initiated in 1980 with a $200,000 grant from the Canadian Turkey Marketing Agency. The objective was to test, improve, and develop vaccines against type-2 avian adenoviruses, which cause hemorrhagic enteritis of turkeys, splenomegaly in chickens, and Marble Spleen Disease in pheasants. The Devonian Group of Charitable Foundations provided an additional $100,000 to initiate the program. More recently, funding was provided from Farming for the Future and the Alberta Agricultural Research Trust.

This support led to the development of a method of growing the virus in tissue culture (Fig. 2). During the past year, we have completed extensive safety and efficacy testing of a tissue culture vaccine under controlled conditions at VIDO. A field trial has also been started, and, if successful, the vaccine will be licensed next year.

In addition to developing a vaccine for turkeys, studies were also initiated this year to determine whether a similar virus causes infection in chickens. Serological surveys indicate that chickens are frequently infected with the virus. The effect of the virus on performance is presently being assessed, and if it is found to cause significant production losses, then vaccine studies will be carried out.

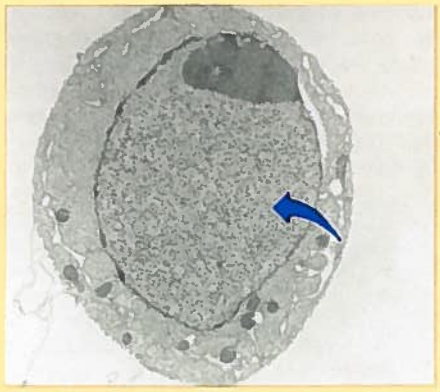


Figure 2 — Electron micrograph of hemorrhagic enteritis virus growing inside a turkey white blood cell. Note numerous virus particles (arrow).

Summary

This past year has been one of rapid growth and expansion with respect to the number of new scientific staff joining the organization. We were pleased to add six new research scientists to our complement of investigators. As a result of these additions and the acquisition of new equipment, all of the research laboratories are functioning at capacity. This has greatly increased the activity within the Organization and is helping to expedite each of the research projects.

As Research Director, I acknowledge the tremendous effort put forth by the staff to welcome the new employees. All the staff, professional, technical and clerical alike, have a spirit of cooperation and dedication that makes VIDO very dynamic. The continued enthusiasm and camaraderie makes for a very exciting organization in which to work. I look forward to the next year with great anticipation, both for the advancement of research, and the development and licensing of a number of technologies and products. I am also very enthusiastic about the development of novel approaches for disease diagnosis and control which will be forthcoming during the next decade.

Lorne A Babiuk

L.A. Babiuk

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Willson, P.J. Haemophilus pneumonia. July, 1985. Central Swine Veterinary Services Meeting. Beiseker, Alberta.

Willson, P.J. VIDO Swine Research Program. March, 1985. SISCO 9th Annual Meeting, Saskatoon, Saskatchewan.

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Wilson, S.H. Patterns of Disease and Feedlot Records. Feedlot Animal Health Seminar. Sponsored by the Alberta Veterinary Medical Association and District 13 of the American Association of Bovine Practitioners. May, 1985. Calgary, Alberta.

Wilson, S.H. The Application of Epidemiology to Animal Health Management in the Feedlot. Canadian Veterinary Association Annual Convention. July, 1985. Penticton, British Columbia.

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AUDITOR'S REPORT

To the Board of Directors of the Veterinary Infectious Disease Organization:

I have examined the combined balance sheet of the University of Saskatchewan — Veterinary Infectious Disease Organization as at September 30, 1985 and the statements of income, expenditure and unexpended funds for the year then ended. 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, except as explained in the following paragraph.

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 effects 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, 1985 and the changes in its fund balances for the year then ended in accordance with the disclosed basis of accounting applied on a basis consistent with that of the preceding year.

January 29, 1986 — *W.G. Lutz, F.C.A*
Regina, Saskatchewan — *Provincial Auditor*

Notes to Financial Statements
September 30,1985

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

Equipment purchased with Research Trust monies is expensed as purchased, but is not included in the 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.

(d) Pooled Investments

The University of Saskatchewan pools for investment purposes, all cash balances of the various trusts, of which the V.I.D.O. Research Trust and the V.I.D.O. Capital Trust

FINANCIAL STATEMENTS — Year Ended September 30, 1985

STATEMENT 1

COMBINED BALANCE SHEET
As at September 30

ASSETS	1985	1984
Current Assets		
Funds held by The University of Saskatchewan (Note 1(d))	$1,159,142	$1,623,028
Accrued interest receivable	22,075	35,918
Due from University of Saskatchewan — Operating fund	47,236	—
Accounts receivable		
— Royalties	997	360
— Donors	2,500	75,298
— Contracts — Research	39,472	60,541
— Services	29,198	29,898
Prepaid expenses — Marketing Services	25,000	25,000
Inventory (Note 1(c))	36,110	33,965
	1,361,730	1,884,008
Investments (Note 1(e))	85,185	47,000
Plant Assets		
Site and improvements	133,765	133,765
Furnishings, fixtures and equipment	411,891	384,112
Buildings	3,946,728	3,946,728
	4,492,384	4,464,605
	$5,939,299	$6,395,613
LIABILITIES		
Due to University of Saskatchewan — Operating fund	—	$ 284,740
Unearned grant revenue	133,905	31,465
Deferred donation revenue (Note 6)	—	150,000
	133,905	466,205
EQUITY		
Equity in capital assets	4,492,384	4,464,605
Unexpended funds — Research Trust (Statement 2)	1,291,296	1,419,336
Unexpended funds — Capital Trust (Statement 3)	21,714	45,467
	5,805,394	5,929,408
	$5,939,299	$6,395,613

(See accompanying notes to the financial statements)

STATEMENT 3

CAPITAL TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
For the Year Ended September 30

	1985	1984
INCOME		
Interest	$ 4,026	$ 7,225
EXPENDITURES		
Furnishings and fixtures	27,779	1,982
Buildings	—	30,000
	27,779	31,982
Increase (decrease) for the year	(23,753)	(24,757)
Unexpended funds, beginning of year	45,467	70,224
Unexpended funds, end of year (Statement 1)	$ 21,714	$ 45,467

(See accompanying notes to the financial statements)

STATEMENT 2

RESEARCH TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
For the Year Ended September 30

	1985	1984
INCOME		
Grants and donations		
Provincial Governments:		
— Saskatchewan	$ 300,000	267,700
— Alberta	100,000	100,000
— Manitoba	15,500	15,000
— British Columbia	8,000	6,155
Agricultural Research Council of Alberta "Farming for the Future"	212,076	361,652
N.S.E.R.C. Industrial Research Chairs	181,485	—
Livestock industry	188,000	161,671
Kahanoff Foundation	150,000	150,000
Natural Sciences and Engineering Research Council of Canada (NSERC)	104,545	107,146
Agriculture Canada — Department of Supply and Services	66,370	—
Alberta Agricultural Research Trust	22,680	7,554
Canadian Veterinary Research Trust	2,500	10,000
Max Bell Foundation	—	75,000
McLean Foundation	—	15,000
Agriculture Canada — Symposium	—	9,861
Other individuals, companies and foundations	6,670	1,311
	1,357,826	1,288,050
Interest income	145,703	154,657
Contracts		
Research	127,932	153,315
Services	30,684	47,066
Royalties	10,012	14,250
Animal services	5,822	29,786
Miscellaneous revenue	34,402	30
	1,712,381	1,687,154
EXPENDITURES		
Salaries and fringe benefits	890,107	957,975
Material and supplies	365,004	206,344
Equipment (note 1(b))	213,256	58,779
Travel	71,592	75,414
Animal services	55,209	135,748
External research and development	60,000	—
Other	185,253	135,616
	1,840,421	1,569,876
Increase (decrease) for the year	(128,040)	117,278
Add: Unexpended funds — beginning of year as previously reported	1,569,336	1,452,058
Adjustment of prior period (Note 6)	(150,000)	(150,000)
As restated	1,419,336	1,302,058
Unexpended funds — end of year (Statement 1)	$1,291,296	$1,419,336

(See accompanying notes to the financial statements)

are two, maintained in the Trust Fund. Each trust is allocated short term interest earnings in proportion to the average monthly balance of cash on deposit for that account.

(e) Investments — Bonds

Investments in bonds are recorded at cost. The difference between cost and par value of the bonds is not amortized but is treated as income or expense in the year of disposal.

(f) Grants and Donations

Grants and donations are recognized in these accounts in the period as defined in the terms or conditions of the respective grants or donations. Grants and donations received without terms or conditions as to the period in which the grant or donation is to be used are recognized in the accounts when received.

2. Establishing Agreement

The Organization was established by an Agreement dated August 11, 1975 between the Devonian Foundation, the Province of Alberta, the Provincie 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. Related Party Transactions

a) V.I.D.O. is a research affiliate of the University of Saskatchewan. The University of Saskatchewan maintains, as part of its normal operations, the various financial and administrative functions relating to V.I.D.O.

b) The University of Saskatchewan owns approximately 82% of a company called BIOSTAR Inc. During the year the company had the following transactions with V.I.D.O.

	Year Ended September 30 1985	1984
Income from BIOSTAR to V.I.D.O.		
Contract research	$25,620	$37,658
Rent, office services and management fees	30,683	47,066
Inventory	7,511	—
Sponsorship of two chairs at V.I.D.O.	36,885	—
Expenditure by V.I.D.O. to BIOSTAR		
Management service fees	15,000	5,843
Marketing services	—	25,000
External research and development	60,000	—

At September 30, 1985 the Organization has a receivable from BIOSTAR of $48,695 (1984 - $38,608). In addition, BIOSTAR has provided further funds of $32,600 (1984 - $Nil) which are included in unearned grant revenue on the balance sheet, and the $25,000 advanced by V.I.D.O. in 1984 for marketing services is included on the balance sheet as a prepaid expense.

BIOSTAR's primary purpose is to assist V.I.D.O. in both research and development of its products and the ultimate sale of its products/technologies to commercial biological production.

4. Prior Period Error Adjustment

The accompanying financial statements do not include expenditure for administrative and ancillary services, or in-kind support provided by the University of Saskatchewan.

5. Commitments

As at September 30, 1985 the Organization had commitments of $12,372 in the Research Trust (1984 - $43,975).

6. Adjustment of Prior Period

A $150,000 donation received in each of September, 1983 and September, 1984 should have been treated as deferred donation revenue at the respective year ends. These donations were intended to support VIDO's 1983/84 and 1984/85 programs respectively. This has been treated as a prior period error in these financial statements. Unexpended funds — Research Trust at the beginning of 1984 and 1985 have been reduced by $150,000 with compensating increase in 1984 deferred donation revenue.

7. Comparative Figures

As a result of note 6 the comparative figures for 1984 have been restated. In addition, certain of the 1984 comparative figures have been changed to conform with the current year's presentation.