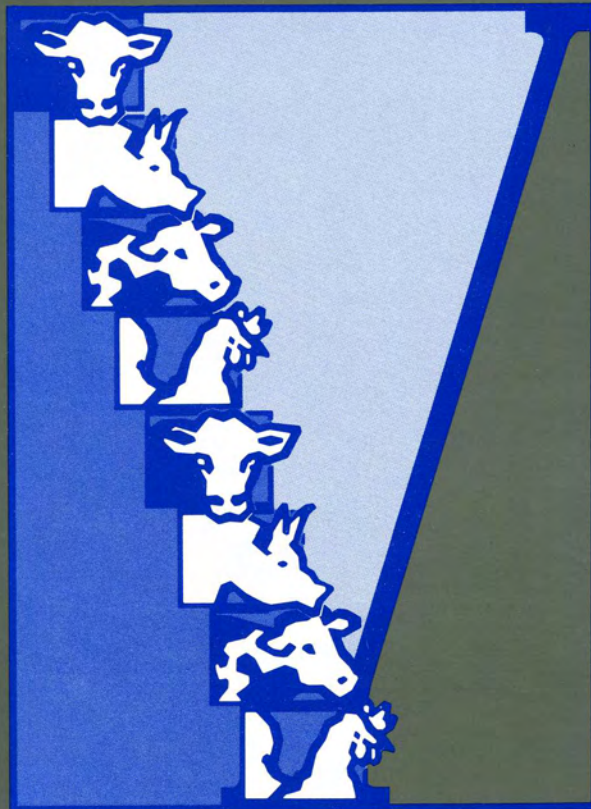


Annual Report 1985-86



VIDO
Veterinary Infectious Disease Organization

THE GOALS 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.

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Veterinary Infectious
Disease Organization

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Report From The Chairman Of The Board Of Directors

VIDO has started its second decade with the enthusiasm and energy of an Organization that is working very hard and tasting some of the success of the fulfillment of many years of planning and hard work.

This past year has seen VIDO accelerate the rate of activity through increased funding and the commitment of additional capable scientific research staff. The rate of activity has increased to where the facilities are being fully utilized. Much of the increased activity is due in part to the successful establishment of BIOSTAR, the commercial arm of VIDO. BIOSTAR contracts much of its research activity to VIDO and due to the increased commercial research generated by BIOSTAR, the activity at VIDO has greatly increased. The recognition of both VIDO and BIOSTAR by commercial companies has not only generated activity, but also provided a very positive vote of confidence in the activity of both organizations. VIDO very definitely has been recognized as a world class center of excellence.

Over the past two years, the Organization has proven financial responsibility. This improvement can be traced to two major factors. The first factor has been management's very stringent cost control and management of budget items. VIDO has taken a very responsible attitude toward the cost of doing research. The second factor has been the very important sources of funding and especially commercial research done in collaboration with major companies interested in animal diseases. In addition, the livestock industry's continuing and increased support of research has allowed VIDO to increase activity. For example, the Swine Research Chair, funded by the hog marketing boards in British Columbia, Alberta, Saskatchewan and Manitoba allows VIDO to expand its activity in the swine area.

A contribution has been made to the VIDO Research Trust and at year end the balance stood at \$1,591,635.

A significant product was released this year with the licensing of a HEV vaccine to protect turkey flocks against hemorrhagic enteritis. The development of this product was made possible by the initial funding and specific backing of the research project from the Canadian Turkey Marketing Agency. Not only will Canadian

producers benefit from the protective benefits of the vaccine, but worldwide royalties will provide VIDO with a valuable future source of research funds.

Special recognition is given to the University of Saskatchewan for the foresight to respond to the needs of VIDO by making it possible to construct the Field Station described further on in this Report. The Station is located on a quarter section of land and is isolated from other premises which will allow research to be conducted on diseases in cattle. The facility will enhance the research activity of VIDO and improve the efficiency of conducting such research. VIDO is especially pleased with the ongoing support of the University of Saskatchewan and the Board wishes to thank the University for its financial participation in the VIDO Research Station.

The increased level of activity has placed extra demands on management. The Board wants to especially recognize the effort of Dr. Stephen Acres, Director, Dr. Lorne Babiuk, Associate Director (Research) and Mr. Paul Hodgman, Executive Officer. As I leave the Board, there is a confidence in VIDO knowing that the Organization is served by such competent individuals.



G. Allwasser
Chairman, 1985-86

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Serving on the VIDO Board has given me a strong level of confidence in the way the Organization is structured. To balance the budget, VIDO requires the support of the livestock and poultry industries and therefore communicates the research program directly to them. This accountability factor helps keep the focus of research on practical, cost effective projects. The mix of capable Board members from industry, government, university and at-large categories, bring a strong measure of balance and judgement to the Board. As I leave at the end of September 1986, I welcome Mr. Ed Thiessen to the Board and also am pleased that Mr. Stuart Kramer and Dr. Bob Church will each serve another term.

The needs of the livestock and poultry industries are well served by VIDO. In the future, I believe that VIDO will increase its presence to be recognized as more of an all Canadian research institution. This will no doubt occur as VIDO receives more worldwide recognition. Increased activity will mean growth not only in budget and staff,



*(Back Row - Left to Right) R. Murray, H. Fast, S. Kramer, W. Cochrane, G. Hamilton, R. Christian, L. Babiuk (Associate Director, Research), P. Hodgman (Executive Officer)
(Front Row - Left to Right) D. Rowlett, B. Anderson (Vice-Chairman), G. Altwasser (Chairman), S. Acres (Director), R. Church
Not present - R. Bailey, R. Klassen*

but also in the need for additional space. I believe that the growing pains of VIDO will lead to major contributions to the profitability of livestock production.

G. Altwasser

Report From The Director

The theme of this year's Annual Report is "looking towards the 1990's". As VIDO enters its second decade of service our strategy continues to be to build an Organization working to solve existing problems and which is also well positioned to tackle the longer term research needs of the livestock and poultry industries. To meet the challenge VIDO must manage its resources efficiently and remain in touch with the needs of the agricultural community. Four of the general areas of research administration which have dominated management's time during the year are discussed below.

Finances

The financial statements for the year ended September 30, 1986 appear on pages 17, 18 and 19 of this report. They show an excess of income over expenditure of \$300,339. This resulted in an increase in the balance of the VIDO Research Trust Fund from

\$1,291,296 to \$1,591,635. This is the largest year-end balance which we have had in the Trust during the past four years. While the increase in the Trust is a positive sign, it does not yet represent a long-term trend. At the end of 1981 the balance in the Trust was \$1,628,086. It reached its lowest point, of \$1,291,269, at the end of 1985 following expansion of the research staff. Therefore, during the past year we have just rebuilt the balance in the Trust to roughly the same level that it was at the end of 1981 in terms of real dollars. However, because of inflation the actual purchasing power has decreased by 25%. On a more positive note, the predictability of funding has improved during the past five years and this has helped balance the erosion of the purchasing power in the Trust. Nonetheless the Organization must continue to work hard to maintain the operating revenue at a level where major research advancements can be expected.



S.D. Acres, DVM, MPVM, PhD

Communication

The second prerequisite to meeting the challenges which face us is to maintain active communication with a variety of groups in agriculture, governments, research and

development, and science and technology. This we do through a variety of mechanisms including publications, presentations, tours, symposia and personal contacts.

It is most essential that we continue to communicate with primary and secondary agricultural producers. This ensures that the Organization remains abreast of existing problems and helps us to anticipate emerging problems. Over the years, VIDO has developed and maintained a high level of accountability to various livestock and poultry groups and makes frequent written or spoken progress reports to them. In addition to this on-going contact, during the past year we conducted a mail survey of producers to help identify the most economically important infectious diseases. Questionnaires were sent to producers of beef cattle, dairy cattle, swine, chickens and turkeys in five provinces. Within each sector, producers were asked to rank the common infectious diseases according to two criteria and the need for research on that particular problem. The results were used to help revise VIDO's long-term research plan as described below.

Research Planning

The third prerequisite is to continually focus research resources on the most important problems. During the past year the Organization redefined and expanded its long-term research objectives. This was done using the results of the questionnaire mentioned

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above as well as other information provided by diagnostic laboratories, practising veterinarians, and others involved in food animal production. Once the most important diseases in each species were identified, we selected our priorities in areas where we felt our research resources would make maximum progress and where duplication with other research centers would be minimized. As a result, there have been several changes to the long-term research plan. These are summarized by animal species in the diagrams presented on pages 7 and 8.

One major change has been the addition of a Dairy Program which includes work on neonatal scours, enzootic pneumonia, and pasteurella pneumonia of dairy calves. While various types of mastitis were ranked more highly than these problems by producers, we felt that other institutes were carrying on extensive programs in this area and rather than duplicate those efforts, we chose to focus on the problems listed above. However, we continue to watch for new technological developments which might allow us to develop new approaches to reducing economic losses caused by the mastitidies. In beef cattle, the emphasis continues to be on neonatal scours, shipping fever, and a feedlot surveillance project which is due to be completed in 1987. In the area of swine, *Haemophilus pneumonia* continues to be the major focus of research because it is an important cause of economic loss and the need for research was ranked very highly by producers. In addition, the VIDO Swine Technical Group is continuing its work on housing design and anticipates publishing a comprehensive bulletin on the design and construction of feeder barns next year. Poultry diseases continue to be an important area of research and this Program has been expanded. In addition to continuing to work to improve HEVLAN TC, the new turkey vaccine described below, we are now studying the possible role of hemorrhagic enteritis virus (HEV) in chickens and the relationship between HEV and the occurrence of *E. coli* septicemia (colibacillosis) in turkeys. We also plan to phase in a research project on the mechanism of immunosuppression caused by infectious bursal disease of chickens.

In all of the research programs we are increasing our emphasis on the study of the immune system. This is because suppression of immune responses is an important underlying factor in many disease processes. At the same time, there are a variety of new biological compounds and chemicals which are capable of regulating or modulating the immune response. Therefore, in the long term, our ability to understand and regulate the immune system may provide one of the most effective methods of preventing and controlling infectious diseases and could have major impact on improving the efficiency of food animal production.

Staff

The fourth ingredient is the development of a dedicated staff which collectively possesses the skills to tackle economically important problems using conventional, as well as advanced techniques. The scientific and technical staff provide the Organization with a variety of skills ranging from sophisticated molecular biology and biotechnology, to conventional microbiology, clinical veterinary medicine and epidemiology. Hence, within the Organization we have a spectrum of capabilities which not only allow us to tackle a wide range of problems, but also to transfer and exchange information and technology between the laboratory and the field. The office and administrative staff are also essential members of the team and provide a variety of support and information

Understanding the immune system and using it to develop effective methods of prevention and control of diseases is likely to have major impact on food animal production.

services without which the Organization could not function.

The Organization has always had a strong core in conventional microbiological research and veterinary science. In 1980, we moved to establish a team of biotechnologists to work on infectious diseases. Since then we have developed a critical mass of scientists in this area and several research projects are developing rapidly. We anticipate starting protection trials with several subunit vaccines within the next year.

We are now building a similar strength in the area of immunology and immunoregulation. Last year, we were fortunate to be able to hire Dr. M. Lawman in the area of immunology, and Dr. P. Frenchick in the area of immunochemistry. During the coming year, we plan to hire several additional immunologists to work in the areas of immunosuppression and immunoregulation. We have also initiated discussions with CIBA-GEIGY Canada, whereby we will continue research on the application of lymphokines for the prevention and control of livestock and poultry diseases. Hence, we are moving rapidly to develop a critical mass of expertise in immunological research.



HEVLANTC - tissue culture hemorrhagic enteritis virus vaccine

Field Station

For many years, we have highlighted the need for a field station dedicated to studies of infectious disease studies. Such a facility is essential to making rapid advances in food animal research including the development of improved management systems and the testing of products currently being used by producers and the development of new products. I am pleased to report that during the past year we were able to purchase such a facility with assistance from the University of Saskatchewan. Construction of animal handling facilities on a quarter section of land just outside of Saskatoon began during the summer and will be completed early in the next fiscal year. This facility, which is described in more detail in the Executive Officer's Report, will allow us to carry out experiments under controlled conditions before undertaking large-scale trials in commercial herds.

Turkey Vaccine

A major research achievement during the past year was the development of HEVLANTC, the world's first tissue culture-produced vaccine for hemorrhagic enteritis of turkeys. This project, which took six years to complete, was started in 1980 at the request of the Canadian Turkey Marketing Agency. The CTMA, along with the provincial turkey marketing boards, provided the initial funding of \$200,000. This amount was later supplemented by a second donation from the CTMA of \$100,000 in 1984, and by the Devonian Group of Charitable Foundations as well as by research grants from the Alberta Agricultural Research Trust and the Alberta Research Council - Farming for the Future. The development of the vaccine was formally announced on March 19, 1986 at the annual meeting of the Canadian Turkey Marketing Agency in Ottawa. It is being marketed by Langford Inc. of Guelph, Ontario and is being widely used by turkey producers across Canada. The vaccine was developed by VIDO Research Scientist Jan van den Hurk who is continuing his studies to improve the efficiency of production of the vaccine. Negotiations for commercial rights to the vaccine are currently underway with companies in several countries.

Acknowledgements

The Board of Directors is a key element in VIDO's success. It is comprised of representatives of the livestock and poultry industries, others involved in agri-business,

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federal and provincial governments, and the University of Saskatchewan. The Organization benefits directly from the unique range and mixture of backgrounds and talents of individual Board members. On behalf of the Organization I would like to offer grateful thanks to three members who retired as of September 30, 1985. They are Pat Moncrieff, who served two terms as Chairman of the Board and helped guide VIDO through the period of transition surrounding Dr. Chris Bigland's retirement as Director. The second is Mr. Barrie Peterson, a dairy producer from Agassiz, B.C. who brought to the Board a wealth of experience and background from the dairy industry. The third is Carol Teichrob who provided dynamic and constructive input on behalf of poultry producers and mixed farmers.

New members who joined the Board on October 1, 1985 include Dr. Bill Cochrane, Chairman of the Board of Connaught Laboratories Ltd., Dr. Harold Fast, a swine producer from Spiritwood, Saskatchewan and Mr. Bob Murray, Manager of Spruceleigh Farms in Brantford, Ontario.



*C.L. Nicholls-Nixon
B.Comm., MBA, BIOSTAR Inc.*



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

I would also like to acknowledge the continuing support which VIDO has received from the Province of Saskatchewan. The encouragement and assistance of Agriculture Ministers Drs. Lorne Hepworth and Grant Devine is especially appreciated.

Thanks also goes to Charlene Nicholls-Nixon, Executive Assistant at BIOSTAR. Through contractual arrangements she has been involved with VIDO on many financial and other projects. Her work and dedication are most appreciated.

Recognition

On June 30, 1984, VIDO's first Director, Dr. Chris Bigland retired. Chris received many awards and accolades during his career which spanned more than 40 years. I am pleased to report that during the past year he received yet another honor when the University of Guelph bestowed on him an honorary Doctor of Science degree. Chris presented the Convocation Address to the graduating class of the University of Guelph on June 5, 1986 and received his degree at that time. This is yet another recognition of the many significant contributions which he has made over the years to veterinary medicine, the veterinary profession, the livestock and poultry industries, and public health in Canada. Congratulations Chris!

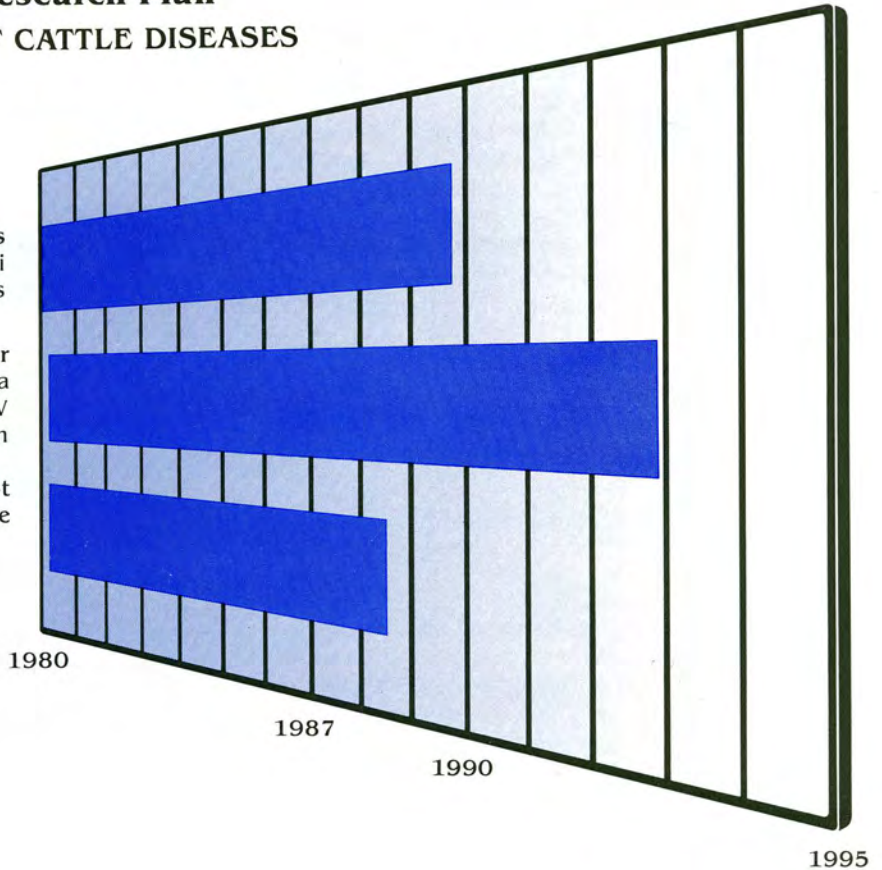
S.D. Acres

VIDO Long-Term Research Plan



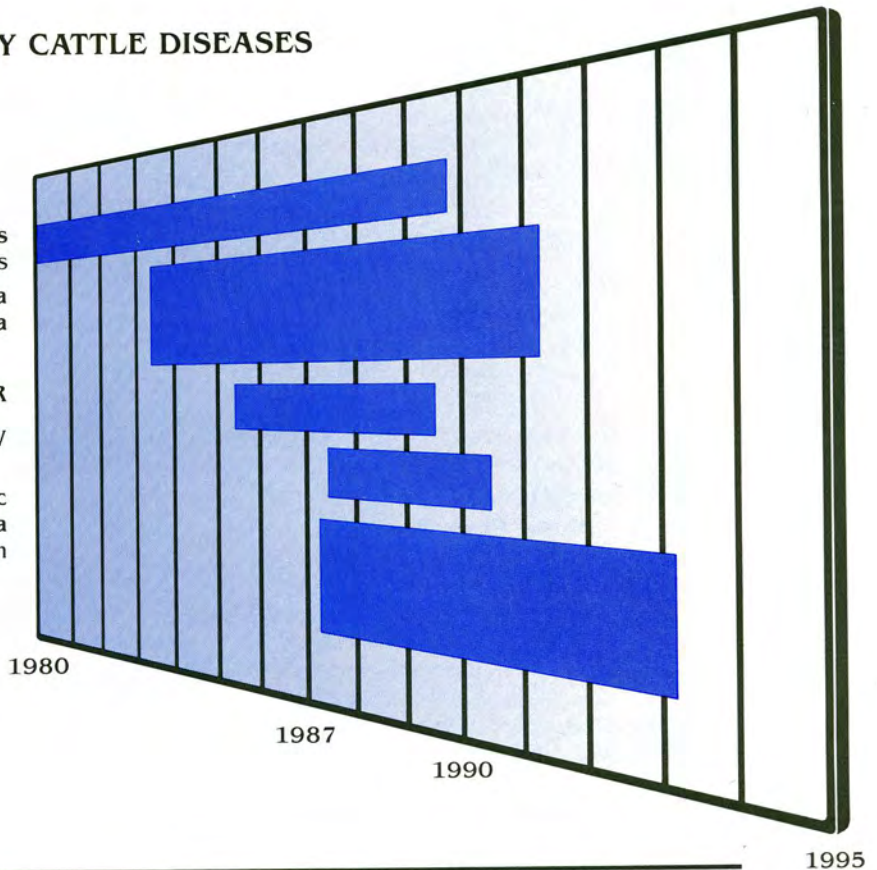
BEEF CATTLE DISEASES

- Neonatal Scours
 - E. Coli
 - Viruses
- Shipping Fever
 - Pasteurella
 - IBR - RSV
- Immune Suppression
- Feedlot Surveillance



DAIRY CATTLE DISEASES

- Neonatal Scours
 - E. Coli - Viruses
- Pasteurella Pneumonia
- IBR
- RSV
- Enzootic Pneumonia
- Immune Suppression



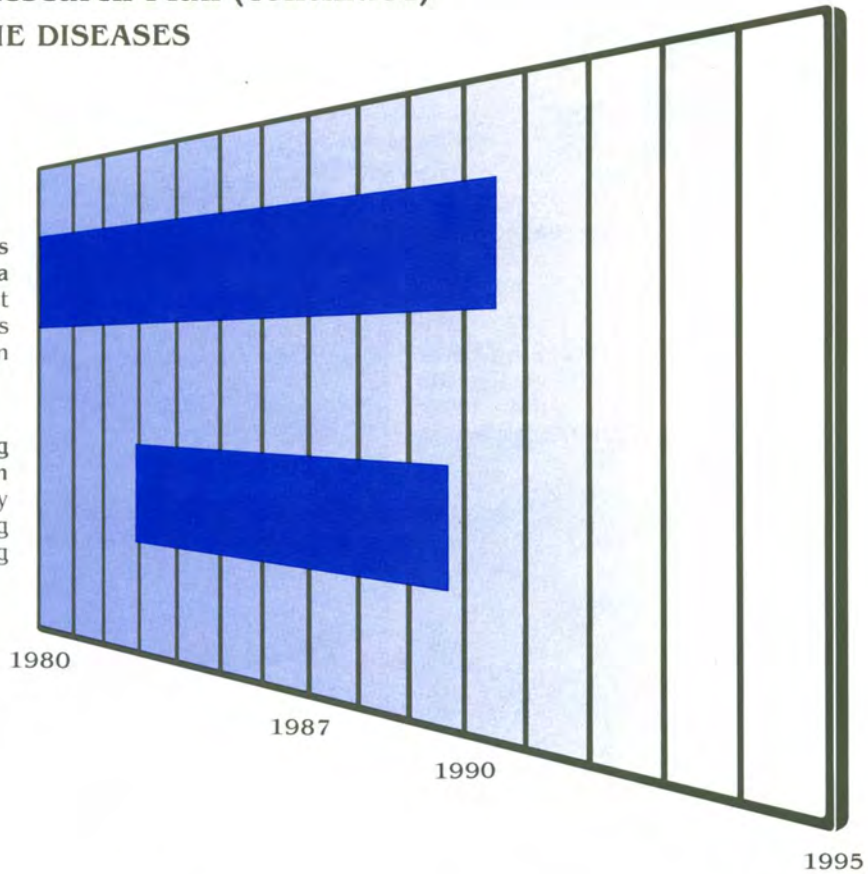
VIDO Long-Term Research Plan (continued)



SWINE DISEASES

**Haemophilus
Pneumonia**
- Treatment
- Diagnosis
- Vaccination

**Housing
Design**
- Nursery
- Farrowing
- Feeding

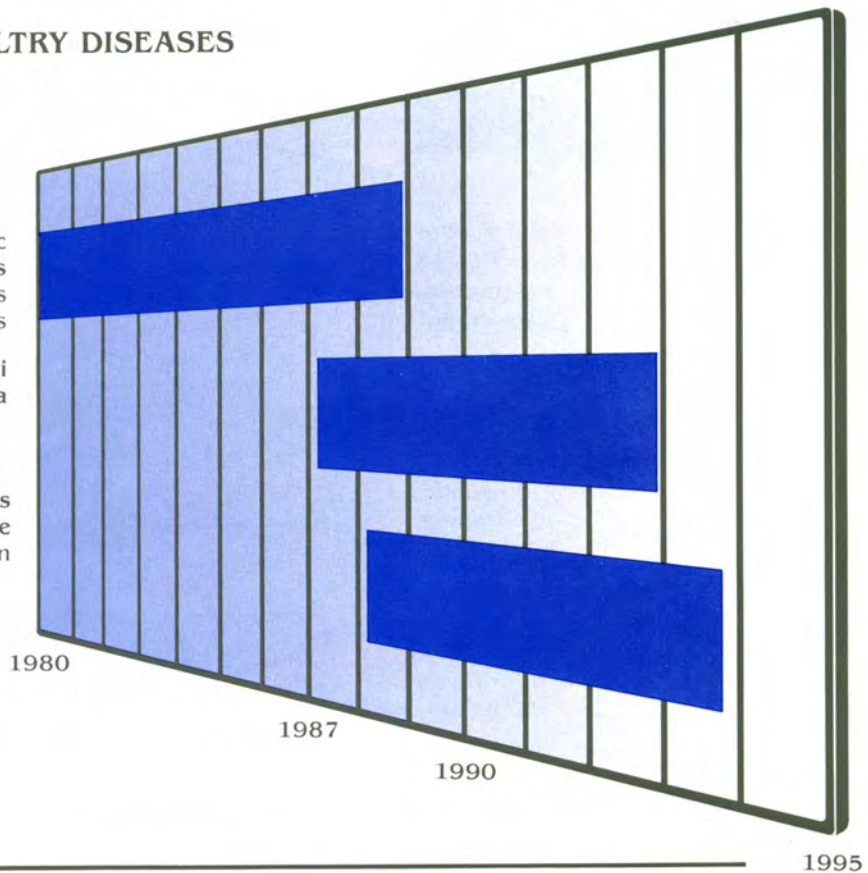


POULTRY DISEASES

**Hemorrhagic
Enteritis**
- Turkeys
- Chickens

**E. Coli
Septicemia**

**Infectious
Bursal Disease
Immune Suppression**



Report From The Executive Officer

Communication

Contact with Canada's livestock and poultry industries is essential to VIDO. Part of our mandate is to communicate with supporters and clients as to the progress of VIDO and the status of our research. Presentations to, and discussion with, producers, governments, charitable foundations, granting agencies and others continue on a regular basis. Also in the past year, VIDO has hosted several tours including several Chinese delegations and members of the Agricultural Institute of Canada.

Through the VIDO Swine Technical Group, a new publication entitled "Farrowing Barn Design and Management" has been made available to the swine industry. It is the second in a series of three publications that cover the major facets of swine operations and production with particular reference to disease. In 1982, "Swine Nursery Design" was published and next year the Group hopes to complete the third technical bulletin on "feeder barns".



P.G. Hodgman, BSc (Agr.)

I continue to be affiliated with several groups that have an interest in veterinary research. This year, I was honored to be elected Chairman of the Board of Trustees of the Canadian Veterinary Research Trust Fund and also sit on the Board of Governors for the Livestock Industry Institute in Kansas City, Missouri.

Contributions

Financial support from the livestock and poultry industries continues to be of paramount importance to VIDO. Their contributions show others in the VIDO "funding mosaic" that producers who directly benefit from the research are committed to financial participation in the Organization. Our appreciation is extended to all who have participated in the financial support of VIDO.

Swine Research Chair

A historical event took place in the past year when the swine industry in Western Canada recognized the need for a long-term commitment of funds for swine research at VIDO. As a result, the B.C. Hog Marketing Commission, the Alberta Pork Producers Marketing Board, the

Saskatchewan Pork Producers Marketing Board and the Manitoba Hog Producers Marketing Board joined forces and committed \$100,000 per year for five years commencing January 1, 1986 towards a Swine Research Chair at VIDO. Contributions from each province are prorated on the annual hog marketings. Dr. Philip Willson, a Swine Research Veterinarian, has been appointed to the Chair and other VIDO scientists complement the team endeavoring to solve the costly disease problem, *Haemophilus pleuropneumoniae*.

The goal of the Swine Research Chair is to develop quick effective diagnostic tests and a safe effective vaccine for the prevention of *Haemophilus pleuropneumoniae*. The pork industry of Western Canada is leading the way in this far-sighted venture.

Research Station

One of VIDO's greatest needs has been to have a research station built to the unique and stringent criteria necessary for doing animal health research. W.W. Manufacturing Ltd. of Nanton, Alberta was contracted to provide VIDO with a "turn-key" operation that was flexible and required low maintenance. This has been accomplished through the use of steel and fiberglass in the pens, equipment and the building.

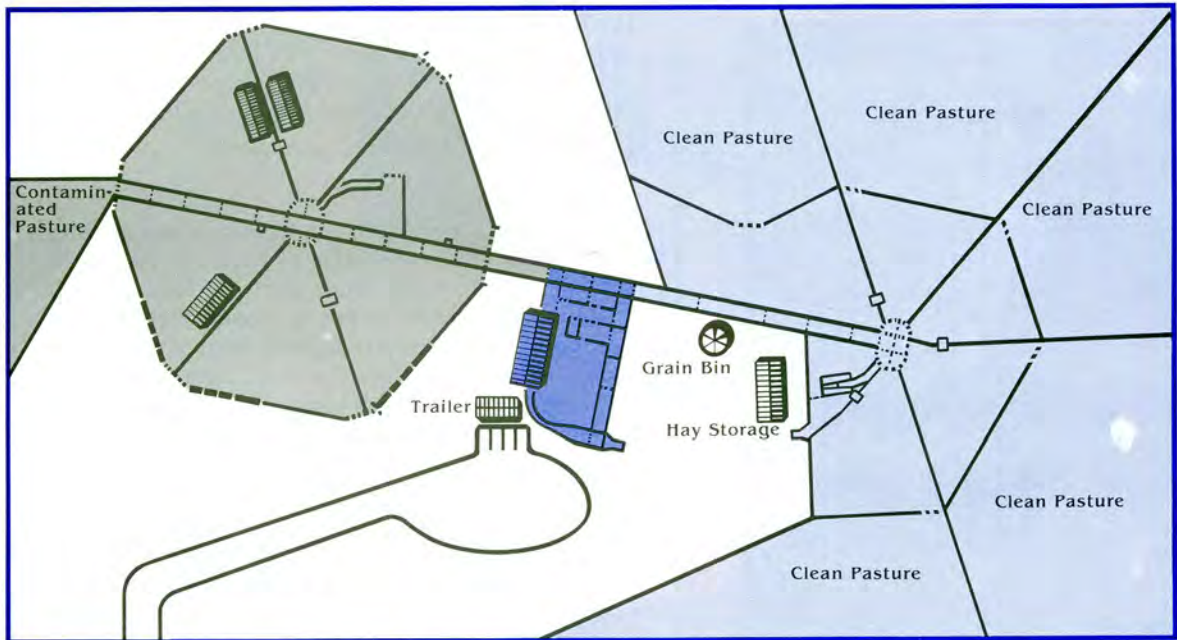
The Field Station is designed to accommodate two primary requirements of our research. The first is for a "clean area" where specific pathogen-free or disease-free

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cattle can be maintained until they are used. The second is for a "contaminated area" where infected animals can be used to study vaccines, treatments or management practices without the risk of spreading disease to commercial herds or feedlots.

The "clean area" includes a small, enclosed animal handling unit. This allows our animal support staff to work with uninfected animals without having them come in contact with other experimental animals. Five pastures fan out from a hub in the "clean area" allowing maintenance of cattle for long periods of time in isolation from other areas of the station. The "contaminated area" consists of six feedlot-type pens which accommodate up to 180 head of cattle. These pens are connected through a hub which gives flexibility when handling animals. An outdoor raceway and squeeze are located in one of the pens. The contaminated area is also served by two small pastures.

Both areas are linked to a central handling facility which will protect our staff and the animals from the extremes of the Saskatchewan climate. The central handling



VIDO Field Station Contaminated Area Central Handling Facility Clean Area

facility consists of a building (approximately 24' x 48') with steel frame construction, fiberglass sandwich walls and ceiling. It contains holding pens, raceway, scale and squeeze that enables easy cleaning and disinfecting. Other facilities include a hay storage shed, grain bin and animal shelters. Power, gas, telephone and water were brought to the site, plus one of our original ATCO trailers that is used as an office and field laboratory unit.

The Field Station will further enable VIDO to bridge the gap between discoveries made in the laboratory and the application of products and technologies on the farm.

BIOSTAR Inc.

BIOSTAR is the corporate marketing arm of VIDO and has continued to develop and grow over the past year. BIOSTAR has directly benefited VIDO by subcontracting parts of its work to VIDO. BIOSTAR continues to be responsible for negotiating contracts with parties interested in accessing VIDO's services and facilities. As well, it markets VIDO products and technologies.

Paul Hodgman P.G. Hodgman

Report From The Associate Director (Research)

Biotechnology is heralded as one of the major advances of this century and it is revolutionizing our approaches to many areas of biology. The potential impact of biotechnology is at present immeasurable with respect to its effect on our life-style including the production of many new agricultural and human products.

The building blocks of this technology include monoclonal antibodies, synthetic peptides and recombinant DNA or gene manipulation. VIDO has developed a strength in each of the above areas and is strategically placed to enter its second decade of research and development into the areas of animal health and production. Hence, our research efforts are being focused at applying biotechnology not only to address today's needs, but to develop a research strategy and a team of researchers able to solve the problems of the next decade as well as the next century. VIDO is applying biotechnology towards identifying the important components of infectious agents responsible for stimulating the animal's immune response and ability to ward off

infections. In addition, we are developing the technologies needed to economically produce these important components for use in diagnosis and immunization. Finally, we are investigating mechanisms whereby we can increase the animal's resistance to infection or aid recovery from infections. It is hoped that the combination of these approaches with our strength in traditional veterinary sciences and epidemiology will produce better methods for the control of many of the common infectious diseases that affect the livestock and poultry industries.

The present report will address the applications of biotechnology to controlling diseases either by vaccination or other means of enhancing the animal's resistance to infection. Although the report emphasizes the technologies being used to control infectious diseases, it is the application of them to important problems which is essential. To maintain its focus, VIDO retains the long-term strategic plan to focus on a limited number of disease entities. The current disease targets, including the refocusing approved by the Board of Directors this year, are summarized in the figures on pages 7 and 8. In each of these Programs, a broad range of techniques are being

used in the area of molecular biology, biotechnology, immunology, virology, bacteriology, epidemiology and veterinary science.

Monoclonal Antibodies

The application of biotechnology to developing improved diagnostic tools and vaccines requires an understanding of the molecular structure of viruses and bacteria involved in disease production. In order to help develop this knowledge, we have established a monoclonal antibody laboratory for the production of specific antibodies which react with individual proteins of the pathogens. Using these monoclonal antibodies, we have identified specific proteins on rotavirus, coronavirus and bovine herpesviruses which are involved in attachment of these pathogens to host cells as well as the induction of immunity and protection against these infectious agents. Similar approaches are being used to identify the important proteins of *Pasteurella haemolytica* and *Haemophilus pleuropneumoniae*. In addition to identifying specific proteins, we have also been able to identify specific regions or "epitopes" on these proteins which are involved in virus attachment and stimulation of immunity. Monoclonal antibodies have also been used to purify individual glycoproteins of bovine herpesvirus-1 and test the ability of these proteins in inducing immunity and protection in cattle. This work has laid the foundation for the development of a subunit vaccine for protection against bovine



L.A. Babiuk, BSA, MSc, PhD

herpesvirus-1 (BHV-1), one of the major viruses involved in the initiation of bovine respiratory disease in cattle.

In addition to development of vaccines, the monoclonal antibodies and purified components of viruses and bacteria are being used to develop rapid diagnostic tests not only for differential diagnosis, but for monitoring the efficacy of vaccines. Although at present these diagnostic reagents and methods are only being used in regional diagnostic laboratories, work is in progress to apply these tests to a format that could be used in the field by veterinarians and/or producers. Such approaches should greatly increase the speed and accuracy of diagnosis, with a resulting reduction of costs to the producer.

Synthetic Peptides and Recombinant DNA

Once the important components of bacteria and viruses are identified, they are being produced by synthetic peptide or recombinant DNA technology. During the past year, specific epitopes of rotavirus have been synthesized and then combined with various carriers or adjuvants to improve their ability to induce immune responses in animals. Testing of these peptide-adjuvant combinations have clearly indicated that protection can be induced with synthetic peptide vaccines against rotavirus infections. Similar studies are continuing with bovine coronavirus and BHV-1. These types of approaches will be useful for production of vaccines against any of the pathogens which VIDO hopes to pursue over the next decade.

In parallel, the genes coding for the important proteins of *Pasteurella haemolytica*, *Haemophilus pleuropneumoniae*, BHV-1, coronavirus and rotavirus are being cloned and expressed in eukaryotic or prokaryotic expression systems. In order to reduce the expense of building research teams in each area of expression, VIDO is collaborating with various groups, including the NRC Biotechnology Research Institute in Montreal, who are helping to express prototype vaccines for us. These are returned to VIDO for vaccine formulation and testing.

The development of a multifaceted approach to subunit vaccines ensures that the final product is both efficacious and economical to produce. Furthermore, development of these different types of products opens the door for investigating other potential vaccine delivery systems including intramammary and intrauterine immunization.

Immunology

Immune responses of animals are important in both disease prevention as well as in recovery from disease. Many diseases either occur or are exacerbated as a result of immunosuppression which can be caused by stress or viral infections. Shipping fever of cattle is one of the best known diseases where suppression of immunity is thought to be of primary importance. Therefore, development of methods to predict and prevent immunosuppression would be extremely beneficial. To be able to reverse immunosuppression, it is important to have a thorough understanding of how specific diseases affect the immune response, as well as how the immune response can be manipulated. Hence detailed information on immune regulation is pivotal for the effective control of specific diseases, either by vaccination or the use of immunostimulatory drugs.

We have started a major thrust to provide new information in several practical areas



Virology

M. Parker (BSc, MSc, PhD), G. Hughes (BSc, PhD), M. Sabara (BSc, MSc, PhD), K. Ready (BSc, PhD), S. van drunen Littel-van den Hurk (BSc, MSc, PhD), J. van den Hurk (BSc, MSc)

of immunology. Studies are in progress to test various types of adjuvants and carriers which will enhance the efficacy or the immunity of the antigens produced by the synthetic peptide or recombinant methods mentioned above. In addition, we have established a close working relationship with Genentech Inc. and CIBA-GEIGY in the area of application of lymphokines to the modulation of immune responses of cattle. During the past year, we have concentrated on the application of interferon to reduction of bovine respiratory disease. We are now expanding this area of investigation by testing a variety of other recombinant DNA produced lymphokines of cattle and expanding their application into the areas of enzootic pneumonia and diarrhea in calves. In the future, it is anticipated that this will be expanded to studies involving modulation of porcine immune responses as well.



Immunology
(Left to Right) P. Frenchick (BSc, PhD),
M. Lawman (BSc, PhD), M. Issa (BSc, PhD)

Epidemiology and Herd Health

Before starting to develop vaccines, it is important to determine whether a specific pathogen is important in a specific disease syndrome, as well as what other factors may influence the disease incidence and severity. Identification of these "risk factors" is one of the ways VIDO uses to help identify specific areas of research.

One specific area where epidemiology is being applied at present is to identify the "risk factors" which affect the occurrence of bovine respiratory disease in feedlots. The data has already been collected and is presently being analyzed by computer. It is anticipated that within the next few months, specific recommendations will be forthcoming outlining the specific management procedures which affect the occurrence of feedlot diseases and suggesting ways in which economic losses can be reduced.

Seroepidemiology involves the use of serological testing to study the epidemiology of diseases. This year Saskatchewan Agriculture has provided funding for a Fellowship in Seroepidemiology through the Saskatchewan Agricultural Development Fund. This support is being used to study the occurrence of hemorrhagic enteritis virus in turkeys and chickens and to refine the use of HEVLAN TC in turkey flocks as outlined below.

New Products

As stated in last year's Annual Report, it was anticipated that a vaccine for hemorrhagic enteritis virus of turkeys would be successfully completed and licensed for use. It gives me great pleasure to report that this has been achieved as anticipated. This vaccine was produced by the group working under the direction of Jan van den Hurk in the Poultry Program and is presently marketed by Langford Inc. under the tradename of HEVLAN TC. This is the world's first HEV vaccine produced in tissue culture. As a result of the overwhelming success of this vaccine in Canada, interest has been expressed by a number of other multinational companies for the rights to manufacture and market this vaccine in other countries around the world.

Since VIDO's philosophy is to continue to follow-up and improve the specific vaccines that we have licensed, we are investigating potential improvements of this vaccine as well as its use in chickens. Studies to date indicate that chickens are frequently infected with this virus. However, before we can recommend the use of the vaccine in chicken populations, further studies must be conducted to determine the economic losses caused to the chicken industry by this virus. In addition, studies are in

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progress to determine the strategy for immunizing turkeys to develop the highest protective immune responses. Finally, investigations are in progress to determine the interrelationships between HEV and *E. coli* septicemia.

Summary

This past year has been a very exciting one, not only because of our successful completion of the HEV vaccine, but because a number of other products have rapidly progressed to the stage where we are initiating clinical trials. The epidemiological studies are also providing new recommendations which producers can use to adjust their management systems. In this regard, I feel that VIDO's employees deserve very special praise. All of the staff have demonstrated their devotion to the Organization by their hard work and their spirit of cooperation in a large number of inter-related projects. As a result of this dedication, I am convinced that the 1990's will see a large



Bacteriology, Epidemiology and Animal Services

*(Left to Right) A. Potter (BSc, PhD), T. Watts (DVM), P. Willson (BA, MS, DVM)
Missing - S. Wilson (PVM, DVM, MPVM)*



Graduate Students

D. Deregt (BSc, DVM), D. Hutchings (DVPM, DVM), D. Fitzpatrick (BSc, BVMS, MVSc)

number of successful products being licensed for the diagnosis and control of many of the economically important common infectious diseases of livestock and poultry. Without the dedication to excellence of our staff, and the financial support of numerous organizations, these achievements would not be possible.

Lorne A. Babiuk

L.A. Babiuk

Publications and Presentations By VIDO Staff

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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:

- T.L. Church - Head, Preventive Medicine Branch, Animal Health Division, Alberta Department of Agriculture, Edmonton
- J.W. Costerton - Department of Biology, University of Calgary
- J. Glorioso - University of Michigan Medical School, Ann Arbor, Michigan
- D. Griffith - National Research Council of Canada, Ottawa, Ontario
- C. Humphrey - Program Analyst, University of Alberta
- P. Lee - Department of Microbiology and Infectious Diseases, University of Calgary
- J. L'italien - Molecular Genetics Inc., Minnetonka, Minnesota
- M. Makarechian - Department of Animal Science, University of Alberta, Edmonton
- W. Martin - Department of Veterinary Microbiology & Immunology, Ontario Veterinary College
- D. McCartney - Agriculture Canada's Research Station, Melfort, Saskatchewan
- K. McMillan - Red Deer, Alberta
- D. Morgan - W.A. Veterinary Services Ltd., Picture Butte, Alberta
- A.D. Osborne - Department of Veterinary Microbiology, Western College of Veterinary Medicine, Saskatoon
- G. Papp-Vid - Alberta Agriculture, Edmonton, Alberta
- P. Paradiso - Praxis Biologics, Rochester, New York
- M. Perry - National Research Council of Canada, Ottawa, Ontario
- J.R. Saunders - Department of Veterinary Microbiology, Western College of Veterinary Medicine, Saskatoon
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- S. Sharabadi - University of Calgary
- N. Skipper - Allelix, Mississauga, Ontario
- C. Whetstone - National Animal Disease Laboratory, Ames, Iowa
- T. Zamb - Molecular Genetics Inc., Minnetonka, Minnesota
- G. Zlotnick - Praxis Biologics Inc., Rochester, New York
-

**University of Saskatchewan
Veterinary Infectious Disease
Organization (V.I.D.O.)
Year Ended September 30, 1986**

Combined Balance Sheet

September 30, 1986

Auditor's Report

To the Board of Directors
of the Veterinary Infectious
Disease Organization (V.I.D.O.):

We have examined the combined balance sheet of the University of Saskatchewan - Veterinary Infectious Disease Organization for the year ended September 30, 1986 and the statements of income, expenditure and unexpended funds (Research Trust and Capital Trust) and of changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as we considered necessary in the circumstances, except as explained in the following paragraph.

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

In our opinion, except for the effect of adjustments, if any, which we might have determined to be necessary 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, 1986 and the results of its operations and the changes in its financial position for the year then ended in accordance with accounting policies described in Note 1 applied on a basis consistent with that of the preceding year.

Deloitte Haskins & Sells

Deloitte Haskins & Sells
Auditors
December 4, 1986

Assets

	<u>1986</u>	<u>1985</u>
CURRENT ASSETS		
Funds held by the University of Saskatchewan (Note 2)	\$ 820,318	\$1,159,142
Due from University of Saskatchewan - operating fund	145,768	47,236
Accounts receivable		
Royalties	14,236	997
Donors	21,614	2,500
Contracts - research	175,109	39,472
- services	34,727	29,198
Accrued interest	41,728	22,075
Inventories (Note 3)	57,102	36,110
Prepaid expenses	16,000	25,000
	<u>\$1,326,602</u>	<u>1,361,730</u>
INVESTMENTS (quoted market value \$533,760)	<u>536,313</u>	<u>85,185</u>
PLANT ASSETS		
Site and improvements	133,765	133,765
Furnishings, fixtures and equipment	431,267	411,891
Buildings	<u>3,946,728</u>	<u>3,946,728</u>
	<u>4,511,760</u>	<u>4,492,384</u>
	<u>\$6,374,675</u>	<u>\$5,939,299</u>

Liabilities

CURRENT LIABILITIES		
Account payable	\$ 3,362	\$ -
Deferred grant revenue	<u>263,669</u>	<u>133,905</u>
	<u>267,031</u>	<u>133,905</u>

Equity

EQUITY IN CAPITAL ASSETS	4,511,760	4,492,384
UNEXPENDED FUNDS - RESEARCH TRUST	1,591,635	1,291,296
UNEXPENDED FUNDS - CAPITAL TRUST		
	<u>4,249</u>	<u>21,714</u>
	<u>6,107,644</u>	<u>5,805,394</u>
	<u>6,374,675</u>	<u>\$5,939,299</u>

Annual Report 1985-86

Research Trust - Statement of Income, Expenditure and Unexpended Funds

Year Ended September 30, 1986

	1986	1985
INCOME		
Grants and donations		
Livestock industry		
- general	\$ 122,699	\$ 188,000
- swine research chair	73,538	—
Provincial governments		
- Alberta	100,000	100,000
- British Columbia	15,000	8,000
- Manitoba	15,500	15,500
- Saskatchewan		
- general	300,906	300,000
- fellowship	50,000	—
National Research Council (NRC) - Department of Supply and Services	202,898	66,370
Saskatchewan Agricultural Research Fund	14,500	—
Agricultural Research Council of Alberta - "Farming for the Future"	216,290	212,076
Natural Sciences and Engineering Research Council of Canada (NSERC)	160,155	104,545
Industrial Research Chairs		
- NSERC	185,200	144,600
- BIOSTAR Inc.	46,252	36,885
Alberta Agricultural Research Trust	—	22,680
Canadian Veterinary Research Trust	—	2,500
Kahanoff Foundation	150,000	150,000
Other individuals, companies, and foundations	—	6,670
	<u>1,652,938</u>	<u>1,357,826</u>
Contracts		
Research	495,888	127,932
Services	43,993	30,684
Royalties	36,768	10,012
Interest	127,415	145,703
Animal services	52,258	5,822
Miscellaneous	34,103	34,402
	<u>2,443,363</u>	<u>1,712,381</u>
EXPENDITURE		
Salaries and fringe benefits	1,047,500	890,107
Material and supplies	382,232	365,004
Animal services	167,999	55,209
Equipment	210,964	213,256
Travel	94,557	71,592
External research and development	—	60,000
Other (Note 4)	239,772	185,253
	<u>2,143,024</u>	<u>1,840,421</u>
EXCESS (DEFICIENCY) OF INCOME OVER EXPENDITURE	300,339	(128,040)
UNEXPENDED FUNDS, BEGINNING OF YEAR	<u>1,291,296</u>	<u>1,419,336</u>
UNEXPENDED FUNDS, END OF YEAR	<u>\$1,591,635</u>	<u>\$1,291,296</u>

Notes to the Financial Statements September 30, 1986

1. SIGNIFICANT ACCOUNTING POLICIES

These financial statements have been prepared in accordance with the following policies:

Funding accounting

The accounts of the Organization are kept in accordance with fund accounting principles which 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. The balance sheet and statement of changes in financial position have been presented on a combined basis reflecting the activities of both funds.

Capital assets

Capital assets are recorded as Capital Trust expenditures when purchased. The same assets are included in the balance sheet as plant assets offset by the "equity in capital assets" account. No depreciation is recorded on the capital assets. Equipment purchased with Research Trust monies is expensed as purchased, and is not included in the balance sheet as assets. The Constitution referred to in Note 5 states that all buildings and facilities constructed for the Organization shall be used by it in accordance with the Constitution and upon termination of the Organization, the buildings, facilities and equipment therein shall remain the absolute property of the University of Saskatchewan.

Inventories

Inventories are valued at the lower of cost and net realizable value.

Investments

Investments 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.

Grants and donations

Grants and donations are recognized in these financial statements in the period 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 financial statements when received.

3. INVENTORIES

	1986	1985
Animals	\$21,555	\$ 1,047
Materials and supplies	35,547	35,063
	<u>\$57,102</u>	<u>\$36,110</u>

4. OTHER EXPENSES

The other expenses consist of V.I.D.O. operating accounts including project expenses, maintenance, equipment rental, recruiting expenses, professional fees and board expenses.

**Capital Trust
Statement of Income, Expenditure and
Unexpended Funds**

Year Ended September 30, 1986

	1986	1985
INCOME		
Interest	\$ 1,910	\$ 4,026
EXPENDITURE		
Furnishing, fixtures and equipment	19,375	27,778
EXCESS OF EXPENDITURE OVER INCOME	(17,465)	(23,752)
UNEXPENDED FUNDS, BEGINNING OF YEAR	21,714	45,466
UNEXPENDED FUNDS, END OF YEAR	\$ 4,249	\$ 21,714

5. 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.

6. 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, various financial and administrative functions relating to V.I.D.O. The financial statements do not include expenditures for administrative and ancillary services, or in-kind support provided by the University of Saskatchewan.
- b) The University of Saskatchewan owns approximately 82% of a company called BIOSTAR Inc. whose primary purpose is to assist V.I.D.O. in both research and development of its products and technologies. During the year V.I.D.O. had the following transactions with BIOSTAR:

	1986	1985
Income from BIOSTAR Inc. to V.I.D.O.		
Contract research	\$337,329	\$25,620
Rent, office services and management fees	43,993	30,683
Material purchases	12,125	7,511
Sponsorship of two industrial research chairs at V.I.D.O. in conjunction with NSERC	46,253	36,885
Expenditure by V.I.D.O. to BIOSTAR Inc.		
Management service fees	13,955	15,000
External research and development	—	60,000
Equipment lease	25,234	—

At September 30, 1986 the Organization has a receivable from BIOSTAR Inc. of \$133,232 (1985 - \$48,695).

7. COMMITMENTS

V.I.D.O., in conjunction with the University of Saskatchewan, has purchased land and buildings with V.I.D.O.'s share of the cost being \$150,000. V.I.D.O.'s contribution will be used for building improvements and equipment none of which had been purchased at September 30, 1986. The balance is to be repaid to the University interest free, in six annual instalments beginning in 1987.

8. COMPARATIVE FIGURES

The prior year's financial statements used to prepare the Research and Capital Trust statements of income, expenditure and expended funds & combined balance sheet were audited by the Provincial Auditor of Saskatchewan.

**Combined Statement of Changes in Financial
Position**

Year Ended September 30, 1986

	1986	1985
OPERATING ACTIVITIES		
Working capital from (used in) operations		
Increase (decrease) in Research Trust	\$ 300,339	\$ (128,040)
Changes in non-cash operating working capital		
Due from University of Saskatchewan	(98,532)	(331,976)
Accounts receivable	(193,172)	107,773
Inventories	(20,992)	(2,145)
Prepaid expenses	9,000	—
Account payable	3,362	—
Deferred grant revenue	129,764	(47,560)
Increase in non-cash operating working capital	(170,570)	(273,908)
Cash provided by (used in) operating activities	129,769	(401,948)
INVESTING ACTIVITIES		
Additions to investments	(451,128)	(38,186)
Capital trust expenditures	(17,465)	(23,752)
Cash used in investing activities	(468,593)	(61,938)
DECREASE IN CASH	(338,824)	(463,886)
CASH, BEGINNING OF YEAR	1,159,142	1,623,028
CASH, END OF YEAR	\$ 820,318	\$1,159,142

Cash represents funds held by the University of Saskatchewan

Mr. Rick Istead
Director of Research and Development
CIBA-GEIGY

Ms. Brenda Machin
Saskatchewan Agriculture Research Fund

Mr. Lynn Biggart, President
Saskatchewan Stock Growers Association

Mr. Garth Larson, Chairman
Saskatchewan Pork Producers Marketing Board

Mr. Neil Reid, General Manager
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Mr. Dave Traynor
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Ms. Elaine Vininsky
Manitoba Co-Operator Magazine

Mr. Harry Siemens
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Mr. Tom Pringle, Assistant Deputy
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Honorable Bill Uruski
Minister of Agriculture

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Manitoba Cattle Producers Association

Mr. Bill Vaags, Chairman
Manitoba Hog Producers Marketing Board

Mr. Bill Munro, Manager
Manitoba Hog Producers Marketing Board

Mr. Burt Waters, Secretary-Manager
Manitoba Chicken and Turkey Producers
Marketing Board

Mr. Waldie Klassen, Director
Manitoba Chicken and Turkey Producers
Marketing Board

Mr. Bob Lawson, Secretary-Manager
Manitoba Egg Producers Marketing Board

Mr. K.T. MacPherson, Chairman
Manitoba Egg Producers Marketing Board

Mr. Bill Chrismas, Chairman
Canadian Turkey Marketing Agency

Mr. Harold Dodds, Publisher
Cattlemen Magazine

Mr. David Wreford, Editor
Country Guide

Mr. Lorne Hehn, President
United Grain Growers

Mr. John Clark
United Grain Growers

Art Rampton, Chairman
Manitoba Milk Producers Marketing Board

Mr. Clarence Vincent, General Manager
Manitoba Milk Producers Marketing Board

Mr. Russ Scott, Manager
Manitoba Broiler Hatching Egg Commission

Mr. Jack Penner, President
Keystone Agricultural Producers Inc.

Mr. Andy Sirski
Grainews Magazine

Dr. Ronald Humble
Industry, Trade and Technology

Mr. Jim Hutch, President
Saskatchewan Research Council

Dr. Dave Christensen
Department of Animal and Poultry Science
University of Saskatchewan

Mr. Mac Sheppard
Associate Vice-President and Controller
University of Saskatchewan

Dr. Bruce Schnell,
Vice-President (Academic)
University of Saskatchewan

Dr. Warren Steck, Director
Plant Biotechnology Institute

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

Dr. Jack Manns
Department of Veterinary Physiology
Western College of Veterinary Medicine

Carol and Dan Teichrob
Past members of the VIDO Board of Directors

Mr. John Taylor, Manager
Saskatchewan Agriculture Development Fund

Mr. Jim Mahone, Director
Alberta Farming for the Future