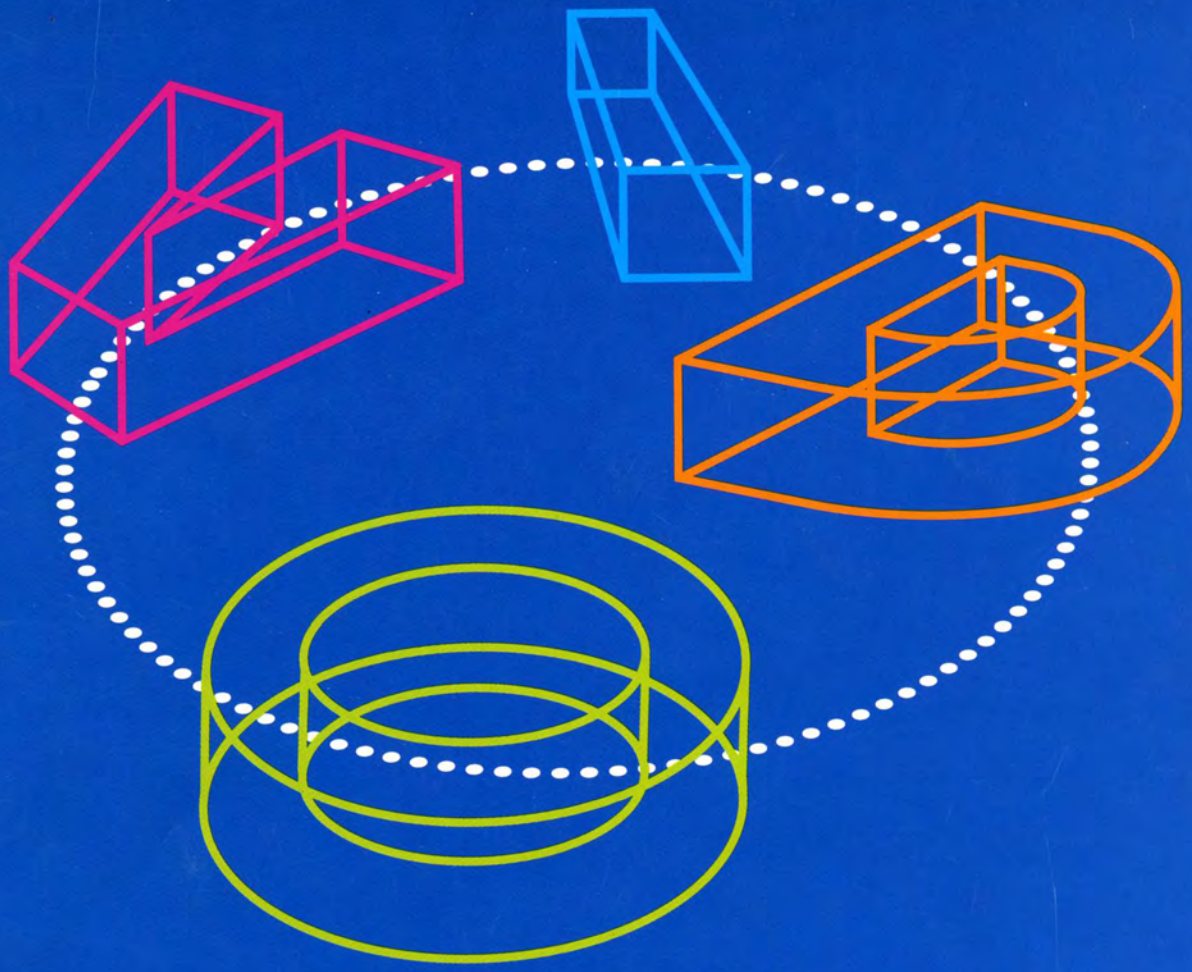
VIDO ANNUAL REPORT



1988-89

The Goals Of Vido

1) To serve the livestock industry through research on the common infectious diseases of farm animals and poultry.

2) To help provide higher quality food to consumers through research on non-residue forming animal health and production enhancement products, preventive medicine programs and improved livestock management techniques.

3) To fill the gap between scientific discoveries in the laboratory and their practical application on the farm.

4) To use science, technology and innovation to improve the economic well-being of the agri-food system.

5) To reduce the suffering and wastage of animals caused by disease.

6) To improve human health by encouraging the application of results from animal health research to developing human health products and by reducing diseases that are directly transmissible from animals to man.

V I D O

In 1975, VIDO was established at the University of Saskatchewan in Saskatoon with a grant provided by the Devonian Group of Charitable Foundations of Calgary. The Foundation was joined by the Provinces of Saskatchewan and Alberta, and the University which supported the original development of the Organization. As a self-reliant organization of the University, it receives on-going funding from governments, charitable foundations, the livestock and poultry industries, federal and provincial granting agencies, contracts and other private sources. The Provinces of Saskatchewan and Alberta, and the University of Saskatchewan continue to be important supporters of VIDO.

VIDO's mandate is to serve livestock and poultry producers and consumers by developing safe and effective animal health and production enhancement products, preventive medicine programs and improved livestock management techniques and information.

1988-89 Vido Board Of Directors

(Back Row - Left to right)
G. Larson, R. Christian, C. Rennie, L.A. Babiuk (Associate Director, Research), E. Thiessen, A. Rampton, S. Kramer, K. Barteski (Manager, Financial Operations)

(Front Row - Left to right)
D. Rowlatt, H. Fast, P.G. Hodgman (Executive Officer), G.Hamilton, W. Cochrane, S.D. Acres (Director), R. Murray (Chairman), R. Church (Vice-Chairman)

It has been fascinating to observe, and a privilege to share in, the evolution of this unique organization.

Its laudatory mission statement is spelled out in the objectives listed for us inside the front cover of this Report. VIDO has always had an abundance of intellectual capital, and it has built well on that foundation.

However, in spite of the generosity of its traditional supporters, and the success of its research, there has always been a degree of restriction in the Organization's ability to achieve its self-imposed objectives due to limitations in financial capital.

There are a number of steps that must be taken between the conception of an idea, and the application of the consequences of that idea (i.e. the introduction of a product). These steps include research, development, testing and scale-up (manufacture) and marketing of the final product.

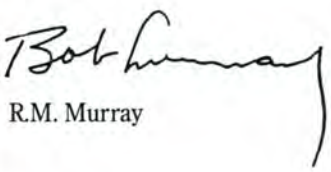
VIDO has hereto for distributed the tangible results of its intellectual harvest through others who have 'scaled-up' or manufactured and distributed the products to the end user. It was not possible for VIDO to participate directly beyond the testing stage. For VIDO, there was this gap between its discovery role and its application role as a consequence of which there was a lack of direct contact between VIDO and the distributor and end user. In addition, VIDO did not receive the major part of the financial reward for its intellectual discoveries.

The VIDO Board and Management have been aware of this for some time, and there has been much discussion of the restrictions imposed by this structural limitation. Therefore,during the course of the past year, VIDO assisted BIOSTAR Inc. in submitting an application for matching grants from the National Agricultural Biotechnology Initiative(NABI) and Ag-West Biotech, a Saskatchewan not- for -profit corporation established to facilitate the commercialization of biotechnology in Saskatchewan.

This grant will allow VIDO's commercial partner BIOSTAR Inc., to close the gap in the technology transfer process. As a result, BIOSTAR will move into the scale-up and manufacturing of its biotechnological products.

In this process, the need for traditional support of VIDO research will not be diminished, but rather, the effectiveness of that support will be substantially enhanced.

The management team- Director Dr. Stephen Acres, Associate Director (Research) Dr. Lorne Babiuk, Executive Officer Paul Hodgman and Manager, Financial Operations Ken Barteski, along with the entire dedicated and hard-working staff, must be commended for their achievements. To the Board members for their commitment and enlightened guidance and support, I express my personal appreciation. As I take my leave from VIDO, I wish you all continuing success.



R.M. Murray

R.M. Murray

R.B.Church

Animal and Research Support Group (Back Row - Left to Right) T. Watts, J. Gilchrist, R. Harland (Front Row - Left to Right) A. Rossi, J. van den Hurk, J. van Donkersgoed, S. Attah-Poku

Animal Care and Research Support Technicians (Back Row - Left to Right) B. Mollison, B. Carroll, V. Wiemken, R. Tabelon (Front Row - Left to Right) J. Gandy, A. Abraha, G. McLeod, C. Toy Missing - P. Green

This is the last VIDO Annual Report of the decade. As we approach the 1990s, the industries which we serve face new demands, challenges, and opportunities as a result of changes in the global economy. Therefore, research organizations, like many other institutions in Canada, must also evolve to meet these changes. Transferring technology from the research laboratory into commercial application is one of the challenges which VIDO is addressing.

VIDO has always felt that its main mission is to do applied research and development which helps livestock producers remain competitive by improving production efficiency. All of the work which the Organization does, whether it is designing new swine barns, improving diagnostic tests, or developing new vaccines, is targeted towards this objective. Within the Organization we plan our research projects around a "Cycle of Discovery and Application" as illustrated in Figure 1. Within this cycle, the livestock industry provides "market pull" by helping us to identify the animal-health problems on which we should focus our research resources. In most cases they also provide some of the financial and in-kind support needed to work on them. Through research and development, VIDO develops products, technology and information which can be transferred to producers for application on the farm.

Transferring technology in a useful form from the laboratory to the end users is a major challenge. Traditionally, it has not been the role of research institutes. However, since it was established in 1975 VIDO has accepted this as part of its mandate and this is clearly specified in the Constitution which guides the Organization's activities.

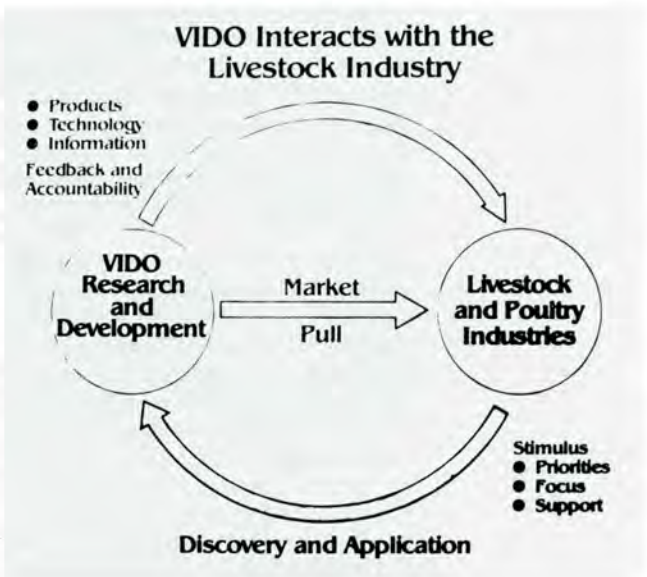
Many of VIDO's projects are aimed at developing new animal-health products, particularly vaccines. Past examples of products which we have developed include Vicogen, Ecolan, and Hevlan TC. This year we licensed Ecolan RC, a new vaccine which is described below. By licensing these products for commercial use, VIDO completed the cycle of discovery and application by ensuring that economically beneficial products are available to livestock producers.

Transferring product-related technology presents unique problems and VIDO has used a variety of mechanisms to achieve it. In 1979, the commercial rights to Vicogen were licensed to Connaught Laboratories of Toronto who manufactured and marketed the vaccine in Canada and the U.S.A. The "Vicogen experience" taught VIDO that it needed a mechanism of working with the commercial world to foster this type of technology transfer. Therefore, to assist with the transfer of product-related technology, in 1983 VIDO and the University of Saskatchewan established BIOSTAR Inc., a federally incorporated, taxable corporation.

The original mandate of the Company was to serve as a "commercial arm" of VIDO. One of its major functions was to transfer technology from VIDO to animal health care companies who could manufacture and distribute them. This has been achieved by licensing the commercial rights to Ecolan, Ecolan RC, and Hevlan TC vaccines to Langford Inc. of Guelph, Ontario. Revenue which the Company receives in the form of license fees and royalties, over and above those needed to operate, flow back to VIDO to support more R & D on animal diseases which are of concern to the livestock industry.

While this relationship has worked well, it does not address a larger issue which all Canadians must be concerned with.

S.D. Acres



That issue is the declining status of Canada's economic competitiveness in a global economy which is radically different from that which we faced during the past two centuries. In the new world economy, science and technology have become the major catalyst in the economic competitiveness of advanced nations.

Canada has a strong university system and an extensive network of government laboratories in which a great deal of world-class research is done. However, the record shows that Canadians are poor at enhancing and exploiting their own research capabilities. For example recent international comparisons showed that in terms of international patents granted, one common indicator of a nation's scientific output, Canada ranked eighth out of eight countries assessed. In terms of the number of technology intensive industries with a positive trade balance, Canada was also at the bottom of the list. As a result, Canada's share of exports in technology intensive products has remained stable while worldwide demand has accelerated. By 1987, our trade deficit in technology intensive products exceeded $7 billion. As one example related to animal health, Canada still imports approximately 90% of the animal health care products used to raise livestock in this country.

The bottom line is that too little of Canada's research output gets translated into industrial application in Canada. Our record as a country must be improved if we are to compete in the new global economy. This means that we must become better at exploiting the technologies which give us the ability to produce goods and services which can be traded internationally.

As a research institution which is supported by public funds from a variety of sources, VIDO must do its part to improve this situation. There is general agreement that resource-based industries, including agriculture, will continue to be the backbone of the Canadian economy. However, if we are to maintain and improve our standard of living then it is crucial that we add the ability to compete in value-added sectors as well. More and more, this ability is based on knowledge intensive technologies which include such things as artificial intelligence, advanced manufacturing technologies and biotechnology. Therefore, while the Organization's primary function is to support the livestock industry, we must also strive to ensure that the commercially relevant research technology which we develop is exploited to the fullest possible extent in Canada.

VIDO is moving rapidly to develop a range of new products to prevent many of the economically important animal diseases. Progress on their development is summarized in the Report of the Associate Director (Research). Rather than continuing to license the production and marketing rights for animal health-care products to companies outside of Saskatchewan, VIDO is encouraging BIOSTAR to develop the ability to commercially develop that technology locally.

Therefore, BIOSTAR Inc. is attempting to build the production capacity needed to produce animal-health products in Saskatchewan. Some small-scale production has already been done. For example, the Company produced the first commercial batches of Hevlan TC and in doing so, was able to ensure that this vaccine reached turkey producers about two years sooner than otherwise would have been the case. This summer, BIOSTAR established BIOWEST Inc., a wholly-owned production company. BIOWEST is producing some of the viral components required for the new calf scours vaccine, Ecolan RC, thereby shortening the time required to get this product to cattlemen.

In the future, BIOSTAR and BIOWEST may expand their production activities so that animal-health products developed at VIDO, and at other institutions in Western Canada, can be produced locally for marketing throughout Canada and internationally. To achieve this, BIOSTAR may have to evolve away from VIDO and the University of Saskatchewan and become more of an independent company. If such a course of action is followed, foremost in the minds of the VIDO Board of Directors will be ensuring that VIDO continues to operate as an autonomous research unit working on behalf of livestock producers and that the

financial benefits from the commercialization of products support research of interest to the livestock industry.

NEW CALF SCOURS VACCINE LICENSED - ECOLAN RC

This fall, Agriculture Canada licensed a new calf scours vaccine developed at VIDO. The production and marketing rights were licensed through BIOSTAR Inc. to Langford Inc. of Guelph, Ontario who markets the vaccine under the name of Ecolan RC. The new vaccine is administered to pregnant cows prior to calving and provides protection against *E. coli* bacteria, rotavirus and coronavirus which are the three most common causes of calf scours. VIDO started its work on this vaccine in the early 1980s and had to complete various aspects of basic research, applied research, development, field testing and technology transfer in order to bring this product to market. Grant support was received from a number of groups and agencies and on behalf of the Organization I would like to acknowledge the following: Farming for the Future Council of Alberta; the Canada - Saskatchewan Sub-Agreement on Agriculture (ERDA); the Saskatchewan Agricultural Development Fund; the Saskatchewan Agricultural Research Fund (SARF); the National Research Council (NRC); and the Natural Sciences and Engineering Research Council (NSERC). I would also like to thank the many cattle groups and organizations which financially supported this research. In addition, I would also like to thank the Kinsella Ranch, Department of Animal Science at the University of Alberta and the Agriculture Canada Research Station at Melfort, Saskatchewan for allowing us to use their cow-calf herds for experimentally testing the vaccine.

BOARD OF DIRECTORS

I have again had the privilege of working with a very supportive and knowledgeable Board of Directors. The 12 other people on the Board are made up of five primary producers, two "at-large" members usually selected from the broad field of agri-business, three representatives from provincial and federal governments, and two from the University of Saskatchewan. They provide a unique blend of talents and perspectives which are critical in guiding the Organization's activities.

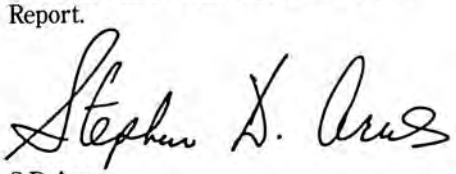
On behalf of the Organization, I extend special thanks to Bob Murray of Brantford, Ontario who retired from the Board after four years of service, including two years as Chairman. I would also like to thank retiring Board members Dr. Harold Fast of Spiritwood, Saskatchewan, and Dr. Bill Cochrane from Toronto, Ontario. I am pleased to welcome to the Board Mr. Grant Huffman, a cattleman from Riske Creek, B.C., Mr. Craig Hunter, a poultry producer from Stroud, Ontario, and Mr. Jim Doherty, Vice-President of Connaught BioSciences Laboratories Ltd. in Toronto, Ontario. I am confident that these new Board members will make a significant contribution to the future activities of the Organization.

PERSONNEL

In the retail business, there is an old adage that some businesses are unsuccessful while others are very successful because of "location, location, location". Research organizations are successful because of "people, people, people". Creative, innovative, motivated, dedicated, and team spirited are descriptors which can be applied to the VIDO staff. Everyone contributes to the success of the Organization in a variety of unique ways. Each and every one deserves recognition for their contributions. For most of them, working at VIDO is not just a job; it is a home for their creative talents and energy. All of them contribute to the success of the Organization in unique ways; many contribute more than can be reasonably expected. I applaud each and every one of them for their dedication and hard work.

RECOGNITION

From time-to-time, VIDO staff members receive exceptional recognition for their activities. I was remiss in not acknowledging one such individual in last year's Annual Report and therefore I am including it this year. Dr. Lorne Babiuk received special recognition from the University of Saskatchewan in May 1987, and the details of this Award are presented on the inside of the back cover of this Report.



S.D.Acres

Bacteriology Group
(Back Row - Left to Right)
B. Allan, A. Potter (Program Manager), K. Fodor
(Front Row - Left to Right)
M. Theisen, P. Willson

Office Staff
(Back Row - Left to Right)
P. Mierau (Office Manager), M. Hagen, D. Kirchmeier
(Front Row - Left to Right)
W. Finn, L. Taylor-Baker
Missing - I. Kosokowsky

FUNDING CONTRIBUTIONS AND GRANTS

VIDO is supported by a wide variety of types of funds including donations, contracts, grants, investment and invention revenue. Specific detailed information on these sources is shown in the September 30, 1989 audited Financial Statements found elsewhere in this Annual Report. The livestock industry continues to play a key role in our funding because granting agencies and others feel that it is particularly important to show that livestock producers, who are benefactors of VIDO's research, have also made financial commitments towards it. Therefore, the financial and in-kind contributions of the livestock and poultry industries assist the Organization in attracting funds from a variety of other sources.

Charitable Foundations have also played a strong historical role in VIDO's development. In the past, the Devonian Group of Charitable Foundations of Calgary, the Max Bell Foundation of Toronto, the Kahanoff Foundation of Calgary, the McLean Foundation of Toronto, and the Richardson Century Fund of Winnipeg, all have contributed funds. This year, VIDO was extremely fortunate to receive a major grant from The W. Garfield Weston Foundation of Toronto. The Foundation has committed $500,000 over a five- year period for various aspects of our research in all species of livestock and poultry.

Based on the past five years, VIDO has been successful in attracting a total of $13,835,890 in operating revenue. The sources of this support are: the federal government, 33%; provincial governments, 26%; and private sources, 41%. VIDO feels that this balanced distribution confirms broad support for its research activities.

COMMUNICATIONS

"The Bovine Virus Diarrhea (BVD) Virus is widely spread within the cattle population. On average, 60%-80% of all tested cattle over one year of age have antibodies to the virus, which indicates that they have been infected at some stage." ... "Infectious Bursal (Gumboro) Disease (IBD) is an economically significant viral disease of young chickens which occurs worldwide."These are two statements drawn from VIDO's latest Fact Sheets written for producers, veterinarians, government extension personnel and others in the animal health care field. The BVD and IBD Fact Sheets were published during the past year and are being used extensively within their respective industries. Under consideration for next year are two additional Fact Sheets; the first is a revision of an earlier one on Calf Scours, and the second is on *Haemophilus somnus* which is becoming more important in feedlot cattle. In the past, VIDO has produced three Swine Technical Bulletins on Nursery Design, Farrowing Barn Design and Management, and Feeder Barn Design and Management. VIDO's Swine Technical Group, whose primary purpose is to assemble practical and new information for the swine industry, is in the process of revising the first bulletin on Swine Nursery Design. It will be available in the coming year.

FACILITIES

Last year we reported on the development of an additional 825 M^2 (10,600 ft^2) of new laboratory and office space in our lower level. This space has been instrumental in allowing VIDO to continue to be on the forefront of immunobiology research. This fall, an additional minor development of 70 M^2 (725 ft^2) was undertaken to complete the facilities in the basement.

The VIDO Research Station located at Floral, Saskatchewan (approximately 10 miles from the VIDO building) is being utilized at a very high rate. We continue to upgrade the facilities and in the current year have continued to develop more "clean areas" and cattle shelters. These livestock handling facilities are enabling our research to progress very rapidly.

PEOPLE

This year has been both demanding and challenging for the Organization. Our staff is dedicated to our research and development activities and without them, the significant progress achieved would not have been possible. In particular, I would like to thank my staff and the rest of the VIDO Management team for their support and assistance in the past year. The excitement generated by our people will no doubt ensure an exciting future for our Organization.

P.G. Hodgman

P.G. Hodgman

Virology Group
D. Yoo, M. Parker,
M. Redmond, S. van Drunen
Littel-van den Hurk,
T. Zamb (Program Manager)
Missing - J. Kowalski

Graduate Students
(Back Row - Left to Right)
S. Tikoo, M. Breker,
C. Morrison, D. Fitzpatrick
(Front Row - Left to Right)
D. Zhao, G. Cox, R.
Pontarollo, D. Godson

Two years ago in our Annual Report, we focused on the application of immunology and biotechnology for the development of vaccines. These research tools are being used by VIDO to produce improved products which will increase the efficiency of animal production. Two types of products are under development: 1) those to reduce economic losses by preventing infectious diseases, and 2) those which enhance productivity such as growth rate, reproductive performance, and carcass quality. This report will describe the progress we have made during the last year in applying these modern approaches to bring these products to commercial use.

VACCINES

Vaccines against infectious diseases contain the micro-organism, or components of it, which causes the disease which the vaccine should prevent. They can be classified into two broad categories: inactivated or killed vaccines, and modified-live vaccines. There are three types of killed vaccines. The first type contain the entire micro-organism which has been inactivated. The second type are extracts which usually contain protective components plus other non-protective parts of the micro-organism. The third type are subunit vaccines which contain only the specific components known to be protective. Any of these three types of vaccine can be produced using conventional or genetically engineered micro-organisms.

The second general category are vaccines which contain a living micro-organism which cannot cause clinical disease but can stimulate the development of protective immunity. Live vaccines can also be prepared from conventional or genetically engineered organisms. At the present time, the only live vaccines which are available in Canada are those which contain the organism which causes the disease against which the vaccine is directed. In the future, it will be possible to make live genetically engineered vaccines which will contain genes from several different micro-organisms. With these "live-vectored" vaccines, it will be possible to vaccinate against a number of diseases at one time.

VIDO is concentrating its efforts on extract and genetically engineered subunit vaccines for bacterial diseases, and genetically engineered subunit and live-vectored vaccines for viral diseases. Production enhancement vaccines will not contain micro-organisms or their components, but will contain natural factors found in animals such as hormones or hormone receptors. Therefore, they are similar to subunit vaccines. The products which VIDO is developing are summarized in Table 1. These are at different stages of development and will be ready for commercial use at regular intervals during the next five years.

L.A.Babiuk

TABLE 1 VACCINES UNDER DEVELOPMENT

PRODUCT APPLICATION	COMPONENTS
A. INFECTIOUS DISEASE	
Bovine Respiratory Disease	*Pasteurella haemolytica* *Haemophilus somnus* Bovine Herpesvirus-1 (IBR virus) Bovine Viral Diarrhea Virus (BVDV) Bovine Respiratory Syncytial Virus (BRSV) Parainfluenza-3 Virus (PI-3)
Porcine Respiratory Disease	*Actinobacillus (Haemophilus) pleuropneumoniae*
Calf Scours	Genetically engineered Rotavirus, Coronavirus, *E. coli*
Poultry - Septicemia and Airsacculitis	*E. coli*
B. PRODUCTION ENHANCEMENT	
	Hormones, hormone fragments, hormone receptors

The steps involved in developing any of the types of vaccines mentioned above are similar. These are summarized in Table 2, using genetically engineered subunit vaccines as an example. The scientific disciplines or "research tools" used during the research and development phases are shown in the right hand side of Table 2.

TABLE 2 SUBUNIT VACCINE DEVELOPMENT

STEPS	RESEARCH TOOLS
A. RESEARCH	
1. Identify the micro-organism which causes the disease (pathogen)	Microbiology
2. Determine whether recovery from infection provides protection from subsequent disease.	Immunology and Epidemiology
3. Identify the virulence factors and protective components (subunits) which allow the pathogen to cause disease or allow the host to resist infection.	Molecular Biology - Monoclonal antibodies - Synthetic peptides - Gene assignment
B. DEVELOPMENT	
4. Produce the protective component(s) and formulate experimental vaccines.	Biotechnology - Gene cloning - Gene expression - Protein engineering
5. Confirm the protective capacity in host animals.	Immunology - Establish protective capacity of expressed antigens
6. Formulate the final vaccine and conduct field trials.	Epidemiology and Immunology
C. COMMERCIALIZATION	
7. Licensing of vaccine by regulatory agencies.	Includes information from all of the above steps.
8. Commercial production	
9. Marketing	

VIDO'S FOCUS

During the past few years, VIDO has made significant progress in developing vaccines designed to reduce economic losses from diseases occurring on mucosal surfaces. These include the economically important problems of the respiratory and intestinal tracts such as pneumonia and enteritis. For many of the diseases, we have clearly identified the micro-organisms which cause disease, the specific components or virulence factors of these micro- organisms that are important in disease causation, and those components or subunits which can induce a protective immune response. Using genetic engineering techniques, we have produced sufficient quantities of some protective subunits and confirmed their potential use as vaccine candidates. The major emphasis is now on developing methods to "scale-up" production of the subunit vaccines so that large quantities can be produced economically. This aspect of vaccine development is being done in collaboration with BIOSTAR Inc., which has the task of commercializing them.

The protective subunits will be produced by single celled micro-organisms which have been genetically engineered. The cells will be grown in fermenters and will produce the subunits in large quantities. Therefore, each one of the millions of cells grown in culture will serve as a "mini factory". The type of factory cell selected will influence the configuration, and therefore the protective capacity, of the subunits. Therefore, it is important to select the correct factory cell. For bacterial vaccines it is most appropriate to produce them in bacterial cells; whereas for viral vaccines, it is more efficient to produce them in either mammalian or insect cells. VIDO is using all three systems and is developing methods to grow large quantities of each cell type in fermenters. When grown under the right conditions, the factory cells can produce much higher yields of protective components than the original micro-organism. For example, it is now possible to produce approximately 100 times as much *Pasteurella haemolytica* leukotoxin in a genetically engineered organism than it is in a normal strain of the bacterium. The leukotoxin is one important subunit needed in a vaccine to prevent shipping fever of cattle. The high efficiency of vaccine production in these systems will ensure that sufficient quantities of the protective subunits are present in the vaccines and that they can be produced economically.

Following production, subunits must be purified by a process referred to as "downstream processing". It is also important to determine whether components from two different organisms, for example, a virus and a bacterium can be combined together so as not to interfere with the protective immunity produced by either of them. In addition, since the subunits themselves are generally not capable of stimulating a strong immune response, they are usually combined with other substances which will enhance the animal's ability to produce protective immunity. Such compounds are called adjuvants. The final steps of mixing various subunits and combining them with adjuvants are referred to as "formulation".

PROGRESS ON SHIPPING FEVER VACCINE

VIDO's work on bovine respiratory disease represents one example of progress made during the last year. *Pasteurella haemolytica* and bovine herpesvirus-1, which causes the disease IBR, are two of the several pathogens which cause shipping fever. Our scientists have identified the most appropriate methods for growing, purifying, and combining the protective components from both micro- organisms in such a way that a very effective immune response is produced against them. Based on encouraging experimental results, a field trial will be conducted during the fall of 1989 to test the protective capacity of these killed vaccines under field conditions. This is the first field trial using recombinant DNA produced proteins that we are aware of in Canada. If these trials are successful, these vaccines may be available to livestock producers towards the end of 1990.

In addition to bovine herpesvirus-1 and *Pasteurella haemolytica*, a number of other viruses and bacteria are involved in the bovine respiratory disease complex. These include *Haemophilus somnus*, bovine viral diarrhea (BVD), Parainfluenza-3 (PI-3) and bovine respiratory syncytial (BRSV) viruses. VIDO is already working on the genes coding for important protective proteins of two of the viruses and *Haemophilus somnus*. Within two to three years, we anticipate adding these other components to the BHV-1-*Pasteurella haemolytica* combination to provide a broad spectrum vaccine against the shipping fever complex.

OTHER INFECTIOUS DISEASE VACCINES

Work is also proceeding well on a number of other vaccines. In the case of *Actinobacillus (Haemophilus) pleuropneumoniae* in pigs, we have used an alternate approach for producing a first generation vaccine. We have identified a way to extract the protective components directly from the bacterium. This extract has proven to not only protect animals from acute disease but also to reduce the chronic form. Chronically infected pigs become carriers which spread the organism to other pigs in the herd and to other premises. This first generation vaccine may be available to swine producers in early 1991. Future work will focus on determining whether the amount of the

protective proteins can be increased by recombinant DNA.

VIDO has already licensed a hemorrhagic enteritis virus vaccine for turkeys which is sold by Langford Inc. under the name of Hevlan TC. This vaccine has proven to be very effective against the virus under field conditions. We are now embarking on a project to develop a second vaccine for the poultry industry which will prevent *E. coli* infections. *E. coli* bacteria are associated with two major diseases in poultry: colisepticemia in which the bacteria acutely infect the blood and internal organs (this also occurs in the form of yolk sac infections), and airsacculitis which is a more chronic infection of the respiratory system. The airsacculitis complex involves a number of organisms of which *E. coli* appear to be one of the most severe. The project is designed to alter the *E. coli* genetically in such a way that their virulence (ability to cause disease) is eliminated while leaving the expression of important protective components unaltered. We anticipate that this vaccine will be incorporated into the drinking water so that it can easily be administered to large flocks.

PRODUCTION ENHANCEMENT VACCINES

During the last year there has been a considerable amount of attention in the news media regarding the use of hormones (such as growth hormone) in animals to increase growth rate, milk production and carcass characteristics. Eventhough these substances have been exhaustively tested, there has been a considerable amount of public resistance regarding this approach. Therefore, in collaboration with BIOSTAR Inc., and the Animal Biotechnology Group at the University of Saskatchewan, which include researchers from the Department of Animal and Poultry Science, the Western College of Veterinary Medicine, and the Reproductive Biology Unit at the College of Medicine, VIDO is exploring innovative ways to increase production efficiency by more natural approaches. Rather than feeding or injecting hormones into an animal, it may be possible to immunize against them so that physiological parameters such as growth, reproduction, and carcass characteristics are enhanced. This work is in the early phases but encouraging results are being achieved in animal tests.

CYTOKINES IN DISEASE PREVENTION

Cytokines are a family of molecules which are produced by immune cells which regulate the activity of the immune system. For example, one type of white blood cell will produce a cytokine which can influence the activity of another cell type. For effective immune responses to occur, it is important that specific cytokines be produced at the correct time and in the correct concentration. If too little of a specific cytokine is produced, there is an imbalance within the immune system often resulting in immunosuppression or increased susceptibility to disease.

At VIDO we have been investigating the role of cytokines in regulating immune responses and altering disease patterns in the hopes of being able both to predict the eventual outcome of the disease, as well as to prevent the disease. In addition to being useful in altering the animal's ability to recover from disease, cytokines can also be used in conjunction with vaccines to enhance immunity. Through a contract with CIBA-GEIGY Canada Ltd. and a Cooperative Research and Development grant from NSERC, we have been exploring the use of several cytokines in livestock. The interferons, interleukins, and tumor necrosis factor (TNF) are systemically being explored. Our studies have shown that some of them are useful for preventing diseases such as pneumonia and mastitis.

The use of cytokines to control disease and alter disease resistance is consistent with VIDO's philosophy of using natural factors to enhance resistance to infection. Cytokines are naturally produced compounds which are very effective in modulating immune responses in extremely small quantities. In addition, they do not leave residues in the meat following administration. Thus, we feel that such approaches are safer than are antibiotics for fighting infections.

SUMMARY

As described above, VIDO has progressed significantly during the last year in its application of modern genetic engineering from identification of the protective components of a disease causing organism to production of large quantities of vaccine components. We are the first organization in Canada to test subunit vaccines under field conditions. It is anticipated that within the next year VIDO will have the first genetically engineered subunit vaccines available to producers for reducing bovine respiratory disease in cattle. Following this, it is hoped that over the next two to three years, VIDO will be able to introduce one new vaccine each year. As a result, it is anticipated that the economic losses to the producer, as well as the degree of animal suffering as a result of infection, should be dramatically reduced.

These new vaccines should set the standard for the future. Future progress is dependent on the continued financial support by the many contributors to VIDO. Therefore, I thank the many organizations who have shared the vision of VIDO and provided us with financial support to pursue this exciting research. I would also like to thank the staff of VIDO for their dedication and continued hard work during this past year to ensure the continuation of the success of each of the individual projects as well as their ideas for future products. Without this dedication, the achievements of the past year or the future would have been impossible.

L.A. Babiuk

Immunology Group
H. Hughes, L. Sordillo, M. Campos (Program Manager), A. Jurado
Missing - H. Bielefeldt Ohmann, K. Ijaz

Laboratory Technicians
(Back Row - Left to Right) E. Gibbons, G. Crockford, Y. Popowych, D. Cordiero
(Middle Row - Left to Right) S. Klashinsky, L. Boyer, M. Snider, N. Rapin, D. Dent
(Front Row - Left to Right) L. McDougall, L. Gilbert, K. Ho, T. Wolfe
Missing - G. Harry, T. Beskorwayne

FINANCIAL REVIEW

Total income grew to $3,397,922 in 1989 compared to $3,277,338 in 1988. This increase of 3.7% was due to a $100,000 donation from The W. Garfield Weston Foundation and increases in conditional grant revenue as detailed in Schedule 2 of the Audited Financial Statements.

Total expenditures reached a record level of $3,285,809 in 1989 compared to $2,902,477 in 1988, a 13.2% increase. Salaries and fringe benefits account for the majority of this increase as the financial impact of new employees hired in the last half of the previous fiscal year and the first half of the current fiscal year took effect. The increased staff level resulted in corresponding increases in other expenditures.

Excess of income over expenditure was $112,113 in 1989 compared to $374,861 in 1988. During the year, $242,465 was transferred to the Capital Trust Fund. This transfer pertains to the financing of the construction costs of the basement development completed in 1988. Total transfers to date are $707,185. The remaining construction costs of $127,064 will be funded in 1990 by a further transfer from the VIDO Research Trust Fund.

The net effect on the VIDO Research Trust Fund balance was a decrease of $130,352 to $1,366,696 from $1,497,048 during 1989. This eliminated an almost equivalent increase in the Research Trust Fund balance of $132,396 in 1988. The balance in the Research Trust Fund at the end of the year represents only 41.6% of total expenditures. VIDO must strive to find new sources of income to maintain or increase this ratio. In addition, new sources of income will be required to fund the final stages of product development and testing for several vaccines which are nearing completion.

Fiscal 1989 was my first full year as Manager - Financial Operations at VIDO. The year provided several challenges and enriching experiences which were both unique and rewarding. I would like to express my gratitude to Deanna Kirchmeier and Marilee Hagen for the assistance they provided me throughout the year in handling their responsibilities in an effective manner. I would also like to thank Drs. Acres and Babiuk and Paul Hodgman for their advice and inspiration which has allowed me to function more efficiently. I look forward to continuing to work with the entire staff at VIDO as we enter a new decade of excitement and challenge.

K.B. Barteski

K.B. Barteski

FINANCIAL HIGHLIGHTS

	1989	1988	1987	1986	1985
Income	$3,397,922	$3,277,338	$3,086,731	$2,361,518	$1,712,381
Expenditures	3,285,809	2,902,477	3,009,614	2,143,024	1,840,421
Excess Income (Expenditures)	112,113	374,861	77,117	218,494	(128,040)
Transfer to Capital Trust	(242,465)	(242,465)	(222,255)	—	—
Increase (Decrease) in Fund Balance	$ (130,352)	$ 132,396	$ (145,138)	$ 218,494	$ (128,040)
Fund Balance	$1,366,696	$1,497,048	$1,364,652	$1,509,790	$1,291,296

Auditors' Report

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

We have examined the combined balance sheet of the University of Saskatchewan - Veterinary Infectious Disease Organization for the year ended September 30, 1989 and the statements of income, expenditure and fund balance (Research Trust and Capital Trust) and combined statement 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 donations and certain grants the completeness of which is not susceptible to satisfactory audit verification. Accordingly, our verification of revenues from these sources was limited to the amounts recorded in the records of the Organization and we were not able to determine whether any adjustments might be necessary to donations and grant revenue, excess of income over expenditure, assets and fund balance.

In our opinion, except for the effect of adjustments, if any, which we might have determined to be necessary had we been able to satisfy ourselves concerning the completeness of donations and certain grants referred to in the preceding paragraph, these financial statements present fairly the financial position of the University of Saskatchewan - Veterinary Infectious Disease Organization as at September 30, 1989 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 2 applied on a basis consistent with that of the preceding year.

Deloitte Haskins : Sells

Chartered Accountants December 1, 1989 Saskatoon, Saskatchewan

Research Trust

Statement of Income, Expenditure and Fund Balance
Year Ended September 30, 1989

	1989	1988
Income		
Donations and unconditional grants (Schedule 1)		
Livestock industry - dairy	$ 63,000	$ 62,000
- beef	114,062	141,000
- swine	100,598	101,374
Provincial governments	402,300	395,900
Other foundations, companies and individuals	100,000	500
	779,960	700,774
Conditional grants (Schedule 2)	1,618,732	1,498,149
Contract research	642,672	652,963
Contract services	67,000	43,608
Royalties	42,488	51,633
Interest	176,281	176,561
Animal services	34,688	40,464
License fees	36,101	113,186
	3,397,922	3,277,338
Expenditure		
Salaries and fringe benefits	1,472,799	1,183,249
Materials and supplies	783,776	686,440
Animal services	223,561	327,068
Equipment and service agreements	342,664	373,029
Travel and recruiting	175,306	109,406
Other (Note 7)	287,703	223,285
	3,285,809	2,902,477
Excess of Income Over Expenditure	112,113	374,861
Fund Balance, Beginning of Year	1,497,048	1,364,652
	1,609,161	1,739,513
Transfer to Capital Trust	(242,465)	(242,465)
Fund Balance, End of Year	$1,366,696	$1,497,048

Capital Trust

Statement of Income, Expenditure and Fund Balance

Year Ended September 30, 1989	1989	1988
Income		
Interest	$ —	$ 45,131
Expenditure		
Site and improvements	10,288	2,450
Furnishings, fixtures and equipment	8,020	7,412
Buildings	20,765	807,344
	39,073	817,206
Excess of Expenditure Over Income	(39,073)	(772,075)
Fund Balance, Beginning of Year	(330,456)	199,154
	(369,529)	(572,921)
Transfer From Research Trust	242,465	242,465
Fund Balance, End of Year (Note 8)	$(127,064)	$(330,456)

Combined Statement of Changes in Financial Position

Year Ended September 30, 1989	1989	1988
Operating Activities		
Working capital from operations		
Research Trust excess of income over expenditure	$ 112,113	$ 374,861
Changes in non-cash operating working capital		
Due from University of Saskatchewan	(378,637)	(106,145)
Accounts receivable	34,088	324,827
Inventories	(24,121)	(21,051)
Accounts payable	(72,175)	73,060
Deferred revenue	51,229	203
Cash (used in) provided by operating activities	(277,503)	645,755
Investing Activities		
Reductions in (Additions to) investments	204,240	(8,644)
Capital Trust excess of expenditure over income	(39,073)	(772,075)
Cash provided by (used in) investing activities	165,167	(780,719)
Financing Activities		
Repayment of loan payable	(25,000)	(25,000)
Cash used in financing activities	(25,000)	(25,000)
(Decrease) in Cash	(137,336)	(159,964)
Cash, Beginning of Year	885,282	1,045,246
Cash, End of Year	$ 747,946	$ 885,282

Cash represents funds held by the University of Saskatchewan and cash on hand.

University of Saskatchewan
Veterinary Infectious Disease Organization (V.I.D.O.)

Combined Balance Sheet

September 30, 1989	1989	1988
ASSETS		
Current Assets		
Cash on hand	$ 5,000	$ 25,000
Funds held by University of Saskatchewan	742,946	860,282
Due from University of Saskatchewan - operating fund	809,406	486,612
Accounts receivable (Note 3)	412,521	446,609
Inventories (Note 4)	100,648	76,527
	2,070,521	1,895,030
Investments (quoted market value $622,970; 1988 - $826,608)	628,689	832,929
Plant Assets		
Site and improvements	146,503	136,215
Furnishings, fixtures and equipment	446,783	438,763
Buildings and facilities	4,987,761	4,966,996
	5,581,047	5,541,974
	$8,280,257	$8,269,933
LIABILITIES		
Current Liabilities		
Accounts payable	$ 38,386	$ 97,818
Deferred revenue (Note 5)	1,310,280	1,259,051
Due to University of Saskatchewan - capital fund	10,912	79,498
Current portion of loan payable	25,000	25,000
	1,384,578	1,461,367
Loan Payable (Note 6)	75,000	100,000
	1,459,578	1,561,367
EQUITY		
Capital Assets	5,581,047	5,541,974
Research Trust	1,366,696	1,497,048
Capital Trust	(127,064)	(330,456)
	6,820,679	6,708,566
	$8,280,257	$8,269,933

Notes to the Financial Statements

September 30, 1989

1. Establishing Agreement

The Organization was established by an agreement dated August 11, 1975 between the Devonian Foundation of Calgary, Alberta, 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.

2. Significant Accounting Policies

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

Fund accounting
Transactions of the Organization are accounted for by fund accounting principles which require classification of resources into "funds" to reflect the various designated uses. The Research Trust fund consists of those revenues and expenses used in the general operations of the Organization. The Capital Trust fund consists of grants, interest and authorized transfers from the Research Trust for the purpose of acquiring capital assets. Funds are transferred from the Research Trust to operations and to the Capital Trust as approved by the Board of Directors. 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 1 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 of materials and supplies are valued at the lower of cost and net realizable value. Animal inventory is valued at cost.

Investments
Investments are recorded at cost. The difference between cost and par value of 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.

Deferred revenue consists of unexpended funds relating to specific grants and donations and is determined on the percentage of completion basis.

License Fees and Royalties
License fees and royalties are recognized as they are received or earned under the terms of the agreements with licensees.

3. Accounts Receivable

	1989	1988
Royalties	$ 6,139	$ 22,437
Unconditional grantors and donors	36,400	—
Conditional grants (Schedule 2)	181,533	234,729
Contract research	159,021	134,455
Service contracts	17,563	31,896
Accrued interest	11,865	23,092
	$412,521	$446,609

4. Inventories

	1989	1988
Animals	$ 57,149	$49,256
Materials and supplies	43,499	27,271
	$100,648	$76,527

5. Deferred Revenue

	1989	1988
Conditional grants (Schedule 2)	$ 961,659	$ 795,497
Contract research	173,621	289,004
Donations and unconditional grants	175,000	174,550
	$1,310,280	$1,259,051

6. Loan Payable

The loan payable is interest free and is repayable to the University of Saskatchewan in equal installments of $25,000 per annum ending October 1, 1993.

7. Other Expenditures

Other expenditures consist of V.I.D.O. operating accounts which include repairs and maintenance, equipment rental, annual report and technical bulletins, professional fees and board expenses.

8. Capital Trust - Fund Balance

During the prior year the Organization completed the development of research facilities in the lower level of the building. Construction costs for this development are being financed through appropriations from the V.I.D.O. Research Trust over a four year period beginning in 1987. At September 30, 1989 the costs of this development exceeded the appropriations from the Research Trust by $127,064. Additional appropriations will be made from the Research Trust as income from existing research contracts designated for this purpose is earned.

9. 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 82% of 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 Inc.:

	1989	1988
Income from BIOSTAR Inc. to V.I.D.O.		
Contract research	$160,324	$82,712
Contract services	67,000	43,608
Material purchases	3,589	4,578
Sponsorship of two industrial research chairs at V.I.D.O. in conjunction with NSERC	60,275	24,467
Expenditure by V.I.D.O. to BIOSTAR Inc.		
Management service fees	27,217	35,267
Research and Veterinary Services	52,959	10,755
Equipment lease	10,200	—

At September 30, 1989 the Organization has a receivable from BIOSTAR Inc. of $46,982 (1988 -$67,352).

10. Comparative Figures

Certain of the prior year's figures have been reclassified to conform to the current year's presentation.

Schedule 1

Schedule of Donations and Unconditional Grants

Year Ended September 30, 1989	1989	1988
Livestock Industry		
Dairy		
Saskatchewan Dairy Producers Cooperative Limited	$ 50,000	$ 50,000
Manitoba Milk Producers' Marketing Board	10,000	10,000
Alberta Milk Producers' Society	3,000	1,000
Fraser Valley Milk Producers Cooperative Association	—	1,000
	63,000	62,000
Beef		
Saskatchewan Cattle Marketing Deductions Fund	75,000	75,000
British Columbia Cattlemen's Association	5,000	5,000
Kamloops Stockmen's Association	700	700
Alberta Cattle Commission	33,362	60,000
Western Stock Growers' Association	—	300
	114,062	141,000
Swine		
Alberta Pork Producers Development Corporation	41,745	41,659
Saskatchewan Pork Producers Marketing Board	18,275	16,885
Manitoba Pork Inc.	33,435	34,525
B.C. Hog Marketing Commission	6,095	5,000
Swine Improvement Services Co-operative (SISCO)	1,048	3,305
	100,598	101,374
Provincial Governments		
Saskatchewan	300,000	300,000
Alberta	75,400	75,400
British Columbia	11,400	5,000
Manitoba	15,500	15,500
	402,300	395,900
Other Foundations, Companies and Individuals		
Richardson Century Fund	—	500
The W. Garfield Weston Foundation	100,000	—
	100,000	500
	$779,960	$700,774

Schedule 2

Schedule of Conditional Grants

Year Ended September 30, 1989	September 30, 1988		1989	September 30, 1989			
	Accounts Receivable	Deferred Revenue	Funds Received	Accounts Receivable	Deferred Revenue	1989 Income	1988 Income
Natural Sciences and Engineering Research Council of Canada (NSERC)							
- Co-operative Research Development Agreement	$ —	$ 596,273	$ 650,000	$ —	$ 570,493	$ 675,780	$ 512,947
- Industrial Research Chairs	—	30,680	291,249	—	117,571	204,358	209,896
- Operating, Strategic and Equipment	—	79,300	155,852	—	35,400	199,752	248,317
BIOSTAR Inc. - NSERC Industrial Research Chairs	—	35,806	72,812	—	48,343	60,275	24,467
Agriculture Canada/NSERC Research Partnerships Grants	—	—	200,000	—	150,000	50,000	—
Farming for the Future Council of Alberta	—	—	38,000	—	28,512	9,488	39,829
Alberta Agriculture Research Institute (AARI)	—	—	11,779	21,579	—	33,358	—
Province of Ontario (OMAF) and Agriculture Research Institute of Ontario	91,009	—	113,388	85,124	—	107,503	126,724
Canada-Manitoba Agri-Food Development Agreement (ERDA)	25,704	—	29,825	19,830	—	23,951	56,390
Canada-Saskatchewan Sub Agreement on Agriculture (ERDA)	37,500	52,520	82,500	5,000	—	102,520	89,857
Saskatchewan Agriculture and Food - Agriculture Development Fund (SADF)	50,000	918	100,000	50,000	11,340	89,578	107,789
Agriculture Canada - Livestock Productivity Improvement Program	30,516	—	92,685	—	—	62,169	66,933
Saskatchewan Agriculture and Food - Agriculture Research Fund (SARF)	—	—	—	—	—	—	15,000
	$ 234,729	$ 795,497	$ 1,838,090	$ 181,533	$ 961,659	$ 1,618,732	$ 1,498,149

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Babiuk, L.A. 1989. Beef cattle research and development at VIDO. Alberta Agriculture Beef Research Review Meeting. Edmonton, Alberta. September 18.

Harland, R.J. 1989. Herd health management program for cow/calf operations. Manitoba Beef Cattle Seminar. Brandon, Manitoba. January.

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Hodgman, P.G. 1988. VIDO - a unique and valuable resource for Canada. Meetings of Degree and Vocational Agriculture Students. University of Saskatchewan, Saskatoon, Saskatchewan. November.

Hodgman, P.G. 1988. Cattle research update. Manitoba Cattle Producers Association Annual Meeting. Portage La Prairie,Manitoba. December 9.

Hodgman, P.G. 1988. Cattle research update. Alberta Cattle Commission Annual Meeting. Calgary, Alberta. December 6.

Hodgman, P.G. 1989. Advanced technology and cattle research at VIDO. Saskatchewan Cattle Feeders Association Annual Meeting. Saskatoon, Saskatchewan. January 9.

Hodgman, P.G. 1989. Swine research update. Alberta Pork Development Inc. Annual Meeting. Edmonton, Alberta. April 12.

Hodgman, P.G. 1989. Advanced technology and animal health adventure in technology program for students sponsored by the Rotary Club. Saskatoon, Saskatchewan. May 10.

Hodgman, P.G. 1989. Cattle research update. Saskatchewan Stock Growers Association Annual Meeting. Kindersley, Saskatchewan.June 5.

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van den Hurk, J.V. 1989. Serological comparison of viral vaccines for bovine respiratory disease. Agriculture Canada Research Station. Melfort, Saskatchewan. August 24.

Watts, T.C. 1989. An overview of VIDO research. Rate payers of Piapot Annual Meeting. Piapot, Saskatchewan. May.

Watts, T.C. 1989. The role of animal health technician in research. Saskatchewan Association of Animal Health Technicians. Saskatoon, Saskatchewan. September.

Chapters in Books, Expository and Review Articles

Babiuk, L.A. 1988. Biotechnology applied in animal vaccine development and production. In: Biotechnology Research and Applications. Ed. J. Gavora, D.F. Gerson, J. Luong, A. Storer and J.H. Woodler. Elsevier, London, pp. 12-23.

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Research Collaborators

Dr. Paula Cray, University of Nebraska, Lincoln, Nebraska, U.S.A.

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Mr. Duane McCartney, Agriculture Canada Research Station, Melfort,Saskatchewan.

Dr. Craig Riddell, Department of Veterinary Pathology, Western College of Veterinary Medicine, Saskatoon, Saskatchewan.

Dr. Anthony Schryvers, University of Calgary, Calgary, Alberta.

Dr. Robert Walker, Michigan State University, East Lansing, Michigan, U.S.A.

GUESTS TO VIDO BOARD BANQUETS

Regina Meeting - February 7, 1989

Les Bowd
Assistant Deputy Minister
Saskatchewan Agriculture & Food

Doug Lisle
Director
Economics Branch
Saskatchewan Agriculture & Food

Roger Fry
Head
Livestock Branch
Saskatchewan Agriculture & Food

Bob Ford
Administrator
Production & Development Section
Livestock Branch
Saskatchewan Agriculture & Food

Al Hingston
Livestock Branch
Saskatchewan Agriculture & Food

David Sim
Head
Agriculture Development Diversification
Secretarit
Saskatchewan Agriculture & Food

John Taylor
Manager
Agriculture Development Fund
Saskatchewan Agriculture & Food

Wayne Gosselin
Provincial ERDA Co-ordinator
Saskatchewan Agriculture & Food

Peter Rempel
Head
Provincial Veterinary Laboratory
Saskatchewan Agriculture & Food

Bruce Hanson
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AGDEVCO

Milos Henhart
AGDEVCO

David Rothwell
Deputy Minister
Saskatchewan Economic Development and Tourism

Bob Perrin
Saskatchewan Trade and Investment

Jim Lowe
Agriculture & Food Development Branch
Agriculture Canada

Bernie Ward
Veterinary Inspection Directorate
Agriculture Canada

Don Hepburn
Food Production & Inspection Branch
Agriculture Canada

Lynn Biggart
Director
Canadian Cattlemen's Association

Theresa Norlander
Secretary-Manager
Saskatchewan Stock Growers' Association

Rob Brown
Executive Vice-President
Agriculture Insight Foundation Inc.

Don Allewell
General Manager
Livestock Division
Saskatchewan Wheat Pool

Vanessa Headford
Project Co-ordinator
Canadian Western Agribition

Betty Guild
Secretary-Manager
Saskatchewan Hereford Association

Ken McDonald
Director
Saskatchewan Cattle Feeders Association

Glen Thompson
Director
Saskatchewan Cattle Feeders Association

Aubrey Wood
Director
Saskatchewan Wheat Pool

Steve Krueger
STV News Room

Sherri-Lynn Hargrave
"The Provincial"
CKTV

Holly Krueger
CKCK Radio

Gordon Stephenson
National Sales Manager
Animal Health
Hoechst Canada

John Murphy
District Manager
Agriculture Services
Royal Bank

Wayne Borys
Agrologist
Bank of Montreal

Ron Presnell
President
Saskatchewan Veterinary Medical Association

Walter Weir
Past Member of the VIDO Board of Directors

Saskatoon Meeting - May 17, 1989

David Dombowsky
Chairman
BIOSTAR Inc. Board of Directors

Mac Sheppard
Trustee
VIDO Research Turst
University of Saskatchewan

Clarence Froese
Member VIDO Swine Technical Group
Manitoba Agriculture
Winnipeg, Manitoba

Joel Allan
Member VIDO Swine Technical Group
Lumby, British Columbia

Burt Jorgenson
Member VIDO Swine Technical Group
New Brigden, Alberta

Paul Veilfaure
Member VIDO Swine Technical Group
La Broquerie, Manitoba

John Patience
Member VIDO Swine Technical Group
Prairie Swine Center
Saskatoon, Saskatchewan

Dennis Hodgkinson
Member VIDO Swine Technical Group
Niverville Feeds & Farm Supplies
Niverville, Manitoba

Walter Heuser
Member VIDO Swine Technical Group
Steinbach, Manitoba

Richmond Meeting - September 26, 1989

Frank Jirik
Biomedical Research Center
University of British Columbia

Barry McBride
Department of Microbiology
University of British Columbia

Jim Love
Co-ordinator
Animal Care
University of British Columbia

Bob Blair
Head
Animal Science Department
University of British Columbia

Bruce Owen
Animal Science Department
University of British Columbia

Bill Dorward
Health of Animals Laboratory
Agriculture Canada

A. Oliver
Regional Director General
Food Production & Inspection Branch
Agriculture Canada

Mike Martin
Regional Veterinary Director
Veterinary Inspection Directorate
Agriculture Canada

J.M. Molnar
Agassiz Research Station
Agriculture Canada

Herb Carlson
Supporter of VIDO
Victoria, British Columbia

Al Leslie
Abbotsford, British Columbia

Stewart Ritchie
Abbotsford, British Columbia

Barrie Peterson
Past Member
VIDO Board of Directors
Agassiz, British Columbia

Chris Byra
Member of VIDO Swine Technical Group
Chilliwack, British Columbia

Dan Haan
Member of VIDO Swine Technical Group
Chilliwack, British Columbia

Chris Bigland
Past Director of VIDO
Victoria, British Columbia

Carol Paulsen
Managing Editor
Butter Fat Magazine

Pat Scarlett
Beef Information Center

Sandra Felgenhauer
Helix Biotech Scientific Ltd.

Bill Sedgewick
Vice President
B.C. Cattlemen's Association

Don Petrar
General Manager
B.C. Livestock Co-op

John Morrison
B.C. Livestock Co-op

Peter Friesen
President
Fraser Valley Milk Producers Association

John van Dongen
President
B.C. Federation of Dairymen's Association

Jack Brown
Vice-President
B.C. Federation of Agriculture

Mike Heppel
B.C. Turkey Association

Walter Goerzen
Chairman
Canadian Feed Industry Association

Lorne Greenaway
Deputy Minister
B.C. Ministry of Agriculture and Fisheries

Peter Hewitt
Chief Veterinarian
Veterinary Branch
B.C. Ministry of Agriculture & Fisheries

Ron Lewis
Veterinary Laboratory
B.C. Ministry of Agriculture & Fisheries

Jack Coates
Veterinary Laboratory
B.C. Ministry of Agriculture & Fisheries

John Robinson
Veterinary Laboratory
B.C. Ministry of Agriculture & Fisheries

Hugh Bryce
B.C. Ministry of Agriculture & Fisheries

Wayne Wickens
Regional Director, South Coastal Region
B.C. Ministry of Agriculture & Fisheries

Tom McLellan
Member
BIOSTAR Inc. Board of Directors

Dr. Lorne Babiuk, VIDO's Associate Director (Research) and a Professor in the Department of Veterinary Microbiology in the Western College of Veterinary Medicine, was awarded a Doctor of Science (DSc) by the University of Saskatchewan. This degree is awarded on the basis of scholarly activity of an outstanding nature, as judged by three outside referees familiar with the individual's work. The research requirements and the calibre of scholarly work are substantially in advance of what is accepted for a Doctor of Philosophy (PhD) degree, which is the highest formal degree attained by most researchers.

L.A. Babiuk

The description of Dr. Babiuk's achievements reads in part as follows:
"Dr. Babiuk has an international reputation in viral immunology. He heads one of the largest teams of biotechnologists in Canada working on animal health problems. The team is developing genetically engineered vaccines against viruses that cost the livestock industry millions of dollars annually. His research with herpesviruses is the most widely known component of the Program. These include infectious bovine rhinotracheitis (IBR), which causes respiratory and genital infections in cattle. IBR is a principle virus associated with shipping fever, which results in widespread losses amongst feeder cattle.
Babiuk has also been working on a vaccine against the main bacterial component of shipping fever. Moreover, he has made important discoveries about how viruses and bacteria increase each other's virulence in respiratory infections. .... he is on the leading edge of investigations into the role of immunomodulators, which enhance the immune response to viral infections. ... he is the first person to develop a method of producing laboratory cultures of rotavirus, one of the common virus causes of scours in all species of young animals and humans. His technique, which opened the way to a better understanding of how the virus develops and reproduces, has been adopted by everyone studying rotaviruses in humans and animals. As a result, a vaccine against human rotavirus infections is under development."

On behalf of everyone at VIDO, we extend our congratulations to Lorne on his scientific achievements.