VIDO 1991-92 ANNUAL REPORT

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 safe and effective animal health and performance products, preventive medicine programs and improved livestock management. 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 the development of human health products and by reducing diseases that are directly transmissible from animals to man.

ORIGINS & MANDATE

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 financially self-reliant national 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 performance products, preventive medicine programs and improved livestock management techniques and information.

Report from the Chairman

One of life's satisfactions is having the opportunity to see a group of people work effectively as a team toward a common goal. Such has been the case during my involvement with VIDO. This involvement extends back to the mid 1970s when the production data from my pig herd was being contributed to a VIDO research project.

B.G. Larson
Chairman

What is remarkable about this Organization is the unique vision held by its founding Director, Dr. Chris Bigland, and the fact that the successive complement of management, scientists and staff have continued to pursue this vision and successfully convert it to reality.

J.G. Huffman
Vice-Chairman

Each successive new invention or product brought to market not only enhances the livestock and poultry industry, but solidly reinforces the vision. It is this impressive record of achievement that will be the sustaining element for ongoing support of VIDO by producers and others.

As an agricultural research institution, the Organization is in a new phase relative to the 1970s. Biotechnology is having such a profound impact on scientific advancement that its discoveries will affect society beyond its traditional agricultural boundaries.

With the establishment of BIOSTAR as the vehicle for commercialization of VIDO's inventions, an intriguing partnership has evolved. This parallel evolution has been fundamental in fulfilling VIDO's mandate – to serve livestock and poultry producers and consumers!

As VIDO and BIOSTAR jointly pursue future challenges, I wish to extend my appreciation to Dr. Stephen Acres, the management, scientists, and staff for their unrelenting effort in converting Dr. Bigland's vision to reality. I'm confident that VIDO's achievements are going to provide significant benefits for the industry and society.

B.G. Larson

1991-92 VIDO
BOARD OF DIRECTORS

Back Row - Left to Right
P.G. Hodgman (Executive Officer), C. Rennie, J. Doherty,
G. Hamilton, A. Hingston, E. Moss, R. Byle, R. Hunsberger, R. Christian

Middle Row - Left to Right
L.A. Babiuk (Associate Director, Research),
D. Rowlatt, K. Barteski (Manager, Financial Operations)

Front Row - Left to Right
G. Larson (Chairman), G. Huffman (Vice-Chairman), S. Acres (Director)
Missing - G. Schoepp

VIDO Management

Left to right

Ken Barteski (Manager, Financial Operations),
Stephen Acres (Director),
Paul Hodgman (Executive Officer),
Lorne Babiuk (Associate Director, Research)

The backbone of any research organization is its staff. Today VIDO has a staff of approximately 70 people, including scientific and support staff and graduate students. The scientific staff includes twenty-five people with one or more degrees from universities, including the degrees of Doctor of Veterinary Medicine (DVM), Master of Science (MSc), Master of Veterinary Science (MVSc), Master of Preventive Veterinary Medicine (MPVM) and Doctor of Philosophy (PhD). Our staff includes specialists in a number of scientific disciplines such as veterinary medicine, epidemiology, microbiology, virology, immunology, chemistry, biochemistry and cell biology. Many of VIDO's researchers have more than one advanced degree, and several have as many as three. These degrees are evidence of the years of training, experience, and specialization which they bring to the job of finding practical solutions to animal health and production issues. The support staff also includes individuals with a variety of experience and expertise in fields as diverse as molecular biology, animal care, media preparation, office management and accounting.

Dr. Stephen D. Acres
Director

Unlike many research institutes, VIDO does not have a guaranteed funding base. Research funds are provided by a variety of sources which are summarized in the audited financial statements making up part of this Annual Report. However, the hallmark of all of these funding sources is that none provide permanent support to the Organization. The great majority of VIDO's funding is received in the form of grants, contracts, or donations which generally last from one to three years, and occasionally as long as five years. As a result, the Organization is under constant pressure to do more, but often without increased resources.

VIDO was fortunate to grow through the late 1980s and to remain stable through the early 1990s at its current size. One of the ways in which VIDO has achieved a certain level of stability in the face of financial uncertainty is to ensure that it maintains funding to sustain a permanent or core group of scientists and support staff. This core group is supplemented, as funding permits, by recruiting post-doctoral fellows, visiting scientists, and other temporary staff for various periods of time. These people make major contributions to projects, but unfortunately the Organization often cannot afford to employ them long term and they move on to permanent careers in other locations. While this turnover in staff causes some disruptions in research progress, it is also beneficial in that replacements bring new ideas, techniques, and perspectives. This helps to provide a fertile intellectual environment from which new ideas can emerge. In addition, those who leave VIDO after a temporary stay often remain in touch and extend VIDO's network of scientific and commercial contacts around the world.

Project teams also play an increasingly important role in how VIDO carries out its research. The business of reducing economic losses from infectious diseases and production problems is complex and requires people with a range and variety of expertise as outlined above. This need to involve and interface people with different training, backgrounds, and perspectives is often referred to as "multidisciplinary" or "interdisciplinary" team work. It is a key element in the way VIDO functions. The use of project teams does not reduce the importance of individuals, and it is often inventive, creative, and insightful researchers working alone

who identify the opportunities and ignite enthusiasm for their practical application. However, more often than not it is teamwork by staff at all levels of the Organization which drives projects through many obstacles to completion.

For the past decade VIDO's research programs have been structured around the scientific disciplines of virology, bacteriology, and immunology. These programs have been assisted by supporting units in animal care, clinical medicine, monoclonal antibody production, peptide synthesis, glassware/media preparation, and administrative services. This program structure has served the Organization well; however, as the size of the Organization increases, interaction among disciplines becomes more difficult to coordinate and to focus on applied objectives.

Therefore as we enter a new year, VIDO's 19th, we are exploring potential ways of restructuring the scientific programs to make them more efficient. Part of this includes improving the Organization's ability to focus on the needs of its supporters. There is a substantial body of research that indicates that the greatest cause of research failure is inadequate understanding of market needs. Therefore, the Organization is continually working to understand those needs and to efficiently apply its resources towards addressing them. The transfer of information to producer through extension activities and contact with producer organizations is another important function which is continually being improved. This ability to focus on the market needs and provide effective solutions will be key to helping VIDO to assist Canada's livestock and poultry industries to remain internationally competitive.

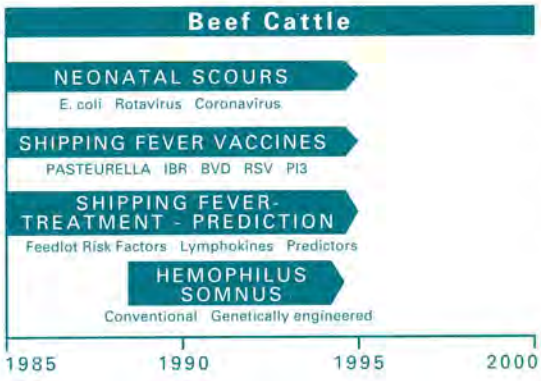

Fig.1

The start of the 1992-93 VIDO fiscal year also marks my ninth year as Director. One of the most rewarding aspects of my role is to observe the contributions which VIDO makes to Canada's livestock and poultry industries on an on-going basis. Another is to support the growth and development of staff, particularly those who will provide the next decade of leadership to the Organization. Over time, new scientists become seasoned researchers, project managers become program managers, and some program managers grow into executive positions where management of research becomes as rewarding to them as doing research. As individuals move through these various stages, management and communication skills become as important as technical skills. Characteristics such as integrity, self-confidence, the ability to think strategically and a facility for communicating ideas are leadership traits which must be combined with strong technical training in a scientific discipline. VIDO has many such people in its ranks and I look forward to working with them in new roles which allow them to grow and develop their personal careers as well as to strengthen the Organization.

The Evolution of Biostar Inc.

In past years, I have described the growth and development of BIOSTAR Inc., the company which was established by VIDO and the University of Saskatchewan in 1983 to commercialize developments made at VIDO. The Company is wholly-owned by the BIOSTAR Trust which was established for the benefit of VIDO and the University of Saskatchewan. The BIOSTAR Trust and the beneficial owners desire to privatize the Company and to see it become more widely held and commercially active. Therefore, BIOSTAR is about to initiate a private equity placement of shares of the Company to raise the capital needed to complete the development and registration of a number of animal health products obtained from VIDO and other sources, and to establish a world class product development and manufacturing facility in Saskatoon. BIOSTAR anticipates that this private placement will be completed in 1993.

Board of Directors

The VIDO Board is comprised of 13 individuals representing the livestock and poultry industries, the business community, the University of Saskatchewan, and federal and provincial governments. Board members serve terms of four years in duration. Board representatives are selected from across Canada and provide balanced representation from the various livestock and poultry sectors VIDO is involved with, as well as geographically. This year it is my special privilege to thank four retiring directors. Dr. Gavin Hamilton, who spent nine years as a director, retired last summer as Dean of the Western College of Veterinary Medicine at the University of Saskatchewan. He was a long-standing Board member who provided sound advice and continuity to Board activities for almost a decade. Dr. Don Rowlatt, Vice-President (Administration) at the University of Saskatchewan, also resigned after seven years as a director. He was a member of the Executive Committee and took an active interest in all of VIDO's activities. I would also like to thank Dr. Clare Rennie who completed four years of service. Dr. Rennie represented the Province of Ontario and provided much thoughtful insight to the issues facing the Board. Finally, I would like to thank Mr. Garth Larson, out-going Chairman, who served as Chairman for the past two years. Garth provided a great deal of practical insight, and was always available on short notice. My thanks to these four retiring Board members and to all remaining directors for their guidance, sound counsel, and support. The entire staff of VIDO wish them well in their future activities. I would also like to welcome four new Board members: Dr. Alexander Livingston, the new Dean of the Veterinary College of Veterinary Medicine; Dr. Dennis Johnson, Associate Vice-President (Research) at the University of Saskatchewan; Mr. Don Taylor, Principal of the Ridgetown Agriculture College of Ridgetown, Ontario; and Mr. Fred van Ingen from Redwater, Alberta. The management team looks forward to working with them in the coming years.

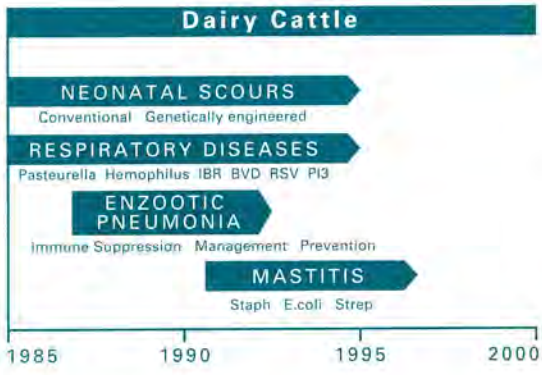

Fig.2

Innovation is defined as "to change or alter by introducing something new." VIDO has always been innovative in its operations, research approaches, and activities. Innovative in that we only do research on those diseases or performance problems as identified by livestock and poultry producers as being of significant economic importance to their industry. We do not research problems just because scientists think they are interesting or important – we research what makes a difference to the bottom line. Innovative in that all research is focused and developed with a practical product or service at the end of the project – not research for research's sake. Innovative in that VIDO remains accountable to the livestock industry and other supporters. Our clients are essential for input and financial contributions. Innovative in our use of facilities and advanced scientific equipment. Innovative in our early adoption of advanced technologies, such as biotechnology and immunology. VIDO may be market driven; however, we are also technology dependent. Innovative in our team approach to research and development. Teams are established to take research from the laboratory bench to application and, if appropriate, commercialization. Innovative in our structure – a self-reliant, national Organization of the University of Saskatchewan. Innovative in our Board of Directors' composition which includes producers, and representatives from government, university, and business. But perhaps in no area do we show greater innovation than in our financing. In this area our uniqueness is both a curse and a blessing. A curse in that we receive no guaranteed funding from any source. A blessing in that we must stay attuned, accountable, and relevant in order to obtain support from all sources.

Mr. Paul G. Hodgman
Executive Officer

VIDO's research operations are funded through its own initiatives and resources. Although legally part of the University, VIDO receives no financial support for salaries through government sources such as other departments receive. The University, however, is a major benefactor to VIDO through its contributions to building maintenance, utilities, and other ancillary services. The Organization's operations are funded through its initiatives and resources. We have obtained financial support from a wide mosaic of contributors including the livestock industry, governments (federal and provincial), granting agencies, charitable foundations, commercial contracts, invention revenue, and interest on our own investments. In fact, in the past five years, VIDO has raised $19,466,300 for research from over 35 different supporters. This feat is particularly amazing as the external environment for funding has become extremely difficult of late. Through tight management, fiscal control, and continued accountability to our clients, VIDO has not only been able to maintain level financial support, we have been able to obtain some new supporters. Our long-term commitment in the areas of public relations, accountability, and "staying the course" with what the industry deems important has allowed VIDO to develop unique scientific knowledge and technologies that are recognized internationally as

being on the cutting edge. Of the $19,466,300 raised in the last five years, the livestock and poultry industries have contributed eight to ten percent. Their support has allowed us to obtain significant additional funds through levering and matching other sources. As previously stated, this unique funding mosaic has been both a benefit and a problem. Changes by agencies in approaches to funding research from providing unencumbered funding to project funding, plus a move to matching fund programs, and the inability of specific grant programs to fund key scientists and certain research activities are causes for concern to VIDO. Often, our leading scientists are supported from unencumbered funds which are declining as a percentage of the total. In addition, protection for proprietary information through patents comes from these same unencumbered funds. Research is expensive. Studies show that to maintain a scientist, a technician, and consumable research goods generally costs between $150-250,000 per scientist per year. At VIDO our investment in the same package is approximately $170,000 per scientist. The cost of developing a modern animal vaccine can range from a minimum of $1 M to $3 M to as high as $7 M or $8 M. By contrast, a human vaccine costs $100-125 M.

The biggest challenge facing VIDO in the next three years will be to obtain more stable funding for our key scientists and to protect our proprietary information. To this end, we are actively pursuing all avenues and developing unique approaches to solve this great challenge.

VIDO's research philosophy continues to be one of focusing our research efforts and resources at solving problems of economic relevance to producers. To help us achieve this goal we identify specific disease problems that are important to producers, then direct the resources available to VIDO to solving these problems. VIDO's major areas of research are designed to understand the pathogenesis of the common infectious diseases of poultry and livestock with the goal of developing better management systems and immunization protocols (by producing more effective vaccines) which will help to reduce the economic losses from infection. Due to our expertise in immunology we have recently expanded our mandate to investigate how the endocrine (hormone) system can be modulated immunologically to improve production parameters such as reproductive efficiency, growth, stress adaptation, lactation, aggression, and to develop vaccines to replace surgical castration. VIDO's current research plans are found in Figures 1 through 4 which indicate the specific areas of investigation that VIDO is currently involved in. These figures not only indicate the projects that are currently being conducted, but provide potential target dates for completion of the project.

Dr. Lorne A. Babiuk
Associate Director (Research)

Some key advances made during the past year include the development of a novel approach to the production of large quantities of subunit vaccines. One of the main considerations in vaccine development is not only to produce large quantities of vaccine economically, but to ensure that the structure of the components in the vaccine are similar to those structures present on the disease causing organism. Thus for viruses, production of a vaccine in mammalian cells would be the ideal. Unfortunately, to date most systems employed to do this require destruction of the cell that produces the vaccine during the harvesting phase of vaccine production. Researchers at VIDO have designed a mammalian cell system that grows continuously under appropriate conditions and secretes the vaccine into the growth media. This not only reduces the cost of producing the product that is going to be incorporated into the vaccine, but also reduces the subsequent steps of purification and formulation into the vaccine. A patent has been filed to protect this technology which we hope to use for producing most of VIDO's viral vaccines as well as licensing the technology to other companies for their use. In addition to the patent mentioned above, we have been active in identifying and protecting other innovations at VIDO. As a result three patents were issued last year and seven new applications filed.

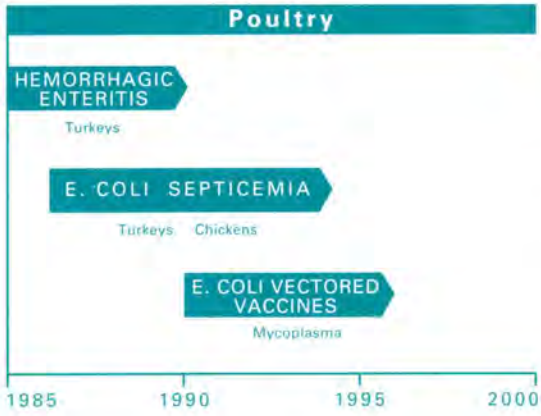

Fig.3

In addition to subunit vaccines, our scientists are also developing genetically engineered live viral and bacterial vaccines. These vaccines are made by identifying specific genes which are responsible for the organism's ability to cause disease

(virulence genes). These genes are then altered or deleted so that the organism's ability to infect an animal is not affected, but its ability to cause disease is completely removed. These "crippled" organisms can then be administered to the animal in such a way that they resemble the natural infection. Such an approach will induce the entire range of host immune responses similar to a natural infection. A further advantage of this technology is the possibility of introducing genes coding for protective antigens from other disease causing organisms into the "crippled" organism. In this way, vaccination with the chimeric organism should induce protection not only to the vector (crippled organism), but also to the additional disease causing organism whose gene was added to the vector. Such an approach is being developed with bovine herpesvirus virus (IBR), where we are incorporating genes from other bovine pathogens (bovine respiratory syncytial virus, parainfluenza-3, bovine virus diarrhea, *Pasteurella haemolytica,* etc.) into the IBR virus. In this way one vaccine should protect animals from all of the bovine respiratory pathogens. A similar approach is being used with *E. coli* in poultry. With this technology, we could insert genes from Salmonella, Mycoplasma and other poultry disease causing organisms into the *E. coli* and provide protection against all of the diseases.

Although no new vaccines were licensed during this past year, we hope that the progress made should result in two new vaccines being field tested and hopefully registered by Agriculture Canada during the next year. These new vaccines will provide Canadian producers with a more efficacious product and hopefully improve their global competitiveness.

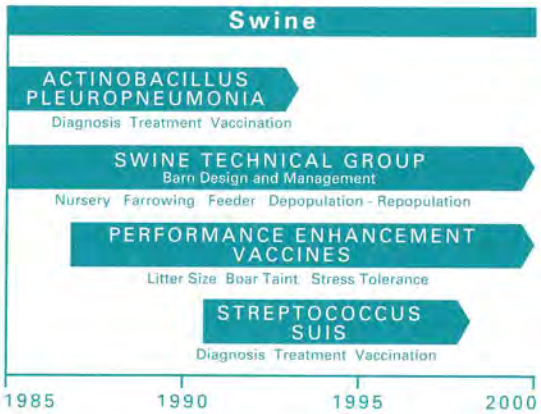

Fig.4

VIDO's total income remained virtually unchanged for the third consecutive year; $4,251,420 in 1992 compared to $4,274,626 in 1991 and $4,265,031 in 1990. This is a significant accomplishment given the current economic situation in the country and the increased number of organizations competing for research funding. Executive Officer Paul Hodgman as well as scientific staff submitting grant applications are to be commended for their efforts in this regard. Schedules 1 and 2 of the accompanying Audited Financial Statements outline the major sources of donations and conditional and unconditional grants.

Mr. Ken Barteski
Manager, Financial Operations

Total expenditures decreased by $69,650 or 1.6% from 1991 reflecting the relative stability in staff levels over the past year.

The net result for the year was an excess of expenditure over income, or decrease in the Research Trust Fund balance, of $20,074 for the year compared to a decrease of $66,518 in 1991. As in the previous year, the Research Trust Fund balance was further reduced by a transfer of $15,000 to the Capital Trust Fund leaving a balance of $1,180,607 in the Research Trust Fund at September 30, 1992, compared to a balance of $1,215,681 at September 30, 1992. The balance in the Capital Trust Fund was $30,000 at September 30, 1992, compared to $15,000 at September 30, 1991.

Fiscal 1992 was my last full year as Manager, Financial Operations at VIDO. The continuing development and progress made by BIOSTAR Inc. has reached the stage that requires me to devote 100% of my energies towards BIOSTAR activities.

The past five years have been a truly unique and rewarding experience – an experience to which many people contributed from the Board of Directors to the entire staff. Thank you!

I am confident that the courtesies and assistance everyone afforded me will also be extended to Carol Martel as she takes up the position of Manager, Financial Operations in January, 1993.

VIDO FINANCIAL SUPPORTERS

The following groups and agencies contributed funds to VIDO over the course of the past fiscal year through donations, grants, or contracts. Their support is acknowledged and greatly appreciated.

Agriculture Canada
Alberta Agricultural Research Institute
- Matching Grants Program
- Farming for the Future Program
Alberta Cattle Commission
Alberta Milk Producers' Society
Alberta Pork Producers Development Corporation
BIOSTAR Inc.
British Columbia Cattlemen's Association
British Columbia Hog Marketing Commission
Canada Bacterial Diseases Network
Canadian Turkey Marketing Agency
Kamloops Stockmen's Association
Manitoba Milk Producers' Marketing Board
Manitoba Pork est.
Max Bell Foundation
National Agricultural Biotechnology Institute - Department of Western Economic Diversification
Natural Sciences and Engineering Research Council of Canada (NSERC)
Ontario Milk Marketing Board
Ontario Pork Producers
Province of Alberta - Alberta Agriculture
Province of British Columbia - B.C. Ministry of Agriculture and Fisheries
Province of Manitoba - Manitoba Department of Agriculture
Province of Ontario - Ontario Ministry of Agriculture and Food and Agriculture Research Institute of Ontario
Saskatchewan Agriculture and Food - Agricultural Development Fund
Saskatchewan Cattle Marketing Deductions Fund
Saskatchewan Health Research Board
Saskatchewan Pork International Marketing Group
Saskatchewan Wheat Pool
Swine Improvement Services Co-operative (SISCO)
University of Minnesota
The W. Garfield Weston Foundation

Auditors' Report

To the Board of Directors
Veterinary Infectious Disease Organization (VIDO),
University of Saskatchewan

We have audited the combined balance sheet of the University of Saskatchewan – Veterinary Infectious Disease Organization as at September 30, 1992 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. These financial statements are the responsibility of the Organization's management. Our responsibility is to express an opinion on these financial statements based on our audit.

We conducted our audit in accordance with generally accepted auditing standards. Those standards require that we plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

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, in all material respects, the financial position of the organization as at September 30, 1992 and the results of its operations and the changes in its financial position for the year then ended in accordance with the accounting policies described in Note 2.

Deloitte & Touche

Chartered Accountants
December 22, 1992

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

Research Trust Statement of Income, Expenditure and Fund Balance

Year ended September 30, 1992

	1992	1991
INCOME		
Donations and unconditional grants (Schedule 1)		
Livestock and poultry industries - beef	$ 85,700	$ 83,200
- dairy	25,000	71,000
- swine	121,132	101,179
- turkey	36,000	44,200
Provincial governments	77,457	80,500
Other contributors	190,155	100,200
	535,444	480,279
Conditional grants (Schedule 2)	2,342,461	2,329,057
Contract research		
Commercial	589,573	727,619
Government	380,286	373,463
Contract services	86,263	55,189
Royalties	35,925	24,567
Interest	108,646	124,751
Animal Services	138,502	124,301
License fees	34,320	35,400
	4,251,420	4,274,626
EXPENDITURE		
Salaries and fringe benefits	2,410,810	2,336,214
Materials and supplies	914,270	751,858
Animal services	112,368	409,721
Equipment and service agreements	337,906	244,628
Travel and recruiting	141,220	131,556
Patents and legal fees	66,334	151,450
Other (Note 7)	288,586	315,717
	4,271,494	4,341,144
EXCESS OF (EXPENDITURE OVER INCOME)	(20,074)	(66,518)
FUND BALANCE, BEGINNING OF YEAR	1,215,681	1,297,199
	1,195,607	1,230,681
TRANSFER TO CAPITAL TRUST	(15,000)	(15,000)
FUND BALANCE, END OF YEAR	$1,180,607	$1,215,681

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

Capital Trust Statement of Income, Expenditure and Fund Balance

Year ended September 30, 1992

	1992	1991
FUND BALANCE, BEGINNING OF YEAR	$ 15,000	$ –
TRANSFER FROM RESEARCH TRUST	15,000	15,000
FUND BALANCE, END OF YEAR	$ 30,000	$ 15,000

APPROVED BY THE BOARD:

Director

Trustee

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

Combined Balance Sheet

Year ended September 30, 1992

	1992	1991
ASSETS		
Current Assets		
Cash on hand	$ 144,674	$ –
Funds held by University of Saskatchewan	84,101	14,108
Due from University of Saskatchewan - operating fund	426,276	1,031,958
Accounts receivable (Note 3)	861,348	1,120,738
Inventories (Note 4)	42,187	98,968
	1,558,586	2,265,772
Investments (quoted market value $250,250; 1991 - $508,432)	252,113	508,639
Plant Assets		
Site and improvements	146,503	146,503
Furnishings, fixtures and equipment	459,752	459,752
Buildings and facilities	5,036,996	5,036,996
	5,643,251	5,643,251
	$7,453,950	$8,417,662
LIABILITIES		
Current Liabilities		
Accounts payable	$ 16,902	$ 14,458
Unearned revenue (Note 5)	558,190	1,479,272
Current portion of loan payable	25,000	25,000
	600,092	1,518,730
Loan Payable (Note 6)	–	25,000
	600,092	1,543,730
EQUITY		
Capital Assets	5,643,251	5,643,251
Research Trust	1,180,607	1,215,681
Capital Trust	30,000	15,000
	6,853,858	6,873,932
	$7,453,950	$8,417,662

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

Combined Statement of Changes in Financial Position

Year ended September 30, 1992

	1992	1991
OPERATING ACTIVITIES		
Working capital from operations		
Research Trust excess of (expenditure over income)	$ (20,074)	$ (66,518)
Changes in non-cash operating working capital		
Due from University of Saskatchewan	605,682	(166,876)
Accounts receivable	259,390	(335,504)
Inventories	56,781	5,495
Accounts payable	2,444	(11,552)
Unearned revenue	(921,082)	301,698
Cash used in operating activities	(16,859)	(273,257)
INVESTING ACTIVITIES		
Reductions in investments	256,526	50,062
FINANCING ACTIVITIES		
Repayment of loan payable	(25,000)	(25,000)
INCREASE (DECREASE) IN CASH	214,667	(248,195)
CASH, BEGINNING OF YEAR	14,108	262,303
CASH, END OF YEAR	$ 228,775	$ 14,108

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

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

COMBINED STATEMENT OF CHANGES IN FINANCIAL POSITION

September 30, 1992

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.

Unearned 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

	1992	1991
Donations and unconditional grants	$ 52,076	$ 115,000
Conditional grants (Schedule 2)	165,872	259,088
Contract research	261,812	690,114
Contract services	20,404	13,505
Recoverable patent costs	308,256	–
Royalties	40,536	21,288
Accrued Interest	12,392	21,743
	$ 861,348	$1,120,738

4. INVENTORIES

	1992	1991
Animals	$ 15,707	$ 63,108
Materials and supplies	26,480	35,860
	$ 42,187	$ 98,968

5. UNEARNED REVENUE

	1992	1991
Donations and unconditional grants	$ 25,000	$ 125,000
Conditional grants (Schedule 2)	553,190	1,109,479
Contract research	–	244,793
	$ 558,190	$1,479,272

6. LOAN PAYABLE

The loan payable is interest free and repayable to the University of Saskatchewan in equal installments of $25,000 per annum ending October 1, 1992.

7. OTHER EXPENDITURES

Other expenditures consist of VIDO operating accounts which include repairs and maintenance, equipment rental, annual report and technical bulletins, professional fees and Board expenses.

8. INCOME TAXES

The Organization is not subject to either federal or provincial income taxes.

9. RELATED PARTY TRANSACTIONS

a) VIDO 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 VIDO. 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 is the beneficiary of a Trust which owns 100% of BIOSTAR Inc., a research and development company which assists VIDO in the development of its products and technologies. During the year VIDO had the following transactions with BIOSTAR Inc.:

	1992	1991
Income from BIOSTAR Inc. to VIDO		
Contract research	$ 171,759	$ 148,267
Contract services	86,262	55,189
Material purchases	4,172	19,391
Sponsorship of two industrial research chairs at VIDO in conjunction with NSERC	149,202	122,157
Expenditure by VIDO to BIOSTAR Inc.		
Management service fees	22,769	26,206
Research and Veterinary Services	54,510	77,815
Equipment lease	20,876	20,757
Expenditures made by VIDO on BIOSTAR's behalf	308,256	–

At September 30, 1992 the Organization has a receivable from BIOSTAR Inc. of $411,740. (1991 - $115,458).

10. COMPARATIVE FIGURES

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

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

Schedule 1

Schedule of Donations and Unconditional Grants

Year ended September 30, 1992

	1992	1991
LIVESTOCK AND POULTRY INDUSTRIES		
Beef		
British Columbia Cattlemen's Association	$ 5,000	$ 5,000
Kamloops Stockmen's Association	700	700
Manitoba Cattle Producers Association	–	2,500
Saskatchewan Cattle Marketing Deductions Fund	75,000	75,000
Saskatchewan Wheat Pool	5,000	–
	85,700	83,200
Dairy		
Alberta Milk Producers' Society	10,000	10,000
Fraser Valley Milk Producers Cooperative Association	–	1,000
Manitoba Milk Producers' Marketing Board	10,000	10,000
Ontario Milk Marketing Board	5,000	–
Saskatchewan Dairy Producers Co-operative Limited	–	50,000
	25,000	71,000
Swine		
Alberta Pork Producers Development Corporation	40,353	41,291
B.C. Hog Marketing Commission	6,336	6,535
Manitoba Pork est.	33,470	33,262
Ontario Pork Producers	20,000	–
SPI Marketing Group	19,842	18,912
Swine Improvement Services Co-operative (SISCO)	1,131	1,179
	121,132	101,179
Turkey		
Canadian Turkey Marketing Agency	36,000	44,200
PROVINCIAL GOVERNMENTS		
Alberta	50,000	50,000
British Columbia	11,957	15,000
Manitoba	15,500	15,500
	77,457	80,500
OTHER CONTRIBUTORS		
The W. Garfield Weston Foundation	100,000	100,000
Max Bell Foundation	90,000	–
Individuals	155	200
	190,155	100,200
	$ 535,444	$ 480,279

University of Saskatchewan
Veterinary Infectious Disease Organization (VIDO)

Schedule 2

Schedule of Conditional Grants and Contracts

Year ended September 30, 1992

	September 30, 1991		1992	September 30, 1992			
	Accounts Receivable	Unearned Revenue	Funds Received	Accounts Receivable	Unearned Revenue	1992 Income	1991 Income
Natural Sciences and Engineering Research Council of Canada (NSERC)							
- Co-operative Research Development Agreement	$ –	$ 526,337	$ –	$ –	$ –	$ 526,337	$ 654,778
- Industrial Research Chairs	–	60,015	33,790	–	23,343	70,462	127,033
- Operating, Strategic and Equipment	–	117,353	503,540	–	143,437	477,456	407,974
- Industry Matching	–	–	102,604	–	–	102,604	120,324
BIOSTAR Inc. - NSERC Industrial Research Chairs	–	82,395	136,837	–	70,030	149,202	122,157
Canadian Bacterial Diseases Network	–	56,937	310,848	–	63,444	304,341	245,445
Agriculture Canada/NSERC Research Partnerships Grants	99,800	149,700	165,800	66,000	99,000	182,700	199,900
Medical Research Council	–	–	53,288	–	35,525	17,763	–
Alberta Agriculture Research Institute (AARI)							
- Matching Grants Program	28,034	51,237	121,788	36,308	10,064	171,235	95,048
- Farming for the Future Program	6,746	44,615	228,088	32,777	19,000	279,734	155,049
Alberta Cattle Commission	–	–	35,200	–	29,022	6,178	36,750
Province of Ontario (OMAF) and Agriculture Research Institute of Ontario	37,656	–	37,656	15,393	–	15,393	43,487
National Agricultural Biotechnology Initiative	–	–	–	15,393	–	15,393	–
Saskatchewan Health Research Board Fellowship	–	20,890	58,199	–	40,325	38,764	17,555
Saskatchewan Agriculture and Food - Agriculture Development Fund (SADF)	–	–	–	–	–	–	47,393
Saskatchewan Horned Cattle Trust Fund	–	–	–	–	–	–	20,000
University of Minnesota	86,852	–	71,751	–	–	(15,101)	36,164
	$259,088	$1,109,479	$1,859,389	$165,871	$533,190	$2,342,461	$2,329,057

PATENTS, PUBLICATIONS, PRESENTATIONS, AND RESEARCH COLLABORATORS

PATENTS ISSUED ON WHICH VIDO STAFF ARE INVENTORS

United States Patent No 5151267

- –Title - Bovine Herpesvirus Type-1 Polypeptides and Vaccines
- – Date - September 29, 1992
- – Inventors - L.A. Babiuk, S. van Drunen Littel-van den Hurk, T.J. Zamb, and D.R. Fitzpatrick
- – Assignee - University of Saskatchewan

United States Patent No 5124145

- – Title - Method for the Prevention and Treatment of Bovine Mastitis
- – Date - June 23, 1992
- – Inventors - L. Sordillo and L. Babiuk
- – Assignee - Ciba-Geigy Canada Ltd.

United States Patent No 5071651

- –Title - Rotavirus Nucleocapsid Protein VP6 as a Carrier in Vaccine Compositions
- –Date - December 10, 1991
- –Inventors - M. Sabara, P. Frenchick, K. Mullin-Ready
- – Assignees - University of Saskatchewan, Saskatoon, Canada

United States Patent No. 5,151,267

- – Title - Bovine Herpesvirus Type-1 Polypeptides and Vaccines
- – Date - September 29, 1992
- – Inventors - L. Babiuk, S. van den Hurk, D. Fitzpatrick, T. Zamb.
- – Assignees - University of Saskatchewan, Saskatoon, Canada

RESEARCH PUBLICATIONS IN SCIENTIFIC JOURNALS

Campos, M., Hughes, H.P.A., Godson, D.L., Sordillo, L.M., Rossi-Campos, A., and Babiuk, L.A. 1992. Clinical and immunological effects of single bolus administration of recombinant interleukin-2 in cattle. Can. J. Vet. Res. 56:10-15.

Gerlach, G.-F., Klashinsky, S., Anderson, C., Potter, A.A., and Willson, P.J. 1992. Characterization of two genes encoding distinct transferrin-binding proteins in different *Actinobacillus pleuropneumoniae* isolates. Infect. Immun. 60:3253-3261.

Gerlach, G.-F., Anderson, C., Potter, A.A., Klashinsky, S., and Willson, A.A. 1992. Cloning and expression of a transferrin-binding protein from *Actinobacillus pleuropneumoniae*. Infect. and Immun. 60:892-898.

Godson, D.L., Campos, M., and Babiuk, L.A. 1992. The role of bovine intraepithelial leukocyte mediated cytotoxicity in enteric antiviral defense. Viral Immunol. 5:1-13.

Goerzen, D.W., and Watts, T.C. 1991. Efficacy of the fumigant paraformaldehyde for control of microflora associated with the alfalfa leafcutting bee, *Megachile rotundata* (Fabricius) (Hymenoptera: Megachilidae) Bee Science 1:4:212-218.

Harland, R.J., A.A. Potter, van Drunen Littel-van den Hurk, S., Van Donkersgoed, J., Parker, M.D., Zamb, T.J., and Janzen, E.D. 1991. Efficacy of a *Pasteurella haemolytica* leukotoxoid and extract vaccine for the prevention of respiratory disease in feedlot calves, when given with subunit or modified live BHV-1 vaccines. Can. Vet. J. 33:734-741.

Hughes, H.P.A., Campos, M., van Drunen Littel-van den Hurk, S., Zamb, T., Sordillo, L.M., Godson, D.L., and Babiuk, L.A. 1992. Multiple administration with cytokines potentiates antigen-specific responses to subunit vaccination with bovine herpesvirus-1 glycoprotein IV. Vaccine 10:226-230.

Hughes, H.P.A., and Babiuk, L.A. 1992. The adjuvant potenial of cytokines. Biotech. Therapeutics 3:101-117.

Hughes, H.P.A., Campos, M., Godson, D.L., van Drunen Littel-van den Hurk, S., McDougall, L., Rapin, N., and Babiuk, L.A. 1992. Immunopotentiation of bovine herpesvirus subunit vaccination by interleukin-2. Immunol. 74:461-466.

Hughes, H.P.A., Campos, M., Potter, A.A., and Babiuk, L.A. 1992. Molecular chimerization of *Pasteurella haemolytica* leukotoxin to interleukin-2: Effects on cytokine and antigen function. Infect. Immun. 60:565-570.

Liang, X., Babiuk, L.A., and Zamb, T.J. 1992. An *in vivo* study of a glycoprotein gIII-negative bovine herpesvirus 1 (BHV-1) mutant expressing ß-galactosidase: evaluation of the role of gIII in virus infectivity and its use as a vector for mucosal immunization. Virol. 189:629-639.

Liang, X., Babiuk, L.A., and Zamb, T.J. 1991. Pseudorabies virus gIII and bovine herpesvirus-1 gIII share complementary functions. J. Virol. 65:10:5553-5557.

Rossi-Campos, A., Anderson, C., Gerlach, G.-F., Klashinsky, S., Potter, A.A., and Willson, P.J. 1992. Immunization of pigs against *Actinobacillus pleuropneumoniae* with two recombinant protein preparations. Vaccine 10:512-518.

Sordillo, L.M., Redmond, M.J., Campos, M., Warren, L., and Babiuk, L.A. 1991. Cytokine activity in bovine mammary gland secretion during the periparturient. Vet. Res. 55:298-301.

Theisen, M., Rioux, C.R., and Potter, A.A. 1992. Molecular cloning, nucleotide sequence, and characterization of a 40,000-molecular-weight lipoprotein of *Haemophilus somnus*. Infect. Immun. 60:826-831.

Theisen, M., and Potter, A.A. 1992. Cloning, sequencing, expression, and functional studies of a 15,000-molecular-weight *Haemophilus somnus* antigen similar to *Escherichia coli* ribosomal protein S9. J. Bacteriol. 174:17-23.

van den Hurk, J.V. 1992. Characterization of the structural proteins of hemorrhagic enteritis virus. Arch. Virol. 126:195-213.

van Drunen Littel-van den Hurk, S., Parker, M.D., Fitzpatrick, D.R., van den Hurk, J.V., Campos, M., Babiuk, L.A., and Zamb, T.J. 1992. Structural, functional and immunological characterization of bovine herpesvirus-1 glycoprotein gI, expressed by recombinant baculovirus. Virol. 190:378-392.

Van Donkersgoed, J., van den Hurk, J.V., McCartney, D., and Harland, R. 1991. Comparative serological response in calves to eight commercial vaccines against infectious bovine rhinotracheitis, parainfluenza-3, bovine respiratory syncytial, and bovine viral diarrhea viruses. Can Vet. J. 32:727-733.

Xiang, J., Pan, Z., Attah-Poku, S., Babiuk, L., Zhang, Y., and Liu, E. 1992. Production of hybrid bispecific antibody recognizing human colorectal carcinoma and CD3 antigen. Mol. Biother. 4:15-23.

Yoo, D., Cox, G.J., and Yoo, I.D. 1992. Phosphorylation of the nucleocapsid protein (N) of bovine coronavirus expressed with a recombinant baculovirus vector. J. Microbiol. Biotechnol. 2:122-128.

Yoo, D., Yoo, I.D., Yoon, Y.H., Graham, F.L., and Babiuk, L.A. 1992. Helper- independent adenovirus vector expressing the haemagglutinin-esterase membrane glycoprotein. J. Microbiol. Biotechnol. 2:174-182.

Yoo, D., Graham, F.L., Prevec, L., Parker, M.D., Benkö, M., Zamb, T., Babiuk, L.A. 1992. Synthesis and processing of the haemagglutinin-esterase glycoprotein of bovine coronavirus encoded in the E3 region of adenovirus. J. Gen. Virol. 73:2591-2600.

RESEARCH PRESENTATIONS, POSTERS, AND ABSTRACTS PRESENTED AT MEETINGS

Allan, B.J., van den Hurk, J.V., and Potter, A.A. 1992. Construction of a candidate vaccine strain of *Escherichia coli* to prevent colibacillosis in poultry. Fallen Leaf Lake Conference in Bacterial Virulence Mechanisms. South Lake Tahoe, California, U.S.A. September.

Campos, M., Hughes, H.P.A., Potter, A.A., Godson, D.L., and Babiuk, L.A. 1992. Cytokine-antigen chimeras: the good, the bad, and the better. 3rd International Veterinary Immunology Symposium. Budapest, Hungary. August.

Campos, M., Bielfeldt-Ohmann, H., Rossi-Campos, A., Harland, R., Redmond, M., Cordeiro, D., Hughes, H.P.A., and Babiuk, L.A. 1991. Regulation of bovine acute phase responses by parenteral administration of tumor necrosis factor and interferon-g. 72nd Conference of Research Workers in Animal Diseases. Chicago, Illinois, U.S.A. November.

Campos, M., Redmond, M.J., Harland, R., Cordeiro, D., and Babiuk, L.A. 1991. Acute phase proteins as predictors and prognosticators of disease. 72nd Conference of Research Workers on Animal Disease. Chicago, Illinois, U.S.A. November.

Cox, G., Parker, M.D., and Babiuk, L.A. 1992. Bovine coronavirus: antigens and cell-mediated immunity. Bio-recognition: International Industrial Biotechnology Conference. Winner of International Graduate Student Presentation Award. Montreal, Quebec. June.

Cox, G., Parker, M.D., and Babiuk, L.A. 1992. Molecular and immunological characterization of recombinant bovine coronavirus proteins. The American Society for Virology 1992 Annual Meeting. Cornell University, Ithica, New York, U.S.A. July.

Ellis, J.A., Godson, D.L., and Campos, M. 1991. Development and application of a capture immunoassay for ruminant tumour necrosis factor-a. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Gerlach, G.-F., Anderson, C., Potter, A.A., Klashinsky, S., and Willson, P.J. 1991. Cloning and expression of a transferrin-binding protein from *Actinobacillus pleuropneumoniae*. 72nd Conference for Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Gerlach, G.-F., Rossi-Campos, A., Anderson, C., Klashinsky, S., Potter, A.A., and Willson, P.J. 1992. Immunization of pigs against *Actinobacillus pleuropneumoniae* with a recombinant subunit vaccine. 72nd Conference of Research Workers in Animal Diseases. Chicago, Illinois, U.S.A. November.

Gerlach, G.-F., Anderson, C., Rossi-Campos, A., and Potter, A.A. 1992. The role of the 103kd *Actinobacillus pleuropneumoniae* cytolysin in virulence and the association of the encoding gene with insertion sequence-like elements. International Swine Veterinary Symposium. The Hague, Netherlands. August.

Gerlach, G.-F., Klashinsky, S., Anderson, C., Potter, A.A., and Willson, P.J. 1992. Distribution and heterogeneity of the transferrin-binding proteins in *Actinobacillus pleuropneumoniae*. Annual Meeting of the American Society of Microbiologists. New Orleans, Louisiana, U.S.A. May.

Godson, D.L., Campos, M., Ellis, J.A., Haines, D.M., Rossi-Campos, A., and Babiuk, L.A. 1991. Development of a lymph node cannulation model to study virus-induced immunosuppression. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Hariharan, K., Hariharan, M.J., Krueger, R.J., Zamb, T.J., Fitzpatrick, D.R., van Drunen Littel-van den Hurk, S., and Srikumaran, S. 1992. Bovine herpesvirus-1 permissive cell penetration is inhibited by gI-specific antibodies and viral peptides. 17th International Herpesvirus Workshop. Edinburgh, Scotland. August.

Harland, R.J., Potter, A.A., van Drunen Littel-van den Hurk, S., Van Donkersgoed, J., Parker, M.D., Zamb, T.J., and Janzen, D. 1991. A field efficacy trial of a recombinant *Pasteurella haemolytica* vaccine and the effect of subunit or modified-live BHV-1 vaccines. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Harland, R.J. Schuh, J., and Potter, A.A. 1992. Experimental *Haemophilus somnus* myocarditis and polyarthritis in cattle. American College of Veterinary Pathology Annual Meeting. Miami, Florida, U.S.A. January.

Harland, R.J. 1992. Bovine respiratory disease – Research update: The epidemiology of bovine respiratory disease; Characteristics of some specific BRD microbial pathogens; Vaccination to prevent BRD; Other prophylactic methods to prevent BRD; Surveillance and treatment of BRD. 53rd Annual Conference. Colorado Veterinary Medical Association. Denver, Colorado, U.S.A. January.

Harland, R.J. 1991. Pasteurellosis vaccination and interaction of vaccines. Academy of Veterinary Consultants, Winter Meeting. Denver, Colorado, U.S.A. December.

Hughes, H.P.A., Campos, M., Godson, D.L., van Drunen Littel-van den Hurk, S., Zamb, T., and Babiuk, L.A. 1991. IL-2 treatment can enhance responses to small immunizing doses of antigen. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Hughes, H.P.A., Campos, M., Potter, A.A., and Babiuk, L.A. 1992. Functional characteristics of cytokine-antigen chimeric proteins and their projected use in vaccine formulation. Canadian Society for Immunology Annual Meeting. Mont Rolland, Quebec. March.

Hughes, H.P.A., Campos, M., Potter, A.A., and Babiuk, L.A. 1992. Characterization and function of antigen-cytokine chimeras. Federation of American Societies for Experimental Biology Meeting. Anaheim, California. April.

Hughes, H.P.A., Campos, M., Potter, A.A., van Drunen Littel-van den Hurk, S., Zamb, T., and L.A. Babiuk. 1991. Molecular chimeras or mixtures of interleukin-2 with antigen modulate antigen-specific responses by enhanced T-cell activation. Third International Workshop on Cytokines. Stresa, Italy. November.

Ijaz, M.K., Redmond, M.J., Attah-Poku, S.K., Dent, D., and Babiuk, L.A. 1992. A synthetic peptide from rotavirus VP4 blocks virus attachment and prevents rotavirus infection. WHO Meeting on Enteric Diseases. Cambridge, United Kingdom. April.

Orten, D.J., Xue, W., Abdelmagid, O.Y., Reddy, D.N., van Drunen Littel-van den Hurk, S., Blecha, F., Campos, M., Babiuk, L.A., and Minocha, H.C. 1991. Comparison of bovine immune response to affinity-purified bovine herpesvirus-1 anti-idiotypes and glycoproteins. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Pfeifer, C.G., Campos, M., Beskorwayne, T., Babiuk, L.A., and Potter, A.A. 1992. Effect of *Haemophilus somnus* on phagocytosis and hydrogen peroxide production by bovine polymorphonuclear leukocytes. UA/UC Meeting on Infectious Diseases. Kananaskis, Alberta. June.

Pontarollo, R., Babiuk, L.A. and Potter, A.A. 1992. Cloning and expresssion of a gene coding for a hemin-binding protein of *Haemophilus somnus*. UA/UC Meeting on Infectious Diseases. Kananaskis, Alberta. June.

Popowych, Y., Campos, M., Hughes, H.P.A., and Babiuk, L.A. 1991. Optimal antigen preparation allows for detection of a biphasic cell mediated immune response to bovine herpesvirus type 1. 72nd Conference of Research Workers in Animal Diseases. Chicago, Illinois, U.S.A. November.

Potter, A.A., Hughes, H. and Harland, R.J. 1992. Recombinant vaccines for *Pasteurella haemolytica*. 1992. International Symposium on Pasteurellosis in Production Animals. Bali, Indonesia. August.

Potter, A.A., and Harland, R.J. 1992. Vaccination of calves with recombinant leukotoxin. Miami Winter Symposium. Miami, Florida, U.S.A. January.

Potter, A.A. 1992. Bovine vaccines. Canadian Bacterial Diseases Network Annual Meeting. Kananaskis, Alberta. June.

Redmond, M.J. 1992. Development of a vaccine for the immunological castration of swine. National Industry - Federal Government Committee on the Production and Marketing of Pork from Intact Male Pigs. Toronto, Ontario. January.

Redmond, M.J., Ijaz, M.K., Parker, M.D., Sabara, M.K., and Babiuk, L.A. 1992. Assembly of recombinant rotavirus proteins into virus-like particles and assessment of vaccine potential. WHO Meeting on Enteric Diseases. Cambridge, United Kingdom. April.

Ribble, C., Van Donkersgoed, J.V., Harland, R., and Janzen, E. 1992. Using epidemiology as an aid in feedlot disease management. American Association of Bovine Practitioners. Minneapolis, Minnesota. September.

Rioux, C.R., Rawlyk, N.A. Theisen, M., and Potter, A.A. 1992. Cloning, characterization, and overexpression of *lppC*, a gene encoding an antigenic 60-kilodalton lipoprotein of *Haemophilus somnus*. UA/UC Conference on Infectious Diseases. Kananaskis, Alberta. June.

Rossi-Campos, A., Campos, M., and Potter, A.A. 1992. *Actinobacillus pleuropneumoniae:* modulation of pathogenesis by recombinant interferon. International Swine Veterinary Symposium. The Hague, Netherlands. August.

Rossi-Campos, A., Anderson, C., Gerlach, G.-F., Klashinsky, S., Potter, A.A. and Willson, P.J. Immunization of pigs against *Actinobacillus pleuropneumoniae* with two recombinant protein preparations. 72nd Conference for Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Sordillo, L.M., Godson, D.L., Campos, M., and Babiuk, L.A. 1991. Recombinant granulocyte/macrophage colony stimulating factor (GM-CSF) enhances bovine peripheral blood and mammary gland neutrophil function. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Theisen, M., Rioux, C.R., Gilchrist, J., and Potter, A.A. 1991. Cloning, nucleotide sequence, and characterization of a 40,000-molecular weight lipoprotein of *Haemophilus somnus*. 5th European Congress of Clinical Microbiology and Infectious Diseases. Oslo, Norway. September.

Theisen, M., Rioux, C.R., and Potter, A.A. 1992. Cloning and characterization of *lppB*, a gene encoding an antigenic 40-kilodalton lipoprotein of *Haemophilus somnus*. 92nd General Meeting of the American Society for Microbiology. New Orleans, Louisiana. May.

Theisen, M., and Potter, A.A. 1991. Cloning and expression of a gene coding for a major outer membrane protein of *Haemophilus somnus*. 5th European Congress of Clinical Microbiology and Infectious Diseases. Oslo, Norway. August.

van den Hurk, J.V., Campos, M., Godson, D., Harland, R., Rossi-Campos, A., Babiuk, L.A., and Zamb, T. 1992. Transient biological changes associated with bovine viral diarrhea virus (BVDV) challenge of calves and lambs. 12th International Symposium of the World Association of Veterinary Microbiologists, Immunologists, and Specialists in Infectious Diseases. Davis, California, U.S.A. September.

Van Donkersgoed, J. 1992. Prophylactic antimicrobials in feedlot cattle. Western Canadian Bovine Practitioners Conference. Saskatoon, Saskatchewan. September.

van Drunen Littel-van den Hurk, S., Parker, M.D., Fitzpatrick, D.R., van den Hurk, J.V., Campos, M., Babiuk, L.A., and Zamb, T.J. 1992. Structural, functional, and immunological characterization of bovine herpesvirus-1 glycoprotein I expressed by recombinant baculovirus. 17th International Herpesvirus Workshop. Edinburgh, Scotland. August.

Watts, T.C. 1992. Large Animal Immunology. Alberta Association of Animal Health Technicians Annual Conference. Edmonton, Alberta. February.

Willson, P.J., Gerlach, G.-F., and Rossi-Campos, A. 1992. *Actinobacillus pleuropneumoniae* serotype 5 with very high virulence. Canadian Veterinary Medical Association 44th Annual Convention. St. John's, Newfoundland. July.

Willson, P.J., Potter, A.A., and Rhodes, C.S. 1992. Spread and control of *Streptococcus suis* in swine herds in Western Canada. Canadian Veterinary Medical Association 44th Annual Convention. St. John's, Newfoundland. July.

Willson, P.J., Rossi-Campos, A., and Potter, A.A. 1991. Effect of adjuvant on tissue reactions in swine immunized with *Actinobacillus pleuropneumoniae* vaccines. 72nd Conference of Research Workers in Animal Disease. Chicago, Illinois, U.S.A. November.

Willson, P.J., Potter, A.A., and Rhodes, C.S. 1992. Spread and control of *Streptococcus suis* in swine herds in Western Canada. Western Canadian Association of Swine Practitioners. Saskatoon, Saskatchewan. October.

Yoo, D. 1992. Prospects for the development of recombinant viral vaccines. The 61st Annual Meeting of the Korean Society for Agricultural Chemistry. Taegue, Korea. June.

Yoo, D., 1992. Adenovirus as an eukaryotic gene expression vector. Genetic Engineering Research Institute. Korea Institute for Science and Technology. Taeduk Science Town, Taejeon, Korea. August.

REPORTS AND PRESENTATIONS TO THE LIVESTOCK INDUSTRY, EXTERNAL GROUPS, AND ORGANIZATIONS

Acres, S.D. 1992. Update on respiratory vaccines. Challenges of the bovine industry in the twenty-first century. 17th World Buiatrics Congress and 25th American Association of Bovine Practitioners Conference. St. Paul, Minnesota, U.S.A. August.

Acres, S.D. 1992. Emerging trends in vaccine development and factors influencing vaccine response. Challenges of the bovine industry in the twenty-first century. 17th World Buiatrics Congress and 25th American Association of Bovine Practitioners Conference. St. Paul, Minnesota, U.S.A. August.

Acres, S.D. 1992. Experience with self-reliant research organizations within universities. University of Guelph Workshop - The Role of Universities in a Sustainable Society. Guelph, Ontario. May.

Acres, S.D. 1992. New Vaccines for Pasteurellosis and *H. somnus* disease complex. Western Canadian Bovine Practitioners Conference. Saskatoon, Saskatchewan. September.

Gerlach, G-F. 1992. Development of a recombinant subunit vaccine against porcine *Actinobacillus pleuropneumoniae*. Statens Serum Institute, Copenhagen, Denmark. August.

Gerlach, G.-F. 1992. Development of a recombinant subunit vaccine against porcine *Actinobacillus pleuropneumoniae*. Central Veterinary Institute, Lelystad, the Netherlands. August.

Harland, R.J. 1992. New research at VIDO on the prevention of respiratory disease in cattle. Beef Producer Field Day. Swift Current Veterinary Clinic, Saskatchewan. August.

Harland, R.J. 1992. Evaluating new vaccines. Western Canadian Bovine Practitioners Conference. Saskatoon, Saskatchewan. September.

Hodgman, P.J. 1991. Beef Cattle Health Research. Manitoba Cattle Producers Association Annual Meeting. Carman, Manitoba. December.

Hodgman, P.J. 1991. Advanced Technologies and Animal Health. Riversdale Kiwanis Club Meeting. Saskatoon, Saskatchewan. December.

Hodgman, P.J. 1992. Dairy Cattle Health Research. Holstein Canada Tour. Saskatoon, Saskatchewan. April.

Hodgman, P.J. 1992. Swine Health Research. Alberta Pork Producers Development Corporation Annual Meeting. Edmonton, Alberta. April.

Hodgman, P.J. 1992. Beef Cattle Health Research. British Columbia Cattlemen's Association Annual Meeting. Dawson Creek, British Columbia. May.

Hodgman, P.J. 1992. Swine Health Research. S.P.I. Marketing Group Research Committee. Saskatoon, Saskatchewan. June.

Hodgman, P.J. 1992. Beef and Swine Health Research. Saskatchewan Wheat Pool Livestock Division Directors. Saskatoon, Saskatchewan. July.

Hodgman, P.J. 1992. Dairy Cattle Health Research. Saskatchewan Dairy Producers Cooperative Ltd. Board of Directors. Saskatoon, Saskatchewan. August.

Van Donkersgoed, J., Janzen, E., and Harland, R. 1992. Technical Report to Rogar/STB. Prophylactic treatment of feedlot calves two weeks post-arrival with long acting oxytetracycline.

CHAPTERS IN BOOKS, EXPOSITORY, AND REVIEW ARTICLES

Campos, M., Godson, D.L., Hughes, H.P.A., Sordillo, L.M., and Babiuk, L.A. 1992. Interferon research in veterinary medicine. pp. 589-600. In *Interferon: Principles and Medical Applications*. Ed: S. Barob *et al*. The University of Texas Medical Branch at Galveston, Dept. of Microbiology. Galveston, Texas, U.S.A.

Acres, S.D., Allen, J., Byra, C., Fast, F., Froese, C., Hahn, D., Heuser, W., Hodgkinson, D., Jorgenson, B., Patience, J., Quiring, R., Vielfaure, P., and Willson, P. 1991. *Swine Nursery Design* and *Management* (2nd edition).

Redmond, M.J., Sabara, M.I., and Babiuk, L.A. 1992. Rotavirus vaccinology - current approaches in rotavirus vaccine development. In: *Viral Diseases Control*. pp. 387-404. Ed: E. Kurstak. Marcel Dekker, New York.

RESEARCH COLLABORATORS

Dr. W.A. Aitchison. BIOSTAR Inc. Saskatoon, Saskatchewan.

Dr. W. Albritton. Provincial Laboratory of Public Health, Alberta Social Services and Community Health. Edmonton, Alberta.

Dr. R. Benz. Biotechnology Laboratory, University of Würzburg. Würzburg, Germany.

Dr. P. Cachia. Synthetic Peptides Incorporated. Edmonton, Alberta.

Dr. J. Collins. Colarado State University Diagnostic Lab. Fort Collins. Colorado. U.S.A.

Dr. L. Corbeil. Dept. of Pathology, University of San Diego. San Diego, California, U.S.A.

Dr. R. Duncan. Animal Disease Research Institute. Agriculture Canada. Nepean, Ontario.

Dr. H. Friedman. Department of Medicine, University of Pennsylvania. Philadelphia, Pennsylvania, U.S.A.

Dr. S. Garzon. University of Montreal. Montreal, Quebec.

Dr. F. Huemer. Universitat Innsbruck, Austria.

Dr. R. Lo, Department of Microbiology. University of Guelph. Guelph, Ontario.

Dr. D. McCartney. Agriculture Canada Research Station. Melfort, Saskatchewan.

Dr. F. Milward. Rhone Merieux. Lyon cedex 07, France.

Dr. H. Minocha. Department of Laboratory Medicine, College of Veterinary Medicine., Kansas State University. Manhattan, Kansas, U.S.A.

Dr. D. Orten. University of Nebraska Medical Centre. Department of Pathology and Microbiology. Omaha, Nebraska, U.S.A.

Dr. W. Parenchych. Department of Microbiology. University of Alberta. Edmonton, Alberta.

Dr. J. Squires. Department of Animal and Poultry Science. Ontario Agriculture College, University of Guelph. Guelph, Ontario.

Dr. P. Tyssen. University of Quebec. Montreal, Quebec.

Dr. C. Whetsone. United States Department of Agriculture. Ames, Iowa, U.S.A.

Dr. Yuanhiu Zhang. Prairie Swine Centre Inc. Saskatoon, Saskatchewan.

University of Saskatchewan

- Dr. M. Chinino-Trejo. Department of Veterinary Microbiology, Western College of Veterinary Medicine.

- Dr. D. Haines. Department of Veterinary Microbiology, Western College of Veterinary Medicine.

- Dr. E. Janzen. Department of Herd Medicine and Theriogenology, Western College of Veterinary Medicine.

- Dr. R. Kumar. Department of Obstetrics and Gynaecology, College of Medicine.

- Dr. G. Matte. Royal University Hospital.

Growth and Reproductive Immunology Program at the University of Saskatchewan

- A multidisciplinary group of investigators from VIDO, WCVM, and the Colleges of Medicine and Agriculture with the mandate of improving livestock production through the immunoregulation of hormone activity.

- Dr. G. Adams. Department of Veterinary Anatomy, Western College of Veterinary Medicine.

- Dr. B. Laarveld. Department of Animal and Poultry Science, College of Agriculture.

- Dr. J. Manns, Associate Vice President (Research), University of Saskatchewan.

- Dr. R. Mapletoft. Department of Herd Medicine and Theriogenology, Western College of Veterinary Medicine.

- Dr. B. Murphy. Department of Obstetrics and Gynaecology, College of Medicine.

Canadian Bacterial Diseases Network Personnel - at various centres throughout Canada

- A network of over 50 investigators from seven Canadian universities, a number of industrial companies, and government laboratories interested in bacterial diseases of humans, animals, and fish.