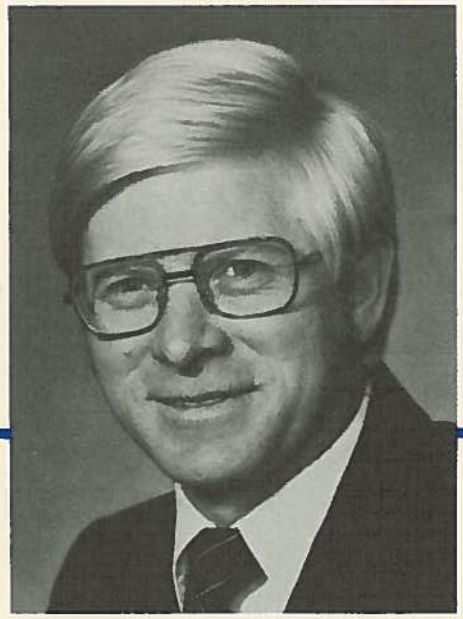
ANNUAL REPORT 1981-1982

VETERINARY INFECTIOUS DISEASE ORGANIZATION



B.E. Thorlakson
Chairman, VIDO Board of Directors
1981-82

REPORT FROM THE BOARD OF DIRECTORS

It has been an exciting year at VIDO. Research has progressed steadily in our specific areas of interest:

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

In seeking to further this research, a great deal of time has been spent negotiating with biological companies to market our products and also seeking support from granting agencies, producer organizations, and charitable foundations. We, in VIDO, are deeply appreciative of the support that has been given and are confident that VIDO will continue to warrant this generous support in future years.

VIDO has been prudent in the use of the funds allocated to it. Priorities are determined, budgets are drawn up, examined and reexamined before being presented to the Board of Directors for ratification.

This year the Board of Directors felt it would be useful to secure an independent appraisal of the scientific work carried out by VIDO. A select group of scientists was requested to give the Board of Directors an opinion on the general efficiency of the scientific work carried out by VIDO.

The members of this Scientific Program Advisory and Review Committee (SPARC) who were selected and kindly consented to serve were:

1) Dr. Howard Fredeen — Research Scientist, Animal Breeding Section, Research Branch, Agriculture Canada, Lacombe, Alberta
2) Dr. Malcolm Perry — Senior Research Officer, Division of Biological Sciences, National Research Council, Ottawa, Ontario
3) Dr. Ken Rozee — Professor and Head, Department of Microbiology, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia
4) Dr. Russ Willoughby — Associate Dean (Research), Ontario Veterinary College, Guelph, Ontario

The Committee extensively interviewed the staff, diligently investigated the scientific program and submitted their report. SPARC's Report confirmed our own observations. Let me quote from it.

"The first meeting with VIDO, its Board of Directors and scientists, introduced SPARC to the philosophy and research program of the Organization. We were most favorably impressed. The program is excellent and highly productive, the scientific staff is vigorous and enthusiastic, and the research atmosphere is confident and buoyant" ...

"The research emphasis and allocation of resources was judged to be fully compatible with the VIDO mandate and goals. Procedures for identifying, priorizing, planning and evaluation of research projects appear to operate efficiently."

"SPARC members were impressed by the competence and dedication of the VIDO Executive and staff. We believe that the combined expertise of all concerned is a sufficient guarantee that the program goals and priorities will continue to realistically reflect the needs of the livestock industry." ...

The Board is proud that VIDO has matured and now has a full complement of research scientists and facilities to complete the mandate of 'Serving the Livestock Industry Through Research'. It is gratifying to have the SPARC Committee confirm our own views of the quality and efficiency of the scientific research program. We thank all the members of the Scientific Program Advisory and Review Committee for their appraisal and advice.

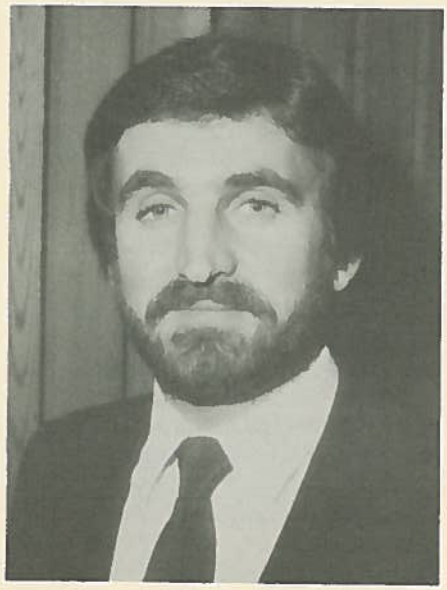
Looking ahead, VIDO recognizes the need for caution in the coming year, but more importantly we recognize the need to continue to strive to meet the goals of disease control. Loss from disease is a loss not only to livestock producers but also an economic burden to all society. By developing products and management techniques that reduce this cost, investments in the animal disease research of VIDO are repaid many times over. For this reason, in this period of economic downturn, we must strengthen our resolve to seek out the paths that lead to successful fulfillment of our goals.

As I leave VIDO I would personally like to thank Dr. Chris Bigland, Dr. Stephen Acres, and Mr. Paul Hodgman for their assistance and patience over the past four years. They are remarkable individuals. Drs. Bigland and Acres' perserverance, passion and action

1981-82 Board of Directors
(Left to Right - Top Row) R. Christian, B. Peterson, B. Tinker, C. L'Ecuyer, P. Moncrieff, S.D. Acres (Deputy Director - Research), W. Weir
(Bottom Row) C. Leask, P. Riese (Vice-Chairman), B. Thorlakson (Chairman), P.G. Hodgman (Executive Officer), C.H. Bigland (Director)
(Missing) C. Teichrob, N.O. Nielsen, J. McFaull

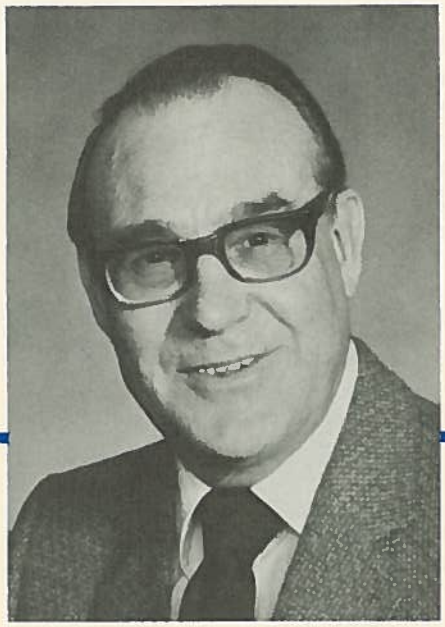
have taken the VIDO vision and molded a "center of excellence" for the study of infectious disease. Their dedicated work has been an inspiration to all at VIDO. They have led a dynamic and resourceful team of scientists to extend the frontiers of knowledge. Paul Hodgman, as well, has made a significant contribution in streamlining the administration and in communicating VIDO's accomplishments and needs to the public.

I am grateful for the support of the Board of Directors in the past year. I would particularly like to thank the Board members who, with me, are leaving VIDO: Dr. Jack McFaull, Dr. Walter Weir, Dr. Art Olson, Mr. Charlie Leask, and Dr. Leo Kristjanson. Their contribution of time and energy are greatly appreciated. I welcome Mr. Stu Kramer, Dr. Ralph Christian, Mr. Garnet Altwasser, Dr. Boyd Anderson and Dr. Brian Tinker to the Board. I am confident that their enthusiasm and experience will be an asset to VIDO during the next four years.



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

P.M. Moncrieff
Vice-Chairman,
VIDO Board of Directors
1982-83



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

REPORT FROM THE DIRECTOR

Due to a change in year-end to September 30 from March 30, this report will cover financial and scientific activities over an 18 month period from April 1, 1981 to September 30, 1982. Highlights are:

PERSONNEL

VIDO personnel shows continued growth in research activities and interaction with the livestock industry. The total VIDO staff is now 36, which includes 12½ active scientists covering many facets of VIDO's four targeted disease conditions. A 10-year Research Plan has been established. There are four major targets including neonatal diarrhea, shipping fever of cattle, respiratory diseases of swine and hemorrhagic enteritis of poultry.

When no satisfactory applications were received for the VIDO Veterinary Fellowship, five students from the Western College of Veterinary Medicine were employed for four months and given research projects to complete under the direction of VIDO scientists. This was in an effort to expose veterinary students to a research environment. One MSc student from Holland was also employed to conduct research for an 8 month period.

BOARD OF DIRECTORS

Under the capable direction of Mr. Ben Thorlakson, the Board has worked admirably. Mr. Thorlakson and I were in constant contact over the functioning and direction of VIDO. He and the Board responded to the many changes and challenges presented in fund-raising, research direction and administration.

We are looking forward to working for the next year under the Board chairmanship of Mr. Paul Riese of Selkirk, Manitoba. We welcome as new members of the Board: Mr. Garnet Altwasser of Lakeside Farm Industries, Brooks; Dr. Brian Tinker, Vice-President (Administration) of the University of Saskatchewan (replacing President Leo Kristjanson); Dr. Doug Maplesden, Dean of the Ontario Veterinary College, Guelph; Dr. Ralph Christian, Director, Animal Health Division for the Province of Alberta (replacing Dr. Art Olson); Mr. Stuart Kramer, Assistant Deputy Minister of Agriculture for Saskatchewan, Regina; and Dr. Boyd Anderson of Fir Mountain, Saskatchewan (replacing Mr. Charlie Leask). Heartfelt thanks for a job well done are extended to the retiring Board Members: Dr. Walter Weir, Dr. Jack McFaull and Mr. Ben Thorlakson each of whom have been on VIDO Boards since its inception.

Thanks also to President Leo Kristjanson, Dr. Art Olson and Mr. Charlie Leask each of whom tendered their resignation prior to the end of their normal term due to other pressures.

We were saddened by the death of Dr. Robert (Bob) Begg, former President of the University of Saskatchewan and member of the Board of Advisors. Dr. Begg was instrumental in initial negotiations for the establishment of VIDO.

FINANCIAL

The Financial Statements for the past full year of October 1, 1981 to November 30, 1982 (budget $1.58 million) and the previous six months (budget $598,500) are included in this Report. Although VIDO stayed within budgeted amounts for the past year, the expenditures have exceeded income and donations by approximately $365,000. This reduces the balance in the VIDO Research Trust Fund to approximately $1.366 million, close to the $1 million minimum set by the Board. Since the proposed budget for 1982-83 will be $1.7 million, even after stringent economies, we will have to redouble our efforts to increase donations, grants, gifts and earned income during this next period.

FUNDING

Core or uncommitted funding of VIDO is still most essential to be used as a base for salaries, office functions, supplying the livestock industry with information, fund-raising and "keeping the doors open". Such core-funding presently comes from the Western provincial governments and the Canadian livestock industry.

(a) Government - In the past 18 months, the base of core-funding came from the Province of Saskatchewan, who donated $310,000, and from the Alberta Provincial Government who donated $100,000. The Manitoba Government also contributed $20,000 and the British Columbia Government $8,850.

The three newly appointed Provincial Ministers of Agriculture ie. Saskatchewan (Mr. Eric Berntson), Alberta (Mr. Leroy Fjordbotten), and Manitoba (Mr. Bill Uruski) have under consideration, a proposal for longer term cooperative committment to core-funding for VIDO.

Despite continued efforts and contacts with Ottawa, again no core-funding was obtained from the federal government.

(b) The Livestock and Poultry Industries - The industries which we serve from all across Canada recognize that they are the prime benefactors of VIDO research and have continued their generous support totalling $128,116 over the past 18 months, despite poor prices for their products.

(c) Foundations - (i) the Devonian Group of Charitable Foundations who started VIDO, completed their promised committment to VIDO funding in 1979 with their grants matching those from other sources. This contributed greatly to the amount of money that could be set aside in the VIDO Research Trust Fund.

(ii) The Max Bell Foundation started funding research at VIDO aimed at developing a proposed vaccine to prevent shipping fever in cattle. Their initial donation in 1982 was $190,000 with a further contribution in 1983 and 1984 to total $395,000. This foundation was established in honor of the late Max Bell, a prominent western Canadian newspaper entrepeneur and businessman.

(iii) The McLean Foundation is supporting the production of germ-free and specific pathogen-free calves and pigs to be used in research on both neonatal diarrhea and pneumonia. Their donation for 1982 was $15,000 with the suggested contributions in 1983 and 1984 to total $45,000. The McLean Foundation was established by the McLean Family in honor of Mr. J.S. McLean, founder of the Canada Packers consortium.

(d) Grants - (i) the Agricultural Research Council of Alberta "Farming-for-the-Future" generously supported 5 research grants at VIDO for a total of $430,000 (for 18 months).

(ii) The Saskatchewan Agricultural Research Trust Fund supported one grant to a total of $35,179.

(ii) With the appointment of Drs. Geoffrey Hudson and Lionel Filion as Adjunct Professors in the Department of Veterinary Microbiology and Medical Microbiology; they will be preparing grant applications for submission to NSERC.

(e) Contracts - two contracts were held with Agriculture Canada and the Department of Supply and Services. These were for research and neonatal diarrhea at the Melfort Research Station and for research on shipping fever. The total received for both projects was $82,689.

(f) Interest - with high interest rates prevailing and expert investment management by Mr. Mac Sheppard Trustee of the VIDO Research Trust and Mr. Matt Webster, interest income made a major contribution to VIDO funding, totalling $436,216 for the past 18 months.

VICOGEN

This was the world's first successful vaccine to combat neonatal diarrhea or calf scours caused by enteropathogenic **E. coli.** Research was conducted at VIDO in 1977-1978. The technology was then transferred to Connaught Laboratories Limited of Toronto for production and marketing. VIDO worked closely with Connaught Laboratories during the period 1978-1979, to develop large scale production, sophisticated testing and data needed for licensing. VICOGEN was licensed December 13, 1979 and marketing started at that time in Canada and later the United States and other countries. In 1982, Connaught Laboratories turned the marketing of VICOGEN over to Pitman-Moore Laboratories in the United States and to MTC Ltd. in Canada. Royalties from VICOGEN for the first two years contributed less than 10% to the VIDO research budget. This has been reduced markedly by reduction in price and competition by many other companies. Because VICOGEN is not a patented product, at least 10 companies throughout the world are now producing and selling a vaccine similar to VICOGEN. Although VIDO obtains no royalties from the sale of these vaccines, the prime objective of VIDO has been achieved ie. to save the lives of calves. With the expansion of the use of VICOGEN-like vaccines, hundreds of thousands of calves throughout the world are now being saved from neonatal **E. coli** diarrhea. Most of the competing companies utilize the technology, time of vaccination and initial research data similar to that developed by VIDO.

Two patents have been successfully filed in both Canada and the U.S.A. on other vaccines for the prevention of **E. coli** neonatal diarrhea and are now ready for licensing.

Other thrusts in the control of the neonatal diarrhea complex are underway and will be discussed in the Report by Dr. Acres.

FUTURE CONCERNS AND THRUSTS

FUNDING

Although VIDO is legally part of the University of Saskatchewan, it is a "self-reliant" part in that it must obtain its own operating and capital funds from outside sources. The University of Saskatchewan does contribute generous "in kind" support to VIDO by supplying maintenance including utilities of the building and the Director's salary. However, all other funds must be obtained by donations, grants and gifts from other sources.

Grants and contracts are increasing gradually. However, these presuppose that the salaries of the scientific staff are paid, the office is functioning, the building is built, equipment is in place and the "doors are open". Grants supply only the amount of the funds needed for the actual research work specified in that grant or contract. In order to obtain these specific grants and contracts, core-funding is essential.

The thrust by the three Western Ministers of Agriculture in considering core-funding for VIDO will be followed closely. With their support, there is the possibility that our further efforts towards federal funding for VIDO may prove fruitful.

COMMERCIAL INITIATIVES

VIDO still wishes to be primarily a research organization serving the livestock industry through applied research on infectious diseases of food-producing animals. However, to increase our funding at VIDO, we have had to consider commercialization in several aspects as follows:

(a) BIOSTAR Inc. - VIDO is barred from obtaining funds through most Federal granting avenues. The incorporation of BIOSTAR, as a profit oriented company will open research and marketing opportunities available to small businesses. The actual research function of BIOSTAR can be "contracted out" to VIDO or other research units. BIOSTAR will be a company at "arms-length" from VIDO dedicated to the acquisition of funds, research and development of animal health products either through VIDO or other organizations, and the sale and commercialization of inventions and discoveries arising from this research. It is expected that much of the contract research for BIOSTAR will be done at VIDO on projects within the four VIDO targeted areas.

(b) VetGen Inc. - this company investigated a close liaison with VIDO in the area of animal biologics. Approximately three months intensive work by VetGen and VIDO is now at an end with each organization going their separate way.

(c) Other Commercial Companies - VIDO now has confidentiality agreements with a number of biological companies, who are interested in the research, vaccines and inventions of VIDO. Dialogue is continuing, with the possibility of future benefit for both VIDO and the collaborating companies.

VACCINE TESTING FACILITY

A facility for testing animal vaccines by challenge with virulent organisms is still a major need at VIDO. At present VIDO is renting part of a feedlot, however, this arrangement is very temporary and unsatisfactory.

A proposal for such a facility was submitted to the Federal Western Initiatives Fund but was refused.

A proposal is continuing to utilize part of the University of Saskatchewan Goodale Farm to establish a vaccine testing facility in conjunction with the Western College of Veterinary Medicine.

THANKS

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

My thanks too, to the administrative staff at the University of Saskatchewan for day-to-day help rendered to VIDO, especially Dr. Brian Tinker, Mr. Mac Sheppard, Mr. Henry Epp, Mr. Matt Webster, Mr. Gary Schlichemeyer, and Dr. Ken McCallum and their respective staffs, also to the Personnel Office particularly Mrs. Joan Watrous, Mrs. Maureen Brown and Mr. Daryle Wilkinson. Thanks also to the staff of the Physical Plant Department for the help in maintaining the VIDO building in "almost new" condition.

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

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

SUMMARY

VIDO has now reached an optimal size of 12½ professionals and approximately 40 total staff who, with outside research collaborators, work to accomplish research on the four major targets of VIDO, neonatal diarrhea, shipping fever, respiratory diseases in swine and hemorrhagic enteritis of poultry. All of the office space is now filled and all of the laboratories are fully operational and exceedingly active. Also, all of the animal isolation facilities and isolator units are filled on steady rotation. In other words, VIDO is now working to its maximum capacity. Funding has been increasing from year to year, however, has still not been able to keep up with the expenditures necessary to achieve our research targets. This has necessitated drawing on the VIDO Research Trust Fund for the past two periods, reducing the Trust to $1.366 million. With the redoubled effort on fund-raising through the livestock industry and provincial governments; through additional appeals to the federal government and through increased commercial endeavors, it is hoped that next year we will pay all expenses and even add money back to the VIDO Research Trust. Despite the poor general economic climate, far-seeing people recognize that research and development are more essential now than in good times, because it is the research done now, that will help to improve the economic climate in the future.

The Veterinary Infectious Disease Organization (VIDO) is devoted to serving the livestock industry through applied research on the control of common infectious diseases of food-producing animals and poultry. The concept of establishing such a research laboratory to act as a bridge between basic scientific discoveries and their use on the farm, has been in the minds of livestock men and veterinarians in Canada for many years.

However, the embryonic concept started to develop in 1975 only when the Devonian Group of Charitable Foundations of Calgary investigated VIDO through the Science Council of Canada and then decided to substantially fund it with $2.2 million. It was quickly joined by the Province of Saskatchewan, who offered $1 million operating funds over a five-year period, and by the Province of Alberta who gave a grant of $1.87 million towards the cost of the laboratory building. The University of Saskatchewan agreed to provide the salary of the Director, 5 acres of land, maintenance of the building when complete, financial administration, and other ancillary services. The final agreement between the above parties establishing VIDO was signed in September, 1975.

Since then, the new VIDO building has been completed and various research projects are underway.

The 3,345 square meter laboratory building containing offices, laboratories, media preparation area, specialized animal containment housing area (called isolation rooms) and germ-free animal isolation units, was officially opened in October, 1978.

HISTORICAL DEVELOPMENT OF VIDO

The building cost $4.5 million (in 1978 dollars) and is currently estimated to have a replacement value of over $15 million. Over one-half of the building space is devoted to the animal isolation facilities as they are integral to the infectious disease research performed on cattle, swine and poultry.

In 1977 and 1978, the initial research target as determined by the Board of Advisors at that time, was that of neonatal diarrhea in cattle, or calf scours. This very large complex disease problem was tackled by a relatively small research team concentrating all their efforts on this one research program. In 1979, VIDO achieved a major breakthrough against the enteropathogenic **E. coli** form of calf scours with the discovery of a vaccine that was subsequently named VICOGEN. It has been marketed through Connaught Laboratories of Toronto, in Canada, the United States, Mexico, Brazil and Israel. At least ten other biological producing companies throughout the world have copied VICOGEN. This has magnified the beneficial effect of the original discovery for calves and livestock producers world wide.

From a handful of staff, VIDO has grown to approximately 40 individuals with 12½ full time scientists. The research programs have also grown. There are now four major targets or research programs that our staff in collaboration with others, are attacking. They are as follows; neonatal diarrhea in cattle, bovine respiratory disease in cattle, porcine respiratory disease, hemorrhagic enteritis virus in poultry. The team approach is emphasized with particular expertise of each VIDO scientist combined with the specialized knowledge of some outside collaborators to result in a strong multi-disciplinary approach to the research objectives within each program.

VIDO is directed in its research by the needs of the livestock and poultry industries. The needs of these industries are made known to VIDO by ongoing contact with individual producers, their organizations and others. VIDO has members from the livestock industry on their Board of Directors. VIDO remains alert to the needs of the livestock industry and keeps abreast of animal health developments, and it reports VIDO research on these back to the industry through various symposia, producer contact, preparation of Fact Sheets and participation at meetings.

Infectious disease is one of the most serious and continuing threats to the livestock and poultry industries in Canada. Both producers and consumers will benefit by the research and attention to these costly diseases through VIDO - a truly unique and growing organization.

OBJECTIVES OF VIDO

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

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

c) To increase the world's supply of animal protein by reducing loss and wastage from livestock disease.

d) To have a higher quality food available to consumers through research on biological (non-residue forming) vaccines and improved production and management techniques.

e) To improve the public health by reducing diseases that are directly transmissible to man and through the spin-off of the research of VIDO to provide better human health products.

f) To reduce the suffering of animals caused by disease.

g) To study the economics of livestock disease.

VIDO RESEARCH TRUST FUND

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

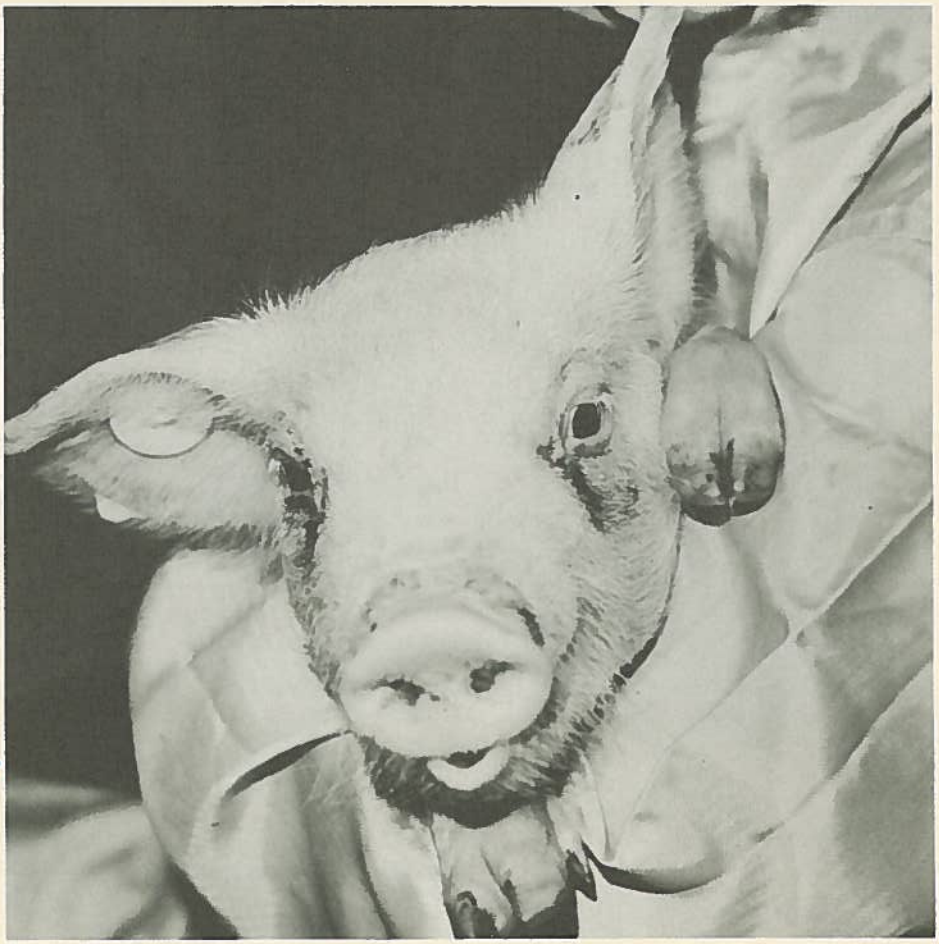
1) To ensure continuity of research funding as a guarantee of security for scientific personnel.

2) To serve as a vehicle into which all donations to VIDO could be placed until the eventual release by the VIDO Board of Directors.

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

4) To serve as a guarantee to the livestock industry to complete research projects initiated on its behalf.

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

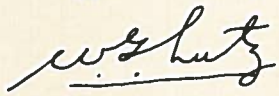


AUDITOR'S REPORT

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

I have examined the balance sheets of the Research Trust Account and the Capital Trust Account for The University of Saskatchewan - Veterinary Infectious Disease Organization as at September 30, 1981 and the statements of income, expenditure and unexpended funds for the six months then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the University of Saskatchewan — Veterinary Infectious Disease Organization as at September 30, 1981 and the results of its operations for the six months then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.



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

Regina, Saskatchewan,
November 27, 1981

Statement 1

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
RESEARCH TRUST
BALANCE SHEET
As at September 30, 1981

ASSETS	
Cash in Bank	$ 9,412
Investments - Short Term - At Cost	1,725,000
Accrued Interest Income	38,794
Contributions Receivable	
— Royalties	16,144
— Other Donors	26,179
Inventory of Animals (Note 2(c))	4,720
	$1,820,249
LIABILITIES	
Due to University of Saskatchewan — Operating Fund	$ 192,163
EQUITY	
Unexpended Funds (Note 2) (Statement 2)	1,628,086
	$1,820,249

(See accompanying notes)

Statement 2

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
RESEARCH TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
Six Months Ended September 30, 1981

INCOME		
Grants and Donations:		$ 35,461
Livestock Industry		
Provincial Governments:		
- Alberta		216,000
- British Columbia		1,000
- Saskatchewan		100,000
Government of Canada		
Department of Supply & Services		30,239
Other Individuals and Foundations		6,400
		389,100
Royalties		24,265
Interest Income		161,577
Animal Services		14,541
		589,483
EXPENDITURE		
University of Saskatchewan (Note 2)		
Salaries and Fringe Benefits		336,118
Materials and Supplies		101,572
Equipment (Note 2(b))		89,073
Travel		36,666
Animal Services		65,759
Other		63,487
		692,675
Excess of Income over Expenditure (Expenditure over Income)		(103,192)
Unexpended funds, beginning of year	$1,722,068	
add: Adjustment to inventory (Note 4)	9,210	
Unexpended funds, beginning of year - restated		1,731,278
Unexpended funds, end of period (Statement 1)		$1,628,086

(See accompanying notes)

Statement 3

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
CAPITAL TRUST
BALANCE SHEET
As at September 30, 1981

ASSETS

Current:	
Cash in Bank	$ 26,749
Investments - Short Term - At Cost	70,000
Accrued Interest Income	1,612
Due from University - Capital Fund	3,477
Total Current Assets	101,838
Capital Assets (Note 2(b))	
Site and Improvements	133,765
Furnishings, Fixtures and Equipment	330,514
Buildings	3,913,110
Total Capital Assets	4,377,389
	$4,479,227

LIABILITIES

Due to University of Saskatchewan — Operating Fund	$ 2,230

EQUITY

Equity in Capital Assets	$4,377,389
Unexpended funds (Note 2) (Statement 4)	99,608
	4,476,997
	$4,479,227

(See accompanying notes)

Statement 4

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
CAPITAL TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
Six Months Ended September 30, 1981

		Cumulative Total To Date
INCOME		
Grants:		
The Devonian Group of Charitable Foundations		$2,180,000
Province of Alberta		1,870,000
Interest Income	$10,407	426,997
	10,407	4,476,997
EXPENDITURES (Note 2)		
Sites and Improvements	—	133,765
Furnishings and Fixtures	24,345	330,514
Buildings	(211)	3,913,110
	24,134	4,377,389
Excess of Income over Expenditure (Expenditure over Income)	(13,727)	99,608
Unexpended Funds, Beginning of Year	113,335	
Unexpended Funds, End of Period (Statement 3)	$99,608	

(See accompanying notes)

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
Notes to Financial Statements
September 30, 1981

1. Change in Fiscal Year

The Board of Directors approved the changing of the fiscal year end from March 31 to September 30, at its meeting of June 4, 1981, as a result, the financial statements are for six months with no comparative figures.

2. Summary of Significant Accounting Policies

(a) Fund Accounting

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

(b) Capital Assets

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

Equipment purchased with Research Trust monies is expensed as purchased without the corresponding balance sheet entries referred to above.

The agreement referred to in Note 3 also states that all buildings and facilities constructed for the Organization shall be used by them in accordance with the agreement and upon termination of the Organization, the buildings, facilities and equipment therein shall remain the absolute property of the University of Saskatchewan.

(c) Inventories

An inventory of animals is maintained by the Organization for research purposes. The animals are valued on the basis of actual cost.

3. Establishing Agreement

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

Effective April 1, 1980 the Organization has adopted a new Constitution which replaces the agreement referred to above and the original constitution. The new constitution provides for a Board of Directors to assume the responsibilities formerly performed by the Board of Advisors and the Governing Committee.

4. Retroactive Adjustment

In an attempt to more accurately distribute costs in the year realized relating to animals purchased for research purposes it was determined to be appropriate to maintain inventory records for large animals, porcine and bovine.

As a result, a retroactive adjustment has been made to the Research Trust's March 31, 1981 financial statements having the effect of increasing Unexpended Funds by $9,210 and increasing the Research Trust's assets by $9,210.

5. Administrative Services

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

5. Commitments

As at September 30, 1981 the Organization had commitments of $27,470 in the Research Trust.

AUDITOR'S REPORT

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

I have examined the balance sheets of the Research Trust Account and the Capital Trust Account for The University of Saskatchewan - Veterinary Infectious Disease Organization as at September 30, 1982 and the statements of income, expenditure and unexpended funds for the year then ended. Except as explained in the following paragraph my examination was made in accordance with generally accepted auditing standards and accordingly included such tests and other procedures as I considered necessary in the circumstances.

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

In my opinion, except for the effect of adjustments, if any, had grants and donations been susceptible to complete audit verification, these financial statements present fairly the financial position of the University of Saskatchewan — Veterinary Infectious Disease Organization as at September 30, 1982 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding period.

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

Regina, Saskatchewan,
December 10, 1982

Statement 1

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

	1982	1981
ASSETS		
Cash and short term deposits	$1,389,580	$1,734,412
Accrued interest	17,115	38,794
Contributions receivable		
— Royalties	14,920	16,144
— Other donors	72,157	26,179
Inventory of animals (note 2(c))	5,067	4,720
	$1,498,839	$1,820,249
LIABILITIES		
Due to University of Saskatchewan — Operating fund	$ 132,778	$ 192,163
EQUITY		
Unexpended funds (note 2) (statement 2)	1,366,061	1,628,086
	$1,498,839	$1,820,249

(See accompanying notes)

Statement 2

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
RESEARCH TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
Year Ended September 30, 1982

INCOME	
Grants and donations:	
Livestock industry	$ 92,655
Provincial Governments:	
- Saskatchewan	210,000
- Manitoba	20,000
- British Columbia	7,850
Agricultural Research Council of Alberta "Farming for the Future"	314,000
Max Bell Foundation	190,000
Department of Supply and Services, Agriculture Canada	52,450
Saskatchewan Agricultural Research Fund	35,179
Other individuals and foundations	2,990
	925,124
Interest income	274,639
Royalties	92,719
Animal services	76,841
	1,369,323
EXPENDITURE	
University of Saskatchewan (note 2)	
Salaries and fringe benefits	844,308
Materials and supplies	277,871
Animal services	158,397
Equipment (note 2(b))	131,801
Other	110,551
Travel	108,420
	1,631,348
Excess of expenditure over income	(262,025)
Unexpended funds, beginning of year	1,628,086
Unexpended funds, end of year (statement 1)	$1,366,061

(See accompanying notes)

Statement 3

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

	1982	1981
ASSETS		
Current:		
Cash and short-term deposits	$ 96,427	$ 96,749
Accrued interest	1,040	1,612
Due from University - - Capital Fund	—	3,477
Total current assets	97,467	101,838
Capital Assets (note 2(b))		
Site and improvements	133,765	133,765
Furnishings, fixtures and equipment	346,352	330,514
Buildings	3,916,728	3,913,110
Total capital assets	4,396,845	4,377,389
	$4,494,312	$4,479,227
LIABILITIES		
Due to University of Saskatchewan — Operating Fund	$ 1,441	$ 2,230
EQUITY		
Equity in capital assets	4,396,845	4,377,389
Unexpended funds (note 2) (statement 4)	96,026	99,608
	4,492,871	4,476,997
	$4,494,312	$4,479,227

(See accompanying notes)

Statement 4

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
CAPITAL TRUST
STATEMENT OF INCOME, EXPENDITURE AND UNEXPENDED FUNDS
Year Ended September 30, 1982

INCOME	
Interest	$15,873
EXPENDITURES (Note 2)	
Furnishings and fixtures	15,838
Buildings	3,617
	19,455
Excess of expenditure over income	(3,582)
Unexpended funds, beginning of year	99,608
Unexpended funds, end of year (statement 3)	$96,026

(See accompanying notes)

UNIVERSITY OF SASKATCHEWAN
VETERINARY INFECTIOUS DISEASE ORGANIZATION
(V.I.D.O.)
Notes to Financial Statements
September 30, 1982

1. Comparative Figures

The Board of Directors approved the changing of the fiscal year end from March 31 to September 30, effective September 30, 1981. As a result, comparative figures for the statements of income, expenditure and unexpended funds are not presented as they cover only a six month period.

2. Summary of Significant Accounting Policies

(a) Fund Accounting

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

(b) Capital Assets

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

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

The agreement referred to in note 3 states that all buildings and facilities constructed for the Organization shall be used by it in accordance with the agreement and upon termination of the Organization, the buildings, facilities and equipment therein shall remain the absolute property of the University of Saskatchewan.

(c) Inventories

An inventory of animals is maintained by the Organization for research purposes. The animals are valued at actual cost.

3. Establishing Agreement

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

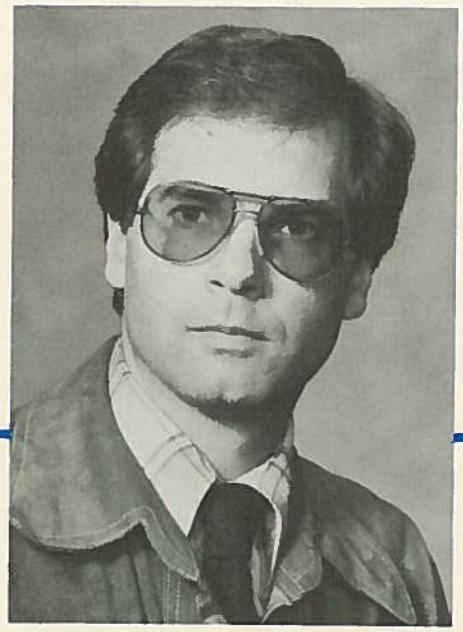
Effective April 1, 1980 the Organization adopted a new Constitution which replaces the agreement referred to above and the original constitution. The new constitution provides for a Board of Directors to assume the responsibilities formerly performed by the Board of Advisors and the Governing Committee.

4. Administrative Services

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

5. Commitments

As at September 30, 1982 the Organization had commitments of $6,745 in the Research Trust.



S.D. Acres, DVM, MPVM, PhD
Deputy Director (Research)

REPORT FROM THE DEPUTY DIRECTOR (RESEARCH)

RESEARCH PERSONNEL

New VIDO Staff - During the past 18 months, there has been further expansion of the VIDO research staff and research projects. Three additional scientists, Dr. James Raybould (BSc - Liverpool, PhD - London), Colin Crouch (BSc - Surrey, PhD - Surrey), and Geoffrey Hudson (BSc - Duke, PhD - Maryland) arrived in early 1982. Dr. Marta Sabara (BSc - Manitoba, MSc - Queen's, PhD - Saskatchewan), a Post-Doctoral Fellow with Dr. Hudson, arrived in October of 1982. In addition, Dr. Trent Watts (DVM - Saskatchewan) joined the staff in August 1982 as Supervisor of Animal Support Services, replacing Margot Buckley who left during the previous year. Dr. Robyn McGuire (BSc - Manitoba, MSc - Manitoba, PhD - Dalhousie) served as a Research Associate from September 1981 to July 1982 when she left to take a position with Agriculture Canada in Ottawa. Along with these increases in professional staff, there has been a concurrent increase in technical and animal attendant staff which now totals 18.

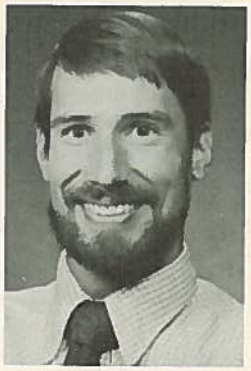
Visiting Scientists - In addition to the new staff, VIDO has enjoyed the contributions and expertise of 2 visiting scientists. These include Dr. Ladislav Rodak (MVDr, CSc - Research Scientist, Veterinary Research Institute, Czechoslovakia) who developed a radioimmunoassay for antibody to bovine coronavirus, and Dr. Helle Bielefeldt Ohmann (DVM-Copenhagen, PhD - Copenhagen), a veterinarian supported by a NATO fellowship, who has been working at VIDO on bovine immunology since September 1981. Mr. Arnold Verbeek, a Masters student in virology from Holland, also worked at VIDO on hemorrhagic enteritis virus from April to November 1982 and was supported by a VIDO Student Training Fellowship.

All of these people have helped to broaden the range of research expertise at VIDO which is being focused on the prevention and control of common infectious diseases of food-producing animals and poultry.

RESEARCH PROGRAMS

Research at VIDO continues to be focused on 4 major disease areas: neonatal diarrhea, shipping fever of cattle, pneumonia of swine, and avian adenovirus type II splenomegaly. In each of these 4 areas a "plan of attack" has been developed in the form of a long-range research program. Each research program is conducted by a program team made up of a program co-ordinator and VIDO scientists and collaborators.

C.F. Crouch,
BSc, PhD
Virology



G.R. Hudson,
BSc, PhD
Molecular Biology

T.J.G. Raybould,
BSc, PhD
Microbial
Immunochemistry

M.I.J. Sabara,
BSc, MSc, PhD
Molecular Biology

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

(a) Neonatal Diarrhea Program

This was the original research program started at VIDO in 1976, and it continues to be an area of major research activity. Previous achievements in this program include a demonstration of the impact of calving management systems and husbandry on the incidence and severity of calf scours in beef herds, and the development of VICOGEN, a vaccine for the **E. coli** form of calf scours. The long-term objective of the program is to develop management systems and safe and effective vaccines which will provide protection against all of the common causes of calf scours including enterotoxigenic **E. coli** (ETEC), rotavirus, coronavirus, and other enteropathogens.

During the past 18 months work has continued in several areas. Studies to explore the function of various antigens of ETEC in intestinal colonization and the use of these antigens as vaccines have continued. In collaboration with Dr. Bill Costerton of the University of Calgary we have conducted studies on the role of pili and capsules of ETEC in intestinal colonization which have shown that ETEC attach tightly to, and are in intimate contact with, the intestinal mucosa of scouring calves. It appears that the bacterial pili or fimbrae are the initial mechanism of attachment and that capsules provide structural rigidity and protection by cementing bacterial microcolonies to the intestinal mucosa (Figure 1). The use of capsules as vaccines is also under investigation. In collaboration with Dr. F.K. de Graaf of Vrije University, Amsterdam, Holland, vaccination with purified F41 antigen, another pilus found on bovine and porcine ETEC was shown to prevent fatal diarrhea in calves caused by a common enteropathogenic serotype. A new subunit **E. coli** vaccine, which includes F41 in addition to K99, has also been developed and tested.

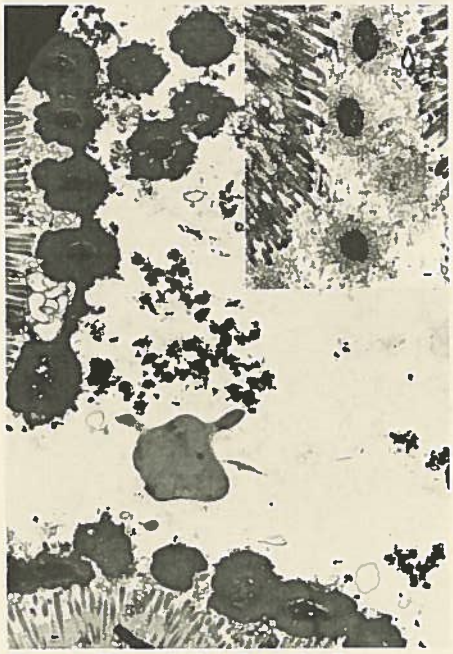


Figure 1. Microcolonies of a strain of enterotoxigenic **E. coli** attached to the intestinal mucosa of a newborn calf. Individual bacterial cells are surrounded with, and interconnected by capsular exopolysaccharide which helps cement the microcolonies in place and to protect them from the normal defensive mechanisms of the calf. Bacterial cells are stabilized with anti-capsular antibody before staining with ruthenium red to make this preparation. Access of the antibody to the bacteria was limited in the intervillous space, therefore, the capsular material is less consolidated (insert). This figure is published with the permission of the Canadian Journal of Comparative Medicine.

Progress has also been made towards developing rota and coronavirus antigens which can be combined with the **E. coli** vaccine. Vaccine trials are being conducted in collaboration with the University of Alberta Kinsella Ranch and at the Agriculture Canada's Research Station in Melfort to determine milk antibody titers developed in vaccinated cows. In addition, tests to determine protective milk antibody titers are being conducted at VIDO using surgically derived specific pathogen-free calves which are raised in plastic isolators.

(b) Bovine Repiratory Disease Program

This research program is co-ordinated by Dr. Lorne Babiuk who now enjoys a cross-appointment between the Department of Veterinary Microbiology in the Western College of Veterinary Medicine, and VIDO. The program team includes VIDO staff as well as faculty from the Western College of Veterinary Medicine, and collaborators at the Agriculture Canada's Animal Disease Research Institute (ADRI) Lethbridge, the Preventive Medicine Branch of the Veterinary Services Division of Alberta Agriculture, the Ontario Veterinary College, and the National Research Council in Ottawa. This is the largest of the VIDO research programs with a 1981-82 budget of $415,200. The emphasis on this program is on the prevention and control of shipping fever of cattle.

Under the direction of Dr. Susan Wilson, a large epidemiological study was started in 1980 to investigate the "risk factors" which effect the

L.A. Babiuk,
BSA, MSc, PhD
Virology - Immunology

R. McGuire,
BSc, MSc, PhD
Immunology

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

occurrence and severity of bovine respiratory disease in Alberta feedlots. Three animal technicians have been collecting detailed data on the source, pre-feedlot handling, transportation, processing, feedlot handling, and disease characteristics of all calves entering 9 feedlots in Alberta. Data from the first year of the study is now being entered into a computer for storage and analysis. We hope to continue this study for a 3-year period in order to assess the seasonal and yearly fluctuations which occur in the incidence and severity of respiratory diseases.

A 2-year study to determine the effect of vaccinating more than 1,000 calves with vaccines for respiratory diseases prior to shipment to feedlots was completed in collaboration with Dr. Wayne Martin of the Ontario Veterinary College. The results showed that intranasal vaccination of Saskatchewan calves with Infectious Bovine Rhinotracheitis-Parainfluenza-3 (IBR/PI3) vaccines 3 to 5 weeks prior to shipment to feedlots in Ontario or Saskatchewan did not reduce the treatment rate for pneumonia once the calves had arrived in the feedlots. Since no attempt was made to determine the cause of pneumonia in the treated calves, it is not possible to determine whether the vaccines were ineffective, or whether the viruses were not involved in causing the disease seen in the calves under study. However, this study did show that the widespread use of available vaccines to prevent respiratory disease should be investigated more intensively.

A major effort to more clearly define some of the immunological defence mechanisms of cattle lungs was continued by Drs. L. Filion, Helle Bielefeldt Ohmann and Robyn McGuire. The main objective of this work is to identify the defence mechanisms which normally protect cattle against shipping fever and to determine how these mechanisms are altered or impaired in calves which develop the disease. Work in the past year suggests that exposure of calves to viruses such as IBR impair the immune response of calves so that they are unable to protect themselves against Pasteurella which is the main bacterial cause of shipping fever. Studies are also underway on developing a vaccine against **Pasteurella hemolytica.** Using a challenge model originally developed at ADRI Lethbridge, in which shipping fever can be reduced by exposing calves to aerosols of IBR and **P. hemolytica,** the protective effects of various Pasteurella preparations has been investigated. These studies have shown that it is possible to protect calves by vaccinating with **Pasteurella hemolytica** and further work is underway to more clearly identify the specific bacterial antigens which are the protective components (Figure 2).

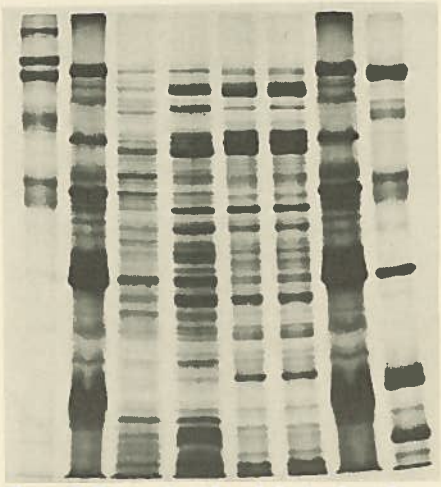


Figure 2. Polyacrylamide gel electrophoresis (PAGE) of extracts of **Pasteurella hemolytica** type A1, the most common bacterium isolated from calves with shipping fever. The many individual proteins which make up the bacteria are located in different positions (top to bottom in each column) according to their molecular weight. Studies are underway to determine which of these proteins will induce protective immunity to shipping fever.

(c) Porcine Respiratory Disease Program

This program was started in 1979 by Dr. Harold Fast who served as Program Co-ordinator until April 1982, when he left VIDO to develop a swine breeding enterprise on his parent's farm in Spiritwood, Saskatchewan. A replacement for Dr. Fast has not yet been found, however, Dr. Dudley Osborne from the Department of Veterinary Microbiology in the Western College of Veterinary Medicine, has agreed to serve as interim Program Co-ordinator. The emphasis of the Program continues to be to identify practical methods of reducing the incidence of respiratory disease in swine, most notably enzootic pneumonia, Hemophilus pneumonia, and atrophic rhinitis. Several projects are underway to develop improved diagnostic tests for some of the infectious agents involved, test antibiotics, develop vaccines, and identify the effects of environmental changes on the occurrence of pneumonia.

With the assistance of the VIDO Swine Technical Group, an "all in - all out" nursery was built and the performance of pigs weaned into this system was shown to be better than that of pigs weaned into traditional raised flat-deck systems. Recently studies were started to explore alternative ways of further improving these nursery rooms. This has involved the use of vaccines for atrophic rhinitis, or air-filtration systems to reduce the level of airborne contamination in the nurseries. A 28-page booklet entitled "Swine Nursey Design", which outlines detailed plans for constructing and operating a pig nursery system has been published and is available from VIDO (Figure 3).

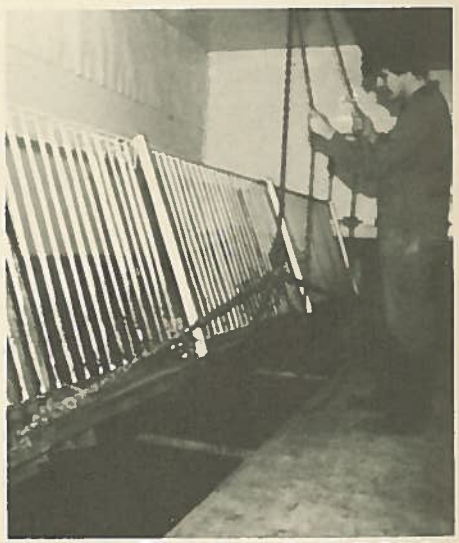


Figure 3. The "Swine Nursery Design Bulletin" outlines construction plans and instructions for operating nursery systems. Thorough cleaning of nursery pens is made easier with a tilting pen floor which can be winched into position to allow access to a manure trench.

Drs. Dudley Osborne and Philip Willson have started a series of projects on Hemophilus pneumonia of pigs. Using an aerosol challenge system previously developed by Drs. D. Osborne and J.R. Saunders of the Western College of Veterinary Medicine, they have investigated the best methods of using antibiotics to prevent and treat acute outbreaks of the disease. They have also demonstrated that antibiotic treatment does not appear to improve growth performance or reduce the number of carrier pigs in chronically infected herds. Two commercial Hemophilus vaccines have been tested and, while they appear to prevent acute losses from the experimental disease, they do not reduce the number of chronic carriers which develop. Because of this finding, studies have been started to develop a subunit Hemophilus vaccine which will not only prevent mortality but will also reduce the level of chronic herd contamination. In addition, stress, often in the form of sudden changes in temperature or other environmental parameters, appears to be one of the main factors which initiates acute herd outbreaks of Hemophilus pneumonia. Work is underway to more clearly identify the nature and magnitude of some of these environmental changes.

One of the unique components of the Porcine Respiratory Disease Program is the Swine Technical Group. This Group was started by Harold Fast and includes swine producers, swine veterinarians, agricultural engineers, nutritionists and economists from the 4 western provinces working together to develop practical solutions to some of the multidisciplinary problems faced by swine producers. This Group made a substantial contribution towards the development of the swine nursery system and published the "Swine Nursery Design Booklet" of which more than 4,500 copies have been distributed throughout North America. They also contributed towards the development of the TI-59 calculator programs which are being used by veterinarians and producers for monitoring swine herd performance.

The Swine Technical Group is currently conducting a project to determine the cause, and to assess the cost, of production shortfalls in swine herds. The objective of this project is to develop a management planning format whereby a producer can use performance levels as they occur in his unit and, with the knowledge of his input costs, determine the areas where he can optimize the unit's return. A project documenting performance levels in Canadian swine herds is also progressing and promises to give us a better understanding of optimum targets and acceptable production levels. In addition, a project to publish a booklet describing the design, management, and performance levels for farrowing facilities has been initiated. While the VIDO Swine Technical Group continues as the main resource body with members from each of the 4 western provinces meeting 3 or 4 times a year, sub-groups are now active in Manitoba and British Columbia, where members meet on a regular basis to discuss local production problems. The members of this Group are:

Dr. H. Fast - Chairman, Spiritwood, Saskatchewan
Dr. M. Sheridan - Steinbach, Manitoba
Mr. J. Patience - Ithaca, New York
Dr. R. Kelly - Dept. of Veterinary Clinical Studies, WCVM
Mr. D. Hodgkinson - Winnipeg, Manitoba
Dr. J. Strokappe - Red Deer, Alberta
Mr. V. Meek - Acme, Alberta
Mr. P. Vielfaure - La Broquerie, Manitoba
Mr. H. Martens - Rosenort, Manitoba
Mr. P. Hill - Langley, B.C.
Dr. D. Paton - Aldergrove, B.C.
Mr. J. Toews - Aldergrove, B.C.
Mr. D. Kolla - Cudworth, Sask.
Mr. D. Roney - Turtleford, Sask.
Mr. D. Lidster - White Fox, Sask.
Mr. R. Rempel - Ste. Anne, Manitoba
Dr. A.D. Osborne - Dept. of Veterinary Microbiology, WCVM, Saskatoon
Dr. E. Barber - Dept. of Agricultural Engineering, Univ. of Sask., Saskatoon
Dr. J. Sawatsky - Humboldt, Sask.
Dr. C.H. Bigland - VIDO
Dr. S.D. Acres - VIDO
Mr. P.G. Hodgman - VIDO
Dr. P.J. Willson - VIDO

L.G. Filion,
BSc, PhD
Immunology

A.D. Osborne,
MRCVS, DVSM,
FRCPath
Microbiology

J.V.J.M. van den Hurk,
BSc, MSc
Virology

P.J. Willson,
BA, MS, DVM
Clinical Medicine -
Epidemiology

4. Poultry Program

Avian adenoviruses cause a variety of diseases in domestic chicken and turkey flocks. The emphasis in this Program has been on type II avian adenoviruses which cause hemorrhagic enteritis of turkeys, marble spleen disease of pheasants, and splenomegaly of chickens. This program is being co-ordinated by Dr. Jan van den Hurk who has been at VIDO since October 1980.

It has been known for some time that Hemorrhagic Enteritis of turkeys can be prevented by vaccinating poults with spleens from infected birds. However, it is difficult to produce a crude spleen extract which will meet potency and safety standards and these vaccines have not been widely available to the turkey industry. Because of this, studies were started to develop methods of producing vaccines of uniform safety and potency. Until recently, the Hemorrhagic Enteritis Virus (HEV) had never been grown in tissue culture. During the past year the virus was grown in a transformed cell line by Dr. K. Nazerian and co-workers at East Lansing, Michigan. However, the cell line which they used was also infected with Marek's Disease virus which makes it unlikely that these cells can be used to grow vaccine virus. Dr. van den Hurk has also been investigating other methods of culturing the virus. In addition, a method of purifying the virus from infected spleens has been developed and a "purified spleen extract vaccine" is being tested (Figure 4). When used in combination with a very sensitive ELISA system which has also been developed for quantitating the virus, this may provide a method of producing a more uniform vaccine in the immediate future.

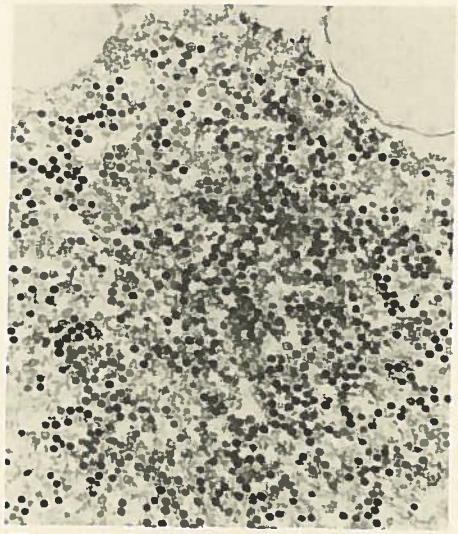


Figure 4. Hemorrhagic enteritis virus (HEV) particles released from a spleen cell of an infected turkey. Poults are infected with the virus which multiplies in the spleen and other body tissues. Five days after infection, the birds are sacrificed and the virus is purified from the spleen material and used as a vaccine.

In addition, there is increasing evidence that avian adenoviruses type II are occurring with some frequency in chicken flocks and could be one of the causes of splenomegaly for which birds are often condemned at slaughter, or a predisposing cause of other diseases. Sensitive diagnostic systems for viral antigen and antibody have been developed and these are being used to determine the prevalence of the virus in commercial chicken flocks.

BIOTECHNOLOGY

Biotechnology has been broadly defined as "the use of biological processes for the production of goods and services". At VIDO, biotechnology is being applied to the research and development of methods to prevent and control the common infectious diseases of food-producing animals and poultry. Development of monoclonal antibodies for research, diagnostic, and prophylactic uses is underway using a variety of bacterial and viral antigens. VIDO recently participated in the testing of a monoclonal antibody against the K99 antigen of **E. coli** which was developed for prevention of enterotoxigenic **E. coli** diarrhea. The antibody was developed by Dr. Peter Sadowski at Molecular Genetics Inc., Minnetonka, Minnesota and is the first use of a monoclonal antibody for prevention of an infectious disease in animals or humans. It is expected that Molecular Genetics will make this product commercially available to cattle producers in Canada and the United States during 1983. In addition, recombinant DNA techniques, including gene assignment, gene splicing, expression of transferred genetic material by surrogate hosts, and sequencing are being used to study the molecular biology of animal viruses, and to develop vaccines.

RESEARCH COLLABORATORS

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

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

J.E.C. Bellamy, Department of Veterinary Pathology, Western College of Veterinary Medicine, Saskatoon

G. Bohac - Agriculture Canada's Animal Disease Research Institute, Lethbridge

J. Cho - Agriculture Canada's Animal Disease Research Institute, Lethbridge

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

M. Cochrane - Department of Animal and Poultry Science, University of Saskatchewn

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

J.J.R. Feddes - Department of Agricultural Engineering, University of Alberta

F.K. de Graaf - Vrije University, Amsterdam, Holland

G.H. Green - Department of Agricultural Engineering, University of Saskatchewan, Saskatoon

J. Greenfield - Veterinary Laboratory, Abbotsford, B.C.

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

K. Jericho - Agriculture Canada's Animal Disease Research Institute, Lethbridge

B. Kingscote - Agriculture Canada's Animal Disease Research Institute, Lethbridge

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

S.W. Martin - Ontario Veterinary College, Guelph

D. McCartney - Agriculture Canada's Research Station, Melfort, Saskatchewan

J.B. McQuitty - Department of Agricultural Engineering, University of Alberta, Edmonton

V. Misra - Department of Veterinary Microbiology, Western College of Veterinary Medicine, Saskatoon

D. Mitchell - Agriculture Canada's Animal Disease Research Institute, Lethbridge

J.A. Morris - Central Veterinary Laboratory, Surrey, U.K.

C. Muscoplat - Molecular Genetics Inc., Minnetonka, Minnesota

K. Nazerian - Regional Poultry Research Laboratory, East Lansing, Michigan

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

M. Perry - National Research Council of Canada, Ottawa

C. Riddell - Department of Veterinary Pathology, Western College of Veterinary Medicine, Saskatoon

J. Robinson - Veterinary Diagnostic Laboratory, Abbotsford, B.C.

R.F. Ross - Veterinary Medical Research Institute, Iowa State University, Ames, Iowa

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

P.L. Sadowski - Molecular Genetics Inc., Minnetonka, Minnesota

D. Spurr - Agriculture Canada, Saskatoon

P.G.H. Stockdale - Chairman, Department of Veterinary Microbiology, Western College of Veterinary Medicine, Saskatoon

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PUBLICATIONS, PRESENTATIONS AND GRANT ACKNOWLEDGEMENTS

RESEARCH PUBLICATIONS IN SCIENTIFIC JOURNALS

(a) "The Immunogenicity of K99 Antigen in Whole Cell Bacterins of **E. coli"** - A.J. Forman, S.D. Acres, R.A. Kapitany, M.L. Buckley, D.W. Stainer and M.A.B. Maxwell - Can. J. comp. Med. 46: 426-429, 1982

(b) "An Antigen Extinction Profile in Pregnant Cows Using a K99-Containing Whole Cell Bacterin to Induce Passive Protection Against Enterotoxigenic Colibacillosis of Calves" - S.D. Acres, A.J. Forman, R.A. Kapitany - AM. J. Vet. Res. 43(4): 569-575, 1982.

(c) "The Effect of Infectious Bovine Rhinotracheitis Virus Infection on Bovine Alveolar Macrophage Function" - A.J. Forman and L.A. Babiuk - Infection and Immunity 35(3): 1041-1047, 1982.

(d) "The Effect of Infectious Bovine Rhinotracheitis Virus Infection of Calves on Cell Populations Recovered by Lung Lavage" - A.J. Forman, L.A. Babiuk, F. Baldwin and S.C.E. Friend - Am. J. Vet. Res. 43(7): 1174-1179, 1982.

(e) "The Susceptibility of Bovine Macrophages to Infectious Bovine Rhinotracheitis Virus Infection" - A.J. Forman, L.A. Babiuk, V. Misra and F. Baldwin - Infection and Immunity 35(3): 1048-1057, 1982.

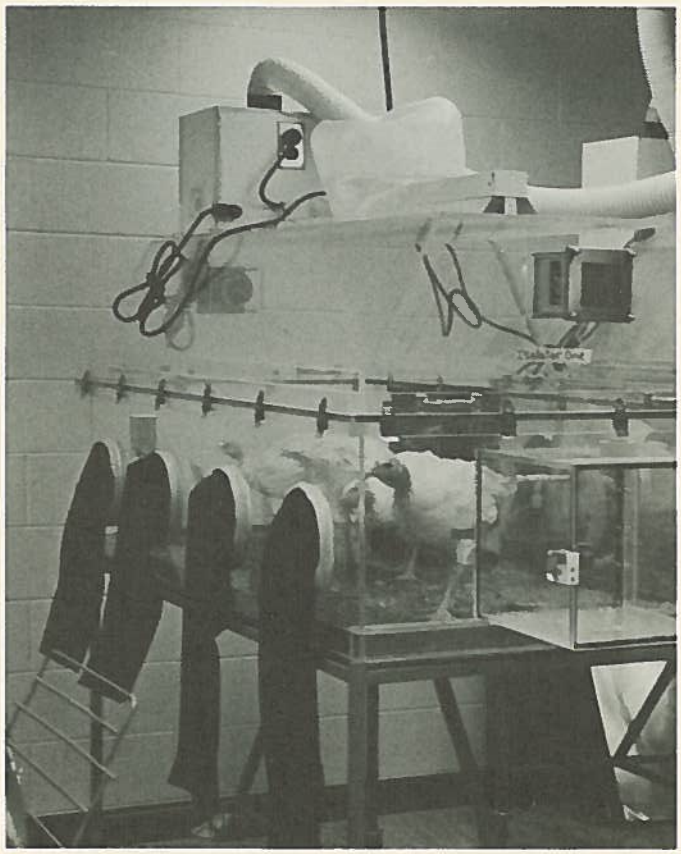
(f) "Radioimmunological (RIA) and Enzymimmunological (ELISA) Detection of Coronavirus Antibodies in Bovine Serum and Lacteal Secretions" - L. Rodak, L.A. Babiuk, and S.D. Acres - J. of Clin. Micro. 16: 34-40, 1982.

(g) "A Comparison of Dichromate Solution Flotation and Fecal Smears from Diagnosis of Cryptosporidiosis in Calves" - P.J. Willson and S.D. Acres - Can. Vet. J. 23: 240-246, August 1982.

(h) "Giardisis in Two Calves" - P.J. Willson - Can. Vet J. 23: 83, March 1982.

(i) "**In Vitro** Culture Characteristics of Bovine Alveolar Macrophages" - R.L. McGuire and L.A. Babiuk - Journal of the Reticuloendothelial Society 31: 251-260, 1982.

(j) "Use of Specific Antibody to Demonstrate Glycocalyx, K99 Pili, and the Spatial Relationships of K99+ Enterotoxigenic **Escherichia coli** in the Ileum of Colostrum-Fed Calves" - R. Chan, S.D. Acres and J.W. Costerton - Infection and Immunity 37(3): 1170-1180, 1982.



RESEARCH PRESENTATIONS

(a) "Effects of Infectious Bovine Rhinotracheitis Virus Infection on Bovine Alveolar Macrophages" - A.J. Forman, L.A. Babiuk, V. Misra and F. Baldwin - 1981 Canadian Veterinary Medical Association Convention - Winnipeg - July 5-8, 1981

(b) "Monitoring Swine Disease" - P.J. Willson - 1981 Canadian Veterinary Medical Association Convention - Winnipeg - July 5-8, 1981.

(c) "Dichromate Solution Flotation for Diagnosis of Cryptosporidiosis in Calves" - P.J. Willson - 1981 Canadian Veterinary Medical Association Convention - Winnipeg - July 5-8, 1981.

(d) "Bovine Respiratory Disease in Alberta Feedlots" - S.H. Wilson - poster presentation - Third International Symposium on Veterinary Epidemiology and Economics - Arlington, Virginia - September 6-10, 1982

PUBLICATIONS IN LAY PERIODICALS

(a) "Swine Herd Health" - H. Fast - Western Hog Journal - Fall 1981

(b) "Hemophilus Pneumonia of Pigs: Current Research" - P. Willson and A.D. Osborne - Western Hog Journal - Fall 1982

OTHER PUBLICATIONS

(a) Swine Nursery Design Booklet - available from VIDO at a cost of $3.

(b) Swine Record Analysis Program TI-59 Calculator Booklet - may be purchased through VIDO for $5, and the entire calculator program including the booklet is sold for $100.

(c) "Effectiveness of Two Vaccines in Reducing the Incidence of Calf Scours" - M. Makarechian and S.D. Acres - The 60th Annual Feeders' Day Report - Department of Animal Science, University of Alberta - pgs. 29-30, 1981.

(d) "Economic Aspects of Vaccination Against Calf Scours" - M. Makarechian and S.D. Acres - The 61st Annual Feeders' Day Report - Department of Animal Science, University of Alberta, pgs. 13-14, 1982.

(e) "The Story of I.B.R." - L.A. Babiuk and S.D. Acres - VIDO Views Fact Sheet No. 7, August 1981 - also appeared as an insert in Cattlemen Magazine.

(f) "Mastitis of Dairy Cows" - Dr. F.H.S. Newbold and Dr. R.S. Butler, edited by S.D. Acres - VIDO Views Fact Sheet No. 8, April 1982. - also appeared in Holstein Journal

(g) "Hemorrhagic Enteritis Virus in Poultry", - H.C. Carlson - VIDO Views Fact Sheet No. 9 - July 1982 - also appeared as an insert in Canada Poultryman Magazine.

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RESEARCH CONTRACTS

Agriculture Canada — Department of Supply and Services

RESEARCH SUPPORT FROM CHARITABLE FOUNDATIONS

Max Bell Foundation
McLean Foundation

B.M. Beswick, BA
Executive Assistant & Public Relations Manager

VIDO REPORTS

In April 1982, an Executive Assistant and Public Relations Manager was hired to augment administrative, extension, and fund raising activities of the VIDO Executive Officer, Paul Hodgman. Since then, Bonny Beswick has been busy with a number of special projects, one of the most important being Editor of the newsletter, "VIDO Reports". This newsletter takes the place of the original newsletter, "Viewing VIDO" and will be distributed at least twice a year. VIDO Reports will be a major component of VIDO's continuing information and public relations activities.

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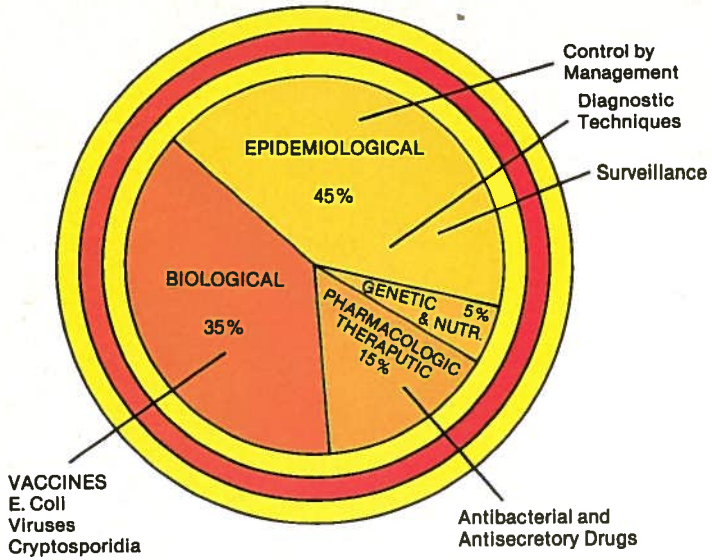
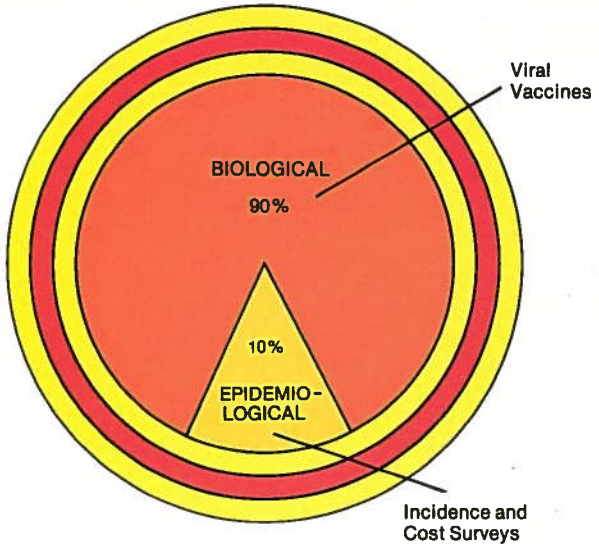
VIDO ALLOCATION OF RESEARCH EFFORT TO TARGET DISEASES BY RESEARCH APPROACH — 1980-85

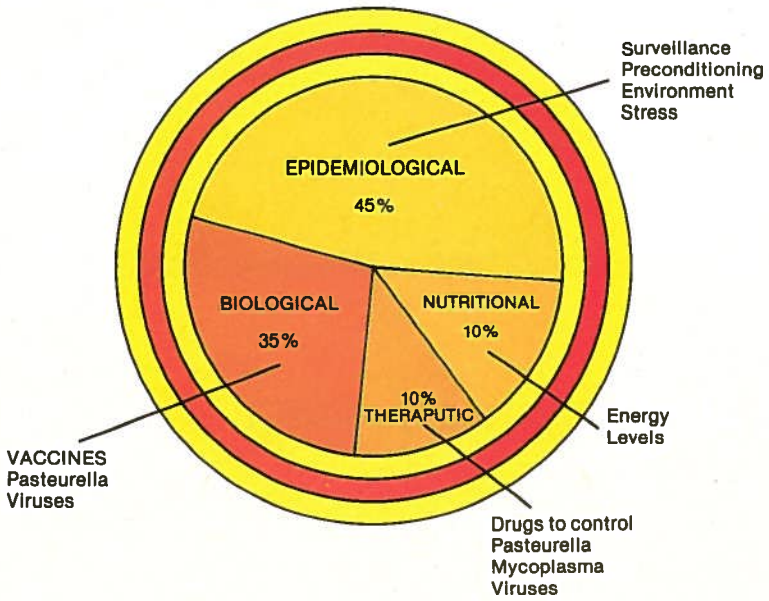
NEONATAL DIARRHEA



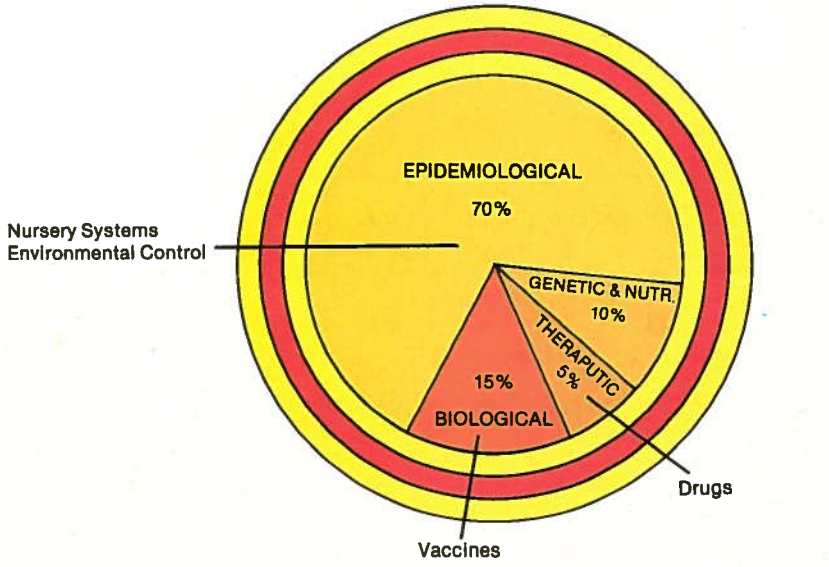
HEMORRHAGIC ENTERITIS OF TURKEYS



SHIPPING FEVER OF CATTLE



DISEASES OF SWINE



VIDO RESEARCH PLAN
Percent Distribution of Operating Costs By Program