



**VETERINARY  
INFECTIOUS  
DISEASE  
ORGANIZATION**

**VIDO**

**ANNUAL REPORT**

**APRIL 1, 1977 —  
MARCH 31, 1978**



# Report of the Chairman of the Governing Committee: VIDO-W.C.V.M. Relationships

By DEAN N. O. NIELSEN (W.C.V.M.);

Chairman

VIDO was sited at the University of Saskatchewan in Saskatoon partly to take advantage of the Western College of Veterinary Medicine, in particular, its scientific manpower and veterinary library. While totally independent of the W.C.V.M., VIDO works closely with the College faculty in areas of common research interests. VIDO has developed a formal system for affiliating those scientists who wish to work on projects in VIDO's research program. Such individuals are appointed as VIDO research collaborators and participate actively in the planning and conduct of

programs and projects. Several W.C.V.M. scientists are already working with VIDO and the results of the co-operative effort has been impressive. There are also research collaborators from other university and government units now involved. Collaborators who receive funds through VIDO are given a budget within the organization to carry out their research.

It is gratifying to point to the productive collaboration that has already taken place between VIDO and the W.C.V.M. It augers well for the future.

## VIDO Governing Committee



L.-R.: Front: Dr. D. Eidinger — College of Medicine; Dr. Chris Bigland — VIDO; Dr. N. O. Nielsen (Chairman) W.C.V.M.  
Back: Mr. E. A. Pallister — Devonian Group; Dr. B. Schnell — College of Pharmacy; Mr. J. McFaul — Manulife; Dr. K. McCallum — College of Grad. Studies.  
(Missing) Pres. R. Begg, Vice-Pres. J. Pringle.

## VIDO Board of Advisors



L.-R.: Front: Dr. H. N. Vance — Gov't of Alberta; Mr. A. E. Pallister — (Chairman) Devonian Group of Charitable Foundation; Dr. W. Weir — Gov't of Sask.  
Back: Mr. G. Flaten\* — Sask. Hog Marketing Commission; Mr. H. Zeiss\* — Sask. Dairy Producers; Dr. N. O. Nielsen — W.C.V.M. (Missing) Mr. J. Shepherd\* — Sask. Stockgrowers Assoc.

\*Non-permanent members.



# Director's Report — 1977-78

by Dr. C. H. BIGLAND

## General Comments

A new vibrant phase of VIDO development takes place with the present move into the new VIDO laboratory. Research on the problems of calf and pig scours is in high gear and a start is being made on research in the area of respiratory diseases. The livestock industry is swinging their moral and financial support behind VIDO and it is hoped that the consumer interests, as represented by federal and provincial governments, will also make financial commitments to on-going research on the common infectious diseases of food-producing animals. The gestation period is over, and with proper nourishment and care, the infant VIDO should survive and grow to fulfill its commitment to reduce wastage caused by common infectious diseases of cattle, pigs, sheep and poultry.

## Building

On March 29, 1978, the VIDO office and laboratory functions moved out of temporary accommodation in trailers and rented laboratories into the new \$4.25 million VIDO laboratory located at 124 Veterinary Road, Saskatoon, Saskatchewan. This is the culmination of almost five years of effort on planning, designing, and fund-raising.

We are indebted to the close collaboration and assistance of the officers and staff of the University of Saskatchewan Department of Buildings and Grounds, who overviewed each stage of development. Construction was completed on time, thanks to the personnel of CANA Construction Company.

The move into the new laboratory has emphasized to us that the severe cutbacks in our initial equipment budget and "start up" costs have put a major strain on our "hold-the-line" budget and have been reflected in reductions to our proposed research plans.

Even with our small, but energetic staff, the building is humming with research activity, leaving just a few laboratories and offices awaiting new research personnel.

The year 1978-79 opens up a new vista for VIDO, allowing the facility to operate in the way we wish it to function, utilizing the large animal isolation facilities and laboratories. This presents an expanded opportunity to serve the livestock industry, the people of Canada and the world through control of common infectious diseases of food-producing animals.

## Financial Picture

Over this past year, we spent about \$390,000 (operating) reflecting an increase in spending activities of 200% as compared to the previous year. Obviously, VIDO is experiencing an exponential growth phase and this will likely continue for another couple of years before achieving its full potential. A large proportion of our expenditures have been for start-up supplies and equipment, and this type of spending will continue for about one more year.

A hold-the-line budget of \$544,000 was approved, which may be enlarged only if additional grant or contract funds are forthcoming. This budget is allocated to research projects led by project supervisors, who are either paid by VIDO or are funded research collaborators of VIDO. The latter would be employees of other institutions. Several projects are grouped within broad programs, the main ones being the neonatal diarrhea, respiratory diseases, and economics of livestock diseases programs.

A VIDO Research Trust fund (VRT) will also be established. All core donations and matching funds will be placed within this trust and allocated to VIDO operations as directed by the Governing Committee and Board of Advisors.

## Organization

The Governing Committee, chaired by Dr. N. O. Nielsen, and the Board of Advisors, chaired by Mr. A. E. Pallister, guided the budgets and research of VIDO at three meetings throughout the year. All Governing Committee meetings were held in Saskatoon. The Board of Advisors meetings were held in Winnipeg, Ottawa, and Saskatoon, in order to attract guests from other parts of Canada. Membership in these VIDO governing bodies will be modified next year to include three livestock producers on each body. In this way the livestock industry will have direct input into the operation of VIDO through the Governing Committee, and to research direction through the Board of Advisors. Most livestock organizations in Canada have been asked to submit names of producers who could serve. The final selection will be made by the two governing bodies before July 1978. The appointments will be for varying terms to allow a continuing broad representation both by livestock species and province of origin.

The following people were special guests at this year's Board of Advisors meetings:

- Dr. J. A. McPhedran, Director, Veterinary Services Branch, Manitoba Department of Agriculture
- Mr. A. Dillworth, Manitoba Pool Elevators
- Mr. R. J. Munroe, Secretary, Manitoba Beef Growers Association
- Dr. G. Cousineau, Dean, Faculté de Médecine Vétérinaire, Saint-Hyacinthe, Quebec
- Mr. C. A. Gracey, Manager, Canadian Cattlemen's Association
- Dr. J. E. McGowan, Assistant Deputy Minister, (Health of Animals), Agriculture Canada
- Mr. H. Seitz, Saskatchewan Milk Producers Association
- Mr. G. Flaten, Chairman, Saskatchewan Hog Marketing Commission; Vice-President, Canadian Federation of Agriculture
- Mr. A. Haight, dairy farmer, Saskatoon
- Mr. J. Shepherd, Saskatchewan Stock Growers Association.



## Fund-Raising

The Devonian Group of Charitable Foundations came to VIDO's rescue at a time of low financial prospect. At the request of the Governing Committee and the Board of Advisors, the Devonian Group offered to contribute additional monies to VIDO on the basis of matching any other core funds donated from other sources. **This matching is on a dollar-for-dollar basis until March 31, 1979**, whereupon it drops to 50¢, 25¢, 15¢, and 10¢ on the dollar in subsequent years to a maximum of \$1.25 million, i.e. if no other funds are forthcoming, the Devonian Group will have nothing to match. Also, if the research activity does not exceed \$800,000 after next year, the Devonian Group's contributions will cease.

This has put the onus on all persons interested in the future of VIDO to ensure core funds do come to VIDO to take advantage of the generous matching grant.

Briefs requesting funds to assist in fulfilling our target budget of \$6.5 million over the five-year period, 1978-83, were submitted in July to the federal government and the governments of British Columbia, Alberta, Saskatchewan, Manitoba and Ontario. Most of these avenues are still being pursued by additional briefs and information. The Saskatchewan Government increased next year's commitment from \$200,000 to \$250,000.

It is felt that the key to federal and provincial government financing is the active interest of the livestock industry as emphasized by their financial contributions to VIDO. To acquaint the livestock industry with VIDO and to get the advice of the livestock industry on diseases of importance to them; Dr. Lorne Greenaway of Richmond, B.C. was hired as a consultant. Dr. Greenaway has been very active throughout Western Canada and together with the Director and other VIDO personnel has contacted the majority of the livestock organizations, breed organizations and their director's groups throughout Western Canada. This activity since September, has resulted in donations of \$23,000 — a remarkable figure in light of the depressed state of the livestock industry during the past few years. In addition, the Devonian Group of Charitable Foundations made a special grant to VIDO and sponsored banquets for persons interested in the livestock industry. These were part of the Board of Advisors meetings in Winnipeg, Ottawa, Toronto, and Saskatoon. In this way the story of VIDO and its need was emphasized. The assistance of the farm and daily press, TV and radio stations, resulted in a large number of articles featuring VIDO, supporting our call for funds, and acquainting the general public with the fact that we are trying to serve the needs of the livestock industry.

Four issues of the newsletter "Viewing VIDO" have been sent to 1,000 people on our newly computerized

mailing list. The first fact sheet to provide disease information to livestock producers, "VIDO VIEWS — Calf Scours" has been widely distributed (14,000 copies). Other topics will be covered in future issues. Our scientists have published six journal articles this past year as well.

## Personnel

The number of research scientists at VIDO has not increased during the past year, but we have, enlarged our staff of technical and office personnel, so as to maximize the activities of the present research scientists. Aside from the Director, our staff now stands at four professionals, three office personnel, and 10 technical personnel.

Plans for this next year are to hire a research microbiologist, and a swine veterinary specialist to expand the multidisciplinary approach to our neonatal diarrhea, respiratory disease and disease surveillance programs.

## Problems

The continuity of funding is still a major problem at VIDO. The fund-raising activities demand a large percentage of the time of all our staff. Everyone at VIDO finds themselves involved to some degree in writing reports for fund-raising purposes, in speaking engagements across Canada, in giving building tours, etc. We realize this activity must continue, but if long-term commitments were made, less energy could be allocated to this function. Although we have reduced our five-year target to \$6.48 million from \$7.5 million, we still have a long way to go before this commitment is met.

A second problem is making the new VIDO laboratory function up to its potential. The inevitable problems of breaking in a new building are being experienced and loom on the horizon. Unfortunately, much of this "breaking in" can also be costly in the form of renovations, change orders and making the "building work". This activity too will occupy a great deal of the time of the Business Manager, Director, and research personnel.

A third problem is attracting additional top scientists at VIDO without long-term financial guarantees. The establishment of the VIDO Research Trust may be helpful in this regard, if sufficient funds can be forthcoming over and above present operating expenses.

## Summary

With the move to the new VIDO laboratory and expansion of research activity, some success for the fund-raising operation and the close collaboration with the livestock industry through six representatives on our governing boards, VIDO looks forward to an extremely busy and rewarding future.



# FACTS ABOUT VIDO

## 1. What is VIDO

— VIDO is a non-profit organization dedicated to researching common infectious diseases of food-producing animals and poultry that cause the most serious continual economic loss to producers.

## 2. Whose Idea Was It?

— VIDO was conceived by farmers, agriculturalists and veterinarians over 20 years ago and was first requested in a resolution to the Alberta government in 1957. The proposal to the Devonian Group of Charitable Foundations was based on this resolution. It was felt that a definite need existed in Canada for a research centre whose personnel would dedicate 100% of their effort to researching common disease problems.

## 3. Where is VIDO Located?

— On the campus of the University of Saskatchewan, Saskatoon. A 5-acre site was donated to VIDO.

## 4. Why There?

— Because VIDO needs the advice, expertise and co-operation of scientists in various facilities of the University, such as Veterinary Medicine, Animal and Poultry Science, Medicine, etc. Being located next door makes this possible.

## 5. Is VIDO Part of the University of Saskatchewan?

— VIDO is independent in its financing and research. Our tie with the University is our location and the fact that our building maintenance and accounting services are donated by the University.

## 6. Who Paid for the Building?

— The Devonian Group of Charitable Foundations of Calgary and the Alberta Provincial Government provided the funds for the building and basic equipment. The Saskatchewan Provincial Government has provided part of the cost of operations for the first five years.

## 7. Who or What is the Devonian Group of Charitable Foundation?

— It is a series of foundations set up to benefit the people of Canada. It is part of the estate of the late Eric Harvie, a well-known and respected Alberta businessman.

## 8. Does the University Pay VIDO's Operating Costs?

— No. VIDO must raise its own money.

## 9. How Does VIDO Propose to Do This?

— By appealing directly to producer organizations, individuals, granting agencies, foundations and provincial and federal governments.

— The Devonian Foundation contributed a special fund to allow VIDO to launch an extensive publicity campaign.

## 10. Has VIDO had any Success to Date in Raising Money?

— Yes and no.

**YES** — In December, the Devonian Foundation donated a further \$1.25 million as an operating grant. This money is to be given on a matching basis ie. for every dollar raised from other sources, Devonian will contribute an equal amount on a yearly declining basis until the \$1.25 million is expended.

The Saskatchewan Government is putting up \$250,000 per year. The Alberta Government donated generously to capital construction costs of the laboratory and now feels other governments should come forward with funds, before it contributes further.

The B.C. Government has contributed \$5,250.

Producer groups, veterinary associations and individuals have contributed \$23,000 to March 31, 1978.

**NO** — The Federal Government and other Provincial Governments have so far contributed nothing to this national project.

## 11. How Does VIDO Propose to Interest the Federal Government?

— By obtaining the support and lobbying power of producers across Canada.

## 12. Is Research Now in Progress?

— Yes. VIDO scientists have been working on many aspects of neonatal diarrhea (scours) in calves and pigs for the past 2-1/2 years.

## 13. How Much Does It Presently Cost to Operate VIDO?

— The next 12-month budget calls for the expenditure of \$544,000 even though the facility is operating at only 50% of its capacity. Research, today, is expensive — approximately \$80-100,000 per year per scientist and his back-up staff, supplies, animal costs, etc.

## 14. Is VIDO in Danger of Becoming Divorced from the Producers that It is Dedicated to Serve?

— No. Specific and definite measures are being taken to prevent this from happening.

VIDO is presently taking six producers from across Canada onto its two Boards. These people will represent many of the varied facets of the livestock industry. Thus, VIDO will ensure it takes direction from producers.

## 15. Are there any other Organizations Similar to VIDO?

— No. The VIDO concept is unique in Canada as well as the U.S.A.

## 16. Will VIDO Succeed?

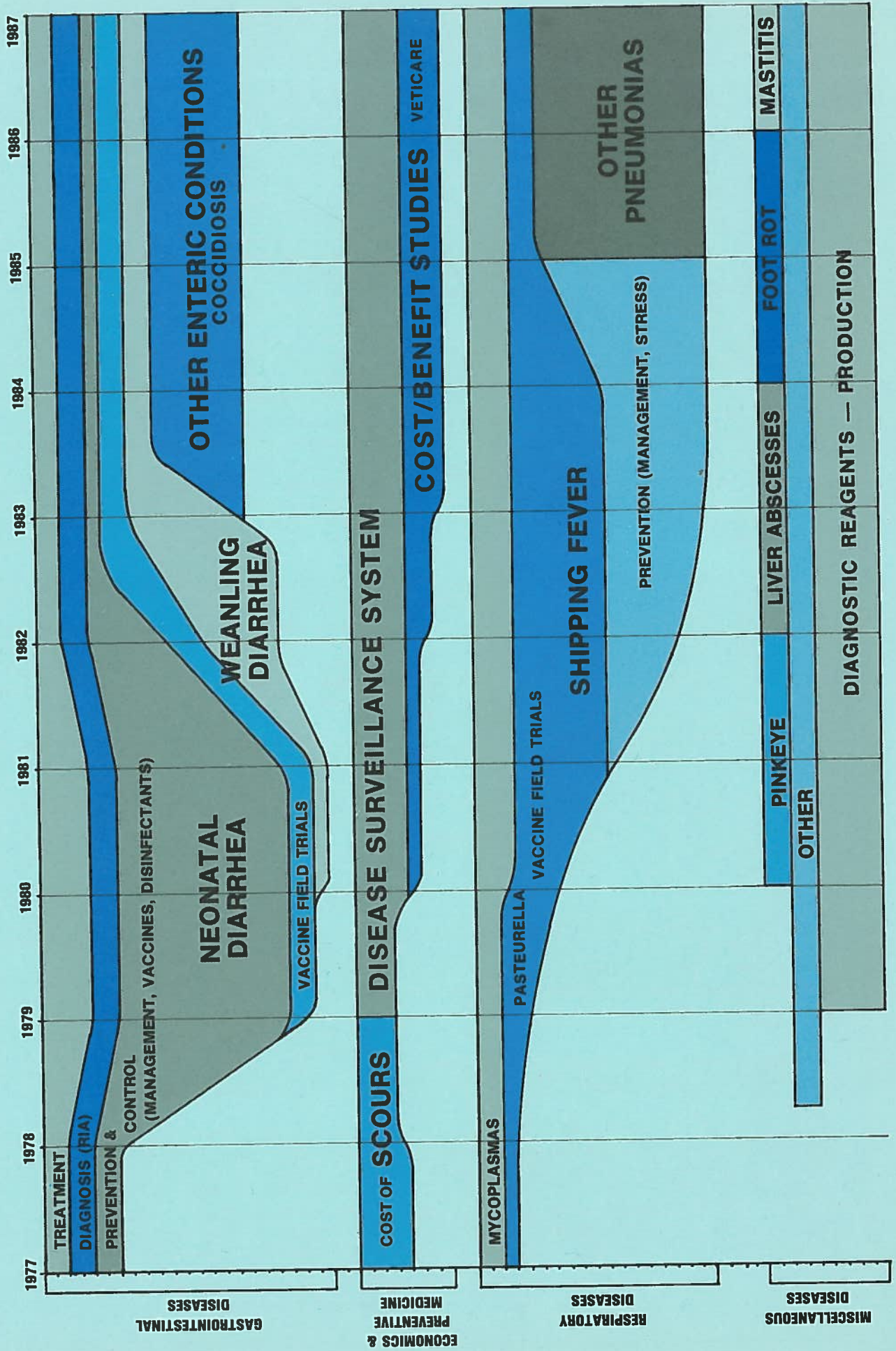
— Yes, without a doubt. Producer support is growing daily. People are beginning to realize that VIDO has the capability of becoming a national livestock disease research centre of international renown; a centre of which the Canadian Livestock industry can be justifiably proud.



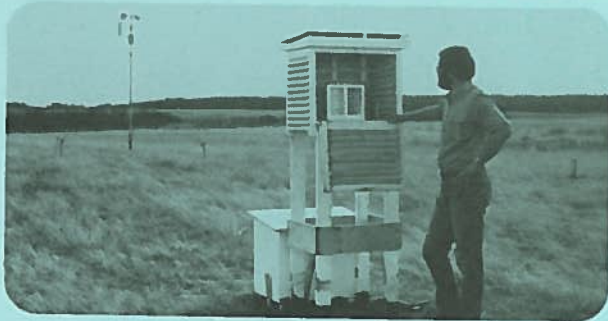
# VIDO RESEARCH PLAN

SCALE: 2.5MM = 1 MAN-YEAR

CATTLE, SWINE, POULTRY, SHEEP, RABBITS, FISH AND OTHER FOOD PRODUCING ANIMALS







*Sampling*



*Working the Animals*



*Spring Conditions*

## Why We Chose Neonatal Diarrhea As Our First Project

In Canada, as in many other areas of the world, acute neonatal diarrhea of calves (calf scours) is a major problem for the livestock industry, and cattle producers, veterinarians, provincial laboratory, pathologists, and animal scientists unanimously condemn diarrhea as the leading cause of calf loss.

A survey of over 1,600 cow-calf producers in Alberta and Saskatchewan conducted during the three-year interval from 1973 to 1975 revealed the following statistics:

1. One out of every four calves born to heifers, and one of every seven calves born to cows, scour before 30 days of age.
2. More than one-third (36%) of all calf deaths between birth and 30 days of age are associated with calf scours.
3. Every year approximately 10% of beef herds experience epidemics of calf scours (i.e. more than 50% of calves born, scour).
4. Scours occurred in at least one of the three years in 91% of herds surveyed.
5. In 1974 producers reported that scours cost the livestock industry \$8.67 for every calf born. Extrapolating this figure to the total Canadian beef and dairy cow herd, scours cost the livestock industry in Canada \$75 million (Table 1).

**Table 1**

### **Economic Losses Associated with Calf Scours to Canadian Livestock Industry, 1974.**

	Number of Calvings <sup>1</sup>	Loss in Dollars <sup>2</sup>
Beef	5,954,200	\$51,622,914
Dairy	2,670,000	23,148,900
<b>TOTAL</b>	<b>8,624,200</b>	<b>\$74,771,814</b>

<sup>1</sup>Based on Statistics Canada Bulletin 23-004, July 1, 1975.

<sup>2</sup>Based on \$8.67 per live calf born. S.D. Acres, Ph.D. Thesis, U. of S., 1977. This estimate is conservative.

**OUR STAFF ESTIMATES, THAT IF WE CAN DECREASE THE INCIDENCE OF SCOURS IN CANADA BY 10% THROUGH OUR ENDEAVOURS, THEN WE WILL HAVE PAID FOR OURSELVES IN ONLY TWO YEARS!**



# Financial Statements

March 31, 1978

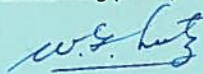
## AUDITOR'S REPORT

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

I have examined the Capital Fund and Operating Fund statements of income, expenditure and balance of unexpended funds for the Veterinary Infectious Disease Organization for the year ended March 31, 1978. 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 results of operations of the Veterinary Infectious Disease Organization for the year ended March 31, 1978 and unexpended funds on hand at that date, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Regina, Saskatchewan,  
April 28, 1978.

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

## CAPITAL FUND — STATEMENT OF INCOME, EXPENDITURE and BALANCE OF UNEXPENDED FUNDS

Year Ended March 31, 1978

	Year Ended March 31, 1978	Cumulative Total to Date
<b>Revenue:</b>		
Grants Received — Devonian Foundation	\$1,670,000	\$1,670,000
— Province of Alberta	—	1,870,000
Other Income — Interest	63,470	313,765
	<u>1,733,470</u>	<u>3,853,765</u>
<b>Expenditure:</b>		
Sites and Improvements	23,286	34,245
Furnishings and Fixtures	46,970	71,988
Buildings	2,275,591	3,417,078
	<u>2,345,847</u>	<u>3,523,311</u>
Excess of Revenue over Expenditure	(612,377)	330,454
Unexpended funds, beginning of year	942,831	—
Unexpended funds, end of year	<u>\$ 330,454</u>	<u>\$ 330,454</u>

See accompanying notes

OPERATING FUND — STATEMENT

BALANCE OF UNEXPENDED FUNDS

Year Ended

### Revenue:

Grants Received — Province of Saskatchewan  
— Devonian Foundation  
— Other  
Other Income — Interest  
— Miscellaneous

Research Projects

### Expenditure:

Salaries and Consultants Fees  
Fringe Benefits — Pension  
— Other

Materials and Supplies  
Travel  
Equipment  
Miscellaneous  
Research Projects

Excess of Revenue over Expenditure  
Unexpended funds, beginning of year  
Unexpended funds, end of year

See accompanying notes



OF INCOME, EXPENDITURE

**RESEARCH PROJECTS**  
**SCHEDULE OF INCOME, EXPENDITURE**  
**and**  
**BALANCE OF UNEXPENDED FUNDS**

March 31, 1978

	1978	1977	Year Ended March 31, 1978			TOTAL	
			National Research Council Grant No. E4004	National Research Council Grant No. A6958	Alberta Agricultural Research Trust Project No. 55-28103	1978	1977
Unexpended funds, beginning of year	\$200,000	\$200,000					
Revenue:							
Grants Received	120,000	—	\$21,000	—	—	\$21,000	\$10,679
	18,460	—					
Expenditure:							
Salaries			—	—	—	—	7,586
Fringe Benefits			—	—	—	—	325
Equipment, Materials, and Supplies			21,000	666	1,312	22,978	1,058
Travel			—	—	—	—	310
Computer Services			—	—	—	—	20
	80,747	32,992	21,000	666	1,312	22,978	9,299
	39,733	13,354					
	38,405	41,979					
	15,063	8,130					
	22,978	9,299					
Unexpended funds, end of year	388,034	175,821	—	(666)	(1,312)	(1,978)	1,380
	(6,076)	57,785	—	666	1,312	1,978	598
	235,204	177,419					
	\$229,128	\$235,204	\$ —	\$ —	\$ —	\$ —	\$ 1,978

g notes

See accompanying notes

**UNIVERSITY OF SASKATCHEWAN**  
**VETERINARY INFECTIOUS DISEASE ORGANIZATION (V.I.D.O.)**  
**NOTES TO FINANCIAL STATEMENTS**  
**March 31, 1978**

1. The current estimated total project cost for VIDO building including furniture and fixtures, required sites and improvements is \$4,335,000. A contract in the amount of \$3,227,130 has been signed with the building contractors and to March 31, 1978 progress payments of \$2,855,360 have been made.
2. At March 31, 1978 VIDO had commitments of \$22,615 in the operating fund (1977 - \$17,372) and \$143,700 in the capital fund (1977 — 0).
3. The research grants as presented in the Schedule are held by the University of Saskatchewan and are administered by VIDO on behalf of the grantee Dr. Chris Bigland.



# Research Section — Progress Report on the Neonatal Diarrhea Research Program

By Dr. S. D. ACRES

In 1977-78 the neonatal diarrhea research program was comprised of five major projects:

1. Management control of neonatal calf diarrhea
2. The *E. coli* ALEC (minicell) production project
3. The *E. coli* heat stable enterotoxin (ST) project
4. The ALEC (or minicell) vaccine trial
5. Immunity to Rotavirus.

The first project entails studying a herd of 200 Hereford cows, loaned to VIDO by the Department of Animal Science, which are divided into four groups of 50 cows each, and calved under different management systems.

In 1976-77 (Objective 1) the cows were put into newly constructed calving pens about two weeks before calving started. Approximately 20% of the calves in the herd suffered from a mild form or viral scours when two-six weeks old. Calves born in all four management systems used were affected; however, in all cases the diarrhea was mild and scouring calves recovered without treatment within two-three days.

In 1977-78 (Objective 2) several changes were made. Cows were put into the calving pens approximately six weeks before calving started. Hence, by the time calving started the level of environmental contamination in the calving areas was higher than in 1976-77. As was the case last year, cows and newborn calves were turned out of pens A and B immediately after calving. However, in pens C and D cows and calves were confined to the calving pens for the duration of the experiment. Therefore, in pens C and D the population density continued to increase throughout the duration of the experiment, as more calves were born in the pens.

The number of calves in each pen which had scoured by approximately 3/4 of the way through the calving season are shown in Table 1. Almost no

diarrhea occurred in pen B where population density in the calving pen was low and where calves were turned out at birth.

The diarrhea was much more severe than that which occurred in 1976-77 and affected primarily calves under four days of age. Early indications are that enterotoxigenic *E. coli* (ETEC) were one of the major causes. During the outbreak, several different treatment regimens were used on the calves, and at the end of the calving season the data will be compared. Death losses would have been much higher if intravenous fluid therapy had not been given. This year's results should yield some valuable information about how producers can prevent and control this type of scour outbreak in their herd.

## E. Coli ALEC (Minicell) Production Project

The objective of this project, which is under the direction of VIDO collaborator, Dr. George Khachatourians, (Department of Medical Microbiology, University of Saskatchewan), is to produce anucleated live *E. coli* (ALEC), which can be used as a vaccine against calf scours caused by enterotoxigenic *E. coli* (ETEC).

Significant progress towards development of a vaccine was made. Considerable time was spent determining the best method of increasing the yield of ALEC and standardizing methods for growing and purifying them. The end result was a procedure which requires 30% less time and yields a product which is at least 10,000 times more pure than the previous one. These procedures are important because they determine a major portion of the cost of eventually producing an ALEC vaccine. A second major achievement was to transfer the K99 antigen, one of

Table 1

### INCIDENCE OF CALF SCOURS IN EACH OF THE FOUR CALVING MANAGEMENT SYSTEMS

Pen	Pop. Den. of Calving Pen	Post-Calving Management	No. of Calves		% Scoured	Died	% Died
			Born	Scoured			
A	High <sup>1</sup>	Turned out	38	13	34	2	5.3
B	Low <sup>2</sup>	Turned out	37	1	3	0	0.0
C	Low	Confined	44	26	59	3	6.8
D	High	Confined	44	26	59	2	4.5
TOTAL .....			163	66	40%	7	4.3%

<sup>1</sup>250 sq. ft. per cow.

<sup>2</sup>1,000 sq. ft. per cow.

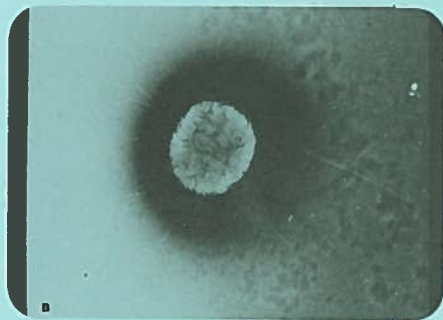


the factors which allow *E. coli* to cause scours, into a minicell-producing parent strain (Figure 1). We can now produce large quantities of K99<sup>+</sup> ALEC to be tested as a vaccine against calf scours. (See ALEC vaccine trial for test results).

Figure 1



*E. coli* K 99+ Minicell Producing Strain GK500.



A Minicell; final magnification 103,200X.  
Note the presence of K99 Surface Antigen.

This project will continue during 1978-79, and will have two main objectives:

1. To increase the amount of K99 antigen carried by each ALEC, and thereby increase the potency of the vaccine; and
2. To ensure that ALEC do not contain any as yet unidentified genetic material which could be harmful to animals.

## E. Coli Heat Stable Enterotoxin (ST) Project

Enteropathogenic *E. coli* produce a heat stable enterotoxin (ST) which stimulates intestinal cells to secrete diarrheic fluid. The chemical composition and configuration of ST normally produced by the bacteria is such that it does not stimulate antibody formation, and hence most animals are susceptible to diarrhea caused by the toxin. The objectives of this project, under the direction of Dr. R. Kapitany, (VIDO Scientist), are to isolate and purify stable toxins from *E. coli* found in several animal species and to alter its structure so that it stimulates antibody formation. If this can be done, then it may be possible to develop an antitoxin or toxoid against ST. Such a preparation would have wide application against diarrheal disease in animals and man.

During the past year ST from one calf strain of en-

teropathogenic *E. coli* was purified by ion exchange chromatography and amicon filtration. Production of ST from calf, pig and human *E. coli* is nearing completion and when sufficient amounts are available the composition of these toxins will be compared. Most of the effort during the next year will be aimed at altering the structure of ST, so that it will stimulate antibody formation.

One toxin "vaccine" was tested in cattle as part of a larger vaccine trial with promising results.

## Vaccine Trials

Enterotoxigenic *E. coli* (ETEC) are the most common bacterial cause of calf diarrhea. Theoretically, diarrhea could be prevented either by antibody which prevents the bacteria from attaching, or by antibody which neutralizes the effects of the enterotoxin. Since the disease occurs during the first few days of life, while calves are still receiving colostrum from the dam, the most convenient way of getting protective antibody into the intestine of the calf is through the colostrum. Unfortunately, the colostrum of most cows does not contain antibodies against either the K99 antigen or enterotoxin. However, by vaccinating the cows before calving, it is possible to stimulate formation of colostrum antibodies against K99, and it may be possible in the future to also produce antibodies against enterotoxin, both which would prevent the disease.

The objectives of the ALEC (minicell) vaccine trial were:

1. To examine the ability of various K99 preparations to stimulate antibody production in cows, and
2. To determine if colostrum antibody against K99 antigen will prevent the ETEC from attaching, and thereby prevent diarrhea.

Development of immunity against the enterotoxin was discussed under the *E. coli* enterotoxin project.

Before conducting this trial, it was necessary to develop a system by which the disease, enterotoxigenic colibacillosis, could routinely be reproduced in calves. Newborn calves at various ages were fed different strains and doses of ETEC to determine conditions necessary to consistently reproduce the disease. Severe, fatal diarrhea occurred in over 90% of calves challenged with a K99<sup>+</sup> strain of *E. coli* when 12-14 hours old. Older calves appeared to be more resistant. Post-mortem examination of the affected calves, done in collaboration with Dr. Jim Bellamy of the Department of Veterinary Pathology, revealed that large numbers of ETEC had attached to the lining of the lower small intestine. When stained with fluorescein-labelled antibody, or when examined under the electron microscope, layers of ETEC could be seen covering the intestinal surface. (Figures 2 and 3)

The next step was to determine the ability of several different vaccines to induce immunity against K99 antigen, and to prevent diarrhea in calves born to vaccinated cows. This part of the project was done at the University of Saskatchewan farm at Lanigan, Saskatchewan using 55 cows purchased by VIDO. The cows were divided into five groups and vaccinated as follows:



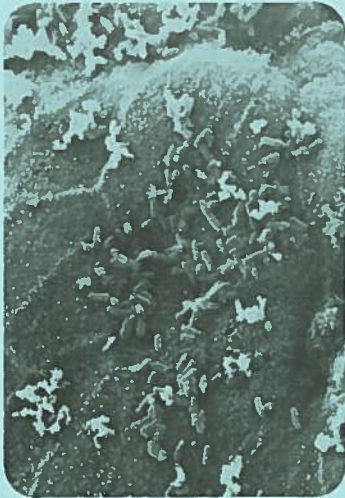


Figure 2 — Pathogenic *E. coli* attached to intestinal wall showing outside of individual epithelial cells. Figure 2 (x 2000).

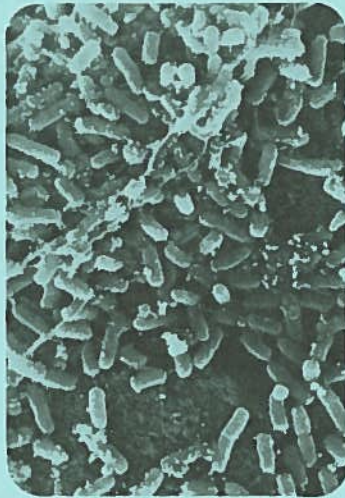


Figure 3 — (x 5000).

1. Nine cows were given ALEC vaccine. The basis of this vaccine is a mutant of *E. coli* developed by Dr. George Khachatourians. Dr. Khachatourians has transferred the genetic material which controls the production of K99 antigen into an ALEC producing parent strain. The ALEC which are produced have K99 antigen on their surface and form the basis of the ALEC vaccine.

Table 2

**OCCURRENCE OF SCOURS AND DEATH IN CALVES WHOSE DAMS WERE VACCINATED WITH EXPERIMENTAL *E. COLI* VACCINES**

VACCINE GIVEN TO COWS	Number of Calves	
	Scoured	Died
None	10/10	9/10
ALEC	3/9	1/9
K99	4/9	0/9
Whole Cells	2/9	1/9
Commercial Bacterin	6/6	4/6

2. Nine cows were given biochemically purified K99 antigen prepared and supplied by VIDO collaborator, Dr. R. E. Isaacson, of the National Animal Disease Center in Ames, Iowa.
3. Nine cows were given a formalin-killed whole cell vaccine containing the strain of ETEC which was used to challenge the calves.
4. Nine cows were given an experimental *E. coli* bacterin which contains six different strains of ETEC, manufactured by a commercial company in the U.S.A.
5. Ten cows were left as unvaccinated controls.

The cows were vaccinated twice, approximately six and three weeks before the onset of calving. Calving started March 21. Cows were watched 24 hours a day, and newborn calves were challenged orally with ETEC when 12 hours old using the method developed previously. Following challenge, calves were examined every 12-24 hours, until they were 10 days of age to determine the degree of protection provided by each vaccine. The number of calves which developed diarrhea and the number which died in each group are shown in Table 2.

The results of this trial indicate that the ALEC and whole cell vaccines, as well as the purified K99 antigen, lowered the incidence of diarrhea and greatly reduced the death rate in calves. The commercial bacterin did not appear to significantly reduce the incidence of severity of disease. The challenge given to the experimented calves was much more severe than would ever be encountered under natural conditions. Even so, the diarrhea which occurred in most vaccinated calves was mild and lasted only a few hours.

This project will continue during 1978-79, with the object of determining the cheapest method of vaccinating cows against ETEC. If work progresses on schedule, a large field trial to test the efficacy of the vaccine in commercial cow-calf herds is planned for the 1979-80 calving season.

## Coming Events

The official opening of VIDO will take place on October 2, 1978. Plans are well underway and invitations will soon be in the mail.

The second VIDO Symposium on Neonatal Diarrhea will be October 3-5, 1978 in the Place Riel Theatre on the Campus of the University of Saskatchewan in Saskatoon. Prominent scientists from several countries will be presenting original papers, discussing the latest research, exchanging ideas and advising VIDO on neglected areas of research.



## Immunity to Rotavirus

By Dr. L. A. BABIUK and Dr. A. GREWAL

Rotaviruses are a common cause of diarrhea in calves and pigs. This project is designed to examine the biochemical and biological characteristics of several different strains of the Rotavirus isolated from calves and to determine the body mechanisms which prevent and control infection by the virus. These studies may suggest ways of developing new vaccines or of improving existing ones.

During the past year culture conditions necessary to grow Rotavirus in the laboratory were developed and refined. Several different strains of the virus isolated from calves in Canada and other countries have been cultured and examined by a number of techniques.

We have shown that virus infected cells cannot be killed by cell mediated immune mechanism which suggests that antibody found in the blood and milk is of major importance in limiting infection and spread of the disease.

This project will continue to examine the immune mechanisms which control Rotavirus infection. The ability of cows and calves to carry and shed the virus over long periods of time will also be examined. Eventually it may be possible to develop rapid techniques to detect carrier cows which can then be isolated from the rest of the herd prior to the onset of the calving season. The effect of various disinfectants on Rotavirus will also be studied to determine the best method of cleaning and sterilizing calving pens and utensils.

Experiments in calves indicate that there are differences between strains in their ability to cause disease and to stimulate antibody formation. If a strain of Rotavirus can be found which does not cause diarrhea but which stimulates antibody production, it may have potential as a vaccine.

## Economics of Calf Scours Prevention and Treatment

By Mr. B. S. FREEZE

Objectives of this study, recently completed, centered on the determination of possible dosage cost for a range of calf scours vaccination alternatives. Associated costs of conducting a calf scours vaccination program were integrated into a beef-forage-grain computer simulation model. For each run or trial, the model computed the increase in returns from calf scours vaccination. A vaccine cost function, based on multiple runs, was developed to determine the change in dosage cost of a vaccine with changes in: herd location, recorded March snowfall, percent of the herd calved outside, percent heifers in the herd, length of calving season, and vaccine effectiveness. For the average size herd, the dosage vaccine cost ranged from minus 23 cents, (for a vaccine which reduces calf scour incidence and mortality by 5% each), to \$2.22 (for a vaccine which reduced calf scours incidence and mortality by 100% each).

This type of computer modelling will guide our researchers in developing vaccines which will be economical for producers to use.



*Multi-purpose out-building*



# Respiratory Diseases Program

## Mycoplasmas

Dr. C. H. BIGLAND

Mycoplasmas are extremely tiny bacteria, some forms being smaller than the larger viruses. Many of them cause disease in humans and animals, including the dreaded bovine pleuropneumonia disease found in Asia and Europe. Fortunately, Canadian cattle are free of bovine pleuropneumonia due to the disease preventive measures of the Federal Health of Animals Branch. However, there are mycoplasmas in Canadian cattle which do cause mastitis, arthritis and respiratory disease.

It is thought that the mycoplasmas may not only be disease producers in their own right, but also damage the lungs of infected cattle and open up avenues for infection with other bacteria such as *Pasteurella* and viruses such as IBR and BVD.

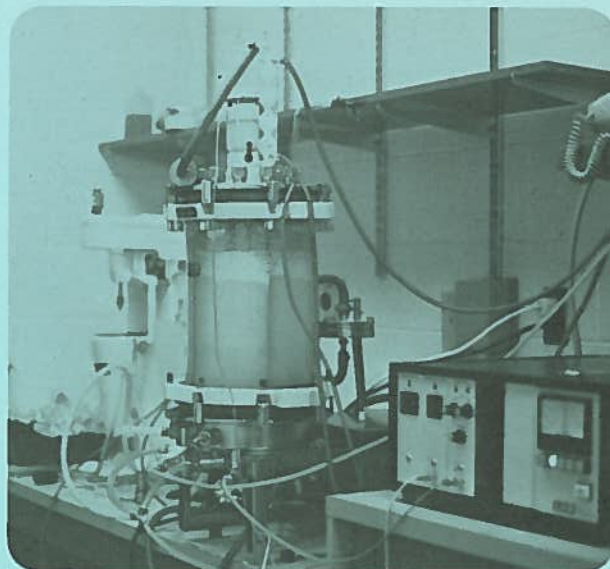
Excellent studies on these have been done by Dr. E. V. Langford, of the A.D.R.I. Western, Lethbridge, and Mrs. H. Louise Rhunke, at the Ontario Veterinary College, Guelph. To investigate this mycoplasma incidence in Saskatchewan, Dr. Eugene Janzen, VIDO Research Collaborator (W.C.V.M.), and Dr. Chris Bigland initiated a study at the Saskatchewan Bull Station with the collaboration of the bull owners, Dr. Hugh Nicholson of the Department of Animal Science, and the R.O.P. Bull Test Station Committee.

Over 300 bulls from 90 farms representing many areas in Saskatchewan were sampled on their arrival in November 1977, again in January 1978, and in April 1978. Samples included blood and swabs of the upper nasal passage. The results are still being analyzed, however, initial data indicates that animals from approximately 85% of the farms were carrying positive blood tests to *Mycoplasma bovis*. This organism is thought to be one of the major mycoplasmas causing disease in Canadian cattle. Actual culturing of mycoplasma are more difficult to do, and other mycoplasmas will show up on culture in addition to *M. bovis*. Studies indicate no spread within the bull station. However, this is not unusual considering the very high percentage of animals that had been exposed to *Mycoplasma bovis* before entering the bull station.

Considering that all the bulls entering the station are young (approximately eight months), indications are they are infected very early in their parent herd.

Such widespread infection may be very difficult to control and eradicate.

VIDO is planning on enlarging its research on respiratory diseases next year with a survey of respiratory diseases in feedlots, a study of respiratory disease immunity, a project on ITEM or Thromboembolic Meningo Encephalitis (the sleeper syndrome), and more work on bovine mycoplasmas.



Fermentor — For growing Bacteria

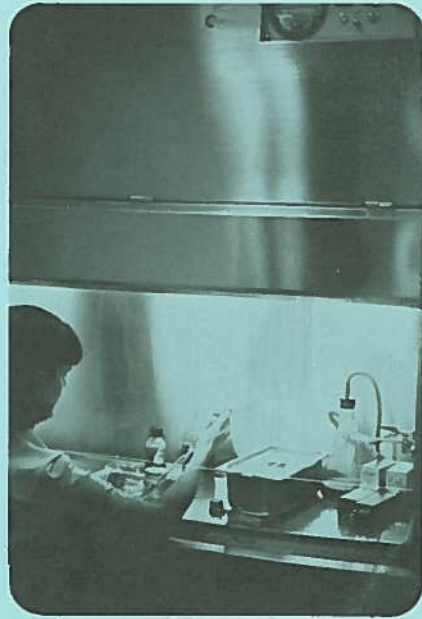


Small Animal Isolator Unit.





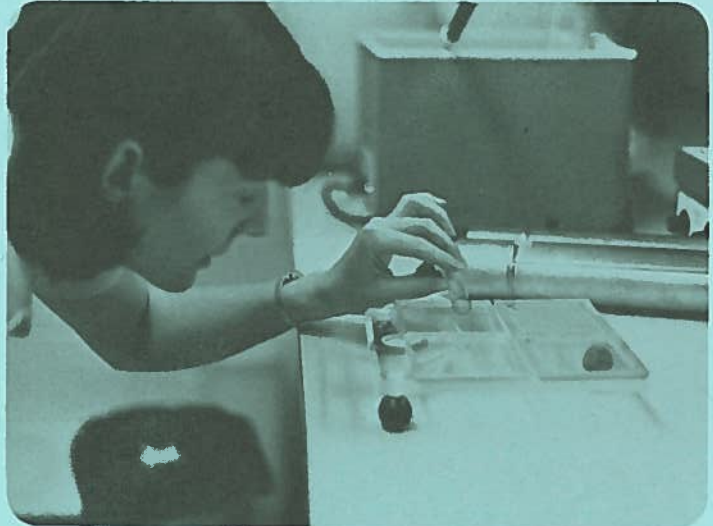
*Fraction Collector and Ion Exchange Column — Toxin Purification*



*Washing Tissue Culture Cells*



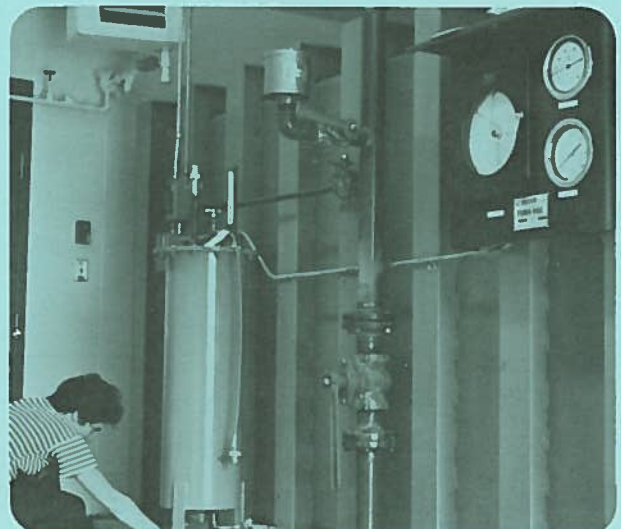
*Spectrophotometer Readings*



*Immunodiffusion Test*



*Infant Mouse Assay.*



*Fumigator*



# V VETERINARY INFECTIOUS DISEASE ORGANIZATION SASKATOON, SASKATCHEWAN

# VIDO

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 Dr. Walt Weir, Director of Vet. Services, Regina.  
 Dr. Hugh Vance, Director of Vet. Services, Edmonton.

## Research Collaborators

- Dr. G. G. Khachatourians, College of Medicine, University of Saskatchewan.  
 Dr. L. A. Babiuk, W.C.V.M., University of Saskatchewan.  
 Dr. E. D. Janzen, W.C.V.M., University of Saskatchewan.  
 Dr. D. E. Isaacson, N.A.D.C., Ames Iowa.  
 Dr. G. Forsyth, W.C.V.M., University of Saskatchewan.  
 Dr. J. E. C. Bellamy, W.C.V.M., University of Saskatchewan.

## VIDO Staff, March 31, 1978

- Dr. S. D. Acres  
 Dr. C. H. Bigland  
 Dr. R. A. Kapitany  
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*L. - R. Front: Mr. Brian Freeze, Mrs. Mollie Denson, Dr. Chris Bigland, Ms. Phyllis Zoerb, Ms. Irene Richard, Ms. Pat Platel.  
 Back: Dr. Steve Acres, Ms. Marsha Permut, Dr. Lorne Greenaway, Dr. Bob Kapitany, Miss Pat Merkel, Mr. Raul Tabelon.*