

I AM VIDO

From Vision to Reality
Veterinary Infectious Disease Organization
by *Christopher H. Bigland*



I AM VIDO

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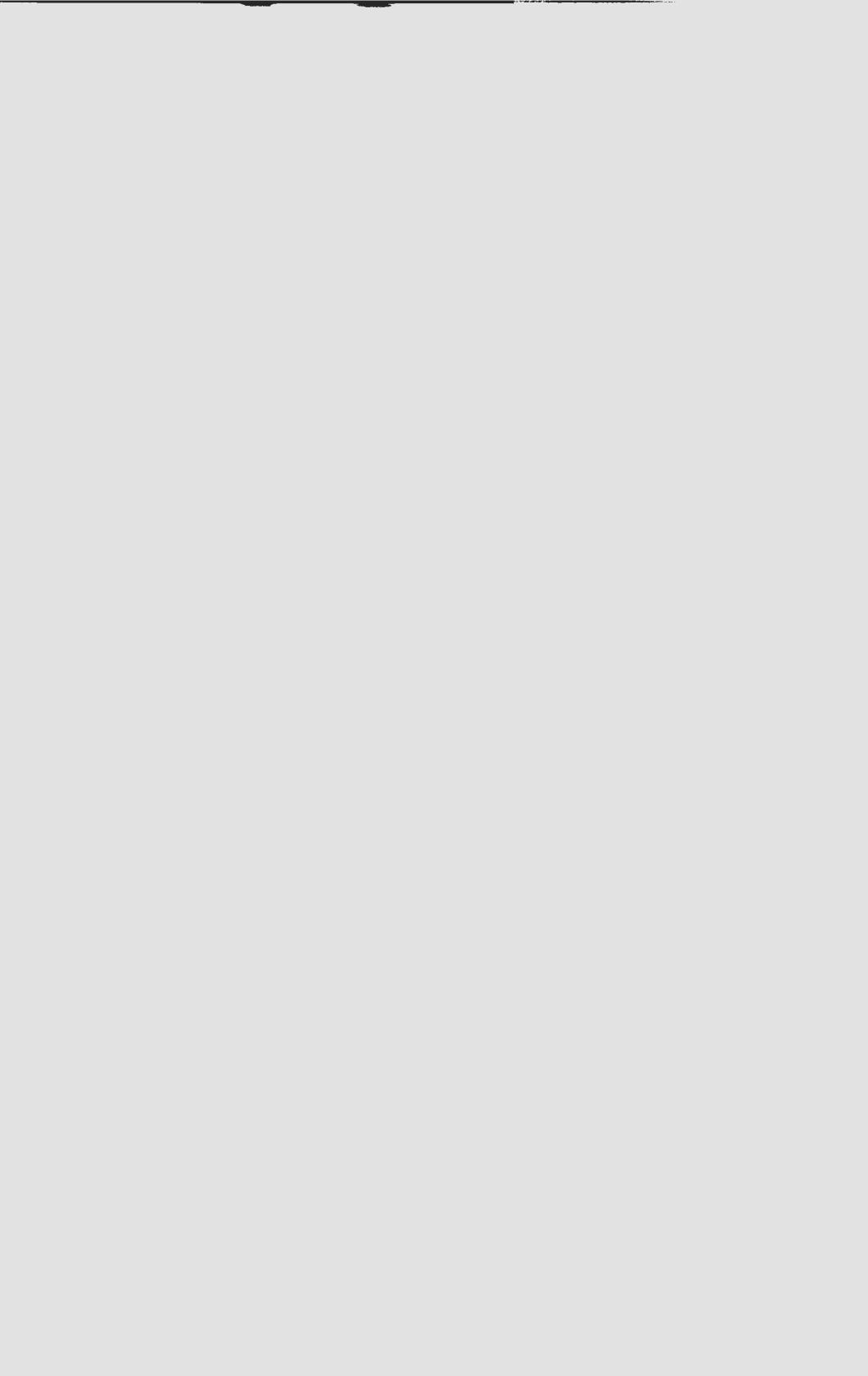
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FOREWORD

In writing this book it has been my endeavour to encapsulate the formative years of a dynamic, growing organization. It is my hope that this recounting will be of value to others who may be thinking of establishing a similar unit in another area of endeavor and also a reminder to those coming afterwards in VIDO of its origins and some of the remarkable people involved in it.

In an attempt to avoid being boring, I have broken the book up into several subject headings – each of which was intended to stand alone – with the full realization that no one ever reads a history book in its entirety in one sitting. As a consequence, there may be some repetition.

The book is written in the first person as I envisaged VIDO would view itself. This was also intended to give the author a greater flexibility in his discussion of people, events and circumstances.

The narrative has been dictated on tape and faithfully transcribed by Mrs. Irene Kosokowsky, to whom I offer my sincere thanks. The dictation was done mostly in the city of Victoria, and aside from several trips to the archives, the majority of information came from memory, annual reports and other information brought to Victoria. As a consequence, there may be many errors and omissions, for which I beg the reader's forgiveness. This is particularly true of some of the people who were involved in the described activities and whose names have eluded an aging author.

Chris H. Bigland

DEDICATION

Positions of responsibility and opportunity come to few men and when they do tradition has usually marked out a way, a path well trodden by other men which it is fairly safe to follow. But seldom is it given a man or group of men to lay the foundations of great institutions, and while doing so, to blaze a path into which an established order shall compel other men to walk.”

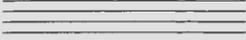
Henry Marshall Troy

Address to the First Convocation
of the University of Saskatchewan

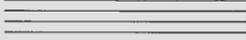
This book is dedicated to Dr. Ernie Pallister, Mr. Eric L. Harvie, Dr. Don Harvie, Mr. Jim Fish and the Devonian Group of Charitable Foundations which made VIDO possible.

To all of the people mentioned in the book who shared in the dedication and aims and objectives of VIDO.

And to my wife Eva Margaret (Inglis) Bigland for her patience during the many long hours, weeks and months of separation necessitated by VIDO activities.

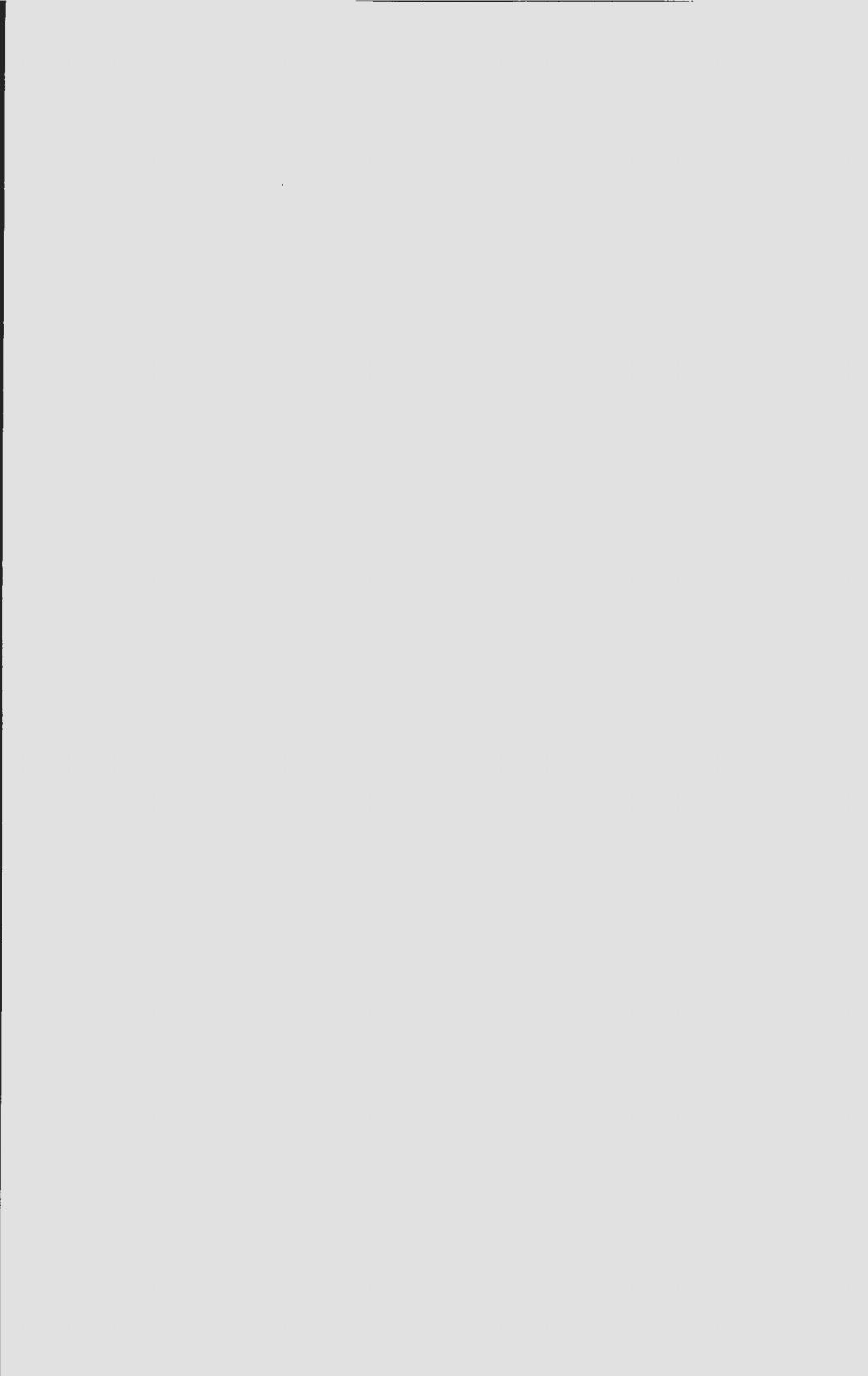


THANKS



My sincere thanks are extended to the following:

- Board of Directors of VIDO.
- Paul Hodgman and Steve Acres for spurring me on to the task of writing this history.
- To Irene Kosokowsky and Phyllis Mierau for transcribing hours of dictation and filling in missing details.
- To all of those mentioned in the book who helped in so many ways to get VIDO started.
- To University of Saskatchewan Presidents Dr. Bob Begg and Leo Kristjanson for continued University support.
- To all of the staff of VIDO for responding to the challenges of the control of infectious diseases of food-producing animals – no matter what their job, from tending to animals, washing the glassware to running sophisticated tests and the most advanced thinking in the frontiers of science. All are necessary for success.
- To Stan Hanson and “Bertie” Bartindale of the University Archives Office who kept all my papers and notes in a manner to which I could rapidly refer.
- To Joe Campbell, Director of University News and Publications for some of the pictures.



CHAPTER 1

My Name

Yes, I am VIDO. I have decided to tell this story myself so the record will be the straight goods, not screwed up too much by pseudo-historians or others who may wish a bigger piece of the action than they deserve. In this way too I can give you, the reader, the inside story without the danger of too many libel suits.

A question that has been asked of me frequently is “where on earth did you get a name like VIDO?” Well it really stands for the **Veterinary Infectious Disease Organization**, which is a big enough mouthful in itself, and hence the shortening to VIDO.

My name really started out to be the Alberta Veterinary Research Laboratory – called by this originally in a Brief from the Alberta Veterinary Medical Association to the Alberta Provincial Government in 1957. I guess the government of the day didn’t like the name and ignored the whole thing. And so, I was a nameless idea until Dr. Otto M. Radostits of the Western College of Veterinary Medicine (WCVM) in Saskatoon sat beside Dr. Patrick McTaggart-Cowan, President of the Science Council of Canada in 1973. “A group from Calgary contacted me the other day”, said Dr. McTaggart-Cowan, “who are looking for scientific research projects in Canada to support. Do you happen to know of any at the University of Saskatchewan?”

“Well I’m sure there are a lot of ideas floating around, but I can’t think of one specifically right now. Give me a few days after I get back

to the WCVM; I'll look around and let you know" said Dr. Radostits.

A few weeks later, Dr. Radostits was meeting with Dr. Chris H. Bigland, Chairman of the Department of Veterinary Microbiology, who had just returned from sabbatical leave in England. They were discussing the progress of Otto Radostits' Ph.D. graduate student, Dr. Stephen D. Acres, who had been doing a great deal of his work on *E. coli* and *E. coli* toxins in the Department of Veterinary Microbiology, aided by Bigland's graduate student Cherry Laing and with the help of several technicians in the Department. Bigland was able to report that Steve Acres must have been working hard and long, at least in the Vet. Micro. Department, as half of the faculty and staff were complaining about his using all the freezer space commandeering technicians, utilizing large gobs of the diagnostic microbiology budget for media — and other assorted complaints. "I was talking to a guy called Pat McTaggart-Cowan, President of the Science Council of Canada, while I was in Ottawa a couple of weeks ago. He was asking if there are any research programs around here that were worthy of funding — do you know of any?" asked Radostits. "Well", replied Bigland, "there are plenty of ideas around that could be developed. However, I just happen to have a brief here, presented by the Alberta Veterinary Medical Association to the Government of Alberta in 1957, entitled 'Alberta Veterinary Research Laboratory'.



Chris Bigland — at the microscope

Now this is something that is really needed, and a good case can be built to support it."

Naturally, being Radostits and Bigland, there were many other words exchanged before June 29, 1973, when Radostits suggested to Pat McTaggart-Cowan that a possible candidate might be a "veterinary medical microbiological institute" and that he should get hold of Bigland for further details.

McTaggart-Cowan did this and in his letter to Bigland, outlined the ground rules as laid out by the "Calgary Initiative". The proposal must be:

1. A scientific research unit that would be of benefit to all of Canada
2. A project that would not in the immediate future be funded by government
3. Headed by a Canadian

These difficult parameters were discussed at length at several meetings of Dean D.L.T. (Larry) Smith, Radostits and Bigland, starting August 14, 1973. At this time my name was "The Microbiological Institute".

Most faculty at the fledgling WCVM were in the chronic habit of writing extensive briefs, primarily aimed at gleaning money for the comparatively impoverished WCVM — briefs to the Wellcome Foundation, the Federal Department of Agriculture, the Medical Research Council, the National Research Council and any other body likely to have a few dollars hanging around for which the WCVM and its stalwarts might be eligible. As a consequence, when McTaggart-Cowan indicated that the Calgary Initiative was expecting a well-documented brief, and emphasized the importance of this by suggesting that the Science Council would enter into a contract to finance it, the three took this very seriously. But at the same time, they knew that contracts and dealings with the Federal Government could be lengthy and so decided to rough out a brief on their own hook, with no Science Council contract. The brief, submitted on August 29, 1973, to McTaggart-Cowan at the Science Council for consideration by the Calgary Initiative, called the unit "the Calgary Initiative Veterinary Microbiological Institute" and was written largely while Bigland was in bed with the flu for a week and polished off at noon hours when a can of Metrecal substituted for lunch.

The lofty name was chosen so the Calgary Initiative could have some identification with it, if they so desired, and really was a description of the kind of activity that should be undertaken. I will not bore you, gentle reader, with the details. (If you're interested, the summary of this ponderous tome is in the appendix, as it turned out to be a 23-page document with nine appendices, each averaging about eight pages). Just to be fair to the Calgary Initiative and to show them how broad-minded and unbiased people from the University of Saskatchewan could be, many alternatives were offered. One of was "a private research institute independently financed similar to the W. Alton Jones Cell Science Center at Lake Placid, New York". Dr. Serge Federoff, Head of the Department of Anatomy at the College of Medicine, has been intimately involved in the founding of the W. Alton Jones Cell Science Center through his wide association with the "Tissue Culture Association" — a group of early pioneers in the new technique of growing living tissues in artificial media. They had been meeting together since 1948, and their dream of a centre to provide specialized training for promising investigators in this field, finally came to fruition in 1967 by a gift of land in Lake Placid, New York, by Mrs. Netty Mary Jones, widow of W. Alton Jones, former Chairman of the Board of Cities Services Company and \$2.5 million from the W. Alton Jones Foundation Incorporated.

The mind-boggling brief to the Calgary Initiative suggested a

research centre similar to this, to which outstanding scientists from all over the world could be attracted to spend sabbatical leaves doing research on veterinary microbiology — also, to attract post-doctoral fellows and possibly graduate students. As a base for this superstructure there had to be a functioning unit with a fairly small cadre of permanent scientists, technicians and support staff, together with animal isolation facilities to back up the unit. Variations of the above were offered to the Calgary Initiative, but were not selected by them.

The proposal chosen for further development by the Calgary Initiative was “a University institute on the University campus either privately funded, or partially funded by the University” — so back to the drawing board for further developments. This time the Calgary Initiative wanted not only a polished up brief on their choice, but a detailed breakdown of budget, including cost of building, size of staff and a budget for each year of operation for the next five years!

“How much should we ask for?” - \$50,000? \$200,000? \$1 million? \$2 ½ million? \$5 million? . . . But we don’t know these people who call themselves the Calgary Initiative - how much money do they have? How much money would they be willing to contribute to one project? Are they supporting other scientific projects? It’s rumoured they are going to fund an engineering project in Newfoundland!! How much do they know about veterinary medicine and our capabilities here? Maybe we’d better not ask for too much or they will automatically turn us down. If we don’t ask for enough to get the project off the ground, we might as well forget it. Yes, but if you ask for \$5 million and get turned down because they don’t have that much money, maybe a small amount like \$200,000 may be better. Yeah, but if you only get \$200,000 what can you do with that? Maybe do one small project, but that’s about all. Yes, that’s really not what we’re after here. We’re after a building — a building, with isolation facilities that we don’t already have. Yes, and the chance to do some research without having other jobs to do, such as teaching, administration and extension. It would be a damn shame to only ask for \$200,000 if we could really get this show on the road for, say, \$2½ or \$3 million. Well, if we’re going to do the job right, we’d better ask for the money it takes to do it and try to prove to them that the money is needed. If they don’t have it, they’ll certainly let us know and we can scale it down at that time.”

These were the arguments, discussions and thoughts of Smith, Radostits and Bigland as they struggled with a budget to present to the Calgary Initiative. Larry Smith elected for a small request, Radostits and Bigland elected for the larger sum, and in November, 1973 budgets for the various options presented to the Calgary Initiative ranged from \$4,961,500 (including a \$3.5 million building) down to \$414,750 for a proposal which utilized only mobile trailer units for buildings.

At this stage of the game, I didn't know whether I was going to be a big unit or a small unit, or if I was going to exist at all. To compound things, that damned Bigland had thrown in a third proposal showing his microbiological bias - a mycoplasma research institute totalling \$163,300. And not to be outdone, Radostits proposed a preventive medicine institute at \$349,500.

I (as the Canadian Veterinary Microbiological Institute) was in the tender hands of the Calgary Initiative, awaiting their decision.

Well! You should have seen the activity around the various buildings in Saskatoon, and between Saskatoon and Calgary, and Saskatoon and Regina, and Saskatoon and Ottawa, between October 23, 1973, and January 7, 1974 - it was like a hive of bees, buzzing back and forth. Ideas were shooting up like sky rockets - some of them fading like burnt embers, others continuing to glow. In this mad flurry of activity I found out that the Calgary Initiative was really the Devonian Foundation of Calgary - one of a group of charitable foundations established by Eric L. Harvie, a prominent Calgary lawyer who had hit the jackpot in the oil industry during Alberta's oil boom of 1947. Rumour has it he made \$100 million in a short space of time. But being a philanthropic man, he decided the money was not his to keep, but actually belonged to the people of Canada - so he started setting up foundations to *give* it away. Now this sounds like a pretty easy business, to give away money, but Harvey didn't want it to just be blown on booze, women and song, so he established some sound basic guidelines on which to donate his money. The general essence revolved around supporting artistic works, museums, parks and the like, but only if someone **else** was putting in substantial amounts of money and guaranteeing continued support for upkeep, servicing and future operation.

The Devonian Foundation was later joined with several other philanthropic foundations under the umbrella of the "Devonian Group of Charitable Foundations of Calgary".

It turned out that Mr. A. Ernie Pallister was not only vice-president of the Science Council of Canada, but also president of Pallister Resource Management of Calgary - a private management consultant firm, primarily serving the oil industry. Also that Ernie Pallister was a geophysicist who graduated from the University of Alberta, joined with one of the large oil companies, and then spent many years in the Middle East exploring for oil - learning a great deal all the while. He put this learning to use by returning to Calgary and forming his own company (Kenting Ltd.), control of which he sold at a later date to "retire". But retirement for a young man not yet 50 was not for him, so he founded "Pallister Resource Management" and, as part of this, was nominated, as vice-president, to the Science Council. Also as part of his resource management, he was asked to be an associate director

of the Devonian Foundation. I suspect that Ernie Pallister was the instigator of the idea of the Devonian Foundation financing scientific projects in addition to their other excellent artistic and cultural philanthropic work. Whether he was or was not, it was definitely his job to look into scientific projects which could possibly be funded by Devonian.

Bigland's part of this tremendous activity involved many meetings with U. of S. President John Spinks, Principal Bob Begg, Dean Larry Smith, Vice-President Balfour Curry, and with Jim Wedgewood, Syl Skarsgard, Gord Smith and Bob Hall of the U. of S. Department of Buildings and Grounds — all having to do with the constitution, the basic outline of operation, the division of responsibilities, the budget, the building location, its dimensions, and **a new name**. The Devonian Foundation did not want their name attached to the unit, the University did not want it called an institute, the name had to be descriptive, and Radostits suggested the "Canadian Institute for Infectious Diseases of Domestic Animals". We had all agreed I was to "achieve the aim of practical research on infectious diseases of animals" and I guess it must have been Bigland who suggested my tongue-twisting name Veterinary Infectious Disease Institute. But because it couldn't be an Institute, the alternative was "Organization". This would make my new abbreviated name, VIDO. It sounded nice and reminded him of his best friend's mother, who was a wonderful woman named Davida, but was fondly called Vida. Because she was Swedish her name was pronounced *Veeda*, so from then on he refused to pronounce my name as anything but *VEEDO*. A sound thinking person of course, would pronounce it *V-EYE-DO*, but this sounded too much like the French dog in the cartoon "Maggie and Jiggs". So VIDO it was — and I was stuck with it!

CHAPTER 2

The Idea

I guess the idea of doing research on common indigenous infectious diseases of animals had been kicked around for a long time and had been discussed by livestock owners, farmers and veterinarians for maybe hundreds of years. Every time a disease started spreading through the flocks and herds, I am sure someone, faced with the frustration of animals sick and dying, would ask the question. Just as that guy Chris Bigland did back in 1941 near Turner Valley, when he faced the sight of several hundred beautiful Hereford cattle sick with ‘shipping fever’, which they now call pneumonic pasteurellosis. The owner was a Mr. Spooner, a wealthy oil man who was fond of good cattle and in caring for them well. Bigland was a newly graduated veterinarian, supposedly up-to-date with all the newer fangled techniques, and here he was faced with several hundred gasping, drooling, heaving, sick and, in some cases, dying cattle. The old armamentaria in the **Materia Medica** books would not do in this case. Possibly the new fangled sulfa drugs might have helped, but these were not available under conditions of war-time veterinary practice. A few so-called bacterins were on the market which supposedly protected against a number of organisms commonly found in cases of shipping fever – but these had not proven very effective in other cases. Somebody should be doing some research on this disease problem!

Not that there hadn’t been research on other diseases. Bigland was well aware of the advances that had been made in the control of anthrax

and black leg, both of which could be controlled by fairly efficient vaccines. Tuberculosis was also starting to come under control with the widespread testing and eradication of infected cattle, and there was a new disease just hitting the cattle industry called "contagious abortion" or Brucellosis, and some research had been done on this to indicate that a vaccine might be effective. But what about the other common diseases we see? Like shipping fever! Like calf scours! Foot rot and pink eye and mastitis! Somebody should be doing some research!

Necessary research into common animal diseases was the prickly topic of discussion around the coffee table at the Alberta Veterinary Laboratory in Edmonton during 1948-49. Graham Wilton, Jim O'Donoghue, Ed Ballantyne, Chris Bigland, Glen Weir, Ed Graesser and Hugh Vance all felt something should be done about research into the diseases they were encountering every day in the diagnostic lab. Diseases for which there was little or no prevention or treatment. (Except for the ubiquitous "Sulmet" - a water soluble sulphonamide put out by the American Cyanamid Company which **did** work wonders for many bacterial problems in cattle and poultry and was the cat's pyjamas, to mix my metaphors, for coccidiosis in chickens). Well, how could they get somebody to do something about research? It pretty well had to be government in one way or another, as they're the only ones with the money to do it. Or the drug firms of course, but they would naturally want to capitalize on their research - as they did with Sulmet and a number of other products. Maybe they could stir up a little action by writing letters to government officials. But they would need a few dollars for stamps. O.K., they would start a stamp fund - grab that old mailing tube over there, we'll punch a hole in the top, put a label on it - "stamp fund" - and get on with this thing. Everyone present threw in the price of the package of cigarettes - which would buy quite a number of stamps in those days - but nobody got around to writing the letters! The stamp fund mysteriously evaporated.

Fortunately, the idea of a veterinary research lab did not stray for long from the active minds of this group or from those of other young veterinarians serving the Alberta Veterinary Laboratory. Further discussion was concentrated around a document originally prepared by Herb Carlson for the Alberta Veterinary Medical Association. It was a proposal to go to the Minister of Agriculture suggesting that a veterinary research unit be built in Alberta as a back-up to the diagnostic laboratory, which was rapidly gaining national and international recognition. Now, let it be said that even **proposing** a research laboratory to the Province of Alberta was a daring move. This is partly because, as diagnosticians, it had been dinned into the staff by the Director, Dr. Ed Ballantyne (who in turn most likely got it from the Minister of Agriculture, Dr. O.S. Longman) that the Province's job was **service**

while **research** was the job of the Federal Government - and "never the twain shall meet!" The Federal Government at the time did have an efficient chain of veterinary research establishments called Animal Disease Research Institutes, with the main one in Hull, Quebec, another in Lethbridge, Alberta and several smaller ones located in Vancouver, Winnipeg and Sackville, New Brunswick. Their prime jobs seemed to be back-up for the federal infectious disease control programs of diseases such as tuberculosis (the making of tuberculin, etc.), brucellosis (blood testing and experimentation with brucellosis vaccines), pullorum disease (the making of pullorum antigen and testing for pullorum) and others. They obviously had some specific research projects under way, one of which was a vaccine for Newcastle disease in chickens. The powers that be in the federal government seemed to guard jealously these animal research aspects and it is most likely from this source that the word came down to the lowly veterinary diagnosticians that *research is a federal responsibility*. This edict set some of the inquiring minds a little bit behind the eight-ball because numerous instances of the crying need for research were presented almost daily in their diagnostic chores. As a consequence, there were numerous so called "scientific investigations" primarily revolving around the incidence of diagnostic cases, but many of which resulted in a continuous series of scientific papers in the *Canadian Journal of Comparative Medicine*, the *Journal of the American Veterinary Medical Association* and other veterinary publications, authored by personnel from the Alberta Veterinary Laboratory. Since these were not "research" investigations per se, they could be noted in the Annual Reports of the Alberta Veterinary Laboratory. It should be mentioned that there were no specific funds for such scientific investigations and the materials and supplies for these were kindly supplied from the diagnostic budget.

Well, as you can suspect, the proposal to the Province of Alberta for a research laboratory was **not** acted upon.

Carlson, Bigland and cohorts were not deterred by the silence which came from the Administration Building. Carlson, as Secretary of the Alberta Veterinary Medical Association, presented a lengthy document to the association suggesting that, as a public relations vehicle, the Alberta Association should be promoting a noble cause such as a veterinary research laboratory. This would have not only research as an end, but would also get the profession in front of the people in Alberta - a public relations vehicle with a powerful idea to convey to various livestock organizations.

To further this idea, when Bigland was President of the Alberta Association in 1957, another brief was prepared, to be submitted to the Alberta Government from the Alberta Veterinary Medical Association, requesting the establishment of a veterinary research laboratory

CHAPTER 3

The Mega-Dollars Initial Funding

a) The Calgary Initiative and The Government of Saskatchewan

As VIDO, I have always had trouble convincing the people I serve and those with money to contribute that I am like an expensive mistress – if they want performance they have to produce the dollars! I don't know why the concept of investing money into research is so difficult to convey, but it is always an uphill struggle. When the first brief to the Alberta Provincial Government suggesting a research laboratory was presented to them in 1957, the cost was estimated to be between \$1 million and \$2 million in capital construction. This was equated to 1/30th to 1/15th the annual estimated loss caused by diseases of livestock in Alberta, or equal to the building of four to eight miles of four-lane divided highway, or approximately seven to fourteen cents per head of the Alberta livestock population. This was back in 1957 when a dollar was worth a 1957 dollar, and Chris Bigland, my future first director, was making \$7,230/year with the Alberta government after being in its service for 10 years. The proposal to the Calgary Initiative through the Science Council of Canada in October, 1973, requested an optimal building budget of \$4.4 million and an operating budget of \$537,000 annually – although alternative proposals were scaled down from these dizzying heights. However, it must be remembered that 1973 dollars were quite a bit different from those of 1957, and for comparison, Bigland

has given me confidential information that his salary in 1974 from the University of Saskatchewan totalled \$26,697 or almost four times as much as it was in 1957.

Believe it or not, the Calgary Initiative was still interested in me, and in October, 1973, Dr. Pat McTaggart-Cowen, Chairman of the Science Council of Canada suggested I telephone or write to Mr. A. E. Pallister who was vice-chairman of the Science Council, at his Calgary address with answers to six major questions. These concerned:

- 1) The potential for future independent continuity
- 2) Accessibility of dynamic leadership and management
- 3) Constituency of a responsible visiting committee
- 4) Relationships and affiliations with universities
- 5) The availability of other financial or dedicated support from provincial or federal agencies
- 6) Assessment and breakdown of forecast budgets and programs — a more detailed statement of projects and relative costs for the first few years of the life of the institute

The questions initiated a tremendous amount of activity on the U. of S. campus. Telephone calls and meetings — Bigland to Smith to Radostits to Principal Begg to Syl Skarsgard to Gordon Smith to Pallister — and many hours of deep thought.

In Bigland's reply to Pallister dated November 22, 1973 (keep in mind that the Calgary Initiative had made no commitments but were certainly getting down to exploring fundamental issues) the answers were:

- 1) *Potential for future independent continuity.* Year 1 and 2 to be construction — operating costs to be mainly carried by the Calgary Initiative. Years 3, 4, 5, and 6 operating costs in decreasing amounts from the Calgary Initiative and equally increasing amounts from the following sources:
 - a) Federal government — in the form of grants from the Department of Agriculture, National Research Council, Medical Research Council, Department of National Health and Welfare, Defense Research Board and Department of Regional Economic Expansion.
 - b) Provincial — governments of Saskatchewan, Alberta, British Columbia and Manitoba (who have few or no research facilities in veterinary microbiology, but are interested in the results of applied research) with the Canadian Veterinary Microbiological Institute (CVMI) to be considered a research arm of their veterinary services branches. Also, provincial

grant funds from the Alberta Agricultural Research Trust, Saskatchewan Research Council and Saskatchewan Horned Cattle Trust.

- c) Industry - contract research with drug companies, biological manufacturers and chemical companies for the testing of their products in Canada, especially where the Canadian protocols are necessary for licensing in Canada.

Also the sale of antisera and vaccines prepared by the CVMI (as was done with the sale of the Western Equine Encephalitis vaccine by Dr. J.S. Fulton). Another example was the supplying of diagnostic antisera for the identification of *E. coli* (presently being done by the *E. coli* research center in the Department of Veterinary Microbiology).

- d) Private funding - including the Canadian Veterinary Medical Association Research Fund, the Mark Morris Foundation, the Cancer Society and Tuberculosis Association, together with private donations and bequests.
- e) The University.

2) *The accessibility of dynamic leadership and management.*

Bigland put his career on the line on this one, and said that if he was acceptable to the Calgary Initiative, he would be prepared to lead the establishment of the CVMI, he hoped in connection with a University appointment. And there would also be consultation with other members of the WCVM in all departments, suggesting that in special instances, members other than the leader could be paid on a consultation basis. He cited the interdisciplinary team already working on neonatal diarrhea in cattle and swine, spear-headed by Dr. Otto Radostits of the WCVM and supported by the Alberta Cattle Commission. It was suggested that two scientists who have been working on *E. coli* neonatal diarrhea research could possibly be hired quickly if funds were available and could start fruitful research almost immediately.

- 3) *Responsible Visiting Committee* - to consist of six to eight persons selected from the following groups, but chaired by a representative of the Calgary Initiative: heads of the Departments of Veterinary Microbiology from three Canadian veterinary colleges, presidents of the Provincial Veterinary Associations, presidents of the Canadian Society for Microbiology, Canadian Veterinary Medical Association and the Canadian Institute of Agrology: representatives of Canadian livestock associations such as the Canadian Cattlemen's Association, the Holstein-Friesian Association, Canadian Swine Breeders Association, Canadian Sheep

Sheep Breeders Association, Canadian Hatchery Federation and Association of Feedlot Operators; representatives of Canada Department of Agriculture, Animal Disease Research Institutes and Health of Animals Division; the heads of the Provincial Veterinary Laboratories or directors of Veterinary Services for British Columbia, Alberta, Saskatchewan and Manitoba, and possibly Ontario and Quebec; heads of Departments of Animal Science for the University of British Columbia, Alberta, Saskatchewan and Manitoba.

It was proposed that the Visiting Committee visit the CVMI yearly, while an elected executive would visit at six-month intervals, with the CVMI to report in detail to them on research progress, plans, courses given, funding, personnel and other details, and to be in turn, guided by the advice of the Visiting Committee.

- 4) *Relationships and affiliations with universities* – the logical university affiliation would be the University of Saskatchewan. Bigland consulted with Principal Begg who looked with favour on the proposal and discussed the possibility that:
 - a) The University may donate land on which to build a private CVMI
 - b) The University could provide on a rental basis – light, water, sewage, heat, chilled water and other services
 - c) The personnel of the CVMI could have access to the Veterinary Medical libraries on campus
 - d) If proper arrangements were made, the personnel could accept graduate students and have them work at the CVMI
 - e) The University of Saskatchewan Administration would be pleased to meet with the Calgary Initiative to work out further details
- 5) *Availability of other financial or dedicated support from provincial or federal agencies* – As mentioned under point (1), the grant applications would go to the various federal and provincial granting agencies and it is to be hoped that provincial authorities will regard the CVMI as a research arm of their Provincial veterinary services, even to the point of funding research projects from departmental and marketing board sources.
- 6) *Assessment and break-down of forecast budgets and programs* – to be held back until after a meeting with Mr. Pallister.

As a result of this discussion, a new budget proposal was drawn up and submitted January, 1974. In it, capital construction was estimated to cost \$1.69 million (with the actual building costing \$1.5 million) and operating expenses estimated at \$294,250/year, which for five years

would total \$1,471,250 - to make a grant total of \$3,161,250. This was sent to Mr. Pallister with everyone's fingers crossed in the hopes of a favourable reply.

Things really started to happen on January 7, 1974, in Saskatoon, when Ernie Pallister came to a meeting with President John Spinks, Principal Bob Begg, Vice-President Balfour Curry, Dean of Graduate Studies Ken McCallum, Dean Larry Smith of the WCVM, Otto Radostits and Chris Bigland. The purpose of the meeting was to discuss the basic outline of operation, the division of responsibilities and, primarily, the *budget*.

Principal Begg had been kept informed of all pertinent correspondence with the Science Council of Canada and was most supportive. In discussing a number of questions with him on November 6, 1973, Smith, Radostits and Bigland tried to outline a basic philosophy for my future operations. These included the possibility of the University donating land for the building, whether the employees should belong to a union, and other questions that could be presented to Mr. Pallister.

President Spinks had previously been informed of pertinent issues at a meeting with Principal Begg, Smith, Radostits and Bigland. In this way, the University was well prepared to "bargain" with Mr. Pallister, and all concerned seemed to be my enthusiastic supporters. I have previously referred to Principal Begg and Acting President Begg, which all may seem confusing, but his appellations changed during my evolution. The year 1973-1974 was a period of transition for the University of Saskatchewan. Until then there had been the University of Saskatchewan with a main campus at Saskatoon and another at Regina, all under the supervision of President Spinks. His officers included Vice-President Balfour Curry, and in charge of the Saskatoon campus, Principal Begg, and in charge of the Regina campus, Principal W.A. Riddell. Now the new NDP government, which was elected in 1971, apparently had decided to abandon this form of University administration by setting up autonomous bodies, the University of Regina and the University of Saskatchewan at Saskatoon. Both were under the direction of a Universities' Commission which would be the liaison with the government.

President Spinks stepped down June 30, 1973, and Dr. R.W. Begg took over as Acting President of the new University of Saskatchewan, being appointed President March 17, 1975.

It was at the January 7, 1974 meeting that I first started to "quicken" within the womb of the University of Saskatchewan (Bigland confided that when he looked out of the window behind President Spinks and Dr. Balfour Curry and saw the first large flocks of Bohemian Waxwings descending upon the Mountain Ash trees on campus - that he felt this was truly a historic occasion!) But as any mother knows,

the quickening or first movement of the fetus is just confirmation that the embryo has taken its first major cycle – and still has a long way to go before birth.

Ernie Pallister deliberated on the proposals advanced at the January 7 meeting and, on behalf of the Calgary Initiative, did a great deal of investigation to gather the opinion of others, particularly in the livestock industry, as to whether a research unit like myself would be a viable and needed operation. Among those people he contacted were Dr. Ken F. Wells, Veterinary Director General, Ottawa, many livestock breeders, veterinarians and agriculturists and provincial departments of agriculture, especially those of Alberta and Saskatchewan.

All this information he took to a meeting with the Calgary Initiative in February, 1974. *At this meeting, the Calgary Initiative approved in principal my establishment as VIDO.* However, they were concerned as to my viability and continuity if it should happen that only they supported me. They asked Mr. Pallister to convey to my proponents this concern, and requested an investigation of contributions, by government or other organizations, of up to \$1 million of the \$3.2 million package. Another milestone!! Another kick of the fetus!

Wow! We have \$2.2 million – if we can get \$1 million from somewhere else. The big question is, where else? Bigland wrote to Pallister March 8, 1974, outlining some possibilities. These included:

a) the federal government, through the Department of Regional Economic Development (who at that time were putting a great deal of money into the Protein, Oil and Starch (POS) Plant on the University of Saskatchewan campus), the Department of Manpower to provide jobs for Canadians, a development grant through N.R.C., M.R.C. or CIDA as a ‘center of excellence’.

b) Provincial governments – first, through the University of Saskatchewan noting a contribution to my organization by a promise of continuation of the Director’s salary and the maintenance of the building (which would amount to a good fraction of the extra \$1 million over a five-year period) or as part of the newly formed Animal Production Research Center; second, by the Government of Saskatchewan through the Horned Cattle Trust Fund; and third, by the Alberta Government through the Alberta Agricultural Research Trust Fund.

c) Livestock Associations and Marketing Boards were also considered but it was felt that funding through these would be fairly small and demand much effort in solicitation, as breed organizations traditionally operate on a marginal or deficit financing basis. The species marketing boards, such as the Cattle Marketing Board, Swine Marketing Board and Turkey Marketing Board, although comparatively new, are thinking of check-off funds, primarily for advertising, but as they become more mature may look with favor on funding me.

d) Canadian Veterinary Medical Association Research Fund - very small in amount and generally devoted to individual research projects.

e) Others including drug companies and private donations.

Advice was sought from many sources as to the possibility of obtaining \$1 million to augment the Devonian \$2.2 million. One of these meetings, the one with Principal Begg, resulted in a great deal of hope. After the pros and cons had been discussed, Begg in his own inimicable way seemed to brighten up, saying "Let's give Ray Harvey a call, and see what the government can do." He was referring to Dr. R.F.E. Harvey, Deputy Minister of Continuing Education, whom he immediately called. Most likely this was one of a series of telephone calls explaining the situation to Dr. Harvey, but perhaps it was this particular one which tipped the balance, for in a few days Bigland was instructed to write to this honourable gentleman outlining the details of my establishment and indicating the position of the Calgary Initiative and the present status of the proposal. This letter was dated March 12, 1974 - and being a man of action, Dr. Harvey contacted the appropriate ministers, deputy ministers and others and set up a meeting in Regina for June 10, 1974.

Needless to say, the setting of such a date involved many letters and telephone calls in order to gather all the "actors in the piece" in the Regina office of the Honourable Mr. Gordon MacMurchy, Minister of Continuing Education. Also behind the scenes, officers in the Provincial Government and in the University were pondering ways of having the Federal Government share in the \$1 million requested by Bigland's letter. I suspect the Provincial Government was exploring such sharing through already existing Federal/Provincial programs such as Agricultural Research Development Assistance (ARDA) and the Department of Regional Economic Expansion (DREE). From the University's side, one of the ideas considered was the possibility of including \$1 million of my capital costs into the capital cost of expansion to the WCVM. Another idea was to approach the four western provinces to permit the University to identify \$250,000 of my annual operating costs along with the instructional costs of the WCMV, in submitting the University's annual accounting to them.

On June 9, Bigland had arranged to meet with Dr. Victor E. Senior, Director of Veterinary Services for the Province of Saskatchewan, and his assistant, Dr. Walter Weir. The purpose was to give further details on the proposal to the Calgary Initiative and the Government of Saskatchewan on my initial financing. Much of this discussion took place in the evening, at a social gathering in Dr. Senior's home. (Bigland must have been under a lot of pressure and tension in the days before he left Saskatoon to journey to Regina because when he was checking his wardrobe at the motel to go to Dr. Senior's, he found he did not have a tie!

The situation was explained to Dr. Senior who graciously chose one of his best ties for Bigland to wear at the meeting the next day. Many years later at one of my banquets in Victoria, Vic Senior wore the same tie in honour of the occasion.)

At 10 a.m. June 10, 1974, a very pleasant secretary invited the members of the meeting into the spacious office of the Honorable Mr. Gordon MacMurchy, in the imposing Avord Towers, Regina. Government representatives included, in addition to Mr. MacMurchy, the Honourable Dr. R.F.E. Harvey, Deputy Minister of Continuing Education, Dr. Victor E. Senior, Director of Veterinary Services, and coming a little later, the Honourable Jack Messer, Minister of Agriculture and Mr. Douglas McArthur, Deputy Minister of Agriculture. The other proposed funder was the "Calgary Initiative" who by now had been revealed as the Devonian Foundation of Calgary. They were represented by Mr. Jim Fish, Vice-President of the Devonian Foundation and Mr. A.E. Pallister of Pallister Resource Management Ltd., Calgary, and Associate Director of the Devonian Foundation. The University, the recipient, was represented by President John W.T. Spinks, Principal Robert W. Begg, Dr. D. Larry T. Smith, Dean of the Western College of Veterinary Medicine, Dr. N. Ole Nielsen, Dean Elect of the WCVM and Dr. Chris H. Bigland, Professor, Department of Veterinary Microbiology, WCVM.

Apparently everyone had done his homework and was fully conversant with all the background of the request to the Devonian Foundation of Calgary and the Government of Saskatchewan to join in my establishment. The total package was \$3,201,250. The Devonian had offered \$2.2 million, and the request was for the Saskatchewan Government to put in \$1 million over a five-year period.

The landmark decisions of my birth were laid out in this historic meeting of June 10, 1974, and revealed for the first time was some of the background and thinking of the Calgary Initiative. Mr. Pallister introduced Mr. Jim Fish as the Vice-President of the Devonian Foundation. Mr. Fish continued with the information that one of the Foundations was the Glenbow Foundation in Calgary, which had supported and continues to support the operation of museums and museum caravans throughout Alberta and Saskatchewan. He indicated the Foundation, at the encouragement of Mr. Pallister, was prepared to branch out into other fields - particularly to initiate or support a research program in the scientific area. Through the Science Council of Canada, the Foundation's directions solicited possible research projects across Canada and received a number to consider. The two projects they were planning to support further were mine and the Centre for Cold-Ocean Research Engineering at (C-CORE) Memorial University in St. John's, Newfoundland.

Their objective was to find areas of scientific research that needed

to be done; programs that were good, but that were not being done at present. Mr. Pallister indicated that they were interested in research because Canada does only five percent of the research development in the world. He reported that his investigations of my fledgling organization had withstood the acid test following contacts with governments, farmers, ranchers, veterinarians and agriculturists, all of whom agreed that it fitted within the concepts required for Devonian Foundation support.

Mr. Pallister said the Devonian Foundation endorsed, in principle, the concept of my unit and were willing to put up \$2.2 million in capital or operating costs at any time during the initial five-year period, provided that \$1 million would be put into the project by others. The main purpose in having others contribute financially was to have an indication of moral and financial commitment from the beneficiaries of the work. Mr. Fish noted that the Devonian Foundation's life is limited because it is using its capital, and therefore, all funding beneficiaries must ensure continuing funding. He indicated that if I proved myself in five years, I should be able to find my own funds. He mentioned that the Foundation realized this was a gamble in some respects, but even if the primary function of my laboratory was discontinued, the buildings would be available to the University of Saskatchewan for other purposes.

Mr. Jack Messer raised the question of a cushion for inflation (a problem that would plague me for many years). The Devonian's offer was firm, but they would give some later consideration to the inflation factor.

In several instances there arose the question of continuity of funds after the five-year period. Bigland's letter of March 18 to Mr. Pallister was referred to for the possible sources of financial funding it outlined.

The meeting adjourned after only an hour and a half – a comparatively short time for such a major decision. Mr. MacMurchy, in concluding the meeting, said that he and Mr. Messer would discuss the concept of my research unit and take a proposal to the Cabinet of the Province of Saskatchewan for further development. On June 26, 1974, Dr. Harvey's secretary, Ms. B. Green, telephoned Mrs. Merle Bocking, Secretary to Principal Begg, and read the contents of a Cabinet Minute No. 4993 dated June 18, 1974:

- 1) That the Veterinary Infectious Disease Organization be supported in principle and that the University of Saskatchewan be authorized to proceed with negotiations with the Calgary Initiative on the assumption of a government guarantee of up to \$1 million support for the project over a five-year initial period;
- 2) the Universities Commission and the Departments of Agriculture and Continuing Education be instructed to explore all feasible

means of sharing costs with the Federal and Western Provincial Governments.

b) The Alberta Commitment

Word of the Saskatchewan Cabinet's support in principle reached the Saskatoon campus June 26, 1974. The next day, Dr. Michael Prior, Head of the Federal Animal Pathology Laboratory on the Saskatoon campus revealed that the building of the new laboratory building for animal pathology, which would be a near neighbor to my proposed location, was estimated to cost \$75 to \$100 per square foot. He estimated his new building of 30,000 square feet (approximately the size proposed for my building) would cost \$3 million. The previous ball park estimate on my space had been \$1,690,000. Inflation was rampant, and might be a factor in shooting down the whole concept of my existence!

These fears were confirmed by Syl Skarsgard and Bob Hall of the Department of Buildings and Grounds, following preliminary meetings with Bigland to ascertain actual building square footage. Their estimate of the cost of building my facilities, as of September 9, 1974, was \$3,645,000 - an extra \$1,955,000 - over double the original estimate! Inflation had certainly caught up with me!

Well, this put the people promoting my endeavor into quite a spot - what to do? We had \$2.2 million offered by the Devonian Foundation, but this had to be confirmed and the proviso of continuity of support money assured. We tentatively had \$1 million from the Government of Saskatchewan; however, this too had to be confirmed and details of the agreement with the University and the Devonian Foundation arranged - and a designated number of dollars, earmarked for my project in the provincial budget was necessary. The University was prepared to go ahead, but could not move until all the other actors in the piece were satisfied. Pallister and Bigland kept the telephone lines hot for days, trying to resolve this impasse. Even with changes to my building to the operating budget, and with other cost cutting endeavors even it appeared the dollar figure was going to be \$1.87 million short for the long dreamed of building for infectious disease research as then envisaged.

What were the alternatives? They seemed to be:

- 1) Abandon the idea? Unthinkable.
- 2) Cut the building in half? This would emasculate or curtail the wide vision of my research - but it would still result in a functioning building, if on a smaller scale.
- 3) Go out and raise more money? Namely \$1.87 million?

The choice was obvious - go out and raise another \$1.87 million! But in the meantime, start planning for a phased-down building. As a

consequence of the latter, two plans were evolved in the building planning process. Plan A, which was the larger building, to be utilized if funds were available, and Plan B, a much smaller building, but still functional!

Many additional smoke signals concerning inflation in the building industry had floated from the Buildings and Grounds Department over to Bigland. This had prompted him to start searching for funds to compensate for the inflation factor. He was a recipient of a grant from the Alberta Agricultural Research Trust (an idea originally introduced into the Alberta Government by the late Dr. Ed E. Ballantyne). Could I also receive funding from this source? In April of 1974, Dr. Fenton V. MacHardy, Dean of Agriculture at the University of Alberta, was in charge of the AART. He sent a letter to the grant holders "seeking to identify problem areas and ways that funds could be used most effectively to solve problems: capital expenses might be considered". Shortly thereafter Bigland met in Edmonton with Dr. MacHardy, who explained that the AART was not the vehicle for large amounts of funding such as I would need, but that the Alberta Heritage Fund might be approachable. As a consequence, on August 19, 1974, a letter was dispatched to Dr. Bruce Jeffery at the Alberta Heritage Fund, requesting capital funds to support my building and research. A copy of this letter also went to Dr. Jim G. O'Donoghue, Alberta's Acting Deputy Minister of Agriculture (Dr. O'Donoghue was a veterinarian who had started with the Alberta Veterinary Laboratory in 1948, the same year Bigland had joined that group).

The reply indicated that a request of the magnitude needed would have to receive Cabinet approval, and so on November 1, 1974, a brief was sent to the Honorable Dr. Hugh M. Horner, Deputy Premier and Minister of Agriculture for the Province of Alberta. The brief requested a grant of \$1.87 million to cover the shortfall caused by inflated building costs. The brief outlined the research grants of \$2.2 million promised by the Devonian Foundation of Calgary, \$1 million from the Government of Saskatchewan and the donation by the University of five acres of land, the Director's salary and building maintenance. It also outlined the benefits to Alberta animal agriculture and to Alberta agricultural and veterinary scientists who could participate in my research. It also noted that my organization would be the only research unit of its kind and emphasized the cost-sharing of other veterinary endeavors such as the funding of Alberta students at the WCVM. The essentials of the brief to the Devonian Foundation, the terms of reference for my administration and operation, the building estimates, a rough requirement study and a list of suggested research projects were also included.

Dr. Horner, in a letter dated November 18, 1974, said he recognized the proposal as an attractive opportunity to work with private sector

and he was willing to discuss it with his Cabinet colleagues. A most generous response! but now the wait began.

On Christmas Eve, 1974, Bigland was eating well at the prestigious Petroleum Club in Calgary, a guest of Don Harvie, Jim Fish and Ernie Pallister. Bigland was pleasantly surprised at the deep knowledge they showed of the livestock industry, as illustrated by penetrating questions on "red nose" or infectious bovine rhinotracheitis in cattle by Don Harvie. He soon realized that the Harvie family had been involved in the cattle business for some time and included the widely known Neil Harvie, one of the directors of the Alberta Cattle Commission.

The three Devonian officials had been meeting that afternoon on my behalf and one of the first discussions revolved around the brief to the Alberta Provincial Government — they were all in a hurry to hear the news of the reception of the Alberta Cabinet. Plans were made for Bigland to call Dr. Hugh Vance, Director of Veterinary Services for Alberta, or Dr. Jim O'Donoghue, Acting Deputy Minister. Mr. Pallister of the Devonian Foundation would call Dr. Horner. Needless to say, there were many, many telephone calls, but the bright side of the picture was that they were all *encouraging*. One of the *most* encouraging came from Jim O'Donoghue some time around the Christmas season 1974, when he was kiddingly told Bigland on the telephone, "We've got a Christmas present for you; it looks like Cabinet is prepared to support VIDO — maybe not with the whole \$1.87 million, but with a substantial amount!"

All participants were saddened in January, 1975, by the death of Eric L. Harvie. This was a personal blow to the Harvie family but they did not waiver in their decision to proceed with my funding, provided it could be shown that a smaller building (or Plan B) could be made functional and viable and still carry out the aims and objectives as set out by the original proposals. But if Alberta joined the consortium, Plan A could go forward and all doubt would be removed from the minds of the Devonian Foundation, the Government of Saskatchewan and the University of Saskatchewan. So Alberta's participation was paramount to the broader concept.

Another letter was dispatched to Dr. Horner on March 6, 1975, requesting information on the previous proposal and pointing out how important it was to have the Alberta Government's participation. It also reported other progress to date, including: a second draft of the detailed requirement study for Plan A and a tentative study for Plan B; information that a satellite laboratory or trailer had been ordered for temporary use on the University of Saskatchewan campus with the intention of later placing it in Alberta; that tentative overtures had been made to two prospective professional staff and that the small staff was now functioning in two little used laboratories in the Fulton Building

on the U. of S. campus.

In the meantime, Ernie Pallister had been active in contacting the Alberta Provincial Government, bringing to bear the prestigious weight of the Devonian Foundation in emphasizing the need for the Alberta Government's participation with private industry in completing this much-desired veterinary research endeavor. Dean N. Ole Nielsen of the WCVM also had made many telephone calls to Edmonton. In addition, I am sure many interested friends in the Alberta Veterinary Services Division and Department of Agriculture were strengthening my case.

The upshot of the effort was a letter dated March 20, 1975, from Dr. H.N. Vance, Director of Veterinary Services to Dean N.O Nielsen, indicating "Cabinet has approved in principle a grant in support of VIDO." The amount was guessed at \$1.8 million! The planners could proceed with Plan A and be guaranteed support for my initial research!

Just the details had to be ironed out now. From Saskatchewan's view, word was received by Acting President Begg in early March that "The VIDO proposal had passed two government hurdles and was on its way to Cabinet." This was confirmed in a letter of March 26 from Dr. V.E. Senior, who indicated that the first payment of \$200,000 of the grant to my organization was included in the 1975-76 budget, which had just been approved.

Details of an agreement were now ready for finalization by all parties. A letter of agreement was initiated in Calgary on May 8, 1975, prepared by Mr. M. Earl Lomas, lawyer for the Devonian Foundation. Details were reviewed by Jim Fish, Ernie Pallister and Chris Bigland. This tied the package of initial funding together as follows: Devonian Foundation, \$2.2 million; Government of Alberta, \$1.8 million, to be used for capital construction on a "one shot" basis; Government of Saskatchewan, \$1 million (\$200,000 each year for five years, to be used for operating funds); University of Saskatchewan, the donation of five acres of land, continuation of the Director's salary and maintenance of the building.

Part of the agreement referred to a constitution which was to be based on the outline of the constitution for the Center for Cold Ocean Research Engineering at Memorial University, Newfoundland. Bigland was to prepare the wording of the constitution, subject to agreement by the University of Saskatchewan. Jim Fish sent the completed initial letter to the Honourable Marvin Moore, Alberta's new Minister of Agriculture, the Honourable J.R. Messer and President R.W. Begg. The Province of Alberta reviewed the initial agreement and requested two minor changes, which were incorporated into the final agreement dated August 11, 1975.

I do not wish to bore you, gentle reader, with the details at this time - as I will be boring you with these in another section. Suffice it to say,

this document will be included as Appendix B.

(It should be noted that by the time the second draft of the agreement was prepared, the Honourable Edgar E. Kaeding had become Saskatchewan's new minister of agriculture.)

There was tremendous jubilation in the offices of the Devonian Foundation, September 9, when they received a telephone call from Mr. Brian Stecyk, Assistant to the Honourable Marvin Moore, saying that the Province of Alberta had signed the agreement and that a cheque could be available for the project within a week. President Begg wrote to the Honourable Marvin Moore on October 3, 1975, expressing thanks for a cheque for \$1,870,000 just received.

By September 25, 1975 all parties had signed the agreement. **I was now in operation! The baby had been born!**

As Ernie Pallister mused in a letter to Bigland dated October 9, 1975, "It has been a sometimes difficult twenty-seven months, but thanks to the efforts of you and your associates at the Western College of Veterinary Medicine, those in the University of Saskatchewan and the Departments of Agriculture in Saskatchewan and Alberta, the Science Council of Canada and the officers of the Devonian Foundation, VIDO is now a reality. With over \$5 million, together with the land allocated by the University, I feel confident we can devote our future efforts to the achievements which will be so important in meeting the food demands of Canada and other countries."

CHAPTER 4

The Follow-up Funding

Well I was finally launched! I could really function – not just the embryonic twitching of research in the Fulton Lab, but genuinely down to earth stuff in my own new building, with my own staff – starting of course in the temporary trailer facilities put into place July, 1975. I could see there would still be enormous amounts of work needed to complete the planning of my building and to put into place a board of advisors to guide my initial steps. This board was a proviso of the Devonian Foundation, and Bigland, Nielsen and others had been submitting names for possible members. But an even bigger challenge now that the *first* \$5 million was in place was to ensure continuing funding. This too had been a worry of the Devonian Foundation and it was now time to put into action all those bright ideas that Bigland had outlined to Ernie Pallister.

In Bigland's letter to Pallister he had put on his "big picture" thinking cap and mentioned funds from the federal government, the provincial governments, the University, the livestock industry, veterinary associations, drug companies and private donations. The eager beavers in the board of advisors, the governing committee and management tackled *all* of these at once. I'll try to break these down into digestible lumps – possibly covering many years in each lump.

a) The Livestock Industry

Possibly the best place to start is with the people who make up the

livestock industry and their efforts in my support. The main reason for starting here, is that in all our dialogue with the Devonian Foundation, it was emphasized that one of the cardinal rules in distributing funds was *that the person benefiting from the gift, should also contribute to the project*. In this way, other people were involved, which in turn would ensure continuity. They felt that since I would be serving the livestock industry, the livestock industry should contribute.

Several other philosophical facts came into play. First, if a person invests in or donates money to a project, he becomes a strong defen- dent and supporter and will go out of his way to promote the concepts that the project espouses.

Second, the livestock industry has had the strong tradition in western Canada of being highly independent. This is particularly true of the cattle industry and swine industry and, to a major extent, the poultry industry. This independence seemed to put a great gulf of distance between the industry itself and the government and univer- sity research agencies because the members of the industry felt they were not involved in decisions concerning the direction of research and that government and university people were doing their own thing with little regard for the needs of the industry itself. My supporters wanted to correct this!

The third factor was the very large number of livestock and breed organizations throughout Canada - each one promoting their own facet of the industry, but with only the small amount of money available from minimal membership dues to use. After several years of trying to in- terest *all* facets of the livestock industry through booths at agricultural exhibitions and so on, the only money available from the livestock in- dustry, aside from small personal donations, came from the "check off" system. The livestock and poultry marketing boards and commissions which were the recipients of such funds rallied to the cause and are now strong financial and moral supporters of my research on behalf of their members.

This idea of a check-off for every chicken, turkey, sheep, cow, pig and pound of milk or a dozen eggs to support research on animal diseases, had been kicked around for many, many years. The efficiency of the system was exemplified in the Horned Cattle Trust Funds established by the Governments of Alberta and Saskatchewan and possibly other provinces. These funds were collected primarily as a fine on each head of cattle still carrying horns when coming into the stockyards. The idea was to encourage livestock producers to dehorn their animals, so that when they arrive at the stockyards, the amount of pain and tissue damage caused by fighting and goring would be minimized. The proceeds were to be used for the promotion of the cat- tle industry, whose interests were protected by having representatives

on the committees dispensing the funds. All concerned, were surprised at the amount of money that accumulated over the years, and many worthy projects were supported.

A fourth idea, at least in the minds of government officials when being requested to support my organization, was the question of the strength of support from the industry being served by that research. Such support could be gauged, in their view, by the amount of money and the number of people from the livestock industry donating cash to my research.

All of these concepts had to be kept in mind when asking for funds from the livestock industry.

Bigland tells me that he recalls vividly the campaign directed at the livestock industries of Saskatchewan and Alberta. In the fall of 1976 it was decided to "take the bull by the horns" and ask the Saskatchewan Stockgrower's Association for a portion of their check-off funds. At that time, their check-off was fifteen cents per animal, and it was decided to ask for five of those cents for my research. (This check-off idea for veterinary research had been around for a long time, and one of its strongest proponents was Dr. Ed E. Ballantyne while he was director of veterinary services for Alberta). Bigland did not consider himself to be much of a salesman, and asking for money was one of the most difficult things he had to do. However, he decided to try to get onto the fall program of the Saskatchewan Stockgrower's Association. His friend, Dr. C.M. (Red) Williams was head of the Department of Animal Science at that time and happened to be the chairman for the upcoming Stockgrower's Association meeting. The program had been fixed for some time; however, Dr. Williams kindly consented to "wedge in" Bigland's talk if it were no longer than ten minutes. Bigland took along my whole management crew, which at that time consisted of business manager, Marsha Permut and Brian Freeze, who started work with VIDO in 1975 but was also seconded as a Graduate Student in Agricultural Economics. My first Annual Report had just been published and a stack of these were taken to the meeting and placed on the chairs prior to assembly. The trio were greeted at the door by Mr. Gary Jones of Crane Valley, Saskatchewan, who was president of the Saskatchewan Stockgrower's Association that year. In due course, after most of the business of the evening, Dr. Williams introduced Bigland who proceeded to give his impassioned plea for a five cents a head check-off - after outlining my hopes and aspirations, my present financing and the value of my research to the livestock industry, all in ten minutes.

Amazingly enough, during the business session shortly afterwards, a resolution was proposed from the floor to earmark five cents a head to support my research. And, after some discussion it was passed!

This action hit the newspapers the next day. However the Saskat-

chewan Livestock Association, of which the Saskatchewan Stock-grower's was a member, took great umbrage at the resolution and vetoed the idea. Its time had not yet come!

A presentation to the executive of the Alberta Cattle Commission was made by Bigland the next spring - 1977 in Calgary. Don Matthews of the Highlands Stock Farms was chairman, John Stewart-Smith was chairman of their Research Committee and Paul Hodgman was general manager. They very kindly allowed him approximately 30 minutes to make the pitch. While Bigland was waiting in the lobby for his time of appointment, Neil Harvie, who was one of the directors, slipped out of the meeting room to emphasize that the Devonian Foundation wished to keep a low profile on my funding and Bigland was not to mention the Harvie name if it could be avoided. The presentation went smoothly; there was a great deal of interest and many questions asked. No monetary figure was mentioned at the time, but it was emphasized that donations or grants would be very welcome from the Alberta Cattle Commission, and even more important would be their political support for any requests made by me to the provincial government.

As part of the campaign to enlist the aid of the livestock industry, letters were sent to all of the breed associations and livestock organizations throughout Canada. Many livestock groups appeared to be interested and asked for more information - or for a speaker for their meetings. However, being thin on the ground by way of manpower, only a few of the latter requests could be met. It soon became obvious that to mount a proper fund-raising effort through this route, someone should be designated to the operation full-time. This concept was promoted and supported by the Devonian Foundation, who made the generous offer of an additional \$100,000 if we would hire someone for this purpose. The big question was, who to get?

Ideally, it would be someone very familiar with the various livestock industries, well respected by them and dedicated to the concept of my research aims. It would have to be someone who did not mind a great deal of travelling from province to province who was a good speaker with a pleasant personality and who was furthermore, honest, trustworthy and honourable. The search was started!

It was decided early in my life, at the strong suggestion of Pallister, then chairman of the board of advisors, that the meetings of this board should rotate from province to province. At each, three times yearly, influential local livestock people, government officials and veterinarians would be invited either to attend the actual meetings or a special banquet at which a full presentation of my activities would be given. The advantage of having a few select people attend the board of advisors meeting was to gain feedback from local areas, glean ideas on research and funding from the various provinces.

In the spring of 1977, the board of advisors held one of their meetings in the Empress Hotel in Victoria. One of the guests at the all day session was Dr. Lorne Greenaway of the Steveston Veterinary Hospital, Richmond, B.C. He had been chosen because of his extensive knowledge of the cattle industry (having owned or managed several large ranches in British Columbia). He was conversant with cattlemen right across Canada, and he had wide contacts with the cattle industry.

Part of the deliberations at the meeting revolved around the idea of hiring a fund-raiser. Obviously, this and my management's evening presentation must have influenced Dr. Greenaway as he telephoned Bigland the morning after the meeting and proposed that his name be put forward as an applicant in the search. Talk about luck or divine guidance or whatever! I could not have asked for a better choice - a person with all the attributes we needed: a veterinarian who was willing to give up his veterinary practice and who was dedicated enough to spend a great amount of time away from his family travelling and promoting my interests!

After Dr. Greenaway's name had been considered by the board of advisors and the governing committee and financial arrangements made with him, he joined my staff on a contract basis, in the fall of 1978.

Just before this time, a twin-projector slide/tape presentation had been prepared by Parry-Lumby of Saskatoon. It described my organization, history, funding, research endeavors and other activities. This had been used at various livestock meetings, board of advisors meetings and had *even* been taken by Permut and Bigland down to New York, in an attempt to obtain funds from the Kellogg Foundation, the Ford Foundation and the Rockefeller Foundation (to no avail unfortunately). Lorne Greenaway quickly mastered the intricacies of setting up this complicated presentation, and for some time used it as a major tool in his presentations to the various facets of the livestock industry. However, his most effective fund-raising style was his own quiet, convincing, sincere personality. He was also most helpful to management, by virtue of his broad background in business and public relations. Greenaway stayed on contract with me until his political aspirations were rewarded by election to Ottawa as part of Prime Minister's Joe Clark's government, in May, 1979.

In soliciting funds from the livestock industry throughout western Canada and Ontario, my managers found themselves on the proverbial horns of a dilemma. You see, my organization was viewed as *part* of the University and as such, eligible for federal and provincial grants to educational institutions.

The other part of the paradox was that members of the livestock industry in general felt alienated from research in governments and at universities! It was their perception that the livestock industry was not

sufficiently consulted in the formulation of research plans and that university and government research was not responding to their actual needs – but were following the ideas and interests of the research workers themselves.

Another perception apparently held by the livestock industry was that their income was so marginal, even with the highly efficient industries that had evolved to this time, that the greatest cash benefit of improved efficiency was not permanently improving their lot as livestock owners. They reasoned that even if there was increased income to the industry from a piece of research, it would only be temporary and that the permanent benefit would accrue to the consuming public by way of reduced prices for food. It was a major concern of the livestock and poultry industries that Canada was following a “cheap food” policy to maintain low food price levels. And that no matter how hard they worked or how efficient they became, incomes were kept low in order to pass the results of that efficiency over to the consuming public. For this reason, livestock men and women felt that if monies were needed to be spent for disease research to improve livestock efficiency, that it should be the *government* who should put up the bucks.

Historically, the federal government had carried the major share of conducting research in agriculture and animal diseases, through the establishment of the federal department of agriculture, research branches, research stations and animal disease research institutes. Provincial governments left research primarily to the universities, each of whom had active faculties of agriculture and were conducting various types of research for the farming industry. As a consequence, the agricultural and livestock interests were in the habit of relying on government to do their crop research – and they expected the government to do the same for infectious disease research. With this in mind; it is not surprising that Greenaway, ran time and time again into statements from livestock and poultry owners that may be paraphrased as “Sure, I lose money from disease (scours in my pigs and calves, shipping fever, enzootic pneumonia, fowl cholera, hemorrhagic enteritis, mastitis, coccidiosis) – but the government should be doing something to prevent or cure these. And I’m sure not interested in putting money into the university – those guys never listen to us farmers anyway.”

To emphasize that my research workers were independent from research control by the University and to emphasize that my research operating costs were not paid by the University, but relied on money raised by my management and Boards, Greenaway prepared a hand-out sheet entitled “Facts About VIDO”. This was also put into my Annual Report of April 1, 1977 to March 31, 1978, asking the question “Is VIDO part of the University of Saskatchewan?” The answer was “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." Another question: "Does the University pay VIDO's operating costs?" Answer: "No, VIDO must raise its own money." Another: "How does VIDO propose to do this?" Answer: "By appealing directly to producer organizations, individuals, granting agencies, foundations and provincial and federal governments." Another: "Is VIDO in danger of becoming divorced from the producers that it is dedicated to serve?" Answer: "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 insure it takes direction from producers." Another: "How does VIDO propose to interest the federal government?" Answer: "By obtaining the support and lobbying power of producers across Canada."

All the statements in "Facts about VIDO" were correct. However, in attempting to emphasize that my research is independent and that I had to obtain my own money from sources other than the University of Saskatchewan, problems did arise!

The first major problem was that federal granting agencies, specifically the National Research Council and later the Natural Science and Engineering Research Council, viewed me as *independent of the University* and therefore, *not* eligible for any of the grants to educational institutions - my researchers were cut off from a major source of funds!

Second, the University personnel felt that I was pulling away from the University and so in some instances the ready cooperation I had previously enjoyed deteriorated to more grudging assistance. However, much of the problem turned out to be personal misunderstandings between my management and some University personnel which could be resolved in earnest discussion. The main University commitment did not waiver.

The effect of explaining "Facts about VIDO" did allow a greater acceptance by the livestock industry. And by March 31, 1978, livestock producer groups, veterinary associations and individuals had contributed \$23,000 towards my research. This included a major donation by the Alberta Egg and Fowl Marketing Board of \$10,000 - a tremendous morale booster, particularly to Bigland, who had worked with the poultry industry in Alberta for many years, and felt this was a major move of faith in that I was not conducting research into any poultry diseases at the time! The veterinary associations of the four western provinces also rallied to the cause, donating \$1,500 from B.C., \$5,000 from Alberta, \$5,000 from Saskatchewan and \$200 from Manitoba. In

addition, livestock men, individual veterinarians and others also contributed \$1,910.

Another major factor in funding from the livestock industry was the appointment in September, 1978 of Paul Hodgman as Executive Officer. This position was to replace Marsha Permut, Business Manager, who left my employ in August, 1978. The change in title denoted additional responsibilities in the management of VIDO, and also an increased emphasis on fund-raising activities. Mr. Hodgman is a graduate of the Ontario Agricultural College, where he specialized in animal science. His student years were distinguished by being in charge of the O.A.C. Student's "College" Agricultural Show. He had several jobs in animal agriculture throughout Canada and was appointed to be one of the first general-managers of the Alberta Cattle Commission. During his tenure there, the Alberta Cattle Commission grew and prospered. With his appointment as Executive Officer, I was able to take advantage of his wide background in animal agriculture and his numerous contacts in the livestock industry. Hodgman became the main contact between my organization and the various corners of the livestock industry throughout Canada. He, as did other of my personnel when addressing livestock groups, tried to provide an update on my activities, the research we were doing on their behalf and the latest information on funding from government and other sources. It was emphasized that the reason for asking the livestock industry for actual financial support was that it would indicate their active approval and interest in my research activities.

Interest on behalf of the livestock industry gradually grew until I became so well-known that Hodgman could report in June, 1985, that the livestock industry had contributed over \$1 million of the approximately \$15 million received to that date. This represented donations from 68 different organizations across Canada, many of them contributing year after year. In addition, 119 individual people made donations. Donations came from all over Canada and the U.S.A., with two coming from as far as China and Japan.

As had been predicted, the main donations from the livestock industry came from the marketing boards and commissions that had the capability to acquire funds through check-off assessments.

The Canadian Turkey Marketing Agency sponsored a research program on Hemorrhagic Enteritis both through their parent body and provincial boards, totalling nearly \$300,000 between March, 1980, and January, 1985.

Various Cattlemen's Associations were also generous; The B.C. Cattleman's Association gave \$35,000 between 1978 and 1984, together with \$3,000 from the Kamloops Stockmen's Association. The Alberta Cattle Commission was a strong supporter donating \$270,000 from

April, 1978, to March, 1984, and the Manitoba Cattle Producers Association gave \$10,000 in two years.

The Milk Producers thoughtfully contributed, spearheaded by the Manitoba Milk Producers Marketing Board who alone donated \$50,000 over a four-year period, followed by the Alberta Milk Producers Association with \$2,000 in two years, the Fraser Valley Milk Producers Association of \$1,500 in three years and the Central Alberta Dairy Pool of \$1,000.

Egg industry donations were led by the Alberta Egg and Fowl Marketing Board, who donated \$47,500 in four years, the Saskatchewan Commercial Egg Producers Marketing Board, \$15,000 in three years, the B.C. Egg Marketing Board, \$5,000 in one year, and the Manitoba Egg Producers Marketing Board, \$3,000 in three years.

Swine industry gifts were led by the Manitoba Hog Producers Marketing Board, who donated \$110,000 in five years, the Saskatchewan Hog Marketing Commission, almost \$10,000 in two years, the Alberta Pork Producers Marketing Board, \$35,000 in four years, the B.C. Hog Marketing Commission, \$2,000 in two donations and the Canadian Swine Breeders Association, \$8,750 in three donations.

Such excellent support from the livestock industry was not only beneficial when my management was talking to government and foundation personnel, but was also a tremendous stimulus to the research effort. It indicated confidence in my research scientists, which greatly lifted their morale and dedication. In fact, if this moral and financial support hadn't been forthcoming from the livestock industry, I am sure that the my people might have been sorely tempted to chuck it all, especially during times of severe financial and organizational stress.

These donations were *doubly* important at one stage of my financing because the Devonian Group of Charitable Foundations agreed to match any such donations, either dollar-for-dollar or fifty-cents-on-the-dollar in the years 1978-1979 (I'll give you more details later on). Some other livestock organizations were also highly supportive, devising their own ingenious ways of collecting funds. One was SISCO (Saskatchewan Improvement Services Co-Operative Ltd.). Over the years this private organization assessed their own members for each hog marketed, which amounted to a total donation of \$10,744.10 to December, 1984. Our "thank you person" in this organization was Eldon McKay.

Another innovative outfit supporting me in the early days, when it was very important, was the Poundmaker Feedlot of Lanigan, Saskatchewan. The owners agreed with the manager, Ross Reynolds, to assess every head being sold from the feedlot to make up a donation to me.

Another very touching story came out of Okanogan Falls, B.C., where the B.C. Southern Interior Hereford Club Ladies Auxiliary held

a raffle and bake sale on my behalf and came forward with a handsome donation of \$200.

Although all the donations from the livestock industry totalled only 1/15 of the money collected in the first 10 years, it was extremely important! These were the people that my researchers and management were working to help by trying to control losses from the common infectious diseases which affected their animals. The donations showed their appreciation, and my staff displayed renewed vigour with each show of support!

b) Foundations

Well tolerant reader, you may wonder why on earth I have been talking so much about money, and *will* be talking about it for a little while yet. But, as the song says, "Money makes the world go 'round.'" This is true with research also – because no matter how talented the research workers are in their fields (and Canada doesn't have very many of them), they still need buildings in which to do their work, good equipment on which to perform their expert skills and a network of support and administrative personnel. The latter to make sure they have money with which to work, stenographic help to write their papers, animal attendants to take care of their animals, devoted people to keep the place clean and tidy and many others to keep the work progressing. The days of the lone research worker who supported himself with his own money and hired his own staff are gone forever. It is only through a well-disciplined, structured organization that scientists can have the freedom to explore the cutting edge of scientific endeavors – to use their own vivid imaginations and apply their abundant energies to their dreams. So money does indeed make research go 'round!

I wedge this "commercial" in at this time because I want to tell you the fascinating story of my funding by charitable foundations.

As mentioned before, I would not be here today without the tremendous financial and moral support of the Devonian Group of Charitable Foundations. On the financial side alone, the Devonian Group put in \$1,370,000 *on top* of their building contribution of \$2,180,000 for a total of \$3,555,000. Much of this came about by the Group's matching of donations from the livestock industry. How did this occur? It's a fascinating story in itself:

The Devonian Group had always been concerned with my continued viability, and even after the building had been built and occupied in 1978, and operating expenses began to come in from governments and the livestock industry, the Devonian was still worried. Ernie Pallister, as chairman of my board of advisors wrote to U of S President Bob Begg, February 9, 1979, with comments from the board. Their primary concern, Pallister said, was my survival, and it would appear

that unless substantial funding was put into place soon, that I would financially expire in about three years, approximately September, 1981. So, I was going broke!?! – Well, we all suspected that. Money was not coming in as fast as we had hoped – there was not the one-third of the annual budget from the federal government we had confidently expected, and it was taking time for the livestock industry to respond to our requests and needs. This was the balance sheet that Pallister saw. But what to do? Everybody had been working hard beating the bushes for funds and they were just slow in coming. The thought occurred that we may have to *reduce* our research activities to adjust to the guaranteed income coming from the Saskatchewan government. However, it was proposed that we go back to the original donors and ask them to come forth with additional operating funds to keep “the baby” afloat. It was soon realized that the governments of Alberta and Saskatchewan and even the University of Saskatchewan could not respond quickly to any such request (although the government of Saskatchewan did increase their grant from \$200,000 to \$250,000 in 1978-79). The Devonian Group of Charitable Foundations was our white hope and a brief was sent to them outlining our position and asking for help. A positive reply was forthcoming, quickly! Pallister had been called in to a high level meeting of the Devonian Group, where he supported my request. After much soul searching, and in an effort to spur my management and the livestock industry into action, they proposed that, with the agreement of the other original donors, the Devonian would match funds donated from the livestock industry dollar for dollar for a period of 18 months starting March, 1979. Then the match dropped to fifty-cents on the dollar for the next year, twenty-five cents on the dollar for the subsequent year, fifteen cents on the dollar for the year after that and ten cents on the dollar for the final year – all to a maximum of \$1.25 million. If the matching money had not exhausted the \$1.25 million by the end of the fifth year, the offer was terminated.

Well, you can imagine what happened around my whole complex and around the country when this boost and prod was finally understood. The Devonian Group in its wisdom had thrown out a challenge to the livestock and other industries supporting me, and at the same time booted my management into getting out and *selling* with even greater vigor! With this impetus, the dollars from the livestock industry really started to roll in.

In addition, at this time, my scientists were putting the finishing touches on a new *E. coli* vaccine that was showing excellent results in the control of scours in calves. In order to place this vaccine in the hands of the livestock industry at the earliest possible moment (because we knew it was good!) attempts were made to have a commercial company produce the vaccine and market it. I'll mention more detail on this

elsewhere, but suffice it to say at this time that an excellent Canadian biological manufacturer was interested and we negotiated with Connaught Laboratories Limited of Toronto for a contract for the production and sale of this invention. This was concluded shortly after the Devonian's matching offer and they generously allowed me to include parts of the income from the invention revenue among funds eligible for the matching grant. As a consequence of the activity in donations from the livestock organization and the invention revenue from Connaught Laboratories, the whole \$1.25 million from the Devonian Group was in my coffers before the end of the second year.

Hodgman was extremely active in seeking out possible charitable foundations to support my research. There are two or three books containing the names of foundations that donate to charity. They list the primary interests of that foundation and the parameters within which they will donate funds. Hodgman soon found that, like the Devonian Group, other foundations are set up by philanthropists to give away money – but they do it on specific and prescribed terms. Many are exclusively for human medicine, many for children or old indigent persons; some for the arts and, on rare occasions, for animal research. It was the latter foundations which were first contacted. Most foundations prefer to support a research project which is defined in size and time; one that can be proscribed and followed closely by way of reports. We soon found out that with any foundation, granting agency or contract agency, that it was wise to give frequent and detailed reports on the research activity and expenditures. I had been used to this, by being responsive to the livestock industry, and so it was a natural activity for me to supply on-going reports to funding foundations.

Of the many, many letters to foundations explored by Hodgman, it turns out that the four other foundations that supported me all had a western flavor and some connection with the livestock industry. As a consequence, they had sympathy for the economic loss and suffering caused by infectious disease in food-producing animals.

The first of these other foundations to make a major contribution was the Max Bell Foundation of Toronto, which decided to give major support to a project on bovine respiratory diseases. In 1981-82, it donated \$190,000 and in the next two years an additional \$205,000 for a total of \$395,000. This seems like a great deal of money for research on bovine respiratory diseases, but it should be noted that they are still the biggest problems and money losers in the cattle business. My scientists needed almost \$300,000 each year for this research, and it was expected that many millions of dollars would eventually be necessary before even the surface was scratched on this complex of diseases. During this first three-year period, considerable progress was made and many promising leads presented themselves – enough to interest the

Kahanoff Foundation of Calgary, who took up the cudgel to assist in the support of bovine respiratory disease research when the Max Bell Foundation funds were being terminated. During 1983-86 the Kahanoff Foundation donated \$450,000 to continue this significant research.

Word had been circulated that my laboratory was one of three units in North America capable of producing germ-free (gnotobiotic) calves. This is a very expensive procedure because one has to buy a pregnant mother, do a complicated Caesarian section and transfer the calf, *without any contamination*, into a germ-free bubble, maintaining it germ-free until the research worker wishes to interfere. Naturally this requires very sophisticated animal attendants, a veterinary surgeon and complex building components. The McLean Foundation of Toronto became interested in the germ-free work and very kindly supplied \$45,000 between 1982 and 1985 to continue it.

Other foundations may not have been as wealthy, but were still willing to assist, and in 1982 the James Richardson & Sons Foundation of Winnipeg donated \$500 towards general research.

In total, \$2,110,501 in operating funds and \$2,180,000 in capital were given to my research by charitable foundations by June, 1985. And this rose to \$2,261,001 by September, 1987.

c) Saskatchewan Provincial Government

As previously mentioned in 1975, the Saskatchewan government had pledged \$1 million in operating funds over a five-year period. Fortunately, when the five years was complete, they recognized the benefit to the Saskatchewan and international livestock industries and continued with contributions which totalled \$2,405,400 over a 10-year period to 1985. Since then, yearly contributions have swelled to the total of \$3,005,400 by September, 1987.

d) Alberta Provincial Government

The Province of Alberta initially pledged \$1.87 million as a capital expenditure to help build my laboratory, in conjunction with the Devonian Foundation. At that time they did not indicate if any operating support would be forthcoming. However, at the end of the five-year initial agreement, and with the strong encouragement of the Alberta Cattle Commission and other Alberta livestock organizations, they decided to fund my operating expenses and over the next seven-year period donated an additional \$601,000. This amount of funding dedicated to research in another province says much for the trust that Albertans had in my performance, as it is rare for one province to send money into another for research. They obviously recognized the benefits to Alberta livestock owners from my investigations; also the operating monies complemented their initial investment in my building.

e) British Columbia Provincial Government

As part of its initial solicitation of the livestock industry, my management had contacted livestock groups in B.C. with favourable response. This interest culminated in a meeting, arranged by the director of veterinary services, Dr. Abe Kidd, with the Minister of Agriculture, the Honourable Mr. Jim Hewitt, the Deputy Minister of Agriculture, Mr. Sig Peterson, and other officers of the Department of Agriculture. Mr. Hewitt listened with interest to my story and indicated that the B.C. Government did have a policy of matching funds, dollar for dollar with their agricultural industries. He asked Mr. Peterson to investigate the possibility of matching any donations towards my research from the B.C. livestock industry. As a consequence, for the first year (1978-79), when notified of donations from the B.C. livestock industry of \$23,848.41, a cheque came forthwith from the B.C. government for a like amount. At first my management was almost *too* successful with industry contributions in B.C., as the people managing the budgets in the Department of Agriculture became concerned at an open-ended funding arrangement and felt they had to be put a ceiling on the donations. This was eventually set at \$15,000 per year. Later, my officers were not always successful in getting contributions from the B.C. livestock industry to even match the ceiling. However, over the seven-year period 1978-1987, the B.C. Government donated \$93,525.41 to match the contributions of their livestock and poultry industries.

f) Manitoba Provincial Government

Many forays were made to Winnipeg to meet with the Minister of Agriculture, always arranged with the blessing of the Director of Veterinary Services, Dr. Jack McPhedran. Dr. McPhedran had an excellent provincial veterinary organization among its functions being the financial support of veterinary hospitals operating in Manitoba. My staff seemed to be slow in getting our message across to the Manitoba livestock industry. However, Manitoba did start to respond in 1977 and has continued to be generous. The Manitoba provincial government felt, however, that I was rather remote, and possibly they were under severe financial constraints. However with persistence and the help of the Manitoba livestock industry, the Manitoba government came through in 1980 with a \$20,000 donation. Over the seven-year period 1980-87 they have donated a total of \$121,500.

g) Federal Government of Canada

Early in my formation it was believed by many, including the Devonian Group, Ernie Pallister, and Gordon MacMurchy and many others that the Federal Government would surely contribute a matching amount towards such a worthy project; a unit to conduct research on

infectious diseases of food-producing animals which in turn would support the whole Canadian livestock industry. But, despite many briefs, innumerable visits to Ottawa and the knocking upon of innumerable doors there it did not happen. Despite changes in government and the solicitation of support by the bureaucracy and political types, not to mention equally vocal support from provincial and federal livestock organizations, the federal government still has given no unencumbered financial support to my organization in its first 10 years of operation. A major and incomprehensible disappointment! However, in recent years targeted grants and contracts are becoming a significant source of funding.

h) Invention Revenue

I hope to have a special section called "The VICOGEN Story" to look a little more closely with the fascinating role its invention played in my history - the research, the players, the negotiations and all the other delightful tidbits. In view of this, we'll deal only with the income aspects here.

When the first Memorandum of Agreement was made, March 23, 1979, with Connaught Laboratories Limited of Toronto, for the production and sale of the world's first effective vaccine against *E. coli*-caused calf scours, we all felt that the financing of future research would be assured through income from this source. Alas, it was too good to be true, as I will later detail. Nevertheless, in the first year of sales of VICOGEN in Canada, 1979-80, income to VIDO totalled \$188,287. The next year it dropped to \$125,899, although the decline was offset by sales in the United States totalling \$126,579. Unfortunately, VICOGEN was not patented and at least seven international companies moved in on its success, copied VICOGEN to the best of their ability and started to control the calf scours vaccine market throughout the world. This resulted in a marked decrease in sales for Connaught Laboratories Limited, Toronto, and their U.S. subsidiary, Connaught Animal Health Inc. of Swiftwater, Pennsylvania, which was in turn reflected in a drop in income to my research coffers. However, earnings from these sources in the five-year period 1979-1984 totalled \$579,635 - \$217,306 of which came from the U.S. subsidiary.

Some other invention revenue came from Molecular Genetics Incorporated of Minnetonka, Minnesota. Through the initiative of Dr. Chuck Muscoplat, this company had produced a large quantity of the new monoclonal antibody against the "K99 antigen" (the attachment factor of the pathogenic *E. coli*). To illustrate the value of attending international meetings, Dr. Muscoplat had spoken to Dr. Stephen Acres at the Conference of Research Workers in Animal Disease annually held in Chicago. He asked, "How would you like to test the efficacy of our

K99 monoclonal antibody against calf scours in your test system in Saskatchewan?" Since a series of tests of VICOGEN and other vaccines had already been planned, this would mean little more than establishing another group of calves for the test – and so Dr. Acres agreed. The K99 monoclonal antibody was a success in the trials the next spring, enabling Molecular Genetics to have the product licensed in Canada under the name of Genecol 99. For the part Acres played in the testing and licensing, Molecular Genetics gave a royalty to my research pool totalling \$8,698 over a two-year period.

This invention income was believed to be *just the start* of revenue earned as a result of research by my scientists and its subsequent commercialization. Although in the first 10 years only 3.86% of the income has been derived from the sale of technology, it is expected that in future years, a greater percentage will come from this source.

i) Grants

Research grants, non-research grants and contracts are definite commitments to conduct specific pieces of work – by my organization all aimed at the control of infectious diseases in cattle, swine or poultry. In each case, the grant or contract was contingent upon a specific policy formulated by the federal government, provincial government or producer organization. Generally, the broad outline of such a policy was widely circulated to potential research groups, and anyone hoping for a grant or contract could apply or bid with a well-defined, detailed project. The application would include a scientific history and a description of each step in the proposed research, together with a specifically documented budget and time table.

In the area of research grants, as my scientific reputation started to expand more and more funds were available through this route, so that in the first 10 years, research grants amounted to \$2,272,764 or almost 15% of total revenue.

Here again the Province of Alberta came through with flying colors via two granting agencies: the Alberta Agricultural Research Trust grants from which totalled \$209,481; and the Alberta "Farming for the Future" portion of the Alberta Heritage Trust, which granted \$1,199,252. Altogether over \$1.4 million from that province up to June, 1985 – and the grants continue! (To September, 1987, an addition \$320,363 was received from Farming for the Future).

The Saskatchewan government also provided some funding for agriculture research, laterally through its Farm Lab Program. Unfortunately, the terms of reference were such that my scientists were **not** eligible for these. However, the Saskatchewan Horned Cattle Trust Fund, between 1978 and 1983 made grants totalling \$96,500 and the Saskatchewan Agriculture Research Trust in two years ending in 1982

granted \$67,674, making a total of \$164,174.

The federal government did have some grant programs for which my organization was eligible. Early in my history, Bigland held a National Research Council Grant for the study of avian mycoplasmas. This was continued in his name for three years, the research being conducted in my laboratories. Between 1975 and 1978, NRC granted \$38,330 to this project.

For some mysterious reason, my organization was not considered to be eligible for grants under the Natural Science and Engineering Research Council (NSERC), despite many pleas from my management and the University of Saskatchewan, until 1985. This was the only federal agency to which I could appeal for funds, and being cut off this way by the federal government greatly jeopardized my research. The main reason for disallowing me to compete for grant funds (possibly related back to the "Facts About VIDO" article) was that I was viewed as being "independent" of the University of Saskatchewan, despite the fact that all my activities were channeled through the University of Saskatchewan except for a teaching role. Under NSERC rules if a scientist did not have an appointment within a teaching department of the University of Saskatchewan, he was considered to be ineligible to apply for grants. It was proposed that all my scientists should obtain part-time appointments through various departments in the Western College of Veterinary Medicine a manoeuver which had been done in a number of other universities where part-time appointments or adjunct professorships were very common. But at the University of Saskatchewan each adjunct appointment had to be processed through a Department and a College - just the same as a full-time employee. In addition, if an adjunct professor were "taken on strength" this would count towards a full-time equivalent (FTE) within the University and have an effect on the student/faculty ratio for teaching and finance purposes. So the adjunct professor route was not for us. We however, did have one cross appointment. Professor Lorne Babiuk, who worked half-time for the Department of Veterinary Microbiology and half-time for me. In addition, the Department of Veterinary Microbiology was able to grant an adjunct professorship to Dr. Geoff Hudson, a molecular geneticist who they desired to have teaching some lectures in molecular genetics to veterinary students. As a consequence, NSERC recognized Dr. Hudson and Dr. Babiuk as eligible for their support. This resulted in NSERC grants totalling \$296,728 between the years 1982 and 1985. It may - or may not be - coincidence that in the fall of 1984 when Bigland kicked over the traces and took early retirement - or when a new government was elected in Ottawa a fresh initiative to "put things right with NSERC" was organized by my long-time friend Ernie Pallister and the Devonian Group of Charitable Foundations.

Apparently I was not the only one to be frozen out of NSERC funding and was in the good company of other research units established by Devonian: C-CORE and C-FER (the Centre for Frontier Engineering Research at the University of Alberta in Edmonton).

This thrust was launched by a meeting of the directors of these institutions, Harold Snyder of C-CORE, Peter Adams of C-FER and Stephen Acres of VIDO, to plan strategy and to formally request a meeting to discuss the eligibility problem with Dr. Gordon MacNabb, President of NSERC.

This meeting resulted in the formation of a task force to review VIDO's eligibility and included a site-visit to VIDO and BIOSTAR.

The result was that Acres could write in the 1984-85 Annual Report ". . . early in the year (1985) the Executive Committee of NSERC recognized VIDO as 'an institution eligible to authorize applications for NSERC grants by qualified members of its research staff' - the Council confirmed that they would fund two research chairs in biotechnology" (The latter in partnership with BIOSTAR).

The breakthrough had been made!

Connaught Laboratories Limited of Toronto were also generous in their grant support of my research - primarily for further explorations on VICOGEN. Two specific grants were given in the year 1979-80, one totalling \$250,000, the other \$33,542, for a total of \$283,542.

Research grants from livestock organizations were several: the Ontario Pork Producers Marketing Board \$28,357; Ontario Cattlemens Association \$12,400; Canadian Veterinary Research Trust \$12,500; B.C. Cattlemens Association (Bostock Memorial Trust) \$6,000 (which consisted of winning the Bostock Memorial Trust Research Grant for five years).

Non-research grants came from 15 donors representing the City of Saskatoon, Province of Saskatchewan, Canada Agriculture, National Research Council and 10 commercial biological companies. The majority of these were for the support of the International Symposia on Neonatal Diarrhea or Swine Diseases.

j) Contracts

Contracts generally are followed even more closely than research grants. With a contract, one outlines *exactly* what work is to be done, *exactly* the budget and *exactly* the time-table. Also, the dates of interim reports and the dates of the final report are specified. The researcher cannot vary from the terms of the contract.

One of the reasons the Federal Government gave for refusing uncommitted or non-grant support of my organization was the lack of a mechanism to do so. However, they did have *contract* research plans available and so we were able to tap in to two of these programs. One

was with the Department of Supply and Services whose rules necessitated a sponsoring Line Department and Canada Agriculture in 1981 set aside approximately \$50,000 to support outside research on prescribed animal diseases. This was one way the animal health authorities felt they may be of benefit to my research. However, the funds had to be applied for through one of the three veterinary colleges in Canada, be reviewed by scientists within the Food Production and Inspection Branch and was subject to decisions made by them. As with all D.S.S. contracts, a supervisory officer had to be named and frequent progress reports submitted. Funds were only released after submission of detailed expenditures accompanied by documentary evidence of such expenditure. The latter took a great deal of office work, time and equipment. In discussions with other scientific research units in Canada it was generally agreed that jumping through the hoops for D.S.S. contracts was actually not worth the money. In view of the added paperwork burden which in turn increased overhead markedly and for which adequate compensation was not forthcoming. However, my scientists were successful for four years in being awarded a contract to work on bovine respiratory diseases. Over this period of time the contract brought in \$134,579, which was a major help as at that time I was spending between \$250,000 to \$300,000 per year on bovine respiratory diseases research.

Another federal program for which funds were obtained was the PILP Program (Program for Industry/Laboratory Projects). Actually, all PILP Programs were awarded to commercial companies. In this instance I was working with Langford Laboratories Limited (now Langford Inc.) of Guelph on a rota/corona viral vaccine for the prevention of calf scours. Langford Laboratories applied for a grant to support this work and sub-contracted parts of the research to me, which over a period of two years amounted to \$200,000.

BIOSTAR Inc. was incorporated under the Canada Business Corporations Act of February 16, 1983. Its mandate was to carry out research, development, testing, production and marketing of animal and poultry health care products and technology. I promise to give more details later in this narrative, but briefly, BIOSTAR was a spin-off from my organization and was to become its marketing arm, by virtue of holding first rights of refusal on all my products and inventions. However, it is an independent commercial company fully owned by its shareholders.

BIOSTAR's activities included contacting various commercial companies with proposals for animal health research. This with a view to manufacturing biologics, whether conducting the research themselves or subletting some of the research to me. In the latter category, BIOSTAR in its first year of operation obtained four contracts with various

biological supply houses for research programs. Portions subcontracted to my group totalled \$44,529. By 1987, BIOSTAR's gross contract revenue had grown in excess of \$700,000 with a substantial portion being contracted by my organization. It is expected that in the future, as BIOSTAR grows and expands, that subcontracts with my organization will become an integral part of the operation.

k) Interest

Not to be overlooked in the continued funding was the interest accruing on money already received, but not yet spent. As was previously mentioned, the Alberta provincial government gave their capital contribution as a lump sum, on which interest accumulated. In addition, with the establishment of the VIDO Research Trust Fund, into which all my funds were channeled, these too were invested to gain interest, all of which was credited back to the trust account. We were indeed fortunate to have the funds in the hands of a far-seeing group of administrators headed by U of S officials such as president Bob Begg, vice-president John Pringle, controller Malcolm Sheppard and Matt Webster, Henry Epp, Gary Schlichemeyer, Karen Berg and others in the Controller's Office. We were also fortunate to have funds available for investment at a time of excellent interest rate return, particularly on short-term investments. As a consequence, interest on both capital funds and VIDO Research Trust Funds totalled \$1,678,871 - over 10% of the entire amount of funds brought in during this ten-year period!

l) "In-Kind" Contributions

"In-kind" means the contribution of goods or services as opposed to a cash contribution. Nineteen separate donations have been acknowledged and fall into five groups.

i) Publications

One group includes those journals and magazines which have published "VIDO Fact Sheets" about significant animal diseases in their pages, mostly free of charge. This allows wide circulation of animal disease information for the benefit of the livestock industry and saves many hundreds of dollars in publishing and mailing costs. Included among these are: Cattlemen Magazine, Western Hog Journal, Holstein Journal and Canada Poultryman.

ii) "Grassroots"

A second group involved in the information transmission area is Infomart of Winnipeg. They have taken all my "fact sheets" newsletters on the various diseases of livestock and put these on their computer system called Grassroots. As a consequence anyone with a computer modem hook-up to Infomart can call up Grassroots and ask for factual

information on the diseases covered in these newsletters.

iii) Symposium Favors

My organization also sponsors International Symposia on Neonatal Diarrhea in animals and humans and on swine diseases. The third group included contributions of "goodies and favors" towards these symposia by the Bank of Montreal, the Western Producer and the Saskatchewan Wheat Pool.

iv) The Swine Technical Group

A fourth entity of in kind donors revolved around one of the meetings of the Swine Technical Group. The latter is a team of interested and eager people enthusiastic about innovation in the swine industry. It includes swine producers and breeders, nutritionists, agricultural engineers, swine specialists and veterinarians. The group first started meeting in Manitoba centered around the swine practice of Dr. Harold Fast at Steinbach. When Dr. Fast joined my staff, my organization agreed to provide the group a meeting place, secretarial help and a budget for travel expenses. The Swine Technical Group has been a success for the swine industry and for me in that the latest problems in swine production are discussed. Attempts are made to help the industry by consolidation and formulation of management practices to improve efficiency. The group publishes "Helpful Hints" for newcomers in the industry; contributes information to national committees concerned with swine buildings and nursery management and has published technical booklets on farrowing barns, swine nursery designs and other subjects of interest to swine producers.

Some of the members of the Swine Technical Group come from British Columbia, and it was they who proposed that the Group meet in British Columbia in order to look at operations and review swine production in B.C. My management agreed to this, providing they could do it on a budget similar to their meetings in Saskatoon - and despite the distances involved, they did it! They received donations of items such as plastic gloves, plastic boots, coveralls, truck transportation, gasoline and so on and they took advantage of airfare reductions possibly because the meeting had been booked sufficiently well in advance. Eight British Columbia individuals and companies contributed to this effort.

v) The University of Saskatchewan

A fifth entity was the greatest "in-kind" contributor to my welfare - the University of Saskatchewan. As previously mentioned, the University donated five acres of land for my building. The Department of Buildings and Grounds took the construction of the building under its wing and treated it as any other University building - providing preliminary estimates, control over the appointment of architect and

supervision of every phase of the building until its final completion. In addition, they provided us with janitorial service, grounds, upkeep and service for mechanical problems which arose over the years (which were numerous, especially in the "break-in" period) including the installation of the complicated scientific equipment and apparatus necessary for highly sophisticated research. Buildings and Grounds also maintained the strict animal isolation unit and facilities for producing and managing "germ-free" animals. In addition (an item very important to the Director), the University paid the Director's salary - the only full-time University-paid employee in my organization. Also the University of Saskatchewan handled all purchase orders, postage, payroll records, delivery orders, overall bookkeeping and maintenance of an expanding number of budget allocations. To properly integrate my organization into the University system, in 1975 a document was drawn up in 1975 entitled "University Policy on Services in Respect to VIDO". This was initiated by Vice-President John Pringle and implemented by the Controller Mac Sheppard. It covered such items as technical positions - under which housing my technicians are members of the Canadian Union of Public Employees (CUPE), my business manager, was appointed in the "Administrative Officer" category and the professional research staff, became "professional research associates". Other items included budget expenditures - with my accounting to dovetail with the University accounting system under the direction of Henry Epp; capital expenditures - to be carried out through Buildings and Grounds (with monthly statements to my management being provided by Merv Harrison and Ron Kuny); revenue - assets and trust accounts to be kept by the Controller's Officer under the supervision of Matt Webster; audit - the Provincial Auditor being also my auditor; printing services - under the Director, Bill Snell, in Printing Services.; and a "general" clause outlining the natural flow of information between my staff and the University accounting offices. The U. of S. "in-kind" contributions, were deeply appreciated by all of my management, and, although it is very difficult to assign a dollar figure, possible value may have been in the range of one to two million dollars over the 10-year period.

CHAPTER 5

The Building

a) The Requirement Study

In August and September 1973, when Radostits, Smith and Bigland were considering making a submission to the 'Calgary Initiative', they each had some experience with construction of a building, especially Smith and Bigland. Larry Smith had been involved, as head of the department of Microbiology and Pathology at the Ontario Veterinary College, in the building of a large new wing behind the existing OVC. As this was to house the departments of pathology, microbiology and poultry diagnostics, the building was very complex, had good quality animal isolation facilities and huge and very sophisticated 'boiling tanks' in order to sterilize the effluent from the whole building. He brought this expertise with him to the University of Saskatchewan as the new Dean of veterinary medicine in 1964. Here, one of the first jobs was to sit down with the other new appointees, Dr. N. Ole Nielsen, Dr. Otto Radostits and Dr. Chris Bigland, and start planning a new veterinary college - with the added suggestions of Dr. Robert H. Dunlop, who would be taking up his appointment as head of the department of veterinary physiology in 1965. The building supervision for the Western College of Veterinary Medicine on-board faculty was undertaken by Dr. Nielsen. But both Radostits and Bigland, and of course Smith, had a great deal to do with the internal structure and planning of the WCVM, and as a consequence, also had a close relationship with Buildings and Grounds personnel under the headship of Mr. Jim Wedgewood. Bigland

had some previous experience in building laboratories, being involved with some of the construction of the Alberta Veterinary Laboratory in Edmonton, and also serving on building committees at the University of California.

But it was Bigland's experiences with the construction of the WCVM which would be most useful to him as director of my organization. Personal relationships with the entire buildings and grounds department would prove to be most beneficial in the planning and building of my laboratory.

The process of constructing a building on the University of Saskatchewan campus evolved in several stages and, much to his surprise, it did *not* start with drawing plans on a piece of paper! Rather, it started with a general discussion on what the building was to be used for, the number of people that would be housed, the functions of the various parts of the building, and of course, assurance that funds were available to carry it through. To accomplish some of this, the first stage was a "requirement study", which turned out to be a very fat document in which *every* room in the building had to be visualized in the imagination and then specified as to room name, room number, grouping title, size or net area, critical dimensions as far as being rectangular or square, functions both primary and secondary and then its relationship to other rooms or "zoning", externally and internally, noting any undesirable factors such as noise and odors. Its occupancy and utilization had to be detailed - a task involved describing the number of people working in the room and what it would be used for as well as, its major furnishings and equipment. Any necessary flexibility or expansion possibilities had to be extrapolated. Specific remarks on detail had to deal with number and location of convenience outlets or electrical boxes, the type of ceiling, the composition of the floor, the materials for the walls, and the location of windows and doors.

The document would also include a general description of the building and its uses, an outline of the staff, any problems anticipated, the possibility and preferences for expansion, an idea of optimal location, and importantly, *details on financing*.

Once the requirement study had been pulled together, reviewed, corrected and discussed with the department of buildings and grounds, it was ready for submission to the University buildings and grounds committee, and thereafter, in the form of a project outline, to the board of governors for approval. My requirement study was submitted by Buildings and Grounds on January 30, 1975.

The next step in the procedure, after approval by the Board of Governors, was for Buildings and Grounds to search out a suitable architect. Once the architect had been chosen, he worked with Buildings and Grounds and with my director, to convert the requirement

study into detailed drawings. When the drawings were completed, Buildings and Grounds let them out to public bid by contractors. When the deadline for receiving bids was passed bids were opened and the contractor chosen - generally the lowest bidder.

Once the contract had been assigned, construction could start. But each aspect and phase of construction was closely supervised and scrutinized by engineers from Buildings and Grounds. Upon completion of construction, the contractor turns the keys of the building over to the architect, who in turn turns them over to the president of the University, who in turn turns them over to the management (in this case, Bigland). In actual fact, *before* the official opening ceremony, the contractor allowed my management and research personnel to move from trailers and rented space in the Canada Animal Pathology Building, into my new laboratories and offices in March 1978, four and a half years after the initial submission to the Science Council of Canada and the Calgary Initiative.

As you can gather, a tremendous amount of work had been done on the project between 1973 and the January 1975 submission of the Requirement Study. Bigland had been extremely fortunate, on my account, having a very good friend in buildings and grounds mechanical engineer Robert (Bob) Hall. Many of the first ideas on the building were discussed with Hall on a personal basis, then on a more formal basis with Syl Skarsgard who was in charge of planning and engineering. Both were always most helpful and concerned for the good of the project. On February 12, 1975, Gordon Smith, a civil engineer with Buildings and Grounds, was assigned to the supervision of the design of my building. Smith was later assisted by a number of competent engineers from Buildings and Grounds including Terry Helquist and Paul Juneau. About this time, the Saskatchewan government had decided to divide the University of Saskatchewan in Saskatoon from the University of Regina. They put into place the "Universities Commission" to be the liaison between each of the universities and the government. The first Director of the University Commission was Jim Wedgewood, who then left the department of buildings and grounds. His position was filled by a long-time employee of the department and a former assistant to Wedgewood, Alan Reed.

When Smith, Radostits and Bigland were first discussing the possibility of putting in a proposal to the Calgary Initiative the shape and facilities of the building to house the proposed Canadian Veterinary Microbiological Institute had been vague. This vagueness was because no one knew the amount of money which would be involved or whether the project would "sell". The Alberta Veterinary Medical Association's proposal to the Alberta Provincial Government in 1957 assumed an adequate research laboratory would cost between one and two million

dollars (1957 dollars) to provide "suitably equipped laboratory buildings, barns, houses, gas, water and electrical facilities. And due to the need for studying large groups of animals and birds under proper conditions of isolation, a tract of land may be necessary possibly up to 640 acres". The same brief noted that the one to two million dollar cost would be equivalent to building ten to twenty miles of two-lane highway or approximately 7-14 cents per head of livestock in Alberta.

No doubt the proposal to the Calgary Initiative and ideas concerning a Microbiological Institute were somewhat tempered by the need for animal isolation facilities at the WCVM. When the WCVM was in the planning stage, animal isolation facilities were "in the works". Unfortunately, due to rising building costs and stringency of funds, these had to be eliminated. Several strategies had been tried by Dean Smith and his faculty to obtain the animal disease isolation building after it was removed from the WCVM's first phase. One of these efforts was a submission to the Wellcome Research Trust in Beckenham, England. Established from profits arising from sale of drugs and biologics by the Burroughs-Wellcome Company, the trust was designed to provide buildings and facilities or equipment to veterinary colleges in England when necessary, but also to assist the veterinary institutions in "underdeveloped countries". Word went around, encouraged by the Burroughs-Wellcome sales staff in Canada, that large sums of money had been given to veterinary colleges in Australia and several in Africa. Dean Smith was encouraged to submit a proposal to the Wellcome Research Trust for the animal disease isolation building. An excellent brief was prepared in 1968 documenting the need for financing of research into diseases of food-producing animals and comparative medicine. It outlined the existing personnel and facilities, including the list of publications of each of the faculty, and included the requirement study for the dreamed-of animal disease isolation building.

The WCVM had no way of knowing whether the Wellcome Research Trust took the request seriously or not - however, after what seemed to be years, the answer came back **NO!**

A similar brief was circulated widely by Dean Smith to the livestock industry throughout Western Canada in June 1970. Nothing was done about it, but this type of preparation did have an influence on Smith, Radostits and Bigland when they were preparing the brief suggesting the establishment of my laboratory. Also, the department of buildings and grounds did have in their files the requirement study and line drawings of a proposed isolation unit - although my final building was markedly different.

b) Building Plans

i) *Size and Cost of Plan "A" vs Plan "B"*

Please keep in mind, patient reader, that the "VIDO boys" were

either very far seeing or they were sticking their necks out a long way because planning of the building was being done long before there was confirmation of funding for it. In my Archival material (now in the tender hands of Stan Hanson and Burt Bartendale at the University of Saskatchewan Library), one can find handwritten lists of needed rooms and facilities, some scratched on the backs of envelopes, some on copies of briefs – but all necessary for the mental concoction of a functioning laboratory building. These seemed to coalesce January 4, 1974, with the proposal to the Devonian Group. In it, was a rough requirement study of a building totalling 29,725 square feet. Although Bigland should have known, the proportion of a building utilizable by the occupant is only 60% of the total square footage – the remainder being allocated to mechanical. (It was later found, in the final building phase, that the mechanical space requirements for my building were even much greater than for a “normal” building.) For ballpark figuring, the 29,725 square feet was rounded out to 30,000, with a possible building cost of fifty dollars per square foot, a total of \$1.5 million, the figure submitted to the Devonian Group. Disquieting thoughts must have penetrated the office where Bigland was doing his fancy calculations because in his typical chicken scratches on the bottom of a copy of this requirement study, the 30,000 was multiplied by fifty, by sixty, by seventy and by eighty, giving an ascending figure cost of \$1.5 million, \$1.8 million, \$2.1 million and \$2.4 million. (It was not too long after this date that Dr. Mike Prior telephoned Bigland to indicate that his new Animal Pathology Laboratory Building had been confirmed by a contract at \$83/square foot).

This rough Requirement Study however, served as a basis for a proposal to Buildings and Grounds for the choice of a site to place the building and for a request for approval from the University Planning Committee and the Board of Governors. This study noted “the facility will include laboratories for microbiology, pathology, biochemistry, necropsy, media and autoclave room and possibly an incinerator. There will be eight offices and eight individual laboratories, a seminar room and business area.” It is noteworthy that a staff of thirty-four professionals and non-professionals was proposed; that sufficient on-site parking for all staff, plus four stalls for visitors was requested, and it was suggested that it “may be well to provide for 100% expansion of the Physical Plant in future years.” Also, that farm-type accommodation would be needed in the future.

By June 3, 1974, in a presentation to the Saskatchewan government requesting funds, the original 29,725 square feet had been expanded to 30,445 square feet by the addition of a trailer or satellite laboratory and an incinerator.

On August 2, 1974, when Bigland sat down with Skarsgard and Hall

of Buildings and Grounds, the rough requirement study had been expanded further by the addition of three visiting professors or graduate student laboratories, two manure storage tanks and three storage rooms. The total square footage now was 33,384. This was discussed with Pallister on August 26, 1974 in Calgary; the rough estimate of cost by that time had risen to \$2,730,000 from the previous rough estimate of \$1,730,000. A detailed estimate was assembled by Skarsgard September 9, 1974, to indicate that the total cost of my laboratory would now be \$3,645,000. Part of the increase stemmed from inflation hitting the building industry, but the new calculation also included items we had not previously considered: planning and fees of \$300,000, site preparation of \$20,000, utilities of \$105,000, site development of \$105,000, furniture of \$20,000, equipment of \$250,000, miscellaneous (including trailer) of \$40,000, and a contingency fund of \$100,000. He noted that the \$1.69 million previously allocated would build only half of the proposed building.

So they wanted to cut me down to half size! And the scissors came out and the slashing started. My only saviour would be if additional funds could be put into the pot for the capital construction - a highly unlikely scenario.

The main idea of the slashing activity was to wind up with a building that was still functional, but which would fit the proposed budget. It was generally conceded that since the Calgary Initiative (Devonian) had put no strings onto their \$2.4 million offer, that possibly we could use the whole \$2.4 million for capital construction, leaving the requested \$1 million from the Saskatchewan government for operating funds.

As a consequence, Plan A, the original building, was changed into the alternative Plan B. As reported by Bigland to acting president Begg on October 18, 1974, "this has involved reducing the number of offices, laboratories, visiting professor and graduate student laboratories and animal isolation facilities. In addition, many of the rooms have been made smaller and several areas completely eliminated. The latter included the audio visual preparation room, the dark room, the teaching laboratory, two of the animal isolation outbuildings and the incinerator." In the same letter he noted that Pallister had suggested no major reduction being made in the planning fees, site preparation, utilities and site development - as, there might be a possibility of these being absorbed by the university. He also made mention of reducing the annual operating budget. Pallister was also making appointments with Dr. J.G. O'Donoghue, Alberta's acting deputy agriculture minister and with Dr. Fenton McHardy, Dean of the College of Agriculture and Forestry, U. of A., as both were involved with the Alberta Agricultural Research Trust and discussions would revolve around the possibility of capital funding coming from that source.

Investigating possible space in the Fulton laboratory of the WCVM was discussed and work on a trailer-type facility mentioned. Bigland wrote "that the temporary facilities are important psychologically at this time to initiate research activities so as to crystalize the commitment from the Devonian Foundation and also from the Government of Saskatchewan." (we) would like to see VIDO have a visible profile by January 1, 1975," he added.

By January 7, 1975, Bigland could report to Ernie Pallister, Bob Begg and Ole Neilsen that the Plan B building costs had been reduced to \$2.4 million in contrast to the \$3.6 million for Plan A and that the operating expenses had been reduced in Plan B to \$214,000/year versus \$341,000 for Plan A.

The reduction in square footage to 16,781 square feet from the 29,318 square feet in Plan A required careful assessment of the rough requirement study. Each area was carefully scrutinized regarding necessity and its size.

Two major problems were grappled with at this time. The first was the provision of an incinerator. Bigland had been involved with a couple of disasterous experiences with incinerators, first at the Alberta Veterinary Laboratory in Edmonton, and later at the WCVM. His tours through other research facilities always highlighted trips to their incinerators to ascertain the make, utilization and any problems. His experience was that incinerators are expensive to build, expensive to maintain, expensive to operate and there always seemed to be flaws even in the best designs. As a consequence, the incinerator for my building was one of the first to go - on the understanding that the incinerator at the WCVM could be utilized whenever necessary by utilizing proper sanitary precautions in the transportation of potentially contaminated animals or animal parts. Part of the surgery cum post-mortem room was set aside for a refrigerator to hold large closed garbage cans in which portions of necropsied animals could be placed for transportation to the incinerator when convenient.

The second problem was the disposal of manure and effluent from the animal isolation units and from the laboratories themselves. The "virus laboratory" recently built at the Ontario Veterinary College in Guelph when Larry Smith was head of the department of veterinary microbiology and pathology, had a highly elaborate three-tank boiling facility. Each tank had the capability of handling one day's effluent from the laboratory. When the tank was filled, steam was injected to bring it to sterilizing temperature. Then, after some cooling, the effluent was released into the sanitary sewer. This necessitated three such large tanks, one for use, one for cooling and the third to be used to receive the effluent of the day. Because high pressures of steam were utilized in this procedure, it was necessary to have employees with at least a

fourth-class steam ticket. One of these had to be on duty at all times, so at least three were needed, with a possible fourth for standby and weekend work.

A similar, but possibly more elaborate set up was built into the new Animal Disease Research Institute Laboratories in Nepean, Ontario. Both units worked very well, but frugal Bigland was appalled by the initial cost and expensive operation and maintenance of such disposal facilities. Either would cost at least half a million dollars to install – which would buy a lot of research laboratories. And four research technicians could be employed for the price of the steam engineers!

In trying to rationalize the expense, it was understood that the research bodies with the boilers were needed because they may have been dealing with highly infectious materials and exotic diseases which possibly could spread down-stream from contaminated effluent. However, my organization would be dealing only with common indigenous infectious diseases that are present on almost every farm. Also, the effluent from my laboratory itself would be no more of a danger than that from the many other laboratories on campus which emptied directly into the sanitary sewer. In addition, small amounts of manure effluent from the animal isolation units would be even less of a danger to the public health than the materials going into the sanitary sewers from the several human hospitals in Saskatoon. This reasoning was discussed and documented with the provincial and city departments of health, who agreed and gave their stamp of approval for allowing the sewage from my laboratory to be handled in the normal way. The only proviso was an extra financial charge if the biological oxygen demand (needed to break down particulate matter) exceeded a prescribed level. We had saved over half a million dollars in construction costs and the salaries of four steam engineers!

The only problem which remains in Plan B was two manure storage tanks for the outbuildings. These also were later eliminated.

The detailed work on Plan B was made in a necessary effort to convince the Devonian Foundation that a unit smaller than Plan A was still viable. This was believed to be the case, and it was assumed that the building would be going ahead forthwith, either with reduced funding as in Plan B or, if our overtures to the Alberta Provincial Government were successful, proceeding with Plan A. A positive step was taken by the University on June 6, 1975, when Skarsgard reported to Bigland that a site on the campus had been selected for the building of my laboratory (also again noting that the budget was substantially too low!).

To the joy of all concerned, Pallister was able to report on May 8, 1975, in Calgary that the government of Alberta had agreed to a capital grant for my building of \$1.8 million (confirmed by telephone with Dr. J.G. O'Donoghue!) This meant that Plan A of the building could go forward immediately.

ii) The Choice of the Architect

The agony of having to rethink the smaller Plan B was not wasted. With the green light given to Plan A, not all of the reductions were replaced. Such replacements had been prioritized and were carefully scrutinized before being put back into the new Plan A package.

The next step, following approval by the university building committee, the board of governors and the universities commission, was to appoint an architectural firm to start on detailed plans. Although this decision was entirely in the hands of Buildings and Grounds, Bigland was delighted that the firm of Arnott, Johnstone and McPhail were chosen. His pleasure primarily centered around the choice of Ross Johnstone, a senior architect, who would be in charge of the project. Johnstone had been also in charge of the building of the WCVM for his architectural firm 10 years previously, and Bigland had worked closely with him in the design and implementation of the Department of Veterinary Microbiology. As a consequence, Johnstone knew the fundamentals of building complicated structures such as veterinary laboratories, was imaginative in grasping the reason for scientific detail, and innovative in the planning of space and utilization of materials. His appointment made the planning of the research laboratory and service section comparatively simple. Bigland and Johnstone walked through the Department of Veterinary Microbiology with Bigland pointing out "we need eight of these (research labs), three of these (visiting professor and graduate student labs), one of this complex (glassware and media prep lab), a room like this (seminar and conference room) and eight offices like this (scientists offices)." Naturally each had some modifications, with the things that did not work being eliminated and the ones that did being expanded. For example, the research laboratories were enlarged with storage rooms expanded in width to take a biological "sterile hood" at each end and a whole wall of shelving to store needed materials and extra electrical outlets were supplied in each room with at least one having 220-volt wiring. The remainder of the rooms however were a whole new ball game in that each had to be thought out, rethought, specified and respecified. But all, fortunately, based on the modified Plan A requirement study of March, 1975, which was "translated" by Ross Johnstone and his many willing workers into a huge paper roll of plans, 18' in diameter, specifying every structural detail and component in the very complex building.

iii) The Tour

Long before pen was put to paper in drawing the final plans, a great deal of research had to be done. The first major step, after Johnstone had been named architect, was to have a look at the "state of the art" of isolation units and animal research laboratories in North America.

And so was organized "THE TOUR" for June 1975. It was designed to visit many of the modern laboratories in Eastern Canada and in United States - to gather ideas and ascertain how the problems we would be encountering, might be handled. Tour members consisted of Gordon Smith and Bob Hall, both engineers with Buildings and Grounds; Ross Johnstone, architect and Jim McCarten, mechanical consultant, both with the architectural firm of Arnott, Johnstone and McPhail, and Chris Bigland, my new director. Smith was put in charge of obtaining all the tickets, making the arrangements for flight schedules, interconnecting taxis and *carrying the money* - the rest just had to absorb information! The small hand-held dictating machines were just becoming very popular and each member had his own machine into which he would dictate notes, specifications and ideas as the tour progressed. In addition, each had a camera, and snapped the things of particular interest to him. The intent was to compile all these notes and pictures together in one volume when the tour was completed.

Smith had done a good job and kept "the tour" on a very tight schedule. First there was a flight to Ottawa to look through the new Animal Disease Research Institute at Nepean and meet with the director, Dr. Conrad L'Ecuyer. Dr. Bob Avery had been instrumental in supervising the construction of the building, and with the assistance of Dr. W. Barrett, very kindly conducted the tour giving us all the details asked. Included in this tour was the new incinerator and the boiling facilities for sewage effluent, the isolation laboratories and isolation barns. Also shown was the sophisticated poultry isolation unit built to study leukosis, under the direction of Dr. Lloyd Spencer. The group was particularly impressed with this, as it was a high security animal isolation facility in which there was sophisticated air sterilization by filtration. All materials entering into the unit were sterilized or passed through a disinfectant dip tank and all personnel were "showered in" with a complete change of clothes and "showered out" each day. It was noted that the personnel working inside the unit were completely cut-off from the outside world except by telephone, during the entire working day.

Also while in Ottawa, the group visited the animal research station on the Central Experimental Farm where, under the direction of Dr. Bob Gow, they were shown the newly built swine facilities. These were also high quality isolation units that were still in the process of construction and "break in". A number of new ideas were recorded on the dictating machines and innumerable photographs taken.

Then, from Ottawa to Guelph, where Dr. Bruce Truscott gave the group an intensive tour of the isolation units in the "virus" building, which had been in operation for several years and was partly designed by Larry Smith. This too had been planned as a "shower in and shower

out" high-security type of facility, but, due to the low-security nature of the materials being used, the shower was being bypassed, primarily in order to save time. The tour team noted many significant features here that were eventually incorporated into my unit, including the anterooms prior to entering the animal isolation room itself, the size of the rooms, which would accommodate many species of animals, and the observation windows allowing viewing of all corners of the room from the clean corridor.

From OVC the group went to the University of Guelph's Laboratory Animal Facility under the charge of Dr. Jim Schroeder. This unit opened up the eyes of all of our group from Saskatoon where scientists, had been clamoring for a laboratory animal unit for many years. Here in Guelph was a superb example of bright, airy, sanitary, humane handling of laboratory animals. One impressive feature was the "hurricane winds" that were generated to blow out flies whenever the loading door was open. Very effective, but very expensive!

From Guelph to Toronto to visit the animal facilities of the Connaught Medical Research Laboratories where "the tour" was hosted by Drs. Mike Walcroft, Gordon Boylan and Margaret Maxwell. An impressive feature of this visit was a tour of the "monkey house". Here each person had to be fully clothed in white coveralls, waterproof boots, white hat and face mask - an outfit which was worn throughout the whole monkey house tour. This greatly impressed the engineers and architect, who were also shown actual building plans by Mr. W.P. Speare. From Toronto the group proceeded to Ithaca, New York, to visit Cornell University's animal facilities, under the direction of Dr. C.G. Boyer. The most impressive sight here was a facility encompassing three separate units, each financed from different sources, including an isolation house for cats, a unit for equine research and another laboratory for research on cat and dog diseases. In the equine research unit the group met with Dr. Coggins, developer of the famous "Coggins Test" for equine infectious anemia.

The many innovative details seen and recorded during the tour were referred to many times and a number of them were seriously discussed by the engineers, the architects and my personnel. It served its purpose by giving a scientific laboratory orientation to all concerned with the preparation and planning of my complex laboratory building.

iv) Other Architectural Problems

In addition to the sewage disposal and incinerator questions, there were several other major problems needing thought:

A) Animal Isolation Ventilation

In order to avoid entering or leaving the isolation units, near sterilization of both the incoming and outgoing air was necessary, as

was maintenance of the proper air balance. It had been decided to utilize only one "clean corridor", supplying ranks of animal units on either side of it and to abandon a "dirty" corridor concept as used in conventional isolation buildings by simply utilizing the outdoors. The reasoning behind this decision was that dirty corridors actually *do* get dirty, actually are a source of contamination in many cases and are frequently difficult to clean. Also the extra square footage was considered to be unnecessary and costly, since my research would be dealing only with common indigenous infectious diseases that are present on most farms, thereby minimizing any danger to animals on the outside of the building.

But this did not negate the importance of air balance. Against, using the reasoning that only common infectious diseases would be worked upon, it was decided that the airflow would go from positive pressure in the clean corridor, to somewhat negative pressure in the anterooms, to even less negative pressure in the animal isolation units themselves. These would be balanced or slightly positive with respect to the outside air. This system was in contrast to the concept of having the animal isolation unit under positive pressure to avoid air flow from a possibly contaminated animal or source on the outside, a very costly system which might be difficult to monitor and maintain.

B) Sterilization of the air

Bob Hall, Dale Child and Gordon Smith of Buildings and Grounds and Bigland combed all the available literature on air sterilization. One major manufacturer even brought a demonstration into Saskatoon for us to view. This concept worked by exposing flowing air to ultraviolet light - an elaborate system that could be jeopardized even with a thin film of dust deposited on the banks of ultraviolet lights. Sterilization by filtration was being rapidly improved at that time, and was being practiced in farm buildings and laboratories in Europe and the Animal Disease Research Institute in Nepean. In that laboratory, the air was filtered through HEPA (high efficiency particle assembly) filtration units capable of removing over 99% of particulate matter. The particulate matter was important in that microorganisms and viruses were generally attached to dust particles and, if these could be removed, the organisms themselves would be filtered out. HEPA filters were also used in the newly developed laminar flow hoods and biological "sterile hoods" which were just coming into use. These allowed a great deal of flexibility in the sterile handling of bacteriological cultures and tissue cultures in normal laboratories; thus bypassing the cumbersome "sterile room" previously needed for such work.

One of the main problems with such HEPA filters was that their construction of very fine ceramic material filled with minute pores sized to trap the particulate matter in the air. As was kindly demonstrated

by Bob Avery at the ADRI, sometimes, even with the most careful handling, cracks could appear in the ceramic tile, effectively negating their filtering capacity. This necessitated careful, ongoing checking together with extremely careful installation and handling of the tiles themselves. In addition, HEPA filters were expensive!

At that time, a great deal of work was being conducted in the assembly of very fine electronic components, microchips and other materials which necessitated a dust-free atmosphere. A great deal of work was going on in the United States directed at providing rooms which were dust-free, pollen-free and, if handled correctly, free of bacteria and viruses. Perhaps aware of one of the American innovations, it was either the architect or the engineers from the University of Saskatchewan who came up with the idea of utilizing "bag" filters, which would remove approximately 93% of the particulate matter versus the 99% attributed to the HEPA filters, but were easier to handle and install and less expensive.

So bag-type filters were chosen for the ventilation systems of the isolation facilities. However, in order to handle the large volumes of air which would need to be pumped in and out of the animal isolation units themselves, huge ventilation ducts and a sophisticated air handling system were necessary. This major engineering problem was efficiently handled by Jim McCarten, Ross Johnstone, Bob Hall and Dale Child. In order to provide safety for the animals within the units, in case of the ventilation system for some reason shutting down, it was decided to have a back-up *second* complete ventilation system which would take over in case of emergency. In fact, the two systems were installed with separate fans in each and set up to run alternately during regular non-emergency use.

This would equalize wear and tear on the motors and fan units. The air balancing and various air pressures necessitated that the isolation units had to be sealed airtight, with incoming air channelled through one duct and effluent air through another. All duct inlets were protected by preliminary filters designed to take out coarser material while allowing only the very clean air to pass through the bag filters. It was assumed that the bag filters would have to be replaced in several years time; they would be replaced when the hydrostatic pressure meters installed in each unit indicated that air pressures were not being properly maintained. A procedure was worked out with Buildings and Grounds whereby the filters would be changed and disposed of in a sterile manner, utilizing personnel protected from any possible contamination that might be in the bag. Nine years later, as I write this, the pressure indicators are still normal, and the bags have not yet been replaced.

C) Preventing transmission of microorganisms between isolation units

Rigid tests on the transmission of infection from one isolation unit

to another have been conducted, both purposely and accidentally. No cross transmission has been detected. The mechanical part of my system works! And we can say this while recognizing that *any* isolation system can be nullified by improper use or care by animal attendants, scientists or others entering the units. High praise is deserved by the personnel of the animal isolation facilities for maintaining the integrity of the system by meticulously following the rules of the isolation complex as laid down early in its operation. They are donning rubber boots in the change rooms attached to the animal isolation facility, cleaning their boots each time in a moat of disinfectant solution; putting on an additional sterile or disinfected pair of coveralls when entering the anteroom of each unit, disinfecting their boots again in two separate dip tanks in the anteroom, then donning a sterile hat, sterile mask and sterile rubber gloves before entering the animal chamber itself. When the work in the animal chamber is finished, they reverse the procedure. Back in the anteroom, the hat, mask and rubber gloves are disposed of in a special container, the second pair of coveralls are removed, disinfected and hung up to dry; the boots are again disinfected in the footbath as they step out the door of the unit, which, incidentally closes by itself. In this way all materials which had been in contact with the animals are disinfected or removed and left in the antechamber. The attendant can then move on to the next unit.

D) The isolation anterooms

These were a real conundrum because it was desired to have, in as small a space as possible, two foot baths, a sink; a disinfectant tank, a "telephone" type shower hook-up with disinfectant feed, a tank for disinfecting coveralls, a disposal bag for used hats, masks and gloves, a shelf to hold clean supplies of these together with disinfectants and cleaning materials, a clothes bar on which to hang disinfected coveralls, waterproof lights, and an adequate floor drain. To help design such a complicated room and pass the information along to the architect, it was decided to do a "mock up" of a anteroom. Dr. Bill Adams, head of the department of veterinary clinical studies, very kindly loaned us a room in the animal barns to use while "the mock up" was being constructed and tested. Mr. Joe Parsons, a university student and part-time animal attendant, was working for Bigland, primarily taking care of his specific pathogen-free turkey flock and assisting in the laboratory work at the trailers. Bigland enlisted the willing help and innovative brains of Parsons and technician Molly Denson to help design the unit. The "mock up" was built using large sheets of inexpensive plywood on which the various pieces of equipment or models of same were attached. These were moved, interchanged and carefully tested to ascertain if there was sufficient space. It was not easy. There had to be

enough room to get into a pair of coveralls, enough garbage capacity to dispose of several hats, masks and gloves and a disinfectant tank was large enough to handle the disinfection of feedbags and other materials including coveralls. After several major adjustments and final testing by Parsons, Bigland and Denson, the ideas in the mock-up were passed on to the architect.

E) The Isolator Lab

The art and science of deriving and maintaining animals in a germ-free environment, pioneered at the Lobund Institute in the USA, was several decades old at the time of the planning of my laboratory. Bigland had been following this work for a number of years and had seen its practical utilization in the Lederle Laboratories in Pearl River, New York, where germ-free chickens and pigs were housed and at the Royal Veterinary College in London, England, where a pioneer of the field Dr. Trexler, was working with germ-free pigs and had gone so far as to deliver a germ-free calf keeping it germ-free for at least three months. The National Food and Drug Center in Ottawa also maintained some germ-free or minimal-disease animals in plastic isolators, under the direction of Dr. David Neal. A firm in the United States had gone so far as to develop a commercial product whereby solid plastic and flexible plastic units could be utilized for germ-free work. This was done either under negative pressure with the solid plastic units, or positive pressure in the case of the flexible plastic units. These opened up tremendous alternative possibilities for the study of infectious diseases, because, with the solid plastic, negative-pressure units, a whole series of experiments could be done side by side in the same room - a system utilized at the Houghton Poultry Experimental Station in England for the production and maintenance of germ-free chickens. The WCVI had only one plastic isolator unit, and unfortunately it was not being used because the derivation and maintenance of animals in a germ-free environment is time consuming, meticulous and costly. However, the potential and advantages seemed enormous to Bigland, who insisted that a large "isolator lab" be built in my laboratory to accommodate a series of solid plastic and flexible plastic isolators.

F) The Fumigator

The problem of supplying food free of infectious agents to animals in the isolation units was a difficult one. Bigland had been following the work of Dr. E.G. Harry in England, who was fumigating poultry feeds with methyl bromide, a gas frequently used for the fumigation of ships filled with grain and in other large-scale fumigating projects. (Methyl bromide was approximately 1/20 the cost of ethylene oxide, another commonly used fumigant used for plasticware and equipment).

It was decided to have a large fumigation tank, large enough to hold half a ton of bagged animal feed. This would also accommodate major pieces of equipment for fumigation with either methyl bromide, ethylene oxide or formadehyde. In order to obviate danger to the operator or other people within the building, the fumigator had to be completely air-sealed, be capable of withstanding negative pressures, have heating units for vaporizing the methyl bromide to be metered in, and have exhaust vents for pumping out air and spent fumigant. The procedure was to load the fumigator tank, close the air-sealed door, pump out the air to a twenty-pound vacuum negative pressure, put in the fumigant, let it work its prescribed time, then purge out the fumigant with air a sufficient number of times so that no fumigant would be left in the tank. The fumigator worked very well and has been used for feed, large pieces of equipment and machinery from the Western Development Museum, the Ukrainian Museum and the Diefenbaker Centre and books from libraries and the unit was even loaned to the Leaf Cutter Bee Association for fumigation of their hives and bee-keeping materials and to others interested in large volume fumigation. However, the concern over the fumigation of feed turned out to be overblown, and the fumigator has very seldom been used for the purpose. The feed placed inside the isolation units is all "pelleted" under two hundred pounds of steam pressure, which destroys most of the potentially pathogenic organisms.

This rendered my fumigator redundant. Another of Bigland's follies!

G) *The Electronic Scales*

Many of the experiments envisioned for the animal isolation units entailed working with diseases of low pathogenicity that did not necessarily cause death, but interfered with the proper conversion of feed into meat which reduced weight gains. In view of this it was felt that scales for weighing animals were essential in each isolation room.

Bigland fretted and stewed about this for weeks and weeks, trying to figure out some way whereby *one* weigh scale could serve the ten planned isolation units and still maintain sterility and obviate any cross contamination. After consulting many, many people about the problem, he finally gave up and decided it was impossible. The alternative was to have a weigh scale in *each* unit so the animals could be weighed daily if necessary without taking them out of their isolation facility. Once this had been decided, the quest was on for the proper scales. They had to be large enough to weigh a cow, yet sensitive enough to weigh small pigs and calves. He trailed around to livestock barns, auction markets and dairy barns in an attempt to find such a scale, keeping in mind that it would have to have the working mechanism enclosed, so that it could

be properly disinfected. Two of the most modern animal weighing scales on the U. of S. campus were at the dairy barn and the WCVM, but due to the strict specifications needed – neither of these designs would serve the purpose. Just about this time, George Dyck of the College of Engineering workshops was getting some favorable publicity about a scale he had invented which could be implanted into a road surface and was capable of measuring the weight of a truck, travelling down that road at 40 mph! This sounded like the type of scale Bigland was looking for and he immediately contacted Dyck and explained the animal isolation weigh scale problem to him. After serious consideration, Dyck said he could do it by embedding such a scale in the floor of part of the animal isolation unit, utilizing electronic weight sensors and a digital electronic read out on the wall to give the desired results, and the exposed part of the scale could be thoroughly disinfected. He judged he could prepare a working model for approximately \$5,000. My building was not far enough along to test the new model/scale, however, again with the kind cooperation of Dr. Bill Adams and Otto Ulrich, his Departmental Assistant, the prototype of the scale was set up in the chute area of the WCVM for testing. In this way, all animals going through the chute could be weighed and the results of the weighing checked on the regular WCVM weigh scales. The new electronic scales were declared a success and so seven duplicates were ordered for installation in my animal isolation units. These scales were up to specifications in that they would weigh any object from three pounds up to two thousand pounds with the sensitivity of one pound either way.

With men, as with mice, said Robert Burns “plans aft gang agley.” Although the scales worked, could be disinfected and were accurate, their location within the isolation unit was such that it was difficult to get animals on and off easily. As a result, they were very seldom used. Another of Bigland’s follies, expensive to the tune of \$40,000!

H) The Trailers

The idea of having a physical presence for my activities, long before any building was built, arose from a combination of circumstances. When Bigland volunteered to “carry the can” in the bidding to the Calgary Initiative for a microbiological institute, he had stepped down as head of the department of veterinary microbiology and taken a one year sabbatical leave in England. He was anxious to continue his research program in the area of avian mycoplasmas, possibly expanding it into pathogenic mycoplasmas affecting cattle and swine. He was fully aware that accepting the leadership role in a microbiological institute program would necessitate a change in his career goals and responsibilities. He would be committed to putting the major emphasis of his energies on this project. However, he had an ongoing research program

on avian mycoplasmas, supported by several grants. And, being very close to his heart, he felt this area of research should continue, as it was one of the few mycoplasma research projects in Canada. He still had his office and laboratory in the department of veterinary microbiology, but the department was expanding and needed more space in the virology and immunology area. So, for the convenience of all, Bigland moved into the Fulton Laboratory just before Christmas, 1973, also with technician Mrs. Molly Denson and graduate student Dr. Jim Matsomoto. These arrangements worked fairly well. The planning of my building proceeded in the office on the main floor of the Fulton Laboratory and the mycoplasma research went on the top floor.

However, with the promise of funding from the Devonian Foundation and the financial participation by the Saskatchewan government, a more visible physical presence for my activities was felt necessary. This was especially true because my proponents were wooing the government of Alberta into financial support for my embryonic organization and the Alberta people were wondering why it was not placed in Alberta rather than in Saskatchewan. This combination of events triggered the idea of house trailers as temporary laboratories and offices which would be sufficiently mobile that they could be transported to Alberta at a later date to be used as a "satellite" laboratory there. Buildings and Grounds had some experience with house trailer facilities utilized on campus for offices, storage and other purposes and so were amenable to the idea - as long as they were *not* permanent. After the idea had been discussed with all concerned, Bigland got together with Terry Helquist to plan a two-trailer complex to be joined by an entrance hall. One trailer would house two small offices (one at either end) and a large central general office. The other trailer housed two laboratories, a dark room, washroom facilities and an "animal room". Once Helquist had put his stamp of approval on the finished plans, he took them to the ATCO people in Calgary for bids. The ATCO bid was approved, the trailers ordered, a site prepared for them, and they were delivered near the site of my building July 1, 1975. They proved to be most useful, giving my organization a separate identity and address and providing adequate laboratory space for Bigland's research as well as room for one other scientist. However, they were soon too small for an expanding scientific staff, and I was fortunate that arrangements could be made with the newly opened Canada Animal Pathology Laboratory for the rental of a large laboratory there, together with two offices. The latter housed Dr. Stephen D. Acres, Dr. Bob Worthington (visiting professor from South Africa), Dr. Bob Kapitany, a biochemist, and three technicians. This combination of facilities served my research well because experiments were soon underway which would eventually result several years later in the world's first effective vaccine against bacterial calf scours - VICOGEN!

v) Going to Tender

Once Ross Johnstone his partners and their army of draftsman in Regina had worked their architectural magic, and with the approval of the dedicated staff of Buildings and Grounds, a huge roll of plans detailing every item in my building was prepared. The stage was now set to go to tender. As Bigland found out, this phrase meant advertising in all the suitable newspapers and trade journals the fact that any contractor could now view and obtain copies of the plans from the architect, this in order to place a bid for the construction of my building. Tenders closed July 1976.

My newly formed board of advisors and governing committee had approved, in principle, the plans of the building and compared them with the budget. By this time, the Devonian Group had pledged \$2.2 million and the government of Alberta had indicated that their \$1.87 million contribution should go into capital construction. As a consequence, there was over \$4 million which could be used for building purposes. However, this had to include all of the equipment, the land development, the trailers, special steam lines and many, many other factors. The tender was placed such as to include several alternatives. Although, as primarily based Plan A (the larger building), many of the reductions and cuts of Plan B were also instituted. A lengthy list of alternatives to the main bid was cited in the tender. Those finally accepted included:

- 1) three offices and labs in the laboratory wing,
- 2) completion of a full cement slab in the floor of the basement (a deeper basement excavation under the laboratory office wing would allow for 100% expansion in this area. The acceptance of the cement slab floor permitted immediate use of the area for storage and other activities.)

Items *deleted* in the alternate bidding included:

- 1) Two outbuildings, one designed for cattle, the other for hogs. This left the poultry outbuilding, which was deemed flexible enough for use by other species of animals and so retained. With the elimination of the cattle and swine barns, the necessity for manure storage tanks, feed silos and other animal handling machinery no longer existed.

- 2) Windows designed to provide light to the offices in the basement area.

- 3) One third of the equipment budget!

The tender was opened July 27, 1976. My board of advisors and governing committee viewed it and made their final decision on August 3. It then went to the University board of governors who gave their stamp of approval on August 5. This paved the way for the official ground-breaking ceremony on August 12, 1976. The contractor winning

the bid for the building was CANA Construction Company of Regina, with the lowest bid of \$4.7 million. This was cut back to the allowable \$4.25 million by the forementioned deletions.

vi) The Ground Breaking Ceremony

This had to be a dramatic event! It also had to be unique! The Protein, Oil and Starch Plant, my next-door neighbor to me on the University of Saskatchewan campus, was a unit almost totally supported by the federal government. The then minister of justice, who was also minister in charge of the Canadian Wheat Board, the Honorable Otto Lang, had broken ground for the P.O.S. Plant a few months previously, by detonating an explosive charge which blew a hole opening on the proposed site. My debut had to be different and more in keeping with the agricultural heritage of my affirmed goal of "serving the livestock industry through research." Bigland sweated over this for some time and, after consulting many friends and colleagues, the idea boiled out that a ground breaking ceremony using a team of oxen on the plough as was done in the old days in Saskatchewan would be just the right touch. The next thing was to find the team of oxen! Bigland put out



Ground-breaking oxen "John Diefenbaker and Lester Pearson". L-R Frank Andres, Dean Ole Nielsen (on the plough), Ed Muensch (with the whip) and John Andres (at the front).

feelers to all of his contacts in western Canada and even the United States, but came up blank. It was only when he visited the Western Development Museum in Saskatoon and had a chat with George Sheppard, long-time curator and secretary, Cathy Andres, that he finally got a clue. Miss Andres knew of a team of oxen – twin Herefords, owned by Mr. Ed Mensch of Shellmouth, Manitoba. He was a friend of the Andres family; in fact, Frank Andres (her uncle, of McNutt, Saskatchewan) transported the huge oxen team to various shows for Mr. Mensch in his enormous grain truck. Both of these gentlemen agreed to come to Saskatoon to break the ground for my building with a walking plow and also

to provide rides for visitors in a democrat and hay wagon pulled by the team. (The latter were kindly provided by the Western Development Museum.) On August 11, Mensch and Andres, assisted by Andres' brother John, arrived with the oxen - named Mike Pearson and John Diefenbaker! Mensch mentioned that the names were chosen because they were the only two individuals, with those names, who could ever be hoped to "pull together", a reference to the stormy relationship of their political counterparts.

August 12 was an extremely hot day, but at 2:00 p.m. the oxen team in front of the walking plow literally ran across my future site, turning a handsome furrow in soil baked brick hard by the hot Saskatchewan sun. The first person to handle the walking plow after Ed Mensch's initial furrow was the Honorable Edgar Kaeding, Saskatchewan's minister of agriculture, representing both himself and the Honorable Marvin Moore, his Alberta counterpart.

Many honored guests attended the short ceremony that took place before the ground breaking, and several also took the walking plow in hand to plow a few feet of furrow. These included: President Bob Begg, Dean Ole Neilsen, Dr. Walter Weir, Director of Veterinary Services in Saskatchewan, and Bigland. Dr. George Sheppard of the Western Development Museum was the only person present that had actually used an oxen team to plough the land, which he did in his early homesteading days in southern Saskatchewan. My whole staff at ground-breaking time consisted of Dr. Stephen Acres, research scientist, Marsha Permut, business manager, Sue Adolf and Phyllis Zoerb, secretaries, Brian Freeze, graduate student in agricultural economics, Ray Roberts, summer veterinary student and Chris Bigland.



VIDO STAFF 1978 - Ray Roberts, Brian Freeze, Marsha Permut, Sue Adolf, Molly Denson, Chris Bigland, Phyllis Zoerb (Missing - Stephen Acres)

vii) Moving In

Construction started in September, 1976, with completion set for February, 1978. Fortunately, there were no strikes or delays in construction which allowed my entire staff to move into the new building from their various temporary locations by March, 1978. It was a magnificent day!

viii) Unique Building Features

A. Isolation Units

Moving in allowed all concerned to consider some of the unique features in the building. Chief among these were the isolation units with their anterooms. The system for utilizing the rooms in order to control transmission of infection was considered to be ten times as costly in labor and materials as a non-security system. The changing of coveralls, hat, masks, gloves and disinfected boots were ideas that Bigland had seen in operation while on sabbatical leave with Dr. Frank Jordan of the University of Liverpool. Details of operation were refined by Dr. Steve Acres and Ms. Margot Buckley, the supervisor of animal services, at the time. The system has proven effective under severe trial – but only with the diligent co-operation of the animal technicians who do the day-to-day work. The isolator labs were also unique, as were the “in-floor” electronic scales.



VIDO under construction 1977 – L-R Dr. Jim G. O'Donoghue - Alberta Deputy Minister of Agriculture, Dr. N. Ole Nielsen - Dean of W.C.V.M., Mr. Morley Douglas - Alberta Assistant Deputy Minister of Agriculture

B. High Porosity Fence

Another comparatively unique feature was a high porosity fence protecting the external doors of the isolation units from wind pressure. Such fences were used in livestock operations to provide cattle with protection from cold wind intensities, and the method adapted for our purposes.

C. Computer control of machines

Another unique feature was the computerized control of all the mechanical devices, primarily as an energy saving factor. The computer controlled all fans and mechanical equipment and, if there were any difficulties, would diagnose the problem and relay this information to the central control room at the offices of Buildings and Grounds who could then take immediate action.

D. Heat recovery system

Another energy saving arrangement was the use of ethylene-glycol coils for the recovery of heat from all of the air exhausted from my building. It was decided that all of the air from the animal isolation units, the isolator lab and even the office wing was to be used only *once* and then discarded. Various methods of recovering the heat from the discarded air were discussed. The ethylene-glycol coil heat recovery system was decided upon as it was a permanently sealed system which would alleviate any possibility of leakage of contaminated air into the fresh incoming air. Such cross-contamination was possible in other heat exchanger systems since they utilized counter-currents of incoming and outgoing air separated only by a thin metal barrier in which even a small nail-hole would allow the introduction of contamination.

E. The autoclave room in the glassware media preparation (GMP) area contained the bodies of all of the autoclaves utilized in the area, the glassware washer and hot air sterilization unit. The doors of these heat-producing machines opened into other cooler rooms. This concentrated all the heat-dissipating machinery in one room so that the heat could be handled with a separate exhaust duct, without interfering with air balance within the building.

F. Corridor lighting baffles

Another especially unique feature was the yellow baffles on the ceiling corridors behind which were the fluorescent lights. This gave my building the illusion of sunlight beaming in the long corridors. The baffles are plywood carved in the shape of large question marks – a fitting shape for a research building. These are painted yellow and suspended at intervals along the hallways. They were Ross Johnstone's answer to a problem forced on him by Bigland. The original plans had fairly wide corridors in the office/laboratory wing. Bigland insisted that these corridors be made as narrow as possible, but still comply with fire regulations, because every square foot of the building was costing approximately \$130 and he did not want to see a lot of the money spent in overly wide corridors. Johnstone's reaction was "what on earth are we going to do with these long barren corridors?" His answer was the yellow question marks!

ix) Building Features Abandoned

When Bigland moved into his new office in March, 1978, he gave a special moment of thought to all the ideas on which tremendous amounts of energy had been expended but which were *not* incorporated into the building. Some of these were:

A) *A Definitive Piece of Artwork*. He had been on the art committee of the Western College of Veterinary Medicine and was conversant

with the concept that every University building should have a portion of its budget devoted to works of art. Considering the tightness of the capital and research budgets and the outside funding of my building, the art committee for my building met only once briefly and came to the conclusion that "the art in VIDO is VIDO's responsibility." Many ideas were discussed, including an Indian totem pole in front of the building, a large sculpture of a team of oxen plowing, or small sculptures depicting aspects of agriculture inside of the building (Bigland even went so far as to contact John B. Weaver, a sculpture in Edmonton who had done some famous bronze works. Weaver found "your suggestion



VIDO Laboratory Building – front



VIDO Laboratory Building – aerial view — 1978

of a team of oxen or cow/calf grouping appealing." However the cost of his works ranged from \$2,000 to \$30,000.) Johnstone suggested sculptures by Joe Fafard of Pence, Saskatchewan, who was then gaining popularity and who has since become one of the countries foremost artists. All of Fafard's sculptures were very small and that idea was put on the back burner.

The Devonian Group had been collecting art from all over the world for many, many years. To display it they set up display kiosks in many public places including the new Calgary airport. As well, they stored many fine paintings in their voluminous warehouses. Bigland thought it would be a good idea to ask the Devonian Group to set up an art exhibit in the entrance hall of my building. The idea was received graciously, but refused. Due to the uncertainty of any additional funds available to purchase works of art this avenue also was dropped. As a consequence, the only works of art in my new building were a painting donated by Dr. Jeremy Greenfield of Abbotsford, B.C. – a colorful collage by A. Janina – and a beautiful oil painting representing an impending prairie thunderstorm over a Saskatchewan wheat field by John Rogers Cox, donated by Gordon Anott on behalf of the architects.

B. Television In Animal Isolation Units

Although curved viewing windows were placed in each animal isolation unit, permitting the viewing of the animals in the unit without having to enter, Bigland had the idea that seeing animals by television, at various places within the building without even being near the isolation unit would be highly advantageous. This would allow for continuous monitoring without disturbing the animals. Several such plans for television viewing of animals were reviewed with knowledgeable people in the television industry. A plan designed by Don Epp and supplied to Gordon Smith was considered with two options. The first was viewing through a window in the ceiling, which had the advantage of the TV camera being outside the actual unit itself, which would make servicing easier. It was felt that with a 12.7 mm lens an area of approximately 11' x 8' in the center of room could be viewed. Monitors could be placed in the clean utility area and in the hallway of the laboratory office wing. With a switching panel, the cameras in any of the rooms could be read. The other alternative, was to place the cameras *inside* the isolation unit. This would necessitate camera covers and also make necessary, a "panning mode" so that the camera could be swung from side-to-side for the viewing of all parts of the room. Any servicing of the cameras would necessitate temporarily shutting down the research project. In addition, the second format was far more expensive. The ceiling television viewing was elected and windows installed in the ceiling of each isolation unit.

To date no television cameras have been installed!

C. Elevator to the Basement

It was pointed out that to make the more than 12,000 square feet in the basement available for full use as laboratories or office space an elevator would be necessary for convenience and the transportation of heavy equipment or even handicapped personnel. Consequently, an

elevator of the hydraulic type was designed and an elevator-base-pad installed in the basement, together with room for an elevator shaft. Because an elevator at that time was estimated to cost approximately \$80,000, and because it did not seem immediately necessary, it was temporarily put on hold and main floor elevator space was used for storage of stationery. The elevator would have been useful alternate to the man-handling of supplies and equipment up and down stairs during the first 10 years, and will become a necessity when the basement expansion area is further utilized.

D. Farm Facilities

At every stage in the evolution of a veterinary research unit in western Canada, a farm type of animal holding facility had been envisaged, this to allow experimentation on a large scale with infectious agents without endangering animals on neighboring farms by the risk of disease transmission. Another purpose was the production of specific-pathogen-free animals (SPF), such as an SPF cattle herd, a swine herd and poultry flocks. Unfortunately, such facilities always came secondary to other considerations, and even now, after 10 years there is still not a farm facility controlled by those in charge of my operation. Over the years, many farm areas have been viewed and investigated with a view to the possibility of building good quality animal isolation facilities.

The closest this came to fruition was during the tenure of one of my board of advisors, Orest Lukey of Acme, Alberta, representing the Alberta Egg and Fowl Marketing Board, in 1977. Bigland had investigated a farm approximately ten miles east of the University campus with flat fertile soil, a barn, house and other buildings. The price was approximately \$1000/acre. Lukey spoke up and advocated this farm be bought and the job got on with. That decision was never made.

One factor that influenced purchasing a farm was the viewpoint of the University of Saskatchewan on farms in general. The University already owned a number of farms, and they were a major drain on the University budget. As a consequence, President Begg was heard at one time to make the statement "this University does not need or want any more farms!" The fact that farm facilities *are* a major drain on the budget was also recognized by my board of advisors and governing committee. But at the same time the necessity for farm-type facilities was recognized and the drain of funds carefully weighed against the benefits.

Several attempts were made to have farms donated for the use of my organization. One of these was a swine operation at Lanigan, Sask., owned by Intercontinental Packers Ltd. of Saskatoon. Fred Mitchell, president of the firm made the offer to Bigland, who thoroughly investigated it. The operation was not necessarily ideal for my activities

but could have been modified by major alterations.

Another option was fifty acres of the old Circle 4 Feedlot at Dundurn, owned by the Remai Brothers of Saskatoon. For a time there seemed a chance that Frank Remai might donate the unit to the University. However, the University would have had to provide a receipt for the land, for a value equal to what had been expended by the owners. Following investigation, the University is believed that, in all conscience, it could only value the land as it was presently assessed. This was not sufficiently high for the potential donors, and so the offer was withdrawn.

Another attempt was the rental of provincially owned farms. Acres, Hodgman and Bigland toured the area around Saskatoon looking at some of these with a view to renting one and building there. Here again, the cost of building and operating farm facilities was a major factor. Especially compared with facilities at the Circle 4 Feedlot which were already in use, the blocks of capital necessary to go the "farm facility route" were not yet available.

Another possibility was the Goodale Farm, just south of town which was already owned by the University used for large animal research by Dr. Jack Manns and other researchers at the WCVM. As a consequence the entire Goodale farm facility had been ostensibly earmarked for veterinary use. The WCVM had agreed to letting my research workers use part of this land, on a joint infectious-disease large-animal facility, providing we could both come to an agreement on the buildings that had to be built, the uses to which the facilities would be put and some type of equitable financial sharing of the costs. Dr. Steve Acres, as the main user from our point of view, met on innumerable occasions with Dr. Jack Manns and later with Dr. Walter Roe and several other members of the WCVM large animals teaching staff. They formulated many plans of buildings, chutes, fences, etc. to be used on a joint basis. Innumerable hours were spent in the planning and discussion process, but here again, funds to build the complex were the major stumbling block for both sides. "The plans are excellent - all that's necessary is the funding!"

Another farm and cattle operation that was looked into was the provincially owned farm at Lebret, Saskatchewan. This was a demonstration farm for the training of native Indian students and had an excellent cattle operation component. John Nowoselsky, who was in charge of the operation, was most cooperative and on several occasions my scientists were permitted to utilize part of the Lebret cattle herd for the testing of *E. coli* vaccines.

However, farm facilities were needed, especially for the large scale research on animal vaccines and biologics, as well as for management manipulation, particularly of cattle. The first large-scale testing of management manipulation to control calf scours was undertaken in

1976 and 1977 on a portion of the Termeunde farm owned by the University and managed by the department of animal science was very kindly allocated by Dr. C.M. (Red) Williams. Dr. Acres and his three animal attendants, Jerome Dunne, Wayne Stephankew and Dwight Webber, were able to put into effect a management-control program aimed at determining whether density of calving was a major factor in the spread of disease agents causing calf scours. This finding alone may have been worth many millions of dollars to the livestock industry, in that the relatively minor change in management practices of not concentrating calving in small areas could reduce the incidence of calf scours markedly.

Another need for farm facilities was for the testing of the new *E. coli* vaccines that were being researched by my scientists. Here again the Termeunde farm's two hundred head of beef cattle were put at Dr. Acres' disposal so that the blood antibody levels stimulated by the various vaccines could be monitored. Naturally, Acres had to assure the Termeunde farm management that no infectious agents would be spread throughout the herd as a result of these tests - a factor that always has to be considered when "borrowing" other peoples' cattle for research purposes and which again emphasized the need for separate isolation farm facilities.

The facilities at the Termeunde farm were used for approximately three years. However, the distance of eighty miles between the University and Lanigan was a deterring factor in obtaining personnel and in the loss of considerable time by my research workers. Other facilities were investigated. The Circle 4 feedlot which had been not used for several years, but which contained ideal facilities for the handling of beef cattle, including chutes, watering facilities, hay racks and good fences, was looked upon with favor. Arrangements were made to rent one of the circles of the Circle 4 feedlot from Cascade Developments and later the Remai Brothers, at the cost of \$500 per month. My research scientists are still using it. The remainder of the feedlot has been removed and the land has been sold. Unfortunately, the corrals, chutes and other equipment are worn and disintegrating and it will not be long before my board of directors will have to think of other alternatives - possibly buying a farm?

Another opportunity seemed to present itself in 1981 when the federal government announced a \$100 million fund to support western Canadian initiatives. Since Canada did not have any facilities for testing animal vaccines, the approving authorities in Ottawa could only consult the protocols as supplied by the vaccine manufacturers and approve importation based on their evidence. It was felt that Canada *did need* a vaccine testing facility, so my board of directors, chaired by Ben E. Thorlakson of Acme, Alberta, directed Bigland and his staff to prepare

a brief to the Western Canadian Initiatives Fund. The detail was based on the animal isolation facilities that had evolved in the various plans presented by Dr. Acres, in conjunction with Dr. Eugene Janzen and others at the WCVI. The brief, presented to Senator Bud Olson by Thorlakson and Bigland, detailed a 640-acre farm with appropriate double fencing, 160 acres of which was for the maintenance of a specific pathogen-free cattle herd, 160 acres for manure disposal and the other 320 acres divided into three areas: 1) medium containment and medium isolation area of approximately 150 acres; 2) a specific pathogen-free area of approximately 120 acres, and 3) a maximum containment of approximately 50 acres. Each area had the appropriate handling facilities, buildings, chutes, feed storage areas and barns. The detail had been worked out sufficiently that Gordon Smith of Buildings and Grounds could give a fairly accurate estimate of cost - \$13,450,000 for the buildings and \$768,000 for the 640 acres of land. This totalled \$14,218,000! It could have been a one-time capital contribution by the federal government to the livestock industry serving all of Canada. Unfortunately news trickled from Ottawa that the Western Canadian Initiatives Fund either was non-existent or had been previously earmarked for other projects.

E. Parking

Two of the biggest problems on any university campus are parking and sex - fortunately in the case of my organization, parking was the more major one. The original intent was to provide parking space near the building for all occupants and visitors. This had been done in the construction of the Federal Animal Pathology Laboratory, the Federal Wildlife Research Building and the Protein, Oil and Starch Plant - all my immediate neighbors. This concept was ruled out by the university planners as was the substitute idea of sharing parking space with the P.O.S. Plant. The rationale was since my building was considered part of the university operation, it should conform to the parking regulations of a university building, ie. the occupants thereof were to utilize university parking lots that have been strategically situated around the campus. Fortunately, "V" lot parking was only a block or so away from my building and, for the most part, worked out satisfactorily for my staff. Provision was made for six stalls of visitors parking in front of the laboratory. However, on occasion, some employees thought it was too far to walk from "V" lot, especially in the cold weather, and started parking in the visitors parking area, and along the curbs in front and on the side of my building. The reaction of the campus police varied between crack downs and leniency. This situation was additionally confused because some employees even after application to the University parking office, were either refused an allocated spot in the parking area

or given a space at great distance from work. Most likely this situation still exists – always headache for the director!

F. Specific Pathogen-Free (SPF) Rearing Facilities for Chickens and Turkeys

In many instances, eggs and even chicks or turkey poults from SPF flocks are necessary for the production or testing of vaccines – also for conducting sensitive serological tests. The availability of eggs from SPF flocks generally was greatly reduced, and in Canada, eliminated, by the closure of their SPF chicken flock by Connaught Laboratories Ltd., who previously had been able to supply many of the needs of scientists in Canada. Bigland had been maintaining an SPF turkey flock on the campus for several years – however this was only free of the avian mycoplasmas and did carry some of the indigenous viruses. It was proposed that one of the buildings needed in my complex was to fulfill the role of supplying SPF chicks and poults in Canada. With the cooperation of Dr. Roy Crawford of the department of animal and poultry science, rough plans were drawn up for a building that would house SPF chickens and SPF turkeys to accomplish this purpose. Unfortunately, when assessing the costs and benefits from such a building, Bigland was forced to acknowledge that the costs would be far greater than the benefits gained. This was particularly true because of the advent of numerous tissue-culture cell-lines that could be utilized for viral reproduction, which obviated the use of chicken eggs in the production of many viral vaccines. Since SPF eggs would be the greatest source of revenue, the balance sheet was such that the SPF facility was eliminated.

G. The Swine and Cattle Research Outbuildings

Plans were drawn up and submitted for bid on two buildings, one to house swine and the other cattle, as outbuildings from the main laboratory. These were intended as farm type buildings, but with each building divided into four components. This would allow four variations in experimental design, such as a control group plus three other groups each vaccinated with different vaccines or given three different levels of a drug or antibiotic. The interior design of each building was based on ideas obtained from the departments of animal science of the Universities of Saskatchewan and Alberta blended with plans put out by Agriculture Canada.

Both of these buildings were put on the “alternatives” list, and were eliminated when the tenders were opened, primarily due to cost.

H. The Calan-Broadbent Door

This was an electronic headgate for cattle. It would allow an animal, carrying an electronic key or “transponder” to open a specific feed

bunk door. It was used to assess the amount of feed-intake of individual animals in an experiment and was working successfully at the cattle research station operated by the department of animal science at the Ontario Agricultural College. After thorough investigation, it was felt that it would be impractical to try to incorporate this invention in my isolation units.

I. Radiotelemetry

One far-fetched idea which was not incorporated into the animal isolation areas was the monitoring of various physiological parameters by radiotelemetry. Technically it was possible in the 1970s to monitor temperature, heart rate, respiration, bowel movements and many other parameters by placing sensors at appropriate places in the animal. Bigland thought this would be a good idea for the continual monitoring of test and control animals in the isolation units because it would allow constant recording of various parameters without disturbing the animal. No person would be present to excite the animal and no bias could be placed on the interpretation of observations. There was an expert on radiotelemetry in Edmonton, Mr. Howard Baldwin, and he was invited down to Saskatoon to give lectures to both my scientists and those in the WCVM concerning the potential for radiotelemetry. Radiotelemetric monitoring acutally works very well, but at that time, was extremely expensive and so, due to the cost, the idea was shelved.

So much for the energy expended in exploring ideas that were not utilized in the construction of my building. However, with a building so complex and comparatively new in concept, all innovative ideas had to be explored, weighed in the balance and either accepted or rejected.

c) The Official Opening

Although all my scientists, management and other staff moved into my new laboratory building March 29, 1978, the "Official Opening" was not scheduled until October 2, 1978. This opening was to coincide with the second international "VIDO Symposium on Neonatal Diarrhea" scheduled for October 3-5 at the Place Riel Theatre, U of S campus. At the same time, a meeting of the governing committee and the board of advisors was to take place in Saskatoon and an exceptional "thank you" banquet was planned for the evening of October 2. All in all, an event-filled week!

Preparation for these events, together with continuing research activity and fund-raising efforts, kept my small staff extremely busy. And the time-lag between moving in and the official opening had allowed for a shake down of the building and equipment, which was naturally manifest with multitudinous small problems normally encountered in the breaking in period for a complex new operation.

The ribbon cutting ceremony was scheduled for October 2, at 3:00 p.m. With the assistance of Jock Anderson of Buildings and Grounds, an outdoor ceremony had been planned; with suitable podium, chairs and benches for guests in front of my building. Unfortunately, October 2 dawned dark and rainy. And so hurried moves were made to put the podium, chairs and other paraphernalia into the huge vacant basement area. On one wall was an enormous banner emblazoned with the VIDO logo on one end and a large red Canadian maple leaf at the other. And on the bottom edge was my slogan "Serving The Livestock Industry Through Research". This banner had been prepared by Dr. Lorne Greenaway as a backdrop for a public relations booth placed that spring at Agribition in Regina. It also made a suitable backdrop for the podium and brightened up the rather dark basement area (which had been illuminated by imported banks of fluorescent lights). On the podium were four chairs for the four major donors, represented on that day by: the Honorable Marvin Moore, Minister of Agriculture for the province of Alberta, the Honorable Herman Rolfes, Minister of Social Services for



Mr. Patrick Harvie cuts the ribbon at the Official Opening of VIDO, with Dr. Chris Bigland and Dr. Walter Weir (holding the ribbon), October, 1978

the province of Saskatchewan (representing the Honorable Edgar Kaeding, Minister of Agriculture) Dr. Robert W. (Bob) Begg, President of the University of Saskatchewan, and Mr. Jim Fish, Vice-President of the Devonian Group of Charitable Foundations. Before the over 100 visitors would hear greetings from the distinguished guests there was the traditional "key" ceremony, essential to the opening of all university buildings. In this case, Mr. Stan Mortensen, representing the contractor, CANA Construction, passed the keys to the building to Mr. Gordon Arnott, representing the architect's firm of Arnott, McPhail and Johnstone. He in turn passed the keys to Mr. Jack McFaull, Chairman of the University Board of Governors, who in turn passed the keys to Chris Bigland, my director.

Messages of greetings were given by the above-mentioned distinguished guests, by Dr. Ole Nielsen, chairman of my governing committee and Mr. Ernie Pallister, chairman of my board of advisors. Then came the ribbon cutting ceremony. The ribbon was a four-inch broad ribbon in "VIDO Blue", on which had been attached pictures and cartoons of all the species of farm animals that I was dedicated to help. It had been prepared by Phyllis Zoerb, Irene Richards, and Pat Platel, assisted by Brian Harris the current "go-for" or general assistant. The ribbon was cut by Mr. Patrick Harvie, grandson of Mr. Eric Harvie, founder of the Devonian Group of Charitable Foundations. It was held on one end by Dr. Walter Weir, Director of Veterinary Services in Saskatchewan and Dr. Hugh Vance, Director of Veterinary Services in Alberta. To Patrick Harvie's consternation, he was not given scissors to do his ribbon cutting job, but was handed a pair of emasculators, an instrument used in the castration of bulls! He had used such instruments before and found this one particularly dull. But after several valiant attempts, was able to sever the colorful ribbon, to the applause of the audience. Following this program, the building was open to tours by guests and the public.

At least two of the guests at the official opening were later to come onto my staff - Mr. Paul Hodgman, general manager of the Alberta Cattle Commission in Calgary and Dr. Tony Forman of the CSIRO veterinary research station in Melbourne, Australia.

In the evening, there was a gala banquet at Marquis Hall on campus to which had been invited many special guests, all of whom had contributed markedly to the formation and building of my organization. The list of head table guests was a long one representing many key people and organizations. These included: Ernie and LaVone Pallister, Hugh and Lola Vance, Ole and Marilyn Nielsen, Bob and "Duzz" Begg, Jack and Muriel McFaul, Jim Fish, Bob Norman, Zlatta Batten, Ross Reynolds, Gordon Smith, Herman Rolfes, Pat Harvie and (inevitably) Eva and Chris Bigland. Each of the men brought greetings from their respective groups, some of which have been mentioned before. Memorable presentations were also made by Bob Norman, representing the



Mr. Jim Fish - Vice-President of the Devonian Group of Charitable Foundations speaks at the Official Opening Ceremonies, with the Honorable Herman Rolfes, representing the Saskatchewan Government, October, 1978

Employees Union and Ross Reynolds who had entitled himself as the “token livestock producer”.)

However, another livestock producer, Eldon Mackay of Aberdeen, was also present and made a presentation to the cause in the form of a cheque from SISCO (Swine Improvement Services Co-operative). The members of SISCO also pledged an allotment of money each month for each head of swine in their establishment to go towards the functioning of my organization.) In addition, Ross Reynolds, who also represented the Poundmaker Feedlot, later allocated a check off sum per head of animals going through the feedlot, to be dedicated to my animal health research. Gordon Arnott made the presentation of the architects’ oil painting to be hung in my building. Ernie Pallister had just returned from a trip to Japan and had a presentation for Bigland – a bottle of Japanese whiskey with a metal covering over the top of the bottle to make it look like a Samurai warrior. He indicated that Bigland had to fight like a Samurai warrior to assist in the success of my organization. Bigland also was emotionally touched by a personal presentation from Steve Acres and my other personnel of a picture of a cattle roundup in the foothills.

My director had reserved the main speaking spot for himself. His excuse was, with his penchant for figurative speech as exemplified by his naming of the newsletter “Viewing VIDO” and information booklets called “VIDO Views” that he was calling this banquet a “thank you banquet”. He mentioned that the banquet marked the opening of the Second VIDO International Symposium on “DATTA-DAH” (Mayor Cliff Wright he said, was embarrassed by the name neonatal diarrhea) but also was to especially celebrate the official opening of my laboratory, which he stated was truly a “minor miracle” which could not have happened without some type of divine guidance. This divine guidance was in the form of a host of “angels” who he would like to thank by name. He said that the list was so long that he had to write it on a scroll of toilet paper, but that he would most likely bore everyone stiff by reciting the names, and so had to cut the list down markedly. I had a sneak look at Bigland’s scroll and will put at least some of these names on a footnote to this page.

(* Ernie Pallister, Devonian Group of Charitable Foundations represented by Don Harvie and Jim Fish who consulted the Alberta and Saskatchewan Veterinary Associations, Harry Hays, many ranchers, C-CORE, Larry Smith, Otto Radostits, Pat McIlggart-Cowan, Gordon MacMurchy, Ray Harvey, Jack Messer, Doug McArthur, Edgar Kaeding, Ron Dalgleish, Ernie Spencer, Walter Weir, Jim Webster, Hugh Horner, Marvin Moore, Jim O’Donoghue, Hugh Vance, Bruce Jeffries, Fenton McHardy, John Bolen; Jack McPhedran, Ed Hudek; Abe Kidd, Maurey King, Sig Peterson; Claire Rennie, Ken McDermid, Dennis Howell, Trevor Lloyd Jones; John McGowan, Ken Wells, Eugene Whelan, John Sheppard, Officers of MOSST, NRC, MRC and ITC, Cliff McIssac, Ralph Goodale, Otto Lang, Bert Hargrave; Bob Begg, John Spinks, Jim Wedgewood, Alan Reed, Syl Skarsgard, Gordon Smith, Bob Hall, Terry Hellquist, Jock Anderson, Joe Dewin, Jack Wickstrom, E. Huszar, Ian Innes and others at the

department of buildings and grounds; Ole Nielsen, Jake Brown, Serge Federoff, Bruce Schnell, Ken McCallum, Jack Pringle, Mac Sheppard, Connie Jamieson, Gary Schlichemeyer, Matt Webster, Henry Epp and staff at the Business Office; Barry Bates, Harold Leece, Bruce McCorkell, Joan Watrous and the staff at the Personnel Department, colleagues in veterinary microbiology, veterinary clinics, veterinary physiology, veterinary pathology and veterinary anatomy; organizations in the livestock industry – Saskatchewan Stockgrowers Association, especially Gary Jones, the Alberta Egg and Fowl Marketing Board, especially Dave Guichon and Orest Lukey, the Manitoba Milk Marketing Board, B.C. Stockgrowers Association, the Alberta Cattle Commission and the veterinary associations of Alberta, Saskatchewan, British Columbia and Manitoba; Joe Parsons, Molly Denson, Sue Adolf, Phyllis Zoerb, Brian Freeze, Steve Acres, Marsha Permut, Bob Kapitany, Lorne Greenaway and the other personnel of VIDO; Lorne Babiuk, George Khachatourians, Eugene Janzen, Otto Radostits, Hugh Nicholson, Red Williams, Jack Manns, Bill Adams and other research collaborators; consultant Al Rankin, “forward thinkers of the 50’s” Herb Carlson, Hugh Vance, Fred Higginson, Bob McMillan, Ernie Taves, Bill Mead, Charlie Gordon, Ed Ballantyne, Jim O’Donoghue, Graham Wilton, Edgar Graesser, Glen Weir, Jim Rattray, Alex Rattray and personal thanks to wife Eva, and to daughters Margaret Wist and Janet Bigland.)

Bigland waxed poetic and directed his most avid thanks to those who took part in the key moments in “The VIDO Miracle”; Ernie Pallister and the Devonian Group, who “as Moses brought water forth where none had been before” so brought forth for the people of Canada three scientific research centers, C-CORE, Banff School Of the Environment and VIDO; the Saskatchewan government, the Alberta government and the University of Saskatchewan – the major founders of my unit.

Since the ground-breaking ceremony in 1976, when I had a staff of six, the number of personnel has risen to almost forty scientific and support staff at the end of the 1975-1985 decade. Whereas at the time of the official opening, in 1978, very few offices and laboratories were occupied, now all spaces are occupied. Offices intended for one now have two people and almost every available square inch in my building is fully utilized. Expansion has been considered and one area of expansion has already taken place in part of the basement area – the building of a conference room in 1983. Plans are now being considered for the further development of the full basement area, the possibility of building machine and hay storage at the back of my building and other modifications. Fundamentally however, the basic building has served its functional purpose well and, with few modifications, has provided scientific and animal laboratories for some major advances in the control of infectious diseases of food producing animals and birds.

Expansion will continue. The only question is “where will the money come from to make this possible?”

CHAPTER 6

The VIDO Philosophy Constitution and Bylaws

a) The Philosophy

The philosophy of my organization, I guess, was developed and refined over a long period of time. Possibly the first place it was partially framed out was in the Alberta Veterinary Association's brief to the Alberta Provincial Government in 1957 requesting the establishment of a veterinary research laboratory (Appendix B). This, in itself, was a distillation of many ideas from livestock owners, agriculturalists, veterinarians and scientists. As with all good resolutions, it had many paragraphs starting with "Whereas", some of which pointed out the following:

- “ — That agriculture is the largest producer of income in Alberta, over half of which is derived from livestock. (This was later reaffirmed by Premier Peter Lougheed in 1985.)
- Livestock diseases cause \$30 to \$40 million loss annually in Alberta (if these were equated to 1985 dollars, it would mean \$300 to \$400 million lost).
- There are over 50 livestock diseases that are transmissible to man.
- A subcommittee on agriculture of the Alberta Post-war Reconstruction Committee, recommended research facilities for livestock diseases, anticipating a great increase in livestock production.

- Research saves millions of dollars in preventing livestock diseases and contributes to the progress of human medicine.
- Animal disease research was being conducted only by the federal government, governments of Ontario and Quebec and the Connaught Laboratories. The multiplicity of problems has overwhelmed these facilities.
- Modern management, production and marketing and transportation accelerate the spread of infectious diseases.
- Research will help to prevent the suffering of animals caused by disease.
- Control of animal diseases would increase the world supply of protein for a human population, much of which exists on semi-starvation diets.”

Many of the same philosophical arguments were presented in November, 1973 to the Calgary Initiative in an effort to convince them that a veterinary research endeavor was needed and to emphasize the desirability of it concentrating on infectious diseases of food producing animals (Appendix A). The application of practical disease control measures on non-exotic disease conditions, ie. pneumonia, footrot, pink-eye in cattle and diarrheas of the newborn. In addition to hammering home some of the ideas mentioned above, it was also noted:

- “ — Disease is the major uncontrollable variable in livestock production and results in the wastage of 10-40% of total production of animal protein.
- The major disease losses are caused by microorganisms (viruses, bacteria, fungi or parasites).
 - Private funding of research on infectious diseases would fill a gap between basic research findings and their practical application in the field.
 - The potential for independent continuity would be expected from the following:
 - a) foundations such as the Calgary Initiative and other private foundations
 - b) the federal government in the form of grants from the Department of Agriculture, National Research Council, Medical Research Council, Department of National Health and Welfare, Defense Research Board and Department of Regional Economic Expansion
 - c) Provincial Governments who could consider the Veterinary Microbiological Institute as the “research arm” of their veterinary services branches. Also provincial granting agencies such as the Alberta Agriculture Research Trust, Saskat-

chewan Research Council and the Saskatchewan Horned Cattle Trust

- d) industry entities such as drug companies, biological manufacturers and chemical companies, for the testing of their products in Canada where Canadian protocols are necessary for licensing, and by the sale of antisera or vaccines prepared by the Canadian Veterinary Microbiological Institute (as was done with the sale of western equine encephalitis vaccine by Dr. J.S. Fulton). Also by the supplying of diagnostic antisera for identification of organisms such as *E. coli*. (Already in operation at the WCVI)
- e) private funding through granting organizations such as the Canadian Veterinary Medical Association Research Fund, the Mark Morris Foundation, the Cancer Society and the Tuberculosis Association. Also private donations and bequest from individuals interested in livestock
- f) the University of Saskatchewan for training of graduate students
- g) a responsible visiting committee of prominent Canadian scientists was recommended to investigate and report on research progress, plans, courses, funding, personnel and other details.

As an outgrowth of much dialogue between Ernie Pallister and officers of the Devonian Foundation, Bob Begg, Jack Pringle and others in the University of Saskatchewan, Dr. Jim O'Donoghue and his staff in the Alberta Department of Agriculture and Bigland representing my organization, the next document, incorporating the basics of philosophy was the Letter of Agreement sent out by Jim Fish of the Devonian Group August 11, 1975, establishing my initial funding. I think this is important enough, kind reader, to put into Appendix C at the back of the book, so that you can judge for yourself the basis on which I was first financed. In a nutshell however, it included:

1. "VIDO will be established at the University (of Saskatchewan) under the direction of Dr. C.H. Bigland of the Western College of Veterinary Medicine who will be the Director of VIDO. During the term of this Agreement, Professor Bigland will be personally involved in VIDO and will spend more than 50% of his working time on VIDO projects."
2. "VIDO shall conduct research on indigenous infectious diseases of food-producing animals under the direction of a Governing Committee with the advice and council of a Board of Advisors."
3. "A Governing Committee of VIDO, composed of the following (or their designates), the President, the Dean of the College of Graduate Studies and Research, the Dean of the W.C.V.M. (Chair-

man), the Director of VIDO, the Deans of the Colleges of Agriculture, Medicine and Pharmacy, and Chairman of the Board of Advisors, with the Vice-President, Administration as a non-voting member shall be established by the University'. . . The Governing Committee shall direct and review the operations of VIDO, approve its budget submissions and advise the staff directly involved in its projects, and shall be responsible to the Board of Governors of the University and report to the Board of Advisors.'

4. 'A Board of Advisors of six persons who are not associated with the University nor Members of the Legislative Assembly of Saskatchewan or Alberta shall be established to advise and counsel the Director and the Governing Committee, to review the projects from time to time being conducted by VIDO, to review and approve budgets which have been approved by the Governing Committee, to approve keeping information and data secret in accordance with Item 11 hereof, and to keep Devonian, Saskatchewan and Alberta advised concerning the operations of VIDO. . . During the term of this Agreement (5 years) Devonian, Saskatchewan and Alberta shall each be entitled to select one member of the Board of Advisors. . . The member, from time to time chosen by Devonian shall be the Chairman of the Board of Advisors. . . The other members of the Board of Advisors shall be initially selected jointly by Mr. A.E. Pallister. . . and Professor Bigland, with Mr. Pallister having the ultimate decision in the event of dispute. . . The fees and expenses of the Board of Advisors shall be paid out of the VIDO budget.'
5. 'All of the staff at VIDO shall be employees of, and paid by the University; provided that VIDO shall reimburse the University for a portion of the salaries and the benefits of such staff (other than the Director) which is reasonably attributed to the work they are performing for VIDO.'

Many details on the actual funding have been mentioned elsewhere.

However, another bit of philosophy in this document was the following:

'The University shall provide at no cost to VIDO: a site of approximately 5 acres on the University grounds for building and facilities to be constructed for VIDO, but excluding such building and facilities. . . Such will be used by VIDO in accordance with this Agreement and the Constitution of VIDO. In the event that the VIDO project is terminated, the buildings and facilities and the equipment therein. . . shall remain the absolute property of the University. . . for research and teaching in the field of veterinary medicine. . . Provision was made for the University to also supply engineering knowledge and advice for the construction of the buildings, maintenance, advice and supervision of the

building and facilities, administration of all VIDO funds and the salary and other benefits for the Director of VIDO.’

‘All grants to VIDO . . . shall be paid to the University for the use of VIDO on the condition that the University is then a registered charity under the Income Tax Act and will issue receipts thereof in accordance with the provisions of that Act.’ It was also provided that ‘all patents, discoveries and inventions obtained as a result of research conducted by the VIDO staff shall be obtained by and held by the University for the benefit of VIDO. . . unless other arrangements are negotiated by VIDO.’

b) The Constitution

The above agreement you will notice, mentioned a constitution. A draft constitution had already been worked upon by Pallister and Bigland. This was based on the constitution of C-CORE (The Center for Cold Ocean Research Engineering) that the Devonian Group had established at Memorial University. The concepts and ideas that the Devonian Group wanted were thus incorporated in my constitution, which also set out many philosophical points in addition to those previously mentioned. I will not include the Constitution in the appendix of this book for fear of boring you, gentle reader. However, the following are some of the highlights of the original constitution of 1975 and the amendments to it made in January 1982:

- My name was officially enshrined as the ‘‘Veterinary Infectious Disease Organization (VIDO) of the University of Saskatchewan.’’
- ‘‘The purpose of VIDO will be to conduct research on indigenous infectious diseases of food-producing animals. Much of this will be practical or applied research with the aim of utilizing discoveries in basic sciences and translating these to useful application on the farm.’’
- In staffing, a permanent staff of three research professionals was envisaged, along with visiting and senior scientists, research teams from the WCVM, other interested scientists and university faculty, post-doctoral and graduate students.
- Also envisaged was the conducting of workshops and continuing education courses.
- A Governing Committee was established with the management of my affairs vested in it. Membership was to be eight members or their designates, all from the University as previously outlined. They were to meet at least three times a year. Members were to receive no remuneration other than travelling and necessary expenses. Three livestock producers were also later added to round out the committee.
- A Board of Advisors was also established to counsel the Governing

Committee concerning their review of research projects and budgets. Membership was to be six, none of whom were to be associated with the University nor Members of the Legislative Assembly of Alberta or Saskatchewan, but with a member from the Devonian Foundation (who would be Chairman), the Alberta and Saskatchewan governments.

- In essence, a board of donors with the later addition of three livestock producers. Members of the Board were to receive remuneration of an appropriate fee on a per diem basis for meetings on behalf of VIDO.
- The section on staff details that, “the Director will be on the faculty of the University and paid by the University of Saskatchewan, and that other personnel will be employees of the University provided that VIDO reimburse the University for their salaries and benefits.” The duties of the Director are detailed in that, “the Director shall be the full-time Chief Executive Officer, responsible to the Governing Committee.” The duties outlined full responsibility for the functioning of my organization, as is implied by the phrase “Chief Executive Officer”. The other staff “assisting the Director” were to be professional personnel, technical, office and secretarial staff. In addition, provision was made for joint appointments by scientists from the University of Saskatchewan, secondment from other universities, institutes, industrial or government organizations, graduate students, post-doctoral fellows and undergraduate students. All staff were to be appointed by the governing committee on the recommendation of the director.
- the seeking and holding of patents, so Bigland tells me, was viewed as a potential source of income, the knowledge of which he gained while at the University of California. He had been urging the University of Saskatchewan to be more active in this area, and did participate in one patent on his research, with a commercial company. As a consequence, patents were covered well in the constitution. This outlined that all patents resulting from research by my staff would be obtained and held by the University of Saskatchewan for my benefit, and the information could be kept secret only for that number of years approved by the board of advisors.

The Constitution of January 28, 1982 (as amended):

Significant changes were made to the above constitution on April 1, 1980 and October 20, 1981, due to the fact that the original agreement was for only five years and so expired in 1980. The Devonian Group wished to withdraw their membership from the managing boards, greater input was desired from the livestock industry and the public, and most importantly, it was felt that it

would be desirable to consolidate the governing committee and the board of advisors into one body – a board of directors. This board would consist of thirteen persons, appointed by the University of Saskatchewan's board of governors and comprised of: five members from the livestock industry, two members at large, three members from provincial or federal governments, two members from the University of Saskatchewan and my director. Each member was to be appointed for a four-year term (except for my director) with a maximum of two consecutive terms. Three appointments were to be made annually to ensure adequate rotation. A chairman and vice-chairman were to be elected for a one-year period, from and by the board (my director to be ineligible).

This constitution detailed what had been in practice since my inception, "the serving of the livestock industry through applied or practical research on common infectious diseases of food-producing animals." It outlined the purpose of informing the livestock producers, governments and universities of the results of my research. One of the responsibilities of the board was to seek guidance and direction from the livestock industry, governments and veterinary professions as to research priorities of the livestock industry."

With these changes, the responsibilities of the board were similar to the combined responsibilities of the old governing committee and the board of advisors. However, with the addition of approval to "establish, guide and direct and be responsible for other entities or corporate structures where applicable," the door was opened for the establishment of BIOSTAR Inc., which would eventually become my commercial arm. Other duties included making further provision for a Scientific Program Advisory and Review Committee (SPARC) to "review the long-term VIDO research plan and current projects, and provide the Board with an assessment of research achievements and priorities."

c) Bylaws

Naturally, as is the case with any well constructed constitution, provision was made for a series of bylaws. These, as amended on April 1, 1980, and January 28, 1982, basically fleshed out details to the generalities noted in the constitutions of those dates. They included details on responsibilities of the director; confirmed that I should have other employees of the University, including a deputy director (research) and an executive officer, professional personnel, visiting scientists, technical and clerical staff. In addition to this, U of S faculty members could have cross appointments as research collaborators for

specific terms, and I could have members of any universities, institutes, industry or government seconded to me on a full or part-time basis, together with graduate students and post-doctoral fellows. It also confirmed cross appointments between my organization and other departments of the University.

Appointments and remuneration were allocated to committees. For the professional staff a committee was composed of my director, the chairman of the board of directors and the dean of the College of Graduate Studies and Research. For the executive officer, the committee was made up of my director, the chairman of the board of directors and the vice-president of administration of the University.

Remuneration and employee benefits of my staff was to be subject to terms and conditions consistent with those negotiated with the University by the particular bargaining unit to which the employee belongs, if any.

Concerning contract research, the bylaws noted that "in negotiating contract research, operating overhead was to be charged, such to be retained by VIDO." It confirmed that patents resulting from my research were to be held by the University of Saskatchewan for my benefit.

The Trustee of my Research Trust Fund was to be the controller of the University and all accounts were to be maintained in a form similar to the University and to be audited at least once a year by the auditor of the University's accounts.

Concerning persons who could attend meetings of the board of directors and the executive committee, the 1982 revision included the deputy director (research) and the executive officer. During this interim, Dr. Stephen Acres had been appointed as deputy director (research) and given responsibility for administration of my research aspects. In view of this, his active attendance at meetings of the board was essential.

In addition, the board could invite other guests to their meetings.

Well, as you can see, the Constitution and Bylaws in their evolution gave form and substance to the actual administration of my organization. I am sure there will be many changes in the future, but the ruling documents have stood the test of time for 10 years, and have been partly responsible for the dependability and maturity of its function.

d) Staff Agreements

All of my staff are employees of the University of Saskatchewan (with the proviso that my trust fund reimburse the University for their salaries and benefits). As a consequence the staff are bound by the generalities of the union contracts, depending upon to which union they

belong, if any. As research evolved however, it soon became apparent that demands would be made upon the staff to maintain confidentiality about the work that they were performing. This was because some would be the basis of patent application. Other work would be on key ideas involving technology transfer. And, since the research was on the leading edge of science, sometimes even the minor details of a chemical used, a new technique or a new procedure could be valuable or even essential to a competing scientist or biological manufacturer, who could then copy the scientific advances made by my scientists and commercialize them. In realization of this, it was felt desirable to have a separate agreement with all of my staff. Steps were taken to draw up a staff agreement for my employees to achieve the desired confidentiality, and to assign to me their personal rights to inventions discovered in the course of their work. The first documents drawn up were fairly simple and were signed by my immediate staff. The question arose of the confidentiality and patent assignment of research collaborators, who worked for other departments in the University and even other universities and laboratories. Part of this consideration revolved around the research collaborators' responsibilities to his parent organization and to the patenting policy of that organization. For example, faculty members of the University of Saskatchewan normally disclose potential patent ideas to the University, who can either turn these back to the investigator or proceed to obtain a patent themselves, either through the federal Canadian Patents Development Office, or a private patent lawyer. Once a patent has been received and commercialized, the University, after paying all the costs of patenting, share with the faculty member, on a percentage basis, the royalties or profits of that patent. In view of this, a separate agreement had to be drawn up for research collaborators, which took this fact into consideration. Normally such a new agreement was signed freely by those collaborating on my research. However, there were some scientists who declined to sign such an agreement and even withdrew from collaboration.

As with all of my documents of a legal nature, these agreements were drawn up a law firm, which was the same as the one employed by the University - McKercher, McKercher, Stack, Korchin and Laing of Saskatoon.

With the revision of the Constitution in 1980, another look was taken at these agreements and an effort was made to meld the two agreements into one. This was facilitated by advice from Dr. Leon Katz, a colorful retired professor and head of the U. of S. department of physics and former chairman of the Saskatchewan Research Council. With the stimulus of a consulting contract, he worked long and hard to smoothly achieve this purpose. The 1980 document clarifies that a

member of staff "is engaged by, at, or supervised through VIDO, is using its or the University of Saskatchewan's equipment and facilities and receiving remuneration from VIDO or any other source." The revision of the staff agreement made June 7, 1983 tightened up the phraseology of the previous agreements, but basically reconfirmed the same objectives. These could be encapsulated as follows:

- assignment of rights of inventions, whether patentable or not, to me
- agreement to treat as secret and confidential any knowledge of any inventions or other confidential information acquired at my laboratory
- disclosure of all such inventions when conceived during the course of employment, the rights to which could be returned to the inventor if my management did not wish to proceed with patent application
- agreement to execute and deliver to my officers all documents necessary for the preparation of patents
- my organization agrees to maintain an inventions and incentives committee consisting of four members, two to be elected from and by the board of directors, the others to be the vice-chairman of the board and my director. Such committee to determine the validity of any claim made and to recommend the apportionment of monies for distribution
- a minimum of 5% of all royalties from the sale or licensing of patents to be distributed to the persons participating in my research programs
- the staff member agrees that all records of research activities while employed by my organization shall be my property and not removed without written consent
- the staff member must declare any other obligations or conflicts of interest which became part of the letter of agreement

I will not trouble the reader by including copies of many of these documents. If you do wish to see them, I am sure my director can make them available to you.

Here again, the staff agreements were accepted by all of my staff knowing well their purpose. To my knowledge there has been no transgressions. However, with the advent and enlargement of BIOSTAR, there is a possibility that such agreements too may have to be reassessed.

CHAPTER 7

The Management and Governing Boards

On some days, and these were many during the past 10 years, I have trembled in my proverbial boots, over my struggle for evolution and sometimes for my very existence. This heavy responsibility was in the tender hands of my management, the governing committee and the board of advisors while I was in my earlier stages and then the board of directors while growing and maturing. Fortunately the people composing these groups kept in mind my primary objective of serving the livestock industry through research on the common infectious diseases of food-producing animals and every major decision was made in the light of this objective. Their collective job was to crystalize a noble idea and bring it to fruition. To “steer the ship” towards this objective unswervingly, but still maintain compatibility, good relations and uniformity with the bodies who funded me and others. Their direct and immediate job was to raise funds, to manage budgets, to hire staff, to oversee the research and business functions and to participate in patents and contracts for the commercialization of my research.

a) Management Staff

Although management staff members were in the front line of all of these endeavors, they did take their orders from above.

Management staff prepare complete reports on my business and research activities, presented to the board of directors three times a year

at appropriate intervals. At these meetings, the intervening months' activities are scrutinized in detail, and the proposals by management staff for the next three months, six months, one year or even ten years are reviewed and direction given. Under this process, the management staff have to be fastidiously responsible to the Board of Directors, meticulous in their reporting, innovative in their future plans and, when these are approved, determined to carry them through.

Naturally, with my evolution the management staff also evolved. From about 1973 to 1976 it was Bigland, assisted by secretaries Phyllis Zoerb and Sue Adolf who responded to the people who would eventually make up the board of advisors and the governing committee. They were later joined by Brian Freeze, a graduate student in agricultural economics. From 1976 to 1978, the management team was expanded to include Marsha Permut, the business manager. Weekly meetings of management were held in the WCVN Dean's conference room for a while, then transferred to the 'animal room' in the trailers. These meetings included research collaborators and the newly appointed scientists, Dr. Stephen Acres, Dr. Bob Kapitany and visiting scientist, Dr. Bob Worthington. This format continued for a short while until the research collaborators and some of the scientists felt that their job was doing research and not being part of management, and so requested that they be dropped from the management team. In 1978, Permut resigned and was replaced by executive officer Paul Hodgman. It was about this time that Dr. Tony Forman came on staff, and with the intensification of research, other staff were added. These scientists were part of the management team for a short time until they too felt their job was research and not administration, which once again shrank the management staff. Dr. Lorne Greenaway, our extension officer, remained. He was later replaced by Bonny Beswick, Assistant to the Executive Officer. Dr. Stephen Acres continued on the management staff following his appointment in 1976. In 1980, he was appointed Deputy Director (Research) and was given, in addition, full responsibility for supervising and reporting on all research activities.

In 1983, Charlene Nicholls, an employee of BIOSTAR (seconded to me part-time), joined the management staff. After Bigland's retirement in July 1984, Acres was appointed director and Dr. Lorne Babiuk associate director (research), and they together with Hodgman and Nicholls still constitute the management staff.

Other attempts were made during the evolution of the management staff to include heads of the research teams, for example, Dr. Peter Stockdale, research collaborator and head of the Bovine Respiratory Team, sat on management staff meetings for approximately six months.

All the various changes and action over the years have been documented in the form of detailed minutes of each meeting carefully

kept since the first one in 1974. These are now in the University of Saskatchewan Archives.

b) The Administrative Boards

My initial five-year period was blessed by the wide and divergent experience of two senior administrative boards. This method of organization was the brain child of Ernie Pallister, who had tested it out at C-CORE before suggesting it for me. One of the administrative bodies, the governing committee, which consisted of upper administrative personnel of the University, reviewed the day-to-day administration worked to tie my activities in with those of the University, and sought to ensure that my management followed the objectives promulgated by the board of advisors. This second body, the board of advisors, was in essence a board of donors, in which each of the major donors would have a representative. Their job was to advise the director and the governing committee, review research projects and approve budgets and set the general policies of operations.

i) The Governing Committee

Original members included the dean of the Western College of Veterinary Medicine, Dr. Ole Nielsen who was named as chairman,



VIDO Governing Committee 1977-1978 — L-R Front: Dr. D. Eidinger - College of Medicine, Dr. Chris Bigland - VIDO, Dr. N.O. Nielsen - (Chairman) W.C.V.M. — Back: Mr. A.E. Pallister - Devonian Group, Dr. B. Schnell - College of Pharmacy, Mr. J. McFaul - Manulife, Dr. K. McCallum - College of Graduate Studies (Missing - President R. Begg, Vice-President J. Pringle)

President Begg, Jack A. Pringle, Vice-President Administration, Dr. Jake Brown, Dean of Agriculture, Dr. Ken McCallum, Dean of the College of Graduate Studies and Research, Dr. Bruce Schnell, Dean of Pharmacy and Dr. G.R. Murray, Dean of Medicine (who named as an alternate, Dr. David Eidinger). These, together with the chairman of the board of advisors, Mr. Ernie Pallister, constituted the first Governing Committee. In 1977, Mr. Jack McFaull, who at that time was chairman of the board of governors at the University, was added to the Committee. In 1979, the committee was enlarged to include livestock producers, welcoming Mr. Gary Jones, rancher from Crane Valley, Saskatchewan; Mr. Ben Thorlakson, a feedlot operator from Airdrie, Alberta, and Mr. Orest Lukey, a poultry producer from Acme, Alberta. Each worked diligently and was an active member of the committee, making himself available to the director for advice between meetings and helping to steer management personnel's actions on budgets, appointments and research activities.

Possibly, the finest hour of committee members was their part in the negotiations between my management and Connaught Laboratories Ltd. on the commercialization of VICOGEN, the first effective vaccine against the pathogenic *E. coli*. A negotiating sub-committee was chaired by Dean Ole Nielsen along with Bruce Schnell and Ben Thorlakson and my management. On the other side of the table sat Connaught's upper management. The business acumen of Ben Thorlakson, the knowledge of the pharmaceutical industry of Bruce Schell and the negotiating capabilities of Ole Nielsen were invaluable in concluding the final contract. It was Nielsen himself who hammered out the final point of conflict, ie. the amount of royalty due to me. This contract was really an important one, as the proof both that my research could have a lasting impact on the improvement of the livestock industry and that I could be innovative and, furthermore could commercialize on that innovation. The experience of the governing committee members and of Ernie Pallister was invaluable because Bigland and his cohorts were veritable babes in the woods in this turbulent arena.

ii) The Board of Advisors

For the first three years, my board of advisors was truly a board of donors. Ernie Pallister represented the Devonian Group of Charitable Foundations and was the chairman, Dr. Hugh N. Vance, was the Alberta appointee and Dr. Walter C. Weir was the Saskatchewan representative. Dr. Ole Nielsen was an "ex-officio" member as chairman of my governing committee. In 1979, the Board of Advisors too was broadened to include representatives from the livestock industry. This was because it was felt that the governing bodies needed input from the industry concerning future research activities and a mechanism to report

to them on present research findings. In addition, by now, funds were flowing from the livestock industry into my Research Trust Fund from private individuals and breed organizations, but primarily from marketing boards and commissions. In order to represent a wide range of livestock species and also geographic areas, the three producers added were Mr. James McCague, dairy producer from Alliston, Ontario, Mr. Paul Riese, a swine producer from Selkirk, Manitoba, and Dr. Zane Block, Hereford breeder from Standard, Alberta. One could say that in the initial period the board of advisors called the shots on major decisions. The first of these (but not the last to) ‘set Bigland and company on their ears’ was their decision that my research should be concentrated one hundred percent on *one* disease problem – calf scours! Up until that time, it had been envisioned that my staff would be working



VIDO Board of Advisors 1977-1978 — L-R Front: Dr. H.N. Vance - Government of Alberta, Mr. A.E. Pallister - (Chairman) Devonian Group of Charitable Foundations, Dr. W. Weir - Government of Saskatchewan
 — Back: Mr. G. Flaten* - Saskatchewan Hog Marketing Commission, Mr. H. Zeiss* - Saskatchewan Dairy Producers, Dr. N.O. Nielsen, W.C.V.M.
 *Non-permanent members

on several disease conditions, and in collaboration with others at the Western College of Veterinary Medicine and other laboratories, would seek out expertise to implement research activity on any infectious disease of food-producing animals wherein that expertise could be identified. This decision by the board of advisors marked a major step in my evolution in that it prescribed the type of scientists we needed, the direction of symposia, the pathway of research and the concentration of funding and equipment.

It was a wise decision, as calf scours or neonatal diarrhea was deemed to be the predominant cause of economic loss to the cattle industry. No glimmers of hope for a solution appeared to be on the horizon and there was documentary proof that the disease was causing annual losses of approximately \$75 million in Canada, and that three infectious agents, ie. pathogenic *E. coli*, rotavirus and coronavirus were major causes, together with the evidence that the management of the calving herd was largely responsible in the incidence and spread of the disease throughout a herd. Much of this evidence had been collected by Dr. Stephen D. Acres and Dr. Otto Radostits, who presented such convincing evidence of the importance of calf scours that it is understandable that it was chosen as the first major disease problem for my scientists to attack.

In choosing calf scours, the board of advisors also underlined the principle of concentrating on one disease, pouring into it the magnitude of financing necessary to get the job done and trying to hire the best scientists available to work on it.

Ernie Pallister (later Dr. Pallister) brought his tremendous experience to bear on suggestions for financial control and budgetary reporting and on almost every detail of the evolution of my initial administration. He capsulized the first 5 years in the Annual Report of 1979-80, from which I will quote in its entirety:

“To the Board of Advisors this Annual Report of VIDO is an important one - for it completes the Board's work.

From April 1, 1980, the affairs of VIDO are to be governed by a newly formed Board of Directors under the leadership of Ben Thorlakson, President of Thorlakson Feed Yards, Airdrie, Alberta. Mr. Paul Riese, Karmona Stock Farms, Selkirk, Manitoba will be the Vice-Chairman. Several members of the previous Board of Advisors and Governing Committee will serve on this single board.

This change of organization recognizes VIDO's maturity. During the past 5-year launching period, the Board of Advisors has worked closely with the Director and the Governing Committee in translating a concept to a reality. In looking back over this short period of time, it is with considerable gratification and some amazement we can see a new research center having been organized, and at the same time, having attained scientific and commercial break-throughs.

At a time when Canada is searching for ways to generate its Research and Development effort, it is worth reviewing some of the principles on which this institution was founded and the manner in which its success evolved.

Following the screening of a number of national projects seen as imperatives to tackling unique Canadian future needs, the

reduction of common infectious diseases of animals was judged by the Devonian Group of Charitable Foundations as a venture worthy of support.

The initial organizational steps were taken in the belief that a university is the ideal place to carry out a full range of basic through applied research. It was considered, though, in addition to the academic freedom traditional to this setting, that researchers and management needed to be provided with "organizational freedom". That is, a release from the administrative and teaching responsibilities normally carried by university researchers. Two further requisites were visualized that secure funding be in an amount above the threshold where significant new advances could be expected, and that a major portion of these resources be allocated to attacking a single problem.

The remaining critical ingredients were seen as the bringing together of highly qualified researchers and strong leadership possessing a knowledge of the needs of potential beneficiaries of their work.

These idealistic preconceptions were applied five years ago.

With initial funding provided jointly by the Foundation and the Governments of Alberta and Saskatchewan, together with support from the University of Saskatchewan, VIDO was established on campus in proximity to the Western College of Veterinary Medicine and the Faculty of Agriculture.

Dr. Chris Bigland, the original proponent of the venture, transferred from the WCVM to devote his full attention to VIDO and assembled an outstanding staff of bright young people. His early facilities were in trailers.

Two groups were formed to assist him – a Governing Committee to guide the business affairs, and a Board of Advisors to recommend research priorities.

A high priority was placed on establishing close relationships with the livestock industry. VIDO's motto became "Serving the Livestock Industry Through Research". The initial membership of these two groups was drawn from the founding organizations, but was soon to include members nominated by livestock associations engaged in cattle, swine, poultry and dairy industries from Ontario to British Columbia. The Board of Advisors held its meetings in these five provinces and gained the participation of people in the numerous agricultural fields. Elsewhere in this report will be found a list of all those who have attended our meetings this year. A large degree of VIDO success can be attributed to the guidance and support provided by participants at our meetings. Public support of VIDO is exemplified by the fact

that VIDO's total financial resources of \$8,398,000 have been received from 143 different sources, including 86 donations by individuals. In addition to having developed scientific and financial credibility and accountability, the Organization has lived up to its motto. As a tangible illustration, the lives of thousands of calves were saved this year as a result of the application of VICOGEN vaccine against neonatal diarrhea. This discovery from VIDO's research and development which was directed to the Canadian-owned Connaught Laboratories for further development, manufacture and distribution, will have a major impact, many times this figure on animal productivity in Canada and the world in coming years.

The remarks of the Governing Committee and the Director which follow, describe VIDO's scientific achievements and future plans. The reports of the Auditor and the VIDO Research Trust Fund Trustee indicate the financial stability which VIDO has achieved and maintained.

In concluding the affairs of the Board of Advisors, it is timely and appropriate to look not only at the performance of this Organization, but to view its short history as a model of the type of initiative that needs to be fostered and can be achieved in this wondrous country when government, industry and university, through dedicated individuals work together in common pursuit of a clear objective.

In this case, the catalytic sponsorship of a charitable organization helped make it happen. As events unfold, perhaps Devonian's greatest contribution will be seen as illustrating that new, concerted, approaches to research are possible and aspirations are attainable.

While many of the founding principles have proved to be valid, the most difficult challenge has been the establishment of good lines of communications between and within the segments of the very complex agricultural structure in place in this country. An incredible amount of energy has been devoted to this endeavor. Yet, as VIDO makes the transition to an established institution and attacks other diseases and in other species, we offer a final word of advice: "We recommend most strongly that VIDO continue to expend this energy in strengthening its relationships with the many hundreds of organizations and thousands of producers and consumers whose livelihoods and lifestyles will be enhanced by the reduction of morbidity and mortality of animals."

The Board of Advisors joins me in thanking the scores of people who have helped us do our job. . . Dr. Patrick McTaggart-Cowan of the Science Council of Canada who recognized the opportunity,

Dr. Chris Bigland whose dream it was, to University of Saskatchewan President Dr. Bob Begg, who backed it through tenuous times, through visionary Provincial Ministers of Agriculture, Horner, Moore, Schmidt, Messer, Kaeding and MacMurchy, who accepted the gamble, to Dr. Ole Nielsen and to the staff who, particularly in those early days performed under pressure with primitive facilities. . .to mention but a few.

I express my personal gratitude to the members of the Board of Advisors for the excellent advice they have provided while patiently introducing their geophysicist Chairman to the intriguing world of veterinary medicine.

A.E. Pallister, Chairman
Board of Advisors, VIDO''

iii) Board of Directors

With the transition to the board of directors, the leadership of my organization was, in essence, turned over to the users of the research - the livestock industry. Of the first twelve-man board of directors, five



VIDO Board of Directors 1980-1981 — L-R Front: N.O. Nielsen, P.V. Riese (Vice-Chairman), S.D. Acres (Deputy Director - Research), J.A. McCague, A.E. Pallister, C. L'Ecuyer — Back: H.N. Vance, C.H. Bigland (Director), B.E. Thorlakson (Chairman), J.Y. McFaul, w.c. Weir, P.G. Hodgman (Executive Officer), O.E. Lukey (Missing — C. Leask, L.F. Kristjanson)

were to be from the livestock industry itself, three from donor governments, two from the University of Saskatchewan and two were members at large, this latter to bring business expertise and experience to the table.

The board of directors was empowered to elect their own chairman, and here again I was blessed with a most energetic, interested and co-operative chairman in Mr. Ben Thorlakson of the Thorlakson Feed Yards of Airdrie, Alberta. Others representing the livestock industry were Mr. Paul V. Riese from Karmona Stock Farms, Selkirk, Manitoba, who was elected vice-chairman; Mr. Charlie Leask, Director, Livestock Division, Saskatchewan Wheat Pool, Regina; Mr. Jim McCague, a dairy producer from Alliston, Ontario, and Mr. Orest Lukey, a poultry producer from Acme, Alberta.

The government of Saskatchewan was represented by Dr. Walter Weir, the Government of Alberta was represented by Dr. Hugh Vance, and although not yet a donor government, the federal Government was temporarily represented by Dr. Doug Hare, from the office of Dr. John McGowan, Veterinary Director General, and later by Dr. Conrad L'Ecuyer, Director General, Operations Directorate, Health of Animals Branch, Agriculture Canada.



VIDO Board of Directors 1985-1986 — L-R Front: D. Rowlatt, B. Anderson (Vice-Chairman), G. Altwasser (Chairman), S. Acres (Director), R. Church — Back: R. Murray, H. Fast, S. Kramer, W. Cochrane, G. Hamilton, R. Christian, L. Babiuk (Associate Director, Research), P. Hodgman (Executive Officer) (Missing — R. Baily, R. Klassen)

I was greatly honored to have the University of Saskatchewan represented by Dr. Leo F. Kristjanson, President and Dr. N. Ole Nielsen.

The very important "at large" members contributing deeply from their wisdom and experience were Dr. Jack McFaul, director of ManuLife, Saskatoon, and the previous chairman of the board of advisors, Ernie Pallister, Associate Director of the Devonian Group of Charitable Foundations.

This able group was a melding of the old board of advisors and old

governing committee, but with emphasis on the livestock producing members. The structure was such that four members of the board "rolled over" each year, to allow new and interested representation, while maintaining continuity. As a result, some members were elected for a one-year period, some for a two-year period and some for a three-year period (this was later changed in 1984 to allow each member to serve for a four-year period). As a consequence, new members of the board were brought on each year, but to orient them to their duties, each was brought in as a guest to the meeting immediately preceding initial appointment. Later on, in 1984, a thirteenth person was added, because it was felt that my director should be a full fledged member. This position was filled first by Bigland and later by Acres.



Dr. N. Ole Nielsen - Chairman of Governing Committee 1975-1980



Dr. A. Ernie Pallister - Chairman of Board of Advisors 1975-1980 and first Chairman of Board of Directors 1980-1981

Over the years, many distinguished people have contributed their knowledge and advice on my board. In addition to those previously mentioned, can be added the following: Mrs. Carol Teichrob, a turkey producer from Saskatoon who was chairman of the Canadian Turkey Marketing Agency at the time they donated \$200,000 for research on turkey hemorrhagic enteritis; Mr. Patrick Moncrieff, Senior Manager, Agriculture Department, Bank of Montreal, Toronto; Dr. Art O. Olson, Assistant Deputy Minister, Alberta Agriculture; Mr. Barrie Peterson, dairy producer, Agassiz, B.C.; Mr. Garnet Altwasser, Lakeside Farm Industries, Brooks, Alberta; Dr. Brian Tinker, Vice-President (Administration), University of Saskatchewan; Dr. Doug Maplesden, Dean, Ontario Veterinary College; Dr. Ralph Christian, Director, Animal Health Division, Alberta Agriculture; Mr. Stuart Kramer, Assistant Deputy Minister,

Saskatchewan Agriculture; Dr. Boyd Anderson, cattle rancher, Fir Mountain, Saskatchewan; Mr. Richard Klassen, livestock producer, Manitoba; Dr. Gavin Hamilton, Dean, Western College of Veterinary Medicine; Mr. Rod Bailey, Assistant Deputy Minister, Regional Development Branch, Agriculture Canada; Dr. Harold Fast, swine producer,



Mr. Ben E. Thorlakson, Airdrie, Alberta
1981-1982



Mr. Paul V. Riese, Selkirk, Manitoba
1982-1983



Mr. Pat M. Moncrieff, Toronto, Ontario
1983-1985



Mr. Garnet Altwasser, Brooks, Alberta
1985-1986

Spiritwood, Saskatchewan; Dr. William Cochrane, President, Connaught Laboratories Ltd., Toronto; Mr. Bob Murray, Manager, Spruceleigh Farms, Brantford, Ontario; Dr. Bob Church, Associate Dean of Research, Faculty of Medicine, University of Calgary; Dr. Don Rowlatt, Vice-

President (Administration) University of Saskatchewan, and Mr. Charlie Leask, Saskatchewan Wheat Pool, Regina.

The Board was successively chaired by Mr. Ben Thorlakson, Mr. Paul Riese, Mr. Pat Moncrieff, Mr. Garnet Altwasser and Dr. Boyd Anderson. Each year an executive committee is struck consisting of the chairman,



Dr. Boyd Anderson, Fir Mountain, Saskatchewan, 1986-

the vice-chairman, my director and two other board members (one of which has traditionally been the University liaison). This committee generally meets between board meetings or at the call of the chair when important matters arise. The board also has a nominating committee of three members, whose primary purpose is to select and recommend new members to the board. In addition, an incentives and invention committee comprised of four members including the vice-chairman, my director (ex-officio) and two members of the board.

I have always been deeply appreciative of the willingness and dedication of so many outstanding members of my board in giving freely of their time to channel the business and research endeavors of my staff. It is no wonder, considering the calibre of these dedicated people, that my organization has been so administered and assisted as to allow my research scientists full scope for their innovative genius.

I would like to also mention one special person at the University of Saskatchewan, who, although not a Board Member, contributed greatly to the board's many successes. This is Mr. Mac Sheppard, the university's controller, who applied his extensive knowledge and capabilities to the finances and contracts of my organization.

iv) Guests of the Boards

When the board of advisors was first formed, it was Ernie Pallister's idea to invite several distinguished guests to each of the board meetings, "particularly those who represent potential beneficiaries of VIDO's research." These guests also contributed freely of their time and talents, bringing their expertise to the board of advisors and later the board of directors to assist in solving problems and guiding my organization. Included in this list of distinguished guests were: Dr. Mervin Franklin, Acting Vice-President (Academic), University of New Brunswick;

Senator Harry W. Hays, rancher, Calgary, Alberta; Dr. Ken F. Wells, advisor to CIDA and former Veterinary Director General of Canada, Ottawa; Mr. Jim Fish, Vice-President, Devonian Group of Charitable Foundations, Calgary; Mr. F. Lynch-Staunton, rancher, Lundbreck, Alberta representing the Alberta Cattle Commission; Mr. R.W. Shopland, Secretary-Manager, Alberta Sheep and Wool Commission, Edmonton; Mr. Wayne Clews, cattle breeder, Pangman, Saskatchewan, representing the Saskatchewan Charlois Association; Dr. Abe Kidd, Head, Veterinary Branch, Government of British Columbia, Victoria; Dr. Lorne Greenaway, Steveston Veterinary Hospital, Richmond, B.C.; Dr. Jeremy W. Greenfield, microbiologist, Veterinary Laboratory, B.C. Department of Agriculture, Abbotsford; Dr. Jack A. McPhedran, Director, Veterinary Services Branch, Manitoba Department of Agriculture, Winnipeg; Mr. Art Dillworth, Manitoba Pool Elevators, Winnipeg; Mr. R.J. Munroe, Secretary, Manitoba Beef Growers Association; Dr. G. Cousineau, Dean, Faculty de Medicine Veterinaire, St. Hyacinthe, Quebec; Mr. Charlie A. Gracey, Manager, Canadian Cattleman's Association, Toronto; Dr. John E. McGowan, Assistant Deputy Minister (Health of Animals) Agriculture Canada; Mr. Hans Sietz, Saskatchewan Milk Producers Association; Mr. Glen Flaten, Chairman, Saskatchewan Hog Marketing Commission and Vice-President, Canadian Federation of Agriculture; Mr. H. Haight, dairy farmer, Saskatoon; Mr. Jack Sheppard, Saskatchewan Stock Growers Association; Dr. Frank X. Aherne, Faculty of Agriculture and Forestry, University of Alberta, Edmonton; Mr. Don Allewell, Manager, Marketing and Operations Section, Livestock Division, Saskatchewan Wheat Pool, Regina; Ms. Cathy Campbell, Ministry of State for Science and Technology, Ottawa; Mr. Al Church, Acting Secretary, Manitoba Cattle Producers Association, Winnipeg; Mr. Norman Edie, Vice-President, Manitoba Cattle Producers Association, Dugald, Manitoba; Mr. Chris J. Mills, Secretary, Canadian Cattleman's Association, Calgary; Dr. Doug Mitchell, Director, Animal Diseases Research Institute, Lethbridge; Mr. Robert J. Munroe, Warren, Manitoba, Director, Canadian Charlois Association; Dr. J. Ross Singleton, Regional Veterinary Director, Health of Animals Branch, Winnipeg; Mr. Bill Vaags, Dugald, Manitoba, Vice-Chairman, Manitoba Hog Producers Marketing Board. Each of these sat as a full conference participant on the board of advisors at one of their many meetings in western Canada and Ottawa.

With the enlargement of the board of advisors and the governing committee to include livestock producers, wider advice was sought by inviting distinguished representatives of the livestock industry, universities, governments and businesses interested in agriculture to be participants of the banquets held in the evening following meetings of the board of advisors. These banquets were exceptional events. They were

at first sponsored by the Devonian Group of Charitable Foundations and on occasion by marketing boards such as the Alberta Egg and Fowl Marketing Board and the Manitoba Hog Producers Marketing Board. They served the purpose of bringing together the leaders and decision makers from each region in which the banquet was held. Either just before, or generally just after, an excellent meal, a short program giving an update on my activities took place. Most of these were chaired by Ernie Pallister, who, after a short talk summarizing the events, encouraged any of the audience to speak up with advice, suggestions or comments. He would then sit down and wait for a response. He was confident that silence would prevail no longer than 120 seconds, before someone would start the ball rolling with ideas and comments. The technique never failed! The list of guests to these meetings is long, but for the record and in appreciation to the many guests who donated so much of their time and talent and comments, their names and titles are included in Appendix E.

c) Internal Meetings

In addition to the weekly meetings of management personnel, a whole cascade of other meetings was called over the years, each with the primary purpose of trying to keep everyone in my organization informed as to fund-raising and research activities. Such meetings also allowed the scientific personnel to raise concerns with management, and to guide one another in the form of suggestions for research activities. These meetings also helped foster harmony between my scientists and research collaborators. The whole concept was to improve communication among everyone involved with my organization, because, thought my management, that is when things get done smoothly, efficiently and willingly.

i) Full Staff Meetings

As this implies, these were meetings of my whole staff, generally held twice a year. Naturally, the function of these being to iron out and herd off problems, the wide range of subjects discussed might seem mundane to an outsider: parking, handling of glassware, management of the central supplies, notices to personnel, posting of minutes of the meetings of the management committee, smoking areas, painting of corridors, rotation of animals in the isolation units, isolation unit procedures and reports of any transgressions of same, and a host of other expressions of opinion – all of which were heeded and acted upon if necessary. One meeting per year was used to brief the staff on next year's budget; in this way all personnel were kept up to date on budget ups, downs and changes in direction. This became particularly important during the financial squeeze of 1982-83, during which period my

management spent more money than was donated, each year for three years, at the rate of approximately \$200,000/year. These funds were "drawn down" from the VIDO Research Trust Fund, which the board of directors and the management were trying to protect. During this period, the Trust dropped from \$1.9 million to \$1.3 million. The board of directors indicated it could go no lower than \$1 million, and so a number of cost cutting measures were instituted, including termination of contracts with scientists and reduction in research budgets. Such "state of the union" information was shared at the staff meetings. My management remains committed to free flow of information.

ii) Scientific Project Meetings

When the board of advisors chose neonatal diarrhea as a primary research project of my scientists, most people on staff were subsequently targeted to this disease problem. The neonatal diarrhea program was headed by Dr. Steve Acres, who called all scientists and research collaborators to meet at intervals to discuss progress, and future directions. Later, as new projects such as bovine respiratory disease, swine disease, and hemorrhagic enteritis were commenced, scientific project teams were formed around these disease problems. In this way, the scientists working on a disease problem could engage in critical discussion before agreeing on the course of action for the next week or month as appropriate.

iii) Scientific Staff Meetings

For a period of time, at intervals of one or two weeks, all scientific staff were asked to attend meetings to discuss research on their particular projects. Research collaborators from other projects were also invited if they could attend. Generally, these began with a presentation which was then opened up for discussion, suggestions and advice. It was felt that with the diversity of expertise within my scientific staff, that the different disciplines could contribute to the path of scientific investigation, even if it was not in their particular project. In fact, many scientists worked on one, two or even three projects at the same time within their own area of expertise. For instance, an immunologist might have been working on the immunology of neonatal diarrhea, a project in bovine respiratory disease and also contributing assistance in the study of hemorrhagic enteritis. These meetings were designed to ensure that each scientific project was reviewed by experts in other areas, but also to keep management personnel up to date on research activities. This was crucial because in endeavoring to attract funds from the livestock industry and governments, management had to be conversant with recent advances in research activity. For their part, management personnel, kept scientific staff informed about income,

budgets and research allocation.

As the staff grew larger and more specialized (and partly as a result of disruption caused by budget cuts and termination of contracts), some scientists felt they were wasting time by sitting in on so many meetings and encouraged management to discontinue them: as a result the weekly meetings were discontinued in favour of sporadic meetings called when necessary.

However, the scientific meetings with each project continued with greater intensity. The deputy director (research) attended all scientific project meetings, and it became his job to keep management and scientific staff informed about what the other was up to.

Of course, scientists kept informed about each others' projects, at coffee time each day and more formally, at the annual scientific meeting of the board of directors. At least once a year, each scientist reported on his/her projects to the board and other scientists in attendance. The harmonious climate within my organization has been commented upon by many people. The occasional storm aside, it is an achievement which has been envied by many research groups.

d) Personnel

As with most organizations, the progress and prominence I have achieved can be almost solely attributed to my people, the goals they share, and their hard work to achieve them. Fortunately, Bigland and my management operated on the principle that everyone was important, no matter what their capacity, when working for common objectives. This seemed to foster the harmony within my organization.

The structure of my personnel was somewhat unique. Technical, service and office staff were employees of the University of Saskatchewan (although their salaries were remitted to the U of S out of my funds), and as a consequence, they were members of the Canadian Union of Public Employees, the union representing non-teaching staff at the U of S. They were paid salaries to conform with union negotiations, had the same holiday periods and were laterally able to take advantage of "a Friday off" routine (which was one Friday out of three for the secretarial staff). They were also registered on the seniority roles of the union and represented by a union steward.

The business manager and later the executive officer belonged to the Administrative and Supervisory Personnel Association and were classified according to their schedules and salary ranges. Salary reviews however, were in the hands of the chairman of my board of directors, my director and the U of S vice-president (administration).

My scientists however, were generally on contract, in some instances indefinite contract wherein no actual termination date was specified, but where the contract could be terminated by either party,

on six-months notice. But, the majority were on term contracts. These varied from one to three years and were structured similarly to other U of S contracts. Within these contracts there existed a modicum of classification, ranging downward from senior research scientist to research scientist to professional associate. The salary scales were generally similar to those of full professor, associate professor and assistant professor. There was also a classification for fellowships which was handy for non-Canadian scientists who wished to work in Canada for a specified period of time – generally two years. As a rule, the contract scientists had all the privileges of faculty members except were limited to four weeks annual holiday.

The director was paid entirely by the University of Saskatchewan and had all the responsibilities and privileges of a full professor.

Ernie Pallister and the early board of advisors established a policy (continued by the board of directors) of selecting a research target, then, when this had been achieved, changing to other targets. Once the original target of neonatal diarrhea had been decided upon, the path of action was to search all over the world for the very best scientists available. Then, when the goal was achieved, the team was disbanded. It was the changing nature of my research endeavors that made the contract scientist so advisable. Still, there are many advantages to this path, there are also many disadvantages. The disadvantages my management encountered were the lack of continuity and the difficulty in attracting some top scientists to short-term appointments, even when there were guarantees that the contracts would be renewed.

Another factor which made attracting scientists difficult was the apparent financial instability of my funding. When outsiders looked at my annual report, particularly the funding and income side, they would find that the bulk of the funds were either donations or short-term contracts or grants – very little was “hard core” money. Although my annual reports show a constantly rising income level, the lack of security frightened some potential research leaders. The latter frequently chose to join the services of a federal research laboratory or a university. One method of overcoming the apprehension of scientists was the establishment of continually funded “chairs”. This began in 1985, and it is my hope that it will expand and continue.

Although there was the usual interplay between management staff and those “at the bench”, very few problems arose that could not be handled by reason. Of all the staff who have passed through my portals, only two have had to be “let go”. The vast majority have served me well, and each in his or her own way has contributed to the scientific breakthroughs and advancements in research and the happy reputation I now enjoy. It is with thanks for this that I include their names in Appendix F.

CHAPTER 8

The Research

a) The Ten-Year Research Plans

The first ten-year research plan was drawn up in 1976 at the suggestion of the board of advisors, primarily Ernie Pallister. Such long-range planning is common in businesses where plans for incorporation and prospectuses for possible investors must be in hand. However, they are foreign to the research mind. Most research scientists, when asked what they'll be doing next year, will reply "I don't know until I study the results of what I am doing this year." Nevertheless, the plan was attempted. It went through many, many forms, and was the result of much consultation, discussion and ratification by the board of advisors and the governing committee.

The first item to be decided was the emphasis of research. As mentioned, the board of advisors had chosen neonatal diarrhea as the major thrust, but we had already started an economics program on the cost of animal diseases with our agricultural economics graduate student Brian Freeze. Also, Bigland was continuing his work on *Mycoplasma*, the cause of respiratory diseases in turkeys, chickens, pigs and cattle. In addition, pneumonias and shipping fever were prime causes of economic loss in the cattle and swine industries. There were also a number of other problems, such as pink eye, liver abscesses, foot rot, mastitis and others, crying for research. There was also an idea that Canada needed a center to produce diagnostic reagents, such as *E. coli*

typing sera and other reagents. Bigland tried to put all these in perspective with line drawings, bar graphs, sections of pies and so on, using the money expended principle as his yardstick. But eventually, he decided time expended was a better measure. He took his own amateurish drawings to an artist, Mrs. Joan (Packham) Trew to be drawn up. After these had been discussed and approved by the board of advisors and governing committee, they were sent to the printer, who sent back a rendition of the line drawings on one side and the bar graphs on the other, all in vivid living color. Copies were sent out to people on my mailing list, and slides made up for talk presentations. This was a precedent in research planning which served as a guide for my own research, as well as providing donors, potential donors and others with a pictograph of our intentions for the period 1977-1987.

The line drawing was reproduced in 1977-78 Annual Report in drab blue and gray for all the world to see.

With the wisdom of hindsight, I can now look back at what my founders foresaw. Under gastrointestinal diseases, neonatal diarrhea naturally had the greatest emphasis between 1977 and 1983. Did my scientists figure it would be well under control by that time? The period included a treatment phase, a diagnosis phase through radioimmunoassay and, the largest section, a phase emphasizing prevention and control by management, vaccines and disinfectants. Vaccine field trials were to start in late 1978 and continue to 1987. With the lessening emphasis on neonatal diarrhea in calves and pigs, other diarrheas would be researched including weanling diarrhea in pigs and other enteric conditions including coccidiosis.

The economics and preventive medicine section focussed on the cost of scours for the first two years, and then the development of a disease surveillance system and further costs-benefit studies (with an eye to veticare) continuing until the end of the planning period.

Respiratory diseases, including work on mycoplasmas and the Pasteurellas involved with shipping fever, were charted to include a vaccine field trial and later stages studying prevention by management and reduction of stress. It was felt that by 1985 other pneumonias could be tackled.

Under miscellaneous diseases, pink eye, liver abscesses in cattle, foot rot in cattle and mastitis would be targets starting in 1980.

Other disease problems were not overlooked, and a section was left for "responding to the needs of the livestock industry" in conducting research on problems not previously envisaged. And of course, some time was allotted for the production of diagnostic reagents.

A second ten-year research plan was developed in 1980, and a color copy included with the 1981-82 Annual Report. Even great countries like the Soviet Union must revise their plans of action every five years,

and since 1980 was the end of the first five-year agreement with the original donors, it was time to look again. This plan depicted the percentage distribution of operating costs by program and the history of the first five years, in addition to extending the planning for ten years to 1990. This was possibly a more realistic graph of activities. Its major base was still enteric diseases including neonatal diarrhea of calves, pigs and lambs and weanling diarrhea of pigs. A bovine respiratory disease program was identified, with primary emphasis on the shipping fever complex and ITEME (infectious thromboembolic meningio encephalitis or *Hemophilus somnus* infection). A swine program, which had started in 1979 would expand to include pneumonias (specifically *Hemophilus pleuropneumonia*) and environmental control of diseases. A poultry program addressed hemorrhagic enteritis of turkeys and chicken adenoviruses. There was a continuation of the disease surveillance into cost-benefit analysis, and realistically, a percentage of costs designated to administration expenses such as fund-raising, extension, research-farm planning and research planning.

On the other side of this second ten-year research plan were pie-charts of each of the targeted diseases, noting the percentage proportions devoted to epidemiology (control by management, diagnostic techniques and surveillance) biological (vaccines, therapeutic control) antibacterials and antisecretory drugs, genetic and nutritional control. Naturally the proportions varied considerably in each of the target areas, a graphic portrayal to the board of directors and potential donors of the emphasis that was being applied to these targets by my research scientists.

The third ten-year research plan announced in 1986, entered into development when Bigland announced his retirement, effective June 30, 1984. This was a time to take a fresh look at my research targets. My new director, Dr. Acres and his scientists have had an opportunity to put a greater imprint on the research planning for 1985-1995.

I should have warned you patient reader, that I would include copies of each of the ten-year research plans in the appendix. However, if I had, most likely you would not have read the foregoing, glowing report.

b) Mycoplasmas

I guess the reader is wondering when on earth I was going to discuss the actual research – since research is my very *raison d’etre*. But you see, much of the foregoing *had* to take place before real definitive research could be undertaken. This doesn’t mean research wasn’t going on during my embryonic life – because there was, and much of it was responsible for that elusive and magic attainment of ‘credibility’. When I was first thought about in 1973, Bigland, my future Director, had about 90 scientific papers published. He had just returned from an

intensive year's research during a sabbatical leave at the University of Liverpool, bringing with him the results of the year's experiments on *Mycoplasma meleagridis*, a pathogen of turkeys, which had been his area of study for several years. He continued this work in the Fulton Laboratory and in my VIDO trailers until the pressure of administrative work forced him into a major decision. "Was Bigland the scientist sufficiently productive to be allowed an allocation of precious research funds?" Every agency administering money for research has to ask this question every time funds are earmarked for a scientist's research endeavors. In this case, Bigland "the Director" decided that Bigland "the scientist" was not sufficiently productive, and the mycoplasma project was closed.



VIDO staff 1977 - L-R Front: Brian Freeze, Molly Denson, Chris Bigland, Phyllis Zoerb, Irene Richard, Pat Platel Back: Stephen Acres, Marsha Permut, Lorne Greenaway, Bob Kapitany, Pat Merkel, Raul Tabelon

c) Calf Scours (Neonatal Diarrhea)

In the interim, the board of directors had decided that my main research target should be neonatal diarrhea in cattle and pigs. As previously mentioned, their thinking was guided by an excellent piece of epidemiological research conducted by Dr. Stephen D. Acres and his supervisor, Dr. Otto M. Radostits, which was supported by a grant from the Alberta Cattle Commission. This was a definitive piece of work which pinpointed the three major infectious disease causes in neonatal diarrhea in cattle, assessed the incidence of the infectious diseases on various farms throughout western Canada, drew strong inferences as to the implications of management procedures on the incidence of diarrhea and death in the newborn calf - and estimated the cost to Canada

to be over \$74 million/year.

Once this target had been defined, it was the responsibility of my management to start building up a team of research scientist to concentrate on the control of this scourge of the cattle industry.



VIDO staff 1979 – L-R Front: Raul Tabelon, Carol Dodd, Patty Merkel, Debra Novakovski, Dr. Chris Bigland (Director), Paul Hodgman (Exec. Off.), Margot Buckley, Kathy Nestor, Phyllis Zoerb, Maureen Kumph, Jan Cartier. Back: Darren Clancy, Sandy Remmen, Dr. Harold Fast, Dr. Tony Forman, Dr. Steve Acres (Deputy Director-Research), Lynn Ashley, Cathie Pound, Sandy Feschuk, Janice LeDuc, Chang-Joo Lian (Missing – Molly Denson, Audrey Munroe)



Scientific and Management Staff of VIDO – 1984 – L-R Front: Steve Acres, Marta Sabara, Chris Bigland – Back: Paul Hodgman, Colin Crouch, Trent Watts, Jan van den Hurk, James Raybould, Phil Willson, Geoff Hudson

Fortunately, by this time, Steve Acres had almost completed his PhD program. His specialty was neonatal diarrhea, at which he was a recognized expert, and he was interested, when approached, in staying

in Saskatoon and continuing his work on this disease problem. Fortunately, he accepted Bigland's offer and became my first research scientist in July 1976.

In January 1976 however, in preparation for a brainstorming session on research on neonatal diarrheas, a list was assembled of eleven scientists on the U of S campus who were working on some aspect of this disease complex. Eight of these had some type of grant funds! Two who did not were Dr. Gilbert Ward of the Department of Microbiology, WCVN, and Dr. George Khachatourians, Department of Microbiology, College of Medicine. They were encouraged to submit research proposals to me, both of which were to have a significant effect on my future neonatal diarrhea research.



Present Management Staff – Lorne Babiuk, Associate Director (Research), Paul Hodgman, Executive Officer, Steve Acres, Director

Dr. Khachatourian's project, was on a possible *E. coli* vaccine in the form of a live minicell, carrying the K99 attachment factor common to the pathogenic *E. coli*. This was later tested by Acres in the field and found to be effective.

Ward's project, conducted in the WCVN cow-barn, was the experimental production of calf scours, following a model developed by Acres during his PhD studies. This would be key to assessing the effectiveness of any manipulations or vaccines aimed at the control of this disease. The breakthrough made by Acres and later by Ward lay in inducing scours in some calves. This led the way to a standard *E. coli* challenge model on which hinged many of the future neonatal diarrhea experiments.

The brain storming session was attended by 23 local scientists, led by Ward, Radostits and Khachatourians in the basement of Gil Ward's home. Here the floor was open to all ideas about the control of calf and pig scours. All ideas were recorded, sifted and judged for future research.



Scientific Staff of VIDO – 1986 – Development Day at White Swan Lake – L-R Kneeling: Andy Potter, Lorne Babiuk, Trent Watts – Front: Sylvia van den Hurk, Gwen Hughes, Kerry Redy, Maria Issa, Susan Wilson, Charlene Nicholls, Marta Sabara, Khalid Ijaz – Back: Julie Orr, Jan van den Hurk, Dirk Deregt, Steve Acres, Jim Gilchrist, Glen Gifford, Phil Willson, Harry Deneer



Support Staff at VIDO – 1986 – Development Day at Pike Lake – L-R Back Row: Melanie Elliott, Ursula Medrek, Barry Carroll, Karen Sollid, Donna Dent, Graham Cox, Doug Morck – Middle Row: Phyllis Mierau, Kathy Brown, Irene Kosokowsky, Jeanette Heise, Elaine Gibbons, Dee Kirchmeier, Steve Acres, Brett Mollison, Wilf Finn – Front Row: Phyllis Green, Carol Bernier, Lorne Babiuk, Carolyn Jewell, Paul Hodgman, Linda McDougall, Molly Denson, Raul Tabelon, Charlene Nicholls-Nixon

Shortly after, an “International Minisymposium on Neonatal Diarrhea” was organized for May 3-5, 1976, bringing together leading scientists in the study of neonatal diarrhea from around the world. At the end of this symposium, the visiting scientists were asked to give their

opinions about future directions for my neonatal diarrhea research. This was so that my scientists would not be duplicating what others were doing, but would instead “plug the holes” in worldwide research. Notable among those requested for advice were Dr. Harley Moon of the National Animal Disease Laboratory, Ames, Iowa; Dr. Charles Mebus, Plum Island Animal Disease Research Laboratory, Greenwood, New York; Dr. Lyle Myers, Veterinary Diagnostic Station, North Dakota; Dr. Carleton L. Gyles and Dr. Mike R. Wilson of the Ontario Veterinary College; Dr. Jorgen Svenson from Denmark; Dr. Michelle Morin of the Faculte de Medecine Veterinaire, Quebec, and Dr. John A. Bradley from ADRI, Alberta - in addition to our Saskatchewan collaborators and staff.

The recommendations were comparatively few:

- 1) search for immunizing agents against the pathogenic *E. coli* and possibly the rotavirus, coronavirus or other infectious disease agents causing neonatal diarrhea.
- 2) Explore calf and pig management as a means of controlling spread of infection and the severity of the disease.
- 3) Investigate the *E. coli* enterotoxins that actually “trigger” the diarrhea itself, including the stable toxin and labile toxin.
- 4) Consider the use of gnotobiotic calves and pigs in these studies.

Steve Acres had been at both the brainstorming session and the minisymposium, contributing markedly to both. However, I wonder if he realized when he accepted Bigland's offer in July, 1976, that his major responsibility would be to scrutinize, dissect and apply the four recommendations coming out of the minisymposium, as indeed, he became the effective leader of the neonatal diarrhea project team.

i) The Termeunde Project

Since the opening of my building was still two years away, my management was fortunate to rent a large spare laboratory in the new Canada Animal Pathology Building. This had just been completed on a site neighboring mine. Here Acres was able to start work in the laboratory on an idea he had researched as a graduate student. He immunized pregnant sheep with *E. coli* carrying the K99 fimbrial antigen, later challenging the lambs with different strains of pathogenic *E. coli*. He wanted to repeat this work on calves. In addition, he planned an elaborate experiment in the management control of calf scours. This was to assess the dangers of crowding and maintaining calving cows in small “calving pens” on the farm. To conduct the experiment, Acres was kindly loaned a portion of the Department of Animal Science's Termeunde farm at Lanigan. Here a fairly elaborate fencing scheme including chutes, feeders, waterers, isolation and changing facilities and a trailer to house the attendants running the project had to be built and

installed, 60 miles from Saskatoon. These were hard-working and exciting days for Steve Acres. Not only did he supervise construction and start-up and hire part-time animal technicians, but he himself had to spend approximately three months during the spring living in the trailer to supervise the day to day operation. This was to monitor calving. As soon as a calf was dropped it was weighed, a sample of colostrum was taken from the cow and fecal and blood samples from the calf and the cow. All of this had to be repeated at intervals – an enormous operation! But one that showed to the whole cattle industry that intensive calving areas are hotbeds of the infectious disease agents causing neonatal diarrhea and that if calving could be spread out over a large area and the calves removed from the calving grounds as quickly as possible, neonatal diarrhea would be minimized. Some authorities, including Dr. Ole Nielsen, feel this may be one of my most significant findings leading to the control of the disease.

ii) E. Coli Enterotoxins

The international advisors at the minisymposium suggested that my scientists work on *E. coli* enterotoxins as part of the research thrust on neonatal diarrhea. They suggested concentrating on the stable toxin, ie. the toxin produced by enteropathogenic *E. coli* that was still active even after heating to 56°C. A related *E. coli* enterotoxin, the labile toxin (which was destroyed by such heating) had been the target of a great deal of research by the *E. coli* scientific community – to the point that one commercial company had produced a type of toxoid or immunizing agent against the labile toxin. This left the stable toxin area wide open for study, as it was believed to be a more important factor in the production of “scours” or neonatal diarrhea in calves. Fairly recent research work had indicated that the *E. coli* stable toxin acted upon the physiological mechanism of the calf’s small intestine to bring about an outpouring of huge quantities of fluid into the gut, the expulsion of which was given the name of “calf scours”.

Dr. George Forsyth of the Department of Veterinary Physiology, WCVM, had done some work on the physiological aspects of *E. coli* stable toxin and possibly was the one that suggested the name of Dr. R.W. (Bob) Worthington of the Oondesport Veterinary Laboratory in South Africa, an expert on bacterial toxins, as a visiting scientist. Worthington was eligible for a sabbatical leave and was willing to bring his expertise to Saskatoon for one year. After completion of the complicated paperwork and administrative details, Worthington was eventually settled in the rented laboratory in the Animal Pathology Building. He was a brilliant and most congenial scientist who immediately got to work on the biochemical aspects of the purification of *E. coli* stable toxins. The objective was to purify the toxin, so that it could be analyzed and

synthesized in order to produce large enough quantities that the toxin molecule could be attached to a hapten or other protein molecule in order to make it immunogenic. The resultant combination could be injected into the mother-cow, who in turn would transfer the immunity to her baby calf through the colostrum. By immunizing the cow, and subsequently her calf, against the *E. coli* enterotoxin, it would make no difference what strain of *E. coli* was affecting the calf (as there were reputed to be many strains of the organism causing the problem).

Prior to the end of Worthington's one-year sabbatical leave, attempts were made to entice him to stay in Canada. He felt obligated to return to South Africa and so my management had to make some arrangement for the continuation of the excellent work already underway. It was decided to bring in another scientist to work with Worthington for the last few months of his tenure, to learn from him his techniques of toxin purification and continue and expand his work after his departure. Dr. R. A. (Bob) Kapitany, a biochemist, was employed and made great strides. His research into the purification of the *E. coli* stable toxin revealed that there were not one but two stable toxins present. The problem of producing large quantities of the stable toxin remained a major one. Kapitany felt that the best way around the problem would be to analyze the toxin for its amino acid linkages and then synthesize the toxin biochemically. He had just started working with Dr. Sam MacKenzie of the National Research Council, Prairie Regional Laboratory, to collaborate on the amino acid sequencing when a crisis arose and Kapitany resigned.

This precipitated another major decision on whether my scientists should continue the enterotoxin project or abandon it. Several factors came into play, but the major ones were time and money. The synthetic production of *E. coli* stable toxin would take at least five years and a great deal of money. In addition, Dr. Michelle Morin and Dr. Serge Lariviere at the Faculte of Medicin Veterinaire in Ste. Hyacinthe, Quebec, had a large scale project on *E. coli* stable toxin in progress. In light of all this the *E. coli* stable toxin project was abandoned to concentrate funding on other areas of neonatal diarrhea research.

d) The Economics of Animal Disease

When the Devonian Group of Charitable Foundations decided to initially fund my research they strongly suggested that an agricultural economist should be an early staff member. Their reasoning at that time was, that if I was doing practical or applied research on infectious diseases I should be working on those that are of greatest economic importance to the livestock industry. This was a unique concept, but one that had a great deal of validity, and so my director started looking for an agricultural economist as one of my first employees. He soon found

that agricultural economists were scarce, and generally specialized in areas of endeavor other than livestock diseases. It was decided I might be better off to train my own agricultural economist to concentrate on the economics of livestock diseases. This too seemed to be a logical approach, and so the search was started for an agricultural graduate who would be willing to undertake such graduate studies. In the spring of 1975, after advertisements were posted in the College of Agriculture, several applicants were interviewed and Mr. Brian Freeze was chosen. He was enrolled in an MSc program under Dr. W.H. Furtan in the Department of Agricultural Economics, College of Agriculture, U. of S. His first office was in the Fulton Laboratory.

Although Brian Freeze's first obligation was to his graduate studies, he was still expected to take a full role in assisting my director in the management of the fledgling organization and to get involved with ongoing research projects as well as his own research endeavors. One of his first jobs was to assist in the screening and hiring of a business manager, a position which was eventually filled by Marsha Permut. He also assisted Bigland in the statistical analysis of a large *Mycoplasma meleagridis* research project conducted in England. This he did by utilizing the computer, resulting in hundreds of "punch cards", the data storage system used for computers at that time.

As part of the original concept of his position, he search for and deplored the lack of statistics in Canada concerning the economic losses caused by various livestock diseases. He pointed out that although much cost-of-disease information was available from various sources, no single group has attempted to put the information together and so there was no such thing as a true picture of total disease costs in Canada. He suggested that what Canada needed was a complete animal disease surveillance system, similar to a model developed about three years previously in the USA, which to date had not been implemented. The program would be too costly for my organization to conduct on a Canada-wide basis, but it was suggested that my economists might conduct a pilot project. This would provide cost-benefit ratios of disease control programs, indicating which diseases are most costly, and so would be logical targets for research. Such information was also needed by governments and producers to determine the necessity and effectiveness of future preventive medicine, herd health and veticare programs. Freeze also emphasized the importance of cost-benefit analysis for vaccines, drugs and management practices recommended by my scientists, in order to insure that maximum returns were realized from such disease control measures.

To further this endeavor and in keeping with my main research target of calf scours, Freeze studied the economics of calf scours prevention and treatment, utilizing a computer model of neonatal diarrhea.

The study was centered on the determination of possible dosages and costs of 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. Vaccination 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, percentage of the herd calved outside, percentage of heifers in the herd, length of calving season and vaccine effectiveness. This study resulted in his M.Sc. thesis "Decision Analysis of Beef Calf Neonatal Diarrhea Vaccination Strategies Via Computer Simulation", presented December 1978.

The overall disease surveillance program recommended by Freeze was thoroughly discussed and trial balloons sent up to look for possible funding even on a limited basis. But grant funds were not forthcoming, a job opportunity arose for an agricultural economist with the Saskatchewan Provincial Government, and Freeze accepted.

e) Miniatures of Disease Outbreaks

My scientists, and indeed all scientists, are constantly bothered with the problem of proving whether a vaccine, drug or management procedure is actually effective. Normally, as was done in the field trials for *E. coli* and other vaccines, large numbers of animals are vaccinated, varying combinations of time and dosage of vaccine. Their sickness and death rate is compared with an equal number of animals under the same conditions, that have not been vaccinated (a control group). The major problem is that one must rely on natural infection attacking *both* the vaccinated and unvaccinated animals with an equal level of severity. To obviate errors, generally field trials are generally done with huge numbers, so that accurate statistical analysis will detect any variations between non-vaccinated controls and the various levels of vaccine procedures. It is most disconcerting to a scientist to find, as is frequently the case, that the disease does not occur in *either* the vaccinated or the non-vaccinated groups on a particular farm, thus negating the experimental lot and making the data useless.

Such happened in several instances in field trials both on *E. coli* bacterin immunization and on rotavirus and coronavirus immunization. The vaccinated mother animals did respond as judged by blood tests, the calves from the vaccinated animals had good blood antibody levels, but the infective agents appeared to be absent and so there was no difference between those vaccinated and those not vaccinated.

In order to reduce the numbers of animals involved, ensure accuracy of the experimental design and prevent suffering in a large number of animals unnecessarily, the answer is the "miniature of a

disease outbreak''. In this case, susceptible animals can be handled in the laboratory setting, maintained under humane conditions and exposed to the actual infective causative agent under study. Since comparatively small numbers of animals can be utilized while leaving the study statistically accurate, any suffering is reduced to the minimum number of animals. During the routine of collecting and analyzing data, every phase of the animal's disease or distress is monitored and can be alleviated when deemed necessary. Scientists are continually searching for ways even superior to the miniature of a disease outbreak by utilizing tissue culture cells and other non-animal models. However, many of the tissue culture systems that can substitute for the actual test of a disease condition affecting its final host have not been perfected. As a consequence, miniatures of a disease outbreak still must be utilized, to answer questions as to whether the disease control method (either vaccination, drug or management system), does actually work on the species of animal that is naturally infected with the disease.

My scientists over the years have developed some very sophisticated, accurate and humane miniatures. These use comparatively small numbers of animals, but can show accurately the effect of a disease control procedure. Their effective manipulation of such miniatures has been noted by the scientific community and also by the biologics industry, this to the point that both my organization and BIOSTAR are able to accept contracts to test various disease control products utilizing animal isolation facilities, germ-free animals or a controlled feedlot-type system. Some of the most successful such miniatures are as follows:

i) *The Neonatal Diarrhea*. One of the big problems in the early days of calf scours study, was the inability to produce calf scours on demand. A miniature outbreak system was needed. As previously mentioned, Dr. Gil Ward attempted to produce calf scours at will, but was only partially successful. Steve Acres found that part of the problem was the age of the calf at the time of exposure and also the strain of *E. coli*. Calves in the field, which have been sucking colostrum from their mothers, many of whom are naturally immune, will develop passive immunity from the colostrum antibodies and will not be affected by exposure to *E. coli*. However, antibody levels and antibody specificity varies markedly from mother to mother, and so no standard could be found. However, Acres ascertained, by reason and experiment, that calves 12 to 14 hours old, when exposed to the right strain of the *E. coli* organism, would consistently develop calf scours. In addition, he was able to test out many strains of *E. coli* organisms, each carrying the K99 pilus and enterotoxigenic plasmids. These could produce the enterotoxin that reversed the physiological flow in the gut, causing water to accumulate in the intestine, the evacuation of which was "scours". When these two factors were present, scours consistently resulted. This

allowed comparison with vaccinated or drug treated calves, allowed the testing of calf scour treatments to prolong their lives and to study the actual physiology of the cause and effect of calf scours. In many trials with *E. coli* bacterins and other *E. coli* products, several hundred animals could be on test with only 10 contracting severe scours.

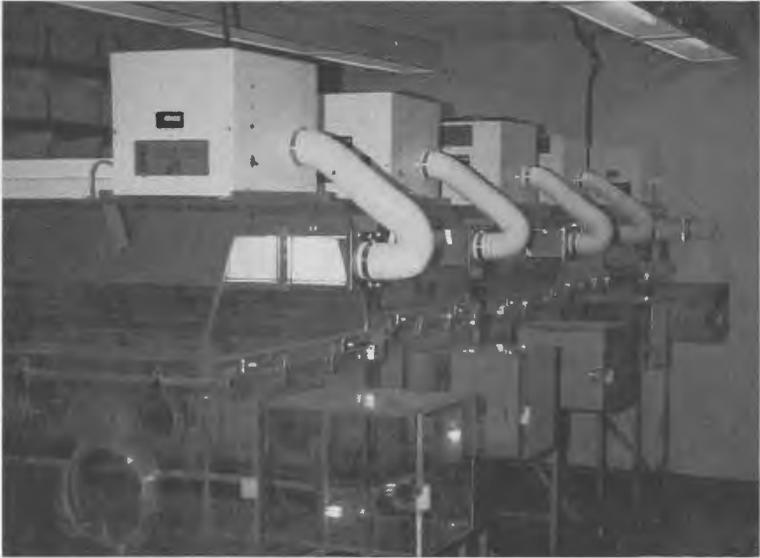
With this system, Acres, in 1981, was able to test the effectiveness of the first monoclonal antibody to be used for the treatment of any disease either animal or human. In conjunction with Drs. "Chuck" Muscoplat and Peter Sadowsky of Molecular Genetics Inc., of Minnetonka, Minnesota, who produced the monoclonal antibody, Acres was able to show that, in comparison with his severely affected controls, the monoclonal antibody was almost 100% effective in preventing death from scours but *not* the occurrence of scours. The monoclonal antibody was prepared against the K99 *E. coli* adherence factor, which prevented the enteropathogenic *E. coli* from attaching to the intestinal wall of the calf where normally it would produce its scour-causing poison. Molecular Genetics Inc. has since marketed it in Canada and the USA under the trade-name Genecol 99.

ii) Rotavirus and Coronavirus. In the early studies of neonatal diarrhea it was shown by Acres, Radostits and many other scientists that the disease was a complex one caused by several agents, one of which was the enteropathogenic *E. coli*. Others were the rotaviruses, coronaviruses and cryptosporidia, and it was suspected there were many others also involved. The pathogenic *E. coli* seemed to strike first, within the first week of life of the baby calf. Diarrheas that occurred later were attributed to rotaviruses, coronaviruses and other agents. Thus it would appear that, if one were to protect calves against the rotaviruses and coronaviruses, protection would have to last at least fourteen to twenty-one days since the normal way for a calf to acquire protection from diseases was from its mother through her milk, first, the colostrum or "first-milk", which is highly rich in antibodies, and later the milk itself which is low in antibodies. The big question was "How can one determine the level of antibody needed by a baby calf seven to twenty-one days of age, which will provide protection against these naturally occurring viruses?" Calves "from the field" were impossible because of the sporadic, intermittent and variable "field" infections. The answer (as was originally pointed out by Charlie Mebus and suggested to my scientists at the first minisymposium) was the use of germ-free or gnotobiotic calves.

The usual method of deriving germ-free calves was to glue a sterile plastic bubble onto the side of an anesthetized pregnant cow, and working with sleeves in the wall of the bubble, perform a Caesarian section, accepting the calf into the body of the sterile bubble. Here it would be resuscitated, its breathing ensured and the umbilical cord clamped,

ready for its next move, which would be into a sterile isolator.

Such isolators were sterile plastic-and-steel tanks with sterile air intakes and exhausts. They had been pioneered at the Lobund Institute in New York and in several other scientific research units throughout the world which specialized in producing gnotobiotic animals – primarily laboratory animals and, later, germ-free pigs. The isolators had become sufficiently perfected to be produced on a commercial scale. Such a commercial unit was used by my scientists to produce our first germ-free piglets, utilizing a method pioneered by Dr. Paul Miniats at the “Pig Palace” Laboratory at the Ontario Veterinary College. His method of producing germ-free pigs was to perform a Caesarian section on the pregnant sow and, in a sterile manner, lift out each piglet,

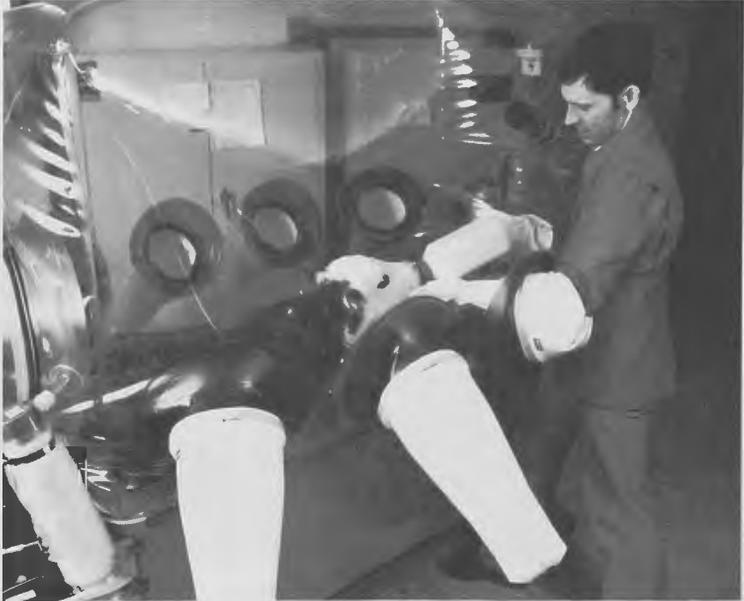


Isolators

plunge it through a curved channel or “U” tube full of disinfectant, up into a sterile isolator. In the majority of cases this did succeed in producing germ-free animals. When Margot Buckley, a microbiologist with graduate training in animal science, came to my organization to head up the laboratory animal and service area, she expressed a desire to learn the techniques of producing germ-free piglets, and so Miniats very kindly accepted her for a one-week intensive training course at his laboratory in Guelph. The training must have been good and the student receptive as, with the assembly of the proper equipment and the active help of the veterinary surgeons, it was not long before my isolator laboratory had several isolators containing gnotobiotic pigs. Buckley had the idea she could utilize this same technique for deriving germ-

free calves, providing she had a large enough "U" tube for the disinfection of the fetus after Caesarian section. Her husband, Dr. Leigh Campbell, had some experience with the use of fiberglass for the manufacture of boats and other articles, so he and Buckley evolved the idea of making a large U tube, similar to the one for producing swine, but large enough to accept a calf. They followed through with this idea and the system worked! After overcoming many other problems, my scientists were soon able to produce germ free calves at will.

These were the calves that allowed the trials for rotavirus and coronavirus, and enabled Acres and his other scientists to ascertain the antibody level necessary for protecting calves for a period of seven to twenty-one days of age.



Dr. Trent Watts with a germ-free calf

iii) Swine Haemophilus pleuropneumonia. Drs. Dudley Osborne and Bob Saunders of the Department of Veterinary Microbiology, WCVM, devised a plastic chamber into which susceptible young piglets could be exposed by aerosol to a specific number of virulent *Haemophilus pleuropneumonia* organisms. Here again the strain of organism was important, as was the history of the small piglet. The latter were obtained from the closed herd at the Prairie Swine Centre of the University of Saskatchewan, and by testing, were determined never to have been exposed to *Haemophilus pleuropneumonia*. This solid plastic challenge chamber was located in one of my isolation units and enabled critical studies using small numbers of animals to ascertain the effec-

tiveness of various vaccines and numerous drugs in the prevention and treatment of this respiratory scourge of the swine industry. Drs. Philip Willson and Harold Fast, veterinary scientists in my organization, worked with Osborne on many such experiments, which, because of their success continue.

iv) Turkey Hemorrhagic Enteritis. Jan van den Hurk, one of my research scientists, used the solid plastic isolators in my isolator laboratory and the large isolation units to test statistically defined small numbers of turkeys to ascertain their immunity to the hemorrhagic enteritis virus. In this way he was able to determine the age of susceptibility under natural conditions, and the immunity elicited by a series of different hemorrhagic enteritis vaccines.

v) Shipping Fever. The respiratory disease complex known as shipping fever throughout the livestock industry is considered to be the greatest disease-cause of economic loss throughout North America and the northern hemisphere. A veritable avalanche of different vaccines and immunizing agents had been tried in the prevention of shipping fever. However, although huge numbers of cattle were utilized in the various test procedures, conclusive results were elusive. Here again, part of the problem was that the disease is so variable under natural conditions that half of a large sample of herds might be immunized, but shipping fever would breakout in only a few – and even in the herds affected, the difference between vaccinated and unvaccinated was ambiguous. For this reason, the whole scientific community was searching for some type of a model whereby one could predict that shipping fever would result from a prescribed regime. To their great credit, scientists from the Federal Animal Disease Research Institute (Western) at Lethbridge, were the first in Canada to perfect such a challenge model for shipping fever. Drs. Klaus Jericho, Peter Stockdale, John Bradley, Ed Langford and Bill Yates and others collaborated on perfecting a successful “cascade” regime, using susceptible calves from their “closed” herd. The “cascade” consisted of exposure of the susceptible animals by aerosol to Infectious Bovine Rhinotracheitis virus, then, precisely four days later, to aerosol challenge with a virulent strain of *Pasteurella haemolytica* (the organism that appeared to be the final invading organism in natural infections).

Dr. Lorne Babiuk of the WCVI also collaborated on some of these experiments by way of his expertise on the Infectious Bovine Rhinotracheitis virus, which was classified as a herpesvirus, one of Babiuk’s interests. He used this model in my studies on bovine respiratory diseases, of which shipping fever is the prime thrust.

I think it is safe to assume that if such miniatures of disease outbreaks had not been available, research progress would not have been as rapid, and as a consequence, larger numbers of animals would have

suffered through exposure to natural infection. This was of particular concern to my scientists as one of the aims in setting up my organization was the prevention of suffering of animals.

f) The VICOGEN Narrative – *A Canadian Success Story.*

I guess, patient reader, that nothing exemplifies the objectives, cooperative spirit, determination and ideals of my organization more than the discovery, research, testing and, finally, the manufacture of the world's first effective vaccine against pathogenic *E. coli* – considered to be the cause of at least 50-70% of the cases of calf scours during the first week of life.

The vaccine to prevent calf scours was, in the early days, like the alchemist's dream of changing lead into gold – an almost impossible accomplishment. The main reason was the lack of knowledge about many causes of calf scours – or, for that matter, neonatal diarrhea in any species. As each of the causative agents was researched an immunizing agent became more and more of a possibility. Following Steve Acres' management studies, his next target was the pathogenic *E. coli*, with which he had worked for several years during his studies at the WCVI. The Department of Veterinary Microbiology at that time had some expertise in *E. coli* typing, as the *E. coli* Typing Center established by Dr. Paul Glantz was still functioning under the direction of Dr. Ted Kramer. Steve Acres worked with others in the Department of Veterinary Microbiology, including graduate student Cherry Lang and Dr. Bob Saunders. Part of Acres' PhD studies was the immunization of pregnant sheep against the pathogenic *E. coli* causing diarrhea in lambs. In this study Acres and Radostits showed that pregnant animals could be immunized, and that their colostrum would contain large quantities of specific antibodies which would be passed along to the lambs through the milk, producing protection against that specific organism in the baby lamb.

Working with this information in mind, Acres assiduously followed the *E. coli* pathogenicity in conjunction with many scientists throughout the world, including the husband and wife team in Denmark, I. and F. Orskov; Dr. Carlton Gyles of the Ontario Veterinary College; Dr. Harley Moon, National Animal Disease Research Laboratories, Ames, Iowa; Dr. Charlie Mebus, and many of the distinguished scientists who were present at the first Minisymposium on Neonatal Diarrhea. It was the consensus of opinion in the scientific world at that time that the K99 pilus antigen on the enteropathogenic *E. coli* was the mechanism by which the organism attached to the intestinal wall and thus allowed the enterotoxin-producing strains to "poison" the normal intestinal function. It was against this K99 antigen that the scientific brains were targeted. Dr. George Khachatourians at the College of Medicine had

successfully produced a live minicell carrying the K99 antigen and Steve Acres had shown this vaccine would produce a high level of immunity in pregnant cattle - with the resultant antibody protection being passed to the baby calves drinking their colostrum. Dr. "Dick" Isaacson of the National Animal Disease Research Laboratory, Ames, Iowa had also produced a purified K99 antigen by elaborate laboratory procedures, and such antigen was able to produce an immune response in rabbits. These and other bits of evidence indicated that a vaccine against the pathogenic *E. coli* K99 antigen was possible.

When it was found that some of the *E. coli* vaccines did produce high antigen levels in the blood and colostrum of pregnant cows, a larger scale vaccine-testing experiment had to be devised. This would allow the vaccination of ten to twelve groups of animals with different levels of a single vaccine. Then, when calving started, a daily monitoring would record the hour of birth, the weight of the calf at birth and the antibody content of the colostrum of the cow at calving. Twelve hours later, a miniature disease outbreak would be allowed to start with virulent pathogenic *E. coli* - a system that had been researched by Acres and found to result in severe diarrhoea in almost 100% of calves from non-vaccinated cows. By 1978, the Department of Animal Science needed their two-hundred-head cow operation for their own experiments. However, they did permit Acres to use twenty acres of land on the Termeunde farm for his experiments, providing they were well isolated from the university herd and on the understanding that he would be using organisms already present in the herd. My budget was squeezed to buy 55 cows which would later become part of the U. of S. herd, but there was another question "Where to get an additional 150 head of pregnant cattle for the bulk of the study? Should we buy a herd? Or rent one? Or borrow one?" The latter idea was brought back from Alberta by Paul Hodgman who had many friends in the cattle business. One of these friends, Jim Boyd of Heinsburg, Alberta, kindly volunteered to loan his entire cow herd for the duration of the experiment, then take both cows and calves back after the completion of the experiment, with me paying only for the calves that were lost. Mr. Boyd did me and the cattle industry a tremendous service that year!

This naturally had some logistical problems, in that the cattle had to be rounded up in Alberta, loaded onto trucks, brought to the Termeunde farm and put into the previously built corrals. Trailer facilities were purchased to house Dr. Acres and the animal attendants. Chute and squeeze facilities were purchased and installed, change rooms built, disinfectant baths placed. A routine was organized and a laboratory established in the trailers for the storage of fecal samples, the collecting of blood sera and, most importantly, the keeping of detailed records necessary for a good experiment. Acres and his animal

attendants lived out at the Termeunde farm for three months during the calving period – working literally night and day to perfect the challenge system that had been devised by Acres, while still a Ph.D. student and gather all the statistical data to back it up.

Was the effort worth it? – Yes!! It was the first trial which *proved* that a vaccine injected into pregnant cattle, would allow a sufficiently high level of antibodies in the colostrum to protect calves against severe challenge with pathogenic *E. coli*! Six or seven vaccines were tested at that time, including the “anucleated *E. coli* minicell vaccine” of Dr. George Khachatourians, several killed *E. coli* vaccines, purified K99 antigen and several vaccines containing whole *E. coli* cells.

The results of this large-scale experiment were astounding to many.

Four of the immunizing agents used were effective in reducing the number of calves that scoured and deaths from diarrhea by 90% compared to non-vaccinated controls and controls vaccinated with a commercial bacterin. The successful agents all revolved around the K99 antigen and included the purified K99 antigen of Isaaccson, the anucleated live *E. coli* minicell vaccine of Khachatourians, a whole *E. coli* cell bacterin and a subcellular *E. coli* vaccine produced by Acres and Kapitany.

When Acres presented the results of this experiment at the Canadian Veterinary Medical Association in Regina in 1978, not all veterinarians or commercial company representatives fully comprehended the importance of



Healthy calf and friend, Dr. Steve Acres

the astounding results. However a veterinarian representing one of the Canadian commercial biological houses was immediately impressed with the potential of the first effective vaccine against the pathogenic *E. coli*. This person was Dr. Gordon Boylan, Connaught Medical Research Laboratories, Toronto, who brought together my management and the management of Connaught Laboratories to start working towards the commercialization of this Canadian research success.

The relationship with Connaught Laboratories was to take many twists and turns, and a great deal of work on the part of the scientists of both groups dove-tailing with the biological production personnel,

to ultimately put onto the market the world's first effective *E. coli* vaccine against neonatal diarrhea in cattle, on December 13, 1979. The name VICOGEN was chosen by Connaught Laboratories; the "VI" portion from VIDO the "CO" portion from Connaught, and the "GEN" from antigen.

One of the major decisions by my scientists, assisted by advice from Gordon Boylan, was choosing which vaccine to offer for production, out of the ones that worked. The purified K99 antigen was eliminated because Dr. Isaaccson had labored for over three months to produce sufficient antigen for the major challenge experiments and gearing up for such purification on a commercial scale would be extremely difficult and costly. The anucleated live *E. coli* (minicell) vaccine held great promise. However, the major block was large-scale production and approval by Canadian and U.S. biological licensing authorities, who would have to be assured that there would be no reversion to pathogenic *E. coli* and that no other pathogen was present in the vaccine. For these reasons, it was tentatively eliminated. The subcellular vaccine, although efficient, needed a great deal of work, in that preliminary trials revealed a great deal of lipopolysaccharide endotoxin which produced severe reactions in some animals. This left the killed whole cell *E. coli* bacterin, which was effective, safe, easily produced on a large scale by techniques familiar to commercial operations, and would have the least problems in being federally licensed. This was the one chosen.

Once this form of vaccine was selected as the route of choice, the first move was to ascertain if it could be patented. We were referred to an excellent patent lawyer, Eli McKhool of Gowling & Henderson in Ottawa. After reviewing all of our data, McKhool felt it was *not* a patentable product because of the high content of "prior knowledge" in its production. This was a great disappointment to my management as it could have secured a source of long-term funding through royalties. However, the objective of my organization was to "serve the livestock industry," and so efforts were made to produce a vaccine as cheaply as possible, to get it into the hands of the livestock producer and his veterinarian as quickly as possible at the lowest price possible, to save as many calves as possible! With the advice of the board of advisors and the governing committee, my management contacted a number of large commercial biological production companies in the United States, England and France see if arrangements could be made for selling the scientific "know-how" on a royalty basis. Many were interested, but when the decision reached upper levels of management the answer was always negative due to the lack of patent protection. Connaught Laboratories Limited was also aware of the lack of patent protection, but felt that we would have two to three years lead on any competitive product. This would establish the product name, ensuring that following

large-scale sales for the first monopoly period sales would continue strong because of the reputation of the brand name. They were willing to proceed!

My management was delighted at Connaught's interest. As a highly responsible Canadian company with many personal connections to my staff, it was a company which my management felt could be trusted whole-heartedly. The decision was made to proceed with this collaboration.

This marked the beginning of the process. My management and scientists were excellent in their own fields, but green as grass when it came to commercial exploitation of a vaccine. Connaught personnel were extremely patient and generous in sharing the information with my personnel, who in turn were impressed with the competence of their confreres at Connaught. These included president Alun Davies, vice-president Doug Sansom and scientists Drs. Mike Walcroft, Gordon Boylan, Ken Lawson, Margaret Maxwell, Helen Blake, Dennis Staynor, Egon Kellner, J. Gupta and Bill Hankins.

My team consisted of management staff, Chris Bigland and Paul Hodgman, the scientific team on which the great load fell of Drs. Stephen Acres, Tony Forman, Bob Kapitany and Harold Fast, their capable and hard-working technical staff of Janice Leduc, Patty Merkel, Sandy Feschuck, Debra Novakovski and Molly Denson and a back-up group of Raul Tabelon and staff, in the preparation of enormous amounts of media and Margot Buckley with her assembly of animal technicians.

As indicated by Connaught Laboratories, my scientists had a great deal to do to further the rapid production and sale of this exciting new vaccine. Many steps had to be followed, including improvement in production methods to ensure the largest number of cells/liter of media and the largest possible amount of K99 antigen on the cells. This necessitated research into new formulas of media preparation and the development of a laboratory test for K99 antigen, as none was available. An antigen extinction test was needed to be done in cattle, to ascertain the actual amount of vaccine needed to correctly immunize pregnant cows, in order to have sufficient antibody protection for their calves. This would involve developing new blood tests for K99 antibody content, and the production of initial lots of vaccine, which would have to be registered by the Federal Agriculture Canada in order to perform field trials for safety and efficacy before the vaccine was licensed. This also involved researching the types of bottles to be used, the level of formalin for inactivation and the level of thiomersol necessary to maintain sterility.

In addition, experiments had to be conducted to ascertain the optimal time of vaccination. This was important to cattlemen in that any vaccination necessitated rounding up and handling every animal in the

herd, a time consuming, labor intensive and expensive project. When Bigland and Acres attended a meeting of the Alberta Cattle Commission to discuss the potential vaccine, cattlemen recommended that at least one of the vaccinations be done at the time of round-up in the fall, when the animals are handled anyway and an added vaccination would entail a minimal cost. They also requested that my scientists research the possibility of having only one vaccination in years subsequent to initial immunization. Although this research was done after the vaccine was put onto the market, Acres was able to prove that one vaccination at round-up time and another approximately six weeks before calving was sufficient for initial immunization. And in subsequent years, the cows that had been vaccinated could maintain sufficient antibody level with one booster dose at the time of round-up.

A laboratory animal test model also had to be developed which would enable the testing of each lot of vaccine for immunogenicity in test populations of rabbits or mice. Experimentation started on both species of animals - the results indicating that the mouse model was the most efficient in proving the antibody stimulating effect.

These projects commanded the time and attention of every member of my staff. All other projects were put aside, and everyone concentrated on the VICOGEN project. Even then, the time inexorably ticked on, so that on occasion, when a test had not been perfected by the end of the week or a procedure completed by the end of the day, the whole time table was put into disarray. Timing was extremely important because everyone was aiming to have a vaccine ready for the spring of 1979.

While the scientific endeavors were in full swing, negotiations continued with Connaught Laboratories. A negotiating team was selected from my two executive boards to act in concert with my management. This team was led by Dr. Ole Nielsen, who was assisted by Mr. Ben Thorlakson, Mr. Jack McFaul and Dr. Bruce Schnell, together with Bigland, Hodgman and Acres. The team from Connaught was made up at various times of Dr. Doug Sansom, Vice-President; Dr. Gordon Boylan, Mr. Terry Rooney, Dr. Mike Walcroft, Mr. David Greig and Mr. Kevin Reilly. These discussion and negotiations could be likened to an adversarial



VICOGEN - Presenting the first doses of the vaccine for sale December 13, 1979 - L-R: Alun Davies - President of Connaught Laboratories, Ltd., Toronto, Ontario, Chris Bigland - Director of VIDO, Douglas Sansom - Vice President of Connaught Laboratories Ltd.

union-management negotiating session. "We" were lined up on one side of the table and "they" lined up on the other. Each side presented extreme positions, and then delicate negotiations commenced to find common ground. Fortunately, the tough negotiators on both sides of the table had in the back of their minds the benefit that such a vaccine would bring to cattle industry.

The negotiators on my side of the table were asking for an initial cash payment upon licensing, together with a second cash payment one year later. They were also negotiating for research funds to finance the extensive field trials and other experimental work needed to scale up vaccine production, because thousands of doses would be needed in order to conduct the massive field trials throughout Canada that would be necessary for federal government approval and licensing. A substantial royalty on each dose of the vaccine sold was also requested - to finance future research by my scientists. Two other rather unusual demands were also made. One of these was the insistence that Connaught Laboratories send to my laboratory samples of every lot of vaccine produced. This was for detailed checking by my scientists to insure that commercial production remained equal to the critical standards set by my research workers and to protect the livestock industry (our clients). Many animal vaccines which are put onto the market are ineffective, and my people wanted to ensure this did not happen in the case of VICOGEN. The second unusual item was limitation on the use of the name VIDO in advertising, and a proviso that all advertising material was to be reviewed and approved by my management before printing. Both of these unusual requests were acceded to. The subsequent laboratory and animal testing of the various lots of vaccine produced by Connaught in Toronto and their American subsidiary, all exceeded the high standards set down by my scientists.

Several of these sessions of negotiation were held both in Saskatoon and Toronto. The Connaught Laboratories' side of the table were augmented from time to time by their lawyers and also representatives of their American arm, a biologics production company in Pennsylvania which Connaught Canada had recently purchased, with the purpose of entering markets in the USA that were inaccessible to the Canadian company. One of the first major products in the veterinary line for the new company was to be VICOGEN.

The Connaught negotiating team grappled with our request for money up front, realized its importance to a fledgling research organization, and agreed to provide \$100,000 upon receipt of the license to produce and another \$100,000 one year after. To obviate having Connaught conduct all of the previously mentioned research and development and also produce the initial lots of the vaccine for field trials, an allotment of \$250,000 was also made to my organization for this research.

However, also in the contract was the specification that “my” scientists collaborate with “their” scientists in all phases of commercial scale-up, and that together we would research the laboratory animal models and investigate the *in vitro* or laboratory testing of the K99 antigen as well as many other technical aspects of laboratory work necessary for that crucial federal licensing.

After most of the above had been ironed out, the final draft of the contract hinged upon the few figures representing the percentage royalty on each dose of vaccine. The battle raged by letter, by courier, by telephone, by meeting – the Connaught group offering 3% to 5%; my group suggesting a graded royalty starting at 12% for the first several thousand doses, dropping to 10% for the next several thousand and then



First International Mini-Symposium on Neonatal Diarrhea in Calves and Pigs – May 1976 – L-R Front: Dr. J.A. Bradley, Dr. G.W. Forsyth, Dr. H.W. Moon, Dr. G.G. Khachatourians, Mr. B. Freeze, Dr. C.H. Bigland – Back: Dr. S.D. Acres, Dr. D.L. Hamilton, Dr. M. Morin, Dr. L.L. Myers, Dr. J. Svendsen, Dr. C.L. Gyles, Dr. C.A. Mebus, Dr. O.M. Radostits, Dr. M.R. Wilson

to 7% for the remainder. Time was getting short and it was here that Dr. Ole Nielsen, chairman of my negotiating team, initiated an intensive personal “shuttle negotiation” and settled on a flat 7.5% of final net sales. This was accepted by both sides on March 23, 1979 and the show was on the road!

While there may have been an adversarial relationship in the contract negotiations, none existed between the scientific personnel, and all worked together harmoniously to the end of producing the commercial vaccine. My scientists and management gained a tremendous respect for the Connaught people in their meticulous attention to detail, concern for the cost-benefit of each action and the safeguarding of the efficacy of the “product”. For example, the antigen-extinction test

consisted of the vaccination of equal groups of pregnant cows with a graded dilution of the proposed dose of vaccine. The calves were then challenged in order to ascertain the dilution that would still give complete protection. It was found that the original concentration was at least 10 times stronger than necessary. This meant a saving in production costs of 90%, or one liter of vaccine for every ten that was originally envisaged. In addition, utilizing their expertise in the growth of organisms in fermenters, Drs. Dennis Stayner and Egon Kellner, J. Gupta, Ken Lawson and Bill Hankins were able to further increase the yield of *E. coli* organisms and the content of K99 antigen present on each organism. This too, was a marked step toward efficiency of production.

Drs. Margaret Maxwell and Helen Blake worked with my Dr. Tony



Second International Symposium on Neonatal Diarrhea – October, 1978 – L-R Front: Saul Tzipori, Mary Kolb Estes, Harold Greene, Ernie Logan, Bob Ellis, Lorne Babiuk, Steve Acres, Chris Bigland, Michael Begin, Valerie Jaspers-Fayer, Manuel Carpio, Dick Isaacson, Anne Scoot, Paul Monette – Middle: S. Stavric, John Bradley, Harley Moon, Al Ritchie, David Brian, Louis Newman, Barry Stuart, Michael Morin, Janice Bridger, Jim Bellamy, Sang Shin, Serge Lariviere – Back: Lazlo Nagy, Doug Alexander, Gerald Woode, Leslie Spence, Lyle Myers, F. Lomba, Daniel Ellens, John Fairbrother, Torkel Wadstrom, Ken Johnson, I. Bijlsma, Dudley Osborne, Peter Newsome

Forman in devising new tests for the K99 antigen and doing pilot projects on an animal model. The actual laboratory work on the animal models was supervised by Margot Buckley. Here again, utilizing the antigen extinction technique, blood sera from mice, guinea pigs and rabbits was tested for K99 antibodies and compared to the antibody levels found in cattle that had been correctly immunized. This animal model system was used to ascertain the potency of each lot of vaccine.

In the meantime, large-scale animal vaccine trials were being conducted on farms in six different provinces: Quebec, Ontario, Manitoba, Saskatchewan, Alberta and B.C. – all under the capable direction of Dr. Gordon Boylan. He had organized veterinarians to do the actual vaccination and solicited volunteer herds for the test procedure. Each herd was divided into two, with half of the pregnant cattle vaccinated with two doses of the vaccine and the other half left unvaccinated. The “proof of safety” lay in the existence of untoward reactions due to the vaccination; the “proof of efficacy” in the incidence of diarrhea or

death in the calves from vaccinated mothers compared to unvaccinated cows - providing there was an outbreak of calf scours.

Finally, all of the late night work and intense activity, both at Connaught Laboratories and by my scientists and technicians, culminated in the meticulously detailed and extensive application for licensing. It was submitted to Dr. Doug Alexander, Head of the Animal Biologics Section, Agriculture Canada. The timing here was crucial, because the target was to have the vaccine in the hands of veterinarians for their livestock producers in sufficient time that two doses of the vaccine could be given, at least six weeks apart and prior to the calving or spring season of 1980, ie. the month of March. With full confidence that the vaccine would be licensed, large volumes were bottled and labelled by Connaught and sent out in bond to their distributors throughout Canada - to be held pending notification of license.

On December 13, 1979, Mr. Alun Davies, President, and Mr. Doug Sansom, Vice-President of Connaught Laboratories, my scientists, management and technical staff met in the nearly empty isolator laboratory of my building for a ceremony. Bottles of the first lot of VICOGEN vaccine, proudly arrayed on a silver tray, were piped in by a bagpiper and presented to the assembly. Word had been received the license was granted that afternoon!

With the product licensed it's sale price became an important point of discussion. My management and staff wanted to keep the price as low as possible to the livestock producer, because much of the basic research had been financed by the livestock industry, the Devonian Group and governments representing consumers. For its past, Connaught had to recoup the cost of production and the tremendous investment in equipment, scale up, personnel and advertising necessary to launch a new product on the market. To the credit of both sides, VICOGEN was placed in the hands of the distributor for approximately \$3.17/dose. As all sales were handled through veterinarians, and the veterinarian was entitled to a mark-up of approximately \$1.00, the final cost was well below the \$5.00/dose that previous research had indicated was the cost-benefit margin.

Well patient reader, this is a long narrative that you might have been spared had you read the 1979-80 Annual Report, which digested the story as follows: "As a result of a tremendous effort by all of the VIDO staff and a like effort at Connaught Laboratories, the *E. coli* calf scours vaccine "VICOGEN" was licensed for sale December 13, 1979."

This simple statement reflects an almost unprecedented achievement in the production of veterinary biologics in Canada. It necessitated, on my side: a concentration of all the staff on the production of initial lots of the vaccine, the development of tests for K99 and other antigens in the vaccine and tests for K99 and other antibodies

stimulated by the vaccine in cattle and in laboratory animals; testing of dilutions of the vaccine in cattle, with challenge of the calves as the yardstick of efficacy, together with parallel studies in mice and rabbits; and the testing of the vaccine for safety and efficacy in dairy and beef cattle in six different provinces of Canada. At Connaught Laboratories it meant: pulling a highly dedicated staff from other areas of the operation to "scale up" the laboratory model *E. coli* vaccine to a large scale production; coordinating of testing procedures with my staff; the purchase of large quantities of equipment and modification of buildings; the preparation of labels, insert materials, and advertising; and the concentration of sales staff in Canada and exploration of sales in other countries.

My Annual Report for 1979-80 featured an article "VICOGEN - A Success Story" which said, in part, "The distribution of vaccine was rapid after the December 13th licensing and in the first four months, over 800,000 doses had been utilized in Canada's cow population. Even this amount is calculated to save between \$4 to \$8 million in preventing calf sickness and death.

VIDO had entered a normal business agreement with Connaught Laboratories of Toronto with regards to the *E. coli* bacterin called VICOGEN. This agreement covered only this invention and product. VIDO has received royalties from the Connaught Laboratories and it is hoped that royalties next year will pay for 10-15% of the VIDO research activities.

VIDO is extremely pleased with the cooperation and efforts that Connaught has made with regards to the marketing and distribution of VICOGEN. It is hoped that within a year the product will be licensed in the USA and generally will be available on a worldwide scale".

Royalties did flow into my Research Trust Fund for a few years. However, sales in the USA were disappointingly low. And it was not long before several multinational biological producers, because of the lack of a patent, copied VICOGEN and sold their *E. coli* vaccines throughout the world. My organization's consolation is that, as a result, many hundreds of thousands of calves have been saved from death by *E. coli* scours in many countries.

g) The Hemorrhagic Enteritis Saga

In the early 1970s a Hemorrhagic Enteritis (HE) type of disease was discovered affecting turkeys in Minnesota, and was described by Dr. Ben Pomeroy of the University of Minnesota. It was a condition causing watery, blood tinged diarrhea in young growing turkeys. It was thought to be caused by a virus. This disease agent was later studied by Dr. Charles Domermuth of the Virginia Polytechnic Institute, Blacksburg,

Virginia, who indicated it *was* a virus and successfully prepared a weakened or attenuated strain and attempted the vaccination of young birds by harvesting the spleens from birds infected with this attenuated strain, grinding these into a "soup" and placing some of this in the drinking water of young turkeys. This crude vaccine appeared to be quite successful, and the production and use of the crude spleen vaccine became popular in areas where the HE syndrome was evident. In Canada, the crude spleen vaccine was prepared and utilized by Dr. Jan Thorson of the OVC and by Dr. John Robinson of the British Columbia Veterinary Laboratory, Abbotsford. Their vaccines were applied to turkey flocks, apparently with some success, as both Drs. Thorson and Robinson were besieged by requests to manufacture the vaccine, overwhelming their facilities.

Dr. Herbert C. Carlson of the OVC, Department of Pathology, was also a student of HE, and he showed conclusively that the virus was localized in the spleen, but also invaded many other tissues, and that it was an adeno-type virus, as judged from its morphology by pictures taken on electron microscopy. In Carlson's observations, the HE syndrome was extremely costly to the turkey industry in Canada and the United States. The economic loss came not only from deaths occasioned by the disease, which averaged 2% to 30%, but by the stunting of young turkeys due to severe damage to the intestinal tract. This injury to the intestine allowed the animal to live and continue to eat its expensive food – but did not allow it to grow at the accelerated rate normal for young turkeys. The birds had to be held and fed for up to two weeks longer than normal (an exceedingly expensive time of feeding) and also reduced the amount of fat under the skin, the presence of which was a mark of superior grading at the killing plant.

In the fall of 1979, Carlson gave a scientific presentation to the Canadian Turkey Marketing Agency (CTMA) on the subject of HE in turkeys. He reviewed his work on the subject, together with the latest findings from other investigators. He pointed out the fact that the disease was costing Canadian turkey producers millions of dollars through death, delayed maturity and discounts because of poor grades. He suggested that although the crude vaccine appeared to be effective in controlling some of the HE virus, there were many other problems with it, because, since it was a crude spleen "soup", it might expose the poults to potentially dangerous disease agents. He suggested that the CTMA contact my officers in Saskatoon, with an offer to support research on HE. This prompted the CTMA to have a committee visit Saskatoon to inquire whether my research scientists wished to accept the challenge of HE. The committee consisted of Carol Teichrob, who was then chairman of the CTMA, from Saskatoon, and Murray Brown of Acme, Alberta, a CTMA director, together with Carlson as their advisor.

After touring my facilities and speaking with my management and scientists, they requested a feasibility study, to include an estimate of economic loss to the Canadian turkey industry, the cost of the research and an approximate timeframe for the development of a safe vaccine. In due course, a brief sent by my officers to the CTMA indicated that the disease was costing Canadian turkey producers between three and nine million dollars each year, and that the cost of the required research would be approximately \$900,000, spread over a period of three years.

In March, 1980, the CTMA donated \$200,000 for HE research. At this time, the Devonian Group were matching dollar-for-dollar any contributions from the livestock and poultry industries. As a consequence, we had a total of \$400,000 to start the HE research.

The decision to accept the challenge to work on HE caused some consternation among my board of advisors and governing committee. The concern was that we may be biting off more than we could chew as we already had a full program on neonatal diarrhea, which had expanded beyond the *E. coli* vaccine to include research on bovine rotaviruses, coronaviruses and cryptosporidia. In addition, the Swine Disease Research Program had just been started under the direction of Dr. Harold Fast. There was also a major need for an in-depth study of bovine respiratory diseases. So the big question was whether we could afford to spread ourselves more thinly to accomplish the HE task. But the boards approved the HE research on the understanding that a poultry research program was needed, that much of the research funding was coming from the turkey industry and that with these funds, a new team to work on the disease could be built up.

With the new grant in place, it was decided to follow the pattern of the neonatal diarrhea research and first hold an international symposium inviting all of the leaders in research on HE to Saskatoon. The objectives were to seek out the latest news on work in progress, invite suggestions regarding future work so as to avoid duplicating programs already under way in other laboratories and to discuss which scientists might be available to conduct the research.

A successful symposium was held in Saskatoon, May 6, 1980, and an unedited proceedings prepared. Here again the wide-spread nature of the HE virus was reviewed, the tremendous economic loss throughout North America was reiterated, the effectiveness of the crude vaccine demonstrated (with adequate warnings of the transmission of other micro-organisms), and the need for research on a safe, effective vaccine for the disease emphasized.

The next move was to hire a competent virologist to start the work. Several scientists were interviewed, and Jan van den Hurk, a Dutch scientist conducting graduate work at the University of Montreal, was hired in October 1980.

van den Hurk was faced with a major difficulty in the prescribed task of producing a safe effective hemorrhagic enteritis vaccine. The causative agent was an adenovirus which no one had been able to grow in any type of tissue culture, in chicken or turkey embryos, or any of the standard media. It was hoped that by trying many combinations of tissue cultures, that eventually one would be found to successfully reproduce the turkey hemorrhagic enteritis adenovirus. But after many months of frustrating attempts such was not the case.

van den Hurk utilized all the latest virological techniques and genetic engineering tools to produce monoclonal antibodies against the adenovirus. These he used successfully in fluorescent antibody detection of the virus in infected tissues, and was able to search for the actual cell-type that the avian adenovirus was using for growth or replication.

In the first few years, he was able to show that most turkey flocks in Canada were infected with the virus, that there was a maternal antibody against the virus carried over in the turkey poult until it was approximately three to four weeks of age, that a vaccine applied while this passive immunity was present would render the vaccine ineffective and that the optimal time for vaccination was between four-and-a-half and six weeks of age.

In addition to this, van den Hurk was able to set up a number of sophisticated techniques for purifying the hemorrhagic enteritis virus so as to exclude any other viruses, tissue material or bacteria. It was proposed that possibly a live virus vaccine could be made from turkeys infected with Dr. Domermuth's attenuated strain of the virus. The spleens in which the virus is concentrated were removed and processed through van den Hurk's many series of purification to yield a live turkey spleen purified virus vaccine. van den Hurk could produce several hundreds of thousands of doses of vaccine, given sufficient time. So it was decided to try to produce this vaccine and get it into the hands of the Canadian turkey producers who supplied the initial funding for the project.

As with any commercial or experimental biological product to be used in Canada, a license had to be obtained from the Veterinary Biologics Section of Agriculture Canada. After a number of preliminary inquiries and the preparation of complete protocols regarding the manufacture, preservation, bottling, labelling and use of the vaccine, a final meeting was held with Dr. Doug Alexander, Dr. Peter Langer, Dr. Ernie Moran and Dr. Corb Stewart in Ottawa, and an interim license was granted for field testing.

Field testing of the purified HE vaccine was planned in six different provinces of Canada under the direction of veterinarians who could be trusted to follow the rigid experimental procedures outlined by my officers, who would collect and submit blood samples from test and

control birds at the proper time, keep detailed records on morbidity and mortality and report on the number of days to market, the grades received and other details necessary for the experimental protocol.

All followed this protocol almost to the letter. The veterinarians were: Quebec - Dr. Louie Roland; Ontario - Dr. Conrad van Dijk; Manitoba - Dr. Claude Mason; Saskatchewan - Drs. Craig Riddell and Keith McMillan; Alberta - Dr. Jim Hanson; British Columbia - Dr. Doug McCausland. In each case they contacted their turkey producing clientele to find out who would be willing to engage in the vaccine experiment. The owner had to be willing to divide one large batch of turkeys, preferably of the same hatch, into two and raise these separately. One group would be vaccinated with the purified HE spleen vaccine. The other would act as controls. The enthusiasm of the turkey industry was sufficiently high that the veterinarians had little trouble obtaining the cooperation of the turkey producers, and so the experiment went forward.

When the results of the field testing were finally tallied, the efficacy and safety of the vaccine was strongly positive. All the vaccinated turkeys seroconverted or showed evidence of building up immunity within three weeks of vaccination. Early mortality in most cases was lower than the control birds. By market time, overall mortality was also generally lower, the vaccinated birds were heavier and the extra weight was achieved on a lower feed conversion ratio. In other words, they *ate less to produce more*.

The purified spleen vaccine looked like it was ready for marketing!

My officers had been in contact with a number of veterinary biological producing firms in the U.S.A. and Canada. Naturally, the largest market would be in the USA, where the turkey population exceeded 100 million birds. However, the biological companies were very concerned about obtaining a license for a new live virus product and the extremely sophisticated tests that would be necessary to prove that there were no other viruses carried along with the hemorrhagic enteritis virus. Also about this time, two investigators at the East Lansing, Michigan, Avian Research Center of the U.S. Department of Agriculture had published a paper on the ability to grow turkey hemorrhagic enteritis virus in a tissue culture of turkey origin, derived from a tumor-cell-line which also carried the Marek's disease herpesvirus. There was some hope that a hemorrhagic enteritis virus vaccine could be produced in tissue culture, which would obviate the possible dangers of utilizing tissue from live turkeys. A tissue culture also would be less expensive to maintain, easier to control and easier to work with.

In the meantime, van den Hurk also had been working on a tissue culture cell line of his own. This looked so promising and so efficient in producing large quantities of the virus - and, in addition, had all the

advantages of a tissue culture system – that plans to market the purified spleen vaccine were put in abeyance and all efforts were concentrated on the tissue culture system. These were given added impetus by an additional grant of \$100,000 from the CTMA.

It had been proposed that van den Hurk be asked to produce a sufficient volume of purified spleen vaccine to fulfil the requirements of the Canadian turkey producers – even if all the costs were born by my organization. However, time was the limitation. van den Hurk was able to work on only on one project at a time, and so his efforts were channeled to the tissue culture production system. Despite this restriction, several hundred thousand doses of the purified spleen vaccine were given to the Canadian turkey industry, which used it with great beneficial effect.

Many months before the decision to switch from purified spleen vaccine work to the tissue culture system, preliminary discussions had been made with Eli McKhool of Gowling and Henderson in Ottawa, my patent lawyers. It had been the experience of my management that if a new idea was not covered by patent that marketing through the commercial biological houses was extremely difficult, if not impossible. Also, that the patents had to be extremely broad, but also extremely detailed, in order to prevent others from usurping the patent ideas. Once the patent has been granted, most commercial firms will respect it for fear of very costly litigation. Unfortunately, it is also costly to defend a patent, and a small company is sometimes not sufficiently wealthy to fight the large companies in court.

van den Hurk continued his dedicated work on the tissue culture-cell vaccines, utilizing a primary cell line taken from SPF turkeys, then cultured and multiplied to produce his new tissue culture vaccine. This too, had to be field tested under a license from the Veterinary Biologics Section of Agriculture Canada in several provinces. The new vaccine, produced in my laboratories, continued to work well, and the rights to market it were turned over first to BIOSTAR Inc. (my commercial marketing arm) and finally to Langford Laboratories Inc. of Guelph, Ontario, for marketing in 1986 as HEVLAN TC. Fittingly, the announcement of the HEVLAN TC vaccine was made at the Annual Meeting of the CTMA in Ottawa, March 1986. Presentations were made by Mr. Paul Hodgman, my executive officer and by Dr. Charles Povey, president of Langford Laboratories Inc. to CTMA and provincial marketing board supporters for their vision and support of this achievement. It was then also recognized that Canada was the only country that has the HE vaccine available to its turkey producers.

The elusive, safe, effective vaccine dreamed of in 1980 was finally realized in 1986! – a tremendous credit to Jan van den Hurk, his co-workers and the financial supporters.

h) Rotavirus and Coronavirus Vaccines

To the owner of an animal suffering from calf scours or pig scours, the cause of the disease doesn't matter a hoot! Whatever the cause, the results appear to be the same: severe diarrhea, weakness and often death. Scientists studying these conditions, however, recognized that more than one disease agent is frequently present, often working together in concert or on a "cascade" principle, wherein one organism starts the ball rolling and another organism takes over where the first has left off. In the 1960s, research scientists who were concentrating their work on *E. coli* as a cause of calf scours (such as Dr. Paul Glantz of College Station, Pennsylvania), were aghast at the notion introduced by Dr. Charles Mebus of Nebraska that a virus was a cause of the problem. Dr. Mebus had isolated two viruses from cases of calf scours and, through the ingenious utilization of germ-free calves, had proved these were indeed pathogens causing a form of calf scours. He was even able to grow these viruses and test them in germ-free calves, showing that they were protective when injected as a vaccine. Patents were obtained by Dr. Mebus in the name of a veterinary biological company that had been supporting his research. However, subsequent field trials threw doubt on the efficacy of these vaccines in the field. In the routine classification of these viruses, one was a rotavirus, the other a coronavirus.

In 1973, Dr. Lorne Babiuk, a virologist, teamed up with Dr. Barry T. Rouse, a veterinary immunologist at the W.C.V.M. They made a dynamic duo, and one of their fields of endeavour was the study of enteric viruses. About this time Dr. Stephen D. Acres was starting a Ph.D. program with Dr. Otto M. Radostits. The objective of Acres' studies was a definitive epidemiological and microbiological study of calf scours in western Canada. Now, this study revealed that one of the primary causes of calf scours in western Canada was the pathogenic *E. coli* organism. However, the viruses of rotavirus and coronavirus, together with the protozoan cryptosporidia, also showed up in many of the fecal samples taken from scouring calves. Babiuk and Acres developed a very sensitive test – a radioimmunoassay for rotavirus antibody, utilizing the new gamma counter. This work was reported in the scientific literature in May 1977. An epidemiological study of bovine rotavirus antibodies in the cattle population of Saskatchewan using Babiuk's test revealed that 79% of cows in 97% of the herds had antibody levels against the rotavirus. The same technique was used by Acres to study antibody levels in calves born under different management conditions and to determine the differences between the levels of rotavirus antibody found in the milk of cows nursing normal calves and those nursing calves infected with rotavirus.

In 1977, a major breakthrough in rotavirus research was made by

Babiuk – a tissue culture method of growing rotavirus. Up until this time, although rotaviruses were found in many species of animals and humans, no one could satisfactorily grow the virus on a large scale in artificial medium. As a consequence, Babiuk's work was soon widely copied in the rotavirus scientific community, as it opened up many opportunities for study of the organism itself, and also made possible the mass production of the virus for potential vaccines. Babiuk, assisted by Dr. A.S. Grewal, a post-doctoral fellow funded by my Research Trust Fund, continued studies on the biochemical and biological characteristics of several strains of rotavirus isolated from calves in Canada and other countries. The tests showed that the antibody found in the milk and blood is of major importance in limiting infection and spread of this disease, but the search continued for strains of virus that could be used for the production of a vaccine.

By 1979, it was also shown that coronaviruses were major factors in causing neonatal diarrhea, and my Annual Report for 1979-80 indicates that Acres and Forman were working on projects to develop a vaccine against bovine rotaviruses, as well as rotavirus and coronavirus vaccine testing and field testing of *E. coli* and rotavirus vaccines. These studies were in collaboration with Babiuk, who was continuing his work on the molecular virology of bovine rotaviruses. This was the year that VICOGEN was revealed as a commercial success. However, the dream of my scientists was to have VICOGEN combined with a vaccine for rotavirus and coronavirus, all in one bottle – a combination which would control 80-90% of the causes of calf scours. These combinations would be called “conventional” vaccines, wherein the *E. coli*, rotavirus and coronavirus would be grown up in large quantities in their special media then killed, combined together and mixed with an adjuvant added (to stimulate antibody production) before bottling and labelling.

In 1982, work continued on the field testing of such a combined vaccine in Alberta at the University of Alberta's Kinsella Ranch, and in Saskatchewan at the federal research station at Melfort. The objective was to determine blood antibody titers, and also to determine milk antibody titers, which would indicate antibody protection of the baby calf through the milk. In addition, utilizing surgically derived specific-pathogen-free calves, tests were conducted to find the level of antibody which would be protective to calves fed the milk from vaccinated mothers.

The conventional combined vaccine studies were greatly accelerated in 1982 and 1983, assisted by my scientists Dr. Colin F. Crouch, a virologist, and Dr. T. James G. Raybould, a microbial immunochemist, and by visiting scientists, Dr. Ladislav Rodak from Czechoslovakia and Dr. Helle Bielefeldt Ohmann from Denmark.

This was also a pivotal year for thinking ahead into the use of

“second generation vaccines”, utilizing the techniques of molecular biology and recombinant DNA, the so called “genetic engineering”. Babiuk had been involved in this area of biotechnology; however biotechnologists were very “thin on the ground” in Saskatoon at the time. With the assistance of Babiuk, my officers were able to hire Dr. Geoffrey Hudson, a molecular biologist, to head up a team in my laboratory, and he was soon assisted by Dr. Marta I.J. Sabara, a new post-doctoral fellow from Babiuk’s laboratory. Biotechnology was an important and courageous step because my management would be concentrating large sums of money into an area of science that was almost unknown to my major supporters, in the hope that this would be the new wave of vaccine production. But we could not expect results for at least five to ten years.

In the meantime, work on the conventional vaccines went forward rapidly. Research studies with the germ-free calves had shown that a certain level of antibody was necessary in the milk and that it must be present for two to three weeks in order to give maximum protection to the calves against rotaviruses and coronaviruses. Testing indicated that vaccine levels used in the field were sufficiently strong to provide this necessary level of protection. It would appear that a combined vaccine would do the job!

Now it seemed to be time to go to a commercial manufacturer. This turned out to be not as simple as it appeared. Most of the large animal biological producers were contacted, and while many were interested on first contact, they later decided against the vaccine. The main reason given was that approximately ten years previously Dr. Charles Mebus had taken out, through the University of Nebraska, a very broad patent which in essence patented all of the enteric viruses found in the calf’s intestine. Commercial companies were afraid of litigation if the owners of this patent challenged their vaccines. Reaching this dead end involved literally years of negotiation, patent searches, visits to various parts of the United States by my officers and concurrent visits by scientists from the biological supply houses to my premises. I think that my scientists and officers would not have felt so badly if the vaccines produced as a result of Mebus’ patent were efficacious. Unfortunately, all the testing that had been done in my laboratory using their commercial vaccine as a control indicated that it failed to give the sustained antibody levels in milk necessary to do the job. The frustration was compounded by the fact that this patent was blocking a good vaccine from being used to save calves from these neonatal diarrhea producing viruses.

In the meantime, a new refinement of the VICOGEN vaccine had been developed by my scientists and turned over to BIOSTAR, which in turn contacted Langford Inc. of Guelph, Ontario, who purchased the

rights to produce the vaccine under the trade name of ECOLAN. This was a successful vaccine, and Langford Inc. became interested in the possible addition of my rotavirus and coronavirus vaccines to ECOLAN. A tentative agreement was reached; however, Langford could not accept the "seed" viruses until they had been declared free of any other contaminating organisms. To my scientists consternation, they were found to be contaminated with the virus of bovine virus diarrhea (an ubiquitous virus in tissue cultures containing fetal calf serum) and also a human *Mycoplasma orale* (also a common contaminant of tissue cultures). It took my scientists a year and a half of laborious work to free the viruses of these organisms. This was completed in 1986; now will come the commercial production of the first lots, the field testing for safety and efficacy throughout Canada, and finally, the sale of the first effective combined triple vaccine for neonatal diarrhea! The conventional vaccines should provide a boon to the cattle industry. Even better, improved vaccines are already on the horizon. These are the recombinant DNA vaccines, the synthetic peptide vaccines and other wonders that will be evolving from a vigorous team of biotechnologists now hard at work in my laboratories. However, these new vaccines are on the cutting edge of science and will take a few more years to filter down to the livestock industry. It is hoped that the advances made here will be also utilizable for other species of animals including humans.

i) Swine Diseases

By 1978, research on the *E. coli* vaccine for calf scours was well under way. There had been a start on bovine respiratory disease research and the board of advisors looked with favor on starting a swine research program. This had been recommended by early visiting advisors to the board, one of whom was Mr. Glen Flaten of Regina, who was chairman of the Saskatchewan Hog Marketing Commission. Mr. Paul Riese of Selkirk, Manitoba, one of the first industry appointees to the board of advisors was also a strong advocate for swine disease research. Such recommendations from members of a major facet of the livestock industry were recognized and heeded by my board of advisors. In addition, the swine industry had already started donating funds to my research endeavors. Bigland, together with Paul Hodgman, the new executive officer, were confident that if swine research was undertaken by my scientists, the swine industry through their marketing boards would support it.

Once the decision had been made, the job was to build up a team of researchers to concentrate on the various aspects of economically important swine diseases. A major problem was the choosing of a leader. Very few veterinarians with specialized training in swine disease research were available, and few veterinarians who were swine disease

specialists in practice were interested in research. We did find one exception, Dr. Harold Fast, a WCVI graduate of 1976 who had been practising in Steinbach, Manitoba, where he concentrated on swine diseases. He agreed in early 1979 to sign a contract with my management wherein he would serve three quarters of his time on swine disease research. The other working time was spent fulfilling contracts to swine producers.

Dr. Fast had been interested in some commercial research in the field, such as the testing of drugs on various swine diseases. Once he joined my organization, he wasted little time planning a more elaborate research program. As with other research targets, my scientists were cautious enough to first investigate research in progress and to seek



International Symposium on Hemorrhagic Enteritis of Poultry – May, 1980 – L-R Front: Louis Rolland, Gary Wobeser, Lloyd Weber, Keith McMillan, Charles Domermuth, Chris Bigland, G. Yan Ghazikhanian, Craig Riddell – Back: Murray Brown, Margot Buckley, Peter Ide, Tony Forman, K.V. Nagaraja, Winston Moffat, Dennis Billo, Herb Carlson, Maurice Smith, Jan Thorsen, David Thomson, Steve Acres, Henry Classen, Conrad van Dijk, R.W. Stevens, Carol Teichrob, Mike Joyce, John Robinson

advice on disease problems of major importance to the livestock industry. Accordingly, an International Symposium on Diseases of Swine was held in Saskatoon, September 24 and 25, 1979. The list of speakers from the United Kingdom, the United States and most provinces in Canada was long and prominent. (In place of cash honoraria, a fly-in fishing trip to northern Saskatchewan was accepted enthusiastically by most.)

The biggest surprise for my scientists was the indication that neonatal diarrhea was *not* one of the major disease problems. The big worries were the swine respiratory diseases including Atrophic Rhinitis, Mycoplasma Pneumonia and Hemophilus Pleuropneumonia. In addition, it was felt that research was needed on management's role as a preventive to swine diseases. This included such research areas as "all-in all-out" housing, better farrowing facilities with an emphasis on isola-

tion and more work on ventilation and swine barn construction. All recommendations were considered by my management, particularly Harold Fast and the members of the swine respiratory disease program.

They soon had four major programs under way:

1) An attempt to prove the value of the "all-in all-out" method of swine management, for the prevention of disease transmission with emphasis on the nursery period for newly weaned pigs. In this method, all pigs of one age (eg. 3 weeks) are raised together in a controlled environment, with no contact with other pigs. When sufficiently grown, the whole age group would be moved out and the premises cleaned and disinfected before replacing them with a new group of pigs. One project included designing and building a three-room nursery on a 100-sow



HEVLAN TC – Hemorrhagic Enteritis Tissue Culture Vaccine

capacity farm, with each room in the nursery holding six litters, each in separate pens and operated on the all-in all-out basis. This was compared to an equal number of pigs nursed in the traditional "raised flat-deck" system. The results indicated that pigs raised in the all-in all-out nursery had a faster rate of gain and a higher feed conversion than those raised in the traditional manner.

Another facet of this study was the "Thompson box" nursery system, in which 10 to 15 newly weaned pigs were placed in a huge self-contained, box within which separate air supply and exhaust ducts discouraged contamination by other pigs. The results were not spectacular and the experiment concluded.

2) Part of the respiratory disease problem raised at the symposium; was that of pasteurella pneumonia in pigs caused by *Pasteurella multocida*. My scientists attempted to develop a model to mimic the occurrence of pasteurella pneumonia in the field by raising germ-free pigs which were then challenged with different strains of *Pasteurella*

multocida. In addition, field trials were started to evaluate two of the commercially available *Pasteurella-Bordetella* vaccines.

3) The TI-59 calculator program. Harold Fast and a number of his Swine Technical Group, as well as veterinarians involved with swine herd health programs recognized the need for an accurate record-keeping system for swine producers. At this time, in 1979, personal computers were very expensive – in the neighborhood of \$5,000 to \$6,000 and it was hoped that a smaller type of data handling system would be useful. Dr. Fast had experience with the Texas Instruments 59 hand-held programmable calculator, and he decided to try to utilize it to allow producers to monitor production performance in their herds. He envisaged the herd owner walking up and down his barn “punching in” data into the calculator for later compilation in his office. To be useful, data processing programs had to be written for utilization on the calculator. Initially, Fast worked briefly with Bob Kapitany, until the latter resigned. Then he developed a productive collaboration with Dr. Roy Kelly, a graduate student whose forte was computers in herd health management. Together, three programs were devised: a herd production summary providing information on reproductive and preweaning mortality; a sow location summary and analysis relating breeding problems, litter size and baby pig mortality to the location of the sows in the dry sow or farrowing barns; and a boar performance analysis and comparison, to compare breeding performances of boars. Other programs calculated daily gain and feed conversion or predicted the weight of pigs at various ages.

The several programs for the TI-59 calculator were used in actual practice by members of the Swine Technical Group. Their data was sent back to Fast, who was sufficiently fortunate to obtain the services of Julie Whitebone, a graduate in agriculture from the University of Saskatchewan. She performed the laborious job of compiling all of the data obtained in the field.

The TI-59 calculator programs were copyrighted and provided to swine producers for a small fee. In order to enlarge the possible income from this practical method of recording, my management tried to sell the copyright to the Texas Instrument Company. After several letter exchanges they indicated they were not interested in purchasing the programs. By this time, computer prices had come down and a number of swine producers and swine veterinarians were starting to use computer rather than hand-held calculator systems. No doubt this was the reason Texas Instruments felt there would be no market for the programs.

4) Swine Technical Group. In the 1970s the swine industry was undergoing major changes characterized by increased intensification, new strains of breeding stock, better nutrition and the utilization of new technology. It was into this changing milieu that Fast entered when he

joined the veterinary practice in Steinbach, Manitoba, to concentrate on swine disease management. His interface with bright young minds in related areas of swine engineering, nutrition and management prompted informal meetings of interested people in these areas. They decided to meet together and discuss the problems of the swine industry and their possible solutions – each bringing to the subject a personal area of expertise. Thus, the Swine Technical Group was born.

The group meetings continued in Manitoba until Fast moved to Saskatoon to join my organization. It was then that he applied for, and was granted, travel funds for the group to meet in Saskatoon or other convenient locations in western Canada three to four times a year. These wide-ranging meetings were conducted in a “no holds barred” manner, all with the objective of finding the actual truth of a given point – but with plenty of comradery and joviality underlying the seriousness.

All members were volunteers, serving without pay. The original group consisted of Dr. Harold Fast, Chairman (veterinarian and now swine producer at Spiritwood, Sask.), Dr. Mike Sheridan, veterinarian, Steinbach; Mr. John Patience, Ithaca, New York; Dr. Roy Kelly, veterinary epidemiologist, WCVM; Mr. Dennis Hodgkinson, agricultural engineer, Manitoba Department of Agriculture, Winnipeg; Dr. John Strokappe, veterinarian, Red Deer, Alberta; Mr. Vern Meek, swine producer, Acme, Alberta; Mr. Paul Vielfaure, swine producer, Labroquere, Manitoba; Mr. Herm Martins, swine producer, Rosenort, Manitoba; Mr. Peter Hill, swine producer, Langley, B.C.; Dr. Dave Paton, veterinarian, Aldergrove, B.C.; Mr. Don Kolla, swine producer, Cudworth, Saskatchewan; Mr. Dick Roney, swine producer, Turtleford, Saskatchewan; Mr. Don Lidster, swine producer, White Fox, Saskatchewan; Mr. R. Rempel, swine producer, St. Anne, Manitoba; Dr. A.D. Osborne, veterinarian, WCVM; Dr. Ernie Barber, engineer, University of Saskatchewan; Dr. Jim Sawatsky, veterinarian, Humboldt, Saskatchewan, Dr. Philip Willson, veterinarian and research scientist in my organization, and from time to time other members of my management, including Chris Bigland, Steve Acres and Paul Hodgman. Over the years there were many comings and goings, the more recent additions including, Dr. Roy Barrett, swine producer, Ponoka, Alberta; Dr. Stewart Bauck, veterinarian, Airdrie, Alberta; Mr. Bruce Creighton, nutritionist, Edmonton; and Mr. Alan Reimer, swine producer, Steinbach.

The Swine Technical Group was an innovative idea that has been of great benefit to the swine industry, enabling my management to live up to one of our basic tenants, that of “serving the livestock industry”.

Although from the beginning, the group made itself available to individual swine producers for advice and suggestions, one of its first concrete contributions was a swine nursery design booklet which was widely circulated through North America. Later “Helpful Hog Hints” was

published in the Western Hog Journal. Early 1986 saw the publication of a booklet entitled "Farrowing Barn Design and Management", which combined sound design management and construction principles with practical information on all aspects of day to day management, including nutrition, farrowing management and optimization of health and productivity. Work also started on the next bulletin in the series, "Feeder Barn Design and Management".

5) Hemophilus pleuropneumonia. In the late 1970s and early 1980s, devastating outbreaks of respiratory disease and pneumonia occurred throughout western Canada. Some of the early outbreaks were studied by Drs. A.D. Osborne and J.R. (Bob) Saunders of the Department of Veterinary Microbiology, WCVU, with the diagnosis being Hemophilus Pleuropneumonia. The two started research on this disease, but it soon became apparent that to make any progress a challenge system had to be devised. As previously mentioned, they did this using a plastic challenge chamber. Since additional containment was needed, a collaborative research project between Dr. Philip Willson, one of my scientists, and Drs. Osborne and Saunders was undertaken. The challenge chamber was moved to the high-security isolation facilities within my building. The challenge system opened up the opportunity to study vaccines, drugs and the influence of stress on Hemophilus pleuropneumonia infection. While Saunders pursues other interests, Willson and Osborne still continue their work on this devastating disease problem.

Very early they found that commercial Hemophilus vaccines, did appear to prevent acute losses from the experimental disease, but did not reduce the number of chronic carriers and possible spreaders. In addition, the percentage of localized abscesses at the site of injection was high. As a consequence, they began work on new Hemophilus vaccines, together with work on new adjuvants, as the old ones seemed to be the cause of the abscess formation. A new test was devised, in conjunction with Dr. Leo Filion, another of my scientists, utilizing the ELISA technique, which was approximately one hundred times more sensitive than the previously used agglutination test. The new test was used to screen blood serum from field herds to correlate serological response with the presence or absence of the organism within the herd.

Several experiments were done to evaluate the use of various antibiotics for the prevention of acute disease and to treat acute and chronic pneumonia. It was found that several antibiotics significantly reduced death, when given very early in the disease, but did not prevent the pigs from becoming chronically infected. Continued antibiotic treatment did not eliminate chronic carrier pigs or improve performance.

The effect of environmental stress caused by transportation, dramatic fluctuations in temperature and mixing were investigated in

an attempt to more clearly identify those factors which might precipitate acute outbreaks of disease. Work continues on a safe and effective vaccine.

6) Assistance to the Prairie Swine Centre. In the late 1970s the University of Saskatchewan decided to establish a swine research center on part of the Goodale farm south of the city. The original idea was conceived by Dr. Bruce Owen of the Department of Animal Science and Dr. Ole Nielsen of the WCV. After the initial launch, work was carried on by others, including Dr. Bob Blair of the Department of Animal Science and Dr. Walter Roe of the WCV. The Prairie Swine Centre (PSC) was intended primarily for research on swine management and nutrition. The plan was to have a one hundred-sow herd, on which trials could be centered. To eliminate many of the disease problems that could adversely effect nutritional and management research, it was decided to start with Caesarean derived pigs. This necessitated good quality isolation facilities. Since my building had just been erected and not fully utilized, four of the isolation units within my building were loaned for a year to the PCS for this purpose.

In addition, one of my scientists sits on the PSC Board of Advisors. First Bigland, then Fast and now Willson.

j) Shipping Fever

Shipping fever is an acute pneumonia which has been the scourge of the cattle industry for centuries. Not only does it cause a considerable amount of death, but even sick animals that recover are severely set back in their normal growth and fattening cycle. In addition, the stockman must spend numerous hours and dollars trying to treat and care for sick animals.

When my first ten-year research plan was approved in 1976, a major component was bovine respiratory diseases, with the primary target being shipping fever. Because the disease was caused by a combination of many factors and was still veiled in conjecture after 200 years, it was recognized that the study may be the most lengthy and costly of my research projects. Such has proven to be the case, but the new board of directors continue to consider it a funding priority. Funds have been supplemented by generous research grants from the Max Bell Foundation, the Kahanoff Foundation and the Alberta Agricultural Research Council's "Farming for the Future" program.

(i) *Mycoplasmas*

My first attempt at research on bovine respiratory disease was undertaken by Bigland in collaboration with Dr. Eugene Janzen at the Department of Clinical Studies, WCV. Bigland at that time was starting to work on bovine mycoplasmas, one of which had been isolated in cases

of shipping fever. This was *Mycoplasma bovis*, an organism frequently isolated by Dr. Ed Langford at the Animal Disease Research Institute, Lethbridge, Alberta, from cases of shipping fever. The objective of the exercise was to find how widespread the infection was in Saskatchewan and to ascertain if there would be any spread of the disease within a confined group of animals. Janzen, working with Dr. Hugh Nicholson of the Department of Animal Science, had access to the University of Saskatchewan Bull Station. It was decided to blood test and culture the throats of all bulls coming onto the station and to repeat this procedure at intervals. The blood testing and culture of nasal swabs was done by technician Molly Denson and graduate student, Dr. Gopi Nayar. Blood test results indicated that bulls from 85% of the farms represented were positive or carried antibodies against *Mycoplasma bovis*. Subsequent tests indicated that there was not evidence of spread in the station. This suggested infection early in the life of the animal.

This could have been productive work on a little known organism which is believed to be a contributing factor to a number of bovine respiratory diseases. However, with Bigland phasing himself out of research, the program was terminated.

(ii) *Bacteria and Viruses*

As classical shipping fever had been around for so many years and was related to many different causative factors variety seemingly all precipitated by stress, a great deal of work had been done in many individual laboratories on various aspects of the disease problem. Some laboratories concentrated on one or more of the viral causes. Others investigated stress and management factors contributing to the disease. As with neonatal diarrhea, my management took a comprehensive approach. It resolved to build up a team of scientists with the resources to investigate all aspects.

A major breakthrough was made at the Canada Agriculture laboratory of the Animal Disease Research Institute (ADRI) in Lethbridge, Alberta. There, a group of scientists headed by Drs. Klaus Jericho, Peter Stockdale, Bill Yates and Ed Langford, together with Lorne Babiuk of the W.C.V.M., devised a method whereby they could actually reproduce shipping fever at will! Until this time no research group had been able to actually cause the typical symptoms and pathology of shipping fever. The ADRI group found that young, susceptible animals which had not been previously exposed to any of the known viruses or bacteria could be initially infected with infectious bovine rhinotracheitis virus, then, precisely four days later, with a *Pasteurella haemolytica* organism administered by aerosol spray. In the majority of cases this precipitated typical shipping fever. As previously mentioned, a challenge model was the key to many definitive studies

on the subject. Accordingly, the ADRI information was utilized at the WCVM by Babiuk and later Stockdale on their studies of shipping fever.

When my organization initially took up the target of shipping fever in 1979, it tried to form a group within western Canada interested in the control of bovine respiratory diseases. This group included personnel from the WCVM, ADRI, the Federal Animal Pathology Laboratory in Saskatoon and my unit under the chairmanship of Bigland. The chairmanship was then taken over by Stockdale, who was at that time Head of the Department of Veterinary Medicine, WCVM, and later by Babiuk.

My boards did approve some funding for research collaborators at the WCVM, including Stockdale and his graduate student, Dr. Richard Smith, as well as a project by Babiuk and his post-doctoral fellows Drs. Lucia Branes from Chili, Helle Bielefeldt Ohmann, Denmark, and Robyn McGuire. Subjects included the study of infectious bovine rhinotracheitis, infectious bovine virus diarrhea, *Pasteurella haemolytica* and *Pasteurella multocida* and studies of the bovine lung macrophages and other cells in the lung associated with invasion by viruses or *Pasteurella*. In addition, attempts were made to prepare whole cell and subcellular vaccines against the *Pasteurella*, testing these first in a mouse model system, and later in cattle, using the ADRI challenge system.

In expanding the challenge system in Saskatoon, Babiuk was able to enlarge and refine it, utilizing not only animal isolation facilities within my building, but also utilizing the rented feedlot facilities at Dundurn.

(iii) Immunological Studies

In 1980-81 Dr. Tony Forman took over studies on immune mechanisms in cattle lungs, specifically the effect of infection with infectious bovine rhinotracheitis virus on the ability of the lung alveolar macrophages to prevent infection with *Pasteurella haemolytica*. When Forman resigned in July 1981 this work was taken up by Dr. Leo Filion, an immunologist with my staff.

Another aspect was the immunological studies on *Pasteurella haemolytica*, the most common bacterial pathogen involved in shipping fever. Dr. T. James G. Raybould studied extracts of the organism, which were tested as vaccines, and some showing the ability to protect calves against experimental pneumonia. This work was assisted by the production of monoclonal antibodies against several of the bacterial components. These were used to separate and isolate some of the main bacterial proteins and carbohydrates which could then be tested as potential vaccines.

(iv) *Potential Immunizing Agents*

Babiuk also continued his research on infectious bovine rhinotracheitis, one of the main viruses involved in shipping fever, together with additional work on *Pasteurella haemolytica*. With this combination he refined the calf challenge model, enabling him to test many different products including monoclonal antibodies, vaccines and interferons.

World scientists will watch this area with much interest, looking forward to subunit infectious bovine rhinotracheitis vaccines and possibly even synthetic peptide vaccines against this virus. In addition, work on *Pasteurella haemolytica* brings with it the prospect of vaccines against the surface structures of this organism or pili, and possibly an antidote to a toxin produced by the organism which kills white blood cells.

(v) *The Feedlot Epidemiological Project*

Cattle feedlots are integral parts of the cattle industry. In these well-organized industrial-type complexes, feeder cattle are fed increasingly rich diets, enabling the animals to achieve a weight gain of more than 1 lb. per day, up to the optimal weight of 1,000 to 1,200 lbs., where upon they are turned over to the packing industry for processing into a bountiful supply of delicious, tasty, grain-fed beef. Young animals entering the feedlot, generally weighing between 500 and 700 lbs., are purchased from many different sources. Frequently, groups of animals are picked up at the farm of origin for transport to the feedlot directly. In other cases, animals are accumulated in sales yards and auction markets, where the feedlot operator may buy 100 or more at a time. Trucks transport the animals from the farm or auction market directly to the feedlot - trips varying from 20 to 400 miles. Animals destined for feedlots in Ontario or Quebec are assembled at the same sources, then loaded onto specially equipped livestock cars or "cattle-liners" and transported approximately 2,000 miles. As you can see, patient reader, these gentle animals undergo a stressful conversion in habitat from their home farm, where they are generally defended by their mothers; through the shock of round up, vaccination, trucking, loading and unloading, to be ultimately mixed in with a group of strangers, where one must immediately begin to establish one's spot in the pecking order through display or threat of violence. Those destined for Eastern feedlots must also undergo the additional stress of travelling for several days while being jostled by other cattle in an extremely noisy conveyance subject to both extremes of heat and cold. No matter how much effort goes into easing the situation the stresses are still there.

The feedlot industry appears to run on a very slim margin of profit. One of the main threats to a financially efficient operation is a

fluctuation in market cattle prices (one of the greatest of which occurred in 1953 when the Foot and Mouth Disease outbreak in Canada blocked the U.S. border – cattle prices dropped from \$.38/lb. to \$.17/lb overnight). And, the other main threat is disease. The average *mortality* in feedlots is estimated at one percent, but this sky-rocketed to 30-40% in some instances, when specific disease outbreaks occur. The most frequent cause of death appears to be respiratory disease – frequently noted under the general classification of “shipping fever”. In addition to dollar losses due to mortality, there is also the financial threat to the feedlot operator of losses due to morbidity or sickness, when the animals will not gain a sufficient amount of weight per day – sometimes even losing weight or “standing still” despite costly food, care and handling. Such losses are frequently referred to as “wrecks”.

In view of such instances of sickness and death in feedlots – which is not unusual within any great concentration of animals or humans – there is little wonder that efforts began early in an attempt to pinpoint the causes of the sicknesses in an effort to reduce or eliminate them.

Veterinary scientists in many intensive cattle raising areas including prominent investigators in Colorado, Texas and North Dakota, conducted studies on feedlot diseases with particular reference to the bovine respiratory diseases. In Canada, veterinarians at the Ontario Veterinary College were concerned about numerous complaints by feedlot operators in Ontario of the high incidence of respiratory disease of young cattle arriving from western Canada. This concern spurred a study of animals shipped from west to east, early in the life of the WCVM. This was done by Dr. O.M. Radostits, who arrived at the new college in 1965 from the OVC. With the collaboration of Dr. Wayne Martin of OVC and partly assisted by Dr. Lynn Benson, a graduate student at the WCVM, he attempted to follow the bacteriological flora of the bovine respiratory system from a level encountered before leaving western Canada to the level present on arrival in Ontario.

Later, veterinarians closely followed, a project headed by Martin, but supported by all OVC departments, called the “Bruce County Project”. In this project several feedlots in the Bruce County area of Ontario were monitored weekly for incidence of disease, a study that included diagnosis, treatment and, if an animal died, necropsy. Publication of this work was of wide-spread interest.

At about the same time, a project was devised whereby Dr. Phil Willson and Dr. Harold Fast of my organization collaborated with Martin and Dr. Waltner-Toews of the OVC by vaccinating calves destined for Ontario feedlots with a series of vaccines purported to reduce the incidence of shipping fever. This and the Bruce County Project revealed that in many instances, vaccination was *detrimental* to the health of the animals. This work was substantially completed by 1981.

Also, around the time an ad hoc Canadian Bovine Respiratory Study Group decided to meet for general discussions at each annual meeting of the Canadian Veterinary Medical Association – or any other convenient time. Teams from OVC, the Faculte de Medecine Veterinaire, the WCVM, the federal Animal Disease Research Institute (Western) and my organization discussed in wide ranging forum the complex of bovine respiratory diseases. Each group had its strengths, and by collaboration, assigned or volunteered for research in a special area of study. For example, the OVC group had strength in epidemiology, the ADRI team had expertise and facilities for controlled challenge studies, and my organization had expertise in immunology, the study of cellular reactions and research on Pasteurella vaccines. Dialogue generally took the form of open and free discussion with each group realizing that the magnitude of the problem was such that no one group could afford to do all that was needed.

As a consequence of these discussions, it was recognized that one area of research seemed to be absolutely necessary. The problem was that no one really knew what was happening inside the feedlots to trigger sickness and death. It was obvious that a detailed epidemiological study utilizing computers, should follow each animal through the feedlot system, recording all parameters of its day-to-day life. No one had attempted this before because of the tremendous amount of work in gathering, computing and analyzing the data.

Dr. Acres' imagination was fired by the concept, as was that of Dr. Terry Church, who had at that time just completed a Masters degree at the WCVM and assumed a new position as Director of Field Services, Animal Health Division, Alberta Agriculture, Edmonton. These scientists trained in epidemiology started to lay out a program of study of feedlots. They looked for an epidemiologist to conduct the actual work, and sought funding for my organization to support the project. The epidemiologist hired was Dr. Susan Wilson, who possessed a Masters of Preventive Veterinary Medicine from the University of California. The funding came from the Alberta Agricultural Research Council through their "Farming for the Future" program. Feedlots chosen were in three areas of Alberta: Airdrie, Brooks-Taber and Lloydminster. The three investigators realized that to do the job properly the data had to be collected by someone trained in some aspects of animal health and not paid by the feedlots. Their solution was to hire three animal health technicians, mostly graduates of the Olds Agricultural College, to gather statistics from one or two feedlots daily. Fortunately, the feedlot operators were most interested in the project and assisted the animal health technicians whenever possible. All data was sent to Dr. Wilson in Edmonton, where she assembled it for computer analysis.

Preliminary data started to come out of this research project in

1985, when the collections were deemed to be complete. Final assessing of the literally millions of pieces of information takes a great deal of time and effort, but the final report is scheduled for 1988. This promises to be of tremendous value to feedlot operators and to the livestock industry by "pointing out" ways that respiratory diseases can be prevented!

A great deal of progress has been made on the bovine respiratory disease target since the feeble start in 1978 - all aimed at the eventual control of this costly disease.

k) Biotechnology

The term biotechnology enjoys several definitions, including: "the application of biological organisms, systems or processes to manufacturing or service industries"; "the utilization of a biological process, be it via microbial, plant or animal cells or their constituents, to provide goods and services"; and "the industrial use for cells and biological systems." To my Board, management and scientists it meant "the use of molecular biology to produce second, third or fourth generation vaccines or products useful to the control of the infectious diseases of animals targeted in my ten-year research plans."



Dr. Phil Willson - A veterinarian's lot can be a chilly one

In the 1960s scientists unravelled the secrets of the double helix DNA and defined structure and relationship to protein synthesis. In the 1970s molecular biology succeeded in cloning technology and recognized the complexity of chemical reactions in the living cell. In 1975, Drs. Cohen and Boyer reported a major breakthrough, the "genetic engineering" or removing of genes from one species of organism and the transplanting of these into the DNA of a different species.

The latter patented discoveries fired the imagination of scientists and scientific administrators throughout the world. Several countries, including the United States, France and Britain, began to pour huge sums of money into the work of scientific teams, intending to utilize the marvelous advances in molecular genetics for the production of new and saleable products.

My management and scientists were also so inspired, but lacked the magnitude of funds necessary to build up a team of specialized scientists. Such a team would be necessary to take a product from its initial research area through the many dozens of steps leading up to a com-

mercial product. Despite these misgivings, my scientists and administrators could see that biotechnology was the wave of the future – the next step after the production of the conventional vaccines on which we are currently engaged.

A major commitment to the area of biotechnology was taken in the early 1980s with the appointment of Dr. G.R. Hudson in October 1982. He became the second member of the biotechnology team with Babiuk. Hudson is a molecular biologist who obtained his Ph.D. at the University of Florida and also completed a post-doctoral study in molecular biology at Duke University in North Carolina. He complemented the interests of Babiuk in the area of biotechnology and was soon joined by a post-doctoral fellow, Dr. Marta I.J. Sabara, from Manitoba. Their



Dr. Marta Sabara conducting a gel test

first project was developing genetically engineered and synthetically produced antigens for bovine rotavirus and coronavirus, two of the causes of neonatal diarrhea. Also contributing to the team was Dr. Leo G. Fillion, an immunologist, Dr. Colin F. Crouch, a virologist, and Dr. T. James G. Raybould, a microbial immunochemist. Besides work in their individual fields, they contributed to the area of biotechnology through the production and refinement of monoclonal antibodies which provided exquisitely targeted diagnostic techniques and procedures aimed at the subcellular components of various viruses and bacteria.

In 1983, my Director observed in the Annual Report that,

“VIDO is in the forefront of biotechnology in animal health in Canada. Six person-years of effort are devoted to work on recombinant DNA vaccines and to hybridomas for the production of monoclonal antibodies. This small team should be expanded with several other disciplines that are necessary to complete the cloning, expression, fermentation and purification of genetically engineered products for animal health care. To support such a team properly, the cost is estimated at approximately \$2 million per year. Since this amount is well above VIDO’s present budget for all areas, VIDO has to elect one of three options: a) find additional money to expand our genetic engineering team, b) link up with a biotechnology company which is already successful (the majority of these are in the U.S.A.), or c) terminate the genetic engineering research.”

This mind-expanding statement was made in the face of difficult economic times, a reduction in research budgets and even a regrettable reduction in my staff. Despite this, several attempts were made to build up a strong team in the area of biotechnology for animal health.



Dr. Dirk Dereg using the ultracentrifuge

One of these attempts was discussed in depth with Dr. Richard Quitenton, head of the Saskatchewan Economic Development Corporations Innovation Place, a large research park just north on the University campus. Briefly, the proposal was for BIOSTAR to rent part of a large

laboratory area in familiarly known as the incubator mall. The laboratory was to be a turn-key operation, complete with furniture and equipment necessary for a first-class biotechnology research laboratory. BIOSTAR would then contract with my organization to utilize the facilities, employing both BIOSTAR and VIDO personnel. It was planned that operating funds would come from provincial and federal grants and contracts with commercial companies. This proposal was discussed with SEDCO head Mr. Neil Overend by Bigland and Hodgman. Mr. Overend was sufficiently interested to request a complete detailed proposal for his consideration, possibly in a form that could be taken to the provincial cabinet. Unfortunately, the deadline for the brief was 30 days — which my officers found impossible to meet, although the process was started. More unfortunately, no second chance came along, as it was only a few months later that the NDP Government was defeated and many of the programs of SEDCO disbanded.



Mr. Raul Tabelon using a biohazard hood

The second proposal was partially developed for the National Research Council, in which an informal request was made through Dr. Vern Seligy of the NRC and Dr. John Vose, administrator for the Program for Industry/Laboratory Projects (PILP). Part of this proposal outlined for financial support, primarily for personnel in my laboratory, some of whom could be trained in the laboratories of Dr. Seligy in Ottawa.

A third attempt at financing biotechnology was a proposal to Dr. M. Brossard, Vice-President (Biotechnology) for the National Research Council in Ottawa. The federal government at this time, had decided to concentrate on biotechnology, first in western Canada at the Plant Biotechnology Institute in Saskatoon, and then by building a new laboratory in Montreal to concentrate on other aspects of biotechnology. My proposal to Dr. Brossard was to help train some of his new staff in the various aspects of biotechnology in which expertise existed in my laboratory. In return for this, NRC would support a number of the research projects that would be the basis for such training.

None of the above attempts worked!

However, the saving grace for my struggling staff in biotechnology was the recognition in 1984 by the Natural Sciences and Engineering Research Council (NSERC) and the National Research Council that my scientists could be eligible for research grants. In addition, BIOSTAR, as an "arms-length" company, in the business of the research and marketing of animal health products, could also be eligible for research grants. As well, research chairs within my organization were being funded through NSERC, and it was not long before Babiuk and Sabara were holders of such research chairs. In addition to providing their salary, they also provided some research funding.

These additional opportunities were vigorously pursued by Acres and Babiuk, who were able to continue building the biotechnology team, replacing Hudson, Crouch and Raybould, who resigned, and expanding the team to nine, not including three graduate students. The biotechnology team currently consists of Dr. Lorne Babiuk, Associate Director (Research) – virology; Dr. Marta Sabara – molecular biology; Dr. Kerry Ready – molecular virology; Dr. Pat Frenchick – immunochemistry; Dr. Mike Parker – recombinant DNA technology; Dr. Andy Potter – bacterial genetics; Dr. Sylvia van Drunen Littel-van den Hurk – molecular virologist; Dr. Gwen Hughes – molecular biologist; Dr. Mark Redmond – molecular biologist; Dr. Richard Harland – clinical epidemiological researcher; assisted by Dr. Dirk Deregt, Mr. Graham Cox and Mr. David Fitzpatrick, graduate students.

This team now has some of the most sophisticated equipment in the area of biotechnology, and is making its mark on future animal health biotechnology research.

1) BIOSTAR Inc.

Well, tolerant reader, most likely you are wondering why on earth the name of a commercial company pops up here in our discourse concerning my research. Well, the answer goes back a long, long way in my life to a time when Bigland and Permut (with the advice of consultant Al Rankin) were making their numerous fund-raising assaults on various

“line” departments in Ottawa – those thought to be interested in the health of Canadian livestock and progress in scientific research. They met only the proverbial stone wall in the form of a tightly mortared series of programs and policies to which my organization was not eligible! But, the first glimmer of the government allowing departments to “contract out” research and programs to private industry was being seen, and this seemed to be the chink in the armour we were looking for. However, such did not turn out to be the case. The line departments did not seem to care to have anything to do with me, turning my management consistently back to the department of agriculture, which, for its part had very limited “contracting out” funds for research. Perhaps, this was just as well. Over the years, individuals and firms who did enter into contracts with the federal government claimed that the cost of constant accounting, supervision and restrictions negated much of the advantage of the contract funds.

However, in the various sojourns from office to office in Ottawa, the message became clear that if my organization were a *commercial* firm then the purse could be opened, with business unlimited.

Inquiries were made of many sources as to the possibility of my organization becoming a limited commercial company. However, this was soon ruled out, because it would change my character from that of a charitable, non-profit unit of service to the livestock industry to a straight commercial endeavor. Such would eliminate most of our financial sources. For this reason, the idea of “VIDO Ltd.” was laid to rest.

But at the same time, my officers were being more and more involved with commercial activities and marketing, as a result of the necessarily complex business of getting our many vaccine successes out to the livestock producers who needed them. In addition, federal policies appeared to be opening up for business endeavors, providing assistance for personnel, research and marketing – all available only to commercial companies. These forces combined to stimulate Hodgman and Bigland into reconsidering the idea of a commercial company to assist my organization in marketing, research and possibly production. The ideal form seemed to be that of a “spin-off” commercial company to do all the commercial dealings for me – allowing my scientists and officers to concentrate on the research endeavors. For months, even years, the idea was discussed – how to finance it, who would be the shareholders, what would be the share structure, how to get incorporated, and all the multiplicity of detail and minutia necessary for starting a new endeavor.

A key consideration was my actual identity. Although my research was financially supported by outside organizations and the direction of the research was independent of the University, we were still an identified part of the University of Saskatchewan. As a consequence, any

moves we made towards incorporating a "spin-off" company must be with the approval, sanction and collaboration of the University.

The idea of the University initiating or being involved in quasi-commercial activities had been discussed for many years on the campus and a "development corporation" had once been proposed by former chairman of the board Dr. Jack McFaul. The University's reticence in engaging in commercial activities stemmed from the sound reasoning that, since it was a government-financed organization, it should not be competing in the marketplace with private industry. McFaul's argument was that the seeds of commercial activity sprouting in university laboratories should be nurtured and encouraged to find their way into the commercial field. In this way, the University could be the incubator of new and innovative commercial businesses.

Many attempts were made to ease the University in this direction, towards at least moral support for such new companies, but so great was the possibility of a back lash by industry, that little or no action was taken.



BIOSTAR Inc.

However, one thrust which did materialize into a commercial endeavor was SED Systems Limited. This entity grew out of the Space Engineering Division of the Department of Physics, a unit which had developed advanced capabilities in the construction of rockets and satellites as an outgrowth of their study of plasma in the upper atmosphere. Their reputation spread so rapidly that contracts began to come in all over the world. The burgeoning department was soon outstripping university facilities in its need for equipment, personnel and building accommodation. The result was that much of the unit moved off campus, to buildings near the airport recently vacated by the airforce. At that point, SED Systems became incorporated, shares were sold, contracts accepted and goods delivered - an apparently successful commercial spin-off from the University. The University however did have great concerns over the financial and internal structure of SED Systems. It is rumoured that many of the twists and turns of commercial endeavor greatly worried its officers over the years. As a consequence, the University was reticent to go through it all again with my organization.

However, in response to faint glimmers of hope from the University and a positive reaction from my board of directors, an exploratory meeting was attended on May 11, 1981, by Ben Thorlakson, chairman of my board of directors, Bigland and Hodgman, along with John Stack and Pamela Haidenger-Bains of the law firm McKercher, McKercher, Stack, Korchin and Laing, who represented the University of Saskatchewan. The topic for discussion was the possible incorporation of a commercial spin-off company from my operations for the purposes of marketing my vaccines and other inventions.

Among the first things required in the incorporation of a company is a suitable name. By August 1981, names such as VITEC, VIVAX, BIOTEC, BIOVET, VETBIOS and BIOSTAR had been suggested. The latter name had been proposed by Paul Hodgman, which was indeed fortunate, because on November 19, 1981, Ms. Haidenger-Bains received word that BIOSTAR was the only name on the list that qualified for federal registry.

The intervening time had not been wasted, but rather had been used for firming up decisions on the full BIOSTAR proposal. These were taken to University President Leo Kristjanson on January 4, 1982. His review and suggestions were incorporated into a document dated February 1, 1982, "Questions Concerning BIOSTAR Inc.", for presentation to the University Board of Governors on May 14, 1982. In January 1983, the final document was sent to Ottawa for incorporation, a process completed in March 1983.

My 1982-83 Annual Report, notes the following for BIOSTAR Inc.

"The Veterinary Infectious Disease Organization (VIDO) and the University of Saskatchewan have established a new arm's-length commercial company called BIOSTAR Inc. in order to better facilitate the development and marketing of VIDO products. BIOSTAR is a federally incorporated profit-making corporation designed to give VIDO's vaccines and other commercial products better exposure to national and international biological production companies and markets.

Products which are under development and which have been assigned by agreement from VIDO to BIOSTAR include: 1) A subcellular *E. coli* vaccine for enterotoxigenic colibacillosis in calves. 2) An inactivated rotavirus-coronavirus vaccine. 3) Rota and coronavirus vaccines developed by biotechnology. 4) A vaccine for *Pasteurella haemolytica*. 5) An *Haemophilus pleuropneumoniae* vaccine. 6) A live attenuated purified spleen extract vaccine for hemorrhagic enteritis. 7) A tissue culture produced hemorrhagic enteritis vaccine. 8) Monoclonal antibodies.

VIDO also plans to participate with BIOSTAR in contracts for the testing of selected animal health products for international

manufacturers and in a Science Council of Canada study on biotechnology in animal health.

The Board of Directors of BIOSTAR are Mr. Willard Kallio of Dinsmore, Saskatchewan (Chairman), Mr. Paul Riese of Selkirk, Manitoba (Vice-Chairman), Mr. Ben Thorlakson of Airdrie, Alberta, Mr. Malcolm Sheppard, Dr. Howard Tennant and Dr. Chris Bigland of Saskatoon. The major shareholder of the company is the University of Saskatchewan with the balance of the shares held in a Trust and in the BIOSTAR Inc. treasury.

Officers of BIOSTAR are Dr. Chris Bigland (President), Mr. Paul Hodgman (Executive Vice-President) and Mr. Malcolm Sheppard (Secretary-Treasurer).

BIOSTAR will be issuing its own Annual Report in 1984.”

Since its incorporation, this commercial “arm’s-length” company continues to serve Canada well. Since incorporation, some changes have been made, including a new president in the person of Dr. Stephen D. Acres, a new executive assistant in Ms. Charlene L. Nicholls-Nixon and a few changes on the board of directors. BIOSTAR continues to collaborate closely with my organization, accessing the markets of the world to channel my vaccines, antibodies, test kits and other inventions into commercial products for the good of livestock and the livestock industry.

m) Vetgen Limited

Dr. A. Ernie Pallister, the first chairman of the board of advisors and board of directors stepped off the directorship of my organization March 2, 1981. He was sorely missed!

As president of Pallister Resources Management Ltd., he had many other activities in addition to guiding my organization. One of these was as a consultant to the North American Ventures Fund, a venture capital organization whose job was to make money for its partners and shareholders. It did this by financing new businesses and new commercial ventures, helping to manage them until they were fully functional and then either taking dividends or selling their shares in the company for a handsome profit. Dr. Pallister had not forgotten my organization or the process leading up to commercial application of the vaccine VICOGEN, with which he was intimately involved. As a consequence, he and other members of the North American Ventures Fund, namely George Fells, Graham Percy, J. Al Spence and Philip McCarthy, together with consultant Dr. Angus Bruneau of Bruneau Resource Management, St. John’s, thought there might be the possibility of establishing a veterinary biological production and marketing company in western Canada — Vetgen Ltd., it was tentatively called. It would be similar to BIOSTAR, that is utilizing the research capabilities, inventions and

vaccines originating from my organization and commercializing on them. The major difference was that Vetgen would be at an even greater arm's-length from me, and would have the capability of pouring enormous amounts of money together with expert management capabilities, into a project. There is a possibility that North American Ventures Fund had sensed the impending decision by Connaught Laboratories Limited to close down their veterinary biologics section, leaving Canada with only two biological companies producing veterinary vaccines, the Institut Armand Frappier in Montreal, Quebec, and Langford Laboratories in Guelph, Ontario.

Dr. Pallister's initial proposal interested my management and the executive of the board of directors, enough to have him invited to give a full presentation to a board meeting slated for May 14, 1982, in Regina. The Board too was impressed and gave management the green light to further proceed on negotiations with Vetgen Ltd.

The speed of negotiation was phenomenal! Within 11 days a complete Vetgen proposal had been submitted, with requests for names of consultants who could be hired in the area of veterinary biologics. During the next month, tentative contracts between VIDO and Vetgen had been drawn up, a business plan outlined and extrapolation of products coming onto the market from my research detailed, together with an estimate of the amount of money that could be made through the sale. By June 29, Fells, Pallister and Spence, together with their consultants, Dr. Peter Langer of Ottawa and Dr. George Appleton of South Carolina, USA met with my management for a closed session task force meeting.

During July and August more work proceeded on a business plan, contracts for first right-of-refusal on my vaccines and inventions, further extrapolation of possible markets and the amount of money that might be realized. By September 7, the North American Ventures Fund was concerned that the rate of return on such veterinary products would not be high enough to justify proceeding, and confirmed this by letter of September 20, terminating negotiations.

It had been an exciting, stimulating look into the operations of a fast-moving venture capital project, and all concerned were sorry the proposal could not proceed - especially the opportunity of working again with Ernie Pallister.

My management learned a lot from the Vetgen experience and used this to its advantage when dealing with Mr. Denny Doyle. He was a very successful business entrepreneur brought in by the government of Saskatchewan to foster venture capital projects in the province. Hodgman and Bigland discussed the establishment of a company similar to BIOSTAR with him. Although this proposal looked promising and my management did attend a number of meetings with venture capital

managers, the experience with Vetgen made them realize that a tremendous amount of pressure would be put on scientists, administration and the board of directors if such a venture were to proceed. The experience re-emphasized the need for a more co-operative or "captured" company such as BIOSTAR.

CHAPTER 9

Miscellaneous

a) Honorary Doctorates

Thank goodness you are a **tolerant reader** or you would not still be with me. Such tolerance may be taxed, because I now want to brag a little about the calibre of five people who helped direct my activities in the early years, and who, aside from the many services to me, served their fellow Canadians in other aspects well enough to be awarded honorary doctorate degrees. Three of these are mentioned in my Annual Report of 1980-81:

“VIDO basked in the reflected glory of three honorary doctorates given to Board Members recently. Dr. A. Ernie Pallister received the degree of Honorary Doctor of Science from Memorial University, Newfoundland, May 31, 1980. Dr. R.E. (Bob) Begg and Dr. Jack McFaul received Honorary Doctor of Law degrees from the University of Saskatchewan May, 1981.”

In 1983, these three were joined by Dr. Boyd Anderson who received an Honorary Doctor of Law degree from the University of Saskatchewan. And on June 5, 1986 and by Dr. Chris Bigland, my first director, who was honoured with the degree of Doctor of Science by the University of Guelph.

b) Think Tank Retreats

My management in 1979 had the bright idea that it would be a good

idea for all research personnel to be whisked off to some remote spot, there to "get to know one another" and talk about research and projections into the future. This idea was greeted with enthusiasm by most of the research people, who no doubt envisaged a pleasant weekend "holiday". Arrangements were made for accommodation at the Red Deer Motel at Waskesiu in Prince Albert National Park, for June 25-27, 1979. The "VIDO van" was able to accommodate Steve Acres, Tony Forman, Margot Buckley, Chris Bigland and Brian Freeze. Paul Hodgman and Bob Kapitany travelled in Hodgman's car. The weekend turned out to be far cry from a holiday. Immediately upon arrival, a meeting room was set up with blackboard, easel, projection screen and overhead projection and the first session started. It did not end until later in the evening. There were three sessions the next day and even one on the day of departure. Everyone had an opportunity to review present research and what was expected in the future in addition to my funding and philosophy. Many questions were asked, and all were answered in detail. Everyone had an opportunity to express their views.

The retreat served its purpose by prompting criteria, analysis of my past, present and future by those to whom I mattered most. As research staff expanded and changed, the need for another "retreat" seemed apparent, but the scientists at that time seemed to oppose the idea - perhaps those in the future will realize their value.

c) Beer Nights

Most of my professional and technical staff got along very well (with the odd inevitable exception). In order to promote the feeling of one "big happy family", a number of get togethers were arranged either by management or the staff themselves. One such meeting took the form of a "beer night" at least once a month after work, where all who wished to, could quaff a bottle or two and generally socialize. This generally took place in the lunch room, with one of the staff volunteering to purchase the beer supplies and "sell" the bottles to the others. Julie Whitebone was frequently commandeered for this job and did it very well. The beer nights were going so well we were even able to invite the personnel from the new Canada Animal Pathology Laboratory and the Protein Oil and Starch Plant to participate in it.

The demise of the beer nights was sudden. It hinged on the fact that a permit from the University had to be obtained before any alcoholic beverage could be served on campus. This permit was essential to the actual purchase of liquor from the provincial Liquor Board Store, where another additional permit had to be obtained. Unfortunately the University started to encounter problems with unlicensed liquor parties among the students (and possibly the staff?) and so clamped down on the issuing of permits. Letters of permission or permits from the Univer-

sity were generally issued by the assistant to the president, Mr. Roly Muir, who I am, sure was uncomfortable in turning down requests for my regular beer nights.

d) Parties

My management and staff seemed to seek every opportunity to hold parties. One of the first was on August 12, 1976 – the “One Year Anniversary” of the Ground-Breaking Ceremony in which the oxen team of Mike Pearson and John Diefenbaker broke the first sod for my building. Although my staff was small, my party was impressive. Molly Denson spearheaded the arrangements with a big birthday cake, a fruit punch and the inevitable wine. The Department of Veterinary Microbiology and the WCVM were invited, and a number of others from around the university were able to attend. The feature of the day of course was the tour through the my laboratory, then in mid-construction, with hard-hats and rubber boots essential gear.



Part of the presentations of souvenir bottles of the first VICOGEN calf-scours vaccines. – L-R: Dr. Bruce Schnell, Dr. Chris Bigland, Mr. Paul Hodgman, Dr. Ole Nielsen, President Bob Begg

Other occasions for parties were the birthdays of any member of the staff who would admit to having one, farewell parties for departing staff members and subsequent anniversaries of my opening. In each case, cake and ice-cream were served at coffee time.

Coffee was also a time for members of the staff to celebrate highlights in their lives or to celebrate “just for the hell of it”. Ice cream, special cakes, cookies and other “goodies” or produce from the garden were often brought out, to augment regular coffee supplies purchased from “The Coffee Fund”, which was self-supporting under the diligent watch of Mrs. Molly Denson. In this way, coffee times served to weld the “family” together. Here, not only were there the usual political

discussions, personal vignettes and some arguments, but also important discussions of research findings, research co-ordination, animal availability and many other work-oriented topics.

Many other events such as staff picnics, barbecues, Christmas parties and other get togethers were efficiently organized by Mrs. Irene (Zacharko) Kosokokwsky, sometimes at the home of Mrs. Phyllis Green, the staff's adopted "den mother".

e) The Pallister Roast

Another special party held on June 4, 1981, was "The Ernie Pallister Roast". Although Dr. Pallister had left the board of directors, his influence during my establishment and formative years made such an impression on my officers and board members that they tried to think of some appropriate way to honor him for all of his endeavors on my behalf. His life with me was just one of his many lives or areas of interest, and it was soon discovered that other groups would also like to honor



The Ernie Pallister Roast

Pallister for hard and constructive work for them. So was born the idea of "the Pallister Roast" in which we could all participate!

With the clandestine help of Mrs. Claire Koven, Pallister's "girl friday", all groups were contacted, a location selected (the Petroleum Club in Calgary), speakers to roast the victim, secured a program outlined and a "front man" (Angus Bruneau) elected to lure Pallister to the banquet - *all in the strictest secrecy!* The "roasters" - each from a different facet of Pallister's life - revealed many of the "shocking and gory" details of his activities in their sphere. Many presentations were made including tee-shirts (suitably monogrammed), a giant cowboy hat and other suitable mementos - culminating in a diamond ring for which

everyone had chipped in.

I have included a picture of this special event and the names of the participants for your enjoyment. However, for the record, it should be noted that one or more friends and representatives of the following groups were there:

Retired (Bud Coote)

C-CORE - Center for Cold Ocean Research Engineering (Angela Bruneau, Harold Snyder)

Devonian Group of Charitable Foundations (Don Harvey, Patrick Harvie, Jim Fish)

Trimac Ltd. (Tony Vanden Brink)

H & T Resource Management Ltd. (Fred Hildenbrand)

Concept Resources (Larry Darling)

Alberta Provincial Judiciary (Tevie Miller)

Western College of Veterinary Medicine and University of Saskatchewan (Ole Nielsen*)

Thorlakson Feedyards (Ben Thorlakson*)

Pallister Resource Management (Ernie Pallister and Claire Koven)

Villa Oil and Gas Ltd. (Noah Cohen)

VIDO (Steve Acres, Paul Hodgman, Phyllis Zoerb, Chris Bigland*)

Government of Canada (Lorne Greenaway)

Kenting Ltd. (Tom Jones)

Saskatchewan Wheat Pool (Charlie Leask*)

Alberta Egg and Fowl Marketing Board (Orest Lukey*)

Hereford Breeders of Alberta (Zane Block*)

Matthews Photo Lab Ltd. (John Matthews)

Ontario Dairy Breeders Association (Jim McCague*)

Manu-Life (Jack McFaul*)

Alberta Agriculture (Art Olson*)

B.C. Dairy Producers (Barry Peterson*)

Karmona Stock Farms (Paul Riese*)

Canadian Turkey Marketing Agency (Carol Tiechrob*)

Francis Williams and Johnson Ltd. (Tag Watson)

Saskatchewan Provincial Government (Walter Weir*)

James E. Wood and Associates Ltd. (Jim Wood)

*VIDO Board of Directors

f) The Safety Committee

Everyone in my organization seemed to be very conscious of safety in the workplace, especially the pathogenic organisms with which they

worked, and potentially toxic or explosive chemicals such as ether and other solvents and disinfectants. There was also the ever present danger involved while working with animals such as cattle, pigs, mice, turkeys and other species.

As my staff grew, it seemed a logical extension of this safety consciousness to establish a safety committee. This would be made up of members of technical, clerical, scientific and management staff, to hear any concerns of those working in my building and to take appropriate action.

The first safety committee was established shortly after the move into my main building in 1978. Members at that time were Margot Buckley, Bob Kapitany, Sandy Feschuk and Marsha Permut. Over the years, many members of my staff have served on the safety committee, but one, Sandy Feschuk (now Mrs. Sandy Klashinsky) is the longest serving and is in fact still active. Others include: Barry Carroll, Dee (Kattler) Kirchmeier, Gloria Falk, Robyn McGuire, Richard Monseler, Leo Filion, Jim Raybould, Heather Green, Raul Tabelon, Bonny Beswick, Chris Bigland, Steve Acres, Trent Watts, Marta Sabara, Pat Frenchick and Phyllis Mierau.

The safety committee has served a most useful purpose for the protection of my personnel and property, looking into such wide-ranging topics as smoking and non-smoking areas, proper storage for explosive and volatile materials, the proper handling of radioactive materials and pathogenic microorganisms, and concerns about snow falling off the roof onto foot-paths.

In addition, the safety committee has provided films on safety and proper use of equipment such as bio-hazard hoods. It also liaises with the University's occupational safety committee upon which it has a member. Recommendations of the committee are viewed with serious concern and appreciation by my management, and action is taken when at all possible. (The most expensive action was renovating the roof of my building to prevent snow and ice sliding off - the cost was approximately \$47,000).

g) The Scientific Program and Advisory Review Committee (SPARC)

Since the inception of my research programs, it has always been the plan to invite an outside body of people to review my research endeavors and make recommendations for future research. Such an outside review is advantageous from the point of view of all donors, the livestock industry, governments and even the research personnel, in this way to ascertain if the research conducted is on the forefront of science, relevant to the livestock industry, properly planned and designed and executed with the appropriate equipment and research management.

A number of ideas on the composition of such an advisory committee were discussed by the board of advisors, the governing committee and eventually the board of directors. The latter, under the chairmanship of Mr. Ben Thorlakson, in 1981 instructed my management to proceed with the establishment of a review committee. Acres was knowledgeable about potential members of the committee and was given the job of contacting a short list to see who would be willing to serve. I was fortunate in his choice and the willingness of the following to be members of such an important review committee:

- Dr. Howard Fredeen (Chairman), Research Scientist, Animal Breeding Section, Research Branch, Agriculture Canada, Lacombe, Alberta;

- Dr. Malcolm Perry, Senior Research Officer, Division of Biological Sciences, National Research Council, Ottawa, Ontario.

- Dr. Ken Rozee, Professor and Head, Department of Microbiology, Faculty of Medicine, Dalhousie University, Halifax, Nova Scotia,

- Dr. Russ Willoughby, Associate Dean (Research) Ontario Veterinary College, University of Guelph, Guelph, Ontario.

The committee spent three full days in Saskatoon, meeting with the board of directors and individual scientists and reviewing the research in detail as laid out in the "logical framework matrices" prepared by each scientist and approved by my management and board of directors each year.

The committee's report was published by my management in early 1982 as "Report of the Scientific Program and Advisory Review Committee (SPARC), An External Review".

The summary noted "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 is highly productive. The scientific staff is vigorous and enthusiastic and the research atmosphere is confident and buoyant.

Documentation of the research projects were comprehensive. We commend VIDO for the adoption of the logical framework matrix approach which greatly facilitated the review process.

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

The recommendations of the SPARC were good ones, and my management has been working towards their implementation as follows:

"1) Staffing: specific requirements were considered to be: a) recruitment of a senior scientist to share the administrative respon-

sibilities and augment research capabilities. b) Recruitment and training for an assistant for Paul Hodgman, Executive Officer. c) Recruitment for a replacement for Dr. Harold Fact, swine veterinarian. d) Statistical expertise engaged as required on a consulting basis.



VIDO's First Birthday Party



Retirement Party for Chris Bigland - 1984 - L-R: Paul Hodgman, Chris Bigland, Steve Acres

2) The feasibility of joint staff appointments with the University of Saskatchewan/Western College of Veterinary Medicine (WCVU) seems to merit further exploration.

3) Consideration might be given to providing more time for further reviews, particularly the interviews with individual scientists. This

would enable SPARC members to gain greater insight into specific aspects of each area of work.’

With my organization now undergoing dynamic growth under the direction of Acres and new research thrusts under the direction of Babiuk as well as increasing joint activity with BIOSTAR Inc., it will soon be time to think of a new SPARC review.

h) The Canadian Encyclopedia Pays Attention to Me

Considering that I started out as just the germ of an idea in 1973, the Canadian Encyclopedia of 1985 thinks I have come a long way. If, as some wise man was supposed to have said, “the world is not just built of sticks and stones and sweat – but is primarily built of ideas”, then it is ideas too which have build me. This idea has been grasped by all who were part of me over the years. The Canadian Encyclopedia appears also to recognize my progress as I was mentioned in five places:

1) Under animal breeding – “Genetic engineering techniques are being applied in research at the Veterinary Infectious Disease Organization (VIDO), University of Saskatchewan Campus, to create new vaccines for livestock diseases.”

2) Under genetic engineering – “The Veterinary Infectious Disease Organization, based at the University of Saskatchewan, Saskatoon, is using genetic engineering technology for production of new vaccines for livestock diseases.”

3) Under veterinary medicine – “An example of an important Canadian contribution to the control of animal disease world-wide is a vaccine against neonatal diarrhea in calves, caused by certain strains of the bacterium *Escherchia coli*. Developed by VIDO, the vaccine was marketed by a Canadian firm.”

4) Under veterinary medicine industry – “In 1979, the Veterinary Infectious Disease Organization (VIDO) in Saskatoon, developed a vaccine to protect calves against calf-hood diarrhea caused by the bacterium *Escherchia coli*. This vaccine is unique in that it confers protection against all known disease-producing strains of *E. coli* by employing hair-like projections (pili) on the surface of the cell as the immunizing agent. The antibodies produced by the mother in response to these pili, which are passed to the calf in the colostrum (precursor of milk) during the first 5 days of life, prevent *E. coli* bacteria from attaching to the inner surface of the intestinal wall, a process which is necessary for the organism to produce disease.”

5) Under Virus – “Agriculture Canada and certain of the universities (notably the University of Saskatchewan, Saskatoon, through the Veterinary Infectious Disease Organization) operate extensive programs on viral diseases of animals.”

i) Research Collaborators

Cheer up, most-patient reader! We're almost to the end! However, I did want to say a few words about some very important contributors to my research endeavors – the research collaborators.

I know that the word “collaborators” was a derogatory term during the Second World War – meaning natives of occupied countries that worked closely with the Nazi invaders. However, I hope that after 40 years the excellent word “collaborator” has been purified and now simply means “a person working with another person to a common objective.” (Possibly the former meaning of the descriptive and joyous word “gay” may be similarly restored to the English language some day). This term was used to designate a scientist who was not on my payroll but was working with my scientists towards the common objective of controlling an infectious disease of food-producing animals. In many instances, the collaborator was funded from outside sources. But in other instances, he could make application and be allocated part of my budget for his research endeavors. The work of the research collaborators was extremely important to my initial research thrusts – especially when my staff was just starting to grow in number and stature. I will always be grateful for their magnanimous efforts.

Over the years, many research collaborators have contributed to my research projects with or without funding. The complete list is given in Appendix “H”.

Also contributing were the managers and staff of the following: University of Alberta Kinsella Ranch; nine feedlots in Alberta involved in the Alberta Feedlot Study; University of Saskatchewan Termeunde Farm, Lanigan; University of Saskatchewan Goodale Farm, Saskatoon, and the Saskatchewan Provincial Farm at Lebret.

Other scientists were invited to utilize my facilities to aid their research when it was for the benefit of the livestock industry. Included among these were the following: the Prairie Swine Center (used isolation facilities for SPF derivation of their initial swine herd) Western Development Museum and the Ukrainian Museum (both used the vacuum fumigator); D. Armstrong, WCVM; Sue Friend, WCVM; Henry Klassen, Department of Animal and Poultry Science; Claire Youngs, PRL-NRC (all used the animal isolators).

j) Visiting Scientists

I have been honoured in having a number of distinguished scientists work in my laboratory and with my research scientists. Some of these have been from other countries and include the following:

1976-1977: R.W. Worthington, University of South Africa. Dr. Worthington is a veterinary biochemist and was working on stable toxins of *E. coli*.

1981-1984: Dr. Helle Bielefeldt Ohmann of Denmark. Dr. Ohmann is a virologist and immunologist who worked on various projects including bovine virus diarrhea, immunological aspects of bovine lung macrophages and lymphokines.

1981-1982: Ladazlav Rodak of Czechoslovakia. Dr. Rodak is a veterinary virologist and was working on radioimmunoassays for rotavirus.

1982: Arnold Verbeek of Holland. Mr. Verbeek was a student with Jan van den Hurk working on virological tests for hemorrhagic enteritis virus.

A number of Canadian scientists have also worked in my laboratory for short periods of time, either utilizing equipment not otherwise available, or learning techniques.

k) Tours

As an early thrust in public relations, various groups and individuals were invited to tour my laboratory and facilities. These tours started early in the construction phase and are still continuing. Several guest books have been filled with prominent names from Canada, U.S.A., U.K., France, Germany, Belgium, Denmark, Holland, Czechoslovakia, Bulgaria, Russia, Israel, China, Japan, Korea, India, Mexico, Argentina, Hong Kong, Saudi Arabia, South Africa, New Zealand, Barbados, Australia, Nigeria and Brazil. In the early years when my staff was small, the tours were conducted by a volunteer, Jim Grainger of Saskatoon. Gradually, as the staff increased and complexity of the building increased, the tours were taken over by my own personnel. Besides the tour of the building, groups were subjected to such intense public relations endeavors as a slide/tape presentation, brochures, fact sheets on various diseases and, on occasion, annual reports. If the group was sufficiently distinguished they were given a "VIDO cap" - a golf-style cap, blue in color with my emblem emblazoned on the front. Most visitors were good natured and immediately put on the caps. It seemed to give great pleasure to my personnel, to see caps on such distinguished guests as federal agriculture minister Eugene Whelan, Saskatchewan ministers of agriculture, Edgar Kaeding, Eric Berntson and Lorne Hepworth and Alberta ministers of agriculture Marvin Moore and Leroy Fjordbotten. Delegations from Russia, China and Korea together with the representatives of many commercial companies in Canada, U.S.A and Europe also walked away wearing VIDO caps.

I was also honoured with tours from interested agricultural organizations, including the Saskatchewan Department of Agriculture who brought successive groups, the Saskatchewan Wheat Pool, the Alberta Cattle Commission, Saskatchewan Stockgrowers, Canada Cattlemen's Association; Charolais Association; Canadian Egg

Marketing Agency; Canadian Turkey Marketing Agency; various beef clubs and a number of Agriculture Canada representatives.

The visitors were invited to put their names onto our mailing list, which entitled them to receive copies of the newsletter "VIDO Views" or "VIDO Reports", fact sheets on various diseases of food-producing animals and my Annual Report. In this way, they and the organizations they represented were kept up to date on my progress and the latest developments in diseases being investigated by my scientists.

l) Innovation Place

In the December 1976 issue of "Viewing VIDO - No. 4" the editor, Marsha Permut, welcomed the announcement of western Canada's first research park. This was to be located on eighty acres north of the main campus of the University of Saskatchewan, a joint venture of the University and the Saskatchewan Economic Development Corporation (SEDCO). The park was to bring together in one location agencies of government and private industry that engage in research and development. Twenty or more research units were expected to locate in the park over the next decade, to pursue their own work while sharing common support facilities and forming a research community to foster the exchange of ideas and expertise. The agencies would also benefit from being close to the established scientific and research community of the university.

Although my research organization was not part of the eighty-acre research park, it was located directed south of it; Dr. R.C. Quittenton, then Director of the SEDCO Research Park, felt it would be desirable to include already established functioning research units under the umbrella of the research park. In 1979, he invited my organization, the P.O.S. Plant, Agriculture Canada's Animal Pathology Laboratory and the Federal Prairie Migratory Bird Research Laboratory to join SEDCO in the research and development park by now called Innovation Place. Already, several buildings were operating or under construction by such organizations as the Saskatchewan Research Council (housing, among other things their slow-poke reactor), research units of Saskatchewan Potash Corporation, Saskatchewan Oil Corporation, Saskatchewan Telecommunications and other provincial bodies engaged in research activities. Mr. Neil Overend, Chairman of SEDCO, and Dr. Quittenton organized some of the administrative officers of each of these units to participate in a committee to advise SEDCO concerning the operations of the research park. My unit, along with the other campus research organizations were also invited to send representatives. In addition, we were encouraged to participate in biweekly seminars, shows and demonstrations, all promoting research in Saskatchewan.

m) Fact Sheets

One of the major goals of my management and scientists was embodied in the slogan on my mast-head, "Serving the Livestock Industry". Part of this service was to get factual information on livestock diseases out into the hands of the livestock producer, where it could be applied. To do this, a series of "fact sheets" was devised under the title of "VIDO Views". The objective was to give the livestock producer the best and latest information in a form he could easily understand. These fact sheets were also useful to practicing veterinarians. The first definitive fact sheet was on calf scours. This has since been revised at least once to give updated information, particularly in view of the successful VICOGEN vaccine and the management control of calf scours.

Most of the fact sheets dealt with diseases on which my research scientists were actively working. However, responding to the needs of livestock people, two additional fact sheets were prepared on infectious diseases coming under the aegis of Agriculture Canada. These were on Brucellosis and Blue Tongue.

Altogether 11 have been prepared, generally authored by my scientists or other outstanding scientists in the area as follows:

Calf Scours - S.D. Acres

ITEME, or Hemophilus septicemia in cattle - O. Radostits .

Blue Tongue - L.E. Greenaway

Brucellosis - L.E. Greenaway

Atrophic Rhinitis - A. Theede

Shipping Fever Pneumonia - O. Radostits

The Story of IBR - L.A. Babiuk and S.D. Acres

Mastitis of Dairy Cows - F.H.S. Newbould, R.S. Butler,
S.D. Acres

Hemorrhagic Enteritis Virus in Poultry - H.C. Carlson

Haemophilus Pleuropneumonia of Pigs - P.J. Willson,
S.D. Acres, A.D.

Osborne, M.R.W. Wilson, R.M. Friendship, L. Robertson.

Bovine Virus Diarrhea (BVD) - O. Radostits

EPILOGUE

Now that I am at the end of my narrative, I would just like to sit back and take a look at what I have accomplished over the past 10 or so years. Well, my people have been instrumental in starting a dynamic and unique new veterinary research unit to further the control of infectious diseases of food-producing animals. They have also built a remarkable new laboratory dedicated to this purpose and have assembled an exceptional scientific and support staff to further these ends (governments would rejoice in the fact that over 50 full-time jobs have been created!).

Two entirely new vaccines of great importance world-wide have been developed, VICOGEN to control the bacterial form of calf scours, and HEVLANTC, a hemorrhagic enteritis vaccine. I am now recognized in many countries of the world as a progressive scientific institution on the forefront of science, especially in the area of biotechnology.

A major accomplishment was the effective two-way communication maintained with the livestock and poultry industries, the user of my research findings. This translated into their generous moral and financial support as they are fully aware that my officers respond to their needs and keep them informed of progress in research in infectious diseases of animals. Also, that my organization has tremendous potential for further improving the welfare of animals through infectious disease control.

I have "spun-off" BIOSTAR Inc., which will also contribute greatly to infectious disease control in animals and possibly humans. All of this has been financed by generous donations from many sources – governments, the university, foundations, livestock organizations and many others – together with some of my own earnings. And all of this ***without going into debt!!***

Even since the writing of parts of this narrative, my officers have

continued the dynamic progress. And my ears in the Board Room and halls have reported some of these recent advancements, including:

- an almost "instant" research field station on land near the Goodale Farm, south of the University, in the latter part of 1986. Land has been purchased, roads developed, buildings built and animal handling facilities installed. This will replace rental facilities, expand animal research capabilities and ensure that every dollar spent is directed to research.

- Mr. Ross Johnstone, my original architect has been employed by my officers to investigate the expansion of laboratories and offices in the basement of my building. The need is there, with expansion of research activities, and if funds are forthcoming the dreamed of expansion will become a reality.

- Extensive commercial and scientific connections have been established, in conjunction with BIOSTAR, with progressive commercial companies involved with the production of vaccines and diagnostic agents. These connections not only provide financial support, but also vigorous interchange of international scientific ideas.

- My financial base is also expanding with a budget forecast of over \$2.5 million per year. This has been markedly assisted by the establishment of "chairs" in which the government organizations and livestock groups support and finance a "scientific chair". This support pays the scientists salary and provides money for his research.

All of this prompts a look into the crystal ball to glimpse the future. A future that may include my animal research being translated into vaccines, medicinal antibodies and diagnostic agents, not only for food-producing animals, but perhaps also applied to human medicine.

- There does seem to be a void in research on diseases of other food-producers. It may be advisable for my scientists to look into infectious diseases of fish, particularly in fish farms involving both fresh-water and salt-water fish. The infectious diseases of wildlife will need attention, especially now that the wildlife species are more closely managed and so are more amenable to disease control intervention. Diseases of bees, silk-worms and other beneficial insects could also become targets to be grappled with my well-trained scientists.

- My scientific staff may become less male-oriented, with the graduation of more female scientists who could use as their model Dr. Marta Sabara. This may be especially true of veterinarians who are willing to undertake graduate work in the advanced scientific fields. With more female veterinarians graduating, more should be viewing scientific research as a rewarding goal.

- Funding will be a constant problem. However, the never-ending battle for research funds is not *all* bad, as it does keep my officers from becoming complacent. However, unallocated funds from the federal

government are still needed to provide a balance of income sources. Possibly, future governments will accept their share of responsibility for advanced research on animal infectious diseases.

- Components of the livestock industry have supported my research well, despite the fact that in the ten or twelve years of my existence, livestock prices have been poor and farmers at a financial low. This is particularly true today, as livestock and grain farmers have been forced into bankruptcy at an unprecedented rate. It is hoped that in the future, when the farmer is allowed to make some money, that he will be even more generous in his support of organizations such as mine.

- A bright future awaits!

ABOUT THE AUTHOR

“The falling drops at last shall wear the stone.”

Lucretius

“I Am VIDO” is the story of an institution, how it came to be, its purpose, its accomplishments and its future. However, institutions don’t create themselves. Rather, they are the products of dedicated men and women with a vision of the future. Since its inception, VIDO has had the benefit of an association with such people. One man merits recognition as the driving force behind the creation of VIDO; a man with the tenacity, foresight and scientific background to bring VIDO to its function.

Christopher Hedley Bigland, V.S., D.V.M., D.V.P.H., M.Sc., M.R.C.V.S., D.Sc. was born in Calgary on October 15, 1919, the youngest son of English immigrant parents, Mary Alice (Polly) and Ernest Bigland. Chris had an older brother named Jack, and a sister, Muriel. Chris’ parents were genuine Canadian pioneers. His mother came from Yorkshire, and his father from the lake country in England. Arriving in Canada in 1912 they chose Calgary as their new home. While the Biglands adjusted to life in their adopted country, they lived a spartan existence for two years in a tent on the banks of the Elbow River.

Chris grew up and was educated in Calgary during the Great Depression. In 1937, he graduated from Western Canada High School, having distinguished himself as a conscientious student. A number of factors accounted for his interest in animals and veterinary medicine. His interest in animals was sparked during teen-age summers spent at his brother’s homestead near Caroline, Alberta. A second important influence on Chris’ career was his brother-in-law, Harry Hays (later Senator Harry Hays), who owned one of the largest dairy farms in the Calgary area. Harry and Muriel Hays encouraged Chris to become a

veterinarian after he finished high school. A third influence on Chris was Dr. J. Gordon Anderson, a 1924 graduate of the Ontario Veterinary College, who had established a veterinary practice in Calgary. It was his association with Harry Hays and Dr. Anderson which finally convinced Chris to seek a career in veterinary medicine. In the fall of 1937, he enrolled in the Ontario Veterinary College (O.V.C.) in Guelph, Ontario.

While attending O.V.C., Chris was very active in campus affairs. He was the Company Sergeant Major in the Canadian Army Veterinary Corps on campus, and spent part of the summer just prior to World War II in a military camp operated by the Veterinary Corps. His main athletic interest was the boxing team. An excellent student, he ranked third in his class throughout his college career, and won the Royal Canadian Army Veterinary Corps prize in his third year. During this period Chris spent his summer vacations working with Dr. Anderson in his practice in Calgary. Chris graduated from the Ontario Veterinary College of the University of Toronto (at the time of OVC was a branch of the University of Toronto) in the spring of 1941. At the age of 21, he was the youngest graduate in the history of the O.V.C. Coincidentally, Dr. Gordon Anderson had also been O.V.C.'s youngest graduate at one time.

Following graduation, the now *Dr.* Bigland accepted an appointment in Dr. Anderson's veterinary practice in Calgary. The practice was mixed, dealing with cattle, swine, goats, horses, poultry, dogs and cats. The two men introduced many new features into their practice. They built a new clinic on 9th Avenue West in Calgary which was one the most modern animal clinics in western Canada at the time. Chris began to develop a keen interest in the disease problems faced by large animal producers in Alberta. He recognized the tremendous potential for increased productivity and reduced costs through disease control. His association with Calgary-area farmers and livestock producers while in practice with Dr. Anderson sparked this interest. Chris continued his association with the Anderson practice in Calgary until the fall of 1945.

That year, Chris left the veterinary practice to enter the School of Hygiene at the University of Toronto, where he studied to obtain a Diploma in Veterinary Public Health. He completed this training in the spring of 1946, at which time he returned to Calgary and accepted an appointment with the Canada Department of Agriculture, Veterinary Inspection Division. Chris then went to work in a packing house in Calgary as a meat inspector. Once again, his innate curiosity prompted him to become involved in several projects outside of his official duties. He started a program to collect and test blood samples for Brucellosis from swine passing through the plant. The purpose of the project was to determine the level of brucella infection in the swine population.

He outfitted the laboratory in the basement of his home to test the samples. Realizing that his interests lay in disease control rather than

inspection, Chris left his job with the Canada Department of Agriculture.

In the fall of 1948, he accepted an appointment as the veterinarian in charge of poultry disease diagnostics in the veterinary laboratory of the Alberta Department of Agriculture in Edmonton. His many and varied interests soon led him into research on poultry diseases. He wanted some solutions to the disease problems that plagued the poultry industry in that province at the time. His contributions to knowledge in that area were widely acknowledged by the poultry industry. Before long he was one of the foremost poultry diagnosticians in Canada. He published widely in scientific and lay journals on the disease problems in the poultry industry.

Although Chris was interested in a wide range of problems, from the quality of the drinking water being provided for the birds, to the still smoldering Pullorum and Typhoid diseases that were evident in a few flocks within the province, his real interest lay in the study of Mycoplasma organisms. The importance of these organisms was just beginning to be recognized in the poultry industry. Chris was the first scientist to associate Mycoplasma organisms with certain deficiencies appearing in turkeys across Alberta and around the world. He gained an international reputation as a researcher in the Mycoplasmas of domestic birds. Another of his interests was Salmonellosis, and he reported the first evidence of *Salmonella heidelberg* in Canada.

Dr. Bigland's interests, however, were not confined to his appointment as a poultry pathologist in the Edmonton laboratory. He became interested in a number of activities associated with the veterinary profession, and served as president of the Alberta Veterinary Medical Association (AVMA) from 1957-1959. It was during this period that he formulated his vision of a veterinary disease research center. The center should, he believed, focus on those veterinary disease problems which particularly affected the animal industry in Western Canada.

During his term as president of the AVMA, Chris was also appointed chairman of the Western Veterinary Study Committee, a group representing the Alberta Veterinary Medical Association, the provincial government and the University of Alberta. The committee's purpose was to investigate the possibility of establishing a veterinary research center in western Canada. As a result of their work, the Veterinary Association of Alberta became actively involved in assessing the need for a veterinary college in the west. In 1957, during his presidency, an important meeting of Western Canadian educators was held in Lethbridge, Alberta, to discuss the need for more veterinary research and the feasibility of a veterinary college in western Canada.

Chris Bigland's experience as a practitioner, active diagnostician and researcher had clearly demonstrated to him the need for an institu-

tion like VIDO. The Canada Department of Agriculture Veterinary Research Division was concerned primarily with diseases which were on the so-called "named" disease list, a list which focussed on diseases whose proportions required federal intervention. The research institution envisioned by Chris Bigland would devote its energy to those diseases which, although not on the national "named" disease list, were nevertheless considered of practical importance to western producers. Existing federal government research institutions could not adequately meet this need.

In the late 1950's Dr. E. E. Ballantyne, the director of the Veterinary Services Branch of the Alberta Department of Agriculture, initiated an educational leave program for professional employees of the Alberta government. The program provided an opportunity for professional staff in government service to take a year's leave-of-absence to obtain further training in their field. Chris Bigland was the first employee of the provincial government to take advantage of the program. In the fall of 1959, he enrolled in the Department of Physiology of the Faculty of Medicine at the University of Alberta. His Master's thesis project was the study of blood coagulation in birds. As a result of these studies, he published a paper in the prestigious British research journal "Nature". The paper explored blood clotting mechanisms in the bird, differentiating the bird's system from that of the mammal. Publication of this paper stimulated a number of comparative studies on the avian and mammalian systems in an effort to learn more about blood coagulation in mammals.

In 1962, Bigland completed his Master of Science program. The College of Veterinary Medicine at the University of California in Davis, California, offered him an Associate Professorship in recognition of his considerable accomplishments in the field of avian Mycoplasma. Dr. Bigland accepted the position, and was an active faculty member of the avian disease section at that university until 1964. While on faculty, he published several papers in collaboration with a number of scientists in the field of Mycoplasma, particularly Mycoplasma affecting turkeys. In addition, his interest in avian blood coagulation continued, and he published several papers related to blood spots in eggs.

In 1964, the dream of a Western College of Veterinary Medicine became a reality. Dean Larry Smith approached Dr. Bigland about returning to Canada to accept an appointment as head of the Department of Veterinary Microbiology. Chris returned to Canada with considerable enthusiasm. He still had the vision of eventually establishing the institution which was later to become VIDO, and his presence on the campus of the University of Saskatchewan was a step toward the realization of this dream.

Between 1964 and 1974, he was head of the Department of

Veterinary Microbiology. During this period, he started working in collaboration with Dr. Otto Radostits and Dean Smith toward establishing VIDO. His interest in Mycoplasma research and a number of other fields related to microbiological diseases of poultry continued.

In 1975, Dr. Bigland's hard work and dedication were finally rewarded with the formation of VIDO, and his appointment as director of the institution.

Dr. Bigland is the author of 93 published papers in scientific journals, and has honorary life membership appointments in several organizations, including the Alberta and Saskatchewan Veterinary Medical Associations, and the Ontario Veterinary College Alumni Association. He is a long standing member of the American Veterinary Medical Association, the Canadian Veterinary Medical Association, the Canadian Association of Microbiology, the American Association of Avian Pathology, Poultry Science Association, the American Association for the Advancement of Science and a life member of the Canadian Society of Animal Science. In 1980, he was given the Award of Merit by the Ontario Veterinary Association.

Dr. Bigland retired from his position with VIDO in the summer of 1984 and moved to Victoria, British Columbia, where he now resides. He was honoured by the Ontario Veterinary College at the University of Guelph as the recipient of the MacMillan Laureate in Agriculture for the period 1979-1984. He is the third recipient of the award, which recognizes the most significant contribution to Canadian agriculture in the previous five years. In the spring of 1986, he was awarded an Honorary Doctor of Science degree by the University of Guelph. The award recognized his:

. . . important contributions to society generally through his imaginative development of research services. His VIDO research laboratory in Saskatoon constitutes an organizational model for filling the gap between research discoveries in the laboratory, and their application in industry. . . the objective being to offset the enormous variety of problems caused by disease. The Senate of the University of Guelph, thinking well of his concern for the well-being of all creatures, (irrespective of size), and in commendation of his contributions as educator and researcher, has resolved that he be appropriately recognized.

Chris Bigland and his wife of 44 years, Eva, have two daughters, Janet and Margaret, and four grandchildren. Dr. Bigland has been an active worker in the Anglican Church for many years.

The story of VIDO is not only the story of an institution, but is also the story of a man. Chris Bigland conceived the idea of VIDO. His

tenacity brought it into being. His scientific curiosity directed its programs. His gentlemanly approach to people drew together a dedicated staff, and his genuine interest in animals and their owners guided the project to its completion.

Herbert C. Carlson
V.S., D.V.M., M.Sc., M.R.C.V.S.

APPENDIX "A"

October 1973

Calgary Initiative Canadian Veterinary Microbiological Institute

Summary

Definition

- (P1) - The veterinary microbiological institute (VMI) would study any infectious disease of animals but primarily the application of practical disease control measures on non-exotic disease conditions (eg. footrot, pinkeye in cattle, diarrhoeas of the newborn):

Need

- (P2-5) - There is a world shortage of animal protein (meat, milk, eggs and fish) due to
 - (a) low supply in developing countries,
 - (b) increasing demand by countries that were formerly low in consumption but becoming more affluent (eg. Italy, Spain), and
 - (c) increased utilization by developed countries.
- Disease is the major uncontrolled variable in livestock production and results in the wastage of large percentages of total production of animal protein (estimates vary from 10-40%).
- The major disease losses are caused by microorganisms (viruses, bacteria, fungi or parasites).
- Research on animal disease does "pay off" in two ways

- (1) in livestock production (eg. Brucellosis and tuberculosis control, vaccination against blackleg and tetanus, therapeutic control of coccidiosis and Marek's vaccination in poultry)
- (2) in the control of zoonoses or diseases shared by animals and man (eg. bovine tuberculosis, brucellosis, hydatid disease, Q fever).

Need for Private funding

- (1) Research
- (P6-11) (2) Utilization of visiting and senior scientists
- (3) Continuing education
- (4) Study center and library
- (5) Training of graduate students

(1) Research - Private funding of research on infectious diseases would fill a gap between basic research findings and their practical application in the field.

- Federal veterinary research through Animal Diseases Research Institutes, Canada Department of Agriculture concentrated on diseases of an exotic nature and those listed in the Animal Contagious Diseases Act and the Meat Inspection Act.

- Federal drug research through the Food and Drug Directorate concentrate on evaluation of veterinary drugs to be placed on the Canadian market.

- Provincial governments do little research, confining their function to diagnosis.

- Commercial institutions doing research in Canada are few, and concentrate on their own products.

- Universities, through veterinary and agricultural colleges, do research of a broad scope depending upon the interests and energies of the individual faculty member. To finance his research he must generate research proposals and aim these at the interests of the various granting agencies (eg. Medical Research Council, National Research Council, Defence Research Board, Canada Department of Agriculture). Most of the granting agencies confine their grants to basic research, leaving the practical and applied research to others. This frequently allows a major gap to develop between new basic discoveries and their application on the farm.

(2) Visiting and senior scientists selected by the board of directors could be attracted to spend one to three years conducting their research in the VMI on an honorarium basis. Many of these would be on sabbatical leave or retired. By providing facilities, many scientists would bring their own grant funds and technicians with them. In return they would

assist in contract or applied research and teach in the workshops in addition to stimulating the research workers and fellow scientists.

(3) Continuing Education – Workshops and courses on various aspects of animal infectious diseases would update and instruct Canadian scientists. These would attract prominent scientists in the field as teachers and lecturers on a no pay basis.

(4) A study center and reference library facility would attract selected prominent scientists to write, teach and conduct research for short periods of one to twelve weeks. These would enrich and stimulate the investigators on applied research.

(5) Promising graduate students could work with resident or visiting scientists by arrangement with one or more universities.

Proposals

(P12-17) (1) Private research institute independently financed similar to the W. Alton Jones Cell Science Center at Lake Placid, New York.

(P18-19) (2) A University institute on the university campus either privately funded or partially funded by the University of Saskatchewan.

(P20-22) (3) A private research unit, similar to but smaller than proposal (1), concentrating research on one group of diseases.

Appendices

(P23)

APPENDIX "B"

June, 1957

A RESOLUTION TO THE ALBERTA GOVERNMENT FROM THE ALBERTA VETERINARY MEDICAL ASSOCIATION REQUESTING THE ESTABLISHMENT OF A VETERINARY RESEARCH LABORATORY.

Summary

- Whereas: livestock production is a basic industry in Alberta accounting for 55% (\$203,928,000) of the total cash farm income in Alberta in 1955 and representing an investment of \$291,241,000 in livestock alone as shown by the 1956 census
- And Whereas: such an investment should be protected against preventable loss by every available means
- And Whereas: livestock (including poultry) diseases cause an estimated \$30 million to \$40 million loss annually in Alberta
- And Whereas: an estimated fifty diseases of livestock in Alberta are transmissible to man
- And Whereas: the sub-committee on Agriculture of the Alberta Post-War Reconstruction Committee recommended provision of facilities for research on livestock diseases
- And Whereas: the Alberta submission to the Gordon Commission estimates that the 1954 Alberta livestock population will have to be increased greatly by 1980 to help feed the future population of Canada
- And Whereas: veterinary research has resulted in the saving of many millions of dollars by the control of animal and poultry

- diseases, and has contributed substantially to the progress of human medicine
- And Whereas: veterinary research in Canada is now being conducted only by the federal government, the governments of Ontario and Quebec, and the Connaught Medical Research Laboratories, where the multiplicity of veterinary problems has already overwhelmed the facilities of these institutions
- And Whereas: many of the disease problems in Alberta livestock are influenced by climate, soil conditions, altitude, water, and husbandry practices peculiar to this province
- And Whereas: modern livestock production, marketing, and transportation methods are accelerating the spread of diseases which become a greater limiting economic factor than previously.
- And Whereas: the Veterinary Laboratory, Alberta Department of Agriculture was established to provide only diagnostic facilities
- And Whereas: the very limited research possible at this institution has contributed to the prevention of livestock losses
- And Whereas: the great suffering of diseased livestock should not be overlooked
- And Whereas: the world human population is increasing rapidly with large segments existing on starvation or semi-starvation diets
- And Whereas: this imposes a moral obligation to increase food supplies by more research to prevent livestock losses
- And Whereas: a Veterinary Research Laboratory in Alberta to conduct practical research in disease problems pertaining to Alberta livestock would be of inestimable value to the people in rural Alberta
- And Whereas: such a Laboratory would raise the economic level of agriculture through improved methods of prevention and control of livestock diseases and would assist in safeguarding the health of all Albertans
- And Whereas: the veterinarians of Alberta are keenly aware of the many unsolved livestock diseases and are willing to financially assist in developing better prevention and control methods through research

Be it Resolved by the Alberta Veterinary Medical Association duly assembled at the 51st Annual meeting in Lethbridge June 21, 1957, that:

- (1) The Government of Alberta be requested to establish a Veterinary Research Laboratory within

the Department of Agriculture for practical research on livestock diseases in Alberta, and

(2) We, the Alberta Veterinary Medical Association pledge to the Government of Alberta the sum of five dollars (\$5.00) for each registered member each year for a period of three years to assist in the establishment of such a Veterinary Research laboratory in the expectation that the Agricultural and Livestock Associations of Alberta will also contribute a comparable amount of monies towards this objective.

APPENDIX "C"

The Devonian Group of Charitable Foundations
901 Tenth Avenue S.W.
Calgary Alberta
Canada

August 11, 1975

Hon. Marvin Moore
Minister of Agriculture
Government of Alberta
Edmonton, Alberta
Hon. Edgar E. Kaeding
Minister of Agriculture
Government of Saskatchewan
Regina, Saskatchewan

Dr. R. W. Begg
President
University of Saskatchewan
Saskatoon, Saskatchewan

Dear Sirs:

This letter, when accepted by all of the parties hereto, will confirm that Devonian Foundation (Devonian), the Province of Alberta (Alberta), the Province of Saskatchewan (Saskatchewan) and the University of Saskatchewan (University) are prepared to support the establishment of a Veterinary Infectious Disease Organization (VIDO) on the following conditions:

1. VIDO will be established at the University under the direction of Professor C. H. Bigland, of the Western College of Veterinary Medicine of the University who will be the Director of VIDO. During the term of this agreement, Professor Bigland will be personally involved in VIDO and will spend more than 50% of his working time on VIDO projects so long as he is employed by the University and is physically and mentally capable of performing such services. If during the term of this agreement Professor Bigland ceases to be employed *by the University* or becomes incapable of continuing such work a new Director shall be appointed by the University subject to the approval of Devonian Foundation.

2. VIDO shall conduct research on indigenous infectious diseases of food producing animals under the direction of a Governing Committee with the advice and counsel of a Board of Advisors.

3. A Governing Committee of VIDO, composed of the *following (or their designates)*: the President of the University, the Dean of the College of Graduate Studies and Research of the University, the Dean of the College of Veterinary Medicine of the University *who shall act as chairman*, the Director of VIDO, the Deans of the Colleges of Agriculture, Medicine and Pharmacy of the University, *and the Chairman of the Board of Advisors* shall be established by the University with the Vice-President Administration as a *non-voting* member. The Governing Committee shall direct and review the operations of VIDO, approve its budget *submissions* and advise the staff directly involved in its projects, and shall be responsible to the Board of Governors of the University and report to the Board of Advisors. An affirmative vote of the majority of the members of the Governing Committee shall be required to approve any matter to be decided by the Governing Committee.

4. A Board of Advisors of six persons, who are not associated with the University or members of the Legislative Assembly of Saskatchewan or Alberta, shall be established to advise and counsel the Director and the Governing committee, to review the projects from time to time being conducted by VIDO, to review and approve budgets which have been approved by the Governing Committee, to approve keeping information and data secret in accordance with item 11 hereof and to keep Devonian, Saskatchewan and Alberta advised concerning the operations of VIDO. An affirmative vote of the majority of the members of the Board of Advisors shall be required to approve any matter submitted to the Board of Advisors for approval. During the term of this agreement Devonian, Saskatchewan and Alberta shall each be entitled to select one member of the Board of Advisors and any and all replacements of such member. The member from time to time chosen by Devonian shall be the Chairman of the Board of Advisors. The other members of the Board of Advisors shall be initially selected jointly by Mr. A. E. Pallister,

acting on behalf of Devonian, and Professor Bigland, with Mr. Pallister having the ultimate decision in the event of dispute. In the event of the resignation or inability to act of any member, other than a member selected by Devonian, Saskatchewan or Alberta, a replacement for such member shall be appointed by the remaining members of the Board. The fees and expenses of the board of Advisors shall be paid out of the VIDO budget.

5. All of the staff of VIDO shall be employees of and paid by the University; provided that VIDO shall reimburse the University for a portion of the salaries *and benefits* of such staff (other than of the Director) which is reasonably attributable to the work they are performing for VIDO. VIDO shall not be a party to or be bound by any union agreement or tenure to which any such employee may be entitled as a result of his or her other employment with the University.

6. Upon acceptance of this letter by all of the parties hereto, Professor Bigland shall prepare a constitution of VIDO for presentation to the Board of Governors of the University and to Devonian, Saskatchewan and Alberta. Upon approval of this constitution by the Board of Governors and by Devonian, Saskatchewan and Alberta:

- (a) The members of the Board of Advisors and Governing Committee will be selected, and
- (b) Professor Bigland will prepare the initial budget for submission to the Governing Committee.

The initial and each subsequent budget, as approved by the Governing Committee, shall be presented to the Board of Advisors for its review and approval.

7. Forthwith after the initial budget has been approved by the Board of Advisors:

- (a) Alberta shall make a grant of \$1,870,000 to VIDO to be used by VIDO for capital purposes;
- (b) Saskatchewan shall make a grant of \$1,000,000 to VIDO to be used by VIDO to pay for costs of operations from time to time conducted pursuant to approved budgets; *such payments shall be made in five equal annual installments.*

Devonian will from time to time make grants to VIDO for capital and operating purposes as follows:

- (i) Grants for capital purposes will be made at various times in installments of \$250,000 each on receipt of an architect's certificate that such funds are within the amount in a budget approved by the Board of Advisors, that the amount requested is required to pay capital expenditures paid or to be paid within 180 days of such request and that the full amount of the grant from Alberta referred to in item 7(a) hereof (together with all interest earned by VIDO thereon)

has been expended for capital purposes;

- (ii) grants for costs of operations shall be made semi-annually in advance in installments of at least \$50,000 each provided that no installment will be made for costs of operations unless an average of at least \$200,000 of the grant from Saskatchewan referred to in item 7(b) hereof shall have been expended or committed for expenditure in operations in the current calendar year and in each previous calendar year of VIDO's operations;
- (iii) the total funds required by VIDO for capital and operating in any one year shall not vary substantially from the estimated funds for that year projected in item 8 hereof; and
- (iv) the total of all grants requested from Devonian and which Devonian agrees to make to VIDO hereunder shall not exceed \$2,200,000.

8. The parties hereto understand that the estimated funds required for VIDO for capital and operating from 1975 through 1979 are as follows:

	1975	1976	1977	1978	1979
capital	\$1,800,000	\$1,000,000	\$1,000,000		
operating	100,000	200,000	400,000	400,000	400,000

9. The University shall provide the following at no cost to VIDO:

- (a) a site of approximately 5 acres on the University grounds for building and facilities to be constructed for VIDO *but excluding such building and facilities.*

Such building and facilities will be used by VIDO in accordance with this Agreement and the Constitution of VIDO. In the event that the VIDO project is terminated the buildings and facilities and the equipment therein or elsewhere, used in or acquired for the project, shall remain the absolute property of the University always to be used by the University for research and teaching in the field of veterinary medicine;

- (b) engineering knowledge and advice for construction of the building and facilities;
- (c) maintenance advice and supervision of the building and facilities;
- (d) administration of all VIDO's funds; and
- (e) the salary and all benefits of the Director of VIDO. In addition the University shall provide, but at the expense of VIDO as set out in item 5 hereof, all other staff of VIDO.

10. All grants to VIDO hereunder shall be paid to the University for the use of VIDO on the condition that the University is then a registered

charity under the Income Tax Act of Canada and will issue receipts therefore in accordance with the provisions of the Income Tax Act of Canada. All grants paid to VIDO shall be invested by the University in interest earning securities for the account of VIDO until such funds and interest are required by VIDO. All interest earned on grants for capital purposes shall be considered a capital grant, and all interest earned on grants for operating purposes shall be considered an operating grant.

11. All patents, discoveries and inventions obtained as a result of research conducted by VIDO staff shall be obtained by and held by the University for the benefit of VIDO provided that the member or members of the staff conducting the research leading to such discovery or invention or the granting of such patent shall be entitled to receive such portion of the licensing fees, royalties and other sums received from such patent, discovery or invention that such member or members are entitled to receive pursuant to his or their agreement with the University concerning patents, discoveries and inventions *unless other arrangements are negotiated by VIDO*. The University's share of such patent, discovery or invention and all license fees, royalties and other sums therefrom shall be *made available to VIDO*. Subject to the foregoing, all research information and data obtained by VIDO and all discoveries and inventions obtained as a result of research conducted by VIDO staff shall be kept secret only for that number of years from time to time approved by the Board of Advisors and thereafter shall become part of the public domain of Canada available to Canadian schools and universities, Canadian federal, provincial and municipal governments, Canadian citizens and residents and firms and corporations carrying on business or research in Canada.

12. The term of the agreement constituted by acceptance of this letter by all parties hereto shall be from the date of acceptance until that date which is one year after all grants to be made hereunder have been made and the amount of such grants and all interest earned thereon have been fully expended on the VIDO project.

If the foregoing terms and conditions are acceptable would each of the parties to which this letter is addressed, please execute and return all four copies of this letter. If this letter is accepted by all addressees and returned to Devonian prior to *September 15, 1975*, this letter will constitute an agreement binding on all parties and Devonian will deliver one fully executed copy of this letter to each party. If this letter is not fully executed and returned to Devonian by that time the offers made hereunder shall terminate.

Yours very truly,
DEVONIAN FOUNDATION

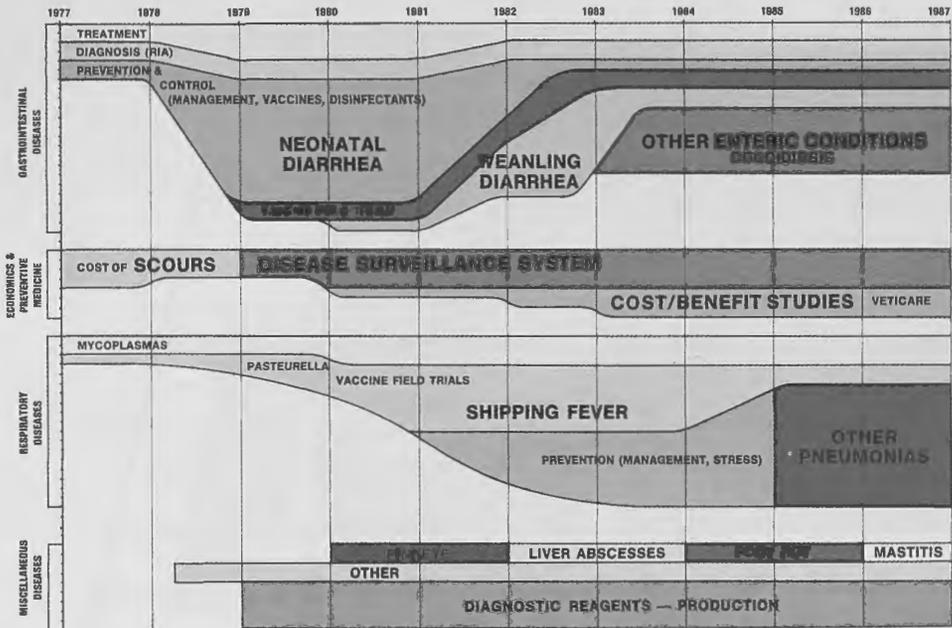
Vice President

10-Year Research Plans

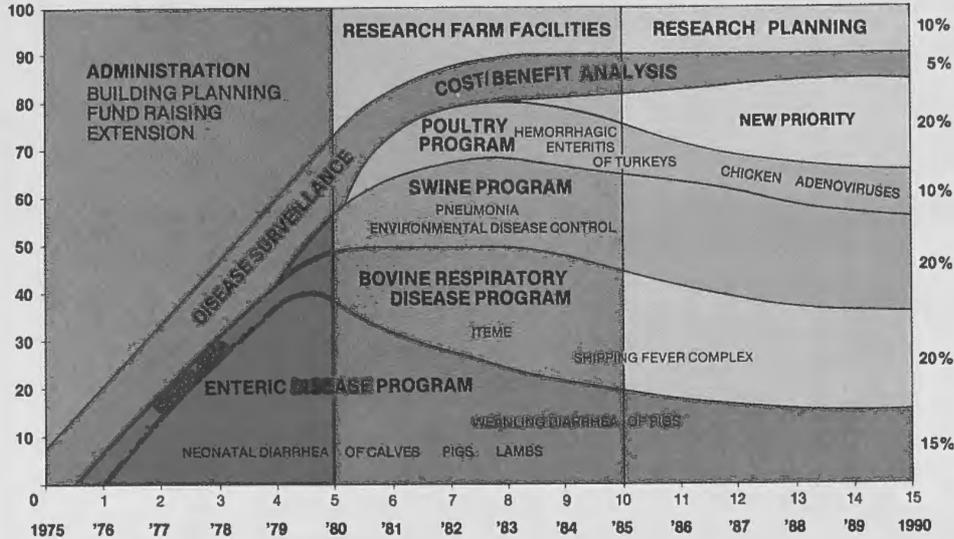
VIDO RESEARCH PLAN

SCALE: 2.5MM = 1 MAN-YEAR

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



VIDO RESEARCH PLAN Percent Distribution of Operating Costs By Program

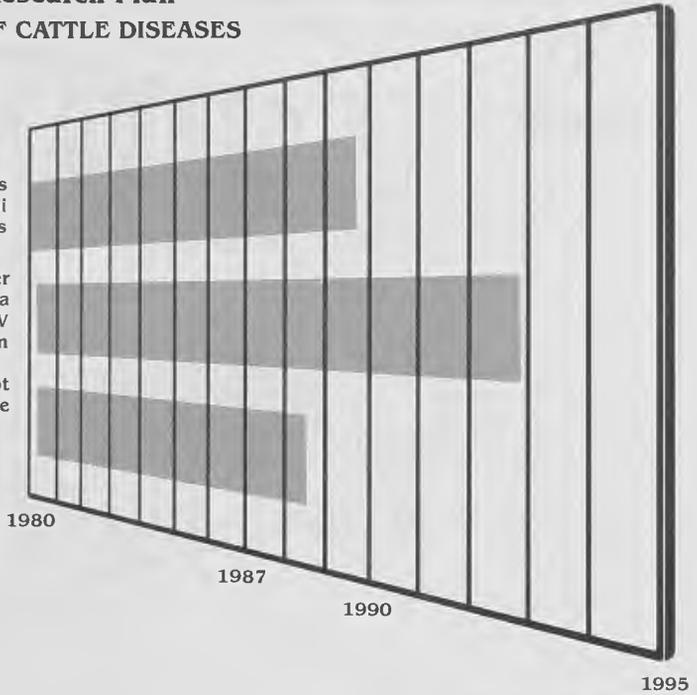


VIDO Long-Term Research Plan



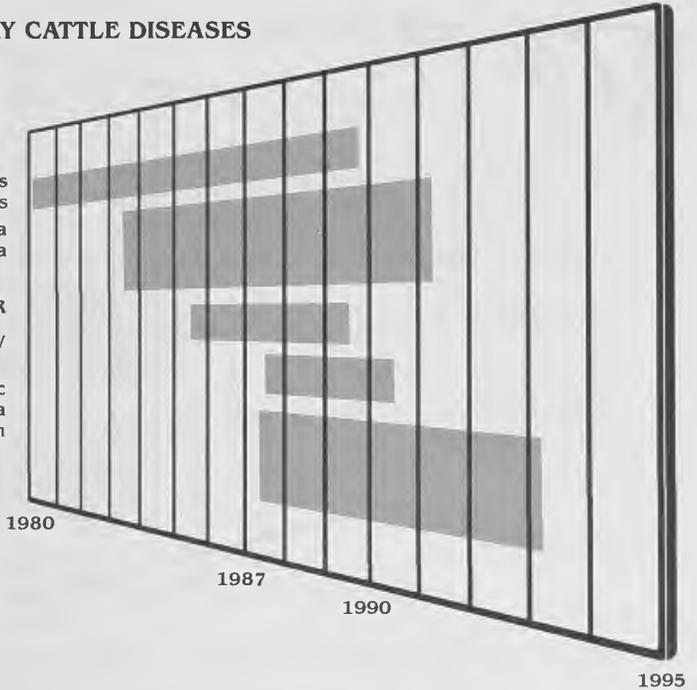
BEEF CATTLE DISEASES

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



DAIRY CATTLE DISEASES

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



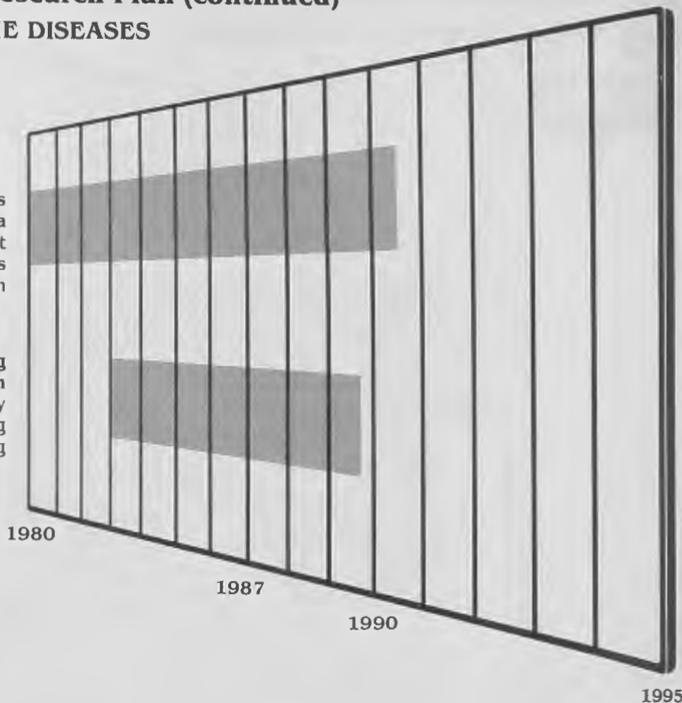
VIDO Long-Term Research Plan (continued)



SWINE DISEASES

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

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

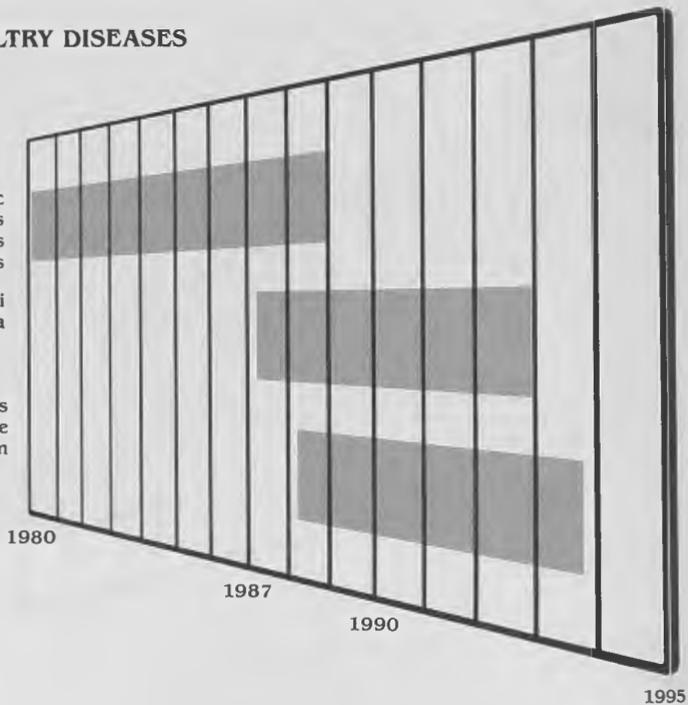


POULTRY DISEASES

**Hemorrhagic
Enteritis**
- Turkeys
- Chickens

**E. Coli
Septicemia**

**Infectious
Bursal Disease
Immune Suppression**



APPENDIX "E"

List of Guests of the Boards

BOARD OF ADVISORS MEETINGS

1976/77

Dr. M. Franklin

Acting Vice-President (Academic), University of New Brunswick
Senator Harry W. Hays (& Mrs. M.A. Hays), Calgary

Dr. Ken F. Wells

Advisor to CIDA and former Veterinary Director General, Ottawa

Mr. Jim Fish

Vice-President, The Devonian Group of Charitable Foundations,
Calgary

Mr. Frank Lynch-Staunton

Rancher representing Alberta Cattle Commission, Pincher Creek,
Alberta

1977/78

Dr. Jack A. McPhedran

Director, Veterinary Services Branch, Winnipeg

Mr. Robert J. Munroe

Secretary, Manitoba Beef Growers Association, Warren, Manitoba

Mr. Art Dilworth

Manager, Manitoba Pool Elevators, Winnipeg

- Mr. Ed. P. Hudek
Assistant Deputy Minister, Manitoba Agriculture, Winnipeg
- Dr. Leonard E. Lillie
Chief Veterinary Pathologist, Agricultural Services, Winnipeg
- Dr. Allen Preston
President, Manitoba Veterinary Medical Association, Hamoita,
Manitoba
- Mr. Arnold Edie
Chairman, Manitoba Milk Producers Marketing Board, Winnipeg
- Mr. Larry Kublik
President, Manitoba Feed Manufacturers Association, Winnipeg
- Mr. Paul V. Reise
Karmona Stock Farms, Selkirk, Manitoba
- Mr. Albert Veilfaure
La Broquerie, Manitoba
- Mr. J.A. White
Corporate Secretary, United Grain Growers, Winnipeg
- Dr. Chuck H. McNaughton
Director, Animal Industry Branch, Winnipeg
- Dr. George Phillips
Department of Animal Science-Physiology, University of Manitoba,
Winnipeg
- Dr. Marvin E. Seale
Department of Animal Science, University of Manitoba, Winnipeg
- Dr. L.H. Shebeski
Dean, Faculty of Agriculture, University of Manitoba, Winnipeg
- Dr. Norm E. Stanger
Department of Animal Science, University of Manitoba, Winnipeg
- Dr. Harold Fast
South East Veterinary Clinic, Steinbach, Manitoba
- Mrs. Signy Lawson
The Manitoba Cooperator, Winnipeg
- Mr. Lionel Moore
Broadcaster, CBC, Winnipeg
- Mr. Dave Wilkins
Canadian Cattlemen, Winnipeg
- Dr. G.M. Carman
Director, Information Services, Agriculture Canada, Ottawa
- Dr. G. (Jeff) Hiscocks
Sr. Food Policy Advisor, Consumer and Corporate Affairs, Hull,
Quebec
- Dr. W.J. Anderson
Assistant Director General, Economics Branch, Agriculture
Canada, Ottawa

- Dr. R.J. (Bob) Avery
Associate Director (East), Animal Pathology Division, Agriculture
Canada, Ottawa
- Dr. J.F. (Julius) Frank
Director, Animal Pathology Division, Agriculture Canada, Ottawa
- Dr. A.E. (Bert) Lewis
Director, Contagious Diseases Division, Agriculture Canada, Ottawa
- Dr. M.G. (Maurice) Morissette
Director, Meat Inspection Division, Agriculture Canada, Ottawa
- Dr. D.J. (Davie) Campbell
Director, Bureau of Veterinary Medicine, Health and Welfare Canada,
Ottawa
- Dr. Doug Dale
Chairman, Canadian Veterinary Medical Association (Research
Trust), Ottawa
- Dr. E.S. Sanderson
Science Advisors Branch, Office of Science & Technology, Industry,
Trade and Commerce, Ottawa
- Mr. Campbell Stuart
General Director, Fisheries and Food, Department of Industry, Trade
and Commerce, Ottawa
- Dr. V. (Valerie) Sonnenfeld
Policy Advisor, Ministry of State for Science and Technology, Ottawa
- Mr. M.S. (Merv) Mitchell
Director, Poultry Division, Agriculture Canada, Ottawa
- Mr. F.E. (Frank) Payne
Director, Livestock Division, Agriculture Canada, Ottawa
- Dr. Conrad L'Ecuyer
Director, Animal Disease Research Institute, Agriculture Canada,
Ottawa
- Dr. R.S. Gowe
Director, Animal Research Institute, Agriculture Canada, Ottawa
- Dr. B.B. (Bert) Migicovsky
Assistant Deputy Minister, Research Branch, Agriculture Canada,
Ottawa
- Mr. J.J. (John) Shepherd
Executive Director, Science Council of Canada, Ottawa
- Dr. F.S. Rolleston
Assistant Director, Grants Program, Medical Research Council,
Ottawa
- Mr. W.A. Cumming
Vice-President (Operations), National Research Council, Ottawa
- Dr. W.G. Schneider
President, National Research Council, Ottawa

- Mr. Dwayne Acres
Past President, Canadian Sheep Marketing Council & Ontario Sheep
Association, Osgoode, Ontario
- Mr. Paul Babey
Chairman, National Farm Products Marketing Council, Ottawa
- Mr. Curt Friend
President, Canada Feed Industry Association, Ottawa
- Mr. Graham Hudson
President, Carleton County Hog Producers Association, Kinburn,
Ontario
- Mr. Joe Hudson
Byury Brae Poultry Farm, Lyn, Ontario
- Mr. Mac James
Hereford Breeder, Carleton Place, Ontario
- Mr. K.G. McKinnon
President, Dairy Farmers of Canada, Port Elgin, Ontario
- Mr. Jerry Pringle
Canadian Egg Marketing Agency
- Dr. Harry Rowsell
Executive Director, Canadian Council on Animal Care
- Dr. R.G. Smiley
Manager, Eastern Breeders Inc., Kemptville, Ontario
- Mr. D. Spratt
Director, Ontario Livestock Auction Association, Ottawa
- Mr. A. Stewart
Shorthorn Breeder, Pakenham, Ontario
- Dr. T.C. (Tome) Willis
Livestock Advisor, Special Advisors Branch, Canadian International
- Mr. E.C. (Ernie) Frey
Director, Canadian Animal Health Institute, Pfizer Co. Ltd.,
Kirkland, Ontario
- Mr. O. Kocvar
President, Ayerst Laboratories, Montreal
- Mr. R. Doyle
Assistant Executive Secretary (Dairy), Canadian Federation of
Agriculture, Ottawa
- Mr. B. Hamilton
Associated Executive Secretary, Canadian Federation of Agriculture,
Ottawa
- Mr. P. Gooch
Cyanamid of Canada Ltd., Montreal
- Mr. K. Haslam
CBC "Country Canada", Ottawa

- Mr. K. Haslam
CBC "Country Canada", Ottawa
- Mr. R.W. Conway
Science Center, Ottawa
- Dr. P. Demers
Acting Provincial Veterinarian, Minister of Agriculture and
Colonization, Quebec City
- Dr. M. Foster, MP
- Mr. B. Hargrave, MP
- Dr. G. Mitges, MP
- Mr. M. Galbraith
Producer, Renfrew, Ontario
- Mr. Bill Craig
Producer, Chesterville, Ontario
- Dr. E.F. Pallister
Producer, Dunrobin, Ontario
- Dr. J.R. Kinney
Executive Secretary, Canadian Veterinary Medical Association,
Ottawa
- Dr. G. Meads
Director, Provincial Veterinary Laboratory, Kemptville, Ontario
- Mr. F.W. Wickham
District Director, Agriculture Canada (Poultry Division), Toronto
- Mr. B. Ayre
Past President, Canadian Sheep Breeders Association, Hampton,
Ontario
- Mr. G. Butcher
Chairman, Canadian Joint Dairy Breeds, Princeton, Ontario
- Mr. R.J. Bluhm
Secretary, Ontario Pork Producers' Marketing Board, Toronto
- Mr. D.H. Clemons
Secretary Manager, The Holstein-Friesian Association of Canada,
Brantford, Ontario
- Mr. B. Ellsworth
Secretary, Ontario Egg Producers' Marketing Board, St. Mary's,
Ontario
- Mr. P.G. Flannigan
Secretary Manager, Ontario Turkey Producers' Marketing Board, St.
Mary's, Ontario
- Mr. S. Fraleigh
Chairman, Ontario Pork Producers' Marketing Board, Forest, Ontario
- Mr. G.W. Hedley
Secretary Manager, Ontario Beef Improvement Association, Toronto

- Mr. A. Connell
President, Ontario Cattle Association, Hensall, Ontario
- Mr. J. Hoover
President, Ontario Hatcheries Association, Port Hopr, Ontario
- Mr. J. Janzen
Secretary Manager, Ontario Chicken Producers' Marketing Board,
Burlington, Ontario
- Mr. M. Martin
Secretary Treasurer, Dairyman's Association of Western Ontario,
Dorchester, Ontario
- Mr. M. McPhail
Secretary Manager, Ontario Poultry Council, Toronto
- Mr. A.C. McTaggart
Secretary, Canadian Sheep Breeders, Aurora, Ontario
- Mr. D. Nicholson
District Supervisor, Beef Cattle Production, Livestock Division,
Toronto
- Mr. J.M. Peaker
Secretary Manager, Canadian Aberdeen Angus Association, Guelph,
Ontario
- Dr. C.R. Reeds
Manager, United Breeders Inc., Guelph, Ontario
- Mr. R. Robson
Director, Ontario Swine Breeders Association, Maple, Ontario
- Mr. G. Mungall
Manager, Shur-Gain Division, Canada Packers, Toronto
- Mr. L. Wilkinson
Producer, Georgetown, Ontario
- Mr. M.W. Clarke
Fine Chemical Division, Canada Packer Ltd., Toronto
- Mr. J.H. Couse
Maple Leaf Mills Ltd., Toronto
- Dr. R. Finlay
Tuco Products Company, Orangeville, Ontario
- Mr. J. Gilroy
Norden Laboratories, Burlington, Ontario
- Mr. H.K. Leckie
Meat Packers Council of Canada, Toronto
- Dr. A.J. MacKinnon
Salsbury Laboratories Ltd., Kitchener, Ontario
- Dr. N.J. McKendry
Secretary, Ontario Veterinary Association, Guelph, Ontario
- Mr. R.G. McManus
Eli Lilli and Company, Elanco Division, Mississauga, Ontario

- Mr. H.D. Sansom
Vice-President, Veterinary Division, Connaught Medical Research
Laboratories, Willowdale, Ontario
- Dr. F. Tittiger
Animal Pathology Laboratory, Guelph, Ontario
- Mr. Delbert Zielmer
CIBA Geigy Canada Ltd., Etobicoke, Ontario
- Mr. S. Cushon
CBC TV, Toronto
- Mr. J. Rusk
Globe and Mail, Toronto
- Mr. L. Dack
Financial Post, Toronto
- Dr. P.D. McTaggart-Cowan
Bracebridge, Ontario
- Professor S. Slinger
Head, Department of Animal Science, University of Guelph, Guelph,
Ontario
- Mr. R.H. Denniss
Sheep and Swine Programs, Livestock Branch, Toronto
- Dr. K.A. McDermid
Director, Veterinary Services Branch, Toronto
- Mr. H.E. McGill
Livestock Commissioner, Minister of Agriculture and Food, Toronto
- Dr. J.C. Rennie
Executive Director, Education, Research and Special Services
Division, Minister of Agriculture and Food, Toronto
- Mr. P.A. Rutherford
Associate Director, Regional Specialist Programs, Toronto
- Dr. V.C.R. Walker
Director, Laboratory Section, Veterinary Services Branch, Toronto
- Dr. J. Schroeder
Director, Laboratory Animal Resources, Ontario Veterinary College,
Guelph

1978/79

- Dr. F.X. Aherne
Faculty of Agriculture and Forestry, University of Alberta,
Edmonton
- Dr. D. Allewell
Manager, Marketing and Operating Sections, Saskatchewan Wheat
Pool, Regina
- Ms. K. Campbell
Ministry of State for Science and Technology, Ottawa

- Mr. W. Clews
 Representative of Saskatchewan Charolais Association, Pangman,
 Saskatchewan
- Dr. G. Cousineau
 Dean, Faculte de Medecine Veterinaire, St. Hyacinthe, Quebec
- Mr. A. Church
 Acting Secretary, Manitoba Cattle Producers Association, Winnipeg
- Mr. A. Dilworth
 Manager, Manitoba Pool Elevators, Winnipeg
- Mr. N. Edie
 Vice-President, Manitoba Cattle Producers, Dugald, Manitoba
- Mr. Glen Flaten
 Secretary Manager, Saskatchewan Boiler Chicken Producers
 Marketing Board and Chairman - Saskatchewan Hog Marketing
 Commission, Regina, Saskatchewan
- Mr. M. Franklin
 President, University of Windsor, Windsor, Ontario
- Mr. C.A. Gracey
 Manager, Canadian Cattlemen's Association, Toronto
- Dr. L.E. Greenaway
 Steveston Veterinary Hospital, Richmond, B.C.
- Dr. J.V.W. Greenfield
 Department of Agriculture, Veterinary Laboratory, Abbotsford, B.C.
- Mr. A. Haight
 Floral View Holsteins, Saskatoon
- Senator H.W. Hays
 Calgary, Alberta
- Dr. A.B. Kidd
 Head, Veterinary Branch, Victoria, B.C.
- Mr. F. Lynch-Staunton
 Lundbreck, Alberta
- Dr. J.E. McGowan
 Assistant Deputy Minister, Health of Animals, Ottawa
- Dr. J.A. McPhedran
 Director, Veterinary Services Branch, Winnipeg
- Mr. C.J. Mills
 Secretary, Canadian Cattlemen's Association, Calgary
- Dr. D. Mitchell
 Director, Animal Disease Research Institute, Lethbridge
- Mr. R.J. Monroe
 Director, Canadian Charlais Association, Warren, Manitoba
- Dr. J.R. Singleton
 Regional Veterinary Director, Health of Animals Branch, Winnipeg

- Mr. H. Seitz
Secretary Treasurer, Saskatchewan Milk Producers Association,
Zehner, Saskatchewan
- Mr. J. Sheppard
Saskatchewan Stock Growers' Association, Maple Creek,
Saskatchewan
- Mr. R.W. Shopland
Secretary Manager, Alberta Sheep and Wool Commission, Edmonton
- Mr. B. Vaags
Vice-Chairman, Manitoba Hog Producers' Marketing Board, Dugald,
Manitoba
- Dr. K.F. Wells
Former Veterinary Director General of Canada, Ottawa

**VIDO BOARD OF DIRECTORS MEETINGS
1979/80**

- Dr. L. Barber
President, University of Regina, Regina
- Dr. J. Bowland
Chairman, Alberta Agricultural Research Trust, Edmonton
- Mr. G. Carlson
Secretary, Saskatchewan Federation of Agriculture, Regina
- Mr. K. Colburn
Chairman, Saskatchewan Commercial Egg Producers' Marketing
Board, Delisle, Sask.
- Mr. Jim Fish
Devonian Foundation, Calgary
- Mr. Brian Freeze
Planning and Reseach Secretariat, Saskatchewan Department of
Agriculture, Regina
- Dr. Jeremy Greenfield
Veterinary Laboratory Abbotsford, B.C.
- Mr. Patrick Harvie
Priddis, Alta.
- Dr. Bruce Jeffrey
Secretary, Beef and Dairy Sub-Committee, Alberta Farming for the
Future, Edmonton
- Dr. G.G. Khachatourians
Department of Medical Microbiology, University of Saskatchewan
President (elect) L.F. Kristjanson
University of Saskatchewan
- Mr. Charlie Leask
Director, Livestock Division, Saskatchewan Wheat Pool, Regina

- Mr. Don Mackay
Past President, Canadian Lacombe Association, Aberdeen, Sask.
- Dr. R. Mapletoft
Department of Veterinary Clinical Studies, University of
Saskatchewan
- Mr. Jim Morris
General Manager, Saskatchewan Hog Marketing Commission,
Saskatoon
- Mr. Bob May
Saskatchewan Department of Agriculture, Horned Cattle Trust
Fund, Regina
- Dr. H.H. Nicholson
Animal and Poultry Science, University of Saskatchewan
- Dr. Jim O'Donoghue
Deputy Minister, Alberta Agriculture, Edmonton
- Dr. A. Olson
Secretary, Agriculture Research Council of Alberta, Farming for the
Future, Edmonton
- Dr. O. Radostits
Department of Veterinary Clinical Studies, University of
Saskatchewan
- The Honorable H. Rolfes
Minister of Health, Regina
- Mr. D. Sansom
Vice-President, Connaught Laboratories Ltd., Willowdale, Ont.
- Dr. J.R. Saunders
Department of Veterinary Microbiology, University of Saskatchewan
- Mr. G. Schlichemeyer
Special Projects Accountant, University of Saskatchewan
- The Honoral Dallas Schmidt
Minister of Agriculture, Edmonton
- Mr. M. Sheppard
University Controller, University of Saskatchewan
- Dr. D.L.T. Smith
Department of Veterinary Pathology, University of Saskatchewan
- Mr. G. Stephenson
General Manager, Canadian Western Agribition, Regina
- Dr. H. Tabel
Department of Veterinary Microbiology, University of Saskatchewan
- Mr. B. Valkenburg
Barrister, McKercher and Co., Saskatoon
- Mr. B. Walton
Executive Assistant to Honorable Dallas Schmidt, Edmonton

- Mrs. J. Watrous
Personnel Office, University of Saskatchewan
- Mr. J. Webster
Saskatchewan Department of Agriculture, Regina
- Mr. M. Webster
Controller's Office, University of Saskatchewan
- Dr. J.G. Manns
Department of Veterinary Physiology, University of Saskatchewan

1980-81

- Dr. R. Abernethy
B.C. Veterinary Medical Association, Vancouver
- Mr. H. Allison
Executive Member, B.C. Cattlemen's Association, Abbotsford, B.C.
- Dr. R.J. Avery
Director, Veterinary Services, B.C. Ministry of Agriculture and Food,
Victoria
- Dr. A. Bildfell
President, Alberta Veterinary Medical Association, Vegreville, Alta.
- Mr. M. Brown
Chairman, Alberta Turkey Growers Marketing Board, Acme, Alta.
- Dr. H. Carlson
Poultry Commissioner, B.C. Ministry of Agriculture and Food,
Victoria
- Dr. B. Costerton
Department of Biology, University of Calgary
- Dr. D. Currie
Director, Frontier Sciences, Edmonton
- Dr. W. Dorward
Director, Animal Pathology Lab, Vancouver
- Mr. H. Falkenberg
President, Unifarm, Edmonton
- Mr. R. Gordon
Alberta Sheep and Wool Commission, Athabasca, Alta.
- Dr. L. Greenaway, MP
- Dr. J. Greenfield
B.C. Veterinary Laboratory, Abbotsford, B.C.
- Mr. D. Guichon
General Manager, Alberta Egg and Fowl Marketing Board, Calgary
- Dr. D. Hawkins
Regional Veterinary Director, Canada Agriculture, Vancouver
- Mr. M. King
B.C. Ministry of Agriculture and Food, Victoria

- Dr. C. Krishnamurti
Department of Science, University of B.C., Vancouver
- Dr. G. MacEachern
Assistant Deputy Minister, B.C. Ministry of Agriculture and Food,
Victoria
- Dr. A. Matheson
Chairman, Department of Biochemistry and Microbiology,
University of Victoria
- Dr. J. O'Donoghue
Deputy Minister, Alberta Agriculture, Edmonton
- Mrs. M.L. Olsen
Victoria
- Mr. M. Oswell
Executive Director, Production Services, B.C. Ministry of Agriculture
and Food, Victoria
- Mr. S. Price
Chairman, Alberta Pork Producers Marketing Board, Acme, Alberta
- Mr. J. Reams
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Agriculture Canada Research Station
- Mr. Hank Steenge
Shur-Gain, Canada Packers Inc.
- Dr. Ron Hamilton
Manitoba Veterinary Medical Association
- Dr. Jim Neufeld
Diagnostic Laboratory, Manitoba Department of Agriculture
- Dr. Gopi Nayar
Diagnostic Laboratory, Manitoba Department of Agriculture
- Honorable Bill Uruski
Manitoba Minister of Agriculture
- Dr. Jack McPhedran
Director, Veterinary Services Branch, Manitoba Department of
Agriculture
- Ms. Mary Ellison
Manager, Manitoba Cattle Producers Association
- Mr. Bill Vaags
Chairman, Manitoba Hog Producers Marketing Board
- Mr. Bill Munro
Manager, Manitoba Hog Producers Marketing Board
- Mr. Burt Waters
Secretary-Manager, Manitoba Chicken and Turkey Producers
Marketing Board
- Mr. Waldie Klassen
Director, Manitoba Chicken and Turkey Producers Marketing Board
- Mr. Bob Lawson
Secretary-Manager, Manitoba Egg Producers Marketing Board
- Mr. K.T. MacPherson
Chairman, Manitoba Egg Producers Marketing Board

- Mr. Bill Christmas
Chairman, Canadian Turkey Marketing Agency
- Mr. Harold Dodds
Publisher, Cattlemen Magazine
- Mr. David Wreford
Editor, Country Guide
- Mr. Lorne Hehn
President, United Grain Growers
- Mr. John Clark
United Grain Growers
- Mr. Art Rampton
Chairman, Manitoba Milk Producers Marketing Board
- Mr. Clarence Vincent
General Manager, Manitoba Milk Producers Marketing Board
- Mr. Russ Scott
Manager, Manitoba Broiler Hatching Egg Commission
- Mr. Jack Penner
President, Keystone Agricultural Producers Inc.
- Mr. Andy Sirski
Grainews Magazine
- Dr. Ronald Humble
Industry, Trade and Technology
- Mr. Jim Hutch
President, Saskatchewan Research Council
- Dr. Dave Christensen
Department of Animal and Poultry Science, University of Saskatchewan
- Mr. Mac Sheppard
Associate Vice-President and Controller, University of Saskatchewan
- Dr. Bruce Schnell
Vice-President (Academic), University of Saskatchewan
- Dr. Warren Steck
Director, Plant Biotechnology Institute
- Mr. Jim Morris
General Manager, Saskatchewan Pork Producers Marketing Board
- Dr. Jack Manns
Department of Veterinary Physiology, Western College of Veterinary Medicine
- Carol and Dan Teichrob
Past members of the VIDO Board of Directors
- Mr. John Taylor
Manager, Saskatchewan Agriculture Development Fund
- Mr. Jim Mahone
Director, Alberta Farming for the Future

APPENDIX "F"

List of Personnel

Present Employees

S. Acres	July, 1977	L. Babiuk	May, 1982
C. Bernier	July, 1982	K. Brown	May, 1986
B. Carroll	October, 1980	M. Denson	July, 1975
D. Dent	June, 1982	W. Finn	March, 1984
P. Frenchick	March, 1985	E. Gibbons	July, 1980
P. Green	February, 1981	P. Hodgman	December, 1978
M. Issa	May, 1986	C. Jewell	May, 1986 (casual)
D. Kirchmeier	August, 1980	S. Klashinsky	June, 1978
I. Kosokowsky	June, 1981	M. Lawman	August, 1985
L. McDougall	June, 1982	P. Mierau	August, 1976
B. Mollison	June, 1984	M. Parker	April, 1985
A. Potter	March, 1985	A. Powell	October, 1986
M. Sabara	November, 1982	R. Tabela	February, 1978
J. van den Hurk	October, 1980	S. van den Hurk	March, 1985
T. Watts	August, 1982	P. Willson	October, 1980
S. Wilson	February, 1981		

PAST FULL-TIME EMPLOYEES

M. Permut	June/76-Aug. 78	K. Sollid	Sept./85-Sept./86
J. Qualtiere	Nov./80-March/87	D. McNeil	Apr./84-Sept./86
B. Neufeld	Jan./82-Nov./86	D. O'Reilly	Oct./81-Dec./83
V. Hanson	Sept./81-Aug./82	S. Neilson	Apr.-July/86
L. Homeniuk	June/84-Apr./86	S. Kostyk	July/82-Oct./84
K. Friesen	Aug./82-Oct./84	S. Adolf	June/75-Feb./78
K. Almdal	June/78-Mar./80	V. Bachynsky	Dec./76-Dec./77

C Ashley	May/79-Sept./80	M. Buckley	Nov./78-Sept./81
C. Baugh (Summer student)	1979-81	B. Buchinski	Apr./81-Feb./85
B. Beswick	May/82-Aug./83	C. Crouch	Feb./82-Apr./84
C. Campbell	Nov./78-Mar./79 & Jan.-Mar./80	J. Cartier	Aug./79-July/81
D. Clancy	July/79-Sept./80	C. Dodd	Mar./80-Sept./80
B. Dreher	Dec./81-Aug./82	K. Dukeshire	(Summer student) 1980-82
J. Dunne	(Winters) 1978-84	E. Davis	Apr.-July/78
D. Duncan	Oct./76-Feb./78	L. Filion	June/81-July/83
S. Fischer	Nov./80-Feb./81	H. Fast	Mar./79-Apr./82
B. Freeze	May/75-Apr./79	A. Forman	Jan./78-July/81
D. Farrow	Jan./77-Jan./78	D. Farrow	Jan./77-Jan./78
W. Fang	June/77-May/78	H. Groat	June/82-Mar./85
A. Grewall	Nov./77-Apr./79	K. Hruska	May/82-Sept./82
B. Harris	May/78-Dec./78	G. Hudson	Mar./82-Aug./84
R. Kelly	June/79-June/81	G. Koop	Feb./82-May/82
M. Kumph	Sept./78-Aug./80	R. Kapitany	Aug./77-Nov./79
G. Krakowski	Dec./82-Aug./85	O. Kondrotoff	Sept./80-Sept./82
R. Kennedy	May-Sept./82	C. Lian	May/80-Aug./81
J. LeDuc	May/78-July/81	N. McKenzie	Nov./80-Mar./81
P. Merkel	Feb./78-Sept./80	R. McGuire	Sept./81-Oct./82
D. McIntosh	Feb.-May/80	G. McGinnis	Aug./82-Feb./84
R. Monseler	July/81-May/84	D. Novakowski	July/79-Aug./80
K. Nestor	Mar./80-June/81	A. Munroe	Sept./79-May/81
P. Owen	May-Sept./82	S. Peberdy	Nov./80-Sept.81 & Summer '83/84
P. Pfeifer	July-Sept./80 & Aug./82-Oct./84	D. Pfeifer	Sept./79-Jan./80
S. Remmen	(Summers) '80/81	C. Pound	(Summers) '79/80
P. Platel	Feb./78-July/70	I. Richard	Jan./78-Sept./79
J. Raybould	Feb./82-Oct./84	M. Ross	(Summer) 1982
C. Rempel	Sept./81-Aug./82	J. Scappaticci	Feb./81-Aug./82
J. Samarin	Oct./77-Feb./78	A. Scoot	Sept./78-Jan./79
R. Tobin	Oct./79-Feb./80	G. Thompson	Feb.-July/78
J. Whitebone	Oct./80-Nov./82	A. Verbeek	June/84-May/86 & May/82-Dec./82
G. Weinmaster	May/78-Sept./79	C. Watson	Dec./80-Feb./81
R. Worthington	Dec./76-Dec./77	D. Young	Jan.-Apr./79
M. Warenycia	Jan.-June/76		

PAST CASUAL EMPLOYEES

L. Reid	- Sept./86 to present	J. Johannesson	- 1986
S. Zablocki	- June/85-Feb./86	J. Gruel	- Dec./85-Mar./86
M. Webster	- Dec./85-Mar./86	K. Hemstad-Falk	- Spring - 1981-1983
L. Koop	- 1980-82	H. McDonald	- May-June/79 & 80
J. Bednuz	- Feb.-June - 1981-82	J. Parsons	- 1976

APPENDIX "G"

Vido Publications

1978-1987

"Effects of Biotin, Folic Acid and Pantothenic Acid on the Growth of *Mycoplasma meleagridis*, a Turkey Pathogen" by C.H. Bigland and W.M. Warencya

"Studies on Rotaviral Antibody in Bovine Serum and Lacteal Secretions, Using Radioimmunoassay" by S.D. Acres and L.A. Babiuk.

"Specific Immune Gammaglobulin in the Control of *Mycoplasma meleagridis*" by C.H. Bigland, W.M. Warencya and M. Denson.

"Vaccination of Cows with Purified K99 Antigen, K99+ Anucleated Live *E. coli* and Whole Cell Bacterins Containing Enterotoxigenic *E. coli* for Prevention of Enterotoxigenic Colibacillosis of Calves" by R.A. Kapitany, A. Scott, G.W. Forsyth and R.W. Worthington.

"Purification and Comparison of the Heat Stable Enterotoxins Produced by Bovine and Porcine Strains of *Escherichia coli*" by R.A. Kapitany, A. Scott, G.W. Forsyth and R.W. Worthington.

"Multiplication Kinetics and Factors Affecting the Replication of Bovine Enteric Coronavirus in Madin Darby Bovine Kidney Cells" by C.F. Crouch.

"Atrophic Rhinitis Vaccine Trials in Feeder and Farrow-To-Finish Swine Pig Operations" by P.J. Willson, L.G. Filion and H.A. Fast.

"Characterization of the Bovine Secondary *In Vitro* Antibody Response" by L.G. Filion, H. Bielefeldt Ohmann, P.W. Owen and L.A. Babiuk.

"Enzyme-Linked Immunosorbent Assay to Detect Type-Specific Swine Antibodies Against *Haemophilus pleuropneumoniae* Serotype 1" by P.J. Willson, L.G. Filion and A.D. Osborne.

"*Haemophilus pleuropneumoniae*: Antibiotic therapy for Experimentally Induced Pleuropneumoniae in Pigs" by P.J. Willson and A.D. Osborne.

"The Effect of Stress in the Induction of Experimental Pneumonic Pasteurellosis" by L.G. Filion, P.J. Willson, H.B. Ohmann, L.A. Babiuk, R.G. Thomson.

"Immunization of Calves Against Enterotoxigenic Colibacillosis by Vaccinating Dams with Purified K99 Antigen and Whole Cell Bacterins" by S.D. Acres, R.E. Isaacson, L.A. Babiuk and R.A. Kapitany.

"Isolation and Partial Characterization of Two Different Heat-Stable Enterotoxins Produced by Bovine and Porcine Strains of Enterotoxigenic *Escherichia coli*" by R.A. Kapitany, G.W. Forsyth, A. Scoot, S.F. McKenzie and R.W. Worthington.

"Evidence for Two Heat-Stable Enterotoxins Produced by Enterotoxigenic *Escherichia coli*" by A. Scoot, G.W. Forsyth, S.F. McKenzie and R.W. Worthington.

"Pathology of Experimental Enteric Colibacillosis in Calves" by J.E.C. Bellamy and S.D. Acres.

"Effect of Infectious Bovine Rhinotracheitis Virus Infection on Bovine Alveolar Macrophage Function" by A.J. Forman and L.A. Babiuk.

"Susceptibility of Bovine Macrophages to Infectious Bovine Rhinotracheitis Virus Infection" by A.J. Forman and L.A. Babiuk.

"Antigen-Extinction Profile in Pregnant Cows Using a K99-Containing Whole Cell Bacterin to Induce Passive Protection Against Enterotoxigenic Colibacillosis of Calves" by S.D. Acres, A.J. Forman, R.A. Kapitany.

"The Immunogenicity of K99 Antigen in Whole Cell Bacterins of *E. coli*" by A.J. Forman, S.D. Acres, R.A. Kapitany, M.L. Buckley, D.W. Stainer and M.A.B. Maxwell.

"An Antigen Extinction Profile in Pregnant Cows Using a K99-Containing Whole Cell Bacterin to Induce Passive Protection Against Enterotoxigenic Colibacillosis of Calves" by S.D. Acres, A.J. Forman and R.A. Kapitany.

"The Effect of Infectious Bovine Rhinotracheitis Virus Infection of Calves on Cell Populations Recovered by Lung Lavage" by A.J. Forman, L.A. Babiuk, F. Baldwin and S.C.E. Friend.

"The Susceptibility of Bovine Macrophages to Infectious Bovine Rhinotracheitis Virus Infection" by A.J. Forman, L.A. Babiuk, V. Misra and F. Baldwin.

"A Monoclonal Antibody Capture Enzyme-Linked Immunosorbent Assay for the Detection of Bovine Enteric Coronavirus" by C.F. Crouch, T.J.G. Raybould and S.D. Acres.

"Comparison of Serological Techniques to Measure Antibody to *Pasteurella haemolytica* A1" by L.G. Filion, H.J. Cho, P.E. Shewen, T.G.J. Raybould and B.N. Wilkie.

"A Study of the Bovine Rotavirus Type-Specific Antigen" by M. Sabara, J.E. Gilchrist, L.A. Babiuk and G.R. Hudson.

"A Bovine-Murine Hybridoma that Secretes Bovine Monoclonal Antibody of Defined Specificity" by T.J.G. Raybould, C.F. Crouch, L.J. McDougal and T.C. Watts.

"Prevalence of Rotavirus and Coronavirus Antigens in the Faeces of Normal Cows" by C.F. Crouch and S.D. Acres.

"Chronic Shedding of Bovine Enteric Coronavirus by Clinically Normal Cows" by C.F. Crouch, H. Bielefeldt Ohmann, L.A. Babiuk and T.C. Watts.

"Serum and Faecal Antibody Responses Following Experimental Coronavirus Infection of Neonatal Calves" by C.F. Crouch, S.D. Acres, L.A. Babiuk and T.C. Watts.

"A Porcine-Murine Hybridoma that Secretes Porcine Monoclonal Antibody of Defined Specificity" by T.J.G. Raybould, P.J. Willson, L.J. McDougall and T.C. Watts.

"Comparison Between Different Commercially Available Gel Matrices as Solid Phase Supports for Polyclonal and Monoclonal Antibody Immunosorbents" by T.J.G. Raybould and C.F. Crouch.

"Alteration of Some Leukocyte Functions Following *In Vitro* and *In Vivo* Exposures to Recombinant Bovine Interferon- and —" by H. Bielefeldt Ohmann and L.A. Babiuk.

"Monoclonal Antibodies to Group II Avian Adenoviruses" by J. van den Hurk.

"Quantitation of Hemorrhagic Enteritis Virus (HEV) antigen and Antibody Using Enzyme-Linked Immunosorbent Assays ELISA's" by J.V. van den Hurk.

"Propagation of Group II Avian Adenoviruses in Turkey Leukocytes" by J. van den Hurk.

"*In Vitro* Assembly of Bovine Rotavirus Nucleocapsid Protein" by K.F.M. Ready and M. Sabara.

"Radioimmunological (RIA) and Enzymim-munological (ELISA) Detection of Corona-virus Antibodies in Bovine Serum and Lacteal Secretions" by L. Rodak, L.A. Babiuk and S.D. Acres.

"Comparison of a Bacterial and A Viral Vaccine for Prevention of Neonatal Calf Diarrhea in a Herd of First Calf Heifers" by S. D. Acres and M.H. Makarechian.

"A Comparison of Dichromate Solution Floatation and Fecal Smears for Diagnosis of Cryptosporidiosis in Calves" by P.J. Willson and S.D. Acres.

"Giardiasis in Two Calves" by P.J. Willson.

"The Kinetics of the Phagocyte Response in the Lung and the Immune Response to an Aerosol Challenge with *Pasteurella haemolytica* in the Bovine" by R.L. McGuire, L.G. Filion and L.A. Babiuk.

"Mechanisms of Clearance of *Pasteurella haemolytica* in Lungs of Calves Exposed to Infectious Bovine Rhinotracheitis Virus" by R.L. McGuire and L.A. Babiuk.

"A Comparison of Different Antigen Preparations as Substrates for Use in Passive Haemagglutination and Enzyme-Linked Immunosorbent Assays for the Detection of Antibody Against Bovine Enteric Coronavirus" by C.F. Crouch and T.J.G. Raybould.

"The Suppressive Effect of BHV-1 on Bovine Leukocyte Functions" by L.G. Filion, R.L. McGuire and L.A. Babiuk.

"Infectious Bovine Rhinotracheitis Virus Induced Neutrophil Dysfunction" by R.L. McGuire and L.A. Babiuk.

"Detection of Actinobacillus Pleuropneumoniae Infection in Pigs" by P.J. Willson, G. Falk and S. Klashinsky.

"Monoclonal Antibody Passive Hemagglutination and Capture Enzyme-Linked Immunosorbent Assays for Direct Detection and Quantitation of F41 and K99 Fimbrial Antigens in Enterotoxigenic *Escherichia coli*" by T.J.G. Raybould, C.F. Crouch and S.D. Acres.

"The Behaviour of a Synthetic Peptide Mimicking the Trypsin-Cleavage Site on the

Bovine Rotavirus 84,000 (VP3) Protein" by M.I.J. Sabara, P.M. Frenchick and L.A. Babiuk.

"Bovine Coronavirus Structural Proteins and Their Intracellular Precursor Proteins" by D. Deregt, M. Sabara and L.A. Babiuk.

"Recombinant Bovine Alpha Interferon: Use in Reducing Bovine Herpesvirus-1 Induced Respiratory Disease" by L.A. Babiuk, M.J.P. Lawman and G.A. Gifford.

"Studies on Functional Characteristics of Macrophages Derived from Porcine Blood Mononuclear Phagocytic Cells Maintained in Short-term *In Vitro* Culture" by C.L.V. Martins, T. Scholl, C.A. Mebus and M.J.P. Lawman.

"Functional Modulation of Porcine Peripheral Blood Derived Macrophages by *In Vitro* Infection with African Swine Fever Virus (ASFV) Isolates of Different Virulence" by C.L.V. Martins, T. Scholl, C.A. Mebus, H. Fisch and M.J.P. Lawman.

"Effect of Different Routes of Immunization with Bovine Rotavirus on Lactogenic Antibody Response in Mice" by M.K. Ijaz, M.I. Sabara, P.J. Frenchick and L.A. Babiuk.

"The Complete Nucleotide Sequence of Bovine Rotavirus C486 Gene 4 cDNA" by A.A. Potter, G. Cox, M. Parker and L.A. Babiuk.

"Generation of IL-2 Dependent Bovine Cytotoxic T Lymphocyte Clones Reactive Against BHV-1 Infected Target Cells: Loss of Genetic Restriction and Virus Specificity" by M.J.P. Lawman, P. Griebel, D.L. Hutchings, W.C. Davis, J. Heise, L. Qualtiere and L.A. Babiuk.

"Induction of Receptors for Complement and Immunoglobulins and Herpesviruses of Various Species" by H. Bielefeldt Ohmann and L.A. Babiuk.

"Monoclonal Antibodies to Bovine Coronavirus: Characteristics and Topographical Mapping of Neutralizing Epitopes on the E2 and E3 Glycoproteins" by D. Deregt and L.A. Babiuk.

"Assessment of Intestinal Damage in Rotavirus Infected Neonate Mice by D-Xylose Adsorption Test" by M.K. Ijaz, M.I. Sabara, P.J. Frenchick and L.A. Babiuk.

APPENDIX "H"

Research Collaborators

1977-1979

G.G. Khachatourians – College of Medicine, University of Saskatchewan
L.A. Babiuk – W.C.V.M., University of Saskatchewan
E.D. Janzen – W.C.V.M., University of Saskatchewan

D.E. Isaacson, N.D.A.C., Ames, Iowa
G. Forsyth, W.C.V.M., University of Saskatchewan
J.E.C. Bellamy, W.C.V.M., University of Saskatchewan

1979-80

F. Baldwin – Department of Veterinary Anatomy, W.C.V.M., University of Saskatchewan
J.E.C. Bellamy – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan
T.L. Church – Head, Preventive Medicine Branch, Veterinary Services Division, Alberta Agriculture, Edmonton
J.W. Costerton – Department of Biology, University of Calgary, Calgary
J. Greenfield – Veterinary Laboratory, Abbotsford, B.C.
E. Janzen – Department of Veterinary Clinical Studies, W.C.V.M., University of Saskatchewan
G.R. Kelly – Department of Veterinary Clinical Studies, W.C.V.M., University of Saskatchewan
M. Makarechian – Department of Animal Science, University of Alberta, Edmonton

S.W. Martin – Ontario Veterinary College, University of Guelph, Guelph, Ontario
D. McCartney – Canada Agriculture Research Station, Melfort, Saskatchewan
V. Misra – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan
A.D. Osborne – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan
M. Perry – National Research Council, Ottawa
J. Robinson – Veterinary Laboratory, Abbotsford, B.C.
J.R. Saunders – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan
P. Stockdale – Chairman, Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan

1981-82

E. Barber – Department of Agricultural Engineering, University of Saskatchewan

J.E.C. Bellamy – Department of Pathology, W.C.V.M., University of Saskatchewan

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 Saskatchewan

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 – University of Saskatchewan

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

E. Janzen – Department of Veterinary Clinical Studies, W.C.V.M., University of Saskatchewan

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 Alberta, Edmonton

S.W. Martin – Ontario Veterinary College, Guelph, Ontario

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, W.C.V.M., University of Saskatchewan

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, W.C.V.M., University of Saskatchewan

M. Perry – National Research Council of Canada, Ottawa

C. Riddell – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan

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, W.C.V.M., University of Saskatchewan

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

D. Spurr – Agriculture Canada, Saskatoon

P.G.H. Stockdale – Chairman, Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan

R.G. Thomson – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan

G. Woode – Department of Veterinary Microbiology, College of Veterinary Medicine, Iowa State University

W.D.G. Yates – Agriculture Canada's Animal Disease Research Station, Lethbridge

1982-83

E. Barber – Department of Agricultural Engineering, University of Saskatchewan

J.E.C. Bellamy – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan

J.M. Naylor – Department of Veterinary Internal Medicine, W.C.V.M., University of Saskatchewan

A.D. Osborne – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan

G. Bohac – Agriculture Canada's Animal Disease Research Institute, Lethbridge
J. Cho – Agriculture Canada's Animal Disease Research Institute, Lethbridge
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J.W. Costerton – Department of Biology, University of Calgary
G.H. Green – Department of Agricultural Engineering, University of Saskatchewan
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B. Kingscote – Agriculture Canada's Animal Disease Research Institute, Lethbridge
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D. McCartney – Agriculture Canada's Animal Disease Research Institute
V. Misra – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan
D. Mitchell – Agriculture Canada's Animal Disease Research Institute

M. Perry – National Research Council of Canada, Ottawa
C. Riddell – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan
R.F. Ross – Veterinary Medical Research Institute, Iowa State University, Ames, Iowa
J.R. Saunders – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan
P.L. Sadowski – Molecular Genetics Inc., Minnetonka, Minnesota
D. Spurr – Agriculture Canada, Saskatoon
L. Splender – Agriculture Canada's Animal Disease Research Institute, Lethbridge
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R.G. Thomson – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan
M.R. Wilson – Ontario Veterinary College, Guelph, Ontario
G. Woode – Department of Veterinary Microbiology, College of Veterinary Medicine, Iowa State University
W.D.G. Yates – Agriculture Canada's Animal Disease Research Institute, Lethbridge.

1983-84

E. Barber – Department of Agricultural Engineering, University of Saskatchewan
J.E.C. Bellamy – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan
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 Agriculture, Edmonton
J.W. Costerton – Department of Biology, University of Calgary
G.H. Green – Department of Agricultural Engineering, University of Saskatchewan

J.M. Naylor – Department of Veterinary Internal Medicine, W.C.V.M., University of Saskatchewan
A.D. Osborne – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan
M. Perry – National Research Council of Canada, Ottawa
O.M. Radostits – Chairman, Department of Veterinary Internal Medicine, W.C.V.M., University of Saskatchewan
C. Riddell – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan
J.R. Saunders – Department of Veterinary Microbiology, W.C.V.M., University of Saskatchewan

E. Janzen – Department of Veterinary Clinical Studies, W.C.V.M., University of Saskatchewan

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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, Ontario

D. McCartney – Agriculture Canada's Animal Disease Research Institute

J.L. Spencer – Agriculture Canada's Animal Disease Research Institute, Lethbridge

D. Spurr – Agriculture Canada, Saskatoon

R.G. Thomson – Department of Veterinary Pathology, W.C.V.M., University of Saskatchewan

M.R. Wilson – Ontario Veterinary College, Guelph, Ontario

G. Woode – Department of Veterinary Microbiology, College of Veterinary Medicine, Iowa State University

W.D.G. Yates – Agriculture Canada's Animal Disease Research Institute, Lethbridge.

1984-85

V.E. Baracos – Department of Animal Science, University of Alberta, Edmonton.

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

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

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

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

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

D. McCartney – Agriculture Canada's Animal Disease Research Institute, Melfort, Saskatchewan.

J.M. Naylor – Department of Veterinary Internal Medicine, Western College of Veterinary Medicine, Saskatoon.

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

M. Perry – National Research Council of Canada, Ottawa.

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

M. Stear – Agriculture Research Service, Clay Center, Nebraska

T. Zamb – Molecular Genetics Inc., Minnetonka, Minnesota

APPENDIX "I"

VIDO's Voyage

by Dr. A.E. Pallister

The 4th Board of Directors Meeting and Supper
Victoria, B.C. – March 2, 1981

Being here on this side of the sea is very invigorating for us from the prairies and I can't help but look at the ships at sea and look at VIDO. I would just like to review the VIDO voyage in nautical terms, being an old sailor, and talk about the seven "C's" that VIDO has crossed – the six "C's" we've crossed and the "C" we're in today.

The seven "C's" are 1) the concept, 2) the concentration, 3) the crew, 4) Canada, 5) communication, 6) credibility and 7) continuity.

"The concept" was a very important start on our voyage. It was brought to us by able Seaman Bigland and his concept was to clear the decks and give people the opportunity to do some research free from teaching responsibilities, from administrative responsibilities, from corporate responsibilities and from paper shuffling. His concept was that if we could clear the decks and give people the ship to do the job, then the job would get done. In looking back to his concept in 1976 he was saying, "Here's what we're going to do. . ." and here we are in 1981 and its done. They did it by clearing the decks.

The next thing that happened of course was "the concentration of effort", our second "C". As you know, one problem was chosen – that of calf scours. And it was then that the Board of Directors came together and argued about all the things we could do, all the seas we could sail, and we chose one course. So the chart was examined, and the course was set – one line on the map telling us where the ship was going to go.

And then there was "the crew", our third "C". We have this theory

that the smarts are in the universities. The universities, as you know, are often looked at as that ivory tower of people who look into space, but really can't do anything. We had faith, from the beginning, that the "smarts" lie in the universities. Given the opportunity, they would translate their intelligence into action. Perhaps I'm saying this in a way that is not complimentary, and I don't mean it that way, but it is a common image of the ivory tower and here again, you've seen what happened when people are given the opportunity. And what a transition of these people who had never looked at a balance sheet and never looked at a budget. It was just money in and money out. . . it was a totally theoretical world in terms of business. But in a matter of months, these people turned themselves to the advice that the business people and the Board gave them and the advice that they were getting from government people, and they made a business of it. So they lifted their anchors and away they went.

And our fourth "C" was "Canada". Why were we doing this? We were doing this because there was a distinctive need in Canada to look after our own research. Solve our own problems. Not wait for the rest of the world to solve our problems. Yes you can look at Canada's research as being nearly 8% of the world's research. But is that research oriented towards our problems? We decided it was not and that we should do something on our own. So we raised the Canadian flag (we've always meant this to be a national institution). We haven't quite succeeded, but it certainly goes from the west coast all the way to the Great Lakes. Unfortunately, eastward of there has not been as strong as we had hoped, but it will be. This is our next mandate, to make this a truly national organization. But looking at it nationally, I have a hard time getting the exact numbers from the scientists, but I venture to say there are 20,000 calves alive today that would not be alive if it weren't for the VICOGEN vaccine. . . I think the number is larger, but I'm being conservative with respect to the scientists. But we've only done a quarter of the job. In the years to come, there will probably be an annual rate of four times as many animals alive because of the work of these people.

Our fifth "C" was that of "communication". Here we, and I say "we" in the sense that all those who are participating, the types and variety of people that you see with you tonight and the many many who aren't here with us tonight, recognize the important of communication - the importance of bringing people together aboard our ship - those in government, those in industry, those in academia, the producers and the tremendous variety of producers. We made a list, I remember in the early days, to approach producer organizations, I quite naively suggested, let's write to all the producer organizations in Canada and tell them what we're doing. They showed me a list - 250 different breed organizations in Canada. . . the brown cows, the white cows, the green

cows. . .everybody's got his own organization. So there was a tremendous job of communication to do. We sent up our signals, our halliards and we tried to communicate to the whole country. "This is VIDO, this is where we're going, we're at sea". And when I say we were at sea, at that time, we were at sea. Somebody said today "if you ever worry about missing the boat, you probably don't remember the Titanic".

Our sixth "C" is that of "credibility". Now it's easy to wave your arms and put up slides and tell people what needs to be done and how you are going to do it. But the world is very skeptical and so the toughest sea to cross, the highest waves and the storms, were those of credibility to show that it could be done. VIDO is no battleship. VIDO is a sailboat on those high seas. And today, VIDO is a dynamic sharp-bowed ship pointed towards its objective. But it's not a battleship. You don't have to be a battleship to beat the enemy.

So we made it through the shoals in our little boat, and we've now entered the "C" of "continuity". During our travel through the shoals, we raised \$8 million from scratch, with no credibility. Five million dollars went into research, four million dollars into a building and two million that we've put aside for rough times. In the next five years, we need another nine million dollars just to do the research - that's before we go into any capital programs, or expand our program into buildings. So our challenge now is to fill the fuel tanks in our seventh "C". . .and I'm confident that we're going to do it. Compared to the first challenge of taking the sailboat through the shoals - we now have this well-equipped vessel (you've seen the kind of people that have made this all happen so far), it's really going to be an easy job. So it's really with confidence and delight, that tonight is incidentally, my fifteenth speech of this nature, I just count three times a year for five years we've been going through this, and I feel so sorry for the Board hearing it time after time. They're enthusiastic, and I hope maybe some of our enthusiasm rubs off.

But I have to wonder why. Why was VIDO successful? I've thought about that a lot, and I think there are probably two reasons. I have been involved in so many projects over the years. . .tens, twenties, of projects and all of them have never met targets, have taken longer, took more money and we never achieved what we wanted to. They weren't failures, but it was always very difficult and this amazing experience with VIDO, where these guy said "we're going to do this" and they did it. It wasn't quite that easy, but essentially, they went from shore out to sea and they accomplished what they said. I've wondered why that is. Perhaps to be a little philosophical, I would like to repeat some of the remarks I made in our official opening.

In my explanation I said I was absolutely convinced that it is the veterinary mentality. In explaining what I mean, I think the rapport that

exists between a medical practitioner and an animal requires a man or woman to develop an ability to communicate, most of us who are person to person in this world don't ever experience. And I think this has an effect on a person. I think this has the effect of making that human being, when he does relate to another human being, to do it in a very sympathetic, cool, calm, reasonable, compromising method, because of that background of working with a patient who cannot speak, who cannot tell you where his pain is. It's a theory, but it's a theory I hold to very strongly. Part of the theory comes from my experience many years ago when I was a young man. I was exposed to a very wonderful veterinarian doctor here in Victoria. When I was in the Navy and came ashore, I found friendship and warmth in a family here in Victoria - a veterinarian who expressed some of those ideas to me, and which really motivated me in my perseverance in working with VIDO over the years. As you know, I am not a medical practitioner of any sort, I'm an oil hunter, but I have accomplished in five years the ability to pronounce "coccidiosis". In fact, I did that in the first year and I haven't learned anything since. But it was that rapport with the animal, I think, that creates a quality in the veterinarian that has made VIDO successful. And I just dream and almost pray that somehow in our country we can have that same ability to talk east and west and liberal and conservative and french and english. Couldn't we somehow use that same kind of power to work together, pull together? Look at the people in this room from every sector - dedicated to doing something. Why in the world in this wonderful country of Canada can't we pull together people who are dedicated not to controversy, not to confrontation, not to rights and power, but to the benefit of our country? It's just a thought that keeps running through my mind that if we can do it at VIDO, why can't we do it as a country?

Well, that's one reason why I think VIDO has been successful and I perhaps wandered a bit because of my concern about our country. The second reason that this ship has gone to sea so successfully is because as we all know, in World War II, the best sailors came from the Prairies. So, I'd like to just close my engagement with VIDO after five wonderful years, by saying, "Bless this ship and all those who sail in it."

Thank you.

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