

*Historical Article—***Early Poultry Vaccine Company Development: the Era of Entrepreneurs**John P. Donahoe^{AB}^AJPD PC, 4863 Netherlands Place, Flowery Branch, GA 30542

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SUMMARY. Early events leading to the establishment of various branches of the U.S. poultry industry and the animal health industry in the United States are reviewed. Entrepreneurs see needs in a developing market and take action to meet these needs. Their skills are suited to organize people and processes to supply these needs. As the early poultry industry consolidated, this was followed by technical education as a marketing tool to expand access to the customer base. Focus will be on two entrepreneurial individuals not well covered by prior history articles, namely Hiram Lasher and Kenneth Eskelund. A discussion of how industries pass from an entrepreneurial phase to a corporate phase will follow, thus explaining the corporate- and biotechnology-oriented vaccine companies we see today.

RESUMEN. *Artículo histórico* - Desarrollo temprano de las compañías de vacunas avícolas: la era de los empresarios.

Se revisaron los primeros eventos que llevaron al establecimiento de varias ramas de la industria avícola y de la industria de la salud animal en los Estados Unidos. Los empresarios detectaron las necesidades en un mercado en desarrollo y tomaron medidas para satisfacer dichas necesidades. Sus habilidades fueron adecuadas para organizar personas y procesos para satisfacer estas necesidades. A medida que se consolidó la industria avícola temprana, esto fue seguido por la educación técnica como una herramienta de mercadeo para ampliar el acceso a la base de clientes. La atención se centró en dos personas emprendedoras que no han sido adecuadamente analizadas por los artículos históricos anteriores como son, Hiram Lasher y Kenneth Eskelund. Se explicó cómo las industrias pasaron de una fase empresarial a una fase corporativa, explicando así las compañías de vacunas orientadas a la biotecnología y las empresas actuales.

Key words: poultry vaccine history, history, entrepreneurs

Abbreviations: AAAP = American Association of Avian Pathologists; ADOL = Avian Disease and Oncology Laboratory; BAI = United States Bureau of Animal Industry; DPL = Delaware Poultry Laboratories; HVT = herpesvirus of turkeys; IBD = infectious bursal disease; MBL = Maine Biological Laboratories; SPF = specific-pathogen-free; USDA = United States Department of Agriculture; Vipol = Vineland Poultry Pathology Laboratory

When I think of my own background in writing this article, the interactions over time seem like a Twilight Zone script or a play about fate. My graduate training was completed at a department that would eventually be partially endowed by Hiram Lasher. I worked in a laboratory that used the Kawamura isolate of herpesvirus of turkeys (HVT) as an experimental vaccine. After an academic career, I went into the corporate world beginning with Salsbury Laboratories. At Salsbury, they dreaded Hiram Lasher and required every new recruit to read *The Golden Egg* by Arthur Goldhaft. I was recruited to Abor Acres in New England where I became active in the New England Poultry Health Conference, working closely with doctors Gerencer, Rountree, Eskelund, and many others. I was recruited to Maine Biological by Ken Eskelund and Gensuke Tokoro of GHEN Corporation in Japan. When GHEN sold Maine Biological, I went to GHEN Corporation in Gifu City, Japan where I literally occupied the chair that Dr. Hitoshi Kawamura had after retiring from the Japanese National Animal Health Institute and Gifu University. My first boss there was Gensuke Tokoro whose sister had been a junior high school classmate of mine while their father was an agricultural attaché in the United States.

There are prior publications on the history of poultry vaccine companies and the regulation thereof (3,7). This article endeavors to describe the background events leading to the development of the animal health industry and the poultry vaccine industry in

particular. Rather than being a thorough review of every poultry vaccine company history, this article emphasizes two entrepreneurs who contributed significantly to the industry and to the American Association of Avian Pathologists (AAAP), namely Hiram Lasher and Kenneth Eskelund. Lectures, awards, and preceptorships were endowed by and named after these individuals. An entrepreneur may be defined as a person who organizes and operates a business or businesses, taking on greater than normal financial risks in order to do so. It will be seen that these types of individuals network within their industry and their environment. They tend to found more than one business, and they tend to be deeply involved in civic and charitable organizations. They find or derive new ideas and act on them. They have a positive impact and lasting legacy on those around them. This article will show how doctors Lasher and Eskelund fulfilled this role and left a legacy for AAAP.

ORIGINS

Humans have been dabbling with chemicals, whether unwittingly or not, throughout history. The birth of the multinational large-scale chemical company traces its origins to the industrial revolution. An early example was the sulfuric acid production works founded in Scotland in 1749 by Roebuck and Garbett (1). Over time, the chemical industry would branch out into many areas of endeavor. This would include the development of chemicals for crop protection, and such chemicals could be mass produced and mass

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applied. Eventually, scientists and marketers realized that chemicals that controlled insects on crops could also control insects on animals. An early scourge in U.S. animal health in the 1800s was Texas tick fever. By the 1890s, it was realized that the disease was arthropod borne. This work was accomplished by a team headed by Dr. Daniel E. Salmon of the United States Bureau of Animal Industry (BAI), aided by other famous early microbiologists, such as Theobald Smith and Cooper Curtice. The application, initially of crop chemicals, to this problem can be considered an early stage in the development of the animal health industry. Many years of repeated laborious cattle dipping programs were required to bring the vector under control (8).

Also existing in the 1800s were the beginnings of various industrial fermentation companies. With the discovery of penicillin, several of them got involved in antibiotic production for the treatment of human infectious diseases. Once again, it was found that some of these products may have application in animal health settings. With the recognition that some of these products were poorly absorbed from the gut but caused growth promotion in food animals, an entire large-volume, feed-additive industry was created. This explains the involvement of certain large pharmaceutical companies, such as Eli Lilly and Merck to this day in animal health (8).

It was comparatively easy for large chemical companies to develop animal health divisions. While animal health applications were a niche compared with mass application to crops, they were a profitable niche. Ectoparasiticides were still a market that was not heavily regulated and was easy to get into. In the early to mid-20th century, many petrochemical companies had animal health divisions. Today, due to environmental concerns, they are gone (8).

The development of the biologics section of the animal health industry was driven by the scourge of hog cholera in the 1800s. An outbreak of this disease wiped out a significant percentage of hog production in the Ohio Valley in 1857. In 1878, the federal government appropriated \$10,000 for research on the prevention of hog cholera. By 1884, it had established the BAI. The objective was for the federal government to research causes of hog cholera and the prevention thereof for the benefit of the swine industry. Following the lead of French chemist Louis Pasteur, scientists studied bacteria to find out the cause of hog cholera. Research led by Dr. Marion Dorsett led to the conclusion that a bacterium could not have caused the disease. By 1901 they had developed filters that would strain out all but viruses, and following this lead, they discovered that a virus had to be the cause of hog cholera. The U.S. Department of Agriculture (USDA) had been established in 1862 during the Civil War. But Congress did not establish a veterinary division within the USDA until 1883. This would evolve into the BAI. This was done in response to the clamor from private industry for government research to solve problems (8).

The importance of hyperimmune serum was realized soon after 1904. The use of hog cholera antiserum was a great benefit to the industry. However, serum lacks sufficient long-term protection. But mixing hog cholera virus with serum produced a longer-lasting immunity. The preparation and administration of this type of product required a great deal of care and expertise. Perfecting preventive techniques was aided by research at an experiment station in Ames, IA. One of the experiment station employees was Dr. Daniel E. Baughman. In 1911, Dr. Baughman set up a small laboratory in his home town of Fort Dodge, IA, and hired a technician to begin commercial production of hog cholera

preventive biologics. This marked the beginning of cooperation between private industry and government in animal health research. Two years later, the Virus Serum Toxin Act was passed by Congress in response to the problem of impure or worthless biologics on the market. Dr. Marion Dorsett was placed in charge. This authorized the USDA to license biologics, thus protecting the public against worthless, unsafe, impure, and ineffective products. By 1916, the first poultry biologic had been licensed to the University of California at Berkeley for the prevention of fowl pox. Throughout the 1920s, four more poultry biologics licenses were issued to various companies from Maryland to California, mainly for bacterial diseases and antisera (8).

Although not the first commercial source of licensed poultry vaccines, no consideration of the early history of poultry vaccine companies can be complete without mention of Arthur Goldhaft and Vineland Laboratories. Arthur Davenport Goldhaft was born in 1886 in Philadelphia, PA, to Jewish immigrants. Goldhaft's parents were part of the Jewish Am Olam group that had settled in Alliance Colony, NJ. A group of Jewish philanthropists in France had started an agency called Alliance Isrealite Universelle, known as Alliance, to help Jewish people all over the world. One of the ways was by making it possible for Jewish families to farm. An Am Olam group sponsored by the French agency was founded at the Alliance Colony northwest of Vineland in 1882. Farming did not work out for Goldhaft's parents, although they tried to make a go of it twice in Alliance. Goldhaft's mother was a skilled midwife and supported the family by delivering babies. They moved back to Philadelphia where Arthur was born (4).

Goldhaft grew up a poor, prone-to-fighting street kid. Goldhaft, when 15 years old, was sent to the Jewish Agricultural School in Woodbine, NJ, figuring he could always run away if it turned out to be the reform school he thought it was. Started by Baron de Hirsch, a Jewish philanthropist in the Alliance agency, the Woodbine school taught Goldhaft, and many others, how to farm scientifically. It changed his life. He graduated second in his class, spent several years as a farmhand in the Midwest and then enrolled in the University of Pennsylvania veterinary school. After marrying Florence Mirsky in 1908 and working his way through the University of Pennsylvania, he graduated in 1910 (4).

The couple moved from Philadelphia to Vineland in search of a healthier country life for their children. By 1916, after treating a menagerie of animals, Goldhaft started applying his knowledge to chickens and the diseases that often killed them in great numbers. You must understand that, at this point in history, the veterinary profession had nothing much to do with pets or food animal agriculture. The profession focused almost entirely on equine medicine and was urban centered. Veterinary schools were in urban areas, and almost all veterinarians practiced in cities. Life in American cities at the turn of the 20th century would surprise and possibly distress most city dwellers of today. Horses were ever present as was their dung and dead carcass odors. In the summer, the stench could be unbearable. The young veterinarian wanted to carve out a visionary role in agriculture. He set up practice in an area that had many poultry farmers and would eventually work with Dr. Fred Beaudette who had moved from Kansas State to Rutgers and was focusing on respiratory diseases of poultry (4).

Beaudette's background was interesting. In the late 1800s, very few veterinarians were interested in poultry medicine. One of the earliest known sources of published literature from a U.S. veterinarian on this subject was by a Midwestern researcher named

Pearson. The first consistently published research series on poultry health came in the early 1900s from the laboratory of Dr. Leland Bushnell at Kansas State University. Bushnell focused on infectious diseases, microbiology, and pathology. He had two prominent graduate students by the names of Hinshaw and Beaudette. They would both move on to prominence in poultry disease research in other areas of the country (6). For Beaudette it would be at the Rutgers Agricultural Experiment Station in New Jersey because Arthur Goldhaft had heard of his research exploits and actively aided Rutgers in recruiting him (4).

In 1914, the young practitioner Dr. Arthur Goldhaft incorporated his practice as a private poultry-testing laboratory to help in the statewide effort to eradicate pullorum disease. He had a large and small animal practice in Vineland, NJ, an area with a high concentration of poultry flocks. His visits to the farms and the farmers' requests for help with poultry disease problems made him aware of the need and the potential for aiding the poultry industry. After 1919, he devoted more and more time to poultry practice. He eventually established a company called Vineland Poultry Pathology Laboratory (Vipol) for vaccine production. The vaccine production laboratory was completed in 1928. With Beaudette's assistance, they began using a serologic test for pullorum monitoring. By 1925, they were producing a crude-tissue-derived fowl pox vaccine for use in New Jersey. Soon, the USDA got into the picture by licensing biologics. Although already in use, the pullorum test was one of the first licensed poultry biologics. In 1929, pox was licensed by Vipol, and in 1933 a vent brush vaccine for what was then called infectious bronchitis (today it is called infectious laryngotracheitis). These early vaccines did not always conform to today's purity standards, but they did reflect the scientific knowledge of the time. Also, they were not amenable to mass vaccination and required more labor to administer than now. This also reflected the standard farm management and practices of the day, with smaller farms and readily available labor (4).

By the mid-1930s, Arthur's son and daughter, both veterinarians, joined the company. When Newcastle disease hit the United States, Beaudette developed two vaccine strains for Vineland, which he named after the farms of origin, Roakin and LaSota. These were licensed after World War II. Beaudette also isolated strains of infectious bronchitis virus, one of which is still used for diagnostics (4).

Other significant poultry vaccine entrepreneurs arose in Goldhaft's early days and deserve noting. One such company had been in business since the early 1920s producing mail order medications for the poultry industry. This was Dr. Salsbury's Laboratories of Charles City, Iowa, later known simply as Salsbury Laboratories. Dr. Joseph E. Salsbury, as a young veterinarian, took over a retired veterinarian's practice and began selling his poultry prescriptions by mail in 1923. These were mostly dewormers and nonbiologicals at first. A specially trained Salsbury field team was started in 1926, a team that later was to spread from coast to coast. This was an early version of technical service that would eventually be embraced by most animal health companies. He moved from an abandoned church to his own building in 1929 and began producing poultry vaccines for the Midwest. He moved from tissue-derived production to egg-derived production in 1930 but experienced some of the pre-specific-pathogen-free (SPF) egg problems, such as egg-transmitted mycoplasma diseases or egg transmitted species-specific *Salmonella* such as *Salmonella* Pullorum. Later, Salsbury was an early adapter of

the Newcastle B1 vaccine and Marek's vaccine. They moved to a much enlarged facility in 1953 (7).

Other pioneers of the 1930s were Lederle Laboratories and I. D. Russell. Lederle was a human biologicals producer that decided to offer some poultry vaccines in the 1930s. Doctors Harold Cox and Floyd Markham operated the poultry biologics section of the company. The best-known member of the operation was the Technical Services Director Dr. C. A. Bottorff. Dr. Bottorff hosted the Bear Mountain poultry disease meetings and was active in AAAP. Because the poultry vaccines were produced in the human biologicals facility, the excessive overhead led to the demise of the operation. I. D. Russell produced some poultry vaccines in the 1940s as well as some bacterins. Price competition eventually led the company to shift toward pharmaceuticals (7).

The stage was set for an expansion in poultry vaccine companies and a new age of entrepreneurs.

THE AGE OF ENTREPRENEURS

Post-World War II. The reader is referred to the article by Dr. Hitchner (7), which reviews the history of almost all poultry vaccine companies. It reviews operations prior to World War II, such as Vineland and others, but also mentions others in what I refer to as the "Age of Entrepreneurs," such as L&M Laboratories and Dr. Winterfield, H&N with Dr. Zander, Agri-Bio with Dr. Easterbrook, Poultry Heath Laboratories, Keevet, Wene Poultry Laboratories, Melini Laboratories, Marshall Laboratories, TriBio, DeKalb, and others. The review is exhaustive, but this article will expand on Drs. Lasher and Eskelund.

Aside from the United States, the rest of the post-World War II nations were either destroyed or undeveloped. After decades of belief in a mixed economy, we led the world in many parameters, such as education, income, investment in science and infrastructure, health, livability, and productivity. Higher education was more accessible in the United States than almost any other country. A person with a college degree could expect a guaranteed career, lifelong employment, a reasonable degree of prosperity, and a good life. We had a government that invested in science and infrastructure, analyzed scientific results, and acted on them. This was an ideal milieu for an age of entrepreneurs (5).

Hiram Lasher. Hiram Nelson Lasher was born on February 8, 1920, in Catskill, NY, on a 300-acre farm that raised a variety of livestock species and assorted cash crops. His parents were also from Catskill. His father, Nelson Frederick Lasher, was born on Sunset Hill Farm, Catskill. Nelson took short courses at Cornell University and served in World War I. The farm that Hiram was born on was called Sunrise Farm because it was over the hill from Sunset Hill Farm. Sunrise Farm produced several commodities, one of which was chickens. It would eventually be operated by Hiram's brother William and would eventually become Sunrise Farm SPF egg operation (9).

Because the depression began in rural America prior to 1929, Hiram came of age during the Depression years. This gave him a sense of the value of money and a work ethic. Being the best at local 4-H competitions meant more money for the family. From this, Hiram learned the value of competitiveness. Hiram's primary education was in the stereotypical rural one-room schoolhouse. He later graduated from Catskill High School where he excelled academically and politically, being elected president of his class.

Hiram's deep involvement with 4-H led to his decision to become a veterinarian. This was aided by the depletion of one of his project flocks by pullorum disease, which made him determined to specialize in poultry diseases as a veterinarian. After a 1-year preveterinary curriculum, Hiram enrolled in the New York State Veterinary College, a part of Cornell University located in Ithaca, NY. While at Cornell, he received training in poultry diseases from Drs. Levine, Hagen, Brunet, and Hofstad, all of whom would become famous in the area of infectious disease. One of his student projects under Dr. Levine was to produce a viable fowl pox vaccine, the first of many vaccines to be produced during his career. Hiram graduated in 1942 with a doctor of veterinary medicine degree (9).

Hiram was advised by Dr. C. A. Bottorff of Lederle Laboratories to gain field experience before specializing in poultry veterinary medicine. He set up a private practice at his home at Sunrise Farms. He was ineligible for military service and spent a lot of time at the Kingston diagnostic lab assisting with pullorum testing. During this 5-year phase of Hiram's career, Salsbury Laboratories service personnel aided him in improving his blood testing skills and breeder selection skills. Hiram was working himself out of a job by being so successful at pullorum eradication. Because of this, he took a job with the state of Delaware in 1948 as assistant state poultry pathologist for Sussex County. Hiram immersed himself in his work for the next 2 years, honing his skills in field diagnostics. Concurrent with this, Hiram partnered with a Delaware State Senator to form Del-Mar-Va Poultry Labs. The business consisted mainly of repackaging sulfaquinolaxine from Merck into a liquid format suitable for drinking water use. This business was terminated by 1950 but was Hiram's first venture into the commercial world of poultry pharmaceuticals (9).

Hiram came to see firsthand the devastating consequences of infectious diseases in the close confines of the Delmarva Poultry Industry. Competition from other regions was increasing. Broiler production in the south and southwest had lower disease losses and lower costs of production. The Delmarva Poultry Industry was at risk of losing out and something had to be done. There was a demand for a better vaccine to control Newcastle disease. Hiram was approached by a couple of feed salesmen to consider the possibility of initiating a vaccine production company. William H. Mitchell subsequently introduced Hiram to Dr. Frances Mullen of Shen Laboratories in Harrisonburg, VA, where he subsequently visited and observed techniques used in vaccine production. Mullen was a charter member of AAAP and was director of the Virginia Regional Laboratory in Harrisonburg for many years. Mullen had started a small lab to produce the newly developed frozen B1 strain Newcastle disease vaccine for in-state poultry producers. As the germ of this idea grew, Hiram consulted with Dr. C. A. Bottorff of Lederle Laboratories and Dr. Tevis Goldhaft of Vineland Laboratories, persons well established in the vaccine business. He developed a vision that a better source of poultry vaccines was needed. Because of the limited impact he could have on these problems as a diagnostician, Hiram was ready for another chapter in his career (9).

In May 1950, Hiram, along with four partners, started a vaccine business named Delaware Poultry Laboratories (DPL). Hiram was president and in charge of operations. The objectives were to produce high-quality but moderately priced poultry vaccines and also provide free diagnostic and flock management advice. Within the year, Hiram had switched from a frozen egg-derived vaccine platform to a glycerinated one; and this was soon followed by lyophilization. Hiram would be a lifelong student of vaccine science

and an early adapter of new technologies throughout his career. Within 2 years, they had phased from state-licensed products to federally licensed products. By the mid-1950s, DPL production efficiencies and quality had increased to the point that they were gaining market share in the south and southwestern United States. A few years later, they began international exports (9).

The company's increased quality of vaccines and production efficiency were due to a commitment to research and development. Their expanding market share was also assisted by a commitment to technical service, with diagnostic labs being opened in various regions of the country. DPL would achieve a 50% market share of the broiler vaccine market. The diagnostic labs proved a conduit for new vaccine strain candidates. Hiram organized dinner meetings to discuss poultry disease topics and these may have become the basis for the annual National Meeting on Poultry Health and Processing. Because of his background and embeddedness in the industry, Hiram saw the need for new products before most competitors (9).

It is not unusual for entrepreneurs to start or be involved in more than one business. The experience with pullorum disease in his youth and the knowledge that *Salmonella* spp. could be egg transmitted led Hiram to the realization that pathogen-free eggs would be important for vaccine production. He recognized this as early as 1950. In 1950, he collaborated with his brother William at Sunrise Farms to construct a windowless environmentally controlled layer house for the production of pullorum-typhoid-free eggs. This type of egg became a requirement for the vaccine industry by 1953. Initially, Sunrise Farms SPF egg supply was a captive market for DPL only. Over time, they offered SPF eggs to other manufacturers. Eventually, the facilities were upgraded for the production of SPF eggs to the industry (9).

By the late 1950s, DPL's stature and success had attracted the attention of merger and acquisition firms. Hiram's partners wanted to sell, so an agreement was eventually reached with Sterling Drug, the owners of Cocco Vac. Hiram would eventually regret this because entrepreneurs do not always fit in a corporate environment. The company continued under the name DPL with Hiram as president until 1968 when it was consolidated into Sterling's Animal Health Division along with Dorn & Mitchell. Sterling Drug had created a distribution company called Winthrop. Thus, the name DPL was replaced with Sterwin, a name derived by combining the first two syllables of Sterling and Winthrop. Throughout the 1970s the company's domestic and export sales increased, eventually achieving the status of number one poultry vaccine company in the United States (9).

It is important to note the role of Hiram's companies in the discovery and development of preventive measures for infectious bursal disease (IBD). The disease was initially described by one of his diagnostic employees, Dr. Cosgrove. The first federally licensed IBD vaccine was granted to Sterwin in 1968. Another characteristic of Hiram was speed. By the late 1960s, Marek's disease was becoming the scourge of the southern poultry industry. Hiram realized that an attenuated vaccine developed in Europe would not be imported into the United States. A closely related HVT had been described by Dr. Hitoshi Kawamura at Wisconsin. The staff at USDA Avian Disease and Oncology Laboratory (ADOL) East Lansing made numerous HVT field isolations and identified a vaccine candidate that was eventually licensed. Trials of the selected HVT field strain at ADOL confirmed the vaccine's potential (Dr. Richard Witter, personal communication). Hiram obtained the vaccine strain within about a month of its announcement. He began his own field trials

immediately and received a federal license for the HVT vaccine within 20 months. It was typical for DPL or Sterwin to be on the leading edge of improvements to existing vaccines and introduction of new vaccines. They were also instrumental in the licensing of early combination vaccines.

It is around this point in Hiram's career that he first met the senior author of this article. The way this unfolded gives interesting insights into Hiram's personality. I was in the early stages of my graduate program and was unknown to the key players of the poultry industry. Nonetheless, the Poultry Disease Research Center had a habit of sending young students to meetings in those days. So, I decided to attend the Western Poultry Disease Conference. The trip to Davis, CA, was full of delays and flight cancellations. I found myself at Denver, CO, waiting for a connection to California rather late one evening. There was a delay in boarding and one passenger succumbed to road rage. During the ensuing melee, I noticed a portly, ruddy-complexioned gentleman was observing me as if he were sizing me up. As the miscreant was being led off, I looked up and he was standing next to me with his hand out. He said, and I quote, "Hello John, my name is Hiram Lasher." I shook his hand, and we chatted briefly and then headed to California. It was late when I got to the hotel and it wasn't until my head hit the pillow and sleep awaited that the obvious question hit me. How did he know who I was?

By the mid- to late 1970s, inactivated adjuvanted vaccines for breeders had been developed, and Hiram saw the future potential for these vaccines. He petitioned the management of Sterling drugs to build an inactivated vaccine plant in Millsboro, DE. Sterling management refused and also showed some other signs of nonsupport for Hiram's leadership at Sterwin. His dedication to service to the industry and always being an industry leader led him to make a decision to resign from Sterwin. The impact of Sterling management's blunder gave Maine Biological Laboratories (MBL) an opening to dominate this market, as will be discussed later in the manuscript (9).

While still at Sterwin, Hiram had developed a relationship with the Dutch animal health company Intervet. This was done when Hiram imported the Baxendale strain of IBD to the United States. Intervet was interested in establishing an operation in the United States. This, combined with some of Hiram's own resources, resulted in him floating a plan to establish a new company in league with Intervet with greater future cooperation in mind later. In the spring of 1979, Hiram incorporated a new company called Intercontinental Biologics. In typical high-speed fashion, Hiram already had the construction plans and land arranged for the new operation. He personally supervised the construction along with family members and former associates. Hiram wisely had the research facilities completed first so that he could begin fast-track licensing of new products for a new company. By 1982, they were receiving their first federal licenses for poultry vaccines. As expected, Sterwin sued Hiram for breach of noncompetition agreements and a settlement was reached, which barely affected ICB's rollout of new products. Intervet International had already acquired the assets of ICB and contracted with Hiram to serve as its president for 5 years. The partnership worked well at first, providing beneficial technologies back and forth between the two parties. The spirit of cooperation would be short-lived (9).

Intervet placed three vice presidents under Hiram, and the Dutch management style of consensus soon clashed with Hiram's visionary strongman approach to management. Intervet terminated Hiram

just as ICB was preparing to roll out their first products. Hiram sued Intervet and won a significant settlement. However, his days as head of a poultry biologics manufacturer were over (9).

It is not far-fetched to say that if Hiram was awake, he was at work. His profession was his passion. He never retired. He formed a consulting company called Lasher Associates, Inc. Virgil Davis was brought in to work with him. It provided services to the domestic poultry biologics companies and consulted internationally in many different countries. An example would be his brokering of the deal for the sale of MBL to GHEN Corporation of Japan. He was ideally suited for this consulting role because of his vast knowledge and experience and because of his insatiable curiosity about new developments in the industry (Gensuke Tokoro, personal communication).

It is important to review Hiram's interaction with regulatory authorities. At times, his competitors thought his constant meetings with USDA and other regulatory authorities was an attempt to tilt the playing field in his favor. It can be seen that this was not the case. He worked through various industry organizations working in cooperation with federal regulators to promulgate regulations that really leveled the playing field for everyone and protected the consumer. He had input in such important concepts as master seeds, purity testing, fast tracking where needed, stability testing, and others (3).

Hiram was a charter member of AAAP at its formation. Later in his career, he was a significant contributor to it. He endowed the C. A. Bottorff award for excellence in field veterinary practice with a \$33,000 donation. This is now known as the Lasher-Bottorff Award. He aided the AAAP history committee late in life. The AAAP History Lecture is named for him. His philanthropy was not limited to AAAP, as he visited various universities and other civic groups. Lasher Laboratory at the University of Delaware is named after him (9).

Like many entrepreneurial people, Hiram was actively engaged in agricultural and nonagricultural efforts in his community and in the state of Delaware. He engaged in many projects, such as the promotion of public education and public television. He was active in the creation of the Association of Veterinary Biologics Companies to protect against encroachment of heavy-handed regulatory concepts from Europe. He was active in Boy Scouts of America. He has a list of civic awards almost a page long (9).

Dr. Hiram N. Lasher, 92 years old, a pioneer in avian vaccine development, passed away October 7, 2012. To the end, Hiram was intellectually active, corresponding with colleagues and actively participating in professional activities (9). He was a giant in his chosen profession and there will never be another one quite like him.

Kenneth Eskelund. Kenneth H. Eskelund was born February 13, 1924, in Winslow ME, the son of Carl and Idabel (Lintern) Eskelund. Ken did not grow up on a family farm as did Hiram Lasher, but he grew up surrounded by farms. He lived near the farm of Donald Corbett, a local agricultural entrepreneur. Corbett routinely hired school kids to help with farm chores. As Ken reached high school, Corbett began giving him more responsibilities by having him supervise a crew of crop harvesters. Corbett must have recognized his budding managerial capabilities. This gave Ken confidence in his abilities. He was introduced to veterinary medicine when Corbett recommended him for a job with a local veterinarian. The State of Maine was trying to clean up brucellosis in dairy herds. They hired "veterinary helpers" to assist veterinarians in taking blood samples of cattle. As such, he assisted Dr. Ingham (a local

veterinarian) with most of his work, whether it was cows, dogs, cats or horses. He graduated from Winslow High School in 1941. After graduation, he attended the New England Aircraft School in Boston, MA, studying aircraft mechanics. He then served 3 years in the U.S. Army Air Corp as an aircraft mechanic serving in the United States, Okinawa, and India, followed by an honorable discharge (Richard Eskelund, personal communication) (2).

After 1 year of preveterinary studies at Maine, and with the aid of the recommendations of Don Corbett, Dr. Frank Witter, and others, he was accepted into Michigan State University College of Veterinary Medicine. He attended Michigan State University in the same class as Drs. Monte Fraser, William Gerencer, and Jerry Rountree. Dr. Fraser would become a long-serving director of poultry health for Arbor Acres Farm. Gerencer and Rountree would work in various capacities in Maine poultry companies with Corbett and Eskelund. All three described their poultry disease curriculum at Michigan State as being very inspiring to their careers. In addition to this, during the summer vacation of 1949, while still in veterinary school, Ken returned to Winslow where he was challenged by Corbett to raise 20,000 baby broiler chicks, a large flock by the standards of the day. This experience also made him realize the great need for veterinarians in the poultry industry. After graduation in 1951, he chose poultry medicine as his career (2).

After veterinary school, Ken was hired by the South New Jersey Poultry Diagnostic Lab. He moved to Vineland, NJ, with his wife Shirley and 6-month-old son, David, living out of a small trailer. A year later, he was offered a job with the state veterinarians office in Indianapolis, IN. This was the first time a veterinarian in Indiana was assigned to avian regulatory medicine. He had free range to cover the state and to set up poultry disease control programs. After about a year in Indianapolis, Don Corbett beckoned again. At that time, the Maine poultry industry and Dons' company (Fort Halifax Poultry Co.) were growing rapidly in the production of broiler chickens. Ken returned to Winslow, ME, to manage Corbett's broiler company. Corbett was a great innovator and mentor and the operation prospered (2).

While a manager for Fort Halifax, Ken worked often with a poultry pathologist from the University of Maine, namely Dr. Harold Chute. Harold was a Canadian who settled in Maine to work for Dr. Frank Witter at the University of Maine at Orono. He had begun at Maine in 1949 and had published a paper on inactivated Newcastle vaccine in 1952. In those days, adjuvants were not well understood, and an improperly adjuvanted Newcastle vaccine gave a response similar to a live mesogenic booster. This was not useful, as it was more expensive and labor-intensive to administer inactivated vaccines. The Maine broiler industry was somewhat isolated, and vaccines at times gave reactions and could be back passaged into more pathogenic forms. As a result, the state experimented with a broiler SPF program. The program attempted to use biosecurity rather than vaccination as a preventive method in the state of Maine. However, it required universal participation and was not working. Drs. Eskelund and Chute became concerned and wanted to produce good-quality vaccines for the broiler industry in the state of Maine. They cofounded MBL in 1957. Dr. Chute was a board member and mentor to MBL but remained affiliated with the University of Maine in various roles and founded a chemical company. During the next few years, Ken derived income by doing poultry disease diagnostic work and consulting for two major Maine broiler-producing companies. Because Maine had refrained from vaccinating chickens, he set up services to go to the hundreds of

farms and apply these vaccines to the chickens. As this service grew, Ken also founded Maine Poultry Services with Tom Teague as his partner to manage crews to apply vaccines to these many farm flocks. He also founded Maine Poultry Consultants with Dr. William Gerencer to diagnose poultry diseases. He also founded Northeast Laboratory Services in Winslow, ME, which still exists. Another key development in MBL history was the hiring of John Osbourne, a native of Great Britain, who would carry out most of the on-site research and development for the company (Kenneth Eskelund, personal communication). The original MBL location was in a strip mall in Waterville, ME. Nine years after Dr. Chute's publication on inactivated Newcastle, MBL was granted a federal license for inactivated Newcastle disease vaccine in 1961. Advancements in adjuvant technology resulted in a much more effective vaccine. When the vaccine was administered to broiler breeders, the broiler progeny had high serum titers to Newcastle disease virus.

This development led to an amusing chapter in Dr. Eskelund's life. He received a call from Dr. Monte Frazier of Arbor Acres Farm. It seems that Arbor Acres had used some of MBL's Newcastle vaccine on breeders and then shipped some of the progeny to Argentina. When the chicks arrived in Argentina, their maternal Newcastle antibody titers were so high that the authorities thought the breeders had been exposed to velogenic viscerotropic Newcastle disease. According to Dr. Frazier, the Argentine military was going to use machine guns to euthanize the flock. I take this as Monte's way of pressing the urgency of the situation on Dr. Eskelund. The Argentinians, after all, know many safer ways to euthanize a flock. It was mandatory that they fly immediately to Argentina to deal with the situation. The only problem was that Ken did not have a passport. In those days, the Rockefeller family owned Arbor Acres. As Ken relates the story, Monte told him to proceed immediately to Rockefeller Center in New York City and go to a certain floor and a certain room and knock on the door. His passport would be ready. Ken could not believe this but complied anyway. When he arrived at the specified location and knocked on the door, he was handed a passport. Off they went to Argentina and the birds were saved (Kenneth Eskelund, personal communication).

MBL grew to the point where they had to build their own facility across the Kennebec River in Winslow, ME. However, the presence of a high-quality killed Newcastle vaccine did not stimulate huge immediate interest in the broiler vaccine community in Maine. MBL was located distant from most supply lines to major markets. As was mentioned earlier, human pharmaceutical companies had an interest in animal health divisions. Norwich and Eaton Pharmaceuticals had dabbled in veterinary products in the past. In 1966, Norwich expressed an interest in purchasing MBL. The partners decided to sell the company in 1966 to Norwich Pharmaceuticals. Ken remained as director of operations for several years. But this was not to be an ideal partnership. Norwich Pharmaceuticals was famous mainly for products such as Unguentine and Pepto-Bismol. As with Hiram Lasher, the entrepreneur did not fit in well with the corporate atmosphere. They removed Ken and replaced him with a Norwich executive by the name of Robert Keenum. The green and white logo most people associated with MBL was a modification of the Norwich logo (John Osbourne and Kenneth Eskelund, personal communication). The company did quite poorly under Mr. Keenum and by the mid-70s was repurchased by the original partners (2).

Several years later, Ken was observing IBD demonstrations by Walter Staples of Cobb Breeders at the University of New

Hampshire. Staples had noticed that the progeny of bursal disease-recovered hens performed better than the progeny of nonimmune hens. Ken decided to experiment with enhancing this effect by vaccinating broiler breeder hens with inactivated adjuvanted IBD vaccine (Kenneth Eskelund, personal communication). The results were impressive. Note that this is occurring near the time when Hiram Lasher wanted Sterwin to build a new killed-vaccine facility. The inactivated IBD vaccine put MBL on the map. It redefined how broiler breeder vaccination programs were going to be in the future. MBL would have a lead in the inactivated vaccine market. The company prospered and grew throughout the 1980s and 1990s. This required facility expansions in 1982, 1988, and 1991 (2).

The energy crisis of the 1970s spelled the eventual end of the Maine Broiler industry. Energy and transportation costs in and out of Maine left them uncompetitive. A white paper was released by the executive branch of the Maine State government predicting the demise of the Maine poultry industry. The report was chillingly accurate. This report was always referred to by Ken as the “Shaw Report” after its author, David E. Shaw, who would eventually found IDEXX (Kenneth Eskelund, personal communication).

It was mentioned earlier that Hiram Lasher helped broker a deal for GHEN Corporation of Gifu City, Japan, to purchase MBL in 1988. The GHEN Corporation had previously been purchased by HyLine Breeders of the United States. The purchase agreement had Ken Eskelund remaining as president for 5 more years. In 1988, HyLine began putting out feelers for a president to replace Ken Eskelund (Dr. William Chase, personal communication). Ken made a decision as to his replacement and then retired in 1993.

Ken remained active in his business world. He was an active board member in Northeast Laboratories and also Tri Bio Laboratories of State College, Pennsylvania. As was Hiram Lasher, Ken was heavily involved in civic groups and local charities. His main emphasis was on the Boys and Girls Club and YMCA at the Alford Youth Center, a nine million dollar facility in Waterville, ME. He was active on their board of directors beginning in 1998 and was honored in many ways, including the naming of the Kenneth and Shirley Eskelund “Kids Room,” which is the after school room where some 200 kids from 4 to 8 years of age receive a hot meal each school day. He and his wife were named to their Hall of Fame and their Heritage Circle. He remained active on their Endowment Committee for the rest of his life. A list of Ken and Shirley Eskelund honors are as follows:

1. Naming of the Kenneth and Shirley Eskelund Conference Center Building on the campus of the Maine Children’s Home for Little Wanderers.
2. Membership in the Good Will-Hinckley Heritage Society of the Good Will-Hinckley Home for Boys and Girls—“Providing a legacy for future generations”. (1995)
3. Appreciation for Leadership Gift for the new Harold and Bibby Alford Youth Center—Waterville Area Boys & Girls Club and YMCA (1999).
4. Membership in the Edgar Allen Founders Society of Easter Seals (2000).
5. Membership in the Founders Club of the Kennebec Valley Mental Health Center.
6. Naming of the Kenneth & Shirley Eskelund Outpatient Conference Room at the Kennebec Valley Mental Health Center in Waterville, ME.
7. Naming of the main drive through the Thomas Teague Biotechnology Park in Fairfield, ME, as Eskelund Drive (July 1999).

8. Naming of the Kenneth Eskelund Lane, next to Maine Biological Labs.
9. Names on the Inspirational Hall of Fame - Waterville Area Boys & Girls Club (1994 Ken, 2002 Shirley).

Professionally Ken was also recognized with the Distinguished Alumni Award from Michigan State University in 2005; it reads as follows: “This honor is awarded by Michigan State University Alumni Association to alumni that have attained the highest level of professional accomplishments, demonstrated exemplary voluntary service on a local, state, national or international level, and possess the highest standards of integrity and character to positively reflect and enhance the prestige of Michigan State University.”

In 2000, at the annual meeting of the AAAP, he was awarded their Special Service Award. This was awarded to one person annually, for lifetime service to the organization and for accomplishments that benefit the poultry health industry.

Kenneth H. Eskelund passed away on May 30, 2013. His profession and community still miss him (Richard Eskelund, personal communication) (2).

TOWARD THE FUTURE

Due to the emphasis of this article, not all of the successful entrepreneurial companies of the mid-20th century have been reviewed. One entrepreneur deserves mentioning because he pointed the way to a future that we can recognize today. The age of entrepreneurs is not completely over, but the face of the industry is more corporate today. Part of the reason for this is the need for more highly technical research and development. Demands in this area today exceed the capacity of most individuals to provide capital for the endeavor.

Select Laboratories started in Athens, GA, in 1979 as Dr. Caswell Eidson making the Marek’s disease vaccine. The company was a partnership of entrepreneurs from Cagle (James Evans), Bruce Wilson, and the Cromartie and Ward part of CWT Farms. They eventually decided to move operations to Gainesville, GA, and hire Dale King from Salsbury Laboratories. The entrepreneurial Dr. King grew the company rapidly. The company was embedded in the broiler belt and was responsive to customer needs. Through the 1980s, researchers such as the Jackwood brothers, Calvin Keeler, and others began describing advanced molecular biology techniques to the AAAP membership. Dr. King saw the potential for these products but also saw the resources needed to do the research. He met with the company’s board and described the potential for biotechnology-derived vaccines. He also informed them that the expertise and expense to bring these vaccines to market would be high and there would be high risk. There would be no guarantees that biotechnically altered vaccines would work at that time. The board enthusiastically agreed with the prospects of these new products but told him he would have to find a corporate buyer for the company. We see in Select Labs a company with the foresight to realize they were moving beyond the era of entrepreneurs (Stan Appleton, personal communication).

Gensuke Tokoro of the GHEN Corporation in Japan hatched a plan to buy MBL while the parent company of HyLine (Lohmann) would purchase Select Labs and combine the two companies. Mr. Tokoro kept up his end of the bargain while Harm Specht of Lohmann failed in his assignment (Gensuke Tokoro, personal communication). Fortunately for Select, a good partnership with

Meril Corporation ensued. Today, several poultry vaccine suppliers can offer a number of recombinant vaccines for poultry with few drawbacks and several beneficial features. Highly technical projects such as these take a long time to unfold. We can expect this line of vaccines to improve even more in the future. But it is not likely that any of them will be supplied by small entrepreneurial companies. Entrepreneurs may come along with new and interesting poultry vaccines, but they will usually occupy a niche and be sold in a shorter period of time than in the era of entrepreneurs.

The age of entrepreneurs is looked upon nostalgically by veterans of this era. However, nothing lasts forever, even good things. Congress relaxed corporate merger laws during the Reagan and Bush administrations of the 1980s. Corporations are viewed differently today than in the past. We see now an era of financialization in which corporations are not viewed simply as entities to maximize production, take care of their employees, and serve customers and their communities. They are viewed now more as commodities to be bought and sold, merged and demerged, and to have their stock values maximized. There are about four major poultry vaccine manufacturers in the United States today. In the past two decades the list could have included American Scientific Laboratories, Biomune, Central Biologics, Intervet, MBL, Sanofi, Select Labs, Solvay, Sterwin, and Vineland, Schering, Lohmann Animal Health International, and Fort Dodge. When corporations are going through merger and acquisitions, it is traumatic for the employees (5). But the larger corporations bring resources that research and development needs to move forward and persevere, for it is still possible to carry out our important mission.

For those who may be frustrated by the comparatively low numbers of poultry vaccine companies today, look at the world situation. MBL began compiling a data base of bursal disease vaccines for Dr. Y.M. Saif decades ago. This author expanded it to a worldwide data base of poultry vaccine suppliers last updated in 2013. It shows that entrepreneurs worldwide were still starting poultry vaccine companies and still looking for that next competitive edge as follows:

Arko
Avimex
Biopharm
Bioproperties
Biovac
Biovet
Bioveta
Boehringer Ingelheim
Brinton Laboratories
CAF Laboratories
Ceva
Epitopix
Fatro Neuva
vaxxinova
Hester Biosciences
Hygieia
Investigación Aplicada, S.A.
Indovax
MSD Animal Health

Izo
Kaketsuken
Kashiken
Kitasato Institute
Komipharm International
Kyoritsu
Kyoto Biken
Laboratorios Hipra
Laboratorios Inmuner
Lohmann Animal Health
Malaysian Vaccines and Pharmaceuticals
Meril
Mevak
Microbial Developments Limited
Nisseiken Co., Ltd.
Onderstepoort Biological Products
Pfizer Animal Health
Pharmagal Bio
Romvac
Ventri Biologicals
Vetech Laboratories
Veterina Animal Health Ltd.
Viridus Animal Health, LLC

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