

Summary of Oral Interviews Created as Part of an Artificial Insemination Documentation Project

(Stored in the Archives, Cornell University's Kroch Library)

Summary by Robert H. Foote, Cornell University. August, 2002

Background

In the 1960s Drs. Robert W. Bratton and Gould P. Colman collaborated in conducting oral interviews of several people connected with the early development of the artificial insemination (AI) industry. This was eventually typed, in rough form, and most cases were sent to the interviewees for editing. Some were not edited, and the degree of editing varied considerably among individuals. The original copies, with the editorial changes written on them, total over 900 pages.

The author of this summary was familiar with the project and interviewees. Recently he contacted the Cornell University Archivist, Elaine Engst, to determine what had happened to these interviews. The response from the archivist was that the information was stored and not used. Dr. Colman was contacted. He indicated that he had no plans to use them. Dr. Bratton was ill and soon was deceased.

So Robert Foote made arrangements to view the documents. Clearly they were valuable documents. They add information as well as an authentic flavor to published reports. This information would be of value to historians and others. I inquired about my editing them and was informed that there were restrictions on the use of these reports. Editing would have to be done by staff of the archives. The whole report would then be prepared and put on a CD. The 1960s copy was done on an old typewriter. That would have cost \$5,000. I found no administrative support for this, and so that idea was dropped.

Then I volunteered to summarize the documents and prepare a written summary. I was told that the interviewees had placed a restriction on the documents that no one could use these without written permission of the persons interviewed or their heirs. Only one person interviewed was still alive (since died), and he gave full permission. All heirs I could locate had no idea these interviews existed and all were delighted that a person who knew those interviewed would bring this hidden document to light. These facts are mentioned to caution anyone trying to preserve historical material that they should not make it impossible to have it used by appropriate parties.

The people interviewed were as follows:

1. Professor Raymond Albrechtsen, extension professor, working especially with type aspects of the AI program.
2. Professor Sydney A. Asdell, professor of reproductive physiology at Cornell, and one of the world's leading researchers in animal reproduction.
3. Professor Stanley J. Brownell, extension leader in Animal Husbandry, Cornell, and clearly the person most instrumental in spear-heading the development of dairy cattle AI in the USA. While his position was in New York State he helped Enos J. Perry with initiating the first AI coop in New Jersey, according to both of these gentlemen.
4. Mr. J. Stanley Earl was a leading farmer, and the first president of the New York Artificial Breeders Coop., Inc. He was an excellent leader.
5. Dr. Charles Henderson was professor of Animal Breeding at Cornell, and one of many fine graduate students from the J.L. Lush program at Iowa State University. Dr. Henderson became one of the world's foremost statistical geneticists-animal breeders, and certainly contributed more to the establishment of the progeny testing system adopted by AI organizations worldwide than any other single individual. His outstanding students came from many countries.
6. Mr. Philip Higley. He was an excellent county agent in NY State hired by J. Rockefeller Prentice to help establish what eventually became the world famous American Breeders Service (ABS).
7. Mr. Maurice W. Johnson. Formerly a DHIA test supervisor who became the first manager of the New York Artificial Breeders Coop., Inc. He was interested in new ideas, and he was one of the first in AI to recognize the value of Dr. Henderson's work on developing better sire programs, the young sire testing program.
8. Prof. Fred F. McKenzie. He was a famous University of Missouri Professor, and later at other universities, including several international programs. He conducted many research projects, including early AI work in several farm animal species. This involved the training of many superb graduate students.
9. Prof. Enos J. Perry. Prof. Perry was an extension specialist in NJ interested in new ideas. After visiting Europe he planted the ideas which set in motion the establishment of the first dairy AI Coop. in the U.S. Brownell was working on one in N.Y. State, initiated a few months later. Perry's book on AI provided information for thousands of workers and students in the AI field.
10. Dr. Glenn W. Salisbury was Professor of Animal Breeding at Cornell. He was a superb researcher, and with his students he laid the foundation for improved

semen collection, extension and preservation in the USA. His egg yolk-citrate, and later with glycerol, was the most widely used bull semen extender in the world for many years. He divided his career between Cornell University and the University of Illinois.

11. Mr. W. D. Goeke was the manager of the Northern Illinois Artificial Breeders Cooperative. Like other early managers he was responsible in the beginning for all aspects of a young AI program, with inexperienced people and the need to sell the program to a doubtful public.
12. Joint interview with Professors George W. Tailby, James Burke and Stanley J. Brownell. George Tailby and Jim Burke were especially involved in selling and modernizing the DHIA program, vital not only for improved herd production, but also for sire evaluation. See previous statement on Brownell.

My idea of making all the interviews available electronically changed when I learned that all the 900 plus pages would have to be redone with word processing. Furthermore, the electronic copy would contain only the edited version (O.K.), but this would require considerable proofing . Furthermore, this would have to be done under the supervision of the University Archivist. All of this would take lots of money (estimate of up to \$5,000). It did not seem likely that \$5,000 would result in a product that would really be used by enough people to justify the expense, valuable as the material might be. The Animal Science Department had no money to do it, nor did I, since mine had gone to Cornell and other charities except for Enron and a few other now worthless ones I had kept.

As a consequence, I read the material and prepared the following summary. It is not all-inclusive, but I believe that it covers most of the important elements in the minds of the interviewees, as they recalled their experiences in the 1930s, the 1940s and the 1950s. I have decided not to quote individuals because quotes taken out of context can be misinterpreted, and certainly each would need to be identified relative to the historical time the quote referred to. In some cases I have associated individuals with specific ideas and developments. In many cases, as these pioneers met at meetings or traveled abroad, it was not clear who gave the idea to whom. Many gleaned ideas from Russian work, and developments they saw on AI in cattle and swine in Scandinavia. Several must have been familiar with Ivanoff's (Ivanov) review of AI in Russia published in the J. of Agric. Sci. 12: 244-256. 1922, and Watsons's book on AI, published by the Imperial Bureau of Animal Genetics, 1933. For an extensive list of references on early work to date see "The History of Artificial Insemination: Selected Notes and Notable" by Robert H. Foote. This was an invited review to be published in the J. of Animal Science, 2002.

However, it has been shifted to the website, and supposedly can be located at <http://www.asas.org/jas/symposia/esupp2/Footehist.pdf>. Accessed July 1, 2002.

Names of many people were cited by the interviewees. These names are listed at the end of each section containing the individual interviews. In total these names include a list of "Who's Who" in animal breeding and AI up to about 1960. I knew many of these people. Consequently, it is certain that if I picked out individuals to quote it would represent my biased selections. So I did not do it. With this background, following is a digest of these interviews. At the end is an Appendix A which is a digest of each interview, plus other appendices.

Overview of the Interviews in the 1960s.

Germination of ideas and work on AI before the development of commercial AI organizations in the U.S.

After Spallanzani's AI of a dog in the late 1700s, sporadic reports of the use of AI in several species occurred in the 1800s. The first major use of AI commercially developed in Russia and spread to Japan. Little was known about Japanese work, but Ivanoff published a paper "On the use of artificial insemination for zootechnical purposes in Russia" (J. Agr. Sci. 12:244-256. 1992.) As this was in English, clearly people in many European countries were aware of this work, but none of the people interviewed referred to this paper. Prof. McKenzie, through his Russian born graduate student, Dr. Berliner, was familiar with Russian work. Several interviewees were aware of mares being inseminated, and isolated cases were reported of AI in cattle to obtain semen from a "prize" bull or for possibly overcoming sterility. The Russians had done considerable work, facilitated by the government farms and the government interest in breeding improved horses for the cavalry. AI could make the prize bull available to all on an equal (democratic) basis in the US.

Professor Brownell, and some others, had performed AI successfully. They were interested in the potential use of AI. The interest in AI received a boost in 1937 when several of those interviewed had traveled to Europe. There they saw (Sweden, Denmark and England) semen collected with the artificial vagina, and improved insemination techniques.

Bull associations had been started to make selected bulls available to more interested dairymen in the U.S. Records of milk production and butterfat production became readily available on many cows through herds enrolled in DHIA. Infertility was a problem in many herds, and occasionally a dairyman was killed by a bull.

This provided a setting in which AI might be established. Certainly many of the

ideas for semen collection and insemination equipment came from Europe, particularly from Denmark. Improvements were made in the U.S., which eventually facilitated the development of AI on a major scale in the U.S. Small countries did not have some of the same problems. Certainly, some of the ideas were generated spontaneously, either simultaneously, or without detailed knowledge of the development in other countries. National and international meetings, travel and mass communications were minuscule compared with today.

Bull Stations and the First AI Cooperatives

The extension service had a big job to do in educating dairymen of what AI could do. Many farmers would like to have access collectively to popular bulls that were restricted to the better known cattle breeders. Housing of bulls and the danger of a bull on the farm were problems that complete AI could resolve. Cooperative bull associations were a step toward AI cooperatives.

Many breeders saw AI as a competitor, destroying their market for bull calves sold to other farmers. Veterinarians knew of AI on a limited basis to reduce infections, and overcome sterility on an individual basis. The insemination was part of the veterinary practice laws. So it should not be done by a layman.

Furthermore, much organization was needed. Trained personnel were required. There were huge gaps in knowledge about the best way to carry out the different facets of AI. Money was needed. Several of the agricultural administrators were doubtful that AI would work commercially. That would embarrass the colleges.

Professors Brownell (Cornell) and Perry (Rutgers) initiated considerable organizational, educational and promotional work. This resulted in small AI Coops in 1938 in New Jersey, and 2 months later in New York. They kept the service charge low, with part provided by the farmer and part was subsidized. They hired veterinarians to do the inseminations, as these people had knowledge of the female reproductive anatomy, could recognize pathology, and did not create professional friction. Brownell and Perry had good contacts at various levels of academic and government agencies. So there were several pluses.

It was depression time. Masses were looking for jobs. It wasn't difficult to locate good people. Most people grew up on farms, and they expected to work hard with long hours all week, and with minimal pay.

Then, with the outbreak of war veterinarians were in great demand in the armed forces. Practicing vets could make considerably more money and use their high level of training in much more challenging ways than by inseminating cows. Some combined AI with their veterinary practice, but the AI aspects suffered. So it was agreed after much

discussion and rulings that lay personnel could be trained to become skilled inseminators, but not do diagnostic work. They were trained to establish contact with the local veterinarians, and with the dairymen and extension service workers to improve reproductive health and nutrition in dairy herds. All this was important for high annual milk production. High milk production, with a steady milk check, was one goal of the dairymen. However, the country did not need more milk, so increased production was not a big selling point with government agencies. Increased efficiency of production was a common goal.

This is not to indicate that everything went smoothly from the beginning. Some bulls produced poor quality semen. Some were of low fertility. Although many bulls came from bulls selected from the pre-existing bull associations they were of unknown quality genetically. Trained laboratory personnel were nonexistent. Delivering semen into the field was a potential problem. Dairymen had to be trained to do a better job of “heat” detection. Some would not report a cow for service if the telephone was answered by a woman. Sexually related talk, words (cows in heat, etc.), were generally taboo in many circles. Women were not appropriately involved originally.

There was considerable turnover of inseminators. The area served was large. The number of cows enrolled per square mile was low. Many country roads were poorly maintained and not plowed in the wintertime. But there were enough positive aspects and patience that AI persisted. One important point was that cows became pregnant.

The unique organizational arrangement development in NY State was an important factor in the major success in that region. The first Pioneer organization in 1938 was small, and served an area around Ithaca. As the service spread, it was difficult to get the semen quickly to more distant areas in the state. So the cooperative moved to Syracuse as the New York Artificial Breeders Coop., Inc. (NYABC) in 1940. However, this was a problem. The personnel at the headquarters depended on Cornell staff in Ithaca for some assistance. Furthermore, research to improve all aspects of semen handling was difficult with this geographical separation.

In December, 1944 NYABC moved to Ithaca. This was facilitated by the cooperative construction of laboratories and bull barn on the edge of the Cornell campus. The Cornell Board of Trustees had agricultural leaders, and with interested personnel all the way to Governor Dewey’s office, the farmers and the state put up money to repay Cornell for building the unit on Cornell land, with a longtime lease.

In the meantime AI cooperatives were being formed in New England, Pennsylvania, the Midwest and California. The history of these is outlined in Harry Herman’s book “Improving Cattle by the Millions”. There were about 100 AI units formed, but these were too small to equip laboratories properly, and do all the testing as

technology advanced.

Development of the Large AI Organizations

The location of the bulls and semen lab., plus data recording in Ithaca, combined with a large DHIA unit, headquartered in Ithaca, and the Cornell research and extension personnel provided the resources needed. Advances in semen collection, evaluation, processing and preservation, alluded to in the summaries of individuals interviewed occurred rapidly. Genetic studies were uniquely possible under these conditions at Cornell and NYABC.

Many advances were initiated by Dr. Almquist in Pennsylvania (not interviewed) and by staff at American Breeders Service (see Phil Higley interview). The advances made are not fully covered in the interviews. For example, much disease control work was done in Ithaca by the staff of the Veterinary College at Cornell. As Phil Higley mentioned, Dr. Bartlett (DVM) initiated an excellent health and disease control program at ABS.

Much of the success of the adoption of a liquid nitrogen frozen semen program is due to J. Rockefeller Prentice, owner of ABS. Containers to hold liquid N₂ were poorly insulated and could not be used to hold frozen semen in the field for extended periods without supply trucks distributing the liquid N₂ to inseminators frequently. Mr. Prentice approached the Linde Division of Union Carbide Co., and struck a deal with them to produce tanks with superior insulating qualities. It was reported that he wrote a personal check for \$750,000 to get this job done, and it was done. While this is not in the interview, it should be recognized today that the whole cryobiology field owes much to the discovery of freezing sperm with the glycerol cryoprotectant, and to containers of high insulating values initially designed by Linde with the \$750,000 (some have told me one million) paid for personally by Mr. Prentice.

Postlude

This report is primarily based on the interviews recorded in the early to mid 1960s. This provides some of the flavor of the early times as it was remembered by people who had intimate contact with AI. Much has occurred since that time. The latter is summarized in many places, including a few references listed in Appendix C. These references refer to hundreds of other books and papers. However, one of the greatest true stories in animal agriculture could not have been told (at least in this way) without brave, pioneering individuals who stuck their necks out after thoughtfully hoping and projecting that it could be done.

Appendix A. A Summary of the Contents of the Interviews (in alphabetical order).

Introduction

This is essentially an unedited summary, based upon word notes that I took while reading the transcripts. The interviews frequently went back and forth over events that occurred at different times. Consequently, these summaries do not follow a time line. They do not reflect all of the comments which can be found by reading the 900 plus pages. My word notes now are discarded.

1. Raymond Albrechtsen was interviewed Oct. 20, 1965.

Early farm experience, later as an assistant to S.J. Brownell, and eventually the Dept. of Animal Husbandary extension leader is chronicled. He had a dairy farm run primarily by his wife, while on the staff at Cornell. He mentioned the great public reluctance to involve women or even discuss AI in the early days of AI. Ray was president of the Pioneer AI Assoc. in the beginning. Later he worked with any organization that needed help. Ralph Space had the first cow inseminated. Prof. Albrechtsen knew early farm leaders as J. Stanley Earl and the veterinarians who helped, Dr. Burch and Dr. Sutton. He was instrumental in small coops merging to form NYABC. He also mentions J. Rockefeller Prentice visiting with S. J. Brownell about bull associations. Prentice established his own American Dairy Cattle Club, as he was upset by breed organizations criticizing the work of his father's (E. Parmalee Prentice) Mt. Hope farm. After he saw the success of AI in N.J. and N.Y. he became interested in AI.

2. S.A. Asdell.

He was not directly involved in the AI movement. However, he was a great source of biological information. Work that Glenn Salisbury did with Prof. Asdell stimulated Salisbury's interest in sperm. Dr. Asdell was modest and his talents were not fully recognized. Stanley Brownell also leaned on Dr. Asdell as a resourceful friend.

3. Stanley J. Brownell was interviewed August 21, 1965.

This interview is one of the more important ones as Prof. Brownell probably had more impact on the development of AI in the US than any other single individual. He certainly was the primemover in New York State, and he put on the semen collection demonstration for Prof. Perry and his dairy leaders in New Jersey at the meeting where they decided in 1938 to proceed with an AI Coop. He organized the Pioneer organization with farmers and the extension service sharing in the \$5 fee. Prof. Brownell had seen AI done in mares at Michigan State University in 1912 when he was a freshman. Bull associations and DHIA were established in Michigan.

He had his own dairy herd in Pennsylvania. Prof. Brownell saw AI as an excellent way to use more fully the better sires assembled in bull associations. He promoted

these in NY State. He practiced AI on half of the Cornell herd in the 1930s and obtained as good fertility as bulls in natural service in the other half of the herd. Even so, college administration was hesitant to support AI, fearing it might not work. Views changed when NJ was getting ahead and Brownell drew big crowds to his extension meetings when he collected semen from a bull.

He found Dean Hagan to be a very open-minded and helpful dean. Brownell overcame resistance of breeders and gained the support of influential farm leaders. He was very good at organizing people. He worked hard to gain facts and use them to demonstrate what could be done. He gained the trust of the leading dairymen.

4. J. Stanley Earl interviewed Oct. 10, 1967.

Stanley was a modest person who was a leader in several farm organizations. He had a knack for getting people to accept his ideas as their own. He saw the advantage of AI to increase milk and increase the pay check. Also, several acquaintances had been killed by bulls, so safety was a factor in supporting AI. His good veterinary friend, Dr. Sutton, had built a local bull association, United Breeders. This relationship helped. Earl was a leader in involving wives and he got the Board to invite and pay for wives to attend annual meetings. He promoted the merger to form NYABC, as small local bull associations could not compete.

5. Wilbur D. Goeke was interviewed January 12, 1966.

Mr. Goeke had grown up on a farm, and in 1938 worked in a herd where a little AI was used. In 1939 J. Rockefeller Prentice started the Northern Illinois Holstein Artificial Breeding Assoc., with AI service starting in April, 1940. Mr. Goeke was the manager. This was enlarged to include several cattle breeds in 1949. It became the Northern Illinois Breeding Coop., (which after this interview merged with the Southern Illinois Breeding Assoc. in 1968). Few details about the operation of this unit are included in the interview.

6. Prof. Charles R. Henderson was interviewed November 8, 1967.

Prof. Henderson is remembered in the scientific area as the superb mathematician who could analyze complex issues and come up with simple solutions. He could take messy complex data and establish rules and procedures for slow mechanical calculators to “prove” that his logic was correct. However, he grew up as a typical Iowa farm boy skilled in judging animals, winning a livestock judging scholarship to go to Iowa State University. He obtained an M.S. degree in nutrition at Iowa. He was an extension agent, a research officer in nutrition in the army, and then a graduate student with Dr. J.L. Lush. He wanted genetics, and he had worked for Dr. Lush while he was a freshman at Iowa State University. He also liked statistics, exposed to this by Dr. Snedecor. Dr. Wald had offered him an opportunity to come to Harvard. At Iowa there

was a great group of statisticians and series of outstanding graduate students in animal breeding. Also, the work of Wright and Fisher was well-known to him through Dr. Lush. He went to Iowa State University.

Dr. Henderson's first exposure to AI was at Cornell. The combination of DHIA records and the cooperation with the AI station (NYABC) located at Cornell were a great attraction and provided the challenge he sought. He made the most of it. The enthusiasm of Profs. Brownell, Carter and Bratton, combining extension with AI research and DHIA records was a large plus. This was important because most of the staff (including Prof. Brownell) initially found it hard to believe that the traditional natural proofs on bulls were unreliable. New ideas had to be sold. By 1950 Prof. Henderson (Chuck as he was called) had outlined his research on the proper weighting of animals in evaluating a pedigree to select young sires for sampling. A symposium was held on this in December 1950. Copies of his proposal with slight modifications have been the basis of sire selection in AI ever since.

7. Phill Higley was interviewed about the same time as others.

He was raised in New York, went to Cornell University and became familiar with the staff. Later as a N.Y. county agent he attended Prof. Brownell's breeding schools. He helped set up the Monroe County Coop., and picked the bulls to use. He had problems with fertility of the Guernsey bulls.

He was hired by J. Rockefeller Prentice when Mr. Prentice organized the American Dairy Cattle Club and associated bull organizations. He mentions that Mr. Prentice was familiar with his father's Mt. Hope Farm, but he did not live there. He had graduated from Yale cum laude. He was interested in food and agriculture from his dad's farm. Higley describes the changes in American Breeders Service, going from yolk-phosphate to yolk-citrate. The influence of Drs. Willett and Elliot in the ABS program likely reflected their experience as graduate students with Glenn Salisbury, where they worked on semen collection, evaluation and preservation.

Later Dr. Bartlett came and handled any bull disease problems. Mr. Prentice always picked a good team. One of his great contributions to the dairy industry was the \$750,000 personal check that he provided Linde (Union Carbide Co.) with to build better liquid nitrogen tanks for using frozen semen.

8. Maurice Johnson was interviewed February 28, 1965.

Maurice rode a bike or a horse 4 miles to high school. After finishing high school he gained dairy farm experience working on the Henry Morgenthau, Jr. farm. Then his career took him to Cornell, then as a DHIA tester when jobs were very scarce in the depression.

He became the first manager of the New York Artificial Breeders Coop., Inc. In the

beginning he was chief cook and bottle washer, with very little protocol to guide him. He had a lot of faith in the Cornell research. He adopted their A.V. design, the egg yolk-citrate semen extender, and the photometer for counting sperm. He discusses technical training, the big area each technician covered, then growth, competition and dividing up areas. He was an early supporter of the Henderson young sire progeny testing program. He enjoyed the many international visitors that came to NYABC through Cornell.

9. Professor Frederick F. McKenzie was interviewed on August 17, 1967.

Prof. McKenzie was one of the pioneers working on reproduction in all breeds of livestock, including swine, sheep, beef cattle and horses. He remember AI of horses being fairly common around 1912-1913. Semen was aspirated from the vagina of one mare, then used by the veterinarian to inseminate several mares. Prof. McKenzie did his undergraduate work at the University of Missouri and did his graduate work there. He took a job as Assistant Professor there in 1923, and continued until 1941. There he was a USDA Cooperative Agent. Later he went to Oregon State University.

Prof. McKenzie was a believer in everyone learning how to do it. He fashioned an AV out of gooch tubing for boars. This was published in JAVMA, and cited by the Russians in their early work developing AVs and other AI equipment. Dr. Vic Berliner, a graduate student, born in Russia had spotted the Russian paper. He helped develop the Missouri horse AV. McKenzie got the idea of a water jacket from a trip he and E.J. Perry took to Europe in 1937. They saw an AV with a water jacket design in Lagerlof's lab. in Sweden.

He trained many famous reproductive physiologists. He had an agreement with Dr. Lush of Iowa, that if a graduate student applicant really wanted to focus on genetics they should go to Iowa. Those with interests in reproductive physiology should be encouraged to go to Missouri. Famous reproductive physiologists such as Casida, Phillips, Andrews, Terrill and others carried Prof. McKenzie's trademark from graduate student days.

He also noted the lack of women in the field in the beginning. It was taboo. He was surprised to see a lady in the audience at Davis, CA when he was demonstrating collecting semen using an AV. He spent many of his senior years in international work.

10. Enos J. Perry was interviewed February 14, 1967.

Prof. Perry is best known for his initiation of the first dairy cattle AI Coop. in America in 1938, and for his book on "The Artificial Insemination of Farm Animals". At the time of this interview 28,000 copies had been sold. The author of this summary (RHF) had an interesting experience in this connection. Prof. Perry had asked if he could use one of my diagrams that I had made for teaching. "Yes, of course", I said. Later, I wanted to use this diagram in an article, and I needed to obtain permission to use it, as it had been

published in Perry's copyrighted book.

Prof. Perry had visited Europe in 1937, and seen AI at work, particularly in Denmark. In December, 1937 he arranged a meeting with dairyman at which Prof. Brownell gave a demonstration of collecting semen by massage of the vesicular glands (seminal vesicles). Dr. Larsen had been recruited from Denmark to come. He was to demonstrate use of the AV also, but the equipment did not arrive in time. Dr. Larsen demonstrated AI with the use of a speculum and long forceps for cervical fixation.

These successful demonstrations, recent injuries by bulls to some farmers, and the desire to obtain semen from famous bulls made AI attractive. At a county meeting on Feb. 24, 1938, the dairymen in N.J. adopted a plan to use AI with a \$5. fee for up to three inseminations, the same plan as used in Denmark. One difference was that the New Jersey farmers need only to submit a few cows in their herd, whereas 100% was required in Denmark. After Dr. Larsen had been on the job for his agreed time of 6 months, Dr. Henderson, a DVM, working on his MS degree at the NYSCVM, Cornell, was hired for a year. This was arranged through Dr. Danks of the Cornell staff who was a friend of Prof. Perry from their New Jersey childhood. Dr. Danks was the son of a dairyman who had carried semen in a vial in his armpit (kept semen warm) in the early 1900s from a famous bull at another farm to his own farm for use by AI. New Jersey farmers now wanted access to a Rutgers Holstein bull siring daughters testing close to 4% butterfat. Dr. Bartlett gave his O.K. for this, although he was concerned that AI would not work. A failure would reflect unfavorably upon the college.

In summary, Perry had seen AI work in Denmark, as organized by Prof. Sorensen and others. He recruited Dr. Larsen for six months, followed by Dr. Henderson (who later was involved with Canadian AI) who worked every day for a year except Christmas. The first 199 cows inseminated up to 3X resulted in 55% nonreturns. The first calf born was normal (as were others). It was a highly photographed calf. Some still laughed at AI because in one herd the first 9 calves were all bull calves. However, "he who laughs last, laughs best", as the next 10 calves were all heifer calves.

11. Prof. Glenn W. Salisbury was interviewed on July 26, 1965.

Dr. Glenn Salisbury was the leading researcher in the early development of dairy cattle AI in the U.S. Although he was a city kid (son of a professor at OSU) he had worked at Mt. Hope Farm (established by J. Rockefeller Prentice's father) and had shown cattle.

He came to work for his Ph.D. at Cornell with Prof. Morrison. Upon arrival at Cornell one evening he called the Morrison home to arrange for an appointment. Mrs. Morrison told him the professor was at work, so he had a meeting with Prof. Morrison that evening at Wing Hall. I (RHF) can vouch for the fact that in the 1940s and 1950s I saw Prof. Morrison night after night pouring over data to select and condense for his classic

book *Feeds and Feeding*.

During his graduate work he was interested in genetics, influenced by the excellent work in Plant Breeding (where Nobel prize winners, Drs. Beadle and McCormick had studied). Although not trained in biochemistry he knew Nobel awardee, Dr. Sumner (of catalase fame) who later gave him some catalase to test its effect on bull sperm where H_2O_2 was produced in the egg yolk-citrate semen extender. He also worked with the excellent reproductive physiologist Dr. Sidney Asdell on a project on sperm survival in vivo.

He was also keenly aware of Prof. Brownell's efforts to establish AI in dairy cattle. In the summer of 1937 he biked 3,000 miles through Europe with his wife Dorothy, where he met John Hammond, Arthur Walton (who had written a short book in 1933, mostly about Russian AI), Eduard Sørensen, and others.

At the same time (1936-37) Henry Wallace, from Western NY State, was pushing for genetic improvement of agricultural crops.

Also Glenn had gained insight into economic problems and the role of government through Prof. Warren's courses (tremendous mind and resource, but not a good lecturer). A graduate TA in a section of Prof. Pearson's course that Glenn was in was Earl Hughes (in the Secretary of Agriculture's Office in the Eisenhower administration).

So Glenn Salisbury gleaned much from great minds in Europe and the USA. He collated this, and with this analysis he devised a program of research, encouraged by Prof. Brownell's enthusiasm. Not everyone was in favor of it. Dr. Asdell was not sure if it would work. Agricultural Dean Ladd was concerned that it might not work, and that would be bad for the college. He gave Glenn good advice to never sell AI with dirty jokes about reproduction.

Glenn knew that there was a surplus of milk in the 1930s, and from his courses in economics was aware that any national help during the depression to increase milk production would not be supported. Dr. W. W. Williams, an outstanding cattle sterility expert in the US, was sure that it wouldn't work (in contrast to the progress in Europe). Dean Hagan (NYSCVM) was very sympathetic, and encouraged the attempt to do research and move ahead with on the farm AI.

So Glenn set up a research program. He liked the Danish AV that he saw Dr. Larsen use, but saw the need to protect the semen from the cold winter mornings by including the collection tube in an AV that provided warm water around the tube. He researched methods of counting sperm based upon the work of Ralph Comstock at Minnesota, using the principle of optical density (absorbance). He knew that citrate was present in considerable quantities in semen and that phosphate was toxic to cells. Although the Phillips egg yolk-phosphate was a great advancement in bull semen

preservation, egg yolk-citrate was better. Also, you could see the sperm for motility evaluation by microscope. Also, he hypothesized that far more sperm were produced in an ejaculate of semen than were needed. If superior bulls were to sire many progeny the semen needed to be diluted. Some people chided that diluting semen was like watering milk. Later Bratton and Foote coined the word extender, as life of the sperm was extended.

Also, a close friend of Salisbury was I.C. Gunsalus, a microbiologist. Discussions were held on the bacteriology of bull semen. This was studied, along with sulfanilamide, which increased fertility. At this time a graduate student who had his life saved by 240 penicillin shots in WWII (Foote) entered the program and investigated a whole array of antibacterial compounds, including antibiotics (penicillin, streptomycin, polymyxin B, and Aureomycin). Note: The previous sentence is a foot(e)note added by the author.

With Mr. Thompson of NYABC, Salisbury developed the nonreturn report as a way of estimating fertility. It was not possible to obtain pregnancy rates systematically on a large population of cows. The delayed returns to service suggested embryonic mortality, which was high before the use of antibiotics, and before the development of Adisease-free@ bull studs. The NR report was of great value.

Research, industry and extension really came together when NYABC moved to Ithaca in December, 1944. This was due to the hard work of Prof. Brownell, leading farmers, and a sympathetic Cornell Board of Trustees headed by agriculturist, Mr. Babcock. Governor Dewey also was favorably impressed and put support for AI in his budget. On a visit by Mr. Dewey to Ithaca, Glenn was highly impressed by the astute questions and comprehension by the Governor. And AI prospered under this relationship.

12. Professors Tailby, Burke and Brownell were interviewed August 17, 1962.

Most of the important aspects of this brief interview are covered more extensively in the interview with Prof. Brownell on August 25, 1965. The importance of DHIA is emphasized in providing records that Stanley Brownell used to obtain natural proofs on bulls, consisting primarily of daughter-dam comparisons. The DHIA and bulls at the local Bull Associations provided a practical framework for moving forward into the AI program. Walter Tailby was primarily involved with the DHIA program. Prof. Burke was an extension specialist with a broad range of knowledge covering most aspects of animal agriculture. Farmers had great trust in his judgment, as they did of all the extension specialists. Extension specialists had close contact with farmers. Direct contact was important.

Appendix B. A Chronology of the Development of the AI Program in New York (see attached).

Appendix C. A Few References on the History of A.I.

Herman, H.A. 1981. Improving Cattle by the Millions NAAB and the Development and Worldwide Application of Artificial Insemination. Univ. of Missouri Press, Columbia, MO. 377 pp.

Sipher, E. 1991. The Gene Revolution. The History of Cooperative Artificial Breeding in New York and New England, 1938-1990. Eastern A.I. Coop., Inc., Ithaca, NY. 396 pp.

Foote, R.H. 1998. Artificial Insemination to Cloning. Tracing 50 Years of Research. Pub. By the author. Available from the Resource Center, Cornell University, #7. Cornell Business and Technology Park, Ithaca, NY 14850.

Foote, Robert H. Artificial insemination from its origin up to today. Proc. of the Spallanzani International Symposium, ed. by V. Russo, S. Dall' Olio and L. Fontanesi. Reggio Emilia, Italy, pp.23-67. 1999. A review with 352 ref.

As this publication is unlikely to be available in most libraries, a copy is attached as Appendix D.

Appendix D.

1. Foote, R.H. See review with 352 references listed in Appendix C.
2. Foote, R.H. The history of artificial insemination: Selected notes and notables. This was supposed to be published in the J. of Animal Science in 2002, but the ASAS decided to put historical reviews on their website. Attached is a copy, but also check the website:
<http://www.asas.org/jas/symposia/esupp2/Footehist.pdf>

APPENDIX B

A Chronology of the Development of the AI Program in New York

The establishment of A.I. in New York came about through the foresight of dairy leaders and College and County Extension personnel in seeking a more certain means for the genetic improvement of dairy herds. The A.I. program was developed through the co-operation of dairymen. Dairymen formed first small co-operatives to provide the means for A.I. service. Experience soon showed that a consolidation of small units into a larger state-wide co-operative was essential for greater financial stability and a more comprehensive program. This move resulted in the formation of the New York Artificial Breeders Co-operative. The following chronology lists significant dates in the development of A.I. in New York.

- October 1938 - Pioneer Association organized around Ithaca, New York.
- November 1938 - First cow inseminated.
- August 1939 - First calf born.
- March 1940 - Four local associations operating.
- April 1940 - The New York Artificial Breeders' Association organized.
- June 1940 - State Association established in Syracuse, centralizing all business and financial records, breeding results, bulls and general administration.

- March 1941 - First school in the U. S. for laymen inseminators.
- July 1942 - First DHIA production record reported on an animal resulting from service by the Association.
- August 1942 - First complete proved sire report on an Association sire through daughters resulting from artificial insemination.
- August 1943 - Cooperative working agreement between Cornell University, the New York State College of Agriculture and the New York Artificial Breeders' Cooperative established.
- December 1944 - Forty local associations in operation.
- December 1944 - New York Artificial Breeders' Cooperative moved to Ithaca, New York.
- November 1945 - Ayrshire service commenced.
- December 1945 - Jersey service commenced.
- December 1945 - First inseminators conference held.
- December 1945 - Changed to a 60-90-day non-return basis of reporting conception rates.
- May 1946 - First fieldman employed by NYABC.
- June 1947 - NAAB formed. Headquarters at Columbia, Missouri.
- August 1947 - Third bull barn built.
- September 1947 - Supplementary farm purchased.
- October 1948 - Marked the first decade of growth with 148,000 cows bred during the year.
- November 1948 - Addition to laboratory and offices completed.
- March 1949 - Brown Swiss service inaugurated.
- August 1949 - Penicillin and Streptomycin added to semen to improve conception rate.
- December 1949 - ABS contracted with Seneca County ABA to supply semen.

- August 1950 - First bull calf purchased by NYABC due to selective mating (Colantha).
- August 1951 - First NYABC competitive cattle show.
- September 1951 - Revision of Sire Selection committee selection procedure – by districts.
- November 1951 - Semen extended on the basis of 10 million live sperm per cubic centimeter.
- Winter 1951-52 - Research library expanded.
- April 1953 - First beef semen shipped – Angus.
- August 1953 - First frozen semen shipped by NYABC.
- May 1954 - First “frozen” calf barn.
- September 1954 - Type appraisal program begun.
- Fall 1954 - Frozen semen laboratory completed.
- December 1954 - 2,000,000th cow inseminated by NYABC.
- August 1955 - Ten thousand persons attend cattle show.
- October 1955 - First state-wide A.I. technician conference at Ithaca. Service recognition to all NYABC personnel.
- October 1956 - Planned mating program making all bulls available via frozen semen.
- Summer 1957 - Plan to make privately owned sires available through NYABC inaugurated.
- November 1958 - CUE extender adopted for field use.
- March 1959 - First all star sale at Earlville.
- May 1959 - Average 60-90-day non-return rate for fiscal year – 75%.
- August 1959 - Four millionth cow inseminated.

- December 1959 - Headliner sale of A.I. animals at Canandaigua.
- January 1960 - Isolation barn completed.
- June 1960 - Mgr. Johnson retires: Charles Krumm – new manager.
- August 1960 - Celebration of 20th anniversary of organization of NYABC.
- Fall 1962 - Semen distribution revised: Holstein liquid other breeds frozen.
- January 1963 - New 70-bull barn placed in operation.
- March 1963 - Eastern A. I. Cooperative formed.
- Fall 1964 - Max-O-matic mating program launched by NYABC.
- Fall 1965 - Preferred calling service-automatic answering uniform phone service for all farmers.

The continuing trend of increased participation in the A. I. program in New York is shown by the following table beginning with 1952.

<u>Year</u>	<u>Cows to Dairy Bulls</u>	<u>Cows to Beef Bulls</u>	<u>Total Bred</u>	<u>% of All Cows</u>
1952		N.A.	303,239	21.2
1953		N.A.	360,602	24.5
1954		N.A.	380,395	29.5
1955		N.A.	425,080	30.7
1956		N.A.	466,560	31.2
1957		N.A.	497,946	34.6
1958		N.A.	551,741	39.2
1959		N.A.	600,289	43.0
1960		N.A.	638,371	45.8
1961	584,253	94,656	678,909	48.6
1962	622,050	73,721	695,771	50.5
1963	610,432	90,558	700,990	52.4
1964	613,496	97,526	707,237	53.4

(N.A. – Data not available)

Nationally, the total A.I. breedings in 1964 are reported as 7,747,953 of which 464,959 were beef cows to beef bulls, 1,117,395 dairy cows to beef bulls. This leaves 6,165,599 dairy cows inseminated to dairy bulls. There were 2,538 sires in service averaging 3,053 cows per sire. These figures show that 41.4 percent of seventeen and one half million dairy cows were artificially inseminated.