

# Charles Roy Henderson

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Charles R. Henderson came from Iowa to Cornell in 1948 as associate professor of animal breeding. Three years later he was promoted to professor and head of the Animal Breeding Division of the Animal Science Department. Under his leadership the Division soon grew to be of outstanding renown, with Professor Henderson (“Chuck” to all who knew him) himself publishing some 171 papers during his 29 years up to retirement, and training some 70 graduate students who came to him from all round the world. The attraction was not experimental work on planned breeding programs. It was Chuck’s own prowess at using statistical analysis of (usually dairy) production records for identifying animals from which to breed successive generations that are likely to be superior in terms of the yield of economically important products such as milk, meat, wool, and eggs.

Charles Roy Henderson was an Iowan through and through, born and raised on a farm in Coin, Page County, Iowa. He obtained his three degrees from Iowa State College (now University): a B.S. in animal husbandry, 1933; an M.S. in animal nutrition, 1935; and the Ph.D. in 1948. From 1935 to 1940 he held a series of positions of increasing responsibility with the Iowa Extension Service. Then in 1941 he became an instructor at Ohio University, and in 1942 he joined the U.S. Army, rising to major and Commanding Officer of the Army Medical Nutrition Laboratory in Chicago before ending his term of duty in 1946. He then went back to Iowa State College and in two years, before coming to Cornell, earned his Ph.D. in animal breeding, with a minor in statistics.

Chuck’s arrival at Cornell coincided with the early growth of the technique of artificial insemination in dairy cattle. The idea that this technique could be a means of increasing milk production per cow was Professor Henderson’s. It depends upon selecting those bulls for use in artificial insemination (by means of which they will each sire thousands of cows) which can be expected to sire cows that will be high producers of milk, indeed preferably higher than their dams. Professor Henderson’s forte was his outstanding and lifelong ability at developing reliable methods for using dairy cow production records to this end. This involved developing (and continually improving) new statistical procedures, the mathematics underpinning them, and the techniques for adapting them to an ever-changing array of computers. The result was a series of constantly-improving methods for establishing numerical evaluation of the genetic worth of animals as parents of a next generation, be they dairy cattle, beef cattle, sheep, swine, or poultry. Chuck Henderson’s prime interest was in dairy cattle, and the resulting world-wide increases in per cow milk production that can be attributed to his methods. Nevertheless, his methods are also applicable to

increasing the productivity of all agricultural livestock and are widely used throughout the world. In this work he was a young and rising star when he came to Cornell in 1948. His first lecture one fall began with the remark that “When I see a herd of cows I don’t see horns and hooves, I see a mean and standard deviation.” He quickly grew to be the shining light that blazed around the world insofar as improving livestock production through breeding was concerned. Moreover, although he formally retired from Cornell in 1976 and became professor emeritus, he never retired from being innovative and developing new ideas. In the succeeding 13 years he published a book and more than 50 papers.

Professor Henderson was highly successful not only in applying statistical procedures to the genetic problems that interested him, but also in developing new statistical procedures themselves, notably in the extension of analysis of variance that is known as variance components estimation. Indeed, his landmark 1953 paper in “Biometrics” on this topic has been designated by the Institute for Scientific Information as being one of the most frequently-cited papers in the scientific literature. Perhaps even more important than this was his single-handed development in the early 1950s of a prediction procedure that has come to be known acronymically as BLUP — best, linear, unbiased prediction. It is the backbone of his achievements in evaluating genetic merit, which is widely known throughout all the animal breeding world. Along with Henderson’s “mixed model equations,” which are so convenient for calculating it, BLUP is equivalent to, and came long before, equivalent procedures in statistics in the framework of Bayes, Stein and shrinkage estimation that are now so widely recognized. In this context, Henderson the statistician, through his intense interest in animal breeding problems, was years ahead of his time.

Chuck’s statistical expertise also attracted numerous faculty and students seeking help in the analysis of research data, especially data from which many intended observations were missing or were unobtainable in the first place. Many biologists, engineers, and social scientists were numbered among his Cornell clientele in his capacity (but by no means his official duty) as a consulting statistician.

Numerous awards came to Charles R. Henderson: among them were Senior Fulbright Research Scholar to New Zealand 1955-56; from the American Dairy Science Association, the Borden Award (1966), the National Association of Animal Breeders Award (1977), and the J.L. Lush Award (1982); from the American Society of Animal Science, the Animal Breeding and Genetics Award (1966), the Morrison Award (1971), and Fellow (1981); Fellow of the American Statistical Association (1968 – one of only four people with Ph.D. degrees in animal science to have received this award, the other three all being his students); The Herman von Nathusius Medaille of the German Society of Animal Production (1981); and election to the U.S. National Academy of Science (1985). He also received

the Henry A. Wallace Award for Service to Agriculture from the College of Agriculture (1984), and the Alumni Research Award of the Animal Science Department (1985) of Iowa State University.

Over the years and particularly after 1976, Professor Henderson accepted many invitations to present seminars, conference papers, and short courses in all corners of the globe: Australia, Brazil, Denmark, France, Germany, Ireland, Japan, the Netherlands, New Zealand, Norway, Portugal, Scotland, Sweden, and Switzerland as well as all over the U.S.A. In what was an active and productive retirement he had two long visits to the University of Guelph in Canada where his book was published; and he held visiting professorships at the University of California, Davis (1981), Kyoto University, Japan (1985), and Ohio State University, (1987); and he had five lengthy sojourns on the faculty of the University of Illinois at Urbana, where he was at the time of his death.

Although Chuck was an enthusiastic and veteran supporter of Cornell hockey, his lifelong interest in athletics was in track and field. This started, perhaps, when he won all three of the 12-and-under, the 14-and-under, and the 16-and-under races at a Page County Farm Bureau picnic; the next year's races were for 10-12, 13-14 and 15-16 year olds! Subsequently, when on the Iowa State College track team, he was part of the 4 x 220 yards relay team that set an indoor (6 laps to the mile) world record of 1 minute 31.8 seconds in 1932, and in 1933 he set an Iowa State College field house record of 51.7 secs, for the indoor 440 yards that stood for more than thirty years. Also, his best time for the outdoor 440 yards was 48.6 sec. when the world record stood at 47.4.

Charles R. Henderson is survived by his wife, Marian; two sons, Charles Jr. and James, all of Ithaca, New York; and by his daughter, Elizabeth Henderson of Cambridge, Massachusetts.

*Robert W. Everett, E. John Pollak, Shayle R. Searle*