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3-25-77

Dear Charlie,

Here is a copy of the N. H. talk to which you contributed. It was well received, and I thank you for your help. Also, I do appreciate the news item you placed in the AAAP letter of recent date. I hear that Ben Burmeister is busy with his chapt. on Sanborn & Marks so things keep moving.

Harold Chute & I traveled together to N. H. Harold is going into the chemical disinfectant-sanitizer business. He has left the Univ.

I will soon travel to Mich & Md. and will confer with Bill Hinshaw who has been a big help to me.

Charlie, don't be pessimistic about VVND control. They just chased a shipment of pet birds over 19 states & caught them all. I have a hard time capturing my limit during bird season and I only want 4 birds.

Best wishes -

Frank

PROGRESS IN POULTRY DISEASE CONTROL OVER THE PAST 25 YEARS

Frank Witter, Animal Pathologist, Prof. Emeritus, Univ. of Maine
Prepared for New Hampshire Poultry Health Conference, March 23, 1977

My assignment is to highlight the landmarks of progress in the control of poultry diseases over the past 25 years. This coincides with Amer. Assoc. of Avian Path. project to write the History of Avian Medicine in the U.S. As chairman of this committee I have kept in close contact with a number of leading poultry pathologists, retired and current. Many old and valuable books, bulletins and reports have been read and abstracted. Hopefully the historical facts which have been uncovered will stimulate current pathologists to more intensive researc

To give credence and authority to what is to be said about these past 25 years, I have called upon a number of outstanding veterinarians whose life work has been or is currently in the field of poultry diseases. Each person was asked to list the top five accomplishments relating to poultry disease control. These are the men who replied: Dr. Kenneth Bullis, U. of Mass., retired; Dr. Ben Burmester, Dir. Federal Poultry Research Lab, retired, E. Lansing, Mich.; Dr. Harold L. Chute, U. of Me. (on leave); Dr. Kenneth Eskelund, Dir. of Maine Biological Labs.; Dr. Tevis M. Goldhaft, previously associated with Vineland Laboratories; Dr. Louis van der Heide, U. of Conn.; Dr. Robert Hanson, U. of Wis.; Dr. William R. Hinshaw, retired ?, Frederick, Md.; Dr. Daryl Johnson, USDA, Athens, Ga.; Dr. Frank W. Kingsbury, Extension Vet., Rutgers Univ.; Dr. Graham Purchase, Staff Scientist, ARS, USDA - Dr. Purchase provided much of the statistical material used; Dr. A. S. Rosenwald, U. of Calif.; Dr. E. E. Stuart, Pres. AAAP, Miami, Fla.; Dr. Richard L. Witter, Dir. Fed. Poultry Research Lab., E. Lansing, Mich.; and Dr. Harry Yoder, USDA, Athens, Ga., also Dr. C. A. Bottorff, Long Beach, Calif. and Dr. C. F. Hall, Texas A & M.

The lists of the five top accomplishments submitted by these pathologists had a high percentage of agreement. Their contributions are included in the substance of this paper.

First we must recognize that there have been fantastic changes in the character of our poultry business. Many of the small independent family farms have been replaced by more efficient, highly integrated complex industries. As a farm youth, I learned to respect farming not primarily as a business, but as a way of life. Without benefit of wealth, we enjoyed wholesome food, good neighbors and an enviably good

value of controlled exposure) (3) there is no cross immunity between coccidia species and (4) Infections are self limiting. Understanding the timing of coccidial multiplication within the host made it possible to effectively adapt the use of coccidiostats upon which the control of coccidiosis now depends.

However, our present knowledge of coccidiosis control is not final. The problem of drug-resistant strains make it necessary to constantly seek new and more effective coccidiostats. The annual cost of this medication alone is estimated at $80 million. Coccidiosis remains the most devastating parasitic disease in poultry costing $35 million yearly

Progress in the control of histomoniasis (blackhead) in turkeys produced amazing changes in the turkey industry and America's turkey-eating habits. Back in 1920 there was 50-75% mortality in turkey flocks largely due to blackhead. Dr. Everett E. Lund, eminent USDA parasitologist relates, "Fifty years ago there were 10 million turkeys for 105 million people. Millions had never tasted turkey - not at Thanksgiving, Christmas or any other time. Turkey was so expensive that a laborer would have to work four days to earn the price of a single bird." Theobald Smith, an outstanding parasitologist in his time, and Tyzzer did much to clarify the cause and the role of the cecal worm in the spread of blackhead. However, when you visit the Poultry Hall of Fame you will see not Smith or Tyzzer, but the portrait of crusty old "Doc" William A. Billings, Extension Veterinarian at U. of Minn., who preached the gospel of raising turkeys free of blackhead and made it possible to grow turkeys successfully and profitably. Dr. Lund comments on this achievement, "discovery is not enough. The implementation of knowledge to the benefit of humanity is a prized accomplishment." This should give solace and inspiration to every extension specialist.

Antihistomonal drugs, unlike coccidiostats, are as effective today as they were in the beginning. These drugs plus the control of cecal worms have resulted in reducing mortality from blackhead to 0.5% and "some growers say they have not seen a case in years". Production has risen from 20 million turkeys in 1953 to 132 million in 1973. Per capita consumption has risen from 1.7 pounds in 1935 to 8.7 pounds in 1973. Turkeys have become mankind's least expensive source of animal protein. What a tribute to Theobald Smith. Tyzzer and "crusty Doc" Billings!

Success in controlling pullorum disease and fowl typhoid was rated high in the list of accomplishments by the experts. The start of pullorum control dates back to Dr. Leo Rettger's discovery of cause and the subsequent development of the blood test. Voluntary eradication programs were in progress in the Northeast in the early twenties. These programs progressed rapidly, and scientifically, largely due to the influence of the Conference of Laboratory Workers in Pullorum Control in the Northeast, organized by Dr. William R. Hinshaw of U. of Mass. and others. At that time the mortality in chicks due to pullorum ranged from 50 to 100%. This disease was the most serious menace to the poultry industry. Very few hatching egg flocks were free of infection. By persistant testing and sound management by 1948, 47 states were on the National Poultry Improvement Plan and 1354 hatcheries involving 30 million birds were tested with only 1.8% reactors. In the year 1975, N.P.I.P. did not find any evidence of pullorum or fowl typhoid in commercial poultry. This has been a colossal achievement! Back yard flocks and exhibition birds which have not come under official surveilance continue to be a potential source of pullorum spread. It is noteworthy that this is the only major domestic animal disease which has been brought under control voluntarily by the industry itself without benefit of federal regulations or federal funding.

Salmonellosis (paratyphoid) is a more difficult problem to solve. It is now the most frequent and important hatchery-born disease facing the poultry industry. It is primarily a disease of young fowl exposed through contaminated eggs and other environmental contacts. Adults are often chronic carriers.

Serological tests are available for only a few of the many serotypes commonly found in poultry, and this of course retards the identification of infected flocks. The USDA cooperative State-Federal program for salmonella surveilance has done much to pin-point sources of contamination such as feed stuffs, rendering plants, rodents, incubators and processing plants, not to mention subsequent exposure of poultry products in retail establishments and kitchens. More than 127 serotypes have been isolated from chickens and turkeys. Progress has been made in eliminating many sources of salmonella contamination, but salmonellosis remains an important public health consideration.

Turkeys not only bear the brunt of financial loss from salmonellosis but also occasionally suffer outbreaks of ornithosis, leading to

costly condemnations, and exposure of humans to this infection. Progress has been made in the use of flock diagnostic tests and the treatment of infections with antibiotics.

The identification, classification and control of various respiratory viral infections of poultry has been one of the major accomplishments of the past quarter century. In the late 1920's poultry were known to have "colds" and "roup". Coryza, infectious bronchitis and laryngo tracheitis were the first specific infections to be singled out. The early laryngotracheitis vaccines were fully virulent and had to be applied to the cloacal region. Even so they were dangerous to use. The development of low virulence and safer I.L.T. vaccines has been a valuable progressive step. Infectious bronchitis vaccines as first recommended by Dr. Henry VanRoekel of U. of Mass. were made from the raw tracheal scrapings of laboratory infected birds. No knowledge was then available on the mighty mycoplasmas which later were found to be the cause of C.R.D. and synovitis. Little did we know of how many such infections were spread by the early crudely made vaccines. Nevertheless, these bronchitis vaccines saved many poultrymen from financial ruin. Standards for commercial vaccine testing now required represents another point in progress. The identification of various strains of infectious bronchitis has made it possible to prepare more effective vaccines. However I.B. continues to cost the industry about $150 million in losses in both broilers and layers. The cost of vaccination, the temporary losses in production from repeat vaccinating layers, and the adverse effect of vaccines on the oviducts of some chickens emphasize the need for safer and more effective means for controlling this problem.

High on the list of recent achievements is the recognition of mycoplasma infections and the development of diagnostic tests which have made it possible to develop mycoplasma free flocks. This has done much to reduce losses from condemnations which at one time was extensive. While progress has been made, mycoplasmosis is still costing the industry nearly $250 million yearly. The object of control is to raise poultry free of mycoplasmosis. A sophisticated isolation and sanitation system is required, starting with eggs from flocks free of mycoplasmosis. The problems associated with present diagnostic tests must be solved and the significance of suspect reactors understood.

In the minds of many poultrymen the discovery of Newcastle disease by Fred Beaudette in the East and J. R. Beach in the West and the subsequent recognition of different pathogenic strains was a giant step toward understanding the problem and developing effective vaccines and control programs. The presence of velogenic viscerotropic Newcastle disease has added a singular challenge for the USDA agencies. It cost $56 million to eradicate VVND from Southern California but it would have cost the industry $230 million annually to live with this virulent infection. Isolated outbreaks of VVND extending from infected commercial aviaries are a continuing threat. Dr. Graham Purchase, Staff Scientist with USDA-ARS says, "The use of sentinal birds in the VVND eradication program was a new concept. Continued monitoring for the disease and strict import restrictions are a necessary part of the control procedure. Although current vaccines do protect against VVND, a more rigorous vaccination schedule, development and application of oil-emulsion killed vaccines and monitoring for immunity would be necessary to live with VVND. All of these procedures are being used in many foreign countries in which VVND is enzootic."

Perhaps this is a good place to insert a paragraph in recognition of the system of developing Specific Pathogen Free flocks. This concept had been used in swine production, but it was most effectively applied to poultry disease control by the U, of Maine Dept. of Animal Pathology under the leadership of Dr. Harold L. Chute, assisted by veterinary epidemiologists from the USDA. News of the success of this system spread across the nation and attracted concerned visitors from many foreign lands. The principles of the SPF program are standard procedures for rearing birds in quarantine, using disease free stock, proper and safe use of vaccines, positive pressure or air filtered housing and other environmental controls designed to prevent the introduction of disease. This concept of disease prevention has done much to raise the standards of poultry production and make more successful the rearing of disease free birds.

Almost 100% of the experts put on their list of the five most important accomplishments the tremendous achievement of controlling Marek's disease by vaccination. This landmark of progress is divided into several components. (1) The separation of lymphoid leukosis and Marek's disease as distinct entities, removing the confusion of a half century in terminology and diagnosis. (2) The transmission of Marek's disease and the identification of the herpes virus as its causal agent.

(3) The isolation of a non-tumor-producing herpes virus from turkeys and demonstration that it protected chickens against Marek's disease.

The successful application of Marek's disease vaccine has had monumental influence on the economy of the poultry industry. It is estimated by the USDA that this vaccine saved the poultry industry in 1974 alone over $168 million. This includes not only a reduction in losses from Marek's disease but also a related reduction in losses from other diseases, an increased growth rate and increased egg production. The economic benefits from the use of Marek's disease vaccine are world wide.

If there is any question in the public mind that research pays its way, consider what Marek's disease research has done. According to documented estimates by Dr. Graham Purchase, the average dollar invested in Marek's disease research (public and private) has returned 10% annually to society. To put it another way, the returns of this research from 1965 to 1974 are estimated at $460 million or $2.30 per person in the U.S. The use of this vaccine has reduced losses from condemnations by $61 million.

"In addition to these monetary benefits, M.D. was the first cancer shown to be caused by a herpes virus and the first neoplastic condition of any animal to be controlled by a commercially applicable vaccine. The contribution of research on M.D. to the understanding of human cancer is great", reports Dr. Purchase.

In conclusion, this list of milestones of progress include Coccidiosis control via coccidiostats, histomoniasis control in turkeys, pullorum control and enlightenment on other salmonellas, identification of the various respiratory disease viruses and mycoplasmas and the development of effective vaccines and other control regimens, and the production of a successful Marek's disease vaccine. There are numerous other accomplishments of which many of you are proud and consider worthy to be listed.

All of this progress was not made without the benefit of basic research techniques. For example, the development of egg embryo and tissue culture systems for growing and identifying viruses and for making vaccines. The production of "The Manual of Methods For Examining Poultry Biologics" and the establishment of the Journal of Avian Diseases and chartering the Amer. Assoc. of Avian Pathologists and its

subsequently becoming a major force in veterinary medicine, are, in the opinion of Dr. A. S. Rosenwald, major areas of progress.

The development of an excellent system of diagnostic and research laboratories by the Federal Government, our Land Grant Universities and by the major commercial companies have made it possible to quickly and accurately detect and analyze new disease problems. However, in these days of retrenchment of public support for State Universities, there is a definite tendency to de-emphasize the importance of diagnostic services. Thus there is a resultant failure to keep in close touch with current disease problems, failure to learn first hand the signs of disease and the extent of the economic loss, and failure to gain access to clinical cases which could stimulate and direct research in areas of need. We need to develop more rapid and accurate diagnostic methodology in order to properly serve our poultry industry. The Land Grant Universities were established as a "people's university" to help the people of the state not only through teaching but through research and service There is no better example of the latter than an animal disease diagnostic laboratory.

This has been a dramatically productive 25 years in poultry disease control. These major landmarks of progress which have been cited will go down in history as the poultry industry's most progressive era, and those who have contributed to this progress can rightfully feel proud of these achievements.

There is much that lies ahead. To quote Dr. Everett E. Lund, eminent parasitologist in the USDA, "I close with the complete satisfaction that the period of discovery is not over. It is upon us, around us and so close to us that we sense its presence but cannot perceive its dimensions. This is the stuff that progress is made of."

To quote from the first chapter of the History of Avian Medicine, Journal of Avian Diseases, Vol. 20, No. 4, Oct.-Dec. 1976,

"The History of avian medicine should evoke pride in today's achievements and appreciation of the pioneers who, with limited knowledge and inferior tools, paved the way for succeeding generations. It should guide us away from the mistakes of the past and steer us to more fruitful avenues. History is a compass bearing that gives a sense of direction for a continuing journey over the winding roads ahead. A look at the past is not a backward turn, it can lay the foundations of future progress."