



Figure 6.

fold responding animal retested by this procedure. By being able to conduct the test immediately you will not cause any undue hardship to the accredited herd owner or the owner who has his herd listed for sale. We would encourage you to check with your local regulatory veterinarian and work out an arrangement for him to provide you with the service of this retest procedure.

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## Epidemiology and Regulatory Medicine

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Man's ageless struggle against disease becomes more complex and more urgent as the intensity of population and interchange of commerce increase. This is in the effect whether we are speaking of animal diseases, plant diseases, insect pests, or diseases of the human family. This enlargement of the problem as the years go by is illustrated by a statement that is often made, and which I believe accurately portrays the situation. It is this—that as the animal population of an area doubles, the disease and pest problems increase four-fold.

We in this country have enjoyed a long development period of expanding into fresh new lands with relatively low concentration of human population, livestock and crops. But the advantages of our natural heritage in this respect are fast diminishing as the leveling effects of our national growth within a fixed land area bring us ever closer to the more urgent disease problems long faced by older countries.

Many older countries keep abreast of the problems as reflected rather accurately in their political, economic and social well-being. Others failed to meet the challenge and gave way to the ravages of devastating plagues and pests, reducing them to a constant struggle for bare survival. It is but stating the obvious that the United States dare not fall among the second grouping.

Veterinary epidemiology or epizootiology are terms that have gained greatly in popularity over the past decade. Older practitioners of regulatory medicine utilized the principals of epidemiology long before the term became common usage.

The cardinal principals of regulatory medicine is possessing knowledge of where disease occurs, when disease occurs, how much occurs, and how it spreads through space and time.

In January 1953, Ohio instituted a new animal morbidity reporting program. This program was put into

effect by the Ohio Division of Animal Industry in cooperation with the Ohio Department of Health and the United States Animal Health Division.

A complete system of animal morbidity and mortality reporting is not a "cure-all" nor in itself a preventive against the inroads of animal diseases and pests. It is one of the important foundation stones in a sound structure of animal disease prevention, control and eradication.

The need for such a program had been paramount in the minds of regulatory officials for a good many years. Information concerning many disease conditions was meager and with little or no degree of exactness. In the opinion of those concerned, such data should be at the fingertips of animal industry, since it could be used to great advantage in programs for disease control as well as contributing valuable information to Civilian Defense.

Of course, the broad objective and the prime concern is to provide better animal health. To provide health, disease must be prevented and controlled. Satisfactory control and prevention is dependent upon knowledge of where and when disease occurs, how much occurs and how it spreads through space and time.

It has been embarrassing to discuss disease control programs at rural meetings and have some interested party inquire as to the number of cases of a given disease entity occurring in the state; or to be questioned concerning the geographic or seasonal pattern of a given disease entity. In the past, we have had largely hearsay with which to answer these questions.

With these points in mind, interest in the reporting program was stimulated and Ohio initiated an animal morbidity reporting program.

In the very beginning of this program we agreed that such a program was dependent upon the cooperation of the local practitioner. Further, it was agreed that to obtain the highest degree of cooperation, we, in turn, must afford the veterinarian some benefits for the effort he was putting forth. Therefore, it was decided that the Division of Animal Industry, with the Department of Health and the United States Animal Health Division cooperating, would publish a monthly bulletin. This monthly bulletin was called "Animal Disease Trends" or A.D.T.

Animal Disease Trends not only contains the compilation of monthly statistics, but contains pertinent information relative to certain disease conditions. This publication usually contains four or six pages with discussions of timely disease conditions. Periodically, there are graphs and charts which contain information that the local veterinarian should find important.

A.D.T. is not only circulated to the participating local veterinarians, but also sent to all veterinarians in Ohio, totaling more than 1200. A.D.T. is sent to all regulatory officials in the 50 other states as well as Canada and Puerto Rico. State health veterinarians in Ohio and other states receive copies of this bulletin

each month.

Valid data obtained from morbidity-mortality reporting must be confirmed by accurate laboratory diagnosis.

In 1954, the Ohio Department of Agriculture developed a modern pathological services laboratory. This service laboratory was the second important phase of providing epidemiological data as well as service to the practicing veterinarian for the livestock industry.

The pathological service laboratory maintains complete necropsy facilities with maximum security. The laboratory provides complete microbiological service, pathological service, parasitological service, toxicological service, as well as serological services. These are most important tools in the practice of epidemiology.

Thus, we have the program to provide routine data to answer where, when, and how much. Laboratory and special investigative services contribute to finding how it spreads.

In considering these factors, we have attempted to maintain that this disease reporting program is in reality the practitioner's own program. The local veterinarian can make the program or he, by the same token, can weaken the program. So by affording as many benefits as possible for the local veterinarian, the Division of Animal Industry is quite sure the local practitioners will repond and cooperate as they have done on disease programs in the past.

The objectives of animal disease reporting in Ohio have been many-fold. Of course, the prime objective is to accumulate accurate data for each specific animal disease. This data is broken down as to the number of cases and the number of premises involved with each disease.

Our veterinary epidemiology section then uses this data for further breakdown so far as just where the diseases are occurring in our state on a geographic level; how much is occurring; and seasonal patterns are plotted to establish the time of year to expect these diseases.

Attack rates are calculated for each disease for each county, area and for the entire state. By using comparative attack rates, we are able to place a given area or county on a relative close comparative basis with any other area or county. The attack rate procedure is accomplished by using a common denominator in each of the areas or counties in question. This common denominator is usually 100,000 animal population. Then by comparative evaluation, we have some means of gauging the amount of disease present for each county or area.

Up to this point, we have addressed epidemiological process involved with most endemic diseases. The same tools are utilized when discussing "so-called name" regulatory diseases or those diseases of an exotic classification.

Regulatory medicine has experienced some real classic epidemiological problems in the past. One of

the most classic was the anthrax outbreak of 1952.

Anthrax was clinically diagnosed on a Clinton County farm on February 22. A laboratory confirmation as afforded on February 24.

A meeting of the Southwestern Ohio Veterinary Medical Association was immediately called to acquaint the local veterinarians as to the symptoms of anthrax, and as to the procedure to be followed if the disease would be encountered by them. Since anthrax appeared in Ohio only four times before in a fifty-year period, the veterinarians in Ohio would not have been familiar with the disease if educational steps had not been taken. In each of the previous cases, it appeared in only one herd.

A meeting of the livestock producers in the Clinton County area was held on February 29 so that accurate information concerning the disease could be given to them. Numerous educational meetings were held with farmers, veterinarians, packing industry and auction market operators.

With the passing of a few days, the disease appeared to be following somewhat of a definite epidemiological pattern, in that principally the sows were affected. This fact was noted by the investigators and attempts were made to ascertain what material the sows were receiving that was not common to that received by other swine. Within the first two weeks, the opinion was formed that the anthrax was coming from a feedstuff. It was necessary to determine the distribution of the feedstuff, as well as to identify the feedstuff. In an action such as this, there was the necessity for not only prompt action, but also accurate action to protect all segments of Ohio's livestock industry.

Histories of the affected herds were carefully taken, particularly the history that pertained to their acquisition of feeding material. These histories showed that the majority of the swine herds had been fed feedstuff from one supplier.

Extensive investigation into shipment records was conducted, and it was found that a central Ohio company had recently received a shipment of imported raw bone meal. By this time, many samples of feeding material had been collected in an attempt to culture the anthrax organism from the feed. Many samples from a central Ohio concern were taken and it was only after arduous effort that on March 23 the laboratory reported that anthrax organisms from a bone meal product had been positively isolated.

It should be pointed out that laboratory work in testing of samples involves time-consuming animal and cultural inoculations, ranging from one to five days before results can be determined. It should be further pointed out that in many instances, samples that tested negative, were re-run to make sure that nothing was overlooked. To assist the Division of Animal Industry with the vast work, the Ohio Department of Health, U.S. Public Health Service, Federal Food and Drug Administration, The Ohio Division of Plant Industry, and Bacteriology Depart-

ment of the Ohio State University, made their laboratories available.

As soon as this definite information was known, all unused contaminated feedstuff was recalled. This bone meal shipment amounted to 100 tons of which 60 tons was mixed with feed supplements, which would make 600 tons of prepared feedstuff. This feedstuff was then sold to over 200 feed dealers, elevators and customers. These customers then mixed this contaminated supplement with thousands of tons of livestock feed. It was this vast distribution of contaminated product that caused anthrax to appear in many counties. It was this distribution which could not be prevented because of the fact that contaminated bone meal was a part of the supplement was not then known.

Following the positive laboratory finding, which was made on March 23, the feed plants were notified and Ohio farmers were informed that if they had recently purchased or had mixed any feed that might have had the supplement added, it should not be fed until it was proven to be free of the anthrax organisms. In this interim, 550 samples of feed supplement had been collected from 107 different feed suppliers. Because of this wide distribution of feeding material, anthrax was eventually diagnosed in 57 counties appearing on 259 farms with a death loss of approximately one and one-half animals per affected farm.

Regulatory programs as well as regulatory officials are criticized too often for the necessity of health certificates, permits and animal identification. These are all important facets of regulatory epidemiology.

In eradication programs, such as brucellosis, tuberculosis, hog cholera, sheep scabies and equine infectious anemia, health certificates and identification are paramount.

Another classical depiction of veterinary epidemiology in utilization of permits, health certificates and animal identification involves the 1972 hog cholera outbreak. On or about August 21, 1972, The state of Kentucky confirmed hog cholera on a premise after enjoying "hog cholera free" status for over two years. Twelve additional Kentucky premises became infected in a very short period of time. Depopulation, quarantining, surveillance, and epidemiological investigations were put into effect.

Based upon the expanding status of the Kentucky problem, Ohio declared feeding and breeding swine from that state no longer eligible for entry after midnight August 23rd.

Ohio had utilized a permit system for all feeding swine entering our state for a period of ten years. Because of this program, Ohio regulatory officials had a record of all legal Kentucky imports.

Initial Kentucky field reports incriminated a specific sale day at one Kentucky market. Ohio records revealed that feeder pigs from that market sale were delivered to eight Ohio farms on or about August 11, 1972. These eight premises (and all others

known to contain Kentucky swine) were placed under strict surveillance. It should be pointed out that all of these imported swine were automatically quarantined to the premises for thirty (30) days after arrival.

On August 26th, one of the eight imported herds revealed a positive fluorescent antibody test for hog cholera. Depopulation was completed on August 28th.

By utilizing trained epidemiologists, trained diagnosticians, appraisal teams, depopulation teams, and cleaning and disinfection teams, they were able to eradicate hog cholera from Ohio. This outbreak involved a total of seven counties, 26 premises, 6986 hogs and \$101,926.56 in indemnity. It could have been far more devastating to our industry if the proper epidemiological approaches had not been put into regulatory usage.

Bovine brucellosis and bovine tuberculosis eradication efforts depend almost entirely upon traceback epidemiological effort. The days of down-the-road testing for these two diseases have become too costly in overall economics to be practical. In the initial phases of these two important programs, testing of each herd was necessary. However, with the state becoming certified "bovine brucellosis free" and modified tuberculosis accredited, the down-the-road testing was not economically practical. Regulatory officials then developed diagnostic programs in conjunction with meat inspection, with epidemiological traceback programs to the source herd. This type of program has proven most successful in revealing that high risk animals are the last reservoir of infection for these two diseases. It should be pointed out that in utilizing this approach, animal identification is a must. Extreme care must be used in the packing plants to (a) maintain identification of the animals, and (2) to be certain that the diagnosis of the lesions or test results incriminate the proper animals.

Animal identification is the key to any regulatory program. Regulatory officials in the past have utilized ear tags, tattoos, neck chains, and other means of

identification. Each of these methods present problems of removal, tampering, or problems of restraint for ease in identification.

We, in regulatory programs involving animal health and consumer protection programs, are most impressed with the research involving electronic methods of identification. We have been exposed to and have witnessed demonstrations involving implanted transmitters that can electronically transmit to a receiver the identification of individual animals. When the cost of such a program is practical, we are of the opinion that identification of animals will take on an entirely new perspective.

Bovine practitioners are in dire need of more practical and efficient methods of identification. Preventive medicine programs involving bovine practitioners, such as vaccination for regulatory diseases, need proper animal identification. Pre-conditioning programs involving vaccination for such diseases as blackleg, leptospirosis, the influenza viral diseases, as well as those programs involving internal and external parasite control need proper identification so that pre-conditioned animals can be easily identified. This proper identity is the prerequisite to demand a higher premium for the owner's effort and for the veterinary fee involved in providing a meaningful pre-conditioned feeder animal.

In recent years, our profession has experienced the tremendous impact of Venezuelan equine encephalomyelitis and Asiatic Newcastle disease. In utilizing all the tools of regulatory medicine with total involvement of veterinary epidemiology, these two diseases have been eradicated. The nation has enjoyed two years of hog-cholera-free status.

In summary, we have attempted to indicate that veterinary epidemiology is preventive and regulatory medicine.

When regulatory officials, as well as practicing veterinarians, are cognizant of the where, when, how and how much disease occurs, the livestock industry of this nation is properly served.

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## International Movement of Bovine Genes: Current Status of Importation and Exportation Regulations

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Despite the fact that the title-subject may be of immediate interest to only a limited number of bovine practitioners, its implication to this country's cattle population and to the cattle industry has been/will continue to be of major significance.

Numerous factors, influences, and interests—scientific, economic, and business, mostly business—have been woven together to create, presently, an importance to international movement of cattle genes that is without precedent. Live animals for reproduction