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FOREIGN ANIMAL
DISEASES REPORT



FEBRUARY
1973

HOG CHOLERA ACTIVITIES



There were nine positive cases of hog cholera diagnosed in five States during January, including cases in Massachusetts (1), New Jersey (1), North Carolina (2), Pennsylvania (1), and Virginia (4).

This brings the Fiscal Year total to 155 positive and 252 exposed cases reported from July 1 through January 31, 1973. During the same 7-month period 1 year ago, there were 40 positive and 147 exposed cases.

Quarantines ... As of January 31, 1973, the following areas were quarantined because of hog cholera: the entire Commonwealth of Puerto Rico; the entire State of New Jersey; portions of Charles, Prince Georges, and St. Marys Counties, Maryland; portions of Bristol and Plymouth Counties, Massachusetts; portions of Gates, Hertford, and Northampton Counties, North Carolina; a portion of Berks County, Pennsylvania; and a portion of Southampton County, Virginia.

Increases in Hog Cholera Incidence in United States ... Statistics comparing positive cases reported during 1971 and 1972, reflect the increase in hog cholera incidence since December 1971. There were 100 positive cases diagnosed in the U.S. from January 1, 1971 through June 30, 1971. During the last 6 months of 1971, only 18 cases were reported, nine of these occurring during December, for a total of 118 cases for the year.

During 1972, 58 positive cases were reported during the first 6 months of the year. One hundred forty six were reported from July 1 through December 31, 1972, with the bulk of them coming in August (25), September (54), October (32), and November (19). Eight cases were reported in both July and December. The 1972 total of 204 cases represents a 73 percent increase from the 1971 total.

Recent positive cases close to the Dismal Swamp areas in Virginia and North Carolina are quite disturbing. It is felt that unless all foci of infection in this area are detected and eliminated prior to March 15, 1973, that this will prove to be another trouble spot during the coming summer months. Evidence of insect transmission of hog cholera occurred in the Dismal Swamp area during the summer months of 1970.

U. S. DEPT. OF AGRICULTURE
NATIONAL ANIMAL HEALTH CENTER

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PROBABLE SOURCES OF INFECTION OF HOG CHOLERA (IN PERCENT)

	Additions		<u>Garbage</u>	<u>Vaccination</u>	<u>Area Spread</u>	<u>Undetermined</u>
	<u>Interstate</u>	<u>Intrastate</u>				
CY 1964	3.0%	18.2%	3.2%	8.5%	25.1%	42.0%
CY 1965	2.0	23.2	5.0	10.1	25.0	34.7
CY 1966	2.2	14.8	7.1	29.0	24.9	21.9
CY 1967	1.2	16.5	5.3	31.0	25.9	20.1
CY 1968	6.5	33.1	12.3	8.6	30.4	9.1
CY 1969	9.8	35.8	8.2	1.5	34.1	10.6
CY 1970	4.1	27.4	11.1	.3	44.3	12.8
CY 1971	1.7	33.8	14.4	2.5	22.9	24.6
CY 1972	6.8	24.5	18.1	--	34.3	16.1

Probable sources of positive cases which occurred from July 1 through December 31, 1972, are interstate herd additions, eight percent; intrastate herd additions, 16 percent; garbage, 21 percent; area spread, 41 percent; and none established, 14 percent. These statistics indicate the need for greater effort in the elimination of transmission of hog cholera through marketing channels and uncooked or improperly cooked garbage fed to swine. The Carroll County, Indiana outbreak which occurred during this period accounted for a high percent of the cases attributed to area spread. This was due to large numbers of swine in the area, very wet conditions, and a large insect population.

HOG CHOLERA IN PENNSYLVANIA - IT COULD HAVE BEEN WORSE

On Friday, December 8th, hog cholera was diagnosed on a farm in Franconia Township, Montgomery County. The disease was believed to originate from pigs from hog cholera infected premises in New Jersey. These pigs had been sold through two Pennsylvania livestock auctions. The Pennsylvania Bureau of Animal Industry sent a team of veterinarians and inspectors headed by Dr. John Dick into the area. After the farm was depopulated of swine and the area quarantined, all premises to which swine had gone from those markets on the days New Jersey swine were sold were traced back, inspected, and quarantined. More than 100 farms were involved. Fortunately, the Federal Government had placed an Exposure Quarantine on Pennsylvania which stopped movement of swine out of the State. The Pennsylvania Department of Agriculture then issued a Stop Movement Order which prevented movement of all swine within the State.

On December 12th, another outbreak occurred in a herd of about 100 swine in Cumberland County. This outbreak was believed to have originated from butcher shop offal from New Jersey swine slaughtered at Allentown. Possible exposure herds in seven Pennsylvania counties were immediately placed under quarantine surveillance.

By the Christmas weekend, both the Federal Exposure Quarantine and the State Stop Movement Order for all classes of swine were lifted. On December 27th, however, another outbreak in ten feeder pigs in Lehigh County was confirmed by the laboratory. This one is apparently connected to the original imports of infected pigs from New Jersey. At this date, December 30th, the Federal and State area quarantines are still in effect. If further outbreaks occur, the State may be forced to stop movement of at least feeder pigs and breeding swine again.

Several things are apparent: The movement of swine is nothing short of fantastic. As a result of pig movement through two Pennsylvania auctions, more than one hundred farms were exposed to the possibility of hog cholera. The Federal Exposure Quarantine and the State Stop Movement Order were tremendously effective in preventing what might have been a disaster. The Pennsylvania Bureau of Animal Industry and the USDA-APHIS handled the individual outbreaks and their tracebacks in a very efficient manner. However, it might well have been different if there had been continued swine traffic and a dozen outbreaks resulting from traffic through additional markets.

The only sour note in the current problem is the knowledge that swine have been vaccinated with BVD vaccine in New Jersey and one drug peddler is known to have sold the BVD vaccine at a Pennsylvania auction market. Several veterinarians have reported that drug salesmen have been pressuring them to use BVD vaccine for hog cholera protection. Widespread use of this vaccine could wreck the nationwide effort to eradicate the disease. Regardless of what the drug salesmen say, MLV-BVD vaccine is not approved for such use, and there are many valid reasons why it should not be used - legally or otherwise.

One last note: There must be a larger than usual amount of virus contaminated or infected pork around as a result of slaughter of large numbers of New Jersey swine in eastern Pennsylvania slaughterhouses. This will serve as a potent source of virus for some time to come. Warn swine producers to feed no garbage not even table scraps, unless it is thoroughly cooked. (From Veterinary News Letter No. 66, December 1972, University Park, Pennsylvania, 16802).

FOOT-AND-MOUTH DISEASE UNDER CONTROL IN BULGARIA

Ministry of Agriculture in Sofia, informed American officials on December 19, 1972, that no foot-and-mouth disease (FMD) exists in that country and necessary precautions were taken to prevent its spread from the neighboring countries. The Ministry has delayed sending Bulgarian veterinarians to the U.S. for training because they are extremely busy conducting control programs at borders.

In an informal conversation with local veterinarians, American Embassy officials were told that a small outbreak of FMD in pigs had occurred in the second week of November, but had been brought under control.

EXOTIC NEWCASTLE DISEASE ACTIVITIES REPORT

During the month of January 1973, exotic Newcastle disease was diagnosed in 16 flocks comprised of slightly more than 230,000 birds. One hundred and twenty flocks consisting of slightly more than 144,000 birds were determined to be exposed. The exposed flocks as well as the infected flocks were in the Norco, Banning, Corona, Woodcrest, Perris, Redlands, Chino, Cherry Valley, and Riverside areas of Riverside County, and Yucaipa, Ontario and Highland areas of San Bernardino County.

As of February 1, 1973, 973 flocks comprised of slightly more than 10 million birds in southern California had been determined to be infected or exposed since the declaration of the national emergency by Secretary of Agriculture Butz on March 14, 1972. These birds were appraised at slightly under \$20 million.

In January of 1973, the area around Cherry Valley, Beaumont, Calimesa, Yucaipa, Redlands, Highland, and Mentone which was designated as a high-risk area by the task force, was removed from this designation. Permits are now being issued for the shipment of poultry into this area as it was previous to the declaration of the high-risk area. This action was taken after it was determined through the evaluation of flocks with sentinel birds, Epidemiological Necropsy Surveillance Program (ENSP), and investigations and inspections, that the area was no longer a high-risk area. In the area currently under quarantine for exotic Newcastle disease, 3,356,000 birds were vaccinated in commercial flocks as a part of the fourth round of vaccination.

As of February 1, 1973, almost 109 million birds immunizations had been completed since the program began on March 14, 1972. Slightly over 12 million bird immunizations have occurred during the fourth round of vaccination. These consisted of 328 commercial chicken flocks comprised of slightly over 12 million birds and 4 turkey flocks consisting of slightly more than 92,000 birds.

On January 23, 1973, exotic Newcastle disease was confirmed in a flock of 27 game birds in Los Ebanos, Hidalgo County, Texas. This area is a sparsely populated poultry area and the flocks are primarily of game birds and other backyard type chickens. Portions of southeastern Hidalgo and southwestern Starr Counties have been placed under State and Federal quarantines. Intensive surveillance of the area is in progress. In addition to the one infected flock, 52 additional flocks comprised of 422 birds were determined to be exposed. All of the exposed and the one infected flock have been depopulated and the premises have been cleaned and disinfected. Intensive surveillance of the area to date indicates that there was no spread of infection. One thousand sentinel birds have been acquired to place in flocks within the quarantine area and on the premises which have been depopulated. These birds will also be used to evaluate flocks outside of the quarantine area.

Surveillance Activities ... As indicated above, intensive surveillance activities are underway in Texas as well as in southern California. Sentinel birds continue to play a very important role in the exotic Newcastle disease surveillance program. Over 11,570 sentinel birds have been placed in 2,222 backyard flocks and over 23,000 sentinel birds have been placed in 440 commercial flocks. One flock was diagnosed positive by this means in January giving a total of 22

commercial flocks and one backyard flock which have been diagnosed positive by the use of sentinel birds. During the month of January, ENSP was responsible for the confirmation of the disease in one flock in southern California. Thus far, 12 flocks have been diagnosed positive as a result of ENSP. Eighty-five percent of the commercial flocks in San Bernardino and Riverside Counties which are under quarantine are under ENSP. Approximately 80 percent of the commercial flocks in Orange, Los Angeles, Riverside, San Bernardino, and San Diego Counties, California, are under the ENSP.

On January 9, 1973, the State-Federal Exotic Newcastle Disease Eradication Task Force, headquartered at Riverside, California, consolidated its field office at Ontario with the Riverside office. The field office at Thousand Oaks in Ventura County will remain open to service that area. It will be closed about the first of March leaving the headquarters at Riverside as the only office.

On January 31, 1973, a press release was issued from Riverside, California which stated that the drive to eradicate exotic Newcastle disease from southern California is entering one of its toughest phases which is finding the remaining infection. The eradication effort in the coming weeks will be concentrating its forces on areas where the disease appears to be localized. Eradication depends upon finding and destroying the last bird infected with or exposed to exotic Newcastle disease. All bird owners were asked to promptly report any signs of the virus disease to the Riverside task force office. An important element during this period of the eradication effort is a three-prong surveillance program now in operation throughout southern California. The purpose of this surveillance program is to rapidly identify exotic Newcastle disease through the use of three basic diagnostic tools. These are examination of bird deaths in each flock or ENSP, the use of sentinel birds, and on-sight inspections through investigations and surveys.

Regulation Changes and Quarantine Actions ... On January 23, 1973, exotic Newcastle disease was confirmed in a flock of predominately game birds in Los Ebanos, Hidalgo County, Texas. As a result, a portion of southwestern Hidalgo and southeastern Starr Counties, Texas, was placed under a State and Federal quarantine. A radius in excess of 5 miles of the infected premises was quarantined.

On January 31, 1973, a docket was prepared which will release portions of San Bernardino and Riverside County, California. A small portion of Riverside County near Riverside, California, will be requarantined as a result of this action. The area under quarantine in southern California will be reduced from 1,450 square miles to 690 square miles. County areas remaining under quarantine will be comprised of 260 square miles in Riverside, 270 square miles in San Bernardino, and 160 square miles in Ventura.

On January 8, 1973, the U.S. Department of Agriculture banned the importation of all fresh poultry meat into the United States and placed restrictions on the importation of table eggs. The action was taken by USDA's Animal and Plant Health Inspection Service (APHIS) because of recent shipments and planned shipments from countries infected with exotic Newcastle disease. It is designed to further protect the Nation's supply of poultry and eggs against the introduction of exotic Newcastle disease which affects poultry and other birds.

APHIS officials said the prohibition on imports covers all fresh, chilled, and frozen poultry carcasses and parts. The only exception is Canadian poultry meat shipped directly to the United States, since Canadian officials are also following an eradication program against the disease.

The restrictions on table eggs requires that all imported eggs be washed, sanitized, and packed in new cartons, flats, dividers, and crates. These eggs must also be certified by a veterinary official of the exporting Nation as having come from flocks proven to be free of exotic Newcastle disease through the use of sentinel birds.

Certification will not be required if the eggs are sent under seal directly from the port of entry to an approved egg processing plant for breaking and pasteurization under Federal egg inspection supervision. The same exemption for poultry meat from Canada will cover eggs imported from Canada.

APHIS officials explained that while this disease does not affect persons who eat poultry meat and egg products, the action was taken as a precautionary measure to prevent the exotic Newcastle disease virus from again being spread to U.S. poultry flocks, where losses could greatly reduce the supply of poultry and eggs available to American consumers.

The new regulations became effective immediately, and cover all poultry and egg shipments to the U.S. Special conditions are provided for table eggs consigned to U.S. buyers on or before the effective date of the regulation.

Special exceptions for individual importations can be made by APHIS officials for educational, scientific, and research institutions with the facilities and equipment to safely receive and handle potential disease bearing materials. Migratory bird carcasses being imported by hunters are exempt from the regulations.

On January 24, 1973, the U.S. Department of Agriculture (USDA) proposed regulations which, if adopted, will permit the importation of pet and exotic birds. The imports would be in commercial lots and under strict controls. USDA noted that the original introduction of the disease in southern California is believed to have resulted from the importation of infected exotic pet birds.

A ban on the importation of such birds was imposed on August 24, 1972, to help prevent further introduction of exotic Newcastle disease into this country. This ban is still in effect.

The proposed regulation would require inspection, testing, and quarantine of imported birds under direction of USDA's Animal and Plant Health Inspection Service (APHIS). It calls for the overseas inspection of each shipment by a full-time salaried veterinarian, employed by the exporting Nation, who would have to certify that the birds are free of communicable poultry diseases, including exotic Newcastle disease.

The certification would also have to state that the location of the origin of the birds was free of evidence of disease, had not been under quarantine for at least 90 days prior to shipment, and that the birds had not been vaccinated for Newcastle disease.

The proposed regulations would require commercial bird importers to provide quarantine facilities in this country at specified ports of entry where the birds would be held in isolation for a 30-day period. The facilities would have to be approved by APHIS and located in the immediate vicinity of the port through which the birds entered the U.S. Except for birds from Canada and Mexico, commercial shipments would have to enter at New York City, N.Y.; Miami, Fla.; San Ysidro or Los Angeles, California; Seattle, Washington; or Honolulu, Hawaii. Commercial shipments from Canada would have to enter at Seattle, Washington; Detroit, Michigan; or New York, N.Y. Those from Mexico would have to enter at Miami, Fla.; Los Angeles, or San Ysidro, California; or Brownsville or El Paso, Texas.

Birds entering the quarantine facilities would be handled on an "all in - all out" basis so that all of the birds could be treated as a single lot during the quarantine period. Each bird in the lot must be individually identified by methods approved by APHIS.

Importors would have to meet APHIS operating standards for quarantine facilities, including inspection and testing under the supervision of an APHIS veterinarian at the port of entry.

The importer, under the proposed regulations, would bear the costs of maintaining the quarantine facility in an APHIS-approved status and the costs of feeding and caring for the birds while they are in quarantine. APHIS would provide the services of qualified veterinary personnel for the required inspections and tests.

The proposed regulations appeared in the Federal Register on January 25, 1973. A period of 30 days will be allowed for public comment. Any comments should be sent to the Deputy Administrator, Veterinary Services, APHIS, USDA, Hyattsville, Maryland, 20782.

Other Activities ... Dr. R. E. Omohundro, Director, Emergency Programs, participated on the program of the annual Southeastern International Poultry Convention of Southeastern Poultry and Egg Association, January 28-31, 1973, Atlanta, Georgia, to discuss the subject "immunization versus vaccination." Representatives of the poultry industry throughout the United States were in attendance. A speaker from Venezuela was also on the program and discussed exotic Newcastle disease in his country. During this meeting, the Animal and Plant Health Inspection Service (APHIS) Information Division presented a display depicting the activities of the exotic Newcastle disease program. A film on the program in southern California was also shown to persons in attendance. This film is being duplicated for distribution to field stations and other people interested in its use.

A full-time information officer has been employed and assigned to the Newcastle disease task force in Riverside, California. The information officer will be extremely helpful in disseminating current information about the progress and direction of the exotic Newcastle disease program.

Four courses pertaining to commercial, pet, and wild bird medicine were scheduled for four locations throughout the United States to train Veterinary Services personnel in inspection procedures and other information which will

be needed in dealing with exotic Newcastle disease and the standards and regulations which are proposed to allow the importation of pet and exotic birds. One of these courses was held in Atlanta, Georgia, during the period of January 29 through February 2, 1973. Other courses are scheduled at Stony Brook, New York, February 12-16, 1973; Chicago, Illinois, February 26 through March 3, 1973, and Los Angeles, California, March 5-9, 1973. These programs have been planned and organized by the Poultry Diseases Staff of Veterinary Services. These courses consist of 32 instructional hours and have the following basic objectives: (1) Familiarize participants with diseases of commercial, pet, and wild birds and with techniques of handling and diagnosis, (2) Review regulations controlling importation and movement of birds and outline responsibilities of three different agencies, (3) Enable participants to communicate with bird fanciers, with persons in the commercial industry and with avian pathologists, (4) Outline the epidemiology of diseases in wild, pet, and commercial birds as related to health problems in commercial poultry, and (5) Establish contacts and sources of information that will provide the basis of a continuing relationship with avian pathologists and the commercial bird industry.

SWINE VESICULAR DISEASE

In a special bulletin dated December 19, 1972, we reported on a disease of swine occurring in Great Britain caused by a porcine enterovirus and called "Swine Vesicular Disease" (SVD).

Since then we have learned that there have also been outbreaks of SVD in Austria, France, Italy, and Poland. From information available at present, it would appear that the disease is currently limited in its distribution to Europe. Our latest information reveals that SVD is being effectively controlled in Great Britain with about 90 percent of the outbreaks traced to a source. There have been approximately 41 outbreaks involving 15-20,000 swine in Great Britain since the initial outbreak on December 11, 1972.

It is recognized that SVD is of great importance as a disease of swine. It also represents a very complicating factor in the control of Foot-and-Mouth disease (FMD). It would be extremely difficult to exert effective control of FMD if swine vesicular disease became widespread. In the case of an outbreak of vesicular disease affecting swine and not cattle, it is important to establish as quickly as possible the differential diagnosis from FMD, and especially to determine that FMD is not present either alone or in mixed infection with swine vesicular disease.

Various laboratory methods may be used to differentiate SVD from other vesicular diseases. On January 9, 1973, an emergency meeting of the Food and Agriculture Organization's European Commission for the Control of Foot-and-Mouth Disease was held in Rome, Italy. The participants discussed the present SVD and FMD situation in Eastern and Southeastern Europe and came up with a list of the most important methods to be used in differentiating SVD and FMD:

1. The growth of the virus in a number of different tissue culture systems. The porcine enterovirus grows in certain tissue cultures of porcine origin (IB-RS-2 cell line, primary pig kidney culture, etc.) but not in those of bovine origin (calf thyroid, bovine kidney, etc.).
2. The demonstration of resistance of the virus to pH 5.0 and its stabilization by IM $MgCl_2$ against heating at 50°C.
3. The demonstration of specific complement-fixation and/or serum neutralization between the new isolate and known antisera.
4. Additional criteria are:
 - (a) Failure to infect cattle by experimental inoculation.
 - (b) Demonstration of particles of about 30 nm in the electron microscope (compared with about 25 nm for FMD).
 - (c) Determination of buoyant density of virus particles at 1.32-1.34 as compared with 1.43-1.44 for FMD.
 - (d) Demonstration of infection of day-old mice (differentiating from the virus of vesicular exanthema but not from FMD).

It is well to note that the five primary breaks of SVD in Great Britain were caused by feeding infected garbage to swine. Direct contact and market movements took it from there.

In addition, the Commission has recommended that control measures be taken immediately, exactly as if the outbreaks were proven cases of FMD. The measures include, when possible, slaughter of infected and in-contact pigs and destruction of carcasses.

EXOTIC NEWCASTLE DISEASE IN CANADA

On November 13, 1972, a shipment of 400-day old chicks was received in Calgary, Alberta, from a Puyallup Washington Hatchery. On the same day 2600 day-old chicks were received from a hatchery in Canada. None of the chicks were vaccinated. On or about the 10th day chicks began dying and by the 3rd week all 3000 chicks were dead. Velogenic Newcastle disease was diagnosed by Canadian officials. Adult birds in the flock were destroyed. A quarantine was placed on an area including all surrounding premises.

FIELD STUDIES ON BROILER VACCINATION AGAINST EXOTIC NEWCASTLE DISEASE

Dr. C. W. Beard, Director of the USDA, Agricultural Research Service, Southeast Poultry Research Laboratory, Athens, Georgia, and Dr. Dyarl D. King, USDA, Veterinary Services, have initiated field studies on Newcastle vaccination

programs in broilers. As of January 26, 1973, the following is a summary of their findings in one very large broiler operation which is presently under study.

1. The breeders are well immunized, have good HI titers and most will survive viscerotropic velogenic Newcastle disease (VVND) challenge.
2. The chicks have variable levels of parental antibodies when placed in the house (parental antibodies will not protect against VVND).
3. Drinking water administration of either B₁ or La Sota strains of Newcastle vaccine at 10 or 17 days (depending on breeder flock source) was the broiler vaccination program.
4. The drinking water program provides 70 to 90 percent protection against the lethal effects of VVND 3 and 5 weeks after vaccination. Additional birds become crippled and paralyzed, which in field rearing conditions would be synonymous with mortality. Almost all of the birds are infected, sick, and shed virulent virus. They show severe respiratory symptoms with depression during the illness.
5. Vaccine virus survives very well in the water troughs in poultry houses. Generally, the higher the vaccine titer, the better the immune response.
6. The HI test continues to be a reliable indicator of what to expect when the birds are challenged. Broilers with negative HI titers usually die, with the incidence of mortality decreasing as the HI titers increase.
7. Limited spray trials in broiler houses have resulted in less adverse reaction than initially anticipated, and the HI titer response has also been less than anticipated. The reasons for this are being explored as the trials continue.

In summary, the experimental results to date indicate that exotic Newcastle disease and a broiler operation are incompatible. The broilers from well immunized breeder flocks are susceptible to the lethal affects of VVND and therefore, it will be difficult or impossible to protect broilers for their entire 8-week life by vaccination. Vaccination will certainly reduce the impact of VVND on the broiler but it will no longer be the efficient low-cost source of meat protein.

It is hoped that these vaccine research efforts can be continued in the field with the goal of developing a program that will provide the most protection at the earliest time and for the longest period with the least adverse reaction. This is a monumental challenge but is a very necessary one that must be successfully met.

EPIDEMIOLOGY AND EMERGENCY DISEASES

Purpose ... Epidemiology, like disease, is not new. The term "epidemiology" appeared around the year 1800. Epidemiological techniques, however, have been used for thousands of years to explore the natural history of diseases in human and animal populations. Refinements have accrued, the latest, within the last 50 years, being statistical measurement of data. But whether an investigation concerned the influence of noxious vapors on health in ancient Greece, the causes of poisoning among cider drinkers in medieval England, or the status of vesicular stomatitis in a rainforest in present-day Panama, the purpose of the inquiry was fundamentally the same - to understand how the disease appeared and spread, and to develop methods of control.

The epidemiologist ... Usually disease arises and is maintained by an interaction of multiple causes. These may be related to the animal host, specific agents, or the environment. They may be associated with the climate or geography; micro-organism, toxins, or nutrition; arthropods or wildlife; housing, husbandry, or management. The epidemiologist observes, describes, and analyses these aspects of the disease problem. He does not purposely seek new knowledge about the nature of disease, though it may follow from routine investigations. Rather, the epidemiologist is concerned with the practical application of what is already known about etiology to explain and to cope with the disease problem.

While investigations are individually motivated and directed, the epidemiologist, as a generalist, neither works alone nor personally follows all avenues of inquiry. The implications of modern disease frequently are so broad that assistance may be sought from specialists in microbiology, pathology, parasitology, toxicology, virology, or biostatistics. The epidemiologist fits these contributions into a mosaic to create a pattern of causal associations and explanations.

Frequently, associations between events are spoken of as cause and effect, the first event being denoted the "cause" of the second. The concept that effect is tied to cause and is an infallible consequence of it, however, has been rejected by schools of philosophy for several hundred years. One event follows another. But regardless of the duration of association, there is nothing inevitable about causal associations, nor are effects ever dependent on single causes.

The epidemiologist is concerned with the discovery of relationships. For this purpose, a causal association may be defined as a relationship between two categories of events in which a change in the frequency or quality of one follows alteration in the other. When related events occur simultaneously, they cannot be considered causal. The stronger the association and the higher the ratio of incidence of B following A to the incidence of B without A, the greater the possibility of a causal relationship.

Variables in epidemiological investigations ... An epidemiological inquiry starts with questions which are influenced by the information already available. The variables not commonly examined and measured relate to the agent, the host, and the environment.

The agent ... The agent is usually thought of as something tangible -- a virus, a bacterium, a mycoplasma, or a chemical or physical agent. The agent may also be a chemical poisoning, trauma, or a carcinogen. To the epidemiologist, however, the concept of the etiologic agent as the single cause of disease is an oversimplification. One event follows another, but regardless of the duration of their association there is nothing inevitable about causal associations, nor are effects ever dependent upon single causes.

The host ... Numerous elements influence host response to disease. Some of these are age, sex, and breed. Others are physical structure and metabolism. Genetic inheritance may determine resistance or susceptibility to certain diseases. This hereditary pattern may be limited to the individual, to a breed or to a strain. Variations in host response to disease may also be influenced by previous artificial immunizations, nutrition, hormones, vitamins, and steroid therapy. Resistance usually increases with age. Resistance in a population resulting from prior exposure to disease is called herd immunity.

The environment ... The influence of environment on disease was recognized long before epidemiology became a science. Hippocrates, 2300 years ago, advised for proper medical investigations, to consider the seasons and their effects, the winds, the waters, and the condition and elevation of the ground.

The epidemiologist seeks to identify and to control the elements that cause disease. In his search for causal associations and relationships, the epidemiologist must explore the entire environment. This has two phases: the macro-environment which includes topography, altitude, time, temperature, season, moisture, rainfall, winds, soil, water, and vegetation; and the micro-environment which includes interrelationships with other animals of the same and different species, arthropods, rodents, birds, feed, sanitation, population density, ventilation, and all the aspects of management in a barn or a house.

Epidemiologists basically are fact finders. In the search for determinants of disease, therefore, epidemiological investigations are only as good as the data collected. Incomplete or inaccurate information can lead to erroneous conclusions or deleterious decisions. The principal methods for collecting data are observation and questionnaire-interview.

Observations ... Whether it is done in the laboratory or in the field, observation is fundamental to all scientific inquiry. The objective is to obtain facts that may serve as the basis for generalizations beyond observation. While observations usually are systematic and related to the disease situation, even chance impressions may be significant. Since memory is fallible, epidemiologists are rigorous note-takers. Particularly in field investigations, data will be more reliably retrieved if it is immediately recorded. At the end of the day notes are elaborated into a narrative as a basis for subsequent reports.

The best repository for information is a diary. If immediate recording in the diary is not feasible, jotting down key words on a small sheet of paper may suffice until more detailed notes are possible.

As survey situations differ in origin and development, so do observations as investigations progress. Thus, initial impressions and judgments, as well as continuous interpretation of data and events, are important. Clear separation of observation from interpretation, however, helps headquarters to understand and to evaluate the complete animal health picture.

Questionnaire-interview ... This technique for data collection complements field observations. The questionnaire for "epidemiological study of animal health" provides a format for an investigation, while not limiting improvisation and change as the progress of investigation opens new avenues of exploration.

In chronological sequence, the epidemiologist has his first interview and obtains preliminary data usually from the veterinarian who precedes him to the premises and with whom thereafter he works closely. Subsequently, the more channels of communication the epidemiologist establishes, the greater the possibility of obtaining useful information. Discrepancies in the accounts of informants are investigated further.

The written questions are both closed and standardized (i.e., require factual information), as well as open-end (i.e., to permit extended explanation). The interview is similarly loosely structured to permit the epidemiologist to acquire as much information and opinion as he believes material.

Good epidemiology is one thought stimulating another. And every epidemiological investigation is a unique experience within itself.

Answers are recorded when given. Lengthy answers may be carried to the back of the sheet or to the diary. If the individual is reluctant or unable to give certain information, answers often may be tactfully obtained from other members of the household or from hired help. Regardless of their place in the questionnaire, questions concerning livestock numbers are best posed at the end of the interview.

An indexing system in the diary consistent with coding in the questionnaire, names of persons, and dates is helpful for reports and reference.

Supplementary to diaries and reports, a plan of the premises, spot maps showing geographic distribution of the disease, and graphs portraying disease incidence by weeks help establish time and space relationships of the disease under investigations.

Submission of data ... Significant information is reported by telephone to the chief epidemiologist at the reporting center. Questionnaires, premises plans, and spot maps are submitted to the appropriate State or national center as soon as they are completed. Field reports, including supplementary observations, hypotheses, and interpretations, are submitted each week. Identified by case number, data are assembled, categorized, coded, and recorded on marginal punch cards for analysis and evaluation.

Epidemiology in animal health reporting ... Establishment of an agent-host relationship is important in the control of diseases. But this is only one aspect of epidemiology. More emphasis is needed on the "why?" -- not only of

specific disease outbreaks, but of total animal health. Epidemiologists assisted by laboratory intelligence are the best agents for obtaining a complete evaluation of animal health in relation to the total environment.

Modern epidemiology is largely analytical (or statistical) and experimental. The analytical method relies upon legwork to gather field data. When acute diseases are involved, investigations must be made rapidly. When chronic diseases are concerned, the epidemiological approach is retrospective and less urgent. In the former (and complicating the need for speed), thorough knowledge of the disease and the organisms involved is initially essential in planning the course and content of the investigation. In the case of chronic diseases on the other hand, since retrospective investigations are after-the-fact, trails usually are less clear, gathering information is more difficult, and definitive conclusions are less certain.

Although built on enumeration, epidemiology in emergency programs is not like counting cabbages. Statistics can put information in an orderly arrangement for machine processing; but epidemiology usually starts where computers stop. The disease process, though convoluted, is a continuum. The web of causation cannot be unravelled without an understanding of all the interrelationships of agent, host, and environment; nor can the associations of disease, treatment, and outcome be determined without epidemiological studies. Only this complete approach will help reveal the true dimensions of total animal health.

TABANID CONTROL DURING HOG CHOLERA ERADICATION

Although research conducted in North Carolina has incriminated tabanids (horse flies and deer flies) as potential mechanical vectors of hog cholera virus (Tidwell et al., 1972, Am. J. Vet. Res. 33:615-622), this group of insects is among the most difficult to control. Therefore, a seminar on Tabanid Control During Hog Cholera Eradication was held on February 8, 1973, at the Emergency Programs Information Center to bring together experts with the latest information on the subject. Invited participants included scientists from Auburn University, Clemson University, Rutgers University, the Agricultural Research Service, and the Animal and Plant Health Inspection Service.

Reviewed during the deliberations were the current state of knowledge regarding tabanid biology and control, the possibilities for initiating an operational control program, and areas of study requiring additional research and development. General indications are that, at the present time, no techniques are available which will provide tabanid control for periods of more than 24 to 48 hours. As a result, programs are being planned to provide operational information which can be applied to the hog cholera eradication program as soon as possible.

VESICULAR DISEASES IN THE WESTERN HEMISPHERE*

Country	Period 1972	0	FMD		VS	
			A	C	New Jersey	Indiana
Argentina	Sept. 1-Nov. 15	277	261	15	-	-
Bolivia	Sept. 1-15	-	7	-	-	-
Brazil	Aug. 12-Dec. 5	42	69	92	-	-
Costa Rica	Dec. 1-15	-	-	-	1	-
Ecuador	Aug. 1-Dec. 31	89	4	-	-	-
Guatemala	Nov. 16-Dec. 15	-	-	-	2	-
Honduras	Nov. 16-Dec. 31	-	-	-	2	-
Mexico	Nov. 1-Dec. 15	-	-	-	2	-
Paraguay	Dec. 1-15	-	-	1	-	-
Peru	Nov. 16-Dec. 31	6	3	-	-	-
Venezuela	Sept. 1-Dec. 31	8	1	-	4	-

Epidemiological Notes:

Bolivia ... Foot-and-Mouth Disease appeared during 1971 in seven out of the nine districts of the country, at different times, with the exception of the district of Cochabamba, in which it appeared simultaneously with other districts. The majority of the outbreaks did not proliferate, and were controlled with pertinent health measures and with the inclusion in the vaccine or subtype O₁ virus. This subtype caused the outbreaks.

In 1972, foot-and-mouth disease affected another district, Tarija, where the disease was absent since 1946. Subtype O₁ virus was identified. In August, a new outbreak appeared in the district of Cochabamba. The virus which caused this outbreak was identified as type A, and the subtype is still under study.

Mexico ... Vesicular Stomatitis affected 240 bovines.

Peru ... Foot-and-mouth disease affected 56 bovines and 45 swine. The subtype O₁ virus was identified on November 2, on two premises. Out of a total number of 2113 cattle - from five farms - 56 were registered as affected and slaughtered in the neighboring slaughterhouse.

Argentina ... Due to a foot-and-mouth disease focus detected in the locality Colonia Sarmiento (Province of Chubut), declared free of the disease since June 11, 1969, according to the requirements of the 6th article of the International Zoosanitary Code of the International Office of Epizootics, on the 22nd of this month, all the susceptible animals in the above mentioned zone, healthy and ill, were slaughtered, according to the 6th article of the mentioned Code. Virus type O₁ was detected.

* Adapted from Pan-American Foot-and-Mouth Disease Center, Epidemiological Reports Vol. 4, Nos. 22-24, November 16-30, December 1-15, and 16-31, 1972, and Vol. 5, No. 1, January 1-15, 1973.

HOG CHOLERA PROGRAM STATUS

Program Status ... Since July 1, 1972, the number of "hog cholera free" States dropped from 46 to 39, with the following States losing their "free" status on the dates indicated: Nebraska (Aug. 21), Kentucky (Sept. 8), Indiana (Sept. 14), Ohio (Sept. 14), Tennessee (Oct. 2), Georgia (Oct. 18), and Virginia (Jan. 10, 1973). States can regain "free" status after 6 months with no infection. New Jersey dropped from Phase IV to Phase III (Dec. 1).

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HOG CHOLERA SEED VIRUS RECALLED

By December 1, 1972, all hog cholera seed virus vaccine had been recalled from commercial companies for storage under the supervision of the USDA's Veterinary Biologics Inspection, Ames, Iowa. Plans call for retention of this material for 3 years after which a decision will be made concerning final disposition. Based on recommendations of USAHA and the Secretary's Advisory Committee on Hog Cholera, with concurrence of States, the issuing of joint State-Federal hold orders when infected or exposed swine are found moving through markets is now being implemented. The aim is to stop further movement in the States involved until tracebacks are completed.

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AFRICAN SWINE FEVER - HEMADSORPTION TEST

A diagnostician of the State Diagnostic Laboratory, Elba, Alabama, attended recently the African Swine Fever Short Course at Plum Island Animal Disease Laboratory, Greenport, Long Island, New York.

During this time, he received instruction in conducting the hemadsorption test for African swine fever (ASF).

Recently the Alabama State Department of Agriculture and Industries purchased the necessary equipment and hired the additional help to assist in conducting the hemadsorption test along with other diagnostic work at the Elba Laboratory.

Arrangements have been made with the other State Diagnostic Laboratories at Albertville and Auburn to furnish all swine spleens submitted primarily on hog cholera investigations to the Elba Laboratory for the ASF hemadsorption test. During the month of December 1972, 18 spleens were tested by the hemadsorption test for ASF with negative results.