Trichinosis Control and Vesicular Exanthema

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TRICHINOSIS, a parasitic disease of animals and man, is a public health problem in the United States. Apparently, it is more serious here than in any other country in the world.

The evidence upon which these statements are based has been in the literature for over a decade and a half (*1–3*). Although there is still no known specific treatment for this disease in either man or animals, there are practicable preventive measures. Yet in the United States relatively little has been accomplished in the application of these measures and in the breaking of the trichinosis cycle, with the exception of Federal meat inspection procedures to control the processing of pork to be eaten without cooking.

In the late 1930's and early 1940's, studies by Gould (*4*), Hall (*3*), Sawitz (*5*), and Wright (*6*) indicated that 1 out of every 6 persons in the United States was infected to some extent with the parasite *Trichinella spiralis*. Wright and his associates, on the basis of the studies at the National Institutes of Health, estimated that 4.5 percent of the number infected had sufficiently heavy infections to have developed clinical symptoms (*6*). If these figures could be assumed to be applicable to the present population, it would mean that millions of Americans alive today have been infected to some extent with the parasite, and it seems probable that many of these persons have had clinical symptoms. Further, on the basis of the aforementioned studies the number of cases expected annually would be several thousands.

Although trichinosis is a reportable disease in 44 States, the disease is seldom diagnosed clinically, and infections other than those in epidemic form are usually unrecognized. The fact that for the 10-year period, 1942 through 1951, an average of only 336 cases was reported annually to the Public Health Service illustrates this point. According to unpublished records, at least 1 epidemic occurred during this period which involved over 300 cases of trichinosis, and in this instance the disease was not diagnosed until some 24 days after the first symptoms were reported.

The practice of feeding raw or untreated garbage is known to be of primary importance in the spread of trichinae among swine. Schwartz (*7*) reports an incidence of trichinae in raw-garbage-fed hogs about five times as great as that in so-called grain-fed hogs. The consumption of raw, untreated, or inadequately cooked pork from garbage-fed hogs, furthermore, is considered primarily responsible for the high incidence of *Trichinella spiralis* in man (*8, 9*). In both England and Canada, the sterilization of all garbage fed to swine has been

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required by law for many years, and in both of these countries the incidence of trichinosis is relatively low.

Vesicular Exanthema Epidemic

The recent nationwide epidemic of vesicular exanthema, a virus disease in swine, has focused new attention in this country on the dangers of feeding raw garbage to swine. As a result of this epidemic, there are indications of strong support among the swine industry and the agricultural agencies for the elimination of feeding raw garbage.

On June 16, 1952, vesicular exanthema was detected among swine at a hog-cholera serum plant in Nebraska, and within 8 months infected swine had been found in 36 States scattered throughout the Nation. Epizootiological investigations by the U. S. Department of Agriculture and the various State agencies concerned indicated the possibility that garbage containing infected pork scraps had been fed raw to swine at a farm in Wyoming, and that contaminated swine from this State and from Nebraska had been shipped to other areas of the country before the disease was recognized. Most of the outbreaks in the other States were also identified with establishments where garbage was fed raw to swine, and the probable vehicle of infection was found to be contaminated pork scraps in the garbage.

Vesicular exanthema, though not transmissible to man and therefore not of direct public health significance, has serious economic and agricultural implications. The U. S. Department of Agriculture reported on February 7, 1953, that since the beginning of the epidemic 100,801 animals in 32 of the States involved had been disposed of by burial or special processing, and that 44,821 animals are awaiting disposal. It is evident, therefore, that the losses to swine raisers and allied industries and the costs to State and Federal governments for indemnities will be many millions of dollars. And to these must be added the costs of disinfecting plants, stockyards, and railway stock cars, of supervising disinfection, and other similar expenses, as well as losses resulting from restraint of livestock movement as a result of quarantines.

An additional concern to agricultural authorities is the fact that the symptoms of vesicular exanthema in swine are almost identical to those of foot-and-mouth disease. The control of foot-and-mouth disease depends so much on prompt diagnosis, slaughter of the infected herd with burial on the premises, and thorough disinfection of the entire area and plant that any delay in diagnosis of vesicular disease could well be disastrous to the livestock industry of the Nation.

Public Health Considerations

Thus, since disinfection of garbage fed to swine is of major importance in the eradication of both trichinosis and vesicular exanthema, combining the public health concern over trichinosis with the agricultural and economic concern over vesicular exanthema is a logical and necessary step. In addition to the public health worker's concern with trichinosis control, he is concerned with sanitary disposal of community solid wastes. For example, in some areas where the practice of feeding garbage to swine was discontinued during the epidemic, the garbage was disposed of by dumping it into a convenient river, thus creating a water pollution problem. Also, of course, he is concerned with such problems of hog farm sanitation as insect and rodent control and nuisance abatement.

Probably the best disease control measure, as well as sanitation measure, would be the discontinuance of raising swine on garbage and the disposal of garbage in incinerators or sanitary landfills or the utilization of it as dried feed or fertilizer compost. However, it is estimated that about 1,500,000 hogs are raised annually in the United States either wholly or partly on commercial garbage. Although they represent less than 2 percent of the hog population in this country, the shift away from garbage feeding would have an obvious economic impact. Until such a step is taken, therefore, the next best solution appears to be disinfection of garbage before it is fed to swine.

The Public Health Service's part in the regulation of garbage-feeding practices concerns primarily the interstate shipment of garbage. In 1941, an Interstate Quarantine Regulation

(section 72.23, 1947 revision) was issued, requiring that any garbage shipped or transported across State lines must be heated to 212° F. for 30 minutes before being fed to swine. Prior to the 1952 outbreak of vesicular exanthema, seven of the States and the Territory of Hawaii had similar regulations. Since the outbreak 9 States and Alaska have adopted regulations and/or legislation requiring heat-treatment of garbage used for swine feed, and at least 28 other States have either introduced similar measures in their legislatures or are preparing to do so.

USDA–PHS Control Measures

Recognizing the importance of the public health worker's role in the sanitary disposal of garbage, the U. S. Department of Agriculture last year requested the assistance of the Public Health Service in its vesicular exanthema eradication program. The Department urged the Federal Security Administrator to take emergency measures to insure enforcement of the Interstate Quarantine Regulation concerning garbage and expressed the hope that the Public Health Service would take appropriate steps to stimulate and assist State programs requiring disinfection of garbage fed to swine.

In accordance with the pursuant understanding, the U. S. Department of Agriculture has been concerned primarily with measures designed to arrest the current outbreak of vesicular exanthema. These include supervision of disinfection of contaminated yards, pens, and railway stock cars; quarantine of affected areas; and a program for disposal of and indemnity for condemned swine, and the cleaning and disinfection of infected premises.

Both the Department and the Service have, of course, been interested in the development of State programs for controlling the feeding of raw garbage to swine. In view of the lack of published information on methodology of disinfecting garbage, they worked together in compiling and publishing a summary of all available material on the subject (*10*). This activity pointed out the need for further research concerning heat-treatment systems, equipment, economics, and related time-thermal characteristics required for disinfection. Iowa State College has recently applied for a Public Health Service grant to study time-temperature requirements for effective disinfection of garbage in relation to various methods of heat treatment.

The Public Health Service has also been cooperating in the vesicular exanthema eradication program through more effective control over the interstate shipment of raw garbage. In August 1952, the Federal Security Agency regional offices were requested to determine the extent of current violations of the Interstate Quarantine Regulation concerning garbage. These regional surveys have resulted in considerable program progress in certain major metropolitan areas and in a number of border areas where interstate shipment of raw garbage has been practiced.

Intrastate Regulation

Intrastate as well as interstate regulation of garbage-feeding practices is essential if the spread of garbage-borne diseases is to be controlled. In many States, disinfection of garbage is still not required, and many of the existing programs need strengthening.

A logical first step in developing intrastate control programs is a survey of garbage collection and disposal practices in each State. A basic data form (PHS Form 1764) has been developed by the Public Health Service for use in such surveys and has been made available to the States. Use of this form will permit collection of comparable data and, with the cooperation of State and local health departments, it should be possible to develop a nationwide inventory of practices. Such data should facilitate practicable planning of control efforts locally as well as in the States and for the Nation as a whole.

A second important step is the enactment of State legislation requiring the disinfection of all garbage used for swine feed and proper sanitation of hog farms. A suggested guide for such legislation, based on present regulations and experience in various States, has been prepared by the U. S. Department of Agricul-

ture and the Public Health Service. This guide is available through the Federal Security Agency regional offices. It provides technical data which will aid the States in developing legislation that is not only legally sound but also practical. For example, it is usually more practical to require treatment of garbage at the feeding farm than at its source; also, the requirement of a license or a permit has been found to be the most practical method of administering a program.

Although disinfection of garbage is the prime factor in the control of trichinosis and vesicular exanthema, the complete sanitation of the establishment involved should be given serious and continued consideration in any State control program. Sanitary solid waste disposal includes not only the disinfection of the potential vector of disease, but also the handling of the media so as to minimize insect and rodent breeding and to prevent water pollution. Nuisance abatement is also a factor and should be taken into account.

For many years, community solid waste problems have been more or less neglected by health workers, but the fact that these problems have serious health implications is now receiving increasing recognition. The recent vesicular exanthema outbreak has underscored the epidemic possibilities of one improper method of garbage disposal and has provided support for trichinosis control efforts. The time is appropriate for a vigorous nationwide program for proper treatment or disposal of garbage to control disease and to improve sanitation.

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