EFFECTS OF FEEDING ANIMALS WITH TRICHINOUS MEAT CONTAINING NONVIABLE TRICHINAE

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INTRODUCTION

In the extensive literature on trichinosis there appears to be no records of experiments dealing primarily with the effects produced by the ingestion of meat containing nonviable trichinae. Various workers have assumed, without adequate experimental evidence, that meat containing nonviable trichinae is innocuous in so far as the production of any of the symptoms that characterize trichinosis is concerned. Flury in 1913, found that apart from the mechanical injuries caused by living trichinae in the host animal, the products formed as a result of their metabolic activities coincident with their growth and development in the host, as well as the products formed as a result of the degeneration of the muscles which they invade, are highly toxic to animals when injected parenterally. Flury, in fact, has explained the entire symptom complex of trichinosis, such as the gastric and intestinal disturbances, vomiting, local irritation, muscle stiffness, capillary hemorrhages, edema, blood changes, fever, and respiratory difficulties, as the result of (1) the toxic substances produced by the parasites, and (2) the degeneration products of the muscles which they invade. His careful studies, involving numerous experiments with various extracts of trichinous muscles, as well as the evidence furnished by various investigators regarding the toxicity of nematodes in general, naturally suggest the possibility that dead trichinae may also be injurious because of the liberation of possible toxic products as a result of their digestion, and that the ingestion of trichinous meat containing nonviable trichinae may give rise to at least some of the symptoms of trichinosis or to other unpleasant symptoms.

In order to determine the effects produced on animals by meat containing nonviable trichinae, several experiments were performed in which such meat was used. On account of their marked susceptibility to trichinosis, rats were chosen for the tests. Rats are likely to show severe symptoms not only after the parasites become established in the muscles but also during the intestinal stage, and usually die at this early stage of the disease even when they are fed very small quantities of heavily infested trichinous meat. Since rats frequently die of trichinosis before the larvae have begun to migrate, it may be assumed that death is due, in all probability, to a severe intoxication, coincident with the rapid growth and development of the parasites in the intestine, other probable contributory

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factors being the effects of the severe irritation to the intestinal mucosa as a result of the rather deep penetration of the worms into the intestinal wall. If toxic substances are present in cooked and refrigerated trichinous meat in a state in which they are still capable of deleteriously affecting susceptible animals, the evidence of such toxicity should be demonstrable by feeding the meat to rats.

EXPERIMENTS

SERIES I

Meat from a trichinous rabbit, containing viable encapsuled worms, was gradually heated in water until the latter began to boil. Liberal portions of this meat were fed to each of six rats on August 16, 18, and 19, 1924. The animals devoured it readily. No symptoms developed as a result of the experiment, the animals continuing to eat the usual oat ration and exhibiting their normal activities for several months.

SERIES II

Trichinous pork that was very heavily infested was refrigerated for a period of 25 days at a temperature below 5° F., a procedure which is destructive to the vitality of trichinae. Liberal portions of this pork selected from parts of the carcass that were known to be heavily parasitized, namely, the diaphragm and the intercostal muscles, were fed to a series of 12 rats on December 3, 4, 6, 9, and 12, 1924. The rats showed no evidence of discomfort. They were kept alive on their usual ration for several months after the experimental feedings and continued throughout this period in apparent good health.

SERIES III

Liberal portions of cooked trichinous pork from a heavily infested hog were fed to 6 rats on January 10, 13, 19, 21, and 24, 1925. A sufficient quantity of meat was given each time to last from two to three days. All the meat given was consumed. No ill effects were observed, the animals continuing in good health for about two months after the experiments. Subsequently they were used in other experiments.

SERIES IV

The same animals that were used in Series III were fed trichinous pork refrigerated as described in connection with Series II. The rats were fed as follows: February 9, 1925, meat enough to last three days; March 6, 1925, enough to last two days; March 14, 1925, enough to last three days. The animals consumed all the meat that they were given and showed no ill effects. They were apparently in perfect health on May 25, 1925, on which date they were used in other experiments.

SERIES V

Three dogs and three cats were fed liberal portions of refrigerated trichinous pork, prepared in accordance with the method described in connection with the experiments in Series II. Sufficient meat was given each time to last from two to three days, no other feed being given during that period. The animals were fed on the follow-
ing dates: January 2, 4, 7, and 9, 1925. No ill effects were observed in these animals during the period of several weeks in which they were under observation.

DISCUSSION

On the basis of experiments described in this paper, in which relatively large quantities of meat containing nonviable trichinae were fed to animals with consistently negative results, it may be concluded that neither the dead trichinae themselves nor the muscles in which they were are encysted are injurious when ingested by animals susceptible to trichinosis, namely, rats, dogs, and cats. There is no reason to doubt the view that susceptible animals other than those used in these experiments, including human beings, would likewise be unaffected as a result of the ingestion of cooked trichinous meat or of trichinous meat refrigerated sufficiently to destroy the vitality of trichinae. If toxic substances are present in encapsuled trichinae and in the muscles in which they are lodged, these substances are either destroyed in the process of cooking and refrigeration or are broken down or neutralized in the course of digestion before they can exert deleterious effects on test animals.

The experiments described in this paper are in agreement with the commonly accepted view that after trichinous meat has been cooked sufficiently, refrigerated sufficiently, or treated by some other method known to destroy the vitality of trichinae, it is no longer capable of producing the symptoms characteristic of trichinosis. These experiments are useful in supplying an experimental verification of a view that has been commonly accepted on the basis of belief rather than on the basis of experimental proof.

SUMMARY

Rats, dogs, and cats were found to be tolerant of heavy doses of meat containing nonviable trichinae, exhibiting no ill effects as a result of repeated ingestion of such meat. These observations are in harmony with the generally accepted view that pork in which trichinae have been destroyed by cooking or by some other method known to devitalize trichinae will not produce any of the symptoms characteristic of trichinosis or other harmful effects.