

DOG OWNERS AND HYDATID DISEASE IN SANPETE COUNTY, UTAH¹

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ABSTRACT.— A questionnaire survey was conducted in Sanpete County, Utah, to determine the knowledge of dog owners concerning hydatid disease and an identification of some basic sheep management practices there. The households surveyed included 21 (Group I) that had one or more dogs infected with *Echinococcus granulosus* tapeworms at more than one annual field clinic, and 19 others (Group II) that had one or more dogs infected when the study first began in 1971–72, but had not had any infected dogs identified at field clinics during subsequent years. The results showed that 92.5 percent of households knew the cause of the disease and how it is transmitted, and that 90 percent knew of someone who had been operated on for surgical removal of hydatid cysts. There was no significant difference in the level of knowledge of the disease between the two groups of respondents, nor in their sheep management practices. Even though the level of infection of the parasite in dogs has decreased since the project started, certain sheep management practices persist among respondents in both groups that allow for continued transmission of the parasite in this region.

Hydatid disease is an infection of people, sheep, and some other animals that produces fluid-filled (hydatid) cysts in the liver, lungs,

or other organs (Fig. 1). The cysts are the larval (immature) forms of a tapeworm parasite, *Echinococcus granulosus* (Fig. 2), which lives



Fig. 1. Fluid-filled hydatid cysts in the livers and lungs of infected sheep.

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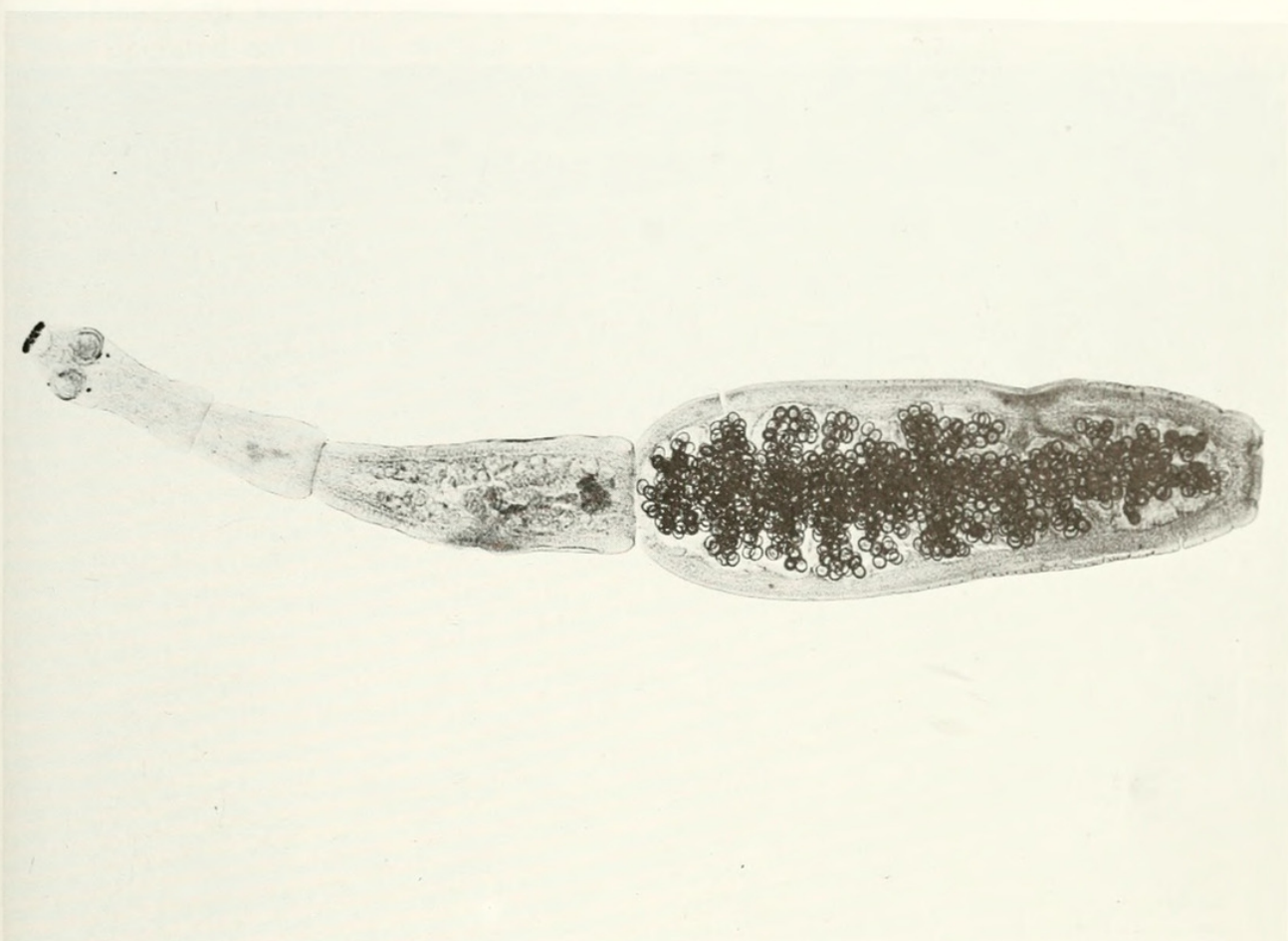


Fig. 2. The adult tapeworm, *Echinococcus granulosus* (approximately 5-6 mm in length), removed from the small intestine of an infected dog.

as an adult in the small intestine of dogs. People and sheep contract the hydatid cysts when they inadvertently ingest the tapeworm eggs passed in the stools of infected dogs. This may occur when people handle dogs that harbor the parasite, and when sheep graze on contaminated pastures. Dogs become infected with the tapeworm when they ingest hydatid cysts in the viscera of sheep. The parasite occurs throughout the world wherever dogs, sheep, and other suitable animal hosts are kept together. The common practice among sheep ranchers of allowing dogs to eat the uncooked viscera of home-killed sheep provides optimum conditions for continued transmission.

In the United States, transmission of *Echinococcus granulosus* in the dog-sheep cycle is known to occur in several western states, including California (Araujo et al. 1975), Arizona and New Mexico (Schantz 1977), and Utah (Spruance et al. 1974). The most serious problem is in Utah, where nearly 50 human

cases have been diagnosed since 1944. Several of these cases were fatal, and most of the others have required surgical removal of the hydatid cysts. Many of the victims were residents of Sanpete County, which is in the central part of the state.

Since 1971 hydatid disease has been studied and control measures initiated through the combined efforts of Brigham Young University (Provo, Utah), the Utah State Departments of Health and Agriculture (Salt Lake City, Utah), and the Center for Disease Control (Atlanta, Georgia). These measures have included (1) the development and distribution of educational displays and brochures on the life cycle of the hydatid tapeworm, (2) the development of adequate methods for disposal of sheep carcasses at community dumping grounds, (3) the periodic holding of public health clinics to detect new cases of human infection, and (4) annual field clinics to detect new or persistent cases of infected dogs (Fig. 3). Following the implementation



Fig. 3. Sheep dogs from Sanpete County restrained at field clinic during examination for detection of *Echinococcus granulosus* tapeworms.

of these control measures, the number of dogs found infected at the field clinics has decreased from 27 percent in 1971 (Loveless et al. 1978) to 14 percent in 1978 (unpublished ms.). Most sheep ranchers have shown a cooperative attitude with regard to proper disposal of sheep carcasses or viscera. Certain individuals, however, have not been successful in preventing reinfection of their dogs as evidenced by the fact that some of their dogs were found repeatedly infected on numerous occasions. We believed that if the reasons could be determined why some dog owners were unable or unwilling to comply with the recommended preventive measures, it might be possible to change or modify the recommendations to obtain more cooperation, and ultimately an improved control program.

MATERIALS AND METHODS

A questionnaire survey was conducted of the owners of dogs that had been found to be

infected in Sanpete County. The survey included 40 households, 21 of which had one or more dogs found infected at more than one annual clinic (Group I) and 19 others that had one or more dogs infected only at either the first or second annual clinic (1971 or 1972), but did not have infected dogs at subsequent clinics (Group II). During the visits, questions were asked about dog-feeding practices, dog control, sheep-killing procedures, and knowledge of the life cycle and control of hydatid disease.

RESULTS

What emerged from our study may be considered a general description of the habits and practices of dog owners that tend to maintain the cycle of hydatid disease in Sanpete County. Each household selected had both sheep and dogs. The average number of dogs per household was 2.5 and the average flock size was approximately 1000. We found that nearly everyone was aware of the dis-

ease. Persons interviewed in 90 percent of the households knew of someone who had been operated on for the disease. This was usually someone from the same town, and in 10 households (25.0 percent) the victim known was a member of the nuclear or extended family. Moreover, persons interviewed in 92.5 percent of households knew the cause of the disease and how it is transmitted. Specifically, they knew that people become infected with hydatid cysts by ingesting eggs passed in the feces of infected dogs, and that dogs become infected with the hydatid worms by ingesting the cysts in the lungs and livers of sheep.

More than four-fifths of the households indicated they sometimes killed and butchered sheep on their premises or in the fields. Despite their awareness and understanding of how hydatid disease is transmitted, nearly two-thirds admitted their dogs had access to the sheep-killing area, and nearly half said the dogs sometimes ate part of the sheep carcass.

The main diet of dogs in more than 85 percent of households was commercial dog food, and in none was the main diet reported as sheep muscle or organ meat. Nevertheless, it was clear that most dogs could possibly eat sheep at least occasionally, since in two-thirds of households dogs were allowed to roam free, and, therefore could scavenge on sheep carcasses at the town dump or in the fields. Less than one-third of households regularly tied or locked up their dogs when the dogs were not working.

Persons interviewed at more than 80 percent of households indicated they believed that the recommended control measures were adequate to break the chain of transmission and eliminate the infection. Persons at only 6 (15 percent) of households indicated they had taken no active measures to eliminate the infection. At the 34 households that indicated they had done something, the most frequently mentioned steps taken were (1) periodic treating of dogs for tapeworms, and (2) discarding of viscera from home-killed sheep in such a way that dogs could not get to it. Four households indicated they no longer had dogs because of the potential of contracting hydatid disease. There was a general consensus (82.5 percent) that government authority

should not make it illegal for dogs to eat parts of the sheep carcass.

When the households were categorized according to whether their dogs had been found infected at only one of the first clinics or whether their dogs had been found repeatedly infected, there were no obvious differences that would allow us to conclude why the first group of households was apparently successful in preventing reinfection. There were no statistically significant differences in the two groups regarding the number of dogs or sheep they owned, the frequency that sheep were butchered for home consumption, the apparent access of dogs to sheep viscera, the household members' knowledge and understanding of hydatid disease, nor willingness to take measures to prevent the infection in the dogs. In fact, the responses to our questions appeared to suggest that dog owners with repeatedly infected dogs were more likely to have tied their dogs up when not working and to have taken other deliberate measures to prevent their dogs from eating parts of the sheep carcass. This apparent anomaly is most likely explained by the fact that owners of repeatedly infected dogs had more recently been made aware of what they should be doing to prevent infection than the other group of dog owners whose dogs had been given a "clean bill of health" at the most recent dog clinics.

In summary, we did not learn from our study why some dog-owning households were successful in preventing reinfection of their dogs and why others were not. What was clear, however, was that numerous opportunities still existed at these households for dogs to become infected with hydatid tapeworms. As a result of health education and other control activities, virtually all the Sanpete County dog owners interviewed in our survey knew the basic facts about hydatid disease; however, few had actually taken all the necessary steps to insure its elimination. Evidence obtained from the survey suggests that many dog owners apparently believe that periodic treatment of dogs is sufficient to solve the problem; however, that may be an oversimplified solution. To effectively break the chain of transmission, all dogs must be prevented from eating the viscera of infected animals. This means not only that dog owners

must refrain from feeding such organs to their dogs, but, since dead sheep are frequently discarded in open pits and are accessible to roving dogs, dogs must be kept under control at all times. An additional feasible control measure would be the installation of large metal pit covers or sturdy fences at the animal pits in order to prevent ready access of roving dogs to animal carcasses discarded at those sites.

From its inception in 1971, the Hydatid Disease Control Program has been an entirely voluntary campaign. Results of this survey suggest that some additional incentives may be necessary to insure that all dog owners take the necessary steps to stop the transmission of hydatid disease.

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