



Trichinellosis in Argentina: An historical review

M. Ribicich^{a,*}, H.R. Gamble^b, A. Rosa^a, J. Bolpe^c, A. Franco^d

^a *Parasitología y Enfermedades Parasitarias. Facultad de Ciencias Veterinarias, Universidad de Buenos Aires, Chorroarín 280, C1427CWO Ciudad de Buenos Aires, Argentina*

^b *Animal Parasitic Diseases Laboratory, U.S. Department of Agriculture, Building 1040, BARC-East, Beltsville, MD 20705, USA*

^c *Departamento de Zoonosis Rurales, Ministerio de Salud, Provincia de Buenos Aires, España 770 (7300) Azul, Argentina*

^d *Salud Pública. Facultad de Ciencias Veterinarias, Universidad de Buenos Aires, Chorroarín 280, C1427CWO Ciudad de Buenos Aires, Argentina*

Abstract

In Argentina, *Trichinella* infection in pigs is endemic. The first report of human trichinellosis in Argentina was from 1898 in Buenos Aires. The number of human cases increased from 908, between 1971 and 1981, to 6919, between 1990 and 2002. In pigs slaughtered in official establishments, the prevalence of *Trichinella* infection was 0.46% in 1914 and 0.01–0.03% during the period 1990–2004. *T. spiralis* is typically found in the domestic cycle that includes pigs, humans and rodents. *Trichinella* spp. from a sylvatic cycle has also caused human outbreaks resulting from the consumption of meat from puma, armadillo and wild boar. European migration to Argentina (principally Spanish and Italian) during the first years of the 20th century brought the tradition of preparing and eating raw sausages. This increased the risk of human exposure to *Trichinella*. Detection in pigs was initially made at slaughter by compression of muscle tissue (trichinoscopy) and continued this way until 1996, when artificial digestion was adopted for use in preventing human trichinellosis in Argentina. The following report synthesizes the evolution of trichinellosis in Argentina over the past century.

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1. Introduction

Pig farming is mainly found in central Argentina which is comprised of Buenos Aires, Córdoba and Santa Fe provinces. These regions represent approximately 80% of the total national pig production. Pork is the most important source of human

trichinellosis in Argentina. In pigs slaughtered in official establishments, the prevalence of *Trichinella* infection is low, although outbreaks of trichinellosis have increased in recent years. Consumption of “chacinados” (sausage, or salami made with raw pork) without veterinary control, is a principle source of human infection.

As a result of an increase in human trichinellosis during the last decade, artificial digestion is now employed as the official control method in Argentina to improve the sensitivity for detection of *Trichinella*

* Corresponding author. Tel.: +54 11 45802820;
fax: +54 11 45802820.

E-mail address: mribicich@fvvet.uba.ar (M. Ribicich).

spiralis. Primary issues contributing to the increase in human trichinellosis over the past century in Argentina have been analyzed in the present report.

2. Materials and methods

Epidemiological data on human and animal trichinellosis collected over the course of the 20th century, were analyzed. Information was obtained from Epidemiological Bulletins edited by the Health Ministry and Yearbooks of the National Service of Animal Health (SENASA, 1972/1984) available in Argentina. Causative factors for human trichinellosis, the distribution of cases and the sources of this disease in humans and animals across Argentine provinces were analyzed.

3. Results

3.1. History, customs and folklore

The first report of human trichinellosis in Argentina was from 1898 when a family ate pork in Buenos Aires and then had symptoms consistent with trichinellosis. A portion of the meat consumed and eight dead rats trapped on the pig farm were analyzed and *Trichinella* larvae were found. Some days later, a man died in Buenos Aires and was misdiagnosed as having typhoid fever, like in other countries of the world (Campbell, 1983); a necropsy was performed and *Trichinella* larvae were found in his muscles. An epidemiological investigation showed that the man had eaten pork meat with the affected family. From this finding, in 1899, a relationship was established between rats and pigs and outbreaks of human trichinellosis in Argentina (Sanchez Moreno, 1916).

European migration to Argentina, during latter years of the 19th and first years of the 20th centuries, influenced the incidence of trichinellosis. Immigrants from countries like Spain, Italy, French, Poland, Russia, Yugoslavia, and the UK brought the tradition of preparing and eating raw pork. This transplantation of eating habits into an environment where *Trichinella* infection was endemic in pigs resulted in regular outbreaks of human trichinellosis.

Even in present day Argentina, the domestic slaughter of pigs without veterinary inspection is a widespread habit in the rural areas. Rural peoples take advantage of the winter season to produce handmade cold meats and sausages using pork from pigs raised locally. Low temperatures during the winter are important for meat handling and inhibit putrefaction and bacterial proliferation. These cold meats and sausages are preserved in dark, airy sheds and are consumed during the year. Argentine small farm operators are subject to constant market fluctuations, which impact their ability to survive. Therefore, food insurance, in the form of preserved meat, has a strong attraction in the rural economy, and domestic slaughter and production of “chacinados” are important contributions to the transmission of trichinellosis.

3.2. Humans

The consumption of locally produced pigs is linked to human outbreaks where such outbreaks occur more frequently during the winter season (Fig. 1). When human outbreaks occur, members of the family and their friends involved in the slaughter and processing of an infected pig are also likely to be affected, and additional cases in these outbreaks involve a close circle of people who live near the place where the infected pig was slaughtered.

Illegal butcheries where pigs are slaughtered without veterinary control increase the risk of human exposure to *Trichinella*. In Argentina, the occurrence of disease in man requires mandatory notification of health authorities according to the law (no: 15742); however, these records are incomplete, resulting from notification of fewer cases than the number actually diagnosed. Between 1960 and 1990, human disease was reported relatively infrequently. From 1990, the number of human cases increased significantly (Fig. 2) where the National Service of Epidemiological Vigilance (SINAVE) during 1990/1999 recorded 5217. There are significant variations among different provinces of Argentina. Initial records from the first years of the 20th century included reports from provinces of the northeast, central and southern regions of the country. However, at present the most affected areas are in the central region which includes Buenos Aires, Santa Fe y Córdoba (Fig. 3). These

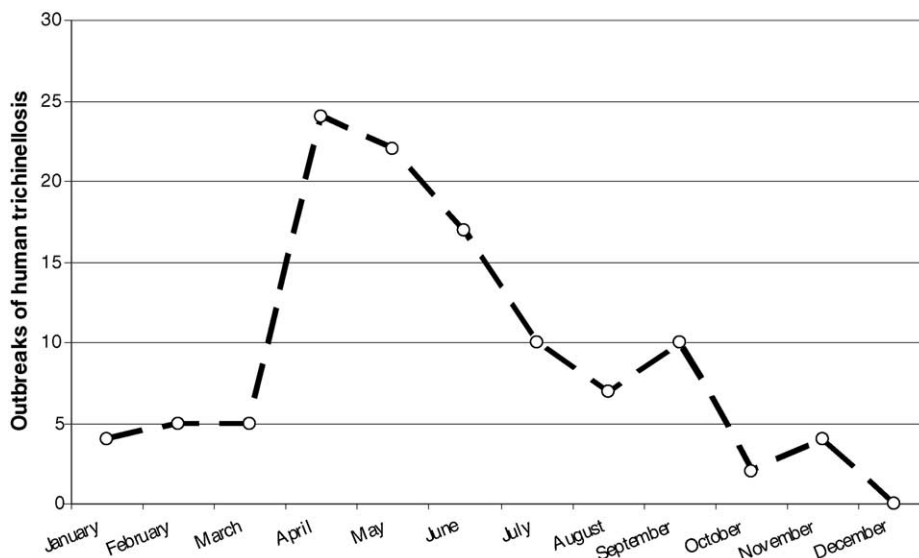


Fig. 1. Human outbreaks of trichinellosis by month in Argentina from 1986 to 2000.

provinces account for the vast majority (91%) of all human cases (Bolpe and Boffi, 2001).

3.3. Pigs

The incidence of trichinellosis in pigs from slaughter establishments in 1899 was found to be 2.5%. Based on this information (Table 1), a mandatory control program was implemented. Subsequently, the

incidence declined to 0.26% in 1913. Detection in pigs was initially made at slaughter by compression of muscle tissue (Sanchez Moreno, 1916). Sanitary officials introduced the trichinoscope method between 1944 and 1996. Artificial digestion was later adopted in all the Argentinean territories. Initially 2 g of diaphragm were used to determine parasite burdens in official establishments, but beginning in 1999, SENASA required the use of 5 g of muscle from each slaughtered

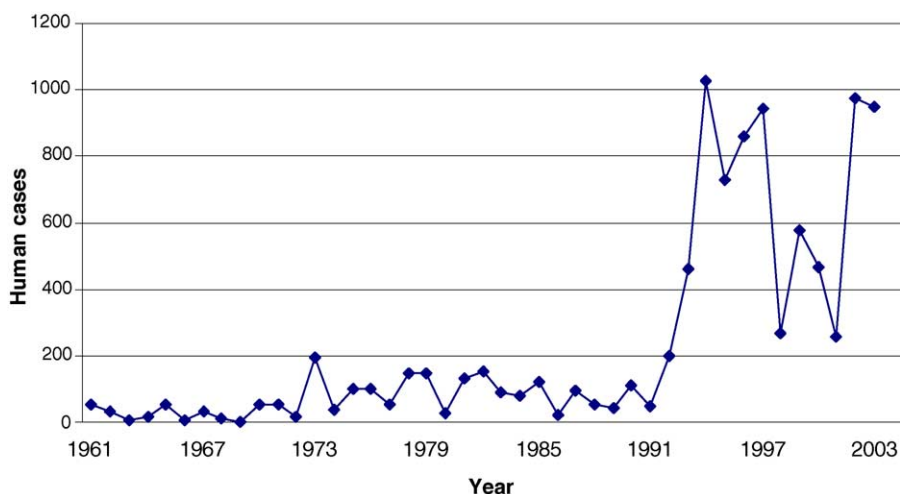


Fig. 2. Human cases of trichinellosis reported in Argentina, during the period 1961–2003.

Regions of Argentina

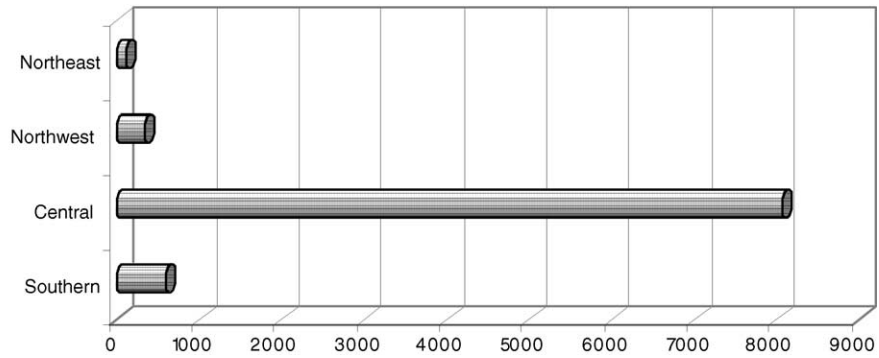


Fig. 3. Regions of Argentina where human trichinellosis occurred during the period of 1961–2003.

Table 1
Trichinella spiralis positive pigs slaughtered in Argentina during the period 1899–1983

Years	Pigs slaughtered	Positive <i>Trichinella spiralis</i>
1899	30757	210
1901	32720	536
1910	93659	111
1914	142614	664
1957	688577	75
1958	545856	3
1972/1983	23655484	228

At present, all slaughtered animals are subjected to artificial digestion and if any animal within a herd is found to be positive, all animals from the herd are seized and the farm of origin is depopulated. All these requirements are controlled by official organizations such as SENASA, Agricultural, Stockbreeding and Food Ministry, Health Ministry and local City Halls. Currently, pigs slaughtered in official slaughter establishments have a low prevalence of *Trichinella* infection (0.01–0.03%). However, there are also pigs being raised under poor hygienic and sanitary conditions and these animals may be sold into commerce without any sanitary control. It is likely that this practice is responsible for a number of trichinellosis cases (Fig. 4).

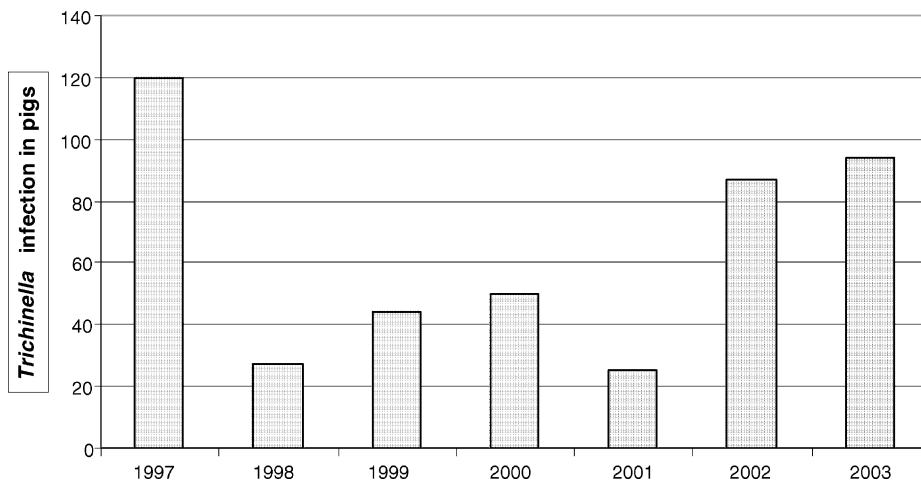


Fig. 4. Outbreaks of *Trichinella* infection in pigs in Argentina from 1997 to 2003.

3.4. Wildlife and horses

In Argentina, *Trichinella* infection has been detected in wild boar and armadillo (*Chaetophractus villosus*) (Tesón et al., 1997; Huici et al., 1999). A recent search was made in over 1000 rodents from Córdoba (Vazquez and Ugnia, 1999) and 500 rodents and 100 opossums from Buenos Aires provinces (unpublished data), where pig trichinellosis is common. All animals were analyzed by artificial digestion and found to be negative. Horses in Argentina are slaughtered only for export and artificial digestion is always performed. Until now, no horses have been found infected.

4. Discussion

When the first human outbreak of trichinellosis was reported, authorities carried out a control program for *Trichinella* in slaughter establishments. For this reason, the prevalence of the disease decreased significantly during the next 8 decades of the 20th century. However, in recent years the number of human cases has increased where Argentina has suffered substantial changes in economic policies resulting in unemployment rates of 17% by the end of 2001. This economic and social crisis had a direct impact on the prevalence of human and animal trichinellosis. Human cases of trichinellosis increased from about 50/year, in the 1950s, to 683/year over the last decade. In addition, animals raised under poor hygienic and sanitary conditions also contributed to a dramatic increase in the incidence of human trichinellosis between 1990 and 2003 (<http://www.direpi.vigia.org.ar/boletines>).

With the objective of controlling the increase in the incidence of human trichinellosis, methods for the detection of infection in pigs at slaughterhouses have undergone important changes. When artificial digestion was adopted in 1996, human outbreaks decreased markedly (Bolpe and Boffi, 2001) and the use of 5 g of tissue further increased the stringency of testing. In the Buenos Aires province during the last decade, government and private veterinarians have worked diligently to ensure privately slaughtered pigs are tested also. It was not uncommon to find high levels of *T. spiralis* muscle larvae in homemade ham and boston butt (Ribicich et al., 2001). Now, however, people have become accustomed to obtaining diaphragm tissue from

pigs and sending it to the nearest veterinary center for testing before consuming the pork with friends and families. In areas where positive pigs are found, sanitary authorities and health officials have begun to work together closely to prevent human trichinellosis by focusing on changing local habits associated with preparing and consuming pork that may result in occurrence of disease such as in the making of “Chacinados”, the principal meat dish involved in human outbreaks. In addition, it has become necessary to provide rural populations with the means to test and detect for *Trichinella* in locally raised animals.

Although the sylvatic cycle has also been implicated in some human outbreaks such as in the consumption of meat from puma, armadillo and wild boar, it remains a minor component of the etiology of human trichinellosis. In like manner, *Trichinella* has yet to be detected in over 2 million horses that were slaughtered in official establishments in Argentina from 1995 to 2004. Thus, it is unlikely that horsemeat which has caused human outbreaks in the European Union (Poizio et al., 1998; Boireau et al., 2000) is a source of infection in Argentina.

In conclusion, political and economic changes in Argentina over the last several years require that policies be put forth to advance the prevention and control of trichinellosis. These efforts should include (1) the dissemination of information to rural populations to prevent human disease without modifying cultural eating habits; (2) enacting more sensitive, on farm detection methods; (3) initiating policies to better control the commercialization of products and by-products of pigs.

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