

Towards an integrated approach for monitoring toxoplasmosis in southern Italy

Paola Pepe^{1,2}, Antonio Bosco^{1,2}, Giuseppe Mangieri^{1,2}, Federico Capuano³, Loredana Baldi³, Angela Giordano³, Andrea Mancusi³, Marialuisa Buonanno³, Luigi Morena⁴, Renato Pinto⁵, Paolo Sarnelli⁵, Giuseppe Cringoli^{1,2,4}, Laura Rinaldi^{1,2,4}

¹Department of Veterinary Medicine and Animal Production, University of Naples Federico II, Naples, Italy; ²Centro Regionale per il Monitoraggio delle Parassitosi (CREMOPAR), Eboli, Italy; ³Istituto Zooprofilattico Sperimentale del Mezzogiorno, Portici, Italy; ⁴Centro di Riferimento Regionale Sanità Animale (CReSan), Naples, Italy; ⁵UOD Prevenzione e Sanità Pubblica Veterinaria Regione Campania, Naples, Italy

INTRODUCTION

Toxoplasmosis, caused by the intracellular protozoan *Toxoplasma gondii*, is the most important food-borne parasitic zoonoses globally (Opsteegh et al., 2016 Final Report EFSA). Beyond its impact on public health, toxoplasmosis has also important veterinary implications, because it causes miscarriage or congenital malformations in livestock with negative economic impacts (Hill et al., 2015 Anim Health Res Rev. 6: 41-61). In order to reduce the spread of this infection, an integrated monitoring programme aimed to deepen the epidemiological data on toxoplasmosis and to identify the risk factors which may favour *T. gondii* infections in animals and humans was conducted in an endemic area of southern Italy (Campania region).

MATERIALS AND METHODS

The monitoring activities started in 2019 and were based on the following tasks: (i) serological analysis (ELISA) and risk factors for *T. gondii* in livestock (sheep, goats, cattle and water buffalo) farms; (ii) serological (ELISA on blood and meat juice) and molecular (RT-PCR) monitoring in meat-producing livestock during the slaughter's activities; (iii) outreach activities (information and dissemination) to farmers, vet practitioners and school-age children.



RESULTS

High seroprevalence of *T. gondii* infection were found in livestock farms (Tab 1). The risk factor analysis showed an association ($P < 0.05$) between the seropositivity to *T. gondii* and the "presence of outdoor cats" (in sheep and goats) and "abortion". The presence of "young animals" (in sheep) and "rodent control measures" (in cattle and water buffaloes) were associated with a low ($P < 0.05$) seropositivity to *T. gondii*.

The results of antibody detection using different matrices (serum, meat juice from myocardium and diaphragm) at slaughterhouse showed a very good ($\kappa > 0.8$) agreement between serum and meat juice from myocardium for all the animal species analysed. Very few samples (no. = 3 from myocardium of sheep and pigs) were found to be positive in RT-PCR, thus confirming the low sensitivity of molecular methods.

Table 1. Overall seroprevalence of toxoplasmosis at farm and animal level according to the animal species (sheep, goats, cattle, water buffaloes, cats).

Animal species	No. farms analysed	No. farms positive	Prevalence (%) (95%CI)	No. animals analysed	No. animals positive	Prevalence (%) (95%CI)
Sheep	29	27	93.1 (75.8 – 98.8)	390	221	56.7 (51.6 – 61.2)
Goats	26	21	80.8 (60.0 – 92.7)	241	114	47.3 (40.9 – 53.8)
Cattle	25	17	68.0 (46.4 – 84.3)	296	48	16.2 (12.3 – 21.0)
Water buffaloes	24	11	45.8 (26.2 – 66.8)	200	43	21.5 (16.1 – 28.0)
Cats*	-	-	-	304	298	98.0 (95.5 – 99.2)

*All cats resulted negative at copromicroscopic (FLOTAC) analysis.

CONCLUSIONS

The finding of this regional programme confirmed the spread of toxoplasmosis in southern Italy with high prevalence values, highlighting the potentially significant public health risk in this area and the need of valid control strategies based on a One Health approach.