

024

Risk factors for the occurrence of antibodies against *Toxoplasma gondii* in organic pig fattening farms in Austria and prospect for their control

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Introduction

In organic pig farms pigs are often exposed to various pathogenic agents that can cause important health problems and/or lead to zoonoses. One of these is the protozoan parasite *Toxoplasma (T.) gondii* that can infect humans by the incorporation of oocytes as well as by intake of raw or undercooked pork (Guo et al, 2016). Generally, the prevalence of antibodies against *T. gondii* in slaughter pigs is low (Steinparzer et al., 2015). In slaughter pigs raised on organic farms, however, the seroprevalence can be far higher (up to 50% of the farms) (Kreinöcker et al., 2017). The aims of the study were to identify risk factors for an infection with *T. gondii* in organic pig fattening farms, to develop strategies to control the infection and to test their efficacy.

Material and Methods

The study included 59 organic farms in Austria. A total of 1035 blood samples (approximately 17 per farm) were taken. All serum samples were tested for the presence of antibodies against *T. gondii* by ELISA (PIGTYPE® *Toxoplasma* Ab, INDICAL BIOSCIENCE, Germany). Additionally, on every farm a questionnaire including information about potential risk factors was completed. Through comparison of antibody positive and negative farms using Fisher’s exact test and an estimation of the odds ratio, risk factors have been identified. All farms that had raised *T. gondii* antibody positive slaughter pigs underwent a farm visit to identify potential possibilities to reduce risk factors. The influence of the elimination of one or more basic risk factors on the prevalence of *T. gondii* antibodies was assessed after one year by re-testing the farms by blood sampling the slaughter pigs.

Results

In 29 farms (49%) antibodies against *T. gondii* were detected. These results have been published in Kreinöcker et al. (2017). The presence of cats on the farms had a significant influence on the prevalence of antibodies; although most farms had cats and the odds ratio had a wide confidence interval. The age of the respective cats, however, as well as the fact that the cats had access to the barns and the pig feed, had a significant influence on the prevalence with a high odds ratio. Pigs raised in farms with cats aged younger than one year were significantly more likely to be *T. gondii* antibody positive. Other factors such as piglet quarantine, access of wild birds or dogs to the pig housing had no significant influence on the seroprevalence. One year after the recommendation to reduce the risk factors (especially to reduce the number of cats and keep them from pigs and feed) 23 of the positive farms were re-tested. Twelve farms (52%) remained *T. gondii* antibody positive. In eight of these farms, none of the recommended measures had been implemented. On the other eleven farms (48%), no *T. gondii* antibodies were detected in the sampled pigs. Most effective was keeping cats away from the pig feed, but the introduction of effective rodent control with the use of rodenticides or traps also helped to reduce *T. gondii* antibody prevalence. Detailed results have been published in Sattler et al. (2019).

Discussion and Conclusions

Organic pig farming enjoys increasing popularity among consumers. Because of regulatory demands, fattening pigs raised in organic farms have increased contact with pathogens and zoonotic agents, including *T. gondii*. By reducing risk factors through simple measures such as restricting the access of cats to pig barns and feed and removing younger cats from farms, the prevalence of antibodies against *T. gondii* could often be reduced.

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