

Helminth parasites in pigs: challenges and current research highlights

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Abstract

Helminths in pigs have generally received little attention from veterinary parasitologists, despite *Ascaris suum*, *Trichuris suis*, and *Oesophagostomum* sp. being common worldwide. The present paper presents challenges and current research highlights connected with these parasites.

In Danish swine herds, new indoor production systems may favour helminth transmission and growing knowledge on pasture survival and infectivity of *A. suum* and *T. suis* eggs indicates that they may constitute a serious threat to outdoor pig production. Furthermore, it is now evident that *A. suum* is zoonotic and the same may be true for *T. suis*. With these 'new' challenges and the economic impact of the infections, further research is warranted. Better understanding of host-parasite relationships and *A. suum* and *T. suis* egg ecology may also improve the understanding and control of human *A. lumbricoides* and *T. trichiura* infections.

The population dynamics of the three parasites are well documented and may be used to study phenomena, such as predisposition and worm aggregation. Furthermore, better methods to recover larvae have provided tools for quantifying parasite transmission. Thus, an on-going study using helminth naïve tracer pigs has surprisingly demonstrated that soil infectivity with *A. suum* and *T. suis* increases during the first 2-3 years after pasture contamination.

Though all three helminth species stimulate the Th2 arm of the immune system, *Oesophagostomum* seems weakly immunogenic, perhaps via specific modulation of the host immune system. *Ascaris suum* and *T. suis* potently modulate the host immune response, up-regulating Th2 and down-regulating Th1. As a consequence, *A. suum* may compromise the efficacy of certain bacterial vaccines, whereas *T. suis*, which establish only short-term in humans, is a favourite candidate for down-regulating autoimmune Th1-related diseases in man.

Some basic research findings have offered new possibilities for future sustainable control measures. For example, the heredity of host resistance to *A. suum* is so high that breeding for resistant pigs may be a possibility. Experimental studies have demonstrated that fermentable dietary carbohydrates have an antagonistic effect on *Oesophagostomum* and to a lesser extent on *T. suis* and *A. suum*, whereas egg-destroying microfungi may be used to inactivate the hard-shelled *A. suum* and *T. suis* eggs in the environment.

Helminth control in Denmark has previously relied solely on anthelmintic treatment in herds with low helminth transmission. When indoor transmission rates increase, or in

outdoor herds with high pasture contamination levels, medication may advantageously be combined with sustainable control measures, such as selected pig genomes, bioactive forages, and egg-destroying microfungi.