

Factors affecting wild rabbit (*Oryctolagus cuniculus*) parasite populations and the effect on their host

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Introduction

Investigations into the interactions between parasites and diseases within a wild host have received little attention and often assumed to be negligible. Similarly the impact of parasites and diseases on free ranging wild animals under field conditions have rarely been studied. Analysis of a unique, large long term data set (over 3000 rabbits collected monthly for 28 years) have given answers to some of the above questions. The rabbits were collected from a mixed marginal farm in eastern Scotland and the presence the viral disease myxomatosis (Fig. 1), the protozoan *Eimeria stiedae* (Fig. 2) and numbers of the nematode (*Graphidium strigosum*, *Trichostrongylus retortaeformis*, *Passalurus ambiguus* (Figs.3-5)) and cestode parasites (*Mosgovoyia pectinata*, *Cittotaenia denticulata* (Figs. 6-7)) were monitored.



Fig 1 Rabbit showing symptoms of myxomatosis

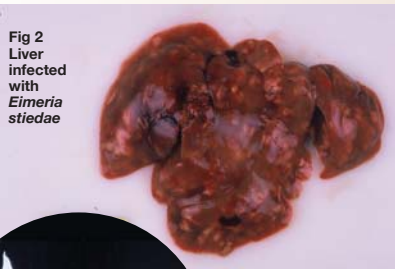


Fig 2 Liver infected with *Eimeria stiedae*

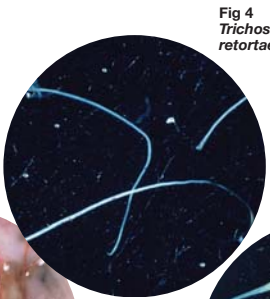


Fig 4 *Trichostrongylus retortaeformis*

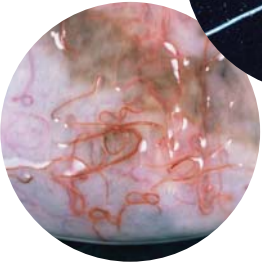


Fig 3 *Graphidium strigosum* (seen through stomach wall)



Fig 5 *Passalurus ambiguus*



Fig 6 *Mosgovoyia pectinata*



Fig 7 *Cittotaenia denticulata*

Results - Interactions between parasites

Rabbits with myxomatosis had significantly greater numbers of *G. ambiguus*, *T. retortaeformis* and *M. pectinata* than none infected rabbits. This was probably due to a breakdown in the host immune system in those rabbits with myxomatosis. The host's immune system has also been implicated in 1) the in the network of interactions between nematodes and cestodes (Fig. 8) (Lello et al., 2004), 2) the peak shift in *T. retortaeformis* infections which occurs in rabbits born at different times of the year (Cattadori et al., 2005) (Fig. 9), and 3) the differences in *T. retortaeformis* populations between male and female rabbits.

Fig 8 Relative positions of the rabbit gut helminths in the host gut, with interaction directions and strengths, based on observed mean burdens

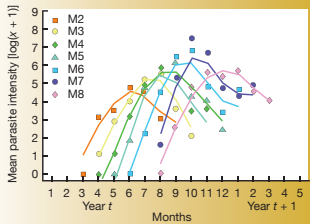
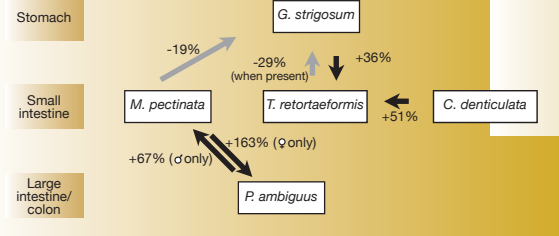
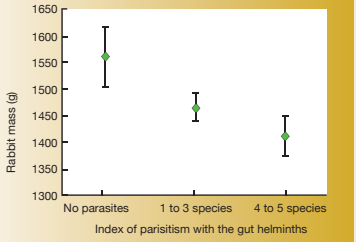


Fig 9 Host age-parasite intensity profiles for each cohort of individuals born from February (M2) to August (M8)

Results - Impact on the host

From the rabbits collected the negative impacts of myxomatosis, *E. stiedae* and the helminths on body mass were -4%, -5.6% and -9.2% (Fig. 10) respectively (Lello et al., 2005). The impact on the amount of abdominal fat, was even greater e.g. myxomatosis -56% and for rabbits harbouring 3 or fewer parasites -46%.

Fig 10 Effect of helminth parasitism on rabbit host total body mass



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Conclusions

Analyses of this large long term data set has elucidate relationships between parasite burdens and diseases within a wild free ranging host. It has also allowed the impact of these diseases and parasites on the host's condition to be quantified. Further research is now required to determine the effect of the parasites on rabbit fecundity and mortality.

References

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