

Control of *Echinococcus multilocularis* in urbanized areas

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Key words

Baiting Campaign, Deworming, *Echinococcus multilocularis*, Infection Pressure, Parasite Control, Urban Foxes

Aim of the study (Formatvorlage Überschrift 2)

Development of practical control strategies to reduce the infection pressure of *Echinococcus multilocularis*.

Material and methods

In the periphery of Zürich, 6 baiting plots (total area ~35 km²) and 3 untreated control plots were defined to investigate the effect of the regular delivery of Praziquantel®-containing baits on the occurrence of *E. multilocularis* (baiting regime: 50 baits/km²*month, Dec. 2007 to June 2010). The effect was quantified by measuring the proportion of fox faeces positive for *E. multilocularis* coproantigens (ELISA) throughout the study (sampling: Jul.-Nov. from 2007-2011). To test the practical feasibility of a cost efficient large-scale application, baits were delivered by field worker who worked in the framework of a social welfare program. The registered expensed were used to for cost benefit analyses of different baiting scenarios. With the aim to find seasonally optimised baiting strategies, the seasonal transmission dynamic of *E. multilocularis* was investigated by analysing the temporal prevalence patterns in the intermediate host *Arvicola terrestris*. Furthermore, the species specificity of different bait delivery methods were compared by means of camera traps.

Results and significance

Before treatment, the proportion of coproantigen positive faeces did not differ between baited (26%, 95%-CI:23-29) and control areas (25%, 22-29). During the baiting period these values decreased significantly in the baited areas to 14% (12-16) in 2008 and 11% in 2009 (9-13), and increased again to the precontrol level already in 2010 (23%, 20-26) and to 28% (24-33) in 2011. In the control areas this measure for the environmental contamination remained on the same level throughout the study (mean 23%, 21-25). Although the delivery of baits reduced *E. multilocularis*, the effect was less pronounced than in preceding field trials (Hegglin & Deplazes 2008). Possibly it is challenging to ensure a very strict compliance to a required baiting regime in practice, which probably is a crucial factor for an efficient baiting strategy. Our epidemiological investigations revealed that the parasite transmission is most intense during winter (Burlet et al. 2011). Therefore a strict baiting regime during this period is of special importance. Furthermore it has been shown, that baiting specificity in urban areas can be increased when baits are placed on elevated structures which are less accessible to bait competitors. Cost-benefit analyses have shown that it is most efficient to control *E. multilocularis* in high endemic areas with a high human population density. Considering the long latency of human alveolar echinococcosis, it needs several decades until saved medical cost outweigh baiting program costs (e.g. 35 years in a city with 400'000 inhabitants). Depending on the scenario, the calculated baiting costs per inhabitant sum up to 3-28 Fr. during the first 10 years of treatment (Hegglin & Deplazes, subm).

Publications, posters and presentations

Hegglin A, Deplazes P. (submitted). "Control of *Echinococcus multilocularis*: strategies, feasibility and cost-benefit analyses". Manuscript attached.

Burlet P, Deplazes P, Hegglin D. 2011. "Age, season and spatio-temporal factors affecting the prevalence of *Echinococcus multilocularis* and *Taenia taeniaeformis* in *Arvicola terrestris*." Parasites & Vectors 4:6.

Burlet P, Deplazes P, Hegglin D. 2010. "Efficient Age Determination: How freezing affects eye lens weight of the small rodent species *Arvicola terrestris*." European Journal of Wildlife Research 56:685-688.

Hegglin D, Deplazes P. 2008. "Control Strategy for *Echinococcus multilocularis*." Emerging Infectious Diseases 14: 1626-1628.

Project 1.07.04

Project duration February 2007 – September 2012