Evaluation of imidacloprid for the treatment and prevention of cat flea (Ctenocephalides felis felis) infestations on rabbits

M. J. Hutchinson, D. E. Jacobs, G. D. Bell, N. Mencke

RABBITS are increasing in popularity as house pets in Europe and North America. They are vulnerable to infestation with the cat flea (Ctenocephalides felis felis) if kept in an environment contaminated with off-host developmental stages of this parasite. C. felis is commonly found on both cats and dogs (Rust and Dryden 1997). Eggs laid in the pelage soon fall to the ground and become widely disseminated throughout the home, thereby providing a reservoir of developing eggs, larvae, pupae and newly emerged host-seeking adults (Robinson 1995). Flea populations on pet rabbits are usually modest in number but may be a source of irritation to their host and a concern to humans (Timm 1988).

Few animal health products are specifically licensed for use on rabbits. Caution is needed when extrapolating from recommendations designed for the cat or dog as differences in drug distribution and metabolism may influence efficacy or safety. Also, rabbits obviously differ with regard to skin and hair type. It is therefore of value to have sound scientific data to support the use of parasiticides on this species. Imidacloprid is a highly effective insecticide in widespread use for flea control on cats and dogs. A single topical application of the commercially available 10 per cent spot-on formulation, at a dose rate of 10 mg/kg (the minimum dosage when label recommendations are followed), gives 100 per cent efficacy against a resident C. felis population and at least 95 per cent protection against reinfection for four weeks on both cats (Jacobs and others 1997) and dogs (Arther and others 1997). The present study evaluates the use of this formulation on artificially infested laboratory rabbits. The cat dosage schedule was used as cats and rabbits are approximately equivalent in terms of size and surface area: body-weight ratio (Timm 1988).

Six male and six female murex half-lop-eared rabbits were caged individually in an environmentally controlled room under conditions complying with animal welfare regulations. Body weights ranged from 2.5-3.7 kg. For allocation to treatment and control groups, each rabbit was infested with 100 unfed adult fleas eight days prior to the treatment date (day 0). One day later (day 7), the number of fleas that had established on each was estimated by the thumb-comb technique described below, and the fleas destroyed. After ranking according to sex and flea-count, matched pairs were formed and the members of each assigned randomly to the two groups. All rabbits were infested with 100 unfed C. felis (RVC03 strain) one day before the treatment date and at weekly intervals thereafter, that is, on days 1-7, 14, 21 and 28. On day 0, rabbits in the treatment group were each given the contents of one prepackaged 0.4 ml applicator of 10 per cent imidaclorpid spot-on formulation (Advantage 40 for Cats; Bayer) as a single topical application onto the skin of the dorsal midline, behind the base of the skull. The rabbits were treated at 30-minute intervals so that flea counts could be started precisely eight hours and 24 hours after treatment. Further
TABLE 1: Flea counts of untreated control rabbits (n=6) and a similar group treated topically on day 0 with 0.4 ml of a 10 per cent imidacloprid spot-on formulation

<table>
<thead>
<tr>
<th>Group</th>
<th>Day post-treatment</th>
<th>Control</th>
<th>Arithmetic mean</th>
<th>SD</th>
<th>Geometric mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>28.2</td>
<td>34.5</td>
<td>29.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD</td>
<td>7.4</td>
<td>9.1</td>
<td>8.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geometric mean</td>
<td>27.4</td>
<td>33.5</td>
<td>28.7</td>
</tr>
<tr>
<td>Treated</td>
<td>Arithmetic mean</td>
<td>300</td>
<td>1.5</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>12.4</td>
<td>1.2</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Geometric mean</td>
<td>28.1</td>
<td>1.2</td>
<td>0</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td>Per cent efficacy*</td>
<td>96.4</td>
<td>100</td>
<td>94.8</td>
<td>81.1</td>
</tr>
</tbody>
</table>

* Calculated by comparison of geometric means
SD Standard deviation

counts were performed 24 hours after each subsequent infestation, that is, on days 8, 15, 22 and 29. On each occasion, the fleas were removed and destroyed, except at the eight-hour count when they were replaced on the animal of origin. Two sample t-tests on square root transformed data were used to test the significance of differences in flea counts between the two groups. Efficacy values were calculated by comparing the geometric mean flea counts of treated and control groups at each time point.

Placing 100 C. felis on each rabbit gave a consistent and adequate infestation (Table 1) without inducing excessive discomfort. Large numbers of live fleas were observed on the cage floors of untreated rabbits. Further studies are needed to determine whether a constant proportion of the initial flea inoculum becomes permanently resident on the rabbit, while the remainder leaves to find another host, or if there is a continued interchange between the fleas on and off the rabbits with an equilibrium developing. Whatever the explanation, this behaviour contrasts sharply with that of the same strain of C. felis on cats as, in this case, live fleas remain almost exclusively on the host and higher establishment rates are recorded (Jacobs and others 1997).

Counting fleas on rabbits by combing proved to be more difficult than performing the same procedure on cats. Rabbit hair is so fine that the comb (a fine-toothed human louse comb) tended to push the fleas away rather than entrap them. Consequently, a counting method (the thumb-comb technique) was developed, whereby fleas were first located by parting the hair with the thumb and then removed with a comb. Experience during pretrial pilot studies indicated that systematic examination for a full 30 minutes is required to ensure an accurate count.

Flea burdens on treated rabbits were reduced by 96.4 per cent within eight hours of treatment and 100 per cent efficacy was recorded at 24 hours (Table 1). At one, two, three and four weeks post-treatment, protection against reinfection was 94.8, 81.1, 78.7 and 67.6 per cent, respectively. There was no statistical evidence of a difference in flea counts between groups before treatment (day –7) but at all other points in time treated animals had significantly lower values than controls (P<0.002).

Results from our experimental model are in accord with observations from a Japanese clinical trial using naturally infested pet rabbits maintained in their home environment (Fukase and others 2000). In this study, naturally infested rabbits treated with the 10 per cent spot-on formulation at 10 mg/kg were compared with a similar number of untreated controls. Whereas, the latter consistently became reinfested after each combing, only three of 30 treated rabbits harboured fleas one day post-treatment, and none were infested from the second to the seventh day. Small numbers were found on one treated rabbit two weeks after treatment and on three at four weeks.

The spot-on formulation was convenient to apply and no adverse effects were observed in either of these studies. Imidacloprid displayed consistently good efficacy against a resident flea population. Both trials demonstrated a high level of residual activity one week after treatment and incomplete but substantial protection which persisted for at least a further three weeks.

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References


Traumatic separation of the auricular and annular cartilages in two cats

A. E. KYles

TRAUMATIC external ear canal separation is reported infrequently in the veterinary literature. Chronic separation of the auricular and annular cartilages has been reported in six dogs, and separation of the annular cartilage from the external auditory meatus was reported in two dogs with chronic signs and one cat with acute signs (McCarthy and others 1995, Boothe and others 1996, Smeak 1997). This short communication describes two cats with para-aural abscesses caused by the traumatic separation of the auricular and annular cartilages.

Cat 1 was a four-year-old spayed female domestic long-haired, acquired by the owner 32 months previously. The cat was reported to have been involved in a road traffic accident before acquisition, although details of the injuries incurred were not available. The cat developed a right-sided para-aural abscess three months before presentation, which had been treated by surgical drainage and antibiotic therapy.

Cat 2 was a 12-year-old castrated male domestic short-haired which experienced a left-sided facial wound and facial nerve paralysis five years before presentation, reportedly caused by a firework injury. The cat had an eight-month history of

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