Treatment and prevention of arachnoses, entomoses and nematodoses in small breeds dogs and cats with a drug based on moxidectin

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Abstract. The authors study the efficacy of pharmaceutical drug “Inspector Mini” for external cutaneous use (spot-on), developed for the treatment and prevention of arachnoses, entomoses and nematodoses in small breeds dogs and cats, puppies and kittens weighing under 1 kg since the use of many drugs is limited for the small weight of the animal. It was found that in 14 days after 2-4 times treatments of animals with demodecosis, saroctosis, notoedrosis and otodeptosis, microscopy in tick scrapings was not found; when observing experimental animals within 30 days, live larvae, adults of ixodid ticks, fleas, lice, and chewing lice were not observed; in 10 days after treatments of animals with intestinal nematodoses were not observed with a coproscopic examination of nematodes eggs (Toxocara canis/mystax, Toxascaris leonina). Within 30 days observing dogs and cats using the drug no side effects were detected.

1. Introduction
The number of domestic carnivores has markedly increased today. In this regard, the infestation of animals with various parasitic diseases has exploded [1, 5]. The main methods against parasites of carnivores are preventive treatments, for which new drugs are constantly being developed and their safety and pharmacokinetic parameters are being studied [1-10]. However, it should be noted that many drugs have contraindications for use according to age and weight of animals [9]. Considering this problem, “Inspector Mini” was developed, intended for small breeds dogs and cats, puppies and kittens with arachnoses, entomoses and nematodoses. The drug in its composition contains the active substance – moxidectin (5 mg in 1 ml) and is presented as a spot-on solution. Moxidectin is a semisynthetic compound of the milbemycin group has a paralysis and death of ectoparasites and nematodes [2, 11].

According to independent studies by M G Papich, G Mark [12] and C Le Sueur, S Bour, R Schaper [13], the therapeutic activity of moxidectin in cutaneous application to both dogs and cats was observed at doses of 0.2-0.5 mg/kg.

The dose of the active substance in the pharmaceutical drug “Inspector Mini” is 1-4 mg/kg of animal body weight. According to the results of the studies, as well as based on literature data, such a dose has the therapeutic effect described in the instructions for use, without causing toxic effects on puppies and kittens [14].
The main aim of this work is to evaluate the efficacy of the “Inspector Mini” antiparasitic drug for dogs and cats with arachnoses, entomoses and nematodoses.

2. Research methods

Studies on the efficacy of the pharmaceutical drug “Inspector Mini” for veterinary use was carried out in veterinary clinics in Moscow on spontaneously infested small breeds dogs and cats of different ages, also on puppies and kittens. In total, there were selected 86 dogs with ectoparasites, including 18 puppies; 84 cats, including 19 kittens. 10 dogs were with observed sarcoptosis. In addition, 10 dogs and 29 cats were infested with otodectosis, 5 dogs with demodectosis. 12 cats had notoedrosis, 14 dogs had sucking ixodid ticks. In addition, 11 dogs were treated with the studied preparation for mite-free treatment as a preventive measure, since the animals were periodically subjected to exercise in forest-park areas. 25 dogs and 32 cats had fleas, lice and chewing lice. Also, there were selected 20 dogs and 18 cats with confirmed intestinal nematodoses after the laboratory study (Toxocara canis/mystax, Toxascaris leonina).

The diagnosis of diseases, as well as the efficacy of the drug was confirmed comprehensively taking into account anamnesis, clinical signs and laboratory studies. Microscopy of scrapings taken from tick-affected skin areas was performed. Upon visual inspection of 40 cm² surface of the skin of the back and neck, the number of fleas, lice and chewing lice was combed out [15]. Fleas were identified by the determinant Н Н Plavilshchikova (1994) [16]. The presence of ixodid ticks was also taken into account. There was performed an investigation according to the Fülleborn's method for detecting helminth eggs in animal’s excrements with their differentiation [15].

To exclude the infection of animals with babesiosis (pyroplasmosis), blood samples were taken from the animals chosen for the study, and laboratory analysis was performed to detect parasites (Babesia canis) in peripheral blood samples using light microscopy – all test results were negative, the animal body temperature was within the physiological norm.

Determining the efficacy of the drug was carried out according to the method of M V Arisov, I A Arkhipova [17].

Animals’ treatment was carried out according to the draft instructions for use of “Inspector Mini” drug. The drug was used by drip application (“spot-on”) on dry intact skin of the animals to places inaccessible for licking – between the bladebones at the base of the neck. The pipette’s upper part was broken off and the drug was applied at the doses indicated in the table 1.

| Animal species  | Animal body weight, kg | Dosage, ml | Dosage of moxidectin, mg/kg |
|----------------|------------------------|------------|-----------------------------|
| Dogs, puppies  | 0.5 – 2.0              | 0.4        | 1 – 4                        |
| Cats, kittens  | 0.5 – 2.0              | 0.4        | 1 – 4                        |

In case of ixodidoses, entomoses and intestinal nematodoses the animals were treated once.

For the treatment of otodectosis, the external auditory meatus was cleaned of scabs and crusts, then 3 drops of the drug were instilled into each ear, the auricle was folded in half and its base was massaged. The rest of the drug in the pipette used was applied to the skin between the bladebones (based on the weight of the animal). The treatment was carried out twice with an interval of 7 days.

In case of demodectosis, sarcoptosis and notoedrosis, the drug was applied in a thin layer on the affected areas, distributing with the fingertips in the groove from the periphery to the center with the capture of border healthy skin up to 1 cm. The treatment was performed 2-4 times with an interval of 7 days until the animal was clinically recovered, which was confirmed with two negative results of acarological research.

To destroy sucking ixodid ticks on the animal’s body, 1 drop of the drug was applied to the tick and the place of its attachment to the skin. If the tick does not fall off spontaneously within 20 minutes, it was gently pulled out of the skin with tweezers and after that destroyed.
After treatment, animals with arachnoses, entomoses were monitored daily: general condition, intake of feed and water, their behavior were taken into account, the clinical examination of the skin-wool coat was repeated after 24 hours, 14 and 30 days. Dogs treated against ixodid ticks were examined after each walk.

With intestinal helminthiases, effectiveness was measured after 10 days.

3. Findings
Clinical examination of animals and laboratory studies of sarcoptosis revealed damages in the form of skin thickening, crusts on the face, around the eyes and ears, in the elbow, inner thighs and tailhead. Microscopy of scrapings of dogs’ skin showed 3-6 specimens of *Sarcoptes canis*. When otodectosis observed hyperemia, swelling, dark brown scabs and crusts in the conches. Microscopy of dogs’ skin scrapings revealed 3-7 specimens of *Otodectes canis*, scrapings of cats’ skin – 3-6 spicemens of *Otodectes cynotis*. Demodecosis was characterized by itching, redness and skin flaking. As a result of a laboratory study, a *Demodex canis* tick was found in an amount of 1 specimen. Cats with notoedrosis have gray-yellow crusts in the areas of skin inflammation. Microscopy of skin scrapings revealed 3-6 specimens of *Notoedres cati*. Animals with ktenocephalosis, aphanipherosis, trichodectosis had itching, scratching. As a result of visual inspection of the skin surface in the back and neck, the number of fleas before the experiment was 8-23 specimens by dogs and 6-29 specimens by cats; the number of lice was 6-24 specimens by dogs, chewing lice – 4-8 specimens by dogs and 4-11 specimens by in cats. In addition, there were observed 1-3 specimens of sucking ixodid ticks on the dogs’ skin.

Animals with helminthiases show weight loss, lethargy, ruffled hair, pallor of the mucous membranes, itching in the anus, and alternating diarrhea with constipation. Wh...
After treatment with the drug animals were monitored daily, it was noted that the general condition improved, there were no new foci of scratching, and regeneration of damaged skin was occurring. By dogs and cats infested by toxocariasis and toxascaridosis, after 10 days of experiment, no nematodes eggs were detected after coproovoscopic examination (Table 3).

**Table 3.** The effectiveness of the medication “Inspector Mini” for intestinal nematodoses of dogs and cats.

| Time        | Number of parasites (in 1 g of feces) | Infection intensity (number of specimens in 1 g of feces avg.) |
|-------------|--------------------------------------|---------------------------------------------------------------|
|             | Dogs       | Cats   | Dogs        | Cats        |
|             |            |        |             |             |
| **Toxocara canis/mystax** |            |        |             |             |
| Before experiment | 14        | 13      | 116.5±1.74  | 128.3±2.90  |
| After 10 days   | 0          | 0       | 0           | 0           |
| **Toxascaris leonina** |            |        |             |             |
| Before experiment | 6          | 5       | 82.0±2.68   | 87.4±1.80   |
| After 10 days   | 0          | 0       | 0           | 0           |

Thus, with arachnoses, entomoses and intestinal nematodoses of carnivores, the veterinary medication “Inspector Mini” showed high therapeutic and prophylactic efficacy.

### 4. Conclusions

With ectoparasitoses (sarcoptosis, notoedrosis, otodectosis, demodecosis (scaly form), ixodidoses, entomoses) and intestinal nematodoses of small breeds dogs and cats, as well as puppies and kittens, the medicinal preparation “Inspector Mini” showed 100% efficacy. The duration of the protective effect of the drug against attack by ixodid ticks was 18 days. In addition, within 30 days of the study there were no side effects and complications noted by the animals.

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