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# PYRANTEL AND CANINE DEWORMING PROGRAM

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Pyrantel was launched onto the market in the 1970s and was very popular all those years, and it still is today. The entry into the market of several other drugs with various indications, similar or complementary, forces us to ask ourselves what possible niche pyrantel might still occupy. A literature review might enlighten us about certain relevant aspects that are often encountered in practice.

**Indications:** The parasites targeted by this drug include the ascarids *Toxocara canis* and *Toxascaris leonina* and the hookworms *Ancylostoma caninum* and *Uncinaria stenocephala*, for which there is an approved use. Pyrantel has also been proposed as a treatment for certain intestinal infections due to nematodes, such as *Baylisascaris* and *Physaloptera*.

**Efficacy:** Several studies in the past showed pyrantel to have 90 to 100% efficacy against ascarids and hookworms[1,2,3,6,9]. Several trials have been reported by Schmid and colleagues[11], who observed 94.3% efficacy in a controlled trial with 20 dogs experimentally infected with *Toxocara canis,* 95% efficacy in an uncontrolled trial with 10 experimentally infected dogs, and 100% efficacy in a controlled trial with 25 naturally infected dogs. Efficacy was determined in these trials by intestinal worm burden. The decrease in egg output in 10 naturally infected dogs was 99.97% for *Ancylostoma caninum*.

More recent studies have confirmed this level of efficacy, but with a product combining pyrantel, oxantel and praziquantel. A clinical trial involving 235 dogs from five European countries, fecal examination showed this drug combination to have an efficacy of nearly 99% against ascarids and hookworms[4]. Eighty-eight dogs were infected with *Toxocara canis*, 4 with *Toxascaris leonina*, 36 with *Uncinaria stenocephala* and 28 with *Ancylostoma caninum*.

**Resistance:** No pyrantel resistance in *T. canis* or *A. caninum* has been described in Europe[11]. A few anecdotal cases were described in the United States in the past, but it is rather difficult to assess their significance[5,10], especially since there have been no new data to substantiate their conclusions.

However, a controlled Australian trial (intestinal worm burden) involving dogs experimentally infected with *Ancylostoma caninum* found pyrantel to have an efficacy of 25.7%[7]. This study was necessary because of statements by practitioners to the effect that this treatment was no longer effective. However, the Australian context should be taken into account. In that country, 51 dewormers or brand names contain only pyrantel and are

available everywhere, at a very low price, without a prescription and dogs are treated repeatedly throughout their life. This is completely different from what the North American context has been for a long time. In addition, there have been no such tests to verify its efficacy against *Toxocara*[8]. This is probably because no lack of efficacy has been reported and because dogs infected with this species generally develop good immunity. Characteristics associated with *Ancylostoma* are also relevant in explaining the emergence of resistance.

***Toxocara* is still too prevalent:** Several studies conducted in the 1970s found a very high prevalence of *Toxocara* in dogs in Canada. In most of these studies, the prevalence was between 10 and 50%[12]. Since the public health problem associated with *Toxocara* was already very well known, the use of pyrantel quickly became widespread. In 2010, stool samples from dogs brought to veterinary establishments and tested in our laboratory, revealed that the prevalence is now much lower, being 4.3%[14]. A recent study of the health of Americans found the presence of immunoglobulins specific to *Toxocara* in close to 14% of those tested[15].

**Choosing a program:** In the past 40 years, many new products have been placed on the market. More than 30 different products are now available, each with specific indications, to the point that it is becoming difficult to make comparisons and choose a drug based on these indications. A different approach to choosing which drug to use could be taken: deciding which parasite species one wants to protect the animal against, then choosing the appropriate drug. This new approach is meant to be more individualized.

Presently, a large number of parasite species are found in puppies. High-volume breeding facilities, travel, the types of food, and personal requirements have led to the appearance of some of these species (e.g., *Sarcocystis* and *Neospora*) and a decrease in the prevalence of several others. The fact remains that approximately 50% of puppies excrete parasitic elements[14], and if we add ectoparasites to this, we arrive at the conclusion that most puppies under the age of 1 year should be treated or protected against parasites. In older dogs, the prevalence is approximately 10%, excluding ectoparasites. Since more than two-thirds of these infections are transmissible to humans, prevention is a must.

An adapted and individualized prevention program takes into account five main factors to determine the animal's risk of parasite infection[13]:

1. The animal's health and physiology
2. The animal's lifestyle
3. The regional parasite prevalence
4. A fecal examination
5. The human environment

It is on the basis of these factors that the choice of drug or drugs to be used is made.

Two types of programs should be discussed: one based on age (0 to 6 months) and one based on the season (if warranted by the risks).

For the age-based program, one should ideally vary the drugs used in order to take advantage of the indications specific to each one and thus cover a broader range of parasite species. *Toxocara* and *Ancylostoma* infections should be treated as early as 2 weeks of age. Treatment of ectoparasite infestations requires the use of macrocyclic lactones. However, for these drugs there is a minimum age of treatment, which delays their use. Furthermore, the very high prevalence of *Giardia* (more than 20% of puppies aged 3 to 8 months) warrants specific routine treatment of all animals. It seems that it takes a long time for immunity against this parasite to develop, therefore, it is recommended that animals receive a first treatment at a young age (2 to 3 months) and that the treatment be repeated later (around the age of 7 to 9 months) since there are probably many opportunities for reinfection at a young age. Treatment is repeated at 2-week intervals during the first 3 months of life and at 4-week intervals during the fourth, fifth and sixth months of life.

The type of program based on the season is easier to manage, unless it is used in young animals, because the risk of infection is lower and there are fewer species to be concerned about. *Dirofilaria* infections and flea infestations involve the main species of concern. The drug can be chosen at the beginning of the season and can be the same for the entire season.

**And the use of pyrantel:** More specifically, on the matter of pyrantel, it can be used in very young animals or interspersed between administrations of macrocyclic lactones at a young age, namely, at around 2½ months. At this age, natural immunity against *Toxocara* and *Ancylostoma* does not provide enough protection, and the residual effect of lactones provides poor coverage during the period between administrations. During the prepatent period for *Toxocara* and *Ancylostoma* infections, which barely exceeds 2 weeks at this age, the worms mature and there is undesirable occurrence of eggs in the fecal matter of treated animals toward the end of this period.

Furthermore, the cost of using pyrantel is generally low, which makes it an attractive option for animals raised in groups, such as sled dogs, or for certain breeding facilities. The use of a product combining pyrantel and other substances can provide further protection against hookworms and tapeworms, species that are too often present in these dogs. In regions where the climate prevents heartworm transmission, this product is an attractive and suitable option to be proposed for our veterinary patients.

To sum up, pyrantel is a good choice for very young animals, prior to the use of macrocyclic lactones or in conjunction with the use of macrocyclic lactones around the age of 2½ months. Pyrantel is also a good choice for adult animals when heartworm prevention is not necessary, as a complement to the use of other drug or in animals bred in large groups. One should also consider proposing it as an alternative in situations where owners decide against heartworm prevention. The parasite species targeted by pyrantel, although less prevalent than they used to be, nonetheless cause zoonotic infections that should never be ignored.

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