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Evaluation therapeutic effects of antihelminthic agents albendazole, fenbendazole and praziquantel against coenurosis in sheep

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Abstract

Coenurosis is a rare infection caused by the larval stage of the tapeworm, *Taenia multiceps* (also referred to as *Coenurus cerebralis*), a platyhelminth belonging to class Cestoda. The adults of *Taenia* spp. live in the intestines of dogs and other canines and discharge eggs in their feces, which are then ingested by grazing animals, usually sheep. Oncospheres escape from the eggs and form coenuri in various tissues, localization in the central nervous system (CNS) of sheep causes coenurosis or the "staggers."

In this survey, antihelminthic agents (albendazole, praziquantel, fenbendazole) were tested for their effectiveness in treating coenurosis in naturally infected sheep which were given different doses of these agents. The autopsy revealed degeneration (calcification) of the cysts in the brains of treated animals; while the cysts in the untreated sheep were viable. This study showed that the best results were obtained by using albendazole at a dosage of 25 mg/kg and composed fenbendazole + praziquantel at a dose of 0.5 g for each affected lamb, along with praziquantel at a dose of 100 mg/kg.

Keywords: Coenurosis; *Coenurus cerebralis*; Sheep; *Taenia multiceps*

1. Introduction

Coenurosis is among the most common causes of a disease of the central nervous system (CNS) in sheep that is also called gid and stagger (Soulsby, 1982; Smyth, 1984), which occurs in several parts of the world. The actual prevalence of coenurosis is difficult to assess because farmers and veterinary surgeons often diagnose the disease and send the animal for slaughter without confirming or reporting the disease. Usually, this is a condition seen in older lamb and adult sheep due to *Coenurus cerebralis*, the cystic larval stage or the metacestode of the dog tapeworm, *Taenia multiceps*. The life of *T. multiceps* depends on the ingestion of the larval stage by the carnivore (dogs or other canids) (Edwards and Herbert, 1982; Herbert et al., 1984; Soulsby, 1982). Sheep or sometimes goats, deer, antelope, chamois, rabbits, hare, horses, and less commonly, cattle, and human beings act as intermediate hosts of T. multiceps following ingestion of the *Taenia* eggs (Soulsby, 1982; Smyth, 1984; Skerritt, 1991). Following the ingestion of grass contaminated with eggs by the intermediate hosts, embryos (oncosphere) burrow their way through the intestinal wall and reach the brain via the bloodstream. Once in the brain, a cyst develops taking several months to grow to a size which will result in the onset of clinical signs. The fully developed *Coenurus* may be 5–6 cm in diameter and cause increased intracranial pressure, which results in ataxia, hypermetria, blindness, head deviation, headache, stumbling and paralysis. When dogs or

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Table 1
Treatment protocol of lambs with clinical signs resulting from administration of 6500 eggs of *T. multiceps*

Group	Drug	Dose	Administration schedule
1	Albendazole	25 mg/kg	6 days
2	Praziquantel	25 mg/kg	7 days
3	Fenbendazole	25 mg/kg	8 days
4	Praziquante + fenbendazole	100 mg/kg	6 treatments
5	Non-treated control	0.5 g/head	20-day intervals

other canids (foxes, wolves, and jackals) ingest infected sheep tissue, usually by feeding on offal, the protoscolices attach themselves to the walls of the small intestine and the worms begin to form proglottids (one of the segments of the tapeworm containing both the male and female reproductive organs). Proglottids containing eggs detach themselves from the end of the worm and pass out in the feces, and the cycle is repeated (Edwards and Herbert, 1982; Herbert et al., 1984; Soulsby, 1982)

With regard to treatment, chemotherapy has been attempted recently (Skerritt and Stallbaumer, 1984). In this study, the effectiveness of various antihelminthic agents in the treatment of coenurosis has been studied to gauge the response in animals and this has been evaluated against recommendations and prescription.

2. Materials and methods

Several experimental trials were conducted as part of this study. The effects of albendazole, praziquantel, fenbendazole and a combination of fenbendazole + praziquantel on *Coenurus cerabralis* were investigated. Animals in each group received different treatments and the medication was administered orally according to the manufacturer's recommendations. The efficacy of each product was compared based on changes such as degeneration and calcification observed in the characteristic morphology of cysts in examinations of the brain and also taking into account, parasitological and clinical criteria based on recovery signs from the clinical evolution of pruritus or when the animal is clinically and parasitologically cured (disappearance of clinical signs).

For this purpose, 5 dogs aged 2.5–3 years and 25 lambs 4–5 months old were used. Two of the dogs were used as control, the protoscolices obtained from the animals in both drug administration groups subjected to therapy, were observed to find out whether there was maturing or no maturing of the cestode in these dogs. Three dogs were infected with *C. cerebralis* protoscoleces, and the eggs collected from their feces were given to the lambs. Approximately 6500 eggs were given to each lamb. The lambs were divided into five groups consisting of five lambs each. Administration of the drug started on the first day of the occurrence of the symptoms of coenurosis in the four treatment groups (Table 1). The fifth group was kept as control. Clinical recovery was observed in the lambs from all of the treatment groups until the day necropsy was performed.

After the disappearance of clinical signs in the treated animals, they were slaughtered. The heads of the slaughtered sheep were separated from the rest of the carcass and the skull was incised sagittally using an electric saw and the brain was sliced thinly (3–5 mm) and inspected for cysts and gross pathological changes. The vitality of the tapeworm cysts and protoscolices was tested by staining (eosin solution 0.1%) and by their movements observed under a microscope.

3. Results

The first day of appearance of clinical signs in the lambs resulting from the administration of 6500 eggs of *T. multiceps* varied widely as follows: for albendazole group from days 58 to 86, for praziquantel group from 21 to 103 days, for fenbendazole group 24–109 days, for the combination group (fenbendazole + praziquantel) 65–114 days and for the control group 63–123 days.

A variety of clinical signs were reported from affected lambs. These included circling, head pressing, blindness and paresis. Circling was the major clinical sign, followed by head pressing, blindness and paresis. A high percentage of animals in the groups treated with antihelmintic agents were clinically and parasitologically cured (disappearance of clinical signs). All the lambs in the control group, one lamb from the second group and two lambs from the third group died, but the others survived until the date of programmed necropsy (Table 2). The patho-anatomical study of the lambs revealed coenurosis cysts localized in the cerebral hemispheres or in the cerebellum or in both. Their sizes varied from 0.5 to 4.5 cm in diameter and their numbers were from one to six at a time. Out of the