Abstract

The efficacy of preventive treatment with toltrazuril against natural infections with *Eimeria bovis* and/or *Eimeria zuernii* in calves was investigated in comparison with diclazuril and untreated controls. The study was conducted as a multi-centred, blinded, controlled and randomised field study, with 164 calves at four centres (farms) in northern, eastern and southern Germany. All participating farms had a known history of coccidiosis. Animals were randomised to treatment 14 days after stabling in the respective facility: group I (57 animals) received 15 mg toltrazuril per kg body weight, group II (54 animals) 1 mg diclazuril per kg body weight and group III (53 animals) served as sham-treated controls. The assessment of efficacy was based on oocyst excretion of *E. bovis* and *E. zuernii* (opg) throughout the study (three to four times per week; study duration 57 days).

Coccidiosis due to *E. bovis* and/or *E. zuernii* occurred in all centres. However, the extent and course over time were variable. The duration and rate of oocyst excretion of *E. bovis* or *E. zuernii* were significantly lower in the toltrazuril-treated group compared to groups II and III. It is concluded that a single prophylactic treatment with toltrazuril on day 14 after stabling provides effective and sustainable control of stable coccidiosis under various field conditions.
Introduction

Bovine coccidiosis is an important disease occurring mainly in worldwide calf-rearing and often induces massive diarrhoea (Ernst and Benz 1986). Infections, especially with *Eimeria bovis* and *Eimeria zuernii*, which are the main coccidial pathogens in housed cattle (Marshall *et al.* 1998, Daugschies and Najdrowski 2005), may lead to considerable intestinal damage and subsequent economic losses (Fitzgerald 1980). Decreased weight gain, exhaustion and frequent secondary bacterial infections typically occur as secondary complications in severely affected calves (Ernst and Benz 1986). Effective treatment of infection with pathogenic *Eimeria* spp. is therefore required. Unfortunately, therapeutic treatment of the disease must generally be considered as insufficient due to the intestinal lesions caused by early stages of the parasites (Daugschies and Najdrowski 2005), which will result in diarrhoea. Thus, the treatment of choice has to be a preventive treatment before onset of clinical disease and oocyst excretion.

In several previous investigations, the preventive anticoccidial effect of toltrazuril was demonstrated against infections with both *E. bovis* (Mundt *et al.* 2003, Mundt *et al.* 2005a) and *E. zuernii* (Staschen 2004, Mundt *et al.* 2005a, Mundt *et al.* 2005b) in calves.

The intention of the present study was to investigate the efficacy of preventive treatment with toltrazuril against natural infections with pathogenic *Eimeria* spp. in calves, compared with diclazuril and sham-treated controls. Treatment was administered two weeks after stabling based on the assumption that calves were exposed to infection from the beginning of the stabling period.

Material and methods

The study was designed as a controlled, randomised, blinded, multi-centred field study according to the standards of Good Clinical Practice. It was conducted at four study sites (centres I–IV) located in different regions of Germany. The timing of the trial overlapped partly in the study centres. The duration of each study cycle was 57 days [study day (SD) 0 to SD 56]. SD 0 was the day of stabling. Data on the individual study centres, feeding and housing conditions are given in Tab. 1. A total of 164 calves, including 52 dairy heifer calves (Holstein Friesian) and 112 bull calves (Holstein Friesian, Red Pied Friesian, Angler, Simmental and [Hereford] Mix) were included in the study. Between 24 and 49 animals were included in each cycle and these were divided into three treatment groups (I. toltrazuril; II. diclazuril; III. sham-treated controls) containing the same number of animals each (±1–2 if the number of animals was uneven).

The calves were aged between nine and 80 days at the beginning of the trial. They were transferred to pens on SD 0 in which coccidiosis had been reported in animals previously reared there. The health status of all the animals was good to acceptable at the time of stabling. In centres I and II the calves were bought from commercial breeders. In centres III and IV the calves were born and kept on site prior to the study, although in other areas. In both cases the calves were moved to the contaminated part of the respective farms on SD 0 and housed. On SD 14 the animals were weighed and assigned to treatment groups in increasing order of body weight using a randomisation list. They received the following treatment once by the oral route:

I. 15 mg toltrazuril per kg body weight;
II. 1 mg diclazuril per kg body weight;
III. sham-treatment with water.