Effect of different decoquinate treatments on cryptosporidiosis in naturally infected cashmere goat kids

I. Ferre, A. Benito-Peña, U. García, K. Osoro, L. M. Ortega-Mora

NEONATAL diarrhoea is one of the main causes of morbidity and mortality in young ruminants, especially goat kids, and *Cryptosporidium parvum* is considered to be one of the main causal agents of diarrhoea in animals of this age (de Graaf and others 1999). To date, no effective treatment for cryptosporidial diarrhoea has been identified, although some drugs, such as halofuginone lactate, paromomycin and decoquinate, have been reported to reduce oocyst shedding, or to prevent episodes of diarrhoea or improve stool consistency in experimentally infected goat kids (Manasses and others 1995, 1997), lambs (Naciri and Yvoré 1989) and calves (Redman and Fox 1994).

This short communication describes a study to evaluate the efficacy of decoquinate in preventing naturally acquired cryptosporidiosis in cashmere goat kids, when administered by two different strategies: medication of the kids themselves and medication of pregnant goats before kidding.

The study was conducted in a flock of cashmere goats with a confirmed history of neonatal diarrhoea caused by *Cryptosporidium* species. During the 2002 and 2003 kidding seasons a number of kids showed apathy, anorexia and diarrhoea. A study of faecal samples from the kids revealed the presence of a large number of *Cryptosporidium* oocysts. In addition, postmortem examination of some goat kids that had died between four and seven days after birth after suffering severe diarrhoea revealed the presence of *Cryptosporidium* developmental stages within gut epithelial cells. The presence of other enteropathogens, such as rotavirus, *Escherichia coli*, *Clostridium perfringens* and *Salmonella* species, was excluded by conventional bacteriological and virological techniques.

Sixty-four kids and 14 pregnant goats were divided into three groups, as follows. Group A, the control group, contained 24 kids (including five sets of twins) that were unmedicated, but received phosphate-buffered saline orally as a placebo, twice a day for 21 days from three days of age. Group B consisted of 25 kids (including six sets of twins) that received 2·5 mg/kg/day decoquinate (0·5 g of Decoxx L; Alpharma) orally for 21 days from three days of age. The daily total dose of decoquinate was divided into two equal doses. Before medication, the kids were fed colostrum. The decoquinate was dissolved in milk and administered individually using a syringe. Group C consisted of 15 kids (including one set of twins) that were not medicated, but their 14 dams had received 2·5 mg/kg/day decoquinate, which was added to a commercial pelleted ration once a day for 21 days before the expected kidding date.

Each experimental group was kept in a different pen in the same animal house. Before the start of the experiment, 19, 19 and 14 pregnant goats from the flock were allocated at random to the pens to produce groups A, B and C, respectively. All the goats were kept under the same nutritional and hygienic conditions.

Samples and measurements were only taken in the goat kids. The bodyweight of each kid was measured at three, 14 and 24 days after birth to record its growth. Individual faecal samples were collected three times a week and examined for the presence of *Cryptosporidium* species oocysts using a modified Ziehl-Neelsen technique (Henriksen and Pollier 1981). A semi-quantitative examination was carried out in which 20 fields of 400× magnification per slide sample were assessed and scored (0 No oocysts, 1 One to two oocysts, 2 Three to five oocysts, 3 Six to 10 oocysts, 4 >10 oocysts). The faecal consistency (1 Pellet, 2 Solid, 3 Soft, 4 Scour) was also scored.

Each animal was assessed clinically daily for appetite and signs of abdominal pain. Groups of mean values of all parameters for the unmedicated and medicated groups were analysed using Student’s *t* test, and the statistical significance of the variables was tested at the 0·05 level of confidence.

The animals in the control group (A) showed the most severe clinical signs, such as significantly softer faecal consistency at 11 days after birth (*P*<0·05) (Fig 1a); one kid died nine days after birth showing an oocyst shedding score of 4. Episodes of diarrhoea were observed only in some kids in group A between 11 and 13 days after birth. Kids in group B had softer faeces than those in group C at 15 and 17 days after birth, but the difference was not significant. Signs of abdominal pain were observed only in some kids with diarrhoea in group A.

The mean weight gains during the experimental period were 2·61 kg for animals in group A, 2·57 kg for group B and 3·23 kg...
for group C; the differences were not significant. The mean weight gain of the kids medicated with decoquinate (group B) was slightly lower than that of the controls (group A).

The oocyst shedding pattern was generally similar in the three groups (Fig 1b). However, the oocyst shedding scores in groups B and C were notably lower than those observed in group A during the course of the experiment. The increase in and maximum level of oocyst output were also lower in groups B and C compared with the control group. In addition, the maximum oocyst shedding score was reached sooner in group A (11 days after birth) than in groups B (13 days) and C (15 days). The oocyst shedding scores in group B were slightly lower than those observed in group C, but the maximum scores were similar in both groups. However, the decrease in oocyst output in groups B and C was more gradual than in the control group. When the faecal consistency at the time of maximum oocyst output was compared between the groups, the poorest faecal consistency (that is, that receiving the highest score) in group A coincided with the maximum oocyst output. However, in groups B and C the poorest faecal consistency appeared to be delayed by a mean of two days after the period of maximum oocyst output.

The number of unmedicated kids shedding Cryptosporidium species oocysts was significantly (P<0.05) higher than the number of kids medicated with decoquinate (group B) or born to medicated does (group C). In general, the percentage of kids in group B that shed oocysts was significantly (P<0.05) lower than that observed in group C, except three to seven and 15 days after birth (Fig 1c).

The present study shows that treatment with 2.5 mg/kg/day decoquinate for 21 days not only delayed the appearance of clinical cryptosporidiosis, but also reduced the severity of naturally acquired cryptosporidiosis in kids. In addition, decoquinate prevented episodes of diarrhoea, although the final weight gain of the kids was not significantly better than that of the untreated animals. The faecal examination showed that the number of treated kids that shed oocysts, and the oocyst scores, were lower than in the untreated kids; the treatment thus decreased the environmental contamination. The results obtained in kids born to does that had been treated with decoquinate (group C) were notably better than those observed in the untreated kids, and almost the same as those obtained in group B. The kids in group C showed a better final weight gain than the kids in the medicated pregnant goats. This may be explained by the effect of decoquinate on the periparturient rise (Ortega-Mora and others 1999) in the medicated pregnant goats. Depression of the periparturient rise may result in a lower level of environmental contamination with Cryptosporidium species oocysts, and thus lower the rate of infection of the kids in group C.

In general, the present results are in agreement with those reported in experimentally infected French Alpine kids by Mancassola and others (1997) and in calves by Redman and Fox (1994). From the authors’ point of view, the results described here are not sufficient to recommend the preferential treatment of kids or pregnant goats. However, it is easier to administer the drug to pregnant goats, which may influence the choice of farmers. In addition, Morand-Fehr and others (2002) reported improved milk production in young female goats that had received a 75-day decoquinate treatment before first mating.

The results of this study suggest that although administration of decoquinate at a dose of 2.5 mg/kg/day for 21 days to kids or pregnant goats did not eradicate naturally acquired cryptosporidiosis from the kids, the treatment was associated with significant improvements, such as no mortality, lower faecal consistency scores and a notable reduction in oocyst shedding. Decoquinate seems to be well tolerated in goats and may be recommended for the prevention of clinical cryptosporidiosis in goats.

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References


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