Efficacy of decoquinate against cryptosporidiosis

Introduction

Cryptosporidiosis is a parasitic disease in humans and animals, spread world-wide, due to a protozoa of the genus Cryptosporidium. Infection in Cryptosporidium parvum causes severe diarrhea in ruminant neonates, calves and kids particularly, the infection rate normally at 40 to 50 %, may rise to 100 % at the end of calving and lambing periods when the contamination of the environment is high.

Decoquinate is a non-antibiotic synthetic molecule, active on certain protozoa: 

coccidia (Mage et al, 2001, Morand-Fehr et al, 2000),

Juranjon et al 1997: calves:

0.5 mg/kg BW; lambs: 1 mg),

cryptosporidia, (Redman et al 1994, Naciri et al, 1997),

toxoplasma, (Butxton et al, 1996: 2 mg/kg BW), neospora (Lindsay et al, 1997, Journel et al 2001: 2mg/kg BW).

Decoquinate has been recently classified in Annex II of the EU regulation 2377/90 regarding MRL. Its means no MRL are requested for decoquinate, therefore no withdrawal period is necessary for bovine and ovine tissues.

This trial is based on the efficacy of decoquinate shown by M.Naciri in the treatment of experimental cryptosporidiosis in kids which 2.5 mg decoquinate/kg BW for 21 days.

1 - Role of adult transmission in infection of by Cryptosporidium parvum to lambs: confirmation of periparturate rise

In sheep farms, oocyst shedding by asymptomatic adult carriers is one of the mechanism which may explain main maintenance in infections by Cryptosporidium parvum between lambing periods.

14 pregnant sheep were randomly selected from 2 farms with a history of neonatal diarrhoea caused by C. parvum and samples were collected from the 6th week before birth until 2 weeks after birth. Faecal samples were filtered, concentrated and examined for oocysts using an indirect immunofluorescence assay.

All except one animal excreted C. parvum oocysts at some time during the experimental period. The percentage of animals passing oocysts increased in the first week post-partum (farm 1) and in the week before birth (farm 2).

Finally, a high percentage of lambs (71%) born to these ewes acquired infection in the first 2 weeks of life.

2 - Efficacy of decoquinate at different administration strategies against cryptosporidiosis in natural infected carcase infected goat kids 

This trial was carried out to evaluate the efficacy of decoquinate to prevent cryptosporidiosis in goat kids.

The experiment (3 groups) was conducted in a flock of Cashmere goats with a confirmed history of neonatal diarrhoea caused by Cryptosporidium sp.

- Group A - 24 kids unmedicated,
- Group B - 25 kids that received orally from 3 days old 2.5 mg/kg/day of decoquinate for 21 days.
- Group C - 15 kids that were not medicated, but born from goats treated during 21 days before the expected day of kidding with 2.5 mg/kg/day of decoquinate.

The animals included in the control group showed the most severe clinical signs such as significantly softer faecal consistency at 11 days after birth, and one kid died 9 days after birth. Episodes of diarrhoea were only observed in some kids included in the medicated group between 11 and 13 days after birth.

Kids in group B showed softer faeces than those included in group C at 15 and 17 days after birth. Abdominal pain was only observed in some kids showing diarrhoea in control group.

The mean weight gains during the experimental period for groups A, B and C were 2.61, 2.57 and 2.33 kg, respectively.

The number of unmedicated Cashmere kids shedding Cryptosporidium sp. oocysts was significantly higher than those observed in kids of groups B and C. In general, the percentage of treated kids shedding oocysts was significantly lower than those kids born from medicated does.

Our results confirm those already obtained by Naciri (INRA) on experimental kids in cryptosporidiosis in kids using 2.5 mg decoquinate/kg BW for 21 days, 3 days after inoculation (fig. 2).

3 - Practical uses of decoquinate in beef cows to prevent cryptosporidiosis in calves

This trial was also used successfully in ewes following the same protocol 28 days before lambing and 8 days after: but at a slightly higher rate (1.5 mg/kg BW). It is to be noted that our colleagues have made the same observations concerning the failure of treatments which did not surround dropping, and the success of those carried out around dropping.

In ewes also, underdosing does not work. It must be noted than frequently the bodyweight of pregnant ewes is underestimated and furthermore than their feed consumption is overestimated which exaggerate the error.

The dosage for toxoplasmosis will also protect against cryptosporidiosis as it is 2 mg/kg BW.

The environment is classically considered as being the source of contamination of very young calves and lambs, but this environment is itself indeed first contaminated by the mothers and then by the sick calves and lambs.

Our hypothesis is that treating cows and ewes over a long period (36 days) diminishes oocyst shedding (fig. 3) which appears to be boosted at calving.

Evaluation of decoquinate to treat experimental cryptosporidiosis in kids

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References

- Navetat H., Poncelet J.L., Richard A. WBC 2004 420 (1204)