The Effect of Varying Levels of DECCOX®* on Experimental *Cryptosporidia* Infections in Holstein Bull Calves

D. R. Redman, *DVM, PhD*[1]
J. E. Fox, *DVM*[2]
[1]*Food Animal Health Research Program*
The Ohio State University
Ohio Agricultural Research and Development Center
Wooster, Ohio 4469l
[2]*Rhone-Poulenc, Atlanta, Georgia, 30350*
®Deccox-Rhone-Poulenc, Atlanta, Georgia 30356

Abstract

Holstein bull calves were used to study the anticryptosporidial effect of decoquinate*. Five calves served as controls and 5 were treated with 225 mg decoquinate in gelatin capsule per feeding until completion of the trial (8 wks). Calves were orally exposed with 8.5x10^5 *Cryptosporidia* oocysts at 4 days of age. Treatment with decoquinate did not prevent shedding of *Cryptosporidia*. It was shown, however, that treatment may delay the time from exposure to shedding, reduce the number of days shedding, and improve the stool consistency score.

Subsequent trials were conducted to compare the effect of varying levels of decoquinate on experimental cryptosporidial infections.

This presentation will include specific results of the trials and a discussion of the practical application of using Deccox® for ameliorating clinical cryptosporidial infections in neonatal calves.

In a preliminary trial, 5 calves were treated from birth with l875 mg Deccox® per feeding for 8 weeks and five served as controls. At four days of age, all calves were challenged with 8.5 x 10^5 *Cryptosporidia* oocysts. Deccox® did not prevent shedding of *Cryptosporidia* oocysts. It was shown that treatment may delay the time from exposure to onset of shedding, reduce the number of days shedding and improve the stool consistency score. The lack of a beneficial response in weight gain could not be explained, although it may be related to the dose of decoquinate used (10X recommended level).

A second trial was conducted to determine the effect of varying levels of Deccox® on experimental *Cryptosporidia* infection in neonatal holstein bull calves. The plan called for four groups of five bull calves consisting of controls, 875, l750, and 3500 mg Deccox® in gelatin capsule per feeding for 4 weeks. Three days after starting the trial, calves were orally challenged with 8.5 x 10^5 viable *Cryptosporidia* oocysts. Calves were penned individually, fed a nonmedicated milk replacer, observed twice daily and daily stool samples were collected, scored and examined for oocyst shedding. Weight gain was also measured. When indicated, samples were checked for other enteropathogens, i.e., *coccidia*, rotavirus, coronavirus, enterotoxigenic *E. coli*.

Because of space and availability of calves, the trial was conducted in two phases with calves being assigned to experimental groups on a randomized basis. The calves were obtained through a local supplier of veal calf facilities, with a request that they originate from the least number of farms as possible and must be assembled and be available within an 8 hour period.

The results of the trial by groups, i.e. controls, 875, l750 and 3500 mg. dosage are respectively shown in Figures l-4. Figures 5-9 show the results for: Fig. 5 - Days to first shedding; Fig. 6 - Number of days shed; Fig. 7 - *Cryptosporidia* shedding score; Figure 8 - number of days with abnormal stool score; and Figure 9 - Average daily gain.

Figure 1. Response of control calves to challenge with 8.5 x 10^5 *Cryptosporidia* oocysts.

CALF #	DA TO 1ST SHEDDING	# DA SHED	CRYPTO SCORE	DA ABNORMAL STOOL CODE	TOTAL WT GAIN	AVG DAILY GAIN
4	5	7	1.33	5	9	.31
10	4	6	2.00	3	6	.21
12	4	10	2.80	3	11	.38
22	4	5	3.00	3	17	.59
Mean	4.25	7	2.2825	3.5	10.75	.37

Figure 2. Response of calves treated with 875 mg Deccox® per feeding and challenged with 8.5 x 10^5 *Cryptosporidia* oocysts.

CALF #	DA TO 1ST SHEDDING	# DA SHED	CRYPTO SCORE	DA ABNORMAL STOOL CODE	TOTAL WT GAIN	AVG DAILY GAIN
1	3	6	2.00	0	16	.55
5	3	9	3.22	2	11	.38
11	3	1	1.00	1	14	.48
13	5	9	2.11	3	13	.45
19	4	4	1.00	0	16	.55
Mean	3.6	5.8	1.866	1.2	14	.48

Figure 3. Response of calves treated with 1750 mg Deccox® per feeding and challenged with 8.5 x 10^5 *Cryptosporidia* oocysts.

CALF #	DA TO 1ST SHEDDING	# DA SHED	CRYPTO SCORE	DA ABNORMAL STOOL CODE	TOTAL WT GAIN	AVG DAILY GAIN
2	10	1	1.00	0	16	.55
6	3	3	3.00	0	19	.66
8	5	1	1.00	1	11	.38
14	3	7	1.85	3	24	.83
17	4	5	1.60	0	12	.41
20	5	2	1.50	0	24	.83
Mean	5	3.16	1.658	.67	17.6	.61

Figure 4. Response of calves treated with 3500 mg Deccox® per feeding and challenged with 8.5 x 10^5 *Cryptosporidia* oocysts.

CALF #	DA TO 1ST SHEDDING	# DAY SHED	CRYPTO SCORE	DA ABNORMAL STOOL CODE	TOTAL WT GAIN	AVG DAILY GAIN
3	3	4	1.25	2	-7	-.24
9	3	9	2.71	2	18	.62
7	3	9	3.33	4	18	.62
18	4	7	3.43	7	2	.07
21	4	1	4.00	0	17	.59
Mean	3.4	6	2.944	3	9.6	.33

Figure 5. Number of days to oocyst shedding between Deccox® treated and control calves challenged with *Cryptosporidium* oocysts.

CONTROLS	875mg	1750mg	3500mg
5	3	10	3
4	3	3	3
4	3	5	3
4	5	3	4
	4	4	4
		5	
Mean 4.25	**3.6**	**5**	**3.4**

Figure 6. Total number of days of oocyst shedding between Deccox® treated and control calves challenged with *Cryptosporidium* oocysts.

CONTROLS	875mg	1750mg	3500mg
7	6	1	4
6	9	3	9
10	1	1	9
5	9	7	7
	4	5	1
		2	
Mean 7	5.8	3.16	6

Figure 7. *Cryptosporidium* shedding scores of Deccox® treated and control calves challenged with *Cryptosporidium* oocysts.

CONTROL	875mg	1750mg	3500mg
1.33	2	1	1.25
2	3.22	3	2.71
2.8	1	1	3.33
3	2.11	1.85	3.43
	1	1.6	4
		1.5	
Mean 2.28	1.866	1.658	2.944

In general, there appeared to be a beneficial response to the treatment up to the 1750mg dosage (10X) level except the number of days to first shedding was not improved at the 875mg level (5X). In contrast, the responses at the 3500mg (20X) level were all very similar to the controls. The reason for the lack of a beneficial response at the 20X level could not be explained. Statistical examination of the data revealed that most all data were very close to being significant; however the only set that was significant was the number of days with abnormal stools where treatment at the 5 and 10X levels were significantly different from the controls and 20X level.

Figure 8. Number of days of abnormal stool scores during oocyst shedding in Deccox® treated and control calves.

CONTROLS	875mg	1750mg	3500mg
5/7	0/6	0/1	2/4
3/6	2/9	0/3	2/9
3/10	1/1	1/1	4/9
3/5	3/9	3/7	7/7
	0/4	0/5	0/1
		0/2	
Mean 3.5	1.2	.67	3

(SIGNIFICANT DIFFERENCE)

Figure 9. Average daily gain between Deccox® treated and control calves challenged with *Cryptosporidium* oocyst

CONTROLS	875mg	1750mg	3500mg
.31	.55	.55	-.24
.21	.38	.66	.62
.38	.48	.38	.62
.59	.45	.83	.07
	.55	.41	.59
		.83	
Mean .3725	.482	.61	.33

The result of the trial, although not conclusive, suggests there may be some beneficial clinical response using Deccox® with experimental cryptosporidial infections. It would be seen beneficial to investigate this in a larger experimental trial or actual field study.

* -®Deccox - Rhone-Poulenc, Atlanta, Georgia 30356.

The Use of J-5 *E. Coli* Common Core Antigens in Controlling Bovine Endotoxemic Disease

Bruce Wren, *DVM, Ph.D.*
Development and Technical Services Veterinarian
Sanofi Animal Health
Overland Park, Kansas

Abstract

Intramammary infections with coliform organisms can lead to endotoxemic disease in the dairy cow, as well as localized disease in the mammary gland itself. Gram negative bacterial core antigen technology is now being used to help prevent both localized and systemic effects of endotoxins. Information concerning the use of an Escherichia Coli Bacterin Toxoid J-5 Mutant Vaccine, J-Vac™ produced by Sanofi Animal Health, in combating an experimental coliform infection in lactating dairy cows will be presented.

Introduction

The endotoxins produced by gram negative bacteria can be devastating to various classes of livestock. Endotoxins produced in cases of coliform mastitis can be especially dangerous and troubling in the dairy cow. Coliform mastitis has become a very prevalent form of mastitis, especially as contagious mastitis appears to be better controlled over the last few years. In addition, some of the most severe cases of clinical mastitis are caused by coliform organisms.

Recent technology has developed a new weapon against the endotoxins formed by the coliforms, the core antigen vaccine. Endotoxins are made up of three main portions: 1) the overlying 0-specific polysaccharide, 2) underlying core antigen and 3) lipid A fraction. It has been found that antibody formed against the core antigen, which has a similar configuration across all gram negative bacteria, is protective against the endotoxins from the coliform group of bacteria. The core antigen technology is based on rough mutations from some gram negative bacteria (*E. coli* and Salmonella) with defects in the overlying O-specific chain, exposing the underlying, cross protective core antigen, allowing for the creation of a truly multivalent anti-endotoxin vaccine.