



Coccivac®-B: Field Coccidial Population Changes Following Vaccination Part 2: Field Observations

Dr. David Chapman¹ and Dr. Harry Danforth² have demonstrated via laboratory sensitivity studies that vaccination with Coccivac-B vaccine can modify the anticoccidia sensitivity of the field population of coccidial oocysts. Dr. Danforth's research has further demonstrated a reduction in the pathogenicity of field oocyst populations following vaccination with Coccivac-B vaccine (Schering-Plough Animal Health Technical Service Bulletin #356).

These laboratory studies have never been corroborated by similar observations under field conditions. The following study details the field observations made at three large integrated broiler complexes over the course of 6 months of vaccination with Coccivac-B vaccine.

Change in oocyst population based upon sequential post-mortem sessions

Companies which initiate vaccination with Coccivac-B vaccine are monitored with regular post-mortem sessions. Each session involves 40 to 60 birds from flocks ranging in age from 14 to 42 days. Gross lesions are monitored using the Johnson and Reid scoring system for *E. acervulina* and *E. tenella*. *E. maxima* scores are based upon microscopic observation of oocysts from a scraping of the midgut mucosa. The *E. maxima* microscopic scoring system is as follows:

+1 = 5 - 100 oocysts per 100 X field

+2 = \geq 100 oocysts per 100 X field

+3 = Too numerous to count (TNTC) oocysts per

100X field + gross lesions such as intestinal ballooning, mild enteritis or petechial hemorrhage.

+4 = TNTC + severe gross enteritis or hemorrhage

This scoring system was developed by technical service veterinarians at Schering-Plough Animal Health. The scoring system is designed to correlate microscopic scraping oocyst counts to actual gross pathology and to the probable impact of *E. maxima* on weight gain and feed conversion under field conditions.

It was determined that a microscopic scoring system was needed for *E. maxima* because oocyst counts greater than 100 could be observed without any gross lesions or enteritis in the affected birds.

Key Points

- **Over the course of sequential post-mortem sessions after the initiation of vaccination with Coccivac-B vaccine:**
 - Complex A saw a marked decline in lesions associated with a heavy population of *E. acervulina*.
 - Complex B saw a marked decline in lesions associated with an aggressive *E. maxima* population.
 - Complex C saw a marked decline in lesions associated with a coccidiostat-resistant *E. tenella* population.
- **Coccivac-B vaccine via spray cabinet can be used as a tool to change the composition of the field coccidial population.**

Acceptable Standard Lesion Scores for Coccivac-B Vaccine Post-Vaccination Reaction

Coccidia spp	+1	+2	+3	+4
<i>E. acervulina</i>	< 30%	< 10%	0	0
<i>E. maxima</i> ¹	< 70%	< 10%	0	0
<i>E. tenella</i>	Combined < 10%		0	0

¹ Based upon microscopic oocyst scores

A sequential summary of these sessions from 3 broiler integrators is shown below. For Broiler Integrator A and Broiler Integrator B, the first post-mortem session was conducted in the spring of the year, and the final post-mortem session was conducted in the fall of the

year. For Broiler Integrator C, the post-mortem session for the ionophore group was conducted in the fall of the prior year, and the Coccivac-B post-mortem sessions began in the spring, and followed the flocks through the fall of the current year.

Broiler Integrator A Post-Mortem Lesion Scores

RED = out of standard

Coccivac-B Flocks	Coccidia spp	+1	+2	+3	+4
Growout 1	<i>E. acervulina</i>	64%	2%	2%	0
Growout 3	<i>E. acervulina</i>	16%	2%	0	0
Growout 1	<i>E. maxima</i> ¹	33%	11%	0	0
Growout 3	<i>E. maxima</i> ¹	13%	2%	0	0
Growout 1	<i>E. tenella</i>	0	0	0	0
Growout 3	<i>E. tenella</i>	3%	2%	0	0

¹ Based upon microscopic oocyst scores

- This complex had a history of heavy *E. acervulina* challenge while using an ionophore anticoccidial program.
- Using Coccivac-B vaccine, *E. acervulina* lesions improved to within standard from the first growout to the third.

Broiler Integrator B Post-Mortem Lesion Scores

RED = out of standard

Coccivac-B Flocks	Coccidia spp	+1	+2	+3	+4
Growout 1	<i>E. acervulina</i>	15%	3%	0	0
Growout 3	<i>E. acervulina</i>	10%	1%	0	0
Growout 1	<i>E. maxima</i> ¹	20%	6%	6%	1%
Growout 3	<i>E. maxima</i> ¹	23%	3%	0	0
Growout 1	<i>E. tenella</i>	1%	1%	0	0
Growout 3	<i>E. tenella</i>	0	0	0	0

¹ Based upon microscopic oocyst scores

- This complex had an extremely aggressive (pathogenic) and ionophore-resistant *E. maxima* population. The pathogenic *E. maxima* was observed during the first post-mortem session.
- Using Coccivac-B vaccine, *E. maxima* lesions improved to within standard from the first growout to the third.

Broiler Integrator C Post-Mortem Lesion Scores

RED = out of standard

Before Coccivac-B	Coccidia spp	+1	+2	+3	+4
salinomycin	<i>E. acervulina</i>	26%	8%	0	0
salinomycin	<i>E. maxima</i> ¹	21%	0	0	0
salinomycin	<i>E. tenella</i>	6%	4%	0	0
After Coccivac-B	Coccidia spp	+1	+2	+3	+4
Growout 1	<i>E. acervulina</i>	20%	0	0	0
Growout 3	<i>E. acervulina</i>	8%	0	0	0
Growout 1	<i>E. maxima</i> ¹	36%	2%	0	0
Growout 3	<i>E. maxima</i> ¹	18%	2%	0	0
Growout 1	<i>E. tenella</i>	10%	6%	0	0
Growout 3	<i>E. tenella</i>	0	0	0	0

¹ Based upon microscopic oocyst scores

- Broiler integrator C had *E. acervulina* and *E. tenella* lesions even while using salinomycin during the same period (fall) in the previous year.
- The *E. acervulina* lesions were actually reduced in vaccinated birds compared to salinomycin-treated birds from the previous year.
- The *E. tenella* lesions improved to within standard from the first Coccivac-B growout to the third vaccination grow out.

Conclusion and Discussion

Sequential field post-mortem sessions are not a scientifically controlled method for observing the changes in field coccidial populations. Coccidial challenge traditionally tends to decline from spring to fall in most US broiler complexes.

Nevertheless, the direct comparison at Integrator C during two consecutive fall seasons appears to indicate a significant improvement in *E. acervulina* and *E. tenella* lesion

scores following vaccination with Coccivac-B vaccine.

Broiler integrators A and B also demonstrated very significant lesion score improvement with respect to their “problem” coccidial challenge.

Coccivac-B vaccine can be a valuable tool to help manage anticoccidial-resistant or aggressive *Eimeria* strains under commercial broiler field conditions.

¹ Chapman, H.D. 1994. Sensitivity of Field Isolates of *Eimeria tenella* Following the Use of a Coccidiosis Vaccine in Broiler Chickens. *Poultry Science* 73:476-478.

² Danforth, H.D., Shirley, M. 2000. Use of Polymerase Chain Reaction-Based Techniques to Identify Avian Coccidia. AAAP Symposium on Molecular Identification and Epidemiology of Avian Pathogens, 137th AVMA Convention, Salt Lake City, UT, pp21-22.

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