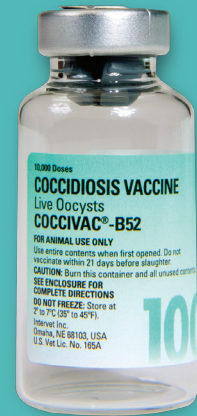


CONCLUSION

Echo Effect



E. maxima hurts performance due to excess nutrients lost to feces and increased body maintenance requirement due to elevated heat production. The impact of *E. maxima* on performance is greatest when these insults occur during the final two weeks prior to slaughter. Ensuring earlier and more complete protection against *E. maxima* infection provides broiler flocks with a better opportunity to achieve full genetic growth and performance potential. The Echo Effect provides full-flock early exposure and faster development of immunity by combining a precocious *E. maxima* with a classic *E. maxima*.

References

McDonald, V, Shirley, MW, Bellatti, MA (1986) *Eimeria Maxima*: Characteristics of Attenuated Lines Obtained by Selection for Precocious Development in the Chicken, *Experimental Parasitology*, April 61 (2) 192-200f

TECHNICAL BULLETIN

Coccivac®-B52 Vaccine “Echo Effect” – What Is It?

Introduction

How does immunity to coccidiosis develop? Under practical field conditions, to achieve immunity, the flock must be exposed to the antigens of the *Eimeria spp* organism multiple times. The immunity to one *Eimeria* species is not cross-protective against the others, so immunity must develop individually against each critical species in a coccidiosis vaccine and immunity must develop individually in each chicken in the flock.

Achieving immunity in every single chicken in the flock is the difficult part: it requires that each bird will pick up sporulated oocysts from each species of *Eimeria* at about the same time. It doesn't take very many sporulated oocysts, but in a broiler house, it can be difficult for some of the birds in the flock to successfully consume the minimum dose needed to achieve full immunity quickly. Eventually, the entire flock will become exposed, but faster immunity develops when there are more sporulated oocysts that are easier to find.



KEY POINTS

- Coccidiosis immunity begins with a priming vaccination, but requires multiple exposures to each *Eimeria* in the field to ensure complete immunity. *E. maxima*, with a lower oocyst output compared to the other broiler *Eimeria* species, often lags behind in immunity development.
- The Echo Effect refers to the double-exposure of vaccinated broilers to a precocious strain of *E. maxima* and a standard strain, with prepatent periods that differ by approximately 24 hours.
- The Echo Effect enhances the priming effect of initial vaccination and improves the opportunity for every individual chicken in the flock to consume sporulated *E. maxima* oocysts in a shorter period of time, resulting in faster, more complete flock immunity.
- Oocyst shedding response and challenge studies have demonstrated that the Echo Effect of Coccivac-B52 induces *E. maxima* immunity faster than the legacy vaccine.
- Earlier immunity means unimpaired growth and broiler performance, even at early slaughter ages.

The Echo Effect induces a faster peak and faster sterile immunity.

***E. acervulina*, *E. mivati* and *E. tenella* are all highly prolific.** Broilers infected with sporulated oocysts of these species will shed a large volume of oocysts in the feces after a typical *Eimeria* life cycle, showering the poultry house with new oocysts. These oocysts sporulate in the poultry litter and re-infect the broilers in the poultry house. Flock immunity is usually achieved by 21 days of age to these species, even when environmental conditions are not ideal for sporulation.

***E. maxima* is not as prolific.** It must also compete with *E. acervulina* for enterocytes to infect under mixed infection or vaccination conditions. Practical experience has shown that full broiler flock immunity may not develop until closer to 28 days of age, with some lingering evidence of *E. maxima* activity at low levels at 30 to 35 days. This is due, in part, to the lower oocyst shedding rate of *E. maxima* compared to the other species, but also because *E. maxima* sporulation is more sensitive to adverse environmental conditions. It is more difficult to ensure that every single broiler in a broiler flock will ingest a sufficient dose of sporulated oocysts to stimulate the immune response after the initial priming vaccination.

Precocious *E. maxima*

A precocious strain of *E. maxima* is created by selecting only the very first oocysts naturally shed from a parent strain. These oocysts are repeatedly put into SPF birds and the very first oocysts from each successive generation are selected. In this way, naturally-occurring precocious *Eimeria* strains are selected. Precocious means “early shedding”; but what it really means is that the life cycle has been shortened by the elimination of one or more asexual stages (McDonald, Shirley et al 1986).

In the case of Coccivac-B52, the precocious strain has a prepatent period of 96 hours vs. 120 hours for the parent strain: a difference of 24 hours. This reduction of asexual stages also reduces the pathogenicity of the strain in terms of number of enterocytes infected and oocyst output.

Echo Effect

The Echo Effect is the double-exposure of the broiler chicks to *E. maxima* with both shorter and longer life cycles. It enhances the opportunity for birds to achieve an initial priming infection with the first vaccination exposure, and also enhances the opportunity for every single bird in the broiler flock to pick up a secondary exposure in a shorter period of time. Thus the time required to achieve full flock immunity is reduced to 21 days. Figure 1 shows the *E. maxima* peaks of a legacy vaccine vs. Coccivac-B52: the Echo Effect induces a faster peak and faster sterile immunity.

Figure 1:
E. maxima shedding patterns: Legacy Vaccine vs. Coccivac-B52

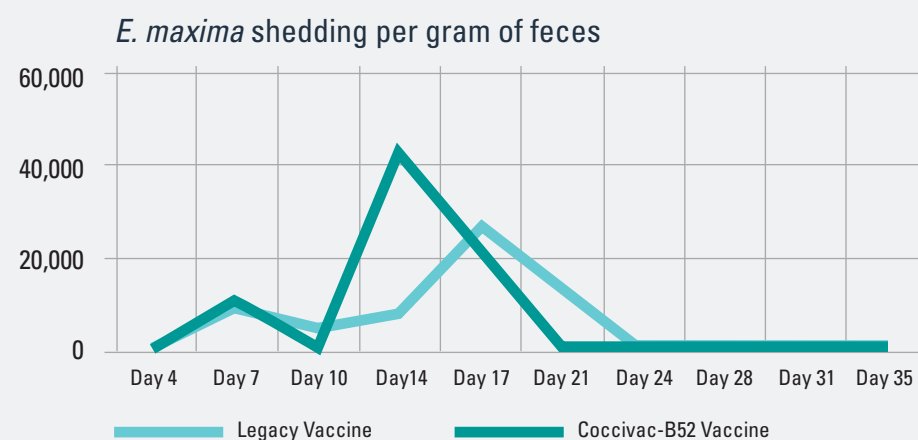


Figure 2:
Broilers vaccinated at one day of age challenge with virulent *Eimeria maxima*

Figure 2 shows the results of a challenge study conducted at 17 days post-vaccination at one day of age, comparing the Coccivac-B52 vaccine vs. a legacy vaccine.

The more effective stimulation of *E. maxima* immunity with the Echo Effect results in faster development of complete immunity to the species that is most associated with damage to the middle intestine and nutrient absorption.

