EFFECT OF SUPRACOX® (EGG YOLK IMMUNOGLOBULIN) IN BROILER CHICKENS AGAINST COCCIDIOSIS

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Introduction

Avian coccidiosis is an intestinal disease caused by several distinct species of Eimeria protozoa and is the most economically significant parasitic infection of the poultry industry worldwide. Different control methods are needed due to increasing concerns with drug use and high cost of vaccines. The use of egg yolk immunoglobulin (SUPRACOX®) has shown to be an alternative for control through passive immunization using specific antibodies obtained through hyperimmunization of SPF birds (Lillehoj and Lucio).

Objective

To evaluate the comparative protective level against a field challenge with avian coccidiosis of a typical program (nicarbazin plus salinomycin) as compared with programs using Supracox® in feed premix and liquid presentation in 2 programs; in the prestarter and starter phase ending with salinomycin in the growth phase (Supracox® 1) or Supracox® during all the feeding phases (Supracox® 2).

Material and methods

The trial was carried out in a broiler farm in the Central area of Mexico. A total of 4,920 day old Ross 308 males were divided in 3 groups of 1,640 each and allocated in 10 pens of 164 birds each to obtain 10 replicas per group. The broilers received one of 3 anticoccidial programs as referred in **Table 1**.

Description of phases:

Prestarter (1 - 7 days)
Starter (8 - 21 days)
Growth (22 - 45 days)
Finisher (46 - 49 days)

Table 1

Typical program		Supracox® 1		Supracox® 2	
Product	**Age**	**Product**	**Age**	**Product**	**Age**
Nicarbazin	1 to 21 days	Supracox® P*	1 to 21 days	Supracox® P*	1 to 45 days
Salinomycin	22 to 45 days	Salinomycin	22 to 45 days		
Withdrawal	46 to 49 days	Withdrawal	46 to 49 days	Withdrawal	46 to 49 days

Notes:
1. Supracox® P* (Premix 10%) was administered at 3 Kg/ton of feed.
2. Groups 1 & 2 received Supracox® L (liquid Supracox®) at a dose of 2 mL/bird/day at 24, 25 & 26 days of age.
3. Nicarbazin was fed at a dose of 200g/ton of feed.
4. Salinomycin was fed at a dose of 500g/ton of feed.

Birds were weighed weekly (all birds per pen) and fecal samples were used to perform oocyst count.
Fecal samples collection was performed on days 14, 21, 28 and 35 days of age. Collection was done taking fresh and suspicious feces; portions of 0.5 - 1.0 grams. The samples were submitted in cool temperature to the Laboratory of IASA in Tehuacan, Puebla for analysis, identification and quantification.

Results

Oocyst count indicated low presence (highest below 8,000) from the 3 groups, to *E. acervulina*, *E. tenella* and *E. maxima*.

Histopathological analysis of the intestine gave an evaluation of above 85% for the 3 groups, which is interpreted as an adequate protection with low level of lesion scores.
The lesion score for each species of *Eimeria sp*. gave for *E. acervulina* and *E. maxima*, a score of lesions of 1.2 for the typical program and 1.3 for groups Supracox® 1 and 2. For *E. tenella*, the score of lesions was similar for the 3 groups (1.3). According to this evaluation, the 3 groups had an excellent protection against the field challenge

Productive parameters

PRODUCTIVE PARAMETERS	Typical	Supracox® 1	Supracox® 2
% of Mortality	3.60 a	4.86 b	3.96 a
Daily weight gain (g)	64.7 a	64.5 a	64.8 a
Weight at 7 days(g)	167.7 a	175.5 b	176.5 b
Weight at 14 days (g)	413.9 a	487.3 b	492.3 b
Weight at 21 days (g)	773.6 a	823.6 b	844.1 b
Weight at 28 days (Kg)	1.293 a	1.309 a	1.314 b
Weight at 35 days (Kg)	1.836 a	1.842 a	1.885 b
Weight at 42 days (Kg)	2.426 a	2.435 a	2,482 b
Weight at 49 days(Kg)	3.168 a	3.162 a	3.177 a
Feed conversion	1.750 a	1.766 a	1.751 a
Productivity index	356.4 a	347.4 a	355.4 a
Density (birds/m^2)	13.5	13.5	13.5
Kg / m^2	41.228 a	40.612 a	41.191 a

a,b. Different literals over the same line indicate statistic differences $p<0.05$ between treatments.
Multiple comparison of medias Tukey-Kramer $p<0.05$.

Discussion

Lillehoj and Lucio have published several papers documenting the strategy to control coccidiosis without using drugs through passive immunization administered by oral route. Lillehoj has obtained in different studies a reduction of oocysts for *E. tenella*, *E. acervulina* and *E. maxima* and a better weight gain, which partially concurs with the results of this study.
Antibodies are produced by B lymphocytes. Antibody molecules are able to chemically recognize surface epitopes of large molecules that act as antigens. Among the effector mechanisms of antibodies are the capacity to combine with antigens to neutralize the antigen, the removal of harmful substances from circulation and the capacity to bind bacteria or foreign cells and cause agglutination. The protection of the invasion from the parasites in the intestine is one of the reasons to expect protection. The better weight gain may be explained due to the lack of toxicity as compared to chemicals and to the saving of energy needed when inflammatory reactions occur.

In this study, the protective effects of orally administered Eimeria-specific hyperimmune IgY antibodies obtained from hens hyperimmunized with mixed species of coccidia oocysts were evaluated against a field challenge exposure.The chicks from groups Supracox® 1 and 2 showed significantly increased body weight gains and low fecal oocyst shedding compared to the typical program with the standard diet during the time they were administered in the feed. Nevertheless, the better weight gain was lost when the product was withdrawn, obtaining a similar weight at the end of the trial. This was probably due to the lack of a residual activity of the product and some level of parasite replication.

Conclusions

We conclude that passive immunization with hyperimmune IgY antibodies provides substantial protection against avian coccidiosis in newly hatched chicks.

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