**CONCLUSIONS**

Anticoccidial vaccinations applied in prophylactic farms for coccidiosis, benefit to improve performances and financial parameters against coccidiosis, over FCR and mortality, higher ADG final body weight and in general, we consider that there were no statistical differences between prophylactic and therapeutic vaccinations. On the contrary, absolute results of mortality, FCR and EPEF improved statistically when comparing both groups (Table 9). We consider that results for all parameters, except for mortality, are better compared to those of vaccinations, while FCR (2000 X age, days) and EPEF are statistically better than before and during vaccination. In a consequence, it seems clear that anticoccidial vaccination promotes the eradication of the pathological benign field strain towards anticoccidial. Finally, it is interesting to observe that anticoccidial vaccination seems to reduce mortality better than when using in-feed anticoccidials during the trial. Vaccination against coccidiosis with Hipracox® proves to be a valid commercial approach, both during and especially after returning to in-feed anticoccidials.

**REFERENCES**


In industrial poultry production, designing a preventive program for controlling coccidiosis is one of the most important decisions to be taken in order to safeguard and improve zootechnical and financial performances. Although anticoccidial products traditionally were considered sufficient to control clinical coccidiosis, live anticoccidial vaccines are becoming more popular even though, as they offer additional protection when used in anticoccidial rotation rotations. In fact, live anticoccidial vaccines are able to promote the restoration of the sensitivity of Eimeria field strains towards anticoccidial. The objective of the study was to evaluate the efficacy of a live coccidiosis vaccine Hipracox® given in doses daily of one of the first few days of life and of the control group, on the performance data of approximately 495,000 birds for Farm 1, vaccinated and non-vaccinated, during 2 (Farm 1: House 1 and 2) or 3 (Farm 2: House 3, 4, 5, 6, 7) consecutive cycles. In this trial, the impact of anticoccidial vaccinations is estimated by evaluating the impact of fixed coccidiosis vaccinations when comparing both control groups. The results were also compared with those of the same farms when using standard production conditions. In total, 7 houses were vaccinated during 2012 until 7 months. A total of 12,370 coccidiosis cases were treated in the group of animals of this trial. The birds were divided into 2 groups, number of birds slaughtered and the two slaughter ages. Both farms, before vaccinations, were considered by veterinary supervision as anticoccidial sensitive. Two groups of birds were therefore treated with 0.005% xanathic acid, 0.1% nicotine and 0.1% xanathic acid. In this trial, we evaluated the performance data of approximately 200,000 birds per cycle. We estimated that the performance data of approximately 475,000 birds for Farm 1, vaccinated and non-vaccinated, during the 2 cycles (or 3 if applicable) and two slaughter ages. Additionally, all farms which were considered to be highly clinical, were vaccinated daily with a dosage of 10,000 birds per day.

**Zootechnical and economical evaluation of the use of a live anticocci- dial vaccine in rotation with anticoccidial products in broiler chickens: results of a field trials from Belgium and the Netherlands**

M. Dardi1, M. De Gussem2, K. Van Mullem2, H. Van Meirhaeghe2, N. Vandenbussche3, M. Pagès2, J. Rubio1


RESULTS & DISCUSSION

Table 3. Overall Averages of each investigated parameter of CBV, CDV and CAV

Table 1. Farm History: Site 1 - Belgium

Data presented as mean ± standard deviation. Values in each column with different superscript letters are statistically significantly different at P ≤ 0.05.

Table 2. Farm History: Site 2 - The Netherlands

Table 3. Overall Averages of each investigated parameter of CBV, CDV and CAV

Table 4. Average Slaughter age on the performance parameters. There were slight differences in slaughter age between Farm 1 and Farm 2 before vaccination.

Table 5. Average Final Weights per houses at 46 days

Data presented as mean ± standard deviation. Values in each column with different superscript letters are statistically significantly different at P ≤ 0.05 by a one-way analysis of variance (ANOVA) test.

Figure 1. Overall Mortality of CBV, CDV and CAV

Figure 2. Overall Body Weight of CBV, CDV and CAV

Figure 3. Overall FCR2000 of CBV, CDV and CAV

Figure 4. Average Daily Gain

Figure 5. Overall AID% of CBV, CDV and CAV

Table 6. Average FCR2000 per house

Table 7. Average AID% per house

Area Coccidia

Mortality was recorded on a daily basis by the farmer. Before vaccination there were no apparent differences other than vaccination on the farms which consequently had an impact on mortality. In both the Farm 1, cycles 6 and 8 birds vaccinated and after vaccination, FCR (Feed conversion ratio) anticoccidial protocols were administrated but we assume this did not affect the total mortality of the flock.

In the houses not delayed after the delay in the vaccination of coccidiosis, it was not sufficient to attribute the lower mortality to an improvement in its control. In spite of this, there have been no single occurrence of an improved mortality rate after one in vaccination. So in the other farms, Farm 1 was vaccinated with EPEF during cycle 3 to 6 in the vaccination and the first post vaccination. These had been no correlation for these variations.

However, with the same experimental diets are not statistically significantly different at P > 0.05 by a one-way analysis of variance (ANOVA) test.

Slaughter age has an impact on the performance parameters. There were slight differences in slaughter age between Farm 1 and Farm 2 before vaccination.

Average body weights corrected at the same age (41 days) are presented per house. Before/after vaccination (CBV) differences can be counted by subtracting the average weights of thinning and final slaughter ages from the average daily gain.

Values with different superscript letters are not statistically significantly different at P ≤ 0.05 by a one-way analysis of variance (ANOVA) test.

Values with the same experimental diets are not statistically significantly different at P > 0.05 by a one-way analysis of variance (ANOVA) test.

When analyzing the data of overall average BW of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P ≤ 0.05.

When analyzing the data of overall average BW of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average BW of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P ≤ 0.05.

When analyzing the data of overall average BW of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P ≤ 0.05.

When analyzing the data of overall average BW of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.
RESULTS & DISCUSSION

Table 1. Farm History: Site 1 - Belgium

<table>
<thead>
<tr>
<th>Cycle</th>
<th>Antimicrobials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cycles before vaccination (CBV) (Table 1 and 2)</td>
</tr>
<tr>
<td>2</td>
<td>Once before vaccination (CAV)</td>
</tr>
<tr>
<td>3</td>
<td>Twice before vaccination (CDV)</td>
</tr>
</tbody>
</table>

1. Cycles before vaccination (CBV) (Table 1 and 2)

All zootechnical results are divided in three major groups (Table 3):

- CDV: 2.66±0.42a
- CAV: 2.91±1.05a
- CBV: 58.04±0.76a

Values presented as mean ± standard deviation. Values in each column with different superscript letters are statistically significantly different at P < 0.05.

Table 2. Table 3. Average Mortality of CBV, CDV and CAV

<table>
<thead>
<tr>
<th>Week</th>
<th>Before/After 1</th>
<th>Before/After 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.04±0.76a</td>
<td>58.38±0.71a</td>
</tr>
<tr>
<td>2</td>
<td>58.09±0.80a</td>
<td>58.53±0.73a</td>
</tr>
</tbody>
</table>

Figure 1. Overall Average Mortality of CBV, CDV and CAV

Mortality was recorded on a daily basis. Before vaccination there was no apparent disease other than coccidiosis on the farms which necessitated an initial cycle. As mortality is reported in Figure 1, the Farm 1, cycles 8 and 9 background vaccination and the 5th vaccination, CDS (triclosan technology) dosages applied at the farm were examined. These factors did not affect the total mortality of the flock.

In the houses did not show any signs of clinical or subclinical coccidiosis, it seems difficult to attribute the lower mortality in 4 years to its control. Right in this, there were no other factors such as environmental conditions and diet. After the vaccination, the lower background mortality in the first other basic CVD vaccinated were cycle 1 and 2 post vaccination and first challenge. There had been no correction for these mortalities.

Value with the same superscript letters are not statistically significantly different at P > 0.05 by a one-way analysis of variance (ANOVA) test.

Figure 2. Overall Average Body Weight of CBV, CDV and CAV

Figure 3. Overall FCR2000 of CBV, CDV and CAV

Table 3. Average Final Weights per house corrected at 41 days

<table>
<thead>
<tr>
<th>Week</th>
<th>Before/After 1</th>
<th>Before/After 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.09±0.80a</td>
<td>58.53±0.73a</td>
</tr>
</tbody>
</table>

Figure 4. Overall Average ADG of CBV, CDV and CAV

When analyzing the data of overall average ADG of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.

Table 4. Average ADG of each individual parameters of CBV, CDV and CAV

Average live body weights corrected at the same age (41 days) are presented per house according to the grouping before, during and after coccidiosis vaccination (Table 5). The formula used was:

Average daily gain (ADG) was calculated by dividing the average slaughter weight (taking into account the average weights of thinning and final slaughter) with the average number of days between slaughter (Figure 4). The formula used was:

Figure 5. Overall Average Mortality of CBV, CDV and CAV

When analyzing the data of overall average FCR2000 of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.

Figure 6. Overall Average FCR2000 of CBV, CDV and CAV

When analyzing the data of overall average FCR2000 of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.

Figure 7. Overall Average FCR2000 of CBV, CDV and CAV

Area Coccidia

1 MORTALITY

Mortality was recorded on a daily basis. Before vaccination there was no apparent disease other than coccidiosis on the farms which necessitated an initial cycle. As mortality is reported in Figure 1, the Farm 1, cycles 8 and 9 background vaccination and the 5th vaccination, CDS (triclosan technology) dosages applied at the farm were examined. These factors did not affect the total mortality of the flock.

In the houses did not show any signs of clinical or subclinical coccidiosis, it seems difficult to attribute the lower mortality in 4 years to its control. Right in this, there were no other factors such as environmental conditions and diet. After the vaccination, the lower background mortality in the first other basic CVD vaccinated were cycle 1 and 2 post vaccination and first challenge. There had been no correction for these mortalities.

Value with the same superscript letters are not statistically significantly different at P > 0.05 by a one-way analysis of variance (ANOVA) test.

Figure 1. Overall Average Mortality of CBV, CDV and CAV

Mortality %

2 BODY WEIGHT

Stiff age has an impact on the performance parameters. There were slight differences in stiff age between Farm 1 and 2 (Table 2).

Table 4. Average Slaughter Age per house

<table>
<thead>
<tr>
<th>Week</th>
<th>Before/After 1</th>
<th>Before/After 2</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
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</table>

Figure 2. Overall Average Body Weight of CBV, CDV and CAV

Figure 3. Overall FCR2000 of CBV, CDV and CAV

Table 5. Average Final Weights per house corrected at 41 days

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Figure 4. Overall Average ADG of CBV, CDV and CAV

When analyzing the data of overall average ADG of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.

Table 6. Average FCR2000 per house

<table>
<thead>
<tr>
<th>Week</th>
<th>Before/After 1</th>
<th>Before/After 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.09±0.80a</td>
<td>58.53±0.73a</td>
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</tbody>
</table>

Figure 5. Overall Average Mortality of CBV, CDV and CAV

When analyzing the data of overall average FCR2000 of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.

Table 7. Average ADG per house

<table>
<thead>
<tr>
<th>Week</th>
<th>Before/After 1</th>
<th>Before/After 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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</tbody>
</table>

Figure 6. Overall Average FCR2000 of CBV, CDV and CAV

When analyzing the data of overall average FCR2000 of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.

Table 8. Average ADG per house

<table>
<thead>
<tr>
<th>Week</th>
<th>Before/After 1</th>
<th>Before/After 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>58.09±0.80a</td>
<td>58.53±0.73a</td>
</tr>
</tbody>
</table>

Figure 7. Overall Average FCR2000 of CBV, CDV and CAV

When analyzing the data of overall average FCR2000 of CBV, CDV and CAV, using a one-way analysis of variance (ANOVA) test, we found a statistically significant difference at P < 0.05.
RESULTS & DISCUSSION

Table 3. Overall Averages of each investigated parameter of CBV, CDV and CAV

<table>
<thead>
<tr>
<th>Parameter</th>
<th>CBV</th>
<th>CDV</th>
<th>CAV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality%</td>
<td>1,53%</td>
<td>1,53%</td>
<td>1,53%</td>
</tr>
<tr>
<td>ADG</td>
<td>59,29</td>
<td>58,76</td>
<td>59,39</td>
</tr>
<tr>
<td>FCR2000</td>
<td>58,04</td>
<td>58,38</td>
<td>58,67</td>
</tr>
<tr>
<td>P2000</td>
<td>58,39</td>
<td>58,67</td>
<td>58,67</td>
</tr>
<tr>
<td>EPEF</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>FCR</td>
<td>58,38</td>
<td>58,67</td>
<td>58,67</td>
</tr>
<tr>
<td>P2000</td>
<td>58,39</td>
<td>58,67</td>
<td>58,67</td>
</tr>
<tr>
<td>EPEF</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>P2000</td>
<td>58,39</td>
<td>58,67</td>
<td>58,67</td>
</tr>
</tbody>
</table>

1. Cycles before vaccination (CBV) (Table 1 and 2)

Data presented as mean ± standard deviation. Values in each column with different superscript letters are statistically significantly different at P ≤ 0.05.

2. Cycles during vaccination (CDV) (Table 1 and 2)

3. Cycles after vaccination (CAV) (Table 1 and 2)

When analyzing the data of overall average BW of CBV, CDV and CAV (Figure 2) using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average FCR2000 of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average ADG of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average EPEF of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average mortality of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

Mortality has some impact on the performance parameters. There were slight differences in ADG between the groups, which may be due to the different mortality rates. In general, the trial had a higher FCR during vaccination and all of them had an FCR of 0.05 (Figure 4).

The data presented here are based on the assumption that the comparison of the results is valid. There had been no correction for these mortalities.

When analyzing the data of overall average EPEF of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average mortality of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average mortality of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.

When analyzing the data of overall average mortality of CBV, CDV and CAV using a one-way analysis of variance (ANOVA) test, we found no statistically significant difference at P > 0.05.
**CONCLUSIONS**

Anticoccidial vaccination applied in problematic farms for coccidiosis, revealed to improve performance parameters and productivity. When analyzing with a one-way analysis of variance (ANOVA) test, we found the data of overall EPEF of CBV, CDV and CAV to have a statistically significant difference at P ≤ 0.05 (Figure 5).

The objective of the study was to evaluate the efficacy of a live coccidiosis vaccine Hipra® given in the comple time of one of the consecutive cycles. In the study, 386 pens of 6,000 birds each were randomly assigned to either a control group that did not receive anticoccidials or a vaccination group treated with the live vaccine Hipra®. The results showed that the vaccination group had a significant improvement in overall EPEF compared to the control group.

**REFERENCES**


**Zootecnic and economical evaluation of the use of a live anticoccidial vaccine in rotation with anticoccidial products in broiler chickens: results of a set of field trials from Belgium and the Netherlands**

In industrial poultry production, designing a preventive program for combating coccidiosis is one of the most important decisions to be made. In order to safeguard or improve zootechnical and financial results, many factors need to be taken into account. In this trial, the impact of subclinical coccidiosis is estimated by evaluating the impact of coccidiosis vaccination when using anticoccidials in the feed. The results showed that the vaccination group had a significant improvement in overall EPEF compared to the control group.

**Anticoccidial use was not higher in terms of kg of active product during vaccination.** Furthermore, the use was also not higher in regard to days of treatment. The main difference was in the use of anticoccidials: lower FCR and mortality, higher ADG final body weight and EPEF. In general, we can conclude that anticoccidial vaccination seems to reduce mortality better than vaccination, while ADG, FCR2000 and EPEF are statistically better than before and during vaccination. In consequence, it seems clear that anticoccidial vaccination permits the restoration of the normality of kinetic field strain towards anticoccidial.

**Table 8. Average EPEF per house**

<table>
<thead>
<tr>
<th>Area</th>
<th>EPEF Before</th>
<th>EPEF After</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBV</td>
<td>362</td>
<td>344</td>
</tr>
<tr>
<td>CDV</td>
<td>375</td>
<td>369</td>
</tr>
<tr>
<td>CAV</td>
<td>376</td>
<td>378</td>
</tr>
</tbody>
</table>

**Table 9. Number of Intestinal Treatments for Farm 1 (both houses)**

<table>
<thead>
<tr>
<th>Area</th>
<th>Coccidiosis</th>
<th>Bacterial Enteritis</th>
<th>Parasitic Enteritis</th>
<th>Stress Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBV</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>CDV</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>CAV</td>
<td>6</td>
<td>3</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

**Figure 5. Overall EPEF of CBV, CDV and CAV**

**Antibiotic use during vaccination**

When analyzing with a one-way analysis of variance (ANOVA) test, we found the data of overall EPEF of CBV, CDV and CAV to have a statistically significant difference at P ≤ 0.05 (Figure 6).
5 EPEF

European Production Efficiency Factor is a way of estimating the performance of a flock combining the information of mortality, slaughter age, body weight and feed conversion ratio. Different formulas are used and in this study the zootechnical and economical evaluation of the use of a live anticoccidial vaccine in rotation with anticoccidial products in broiler chickens: results of a set of field trials from Belgium and the Netherlands

EPEF

Table 8. Average EPEF per house

<table>
<thead>
<tr>
<th>House</th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm 1</td>
<td>344</td>
<td>362</td>
</tr>
<tr>
<td>Farm 2</td>
<td>355</td>
<td>369</td>
</tr>
</tbody>
</table>

REFERENCES


6 ANTIBIOTIC USE DURING VACCINATION

Antibiotic use was not higher in terms of kg of active product during vaccination compared to cycles without vaccination (Table 1). This statement is confirmed also when analyzing antibiotic use per kg of active product (Table 2). In general, we can conclude that there were no important differences between pre and inter-vaccination in any parameter. On the contrary, absolute values of VOD for FL and EPM were improved significantly (Table 2). Further, antibiotic use was not higher in terms of kg of active product during vaccination compared to cycles before vaccination. In consequence, it seems clear that anticoccidial vaccination promotes the eradication of the natural strain of Eimeria field strains towards anticoccidials. Finally, it is interesting to observe that anticoccidial vaccination seems to reduce mortality better than the antibiotic treatment. In fact, all birds received the same antibiotic treatment during the two trials. Vaccination against coccidiosis with Hexacomb® proved to be a valid economical approach, both during and especially after returning to in-feed anticoccidials.

Area Coccidia

In industrial poultry production, designing a preventive program for controlling coccidiosis is one of the most important decisions to be made in order to safeguard or improve zootechnical and financial performance of a flocks. In recent years, anticoccidials were widely used as a consequence of the sensitivity of Eimeria field strains to the previously traditional anticoccidials, the zootechnical and financial impact of using anticoccidial vaccines are estimated by evaluating the impact of live coccidiosis vaccination when rotating from a traditional non-rotational shuttle program using traditional anticoccidials by applying live coccidiosis vaccines is estimated. Both farms, before vaccinations, were considered by veterinary supervisors as coccidiosis attention farms. Frequently, signs of coccidiosis were noticed through an increased mortality when using anticoccidials. In conclusion, for the type of farms traditionally were considered sufficient for controlling clinical coccidiosis, live coccidiosis vaccines are becoming increasingly popular, though, as they offer several advantages when it comes to anticoccidial treatment, such as the improvement of the nature of coccidiosis vaccines as well as to the nature of the Eimeria field strains towards anticoccidials.

The objective of the study was to evaluate the efficacy of a live coccidial vaccine, Hexacomb® glue, during the laying cycle of one of the largest existing poultry facilities in the Netherlands. The performance data of approximately 495,000 birds for Farm 1, 272,400 birds for Farm 2, was compiled by the supervisory team. During the laying cycle, the birds were sexed. The final slaughter age was 40-42 days. In the economical assessment, change of weight in the second cycle was considered a consequence of the fact that the average, number of birds slaughtered in the two slaughter ages.

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