

## THE USE OF A LIVE COCCIDIOSIS VACCINE IN ROTATION WITH ANTICOCCIDIAL FEED ADDITIVES: RESULTS FROM THE BELGIAN FIELD



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### 1 INTRODUCTION

Coccidiosis still is one of the most costly diseases in modern broiler production. The most important reason for this financial loss is an increased feed conversion ratio (FCR) and a decreased weight gain (Williams, 1999), which is even more pronounced when feed costs are high. Additionally, clinical disease - in broilers mainly caused by *Eimeria tenella* - will lead to increased mortality. Coccidiosis is also one of the most important predisposing factors for bacterial enteritis (dysbacteriosis and/or necrotic enteritis), which adds to the total damage (Timbermont et al., 2011).

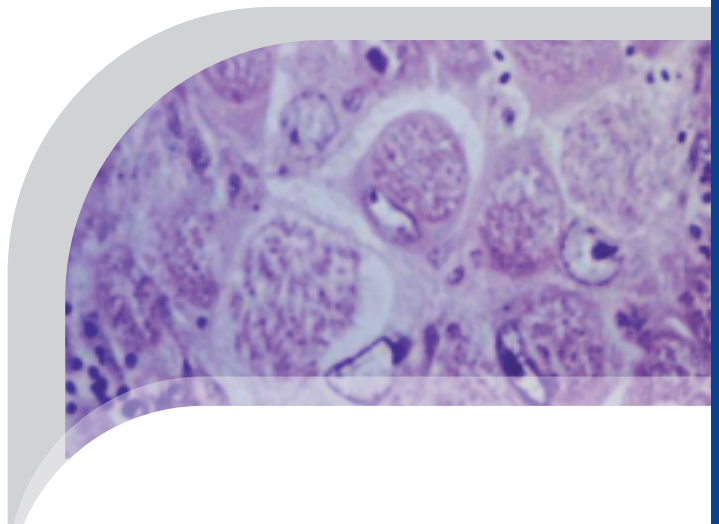
Therefore, adequate coccidiosis prevention is crucial. Anticoccidial feed additives or anticoccidial drugs have been and still are the most widely used prevention tool in broilers. These products have many merits but the two main issues associated with their use are (i) reduced sensitivity of *Eimeria* parasites when a certain product is used too long or too often and (ii) cross resistance between certain compounds (Marien et al., 2007). Recent regulatory developments - i.e. the reduction in withdrawal times of monovalent ionophores and nicarbazin - have increased flexibility for broiler growers but also added to both aforementioned issues: (i) exposure of *Eimeria* to these compounds has increased, since they are used for a longer time during a broiler grow-out cycle and (ii) there is an increased use of products of the same category (monovalent ionophores), between which cross resistance exists.

Therefore, there is an intensified need for alternative coccidiosis prevention approaches. Rotational programmes, where anticoccidial feed additives with different modes of action are used judiciously, are one such approach. Another, increasingly popular approach is the regular use of coccidiosis vaccines as part of a long term prevention strategy.

The current bulletin summarizes the main zootechnical results of the use of a coccidiosis vaccine (Hipracox<sup>®</sup>) under Belgian field conditions in 8 farms (25 houses in total). The number of cycles per house, in which the vaccine was applied, varied between 2 and 6, with an average of 4.3 vaccinated cycles per house. This amounted to 112 vaccinated flocks, totalling 2,330,000 vaccinated broilers. The farms had a history of overuse of monovalent ionophores and/or nicarbazin which led to clinical coccidiosis outbreaks. Prior to coccidiosis vaccination, a so called chemical clean-up programme was applied in approximately half of the houses – the goal being to reduce the background coccidiosis infection pressure and to maximize the chances for the vaccine strains to repopulate the house. To increase the chances for success of this chemical clean-up, a chemical anticoccidial feed additive was selected that was not used recently on the farm. After coccidiosis vaccination, all farms returned to their original anticoccidial programme based on monovalent ionophores and/or nicarbazin.

#### The current bulletin summarizes the main zootechnical results of:

- 8 farms (25 houses)
- 122 vaccinated flocks (2,300,000 broilers)
- Chemical "clean-up" applied in half of the houses



### 2 RESULTS AND DISCUSSION

All results were categorized in 3 groups: 1/ results of cycles before vaccination ("CBV"; 6.9 cycles per house, on average), 2/ during vaccination ("CDV"; 4.3 cycles per house, on average) and 3/ after vaccination ("CAV"; 3.6 cycles per house, on average). The overall averages can be found in Table 1.

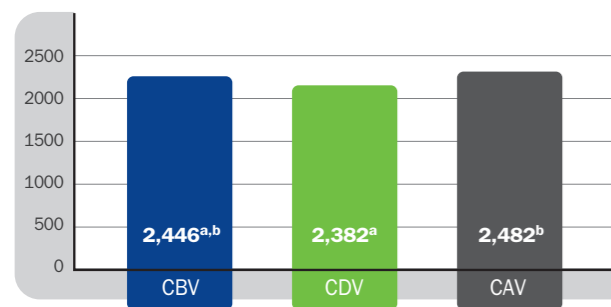
Table 1. Overall averages of the investigated parameters; before, during and after vaccination

	Body weight	Average daily gain	FCR 1500	FCR 2000	Mortality (%)	EPEF
CBV: cycles before vaccination	2446 <sup>a,b</sup>	61.2 <sup>a,b</sup>	1.35 <sup>a</sup>	1.57 <sup>a</sup>	3.8 <sup>a</sup>	366 <sup>a</sup>
CDV: cycles during vaccination	2382 <sup>a</sup>	59.5 <sup>a</sup>	1.33 <sup>a</sup>	1.55 <sup>a</sup>	2.9 <sup>b</sup>	368 <sup>a</sup>
CAV: cycles after vaccination	2482 <sup>b</sup>	62.0 <sup>b</sup>	1.29 <sup>b</sup>	1.52 <sup>b</sup>	2.9 <sup>b</sup>	391 <sup>b</sup>

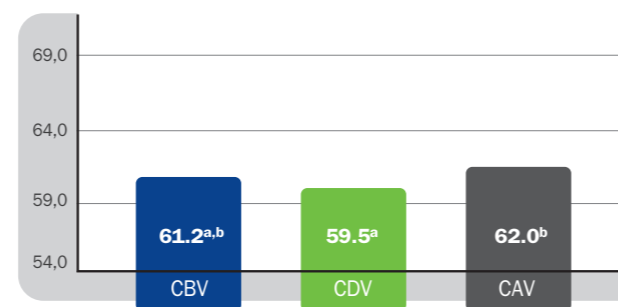
#### Body weight and average daily gain

Since not all flocks in this survey were slaughtered at the same final age, body weights and average daily gains were corrected to an age of 40 days. This allowed for better comparisons. CDV showed no statistical difference with CBV but were significantly lower than CAV. After switching back to the original anticoccidial programme (CAV), the body weights increased with close to 40 grams (graph 1) when compared with CBV. When comparing the corrected average daily gains in CBV versus CDV and CAV, similar observations could be made as were for body weights (graph 2).

Graph 1. Corrected Body Weight



Graph 2. Average Daily Gain



#### Feed conversion ratio

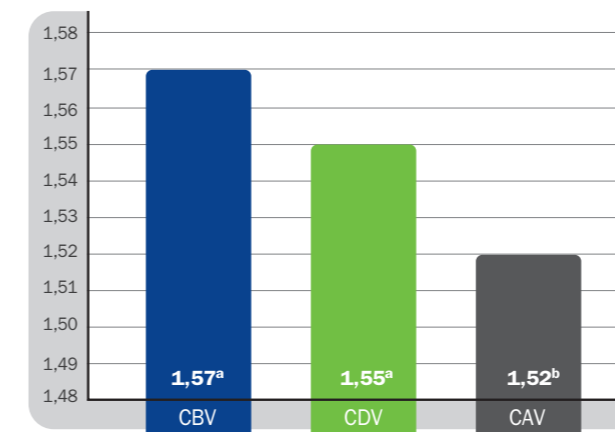
To be able to compare feed conversion ratios, two corrections were made:

(1) To a weight of 2000 grams. Therefore, the following formula was used:

$$FCR2000 = FCR - Y \text{ with } Y = (\text{Average slaughter weight} - 2000) \times 0.33$$

FCR2000 in CBV and CDV was similar. FCR after vaccination, however, was significantly lower than before vaccination. It improved by 5 points. (graph 3).

Graph 3. FCR2000

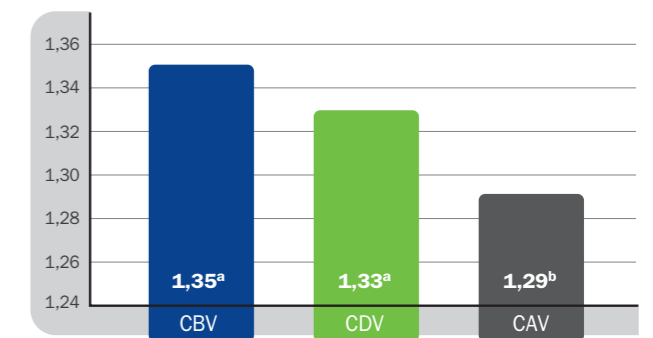


(2) To a weight of 1500 grams. This is a typical Benelux correction, which is still widely used today (although not really adapted to current final weights). For this correction, the following formula was used:

$$FCR1500 = FCR - Y \text{ with } Y = (\text{Average slaughter weight} - 1500) \times 0.33$$

When comparing FCR1500 in CBV, CDV and CAV, similar observations could be made as for the FCR2000. Results are summarized in Graph 4. (graph 4).

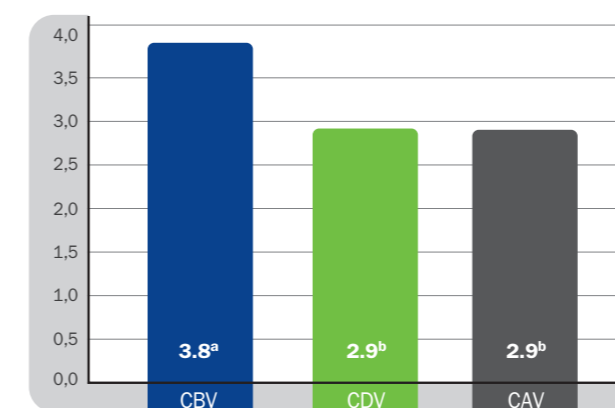
Graph 4. FCR1500



#### Mortality

Mortality was recorded daily by the farmer. Graph 5 shows the results. Prior to vaccination, there were no apparent diseases – other than coccidiosis – with a presumable impact on mortality. There was a significantly lower mortality in CDV and CAV versus CBV. (graph 5)

Graph 5. Mortality



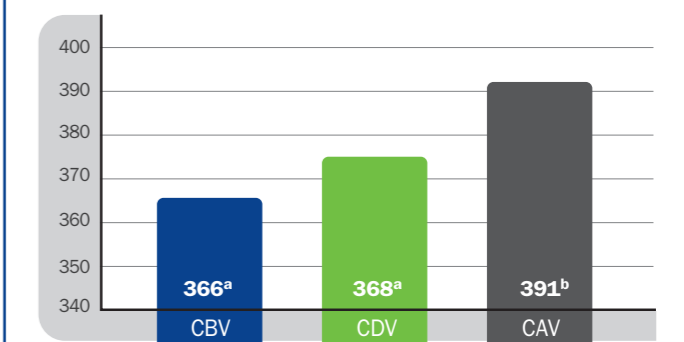
#### EPEF

European Production Efficiency Factors were calculated by using the default formula:

$$EPEF = ((\text{live weight, kg} \times \text{liveability, \%}) / (\text{FCR2000} \times \text{age, days})) \times 100$$

Graph 6 shows the results. There was a relatively similar EPEF before and during vaccination. However, the cycles after vaccination showed a significantly better EPEF. (graph 6).

Graph 6. EPEF



## 3 CONCLUSIONS

Popular belief in the modern broiler industry still says that it is hard to get similar zootechnical results when preventing coccidiosis by vaccination, compared to using anticoccidial feed additives. However, the data above show that there are no significant differences in ADG, BW, FCR and EPEF between the cycles produced with anticoccidial drugs (preceding coccidiosis vaccination) and the cycles produced while using a coccidiosis vaccine. Moreover, the anticoccidial drugs supplemented cycles

following coccidiosis vaccination clearly showed significantly improved FCRs and EPEFs when compared to the cycles before vaccination. This might be the result of a re-sensitization of the coccidian population to anticoccidial drugs, as a consequence of the introduction of sensitive vaccine strains in the poultry houses. This is in agreement with earlier observations, such as those described by Mathis and Broussard (2006) and Peek and Landman (2006, 2011).

- No significant differences in ADG, BW, FCR and EPEF between cycles before and during vaccination
- Cycles after vaccination always showed improvement compared to cycles before with significantly improved FCRs and EPEFs

## 4 REFERENCES

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