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A three-strategy approach to manage coccidiosis

E. N'guetta, A. Wealleans, I. Somers, V. Van Hamme
Kemin Europa NV, Toekomstlaan 42, 2200 Herentals Belgium

Introduction

Coccidiosis caused by *Eimeria* spp. is responsible for huge economic losses in poultry production. The pressure to reduce the use of anticoccidials is increasing, therefore alternative solutions should be assessed. Three strategies could be of interest for natural coccidiosis control: immunity development by the bird against *Eimeria* spp., *C. perfringens* control via microbiome management, and *Eimeria* control. The aim of this work was to evaluate this three-strategy approach either in a bioshuttle program or in a total anticoccidial replacement program, by leveraging synergies between intestinal health promoting ingredients.

Materials and methods

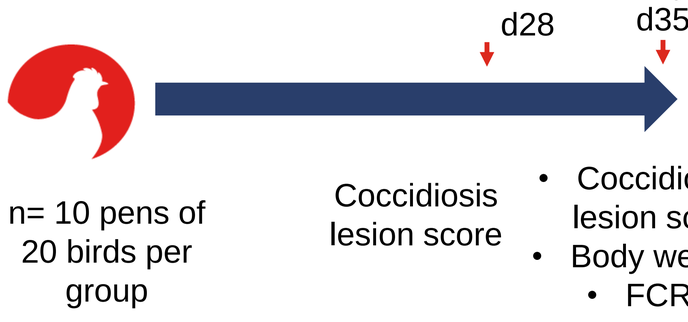
Two studies were carried out to evaluate the bioshuttle program or a total anticoccidial replacement program, respectively:

First study: Bioshuttle study

- 800 healthy Ross 308 male day-old broilers were used for a coccidiosis challenge study, and randomly assigned to one of the following groups:

Group	Challenge*	Treatment
NC, Negative control	No	No
IUC, Infected untreated ctrl	Yes	No
PC, Positive control	Yes	• Starter (0-10d): Narasin and nicarbazin at 40 ppm each • Grower (10-28d) and finisher (28-35d): salinomycin at 60 ppm
3S, 3-strategy	yes	• Starter (0-10d): Narasin and nicarbazin 40 ppm each • Grower (10-28d) and finisher (28-35d): Aleta™ (algae beta-glucan) at 100 g/t, CLOSTAT® (*Bacillus* sp. PB6) at 2x10^8 CFU/kg and phenolic compound at 200 g/t

* Feed and litter spray infection with coccidiosis inoculum (78291 *E. acervulina*, 60900 *E. tenella*, 10440 *E. maxima* and 6960 *E. mitis* oocysts per dose) at 1d, 10d and 15d.



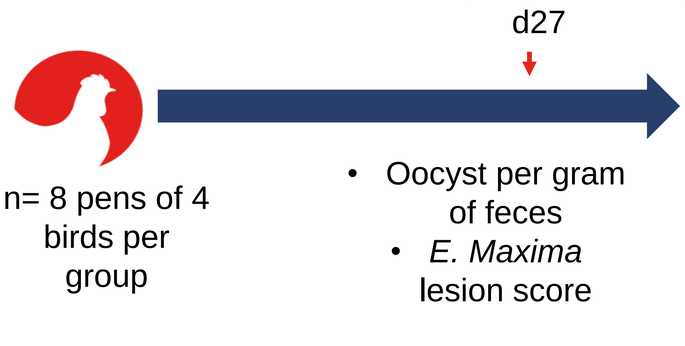
- Data analysis: linear regression models with treatment group as fixed effect

Second study: Total replacement study

- 128 healthy Ross 308 male day-old broilers were used for a coccidiosis challenge study, and randomly assigned to one of the following groups:

Group	Challenge*	Treatment
NC, Negative control	No	No
IUC, Infected untreated ctrl	Yes	No
PC, Positive control	Yes	• Starter (0-13d): Narasin and nicarbazin at 40 ppm each • Grower - finisher (13-34d): salinomycin at 60 ppm
3S, 3-strategy	yes	• Starter (0-10d) • Grower (10-28d) and finisher (28-35d: Aleta™ (algae beta-glucan) at 100 g/t, CLOSTAT® (*Bacillus* sp. PB6) at 2x10^8 CFU/kg and phenolic compound at 200 g/t

* Coccidiosis challenge: at 14d, individual oral vaccination with a 10x dose of a Paracox ® 5 (MSD Animal Health), approximately 6500, 3900, 13000 and 6500 *E. acervulina*, *E. maxima*, *E. mitis* and *E. tenella* oocysts per bird respectively.



- Data were subjected to one-way ANOVA and differences were separated using Tukey's honestly significant difference (HSD) post hoc test.

Results

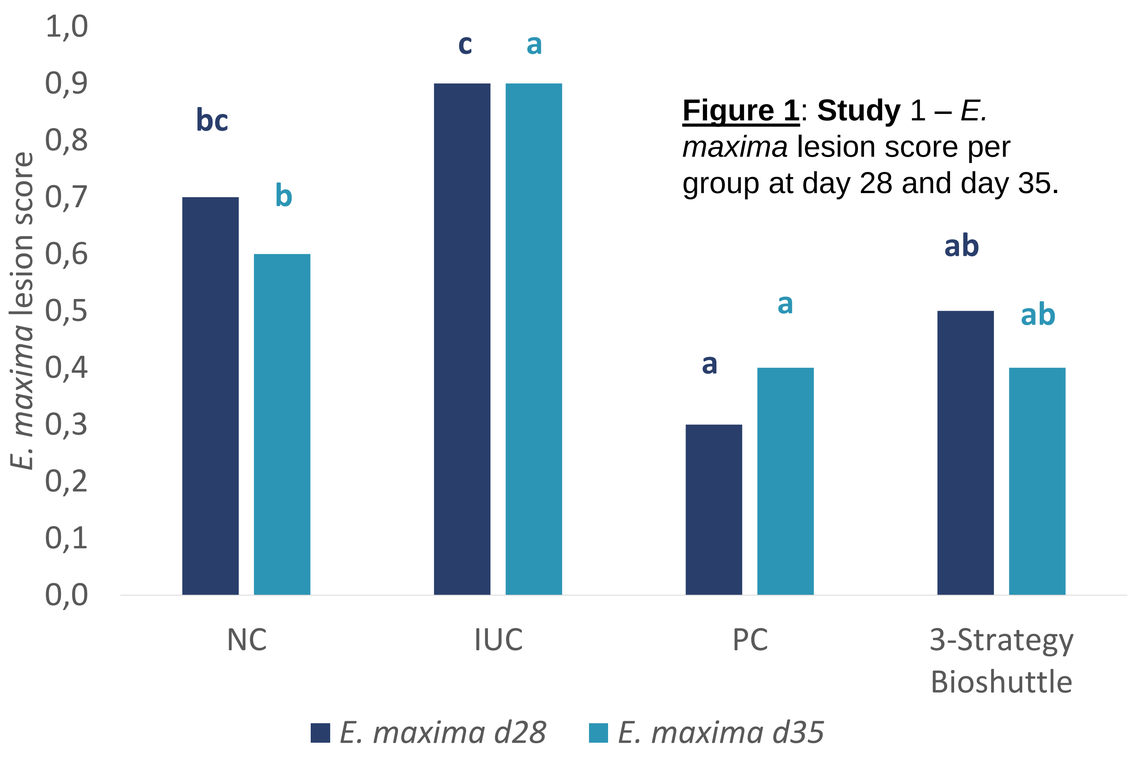


Figure 1: **Study** 1 – *E. maxima* lesion score per group at day 28 and day 35.

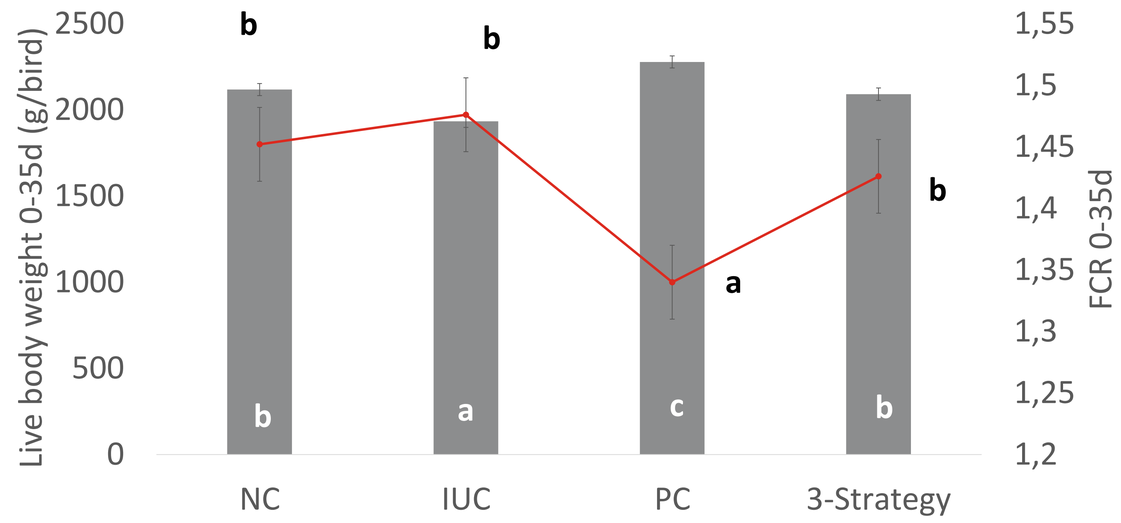


Figure 2: **Study** 1 – Body weight and FCR per group.

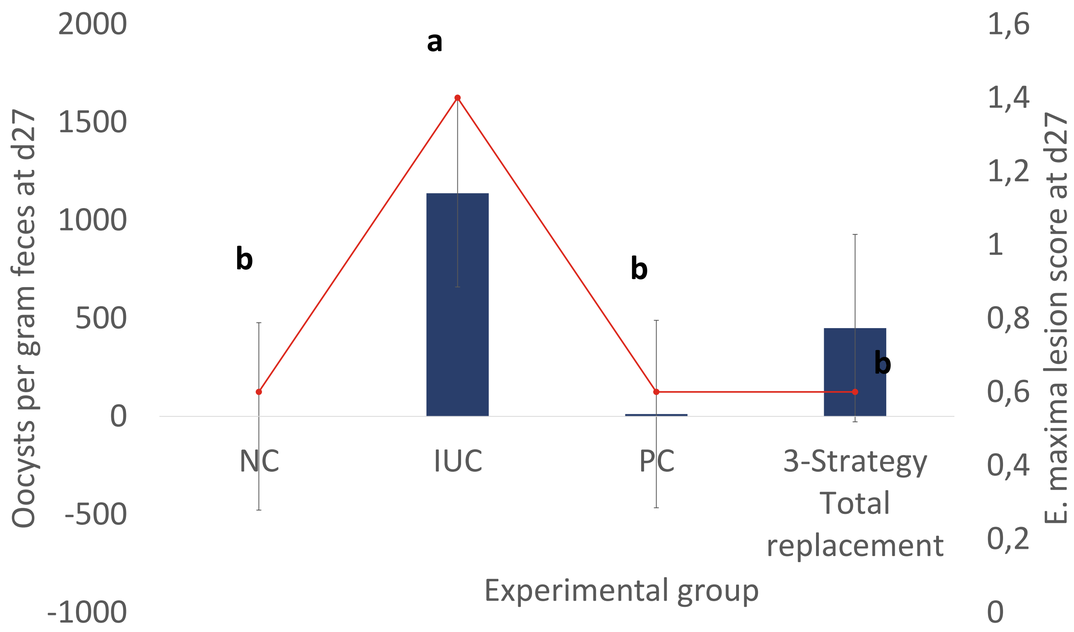


Figure 3: **Study 2** –*E. maxima* lesion score (line) and number of oocysts per gram of feces (bar) per group at day 27.

Discussion and conclusion

The first trial suggests that the 3-strategy approach could be used in a bioshuttle program for coccidiosis control. This confirms the interest of immune modulation and microbiome management for effective coccidiosis preventive strategies. Total replacement approach investigated is promising, however but further work is needed.

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