

USING AN ATTENUATED EIMERIA VACCINE IN BROILERS WITH *IN-OVO* APPLICATION FOR ON-FARM HATCHING

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BACKGROUND AND OBJECTIVES

The non-integrated broiler market in Belgium is undergoing a significant shift towards *in-ovo* vaccination, driven partially by the introduction of EVANOVO[®], a coccidiosis vaccine tailored for *in-ovo* use. This evolving trend is coupled with a simultaneous shift towards on-farm hatching systems, which precludes traditional hatchery coarse spray or gel-spray vaccination methods¹. These innovations could have benefits in performance, antibiotics reduction and improved animal welfare². However, administering coccidiosis vaccines on-site with newly hatched chicks poses challenges, primarily due to potential insufficient vaccine intake and suboptimal oocyst replication. Thus, ensuring an optimal oral intake of the vaccine is crucial. In the case of *in-ovo* coccidiosis vaccines, the chick embryos should keep taking the vaccinal oocysts orally; consequently, a crucial parameter for efficient results is to obtain a high rate of amniotic fluid administrations. Several commercial devices for *in-ovo* vaccination are available in the market, differing in features and precision of the injection³. The effectiveness of these machines ranges between 64% and 100% in the amnion, depending on factors such as the specific machine, incubation age, and breeder age. With meticulous hatchery monitoring and adjustments, achieving a +90% amniotic vaccination rate is attainable.



Figure 1. *In-ovo* vaccination in amnion



Figure 2. On-farm hatching of broiler chicks

MATERIALS & METHODS

The trial was conducted on a Belgian farm using an on-farm hatching system, placing eggs directly in the litter. A total of 524,034 standard broilers (Ross 308) were involved. Among them, 198,154 birds received vaccination with the attenuated coccidiosis vaccine via *in-ovo* administration, while the remaining birds were administered coccidiostats in a programme based in narasin + nicarbazin during the overall rearing period. The birds were monitored until the slaughter age. The vaccination process, audited through the Site of Injection evaluation (SOI), confirmed that 70% of the vaccine was accurately delivered into the amnion-fluid. All eggs originated from a single hatchery, utilizing the on-farm hatching system, and were fed from a single feed mill. The efficiency of vaccine circulation was closely monitored through frequent oocyst per gram (OPG) analysis. Performance parameters as Feed Conversion Ratio (FCR), Average Daily Gain (ADG), Mortality and European Production Efficiency Factor (EPEF) were assessed during the overall study period.

RESULTS

The trial revealed that *in-ovo* vaccination with attenuated *Eimeria* strains reduces the usage of coccidiostats and improves technical performance metrics (Table 1). This includes a 3.4-point reduction for the *in-ovo* coccidiosis vaccinated group in the average FCR and a 5-point reduction in corrected FCR (1.5kg).

Additionally, the intervention resulted in slightly lower mortality rates and an extra daily weight gain of 2 grams. Collectively, these improvements contributed to a remarkable 16-point enhancement in the average EPEF.

Parameter	Narasin + Nicarbazin	EVANOVO [®]
N° of flocks (birds)	6 flocks (325,880 birds)	2 flocks (198,154 birds)
Average slaughter age (days)	38.88	39.29
Average slaughter weight (Kg)	2.558	2.691
Total mortality (%)	3.03	2.86
FCR	1.564 ± 0.036	1.53 ± 0.001
Corrected_FCR (1.5 Kg)	1.132 ± 0.056	1.073 ± 0.023
European Performance Efficiency Factor (EPEF)	396.67 ± 16.49	410 ± 4.24
Company costs (€/Kg chicken meat)*	1.045	1.036[®]

*Costs are calculated according with the average reference prices for the company, including investments in feed, day old chicks, antibiotics and strategies against coccidiosis.

Table 1. Overall performance

Despite the perceived cost of vaccination, using a vaccine instead of coccidiostats resulted in a €0.01 lower average cost to produce one kilogram of meat. Several reasons may influence the outcome of this results. However, the lack of rotation of anticoccidial drugs and its constant overuse may generate resistances from field *Eimeria* strains, a partial or total lack of protection and a subsequent affectation of performance parameters.

DISCUSSION AND CONCLUSIONS

Despite the administration cost associated with *in-ovo* vaccination and the investment in the *in-ovo* attenuated coccidiosis vaccine, the trial demonstrated the economic advantages of this strategy. Additionally, in situations where hatchery coarse spray is impractical, EVANOVO[®] showed an adequate performance, even when achieving 100% amniotic vaccination was not feasible with the existing *in-ovo* machines.

REFERENCES

1. Jerab G., Chantziaras I., Van Limbergen T., Van Erum J., Boel F., Hoeven E., Dewulf J. (2023) Antimicrobial Use in On-Farm Hatching Systems vs. Traditional Hatching Systems: A Case Study. *Animals (Basel)*. 2023 Oct 19;13(20):3270.
2. de Jong I., van Hattum T., van Riel J., De Baere K., Kempen I., Cardinaels S., Gunnink H. (2020) Effects of on-farm and traditional hatching on welfare, health, and performance of broiler chickens. *Poultry Science*, Volume 99, Issue 10, October 2020, Pages 4662-4671
3. Williams C. J., Hopkins B. A. (2011) Field evaluation of the accuracy of vaccine deposition by two different commercially available *in-ovo* injection systems. *Poultry Science*, Volume 90, Issue 1, 1 January 2011, Pages 223-226.