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FIELD STUDY ON THE CONTROL OF COCCIDIOSIS IN RABBITS HOUSED IN PARK SYSTEMS

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ABSTRACT

This study describes a close monitoring of a commercial rabbit farm when 2 different anticoccidial drugs were applied in the feed. Fattening rabbits were housed in groups in a park system with plastic slatted floors. Two houses with two compartments, housing in total 8.424 commercial fattening rabbits were monitored for mortality, oocyst excretion and general health when receiving robenidine (authorised for use in rabbits in EU) or salinomycin (currently not authorised for use in rabbits in EU) in the feed from weaning until one week before slaughter. Based upon mortality, clinical signs and oocyst excretion it was shown that coccidiosis was not well controlled by robenidine. Inclusion of salinomycin instead of robenidine in the feed could significantly improve mortality rates, diarrhoea and oocyst excretion. The trial reveals problems observed in the field with coccidiosis control in rabbits when housed in parks and with limited authorised anticoccidial drugs available, stresses the need for more authorised drugs for rabbits to control coccidiosis.

Key words: *Eimeria*, park system, rabbit, coccidiosis

INTRODUCTION

Control and prevention of coccidiosis in rabbits is based upon hygiene and inclusion of anticoccidial drugs in the feed. Rabbits can be infected by 11 different *Eimeria* species with different replication sites, virulence and impact on health and performance. Due to the implementation of housing systems where a closer contact between rabbits and *Eimeria* oocysts is possible, clinical coccidiosis and coccidiosis related mortality is an emerging problem (Jacquet *et al.*, 2013). At present, 2 anticoccidial drugs are authorised as feed additives for preventive use of coccidiosis in rabbits in the European Union (EU): Coxiril[®] (active diclazuril) and Cycostat[®] 66G (active robenidine hydrochloride). The use of a single coccidiostat in mono-programmes will eventually result in drug resistance of coccidia (Peeters *et al.*, 1987; 1988). In order to prevent or slow down resistance to anticoccidial drugs, switching between drugs that are chemically unrelated is advisable (Peeters and Geeroms, 1992). Even though the so-called rotation of anticoccidial drugs is standard practice in the majority of the rabbitaries in Belgium and the Netherlands, high coccidiosis related mortality has been observed in rabbits housed in park systems. The objective of this study was a close monitoring of the impact of coccidiosis in a rabbitary with park systems when applying different anticoccidial drugs in the feed.

MATERIALS AND METHODS

Animals and experimental design

The trial was conducted in a commercial rabbit farm in the Netherlands where rabbits were housed in parks. After weaning of the rabbits at approximately 35 days of age, kits are moved to production houses where they stay in groups in the parks (27-30 rabbits per park) until slaughter at the age of 75 days. The housing system on the farm was installed end 2015 and consists of parks with dimensions

of 203 x101 cm and plastic slatted floors. Each park is equipped with an additional plateau of 203 cm x 42.5 cm. In total 296 parks are divided over 2 houses for the production of 8,424 fattening rabbits (breed Hyla) . The mortality rate of this farm, which used to be 6% per round before the installation of the new housing system, increased to 14% (average mortality for the last 6 rounds). The observed mortality was due to gastrointestinal problems, with *Eimeria spp.* as a key pathogen.

The trial took place in 2 different houses on the farm, of which each house was divided in 2 compartments. Rabbits were allocated at random to the different houses and compartments at the time of weaning. In each house rabbits were of the same age and the difference of age between the 2 houses was 2 weeks. Rabbits were fed the same standard diet, with the exception of the anticoccidial drug that was included in the feed. In each house, 2 different anticoccidial drugs were included in the feed: one compartment received Robenidine (Cycostat® 66G) at a dose of 66 ppm, the other compartment received salinomycin at a dose rate of 20 ppm. Both drugs were included in the feed from weaning age (35 days), until one week before slaughter (70 days).

A representative number of feed samples were investigated to confirm the correct dosing of the anticoccidial drugs. Mortality was recorded daily per compartment and treatment. Twenty parks/compartment were allocated prior to the start of the study for a closer follow up. In these 20 parks mortality and health parameters were recorded daily. Eight of the 20 parks/treatment were allocated for faecal sample collection for oocyst counting and differentiation at the age of 36, 48, 62 and 73 days. Samples were collected by placing a bucket beneath the respective park during a 24 hour period. From each collected sample, oocysts per gram of faeces (OPG) were quantified using the McMaster method for the total number of oocysts and for differentiation of the *Eimeria* groups: *E. magna/irresidua*, *E. vej dovskiyi/coecicola/media/stiedai*, *E. piriformis/intestinalis/flavescens*, *E. perforans* and *E. exigua*.

Statistical Analysis

The statistical unit is the rabbit and analyses were controlling for the random effect of the parks where applicable. A proportional hazard model, incorporating the random effect of park and house, and the fixed effects, cohort, treatment, and the interaction between these two, were used to assess mortality. If the interaction was significant, analysis was stratified on the involved variables. Stratified analyses with non-parametric testing were used to evaluate the outcomes of non-parametric nature or non-normally distributed variables. OPGs were analysed using the natural logarithmic counts (Ln). The overall OPG results, and the species stratified overall results were analysed with general linear models. Fixed effects included in the general linear models were Cohort and Treatment, while the park was set as a random factor.

RESULTS AND DISCUSSION

Results

Investigation of feed samples confirmed a correct inclusion of the 2 different anticoccidial drugs in the experimental feeds.

One compartment, which received robenidine in the feed, needed to be treated against coccidiosis (toltrazuril in drinking water for 2 days) one week after weaning as a high involvement of *Eimeria* was being diagnosed in the epizootic rabbit enteropathy disease that occurred in this compartment.

Mortality in the allocated parks reached 5.1% for the salinomycin supplemented rabbits and 10.9% in robenidine supplemented rabbits. The proportional hazard model indicates that the hazard of dying was 55% lower for salinomycin supplemented rabbits compared to robenidine supplemented rabbits in the allocated parks (p-value <0.01). The total mortality in the robenidine supplemented houses reached 9.48% and 12.26% (the latter one in the compartment which needed to be treated) and 4.84% and 5.36% for the salinomycin supplemented compartments.

The incidence ratio of diarrhoea in the salinomycin supplemented rabbits was 77% lower than the robenidine supplemented rabbits (p-value < 0.01).

The total Ln OPG was significantly lower in salinomycin supplemented rabbits (Ln OPG 5.4) compared to robenidine supplemented rabbits (Ln OPG 11.4) (p-value <0.01).

Ln OPG for *E. magna/irresidua* was significantly lower in salinomycin supplemented rabbits (Ln OPG 2.6) compared to robenidine supplemented rabbits (Ln OPG 9.8) (p-value <0.01). Ln OPG for *E. vej dovskyi/coecicola/media/stiedai* was significantly lower in salinomycin supplemented rabbits (Ln OPG 4.1) compared to robenidine supplemented rabbits (Ln OPG 10.9) (p-value <0.01). Ln OPG *E. perforans* was significantly lower in salinomycin supplemented rabbits (Ln OPG 2.5) compared to robenidine supplemented rabbits (Ln OPG 8.2) (p-value <0.01). *E. piriformis/intestinalis/flavescens* were not detected in any of the investigated samples and *E. exigua* was only found in very low levels in robenidine supplemented rabbits.

Discussion

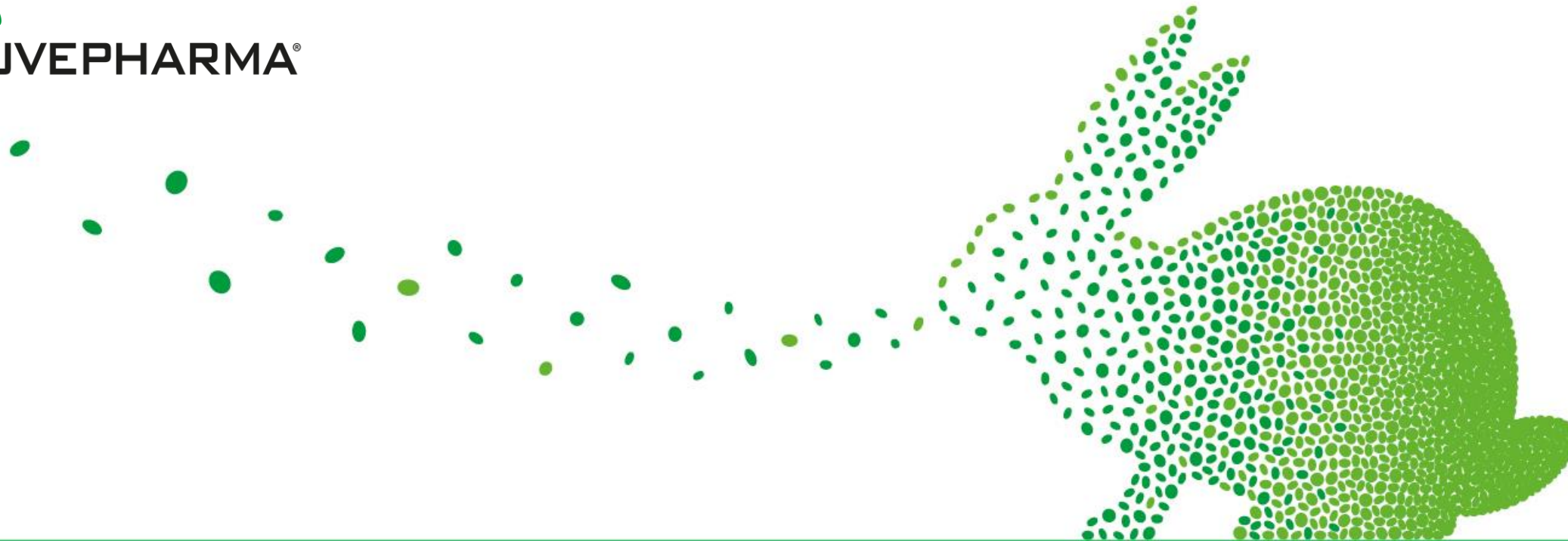
In this study the mortality, general health and oocyst excretion was monitored in a commercial rabbit farm with rabbits housed in parks on slatted floors. Even though rotation between the two authorised anticoccidial drugs (coccidiostats) in EU - Coxiril[®] (active diclazuril) and Cycostat[®] 66G (active robenidine hydrochloride) - was standard applied in this farm, control of coccidiosis became problematic after implementation of a new housing system on slatted floors, which allows a more close contact between parasite and host. In 3 years mortality rates on the farm increased from on average 6% in the former system to on average 14% per round in the park system. This mortality was linked to diarrhoea with high involvement of *Eimeria*. Control of coccidiosis in rabbits mainly depends on the use of authorised anticoccidial drugs. The legislative framework of these authorised anticoccidial drugs guarantees safety for the animal, user, consumer and environment and ensures efficacy based upon evaluated efficacy trials. Currently no products like pre-/pro-biotics, botanical products and herbal feed additives are registered in EU with the claim to prevent coccidiosis. Furthermore, publications demonstrating efficacy of the so called “alternative” products are scarce and the experiments are often poorly designed. The inclusion of salinomycin in the feed during this trial was able to well control coccidiosis by significantly decreasing mortality, clinical signs and oocyst excretion of the different *Eimeria* species.

CONCLUSION

The authorisation of salinomycin (Sacox[®]) for use in rabbits in the EU was not prolonged in 2011 and therefore the use of this anticoccidial drug was no longer allowed. The inclusion of salinomycin in the feed during this trial was able to well control coccidiosis by significantly decreasing mortality, clinical signs and oocyst excretion of the different *Eimeria* species. This trial demonstrates the need for more anticoccidial drugs to be authorised for control of coccidiosis in rabbits in order to guarantee a sufficient control in a more challenging environment.

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Field study on the control of coccidiosis in rabbits housed in park systems

Monita Vereecken, Jan Willems, Selinde de Vries, Koen De Gussem

Introduction



- Control of coccidiosis in rabbits
 - Hygiene
 - Inclusion of anticoccidials in the feed
- 2 anticoccidial drugs authorised for use in Europe
 - Coxiril[®] (active diclazuril)
 - Cycostat[®] (active robenidine hydrochloride)
- Rotation principle

The problem



- Housing systems- closer contact between rabbits and *Eimeria*
 - Emerging problems with coccidiosis related mortalities



6% mortality rate
14% mortality rate

Field study



- Commercial farm with park system
 - 2 houses – 2 compartments
 - 296 parks – 8.424 fattening rabbits
- Each house – same standard diet
 - Compartment 1/3: Robenidine -66 ppm
 - Compartment 2/4: Salinomycin – 20 ppm
- AC inclusion from weaning (35D) till one week before slaughter (70D)
 - Feed investigation confirmed presence of AC in the feed at right concentration

Results



- Mortality
 - Salinomycin supplemented – 4.84% and 5.36%
 - Robenidine supplemented – 9.48% and 12.26%
 - Note: last compartment treated with toltrazuril in drinking water (2D)
- Incidence ratio of diarrhoea
 - 77% lower in the salinomycin supplemented rabbits ($p < 0.01$)

Results



- Ln OPG
 - Significant lower in salinomycin supplemented rabbits (Ln OPG 5.4 vs 11.4) ($p < 0.01$)
- Species:
 - Significant lower for salinomycin supplemented rabbits ($p < 0.01$)
 - *E. magna/irresidua* (Ln OPG 2.6 salino- vs Ln OPG 9.8 robenidine)
 - *E.vej dovskyi/coecicola/media/stiedai* (Ln OPG 4.1 salino- vs Ln OPG 10.9)
 - *E. perforans* (Ln OPG 2.5 salino- vs Ln OPG 8.2 robenidine)
 - *E. exigua* – low numbers in robenidine supplemented rabbits
 - *E. piriformis/intestinalis/flavescens* – not detected

Conclusion



- Introduction of Sacox[®] (salinomycin) could bring situation back to normal level
 - Mortality
 - Clinical signs
 - OPG's
- Need for more products to be authorised for use in rabbits

Thank you for your attention



Questions?