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# THE EFFECT OF CYCOSTAT 66G AGAINST INTESTINALCOCCIDIOSIS IN FATTENING RABBITS.

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## ABSTRACT

The efficacy of a dietary treatment with CYCOSTAT 66G (66 mg/kg robenidine hydrochloride) against intestinal coccidiosis was re-evaluated in artificially infected commercial rabbits. The zootechnical performances and oocyst output in 180, twenty-nine-day-old commercial rabbits were measured after a mixed infection with 2 x $10^4$ oocysts of *Eimeria media* and *Eimeria magna*. An infected, non-medicated group (I-NM) and a non-infected, non-medicated group (NI-NM) served as controls. CYCOSTAT 66G had a significant favorable effect on feed intake and weight gain compared to the I-NM rabbits during the critical phase of the infection. During the entire fattening period (0-42 days), daily weight gain was significantly lower ($P<0.001$) in the I-NM group (35.9 g/d) compared with the I-M (40.6 g/d) and NI-NM rabbits (39.8 g/d). No mortality occurred when medicated with CYCOSTAT 66G, while 5/60 rabbits died in the I-NM group. The oocyst output on day 14-post infection was reduced with 99.2% in the medicated rabbits. Both zootechnical performances and oocyst output demonstrate that a dietary medication with CYCOSTAT 66G is still able to suppress an infection with moderate pathogenic *Eimeria* species.

## INTRODUCTION

Intestinal coccidiosis in rabbits still causes considerable economic losses in commercially reared rabbits due to subclinical infections with growth retardation, altered feed efficiency and diarrhoea. The occurrence of *Eimeria spp.* has been demonstrated in 45% of diarrhoeic rabbits (PEETERS, 1988). Hygienic measures and housing conditions play a determinative role but should be completed with dietary anticoccidials to avoid an outbreak of coccidiosis.

CYCOSTAT 66G (robenidine hydrochloride 6.6%) is one of the leading anticoccidials in rabbit production. During the last two decades the product has proven to have a good efficacy against the most relevant *Eimeria spp.* present in the commercial rabbitry as demonstrated by several authors in laboratory and field trials (COUDERT, 1979; LICOIS, 1980; NIEDZWIADEK, 1989; PEETERS et. al, 1979, 1980a, 1980b, 1983; REID, 1970).

The present study was initiated to re-examine the efficacy of CYCOSTAT 66G using an experimental mixed infection of *E. magna* and *E. media*, the most relevant *Eimeria species* in commercial rabbitries.

## MATERIAL AND METHODS

### Animals and housing

One hundred eighty, 29-d old weanlings of the Institute's own selected strain were used for the trial (MAERTENS, 1992). Out of each litter, 6 young were divided homogeneously over the 3 experimental treatments following a complete block design and housed in conventional

conditions (CLO, experimental house). Before weaning, the young received the same diet as their mother without any drug. In total 15 replicates of 3 cages (4 rabbits/cage) or 60 weanlings/treatment were housed in the same room. Cages with experimentally infected rabbits were separated from the non-infected by means of empty cages. The repartition took place at the day of weaning (29 days).

**Inoculum and oocyst counts**

The oocysts used for challenge inoculation were originating from pure isolates cultured at the INRA's laboratory and used as reference strains by many European Investigators. The strains were multiplied 3 weeks before the start of the experiment in specific pathogen free rabbit and were sporulated at 26 +/1 °C**.**

The fecal samples were examined by the McMaster egg counting technique at the Veterinary and Agrochemical Research Center in Brussels. Samples that were found to be negative were re-examined using the salt-flotation-concentration technique. A proportion of the screened fecal suspension was made up in 2.5 per cent potassium bichromate (w/v) and agitated in a water bath at 27°C in order to sporulate for subsequent differentiation in species as described before (PEETERS et al., 1981). The frequency of the species present was determined on at least 100 sporulated oocysts.

**Experimental design**

*a/ diet and treatments* - A standard fattening diet used in intensive rabbit production (16.1% CP, 16.8% CF and 9.1 MJ ME/kg) was fed during the entire experimental period. CYCOSTAT 66G was supplemented to 1/3 of the meal batch (1 kg commercial premix/ton or 66mg/kg robenidine HCl) whereas the non-medicated diet was used for the control groups. Pelleted diets and drinking water were provided ad libitum during the experiment. A withdrawal period of one week was respected which means that all rabbits received during the 6th fattening week the unmedicated feed.

*b/ challenge inoculation* – At weaning the animals were individually challenged per os with 2 X $10^4$ oocysts (0.2 ml/rabbit) of a mixture of E. media and E. magna (treatments I-M and I-NM). The coccidial strains were delivered by Dr. Coudert-(INRA). One group was used as non-infected, non-medicated control group (NI-NM).

**Recordings**

Rabbits were observed once daily for any clinical abnormalities. Individual body weights were registered at days 0, 14, 21, 35 and 42 after inoculation. An overall representative feces sample was collected at the beginning of the experiment and in each experimental group 10 days and 5 weeks after weaning.

Data were interpreted by a 2-factorial analysis of variance (block, treatment) using the Statgraphics Package version 5 (1992). Means were compared with an LSD-multiple range test.

## RESULTS AND DISCUSSION

The results are summarized in **Table 1**. Daily weight gain (DWG), feed intake (DFI) and feed efficiency (FE) were determined in four different subperiods and then accumulated over the total period. No outliers in the dataset were removed during the experiment.

The experimental infection caused a severe ($P<0.001$) reduction of the feed intake (-34%) and weight gain (-45%) shortly after weaning compared to the controls (NI-NT). The

CYCOSTAT® 66G treated rabbits (I-T) had the same weight gain and feed intake as controls (NI-NT) indicating the effectiveness against the experimental infection. Mortality occurred only in infected rabbits (5/60) and the autopsy revealed a high incidence of coccidiosis.

The negative impact of the experimental infection disappeared during the second period (14-21 days after weaning) and these rabbits showed even some compensatory growth (P<0.001) during the finishing period. During the withdrawal period, a significant lower daily weight gain was determined in rabbits previously not medicated with CYCOSTAT® 66 G. A contamination coming from contaminated animals could explain this observation

The zootechnical performances during the entire fattening period (0-42 days) were significantly lower (P<0.001) in infected and non-medicated rabbits (I-NM) although feed conversion was finally not negatively affected. Comparable results were observed in infected medicated rabbits (I-M) and controls (NI-NM). Average final weight at 71 d was 2320; 2155 and 2360g for controls, I-NM and I-M rabbits, respectively.

**Table 1. The effect of an experimental infection and CYCOSTAT 66G medication on the biological performances of fattening rabbits**

| | | NI-NM | I-NM | I-M | LSD[2] | P (Treatment)[3] |
|---|---|---|---|---|---|---|
| **Start weight, 29d (g)** | | 649[1] | 650 | 654 | 18 | 0.821 |
| **Finishing weight, 71d (g)** | | 2320 a | 2155 b | 2360 a | 54 | **0.000** |
| **DWG (g)** | 0-14 d | 42 a | 23 b | 42 a | 2 | **0.000** |
| | 14-21 d | 42 | 44 | 44 | 3 | 0.424 |
| | 21-35 d | 37 b | 41 a | 37 b | 2 | **0.000** |
| | 35-42 d | 38 b | 43 a | 41 a | 2 | **0.000** |
| | **0-42 d** | 40 a | 36 b | 41 a | 1 | **0.000** |
| **DFI (g)** | 0-14 d | 86 a | 57 b | 88 a | 4 | **0.000** |
| | 14-21 d | 118 a | 113 b | 121 a | 5 | **0.006** |
| | 21-35 d | 136 | 132 | 134 | 8 | 0.672 |
| | 35-42 d | 155 | 155 | 158 | 6 | 0.508 |
| | **0-42 d** | 119 a | 108 b | 121 a | 4 | **0.000** |
| **FE** | 0-14 d | 2.06 a | 2.51 b | 2.09 a | 0.11 | **0.000** |
| | 14-21 d | 2.79 b | 2.56 a | 2.78 b | 0.13 | **0.003** |
| | 21-35 d | 3.63 b | 3.25 a | 3.60 b | 0.18 | **0.000** |
| | 35-42 d | 4.13 c | 3.59 a | 3.91 b | 0.21 | **0.000** |
| | **0-42 d** | 3.00 | 3.00 | 2.97 | 0.08 | 0.584 |
| **Mortality** (0-42 d) | | 1/60 | 5/60 | 0/60 | | |

[1] n = 15 replicates of 4 rabbits [2] Least Significant Difference
[3] Significant differences (at least P<0.01) are marked in bold.

The oocyst counts are presented in **Table 2.** Weaned rabbits were negative. The experimental infection resulted in a high output (700,000/g) of oocysts 10 days post infection. E. *magna* and E. *media* were the dominant species, 70 and 23% respectively. The anticoccidial effect of CYCOSTAT® 66 G was clear on the output of oocysts. Only 5,800 oocysts were determined 10 days after the infection. This was about the same number as observed in the non infected-non medicated controls (5,600/g). Five weeks post infection, oocyst output was very low (NI-NM) or negative, indicating the already high immunity

status.

**Table 2. Effect of an experimental infection and dietary CYCOSTAT 66G medication on oocyst output (number/g feces).**

| | NI-NM | I-NM | I-M |
|---|---|---|---|
| At weaning | | Negative | |
| 10 days post infection | 5,600 | 700,000 | 5,800 |
| Differentiation (%)* | 70-23-7* | 62-31-7 | 75-18-7 |
| 5 weeks post infection | 1,200 | Negative | negative |

- % of *E. magna*, *E. media* and *E. perforans*, respectively

## CONCLUSIONS

From this experiment we conclude that CYCOSTAT 66G is still a very potent anticoccidial in rabbits artificially infected with a mixture of *E. magna* and *E. media.* The continuous dietary medication of 1 kg CYCOSTAT 66G/ton (66 mg/kg robenidine hydrochloride) should protect fattening rabbits from intestinal coccidiosis in commercial rabbitries.

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