

## EVALUATION OF THE EFFICACY OF CYCOSTAT® 66G AGAINST COCCIDIOSIS IN FATTENING RABBITS UNDER CONTROLLED FIELD CONDITIONS.

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### ABSTRACT

This study investigated the efficacy of Cycostat® 66G against rabbit coccidiosis on farm level in fattening rabbits. Three hundred thirty five of four weeks old rabbits from two different breeding farms were divided into three different experimental groups: uninoculated untreated (UIUT), inoculated treated (IT) and inoculated untreated (IUT). The experimental inoculation was low (13200 oocysts per rabbit with different pathogenic or very pathogenic *Eimeria* species) in order to micmick a natural contamination. Body weight gain and feed conversion were significantly better for the inoculated animals receiving feed supplemented with Cycostat® 66G compared to inoculated untreated animals. The oocyst excretion was strongly reduced (more than 85%) for *E.piriformis* and *E.flavescens* + *E.intestinalis* in treated groups versus untreated groups whilst the excretion of less pathogenic species (*E.magna* , *E.media* and *E.perforans*) was less reduced (30 to 40 %). At the end of the trial, none of the most pathogenic species were seen. Mbrtality caused by coccidiosis was low in all groups. At the end of the fattening period there was a clear positive effect of the treatment on the carcass quality and on the ratio carcass weight / live weight. The efficacy of anticoccidial drug is lesser with the batch of rabbits having the most precarious health status.

**Key words:** rabbit, coccidian, robenidine.

### INTRODUCTION

Cycostat® 66G is a feed additive containing 6.6% Robenidine hydrochloride and is indicated for use as an aid in the prevention of coccidiosis in chickens for fattening, turkeys and rabbits for does and fattening. Numerous studies have been done at the beginning of the 80's and have demonstrated the efficacy of the Robenidine against the coccidian of the rabbit. (COUDERT 1979, PEETERS *et al* 1979, PEETERS and HALEN 1980, LICOIS and COUDERT 1980). Robenidine supplemented feed is extensively used in Europe since 24 years and till now only two *Eimeria* species are chemioresistant (*E.magna* and *E.media*) but the most pathogenic strains, including *E.stiedai* have disappeared from the intensive rabbit farms (PEETERS *et al.* 1988a, 1988b, MAERTENS *et al* 2000, COUDERT and ZONNEKEYN 2000). Nevertheless in the recent period in Europe the extension of the Epizootic Rabbit Enteropathy have increased the risk of parasitic disease (COUDERT *et al.* 2000. COUDERT *et al* 2003) in intensive farming and on an other

hand the development of alternative farming methods (bio, ...) are limited because of coccidiosis.

This study was designed to evaluate the today anticoccidial efficacy of Cycostat® 66G (6.6% robenidine hydrochloride) in fattening rabbits under field conditions. Rabbits for fattening were inoculated with a recent field isolate including several species of *Eimeria*.

## MATERIALS AND METHODS

**Animals and husbandry:** The rabbit farm reared only fattening rabbit (no breeding). Animals were housed in a battery of 84 cages (2900 cm<sup>2</sup>) in flat deck at a rate of 4 animals per cage. Three hundred thirty five (335) rabbits, 4-5 weeks of age, were used. Rabbits were obtained from 2 different breeding farms (with different genotypes and hygienic level) giving a phenotypically white origin (n=168) and a phenotypically black origin (n=167) group. Rabbits were weaned at 30 ±3 days. Rabbits of the litter were evenly distributed in each of the 3 treatments so that not 2 rabbits of the same litter were in the same cage. Rabbits of the 2 origins were not mixed (genotypes: identified «white» and «black» in the text).

**Inoculation :** The coccidia were extracted from rabbit droppings coming from a farm not using a coccidiostat. Each rabbit from the Inoculated treated (IT) and Inoculated Untreated Control groups (IUT) was inoculated (Day0) *per os* with 0.2 ml of a suspension containing 13200 sporulated oocysts (*E.perforans* 22%, *E.media* 24%, *E.intestinalis* 17%, *E.piriformis* 29%, *E.magna*10%, *E.flavescens* 2%).

Control of the excretion of oocysts was carried out on each group: before inoculation, at D12 and at D37 (day of slaughter).

**Observed parameters:** The animals were weighed on D0 (inoculation), D12 (peak of coccidiosis challenge) and D33 (day of the withdrawal of supplemented feed). At the slaughter chain, the animals were weighed individually. The feed group consumption was recorded between D0 and D33. Deaths were collected every day and autopsies were carried out at the time of the peak mortality (2<sup>nd</sup> week). Faecal samples were analysed for oocyst output and *E.* species identification. Faecal samples were taken before inoculation, at day 12 after inoculation (peak of infection) and at the end of the fattening period (day 33)

**Statistical analysis.** Mortality was compared by the khi square test. The weight gain was analyzed by variance analysis with 2 factors (treatment, origin) and the means compared by the test of Tukey (software Systat)

## RESULTS

### Body weight gain

**Body weights at the day of inoculation** (Table 1) was  $1086 \pm 225$  g. There was a significant difference ( $p < 0.001$ ) between the two genotypes (“white”  $1267g \pm 10\%$ ; “black”  $903g \pm 15\%$ ) and therefore results of this trial are presented per origin but analysed together (variance analysis with 2 factors (treatment, origin).

At the day of inoculation (D0) there were no significant differences between the different treatments:

**Table 1 Body weights at the day of inoculation:**

Treatment	UIUT = Uninoculated Untreated		IT = Inoculated treated		IUT = Inoculated untreated		total
	White	Black	White	Black	White	Black	
origin	White	Black	White	Black	White	Black	
Numbers	20	44	72	75	76	48	335
Weight g)(*)	$1310 \pm 9\%^a$	$903 \pm 13\%^b$	$1249 \pm 10\%^a$	$906 \pm 17\%^b$	$1273 \pm 10\%^a$	$897 \pm 15\%^b$	$1086 \pm 21\%$

(\*) mean  $\pm$  coefficient of variation on the day of the inoculation. Values with different characters are significantly different.

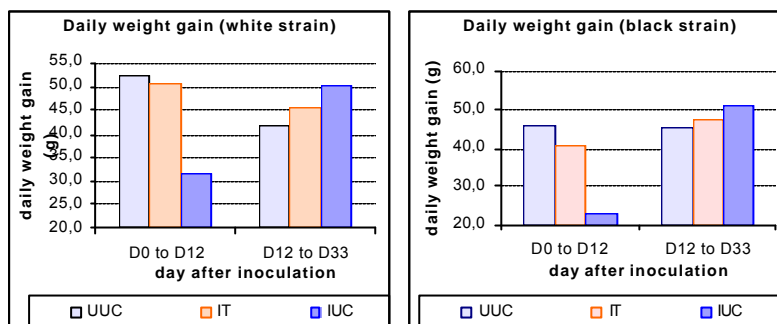
**During the whole fattening period (D0-D33)** the inoculated untreated groups (IUT) had a significant lower body weight gain ( $p < 1\%$ ) (Table 2). The «black» rabbits responded more negatively to the inoculation than the “white” rabbits especially in the untreated groups.

**Table 2 Growth between D0 and D33 in function of treatments and origins**

Treatment	Origin		P (treatment)
	White	Black	
UIUT	1530 a	1512 a	
IT	1565 b	1483 b	$P < 1\%$
IUT	1433 c	1365 d	
P (origin)	$P < 3\%$		Interaction NS

**During the acute phase of coccidiosis D0-D12**, the growth of the untreated animals is significantly weaker than that of the other groups ( $P < 1\%$ ). The growth within the «black» untreated animals is weakest ( $P < 1\%$ ). (Fig 1)

After this acute period, a compensation growth (D12 to D33) is observed. The groups having the most serious signs of coccidiosis during the acute period had the fastest growth compensation ( $P < 1\%$ ).



**Figura 1. Daily weight gain**

### Feed conversion

No difference was observed on feed conversions (weight gain/consumed feed) of the different treatments (Table 3). The overall feed conversion was excellent.

**Table 3 Feed consumption and feed conversion**

treatment	Consumed feed (kg) (a)	Weight profit (kg) (b)	a/b
uninoc. untreated	865,4	291,7	2,97
inoc treated	1579,2	534,5	2,95
inoc. untreated	2045,1	684,0	2,99

### Clinical signs and mortality

No intercurrent pathology was observed during the trial. According to their origin rabbits showed different clinical signs. The black rabbits had short episodes of diarrhoea throughout the whole fattening period.

Mortality within the "white" rabbits was very low in all treatments. Mortality in «black» rabbits was significantly higher than that of «white» rabbits but there was no significant difference between inoculated treated or non treated animals. (Table 4)

The necropsy on 7 animals at D8 and D9 after inoculation revealed catarrhale diarrhoea.

**Table 4: Mortality (%)**

	Uninoc., Untreated	Inoc, treated	Inoc, untreated	P ( $\chi^2$ )
“white”	5,0 %	2.8 %	2.6 %	-
“black”	13,6 %	14.7%	20.8 %	NS

**Oocyst output** (Table 5)

Before inoculation the oocyst excretion was  $8 \times 10^2$  /g in the «white» origin and  $4 \times 10^3$  in the ‘black’ origin rabbits. Only 3 species were present with a prevalence of *E.magna* (the two breeding farms of origin used robenidine as prevention to coccidiosis).

On D12 (

**Table 5. Excretion of oocysts at D12** the oocyst excretion within the uninfected control group (UIUT) was lower than that of the inoculated animals (IT and IUT). The excretion within the untreated animals (IUT) was the highest, the level of *Eimeria* found in the excreta were close to  $1 \times 10^6$  oocysts per gram and this is a sign of acute coccidiosis.

**Table 5. Excretion of oocysts at D12**

Origin	Treatment	Oocyst output / g	Prevalence of the species (%)				
			Nb x $10^{-5}$	<i>E.magna</i>	<i>E.media</i>	<i>E.perforans</i>	<i>E.piriformis</i>
White	UIUT	0,5	36%	39%	24%	0%	0%
	IT	4,6	34%	40%	21%	1%	5%
	IUT	8,6	24%	26%	10%	26%	14%
Black	UIUT	0,6	60%	20%	20%	0%	0%
	IT	2,0	40%	28%	20%	1%	10%
	IUT	8,8	24%	14%	14%	34%	18%
			Reduction of the oocyst output (%)				
Black & White	(IUT-IT) / IUT	62%	43%	31%	35%	86%	85%

The treatment did not completely control the excretion of oocysts of *E.magna*, *E.media* and *E.perforans* that are considered to be medium pathogenic. The most pathogenic *E.species* (*E.piriformis*, *E.flavescens* and *E.intestinalis*) were well controlled.

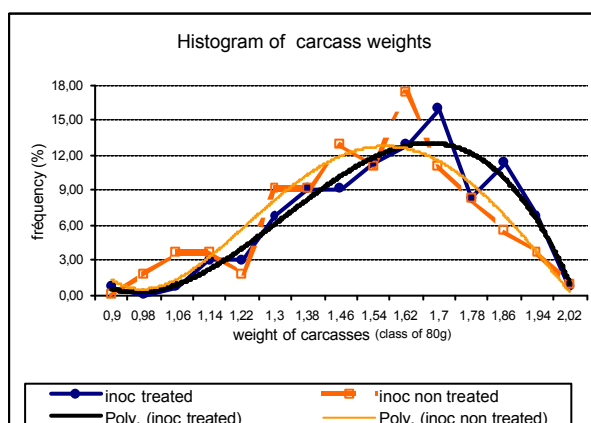
At the end of the fattening period the oocyst excretion was very low in the three treatment groups ( $3.7 \times 10^3$ ,  $1.6 \times 10^3$  and  $0.5 \times 10^3$  per gram). *E.perforans* was the highest in prevalence in all the treatment groups (>80%). Only the IUT group continued to excrete *E.intestinalis*.

### Carcass quality

There were no downgraded carcasses at slaughter. The ratio carcass weight/live weight was good especially in the treated groups as shown in Table 6 and Figure 2.

**Table 6. Scoring at slaughter**

Treatment	Number of animals	Live Weight (Kg)	Carcass Weight (Kg)	Carcass / live weight
UIUT	57	153,5	80,65	0,53
IT	133	367,0	214,86	0,59
IUT	112	304,5	170,64	0,56



**Figura 2. Histogram of carcass weights**

## DISCUSSION AND CONCLUSION

The study design was well conducted as the performances (growth and feed consumption) of the control animals were good whilst the coccidial challenge showed a clear effect in non treated animals but, as expected, no high mortality

The effect of the feed supplementation was positive on all parameters as there was:

- a/ an improvement of the total weight gain during the whole fattening period due to a good control of the disease during the acute phase of the coccidiosis.
- b/ a reduction of the excretion of oocysts. The excretion within the treated groups was still relatively high due to the fact that animals were already carrying coccidial strains resistant to robenidine hydrochloride (*E.magna* and *E.media*). Nevertheless, it should be underlined that the pathogenic species introduced by the inoculum were very well

controlled. At the end of the fattening period it was shown that these coccidia were still present in the untreated group whereas they disappeared in the treated groups.

c/ a better carcass weight and slaughter % for the treated groups.

d/ The severity of the infection was clearly influenced by the origin of the animals. In animals with the most precarious health status the control of the disease during the acute phase and control of the mortality was more difficult. This phenomenon is a characteristic of parasitic diseases (COUDERT *et al* 2003): intercurrent pathology enhances the parasitic load and vice versa

In conclusion, from the results presented it can be concluded that Cycostat® 66G was able to reduce the impact of coccidiosis in fattening rabbits caused by a recent field coccidia isolate. The field isolate induced a pathology marked by a significant growth reduction in non treated animals compared to treated animals during the acute phase of the infection along with a high level of oocyst excretion.

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