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Studies on the Efficacy of Toltrazuril, Diclazuril and Sulphadimidine against Artificial Infection with *Isospora suis* in Piglets

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INTRODUCTION

Isospora suis, the causal agent of piglet coccidiosis, is a prevalent and economically important parasite. This study was undertaken to examine the therapeutic potential of various substances.

MATERIALS AND METHODS

The investigations were carried out with piglets infected artificially with *I. suis* in three blinded studies. The sows were housed conventionally. In each study 8 to 12 piglets per group were allocated to four treatment groups on a random basis. At the age of 3 days all the piglets were infected orally with 10^4 sporulated oocysts of a pathogenic field isolate of *I. suis* obtained from a piglet-rearing farm in northern Germany. The animals were treated orally with either toltrazuril (Baycox® 5%), diclazuril (0.25% suspension and 3% suspension), sulphadimidine or remained as infected untreated controls (table 1).

Faecal consistency (score: 1 firm and formed, 2 pasty, 3 semi-liquid, 4 liquid) and oocyst excretion (opg: oocysts per gram of faeces) were determined from individual rectal faecal samples taken once daily in the morning on the day of infection (day 3) and from days 7 to 14 of life. Oocyst determination was carried out by flotation in saturated sodium chloride solution with glucose and counting in a McMaster chamber. Liveweight development was measured on days 0, 7, 14, 21, 28. Measurement of villi length was performed histologically.

Table 1 Experimental design

Study	Group	Treatment	Dose	Frequency / age (days of life)	Parameters
1	A	tap water	1 ml	5	Clinical picture, faecal consistency, oocyst excretion, body weight.
	B	toltrazuril	20 mg / kg	5	
	C	diclazuril	2 mg / kg	5 and 6	
	D	sulphadimidine	200 mg / kg	5, 6 and 7	
2	A	tap water	1 ml	5	Study 2 primarily: villi length, patho-morphological alterations
	B	toltrazuril	20 mg / kg	5	
	C	diclazuril	2 mg / kg	5 and 6	
	D	sulphadimidine	200 mg / kg	5, 6 and 7	
3	A	tap water	1 ml	5	
	B	toltrazuril	20 mg / kg	5	
	C1	diclazuril	15 mg / kg	5	
	C2	diclazuril	15 mg / kg	5 and 12	

Fig. 1 Faecal consistency days 7 to 14 (study 1; n = 356 samples)

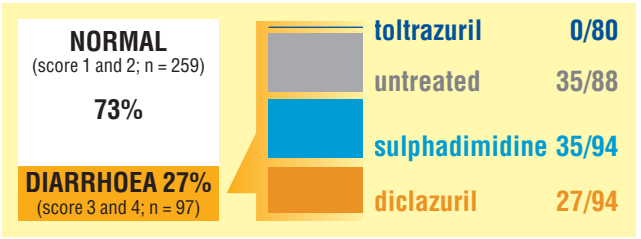


Fig. 2 Faecal consistency days 7 to 14 (study 3; n = 356 samples)

Fig. 3 Average body weight gain of piglets (study 1)

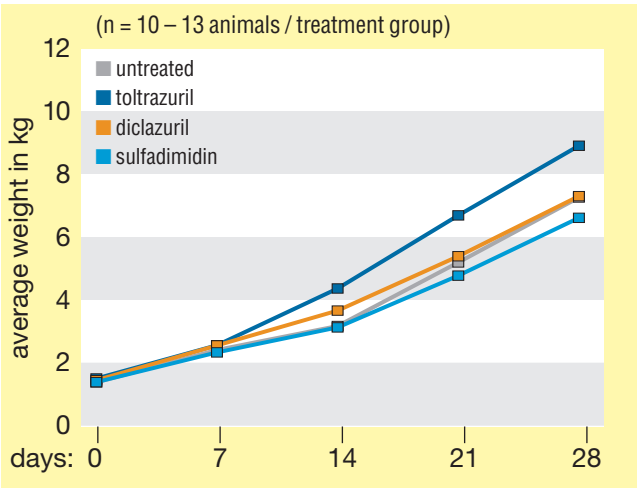
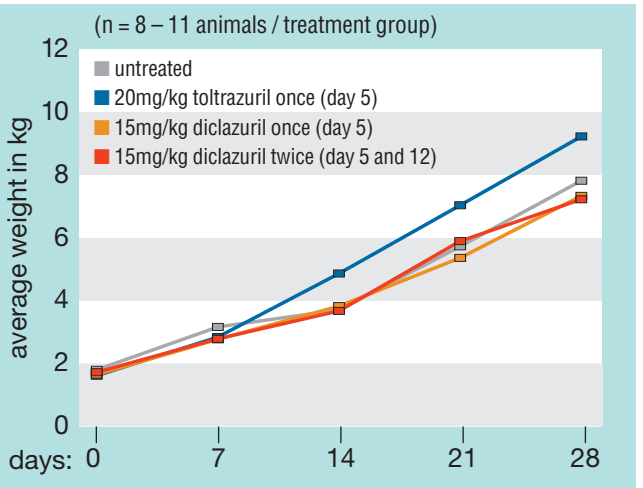


Fig. 4 Average body weight gain of piglets (study 3)



RESULTS

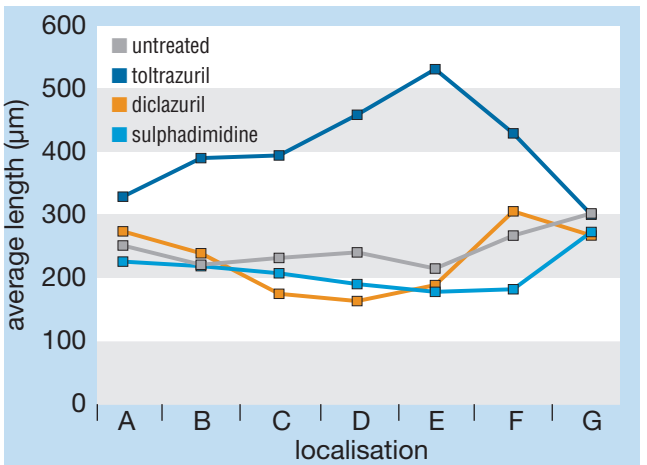
The untreated control animals developed the typical picture of severe isosporosis as a result of the infection, namely diarrhoea. The clinical picture of the treated groups was different. Signs of isosporosis were manifest in groups C (diclazuril) and D (sulphadimidine), while the animals of group B (toltrazuril) remained normal.

In studies 1, 2 and 3, there was a significant difference ($p \leq 0.05$) in the occurrence of diarrhoea between the toltrazuril-treated piglets (no diarrhoea) and groups A, C and D. The diclazuril and sulphadimidine groups did not differ significantly from the untreated control animals. The results of the individual daily assessment of faecal consistency scores of studies 1 and 3 are summarised in figures 1 and 2.

Similar results were obtained for oocyst excretion. The diclazuril and sulphadimidine groups did not differ significantly from the untreated control animals. In the toltrazuril groups, oocyst excretion was substantially reduced and remained low.

The weight-gain profile (figure 3 and 4) from day 7 to day 28 for the toltrazuril treatment groups revealed consistently higher values than for the other treatment groups.

Fig. 6 Average villi length day 11 p.i. (average, µm)



In the second study, the gut villi were considerably longer on average in the animals treated with toltrazuril than in the untreated control animals and the other treatment groups on days 10 and 14 (day 7 and 11 p.i.). Differences to the toltrazuril group could still be determined 14 days p.i. despite rapid regeneration of the villi in the affected groups (figures 5 and 6).

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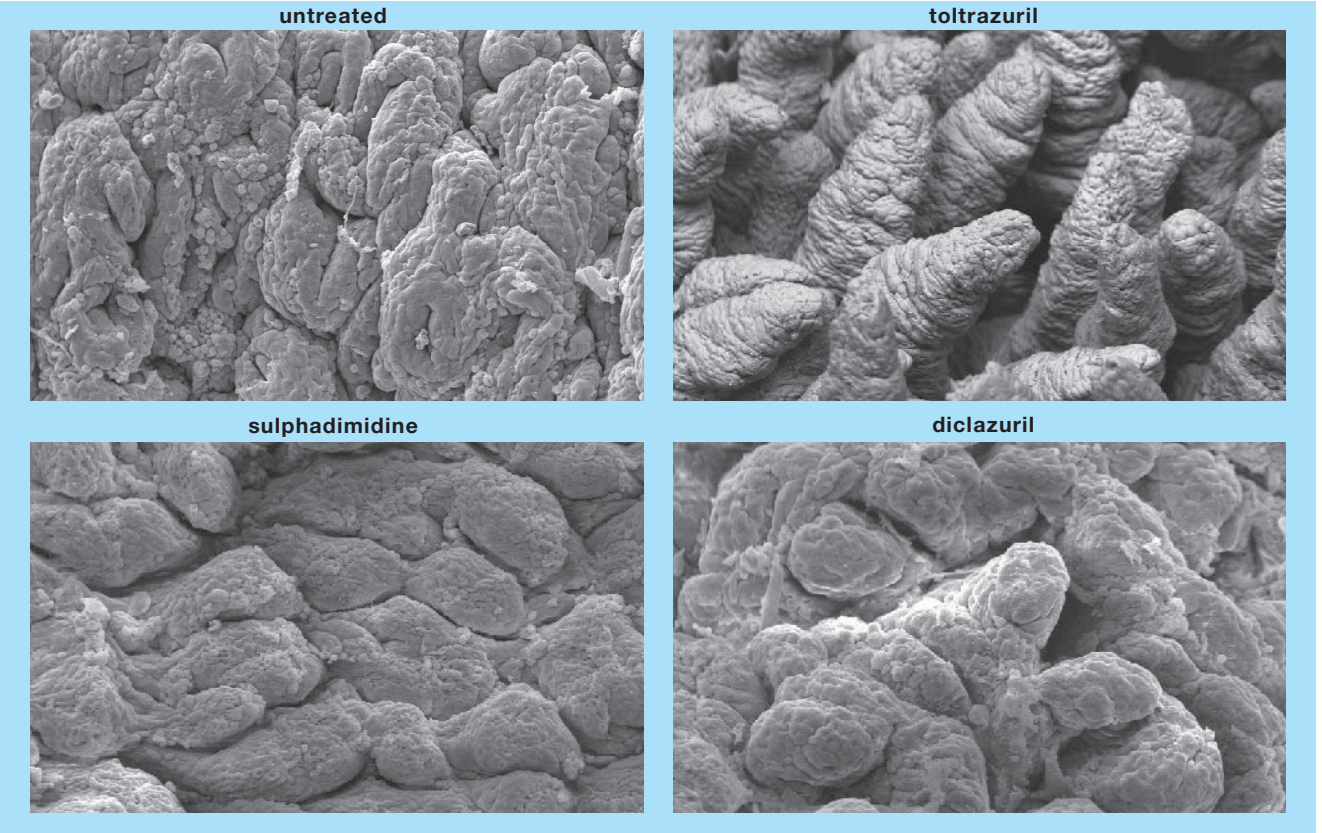
Fig. 5 Villous structure 11 days p. i.



DISCUSSION

Of the treatment regimens applied, only toltrazuril showed satisfactory efficacy in this standardised infection model. A single treatment with 20 mg toltrazuril / kg bodyweight given at an early stage of infection (2 dpi) controlled a massive artificial infection with *I. suis* in suckling pigs.

Treatment with diclazuril produced no pronounced differences to the results in the untreated groups in the tested treatment regimes (2 or 15 mg/kg, repeated treatment in some cases). A similar picture was seen in the group treated with sulphadimidine.

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