RATIONING OF DRINKING WATER SUPPLY IN RELATIONSHIP WITH GROWTH AND SANITARY PERFORMANCES OF GROWING RABBITS

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ABSTRACT

The aim of the research was to try to control the epizootic rabbit enteropathy and improve performances by rationing the same amount of water when a feed without antibiotics was administered. Different ways of water supply for a total of 4 hours a day were tested in an industrial rabbit farm. A total of 480 rabbits were utilized in two trials of 240 subjects each. The rabbits, weaned at the age of 35 days, were randomly distributed into 4 homogeneous groups with 10 replications of 6 subjects each. The control could drink *ad libitum* for 24 hours a day. The other three treatments received water according to different supply planning: once a day for 4 hours; twice a day for 2 hours each time and four times a day for 1 hour respectively. Indicating the time of water supply followed by the time of not supply, the treatments were indicated as 24/0 (control), 4/20, 2/10 and 1/5 respectively. Except the control, all the experimental treatments received water for 4 hours a day globally. In the first trial growth was not significantly different among the treatments. Feed conversion rate was lower than 4.5 in the 24/0 and 4/20 treatment, but rose to 5.9 and 5.1 in the 2/10 and 1/5 treatments, respectively. These results were related with the high mortality rate, since water restriction was not showing any certain positive effect. The values of mortality were 20%, 23%, 35% and 28% respectively for the four treatments. In the second trial the results were still worst. The consumption of water was 21%, 54% and 72% for the groups 4/20, 2/10 and 1/5 respectively, in comparison with the control in the first trial, and 26%, 66% and 85% in the second trial ($P<0.001$). This shows that modulating the same total time of water supply the amount of drinking water can be controlled. According to our 2 experiments, performances remained too low and mortality too high to be considered compatible with the needs of commercial production.

Key words: Rabbit, Drinking water, Epizootic rabbit enteropathy.

INTRODUCTION

Reducing feed ingestion seems to give the most promising results among the many trials to control the incidence of the Epizootic Rabbit Enteropathy, avoiding any pharmacological prophylactic or therapeutic treatment (Boisot *et al*., 2003; Gidenne *et al*., 2003). More recently feed restriction has been obtained by water restriction for different lags of time that can be managed more easily both at research level (Verdelhan *et al*., 2004; Boisot *et al.*, 2005) and in the field practice (Morel and Saives, 2004; Cohen Maurel, 2006; Dorilleau, 2006; Renouf, 2006; Rérolle and Milier, 2006) with declared positive practical results also in the latter case. In agreement with Verdelhan *et al.* (2004), feed restriction represents a large load of work for the farmer and rationing can be impaired by practical problems when the number of rabbits per cages changes as a consequence of mortality. On the basis of the opportunity of rationing feed by mean of water restriction a trial was programmed to test the effect of administering the same daily amount of water fractioning it in different periods along the day.

MATERIALS AND METHODS

A total of 480 rabbits were utilized in two trials of 240 subjects each. The rabbits of each trial were weaned at the age of 35 days and were randomly distributed into 4 homogeneous groups with 10 replications of 6 subjects each. Water was supplied by one drop-drinker per cage. The control group could drink *ad libitum* for 24 hours a day. The other three treatments received water according to different supply planning: once a day for 4 hours; twice a day for 2 hours each time; four times a day for 1 hour respectively. Indicating the hours of supply followed by the time of not supply the treatments were indicated as 24/0 (control), 4/20, 2/10 and 1/5 respectively. Except the control group, all the experimental treatments received water for 4 hours a day globally. In the period when water was supplied it was furnished *ad libitum*.

The granulated commercial starter feed, until 10 days after weaning, contained 16.3% of protein and 16.3% of fibre and was not medicated to prevent the enteropathy. It was supplemented only with 66 ppm of robenidine. In the second growing period, from the 55th day of age the feed contained 16.8% of protein and 14.6% of fibre and no more addition of robenidine. According to a common practice in commercial Italian farms the administration of feed was programmed in order to be finished about one hour before the next administration. The animals were weighed weekly until the age of 11 weeks (live weight about 2.4 kg). Water consumption and mortality rate were daily recorded per group of 6 subjects, growth was weekly recorded also per group and feed consumption was globally recorded at the end of each trial. Clinical symptomatology was observed and a necroscopy was practised on about 10% of dead animals, mainly when age and clinical signs were not clearly indicating the presence of enteropathy. In the second trial also a random sample of 10 subjects per treatment was checked for slaughtering rate.

The treatments 4/20 and 1/5 where video-recorded for three consecutive days to study if their behaviour could help to interpret the results in case fighting to establish a rank order when getting access to drinking could represent a cause of stress.

Rabbit growth and water intake were statistically compared by variance analysis if the variables showed homogeneity of variance, and Kruskall-Wallis' tests if the variables showed heterogeneity of variance. In the analysis of variance differences between the means were evaluated by the Duncan's test. Mortality (survival rate) was tested by a chi square test .The statistical analyses were performed using the SPSS 9.0 program (SPSS Inc. 1999).

RESULTS AND DISCUSSION

To describe the results of the four treatments for all the variables studied, the same order has always been followed: 24/0 (control), 4/20, 2/10 and 1/5 groups. In the both trials, mean final weights were not significantly different among all the treatments (2.24±0.29; 2.20±0.22, 2.21±0.22, 2.24±0.29 kg respectively in the first trial and 2.15±0.31, 2.07±0.13, 2.16±0.45 and 1.74±0.13 kg respectively in the second trial). The trend of first trial is reported in Figure 1. As reported in Table 1, individual daily growth was rather low. This depended on the high morbidity in the farm which was not using any pharmacological control. The values of mortality were 20.0%; 23.3%; 35.0%; 20.0% respectively in the first trial ($P=0.178$) and 36.6%, 43.3%, 50.0% and 15.0% in the second trial ($P<0.001$).

All deaths were attributed to enteropathy, except for two subjects dead by respiratory complications at the tenth week in the group 4/20. The last value of mortality in the second trial reported in Table 1 was very significantly different ($P<0.001$) from the others. This could indicate that, at least in favourable conditions, water administration in four supplies of one hour each could favourably reduce the morbidity by enteropathy. Except for this last observation, general results are not comparable to those obtained by Boisot *et al*. (2005) with feed restriction to -35% of the control or water restriction to 1 hour per day. Verdelhan *et al.* (2004) recorded a lower mortality rates but both water and feed were medicated with antibiotics.

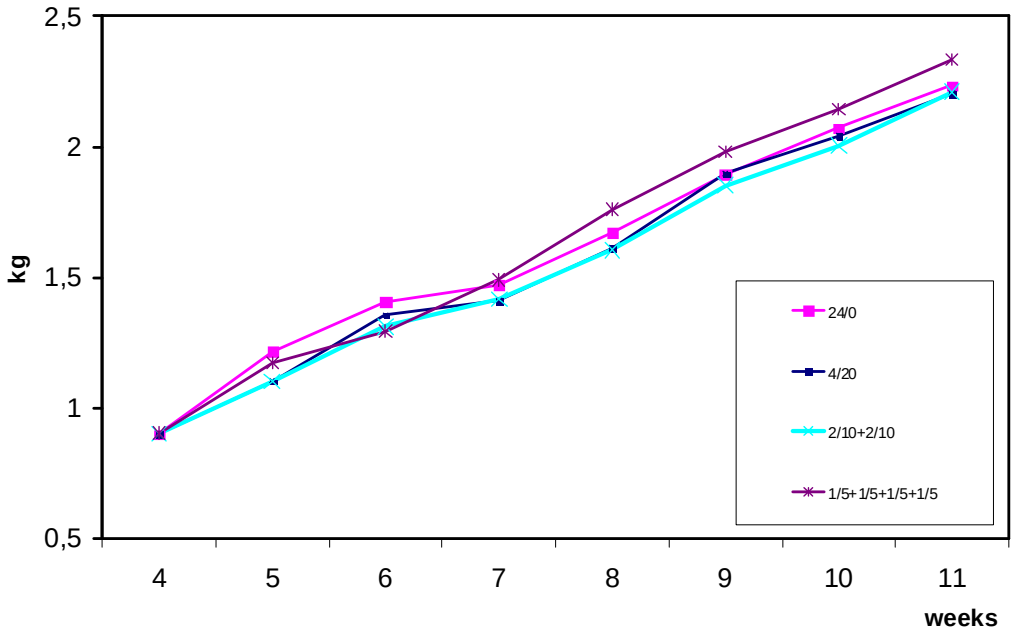

Figure 1: Mean weight of rabbits undergoing different water rationing in the first trial

Table 1: Performances and mortality results according to the different water supply treatments[1]

		Treatment								
		24/0		4/20		2/10		1/5		
		total	mean	total	mean	total	mean	total	mean	
1st trial	Initial no.	60		60		60		60		
	Final alive no.	48		46		39		48		
	Mortality rate (%)		20.0a		23.3a		35.0a		20.0a	>0.05
	Initial group weight (kg)	54	0.90	54.2	0.91	54.1	0.90	54.2	0.91	NS
	Final group weight (kg)	107.4	2.24	101.2	2.20	88.5	2.21	100.4	2.24	NS
	Growth (kg)	53.4	1.34	47.0	1.30	34.4	1.30	54.4	1.34	
	Daily growth (g)		27.4a		26.5a		26.5a		27.4a	>0.05
	Feed intake (kg)	237.0		231.8		202.0		237.4		NS
	Feed conversion	4.4		4.3		5.9		5.1		
2nd trial	Initial no.	60		60		60		60		
	Final alive no.	38		34		30		51		
	Mortality rate (%)		36.7A		43.3A		50.0A		15.0B	<0.001
	Initial group weight (kg)	57.1	0.95	57.1	0.95	56.7	0.94	56.5	0.94	NS
	Final group weight (kg)	81.8	2.15	70.4	2.07	64.8	2.16	88.5	1.74	
	Growth (kg)	24.7	1.20	13.3	1.12	8.1	1.22	32.0	0.80	
	Daily growth (g)		24.5a		22.9a		24.9a		16.3b	<0.01
	Feed intake (kg)	185.3		183.6		187.9		188.8		NS
	Feed conversion	7.5		13.8		23.2		5.9		NS
	Slaughtering rate (%)	57.1		55.3		59.2		52.8		NS

[1]Values in the same row accompanied with different letters are significantly different

In the first trial, feed conversion rate was lower than 4.5 in the 24/0 and 4/20 treatment but rose to 5.9 and 5.1 in the 2/10 and 1/5 treatments respectively (Table 1). In the second trial results were still worst and related with the higher mortality rate. It is obvious that rationing water in the observed experimental conditions is not sufficient to substitute antibiotic prophylaxis of enteropathy. The high morbidity and consequent insufficient daily growth and bad feed conversion are not compatible with commercial production.

In the first trial, water intake was significantly different (P<0.001) according to the treatments (figure 2). The mean daily water consumption in the total period was 286±23, 60±10, 155±21 and 207±36 ml. This corresponded to 21%, 54% and 72% of that of the control batch, for the groups 4/20, 2/10 and 1/5

respectively. In the second trial similar results were obtained with a water consumption being 26%, 66% and 85%, respectively, for the groups 4/20, 2/10 and 1/5, of that of the control group. This shows that, modulating the same total time of water supply, the amount of drinking water can be controlled. In practice, each time that the lag of daily administration is reduced by half and the number of administrations is doubled, the water intake of the rabbits increases by about a 25%.

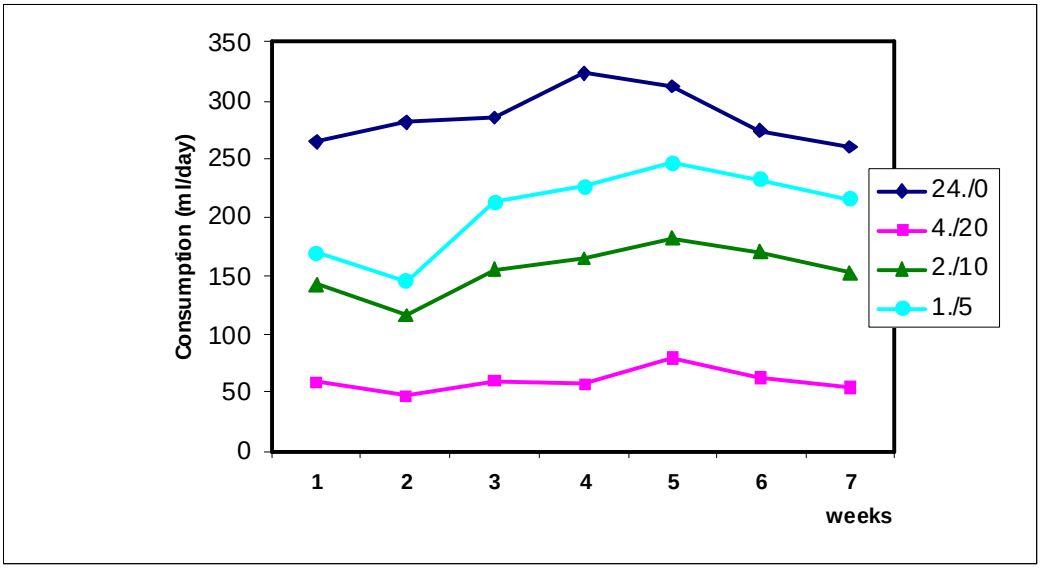

Figure 2: Mean daily individual water consumption, in first trial (P<0.001)

Results show that water intake can be regulated by rationing even if all the groups can have access to water for the same four hours of administration total time. If water is at disposal for four consecutive hours, the rabbits that have drunk do not drink any more. Thus the following opportunities of drinking are lost and when water supply stops they cannot drink also if they are thirsty again. As a consequence, if water supply is fractioned, the animals have more opportunity of drinking when thirsty.

In the second trial, slaughtering rates were in relationship with the body weight, but in a commercial range only for the treatments 24/0 and 2/10 (table 1). The other results were in general even worst than in the first trial. Thus, at least in our experimental conditions, the work hypothesis that water rationing could be effective to control the enteropathy was not confirmed. These results are not in agreement with the data reported by the quoted French Authors that give many confirmations of the positive effect of water rationing. In any case the research by Verdelhan *et al.* (2004) could suggest the possibility of a combined action of antibiotic prophylaxis and feed restriction obtained by mean of water rationing. This matter remains anyhow of major relevance since the enteropathy has nowadays more the traits of an enzootic then epizootic pathology. According to the behavioural control by videorecording, when the water supply was furnished, sometimes the rabbits crowed together, but no evident competition was observed. They tried to drink from time to time, also during the not supply period. When a subject succeeded to get the water, after a while it left the nipple and moved to eat so that a stress from competition should not be feared if a water rationing system is adopted for any reason.

CONCLUSIONS

Our trials aiming to control the mortality due to epizootic rabbit enteropathy simply by controlling the conditions of water supplying does not offer good perspectives, at least in the tested experimental conditions. Nevertheless if rationing water can have some interest in rabbit keeping it is demonstrated that the total intake can be regulated not only by the lag of time in which the water is at disposal of the animal, but also by its fractioning during the day.

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