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EFFECT OF WATER TEMPERATURE ON THE FEED AND WATER CONSUMPTION OF FATTENING RABBITS 2. EFFECT OF THE COLD WATER

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SUMMARY - Two trials deal with the comparison of consumption of cold water (about 11°C) and control water (about 20°C). In each trial, 36 rabbits are used to compare the consumption of feed and water of 6 cages. The air temperature is about 23°C. When the rabbits receive only cold or only control water, there is no difference of consumption. If the rabbits can choose between cold and control water, they drink more control water. Moreover, in that case, they waste the cold water.

Key words : Cold, water, rabbit, temperature.

RESUME - 2 essais de comparaison de consommation d'eau froide (environ 11°C) par rapport à un témoin à 20°C environ ont été réalisés. Dans chaque essai, 36 lapins ont été utilisés pour comparer la consommation d'eau et d'aliment de 6 cages. La température de l'air est proche de 23°C. Lorsque les lapins reçoivent uniquement de l'eau froide ou uniquement le témoin, il n'y a pas de différence de consommation. Si les lapins peuvent choisir entre l'eau froide et l'eau témoin, leur consommation d'eau témoin est supérieure. De plus, dans ce cas, ils gaspillent l'eau froide.

Mots clés : Froid, eau, lapin, température.

INTRODUCTION

The effect of the heat on rabbits has often been studied. Rabbits do not have sudoriparous gland and then do not support high temperature : if the temperature is higher than 26,7°C, the heat will decrease their metabolism and over 40,6°C their body temperature will increase, leading to their death (Colin, 1985).

The effects of the heat on consumption are the decrease of the feed consumption and the increase of the water consumption (Finzi *et al.*, 1994). Consequently, the fattening performances of rabbits are lower in summer than in winter (Lebas, 1989 ; Ayyat *et al.*, 1996).

This work deals with the behaviour of rabbits in relation with the air temperature and the water temperature. The aim is to determine if water cooling system could improve the performances of rabbits under hot conditions.

MATERIALS AND METHODS

The trials are conducted at the Research and Experimentation Centre of Sanders in Sourches (France) from June to August 1997.

Animals and housing

The Hyplus rabbits are housed in a windowless building with an artificial photoperiod of 8 hours of light and 16 hours of darkness.

The rabbits are weaned at 35 days. They are placed in flat-deck cage of 6 rabbits. The cages are 92 × 51 cm. So, the density is 12.8 rabbits/m². It's possible to put water bottle on these cages at the start of the experimental period.

Diet

During the trials, the rabbits receive the same diet. They are fed ad libitum for feed and for water. The analysis of the diet is given in Table 1.

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Table 1. Composition and analysis of the diet (% of the feed)

H ₂ O	11.5
Protein	17.7
Cellulose	14.8

Water

Before the trial, the rabbits receive the tap water of the building. This water is in a tub of 60 L. constantly filled and is brought to the rabbits through pipe and drinker. This is the system usually used in the buildings. In that case, the water temperature is about the temperature of the building.

During the trial, each cage has one or two water bottles of 10 L. On each water bottle, a drinker is placed.

The temperature of cold water to test is 11°C. To obtain such a cold temperature, we froze partially the water-bottle (some of the water have to be in the liquid state). The water-bottles are isolated with isolating plates to slow the melting of the ice.

EXPERIMENTAL DESIGN

There are two different trials with two experimental designs.

Free choice design (Trial 1)

Each cage is equipped with two bottles of water, a control one and a cold one. 2 days before the beginning of the trial, 3 cages receive only the control water and 3 cages receive only the cold water to prevent from the effect of the water temperature before the trial on the choice of the rabbits.

Each day, the bottles are removed and their position are reversed to prevent from the habit of drinking in one point. The trial lasts 5 days.

The rabbits are 56 days of age and weigh 1710 g at the beginning of the trial.

Qualitative design (Trial 2)

Each cage is equipped with only one bottle of water : the control water or the cold water.

There are 6 cages of 6 rabbits in the trial (3 per treatment). The trial lasts 5 days.

Trial 2 : The rabbits are 49 days of age and weigh 1400 g at the beginning of the trial.

RECORDINGS

The temperatures are recorded three times per day at 8:00 am, 2:00 pm and 6:00 pm. The water temperature in the bottle and at the exit of the drinker and the air temperature are noticed.

Water consumption is recorded at 8:00 am and 6:00 pm. Feed consumption is recorded at 6:00 pm.

STATISTICAL ANALYSIS

The statistical analysis of treatment effect for free choice design is the student test.

In case of qualitative design, the number of cages allows to have information about the behaviour of rabbits.

RESULTS AND DISCUSSION

Trial 1

Table 2 gives water and air temperatures during the trial.

Table 2. Temperature of air and water at different hours of the day (°C)

		8:00 am	2:00 pm	6:00 pm
AIR		20.4 ± 1.7	23.4 ± 2.1	23.8 ± 2.6
CONTROL WATER	Water bottle	17.8 ± 0.4	18.3 ± 0.4	18.5 ± 0.5
	Drinker	17.8 ± 0.4	18.3 ± 0.4	19.2 ± 0.8
COLD WATER	Water bottle	4.0 ± 3.4	5.0 ± 3.1	6.2 ± 4.3
	Drinker	10.2 ± 2.3	11.2 ± 2.1	11.1 ± 4.1

The control temperatures do not have much variations. The cold water temperatures are quite different between the water-bottle and the drinker because of the air temperature. Moreover, the standard deviations are higher than for the control. Nevertheless, the difference between cold water and control water is sufficient.

Table 3 gives the results of consumption.

Table 3. Consumption of water (g/day/rabbit/water bottle)

		Control water	Cold water	Total
Number of rabbits		36		
Number of cages		6		
Water intake	Day 1	222.0	87.9	309.9
	Day 2	186.2	86.8 (155.1*)	273.0
	Day 3	185.3	157.0	342.3
	Day 4	195.7	98.5	294.2
				304.9
Water intake	Day 1-4	197.3	107.6	
Water intake (%/water bottle)	Day 1-4	65	35	

Before correction*

The total consumption of water is 321.9 g/rabbit/day before correction and 304.9 g/rabbit/day after correction of one aberrant value. The feed consumption is 102.4 g/rabbit/day. So, the water/feed ratio is 3.0 (with corrected value). The Student test is significative at 1 % with corrected values : cold water is less drink than control water. It seems that the rabbits prefer the control water. The water consumption is very high in relation with the feed consumption, the age of the rabbits and the air temperature. So, we can think that some water has been wasted. Moreover, as the cold water is less drink and has one aberrant value, it could be wasted.

Trial 2

Table 4 gives water and air temperatures during the trial.

Table 4 : Temperatures of air and water at different hours of the day (°C)

		8:00 am	2:00 pm	6:00 pm
AIR		20.4 ± 1.7	23.4 ± 2.1	23.8 ± 2.6
CONTROL WATER	Water bottle	19.3 ± 1.3	21.0 ± 1.5	21.2 ± 1.0
	Drinker	19.0 ± 1.0	21.0 ± 1.5	21.8 ± 1.4
COLD WATER	Water bottle	7.8 ± 1.3	5.9 ± 5.7	5.8 ± 4.6
	Drinker	11.0 ± 1.5	11.6 ± 3.4	12.1 ± 4.3

The control water temperatures are quite constant whereas the cold water temperatures are more fluctuating (higher standard deviations).

The air temperature is about 20°C to 24°C which is quite a normal temperature for this season in France.

The difference between cold and control water is different enough.

Table 5 gives the results of consumption

Table 5 : Consumption of feed and water by cage (g/day/rabbit)

Treatment	Control water	Cold water
Number of rabbits	18	18
Number of cages	3	3
Feed consumption	128.7 ± 15.7	134.1 ± 13.7
Water consumption	233.4 ± 49.9	238.1 ± 20.4
Water/Feed	1.82 ± 0.29	1.80 ± 0.35

The water temperature has no effect neither on the water consumption, nor on the feed consumption. The water/feed ratio is 1.8, which is next to the value usually measured (2.0).

This trial shows that cold water of 11°C does not change the behaviour of rabbits in comparison with control water of 20°C. In this range of temperature, rabbits do not seem to be sensitive to the water temperature.

Nevertheless, when rabbits have the choice between cold and control water, they waste the cold water. So, they are able to differentiate the two temperatures.

As far as the consumption (feed and water) is concerned, rabbits can receive cold water (11°C) without negative effect.

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