

EFFECT OF A LIMITED ACCESS TO WATER ON WATER CONSUMPTION, FEED INTAKE AND GROWTH OF FATTENING RABBITS.

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ABSTRACT

The aim of this trial was to study the effect of water restriction on feed intake for 336 rabbits from 32 to 62 days of age. Rabbits were housed in cages of 7 rabbits. There was 4 treatments (12 cages per treatment) which differed only by the time of access to water. In the control group, the rabbits were given water *ad libitum*, in the 3 other groups, the rabbits were given water during 1h30, 2h30 or 4h per day at the end of the light period (4 pm). Water consumption decreased respectively to 62%, 72% and 87% of the *ad libitum* level (201ml/day/rabbit). Feed intake decreased ($P < 0.0001$) respectively to 78%, 83% and 87% of the *ad libitum* level (129g/day/rabbit). Thus, a limited access to drinking water allowed to reproduce feed restriction. From 62 to 69 days of age, all rabbits were given water *ad libitum*. At slaughter, only rabbits with limited access to water during 1h30 from 32 to 62 days were significantly lighter than the rabbits of the control group, the weight difference was of 135g ($P = 0.031$).

Key words: water restriction, feed restriction, fattening rabbits.

INTRODUCTION

Feed restriction is used in rabbit breeding to reduce digestive mortality after weaning. The efficiency of feed restriction on mortality and morbidity rates was demonstrated by GIDENNE (2003) for feed intake reduced to 70- 80 % of the *ad libitum* level.

Feed restriction represents a large working load for the farmer and can not always be applied in rabbit breeding. Moreover, it is difficult to restrict feed properly when mortality starts in the breeding and when the number of rabbits is variable from one cage to another. Water restriction could be an alternative to feed restriction and is easier to apply in the breeding.

According to PRUD'HON (1975 a), the level of water consumption represents about twice as more as the level of feed intake but changes with the age of the animal, its physiological state and weather conditions. Several works were conducted to study the effect of water restriction on feed intake and rabbit growth during fattening. The time of access to water ranged from 10 minutes per day (PRUD'HON *et al.*, 1975b) to 30 minutes per day (LEBAS and DELAVEAU, 1975; PRUD'HON and CARLES, 1976). These trials were conducted in individual cages, rabbits had a genetic potential, which was different from

the strains currently used, and free access to water was not given back at the end of the fattening period.

The objective of our study was to examine the effect of a limited access to water (between 1h30 and 4h per day) on feed intake in current rabbit breeding conditions. The aim was to reproduce feed restriction thanks to water restriction.

MATERIAL AND METHODS

The trial was conducted at the research facility of Sourches (France) from the 21st of October 2003 to the 26th of November 2003.

Animals and housing

336 weaned rabbits of Hyplus strain were housed in a windowless building with an artificial photoperiod of 8 hours of light and 16 hours of darkness. Light was turned on at 8 am, and off at 4 pm. Minimum temperature was 15.1°C and maximum temperature was 18.8°C in average, with a ventilation system by extraction. There were 7 rabbits per flat-deck cage (density 16.7 rabbits/m²). Each cage was provided with an automatic waterer. 336 rabbits were weight individually and allotted by their weaning weight. Each cage of 7 rabbits was assigned to one treatment among 4, with 12 cages replicate per treatment.

Water and diet

The treatments differed only by the time of access to drinking water. In the control group the rabbits were given water *ad libitum*. In the 3 other groups, from 32 to 62 days of age, the rabbits were given water 1h30, 2h30 or 4h a day. Access to the drinking water occurred once every day, at the end of the light period (4 pm), in the evening. From 62 to 69 days of age, all rabbits were given water *ad libitum*.

Rabbits of the four groups received the same diet: diet 1 from the age of 32 to 62, diet 2 from the age of 62 to 69 (tables 1 and 2). Rabbits fed *ad libitum*.

Table 1. Composition of the diets (% as feed).

	Diet 1	Diet 2
Wheat bran	24.6	30
Soya bean	5	3.3
Sunflower meal	15.7	28.9
Alfalfa	21.5	6.7
Wheat straw	1.4	0
Sugar beet pulp	14.4	18
Grape pips meal	8.7	5.1
Molasses	4	4
Vitamine and Mineral mix	4.3	4.0
Tiamuline 65 ppm	0.4	0

Table 2. Nutritive values of the diets (analysed % as feed).

	Diet 1	Diet 2
Dry Matter	89.1	89.0
Crude Protein	15.9	17.2
Crude Fiber	18.9	16.3
Digestible Energy calculated according to INRA tables (kcal/g)	2350	2450

Veterinary treatment

From the age of 32 to 62 days, the diet was supplemented with Tiamulin (65 ppm) because of the presence of enterocolitis. The aim of this trial was to get water and feed intake results from healthy rabbits.

Records and control

Rabbits were weight by cage every week from the age of 32 (weaning) to 69. Consumptions of diet and water were recorded at the same dates. In case of mortality in a cage, feed and animals were weight the day of death. Mortality and illness of rabbits were noted daily.

Statistical analysis

Analysis of variance was carried out according to a factorial model, with two fixed factors: the treatment (time of access to water) and the group of initial weight, and their interaction. The effect of treatment on mortality and morbidity rates was investigated with a Chi Square Test.

RESULTS AND DISCUSSION

Water consumption

The average daily water consumption was of 200ml/day/rabbit when rabbits get free access to water. Water consumption increased between weaning and slaughter (Figure 1). A limited access to water between 1h30 and 4h/day led to a significant decrease in water consumption from 62% to 87% of the *ad libitum* level. The shorter the time of access to water was, the less water was drunk.

For treatments with limited access to water, the rabbits were moving each day for about 10 minutes around the drinker and they rushed to drink. After drinking, the rabbits ate their diets. Then, things calmed down in the cage.

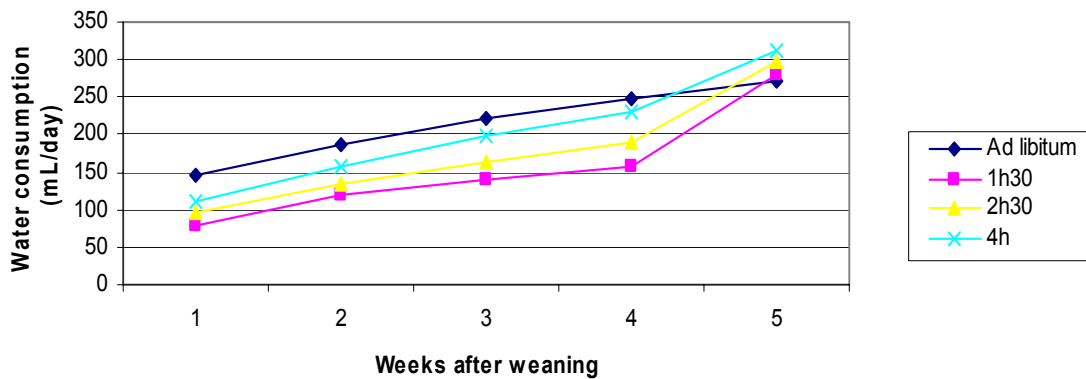


Figure 1. Water consumption between 32 days and 69 days

These behavior observations have already been noted by LEBAS and DELAVEAU (1975), as well as the level of water consumption when access to water was individual and lasted for half an hour. LEBAS and DELAVEAU (1975) recorded consumption daily and was able to observe a 2-days adaptation period; during this period, water consumption was about 40% of the *ad libitum* level. We were not able to observe this adaptation period because, in our experiment, recordings were done weekly. When water was given back unlimited, water consumption of the animals that were first limited increased largely.

Feed intake

The average daily feed intake between weaning and slaughter was of 130g/day/rabbit when rabbits get free access to water (Table 3). The ratio of water to dry matter intake was of 1.7, slightly higher than the ratio found by PRUD'HON (1974).

Limiting water consumption allowed to reduce feed intake in a significant way and thus allowed to realize feed restriction between 78 and 87% of the *ad libitum* level (Figure 2).

In individual cages, 10 minutes of access to water per day allowed to reduce feed intake to 87 % of the *ad libitum* level (PRUD'HON, 1975b).

Lebas observed an instantaneous decrease in feed intake when access to water was limited to 30 minutes /day in individual cages. This decrease lasted for about 2 days and, contrary to our observations, after 3 to 4 days feed intake came back near the *ad libitum* level.

When water was given again unlimited, feed intake of rabbits that were first limited did not increase, unlike water consumption. For the control treatment (*ad libitum*), feed intake decreased compared to the week before. This could be due to the change in diet, diet 2 was more energetic than diet 1.

Table 3. Water consumption, feed intake and rabbits weight.

Water distribution	24h	1h30	2h30	4h	Water	Weight	Interaction	RSD
Water consumption (32-62 days) (ml/d/rabbit)	201±18 ^a	124±10 ^b	145±10 ^c	174±14 ^d	***	*	NS	12
Feed intake (32-62 days) (g/d/rabbit)	129±10 ^a	101±7 ^b	107±7 ^{bc}	118±8 ^c	***	***	NS	6
Weight at 32 days (g)	790±73	790±72	790±73	790±73				
Weight at 62 days (g)	2104±127 ^a	1834±128 ^b	1903±132 ^{bc}	1934±134 ^c	***	***	NS	81
Weight at 69 days (g)	2285±131 ^a	2150±121 ^b	2184±137 ^a	2202±174 ^a	*	***	NS	109
ADG 32-69 days (g/j)	40.4±1.8 ^a	36.8±2.5 ^b	37.7±2.9 ^{ab}	38.2±3.5 ^{ab}	*	NS	NS	0.15
FCR 32-69 days	3.02±0.13 ^a	2.72±0.19 ^b	2.79±0.14 ^b	2.85±0.16 ^b	***	**	NS	2.8

RSD : Residual Standard Deviation ; NS p>0.05 ; ^{a,b,c} Means within a row with different letters are significantly different at p<0.05

ADG : Average Daily Gain – FCR : Feed Conversion Ratio

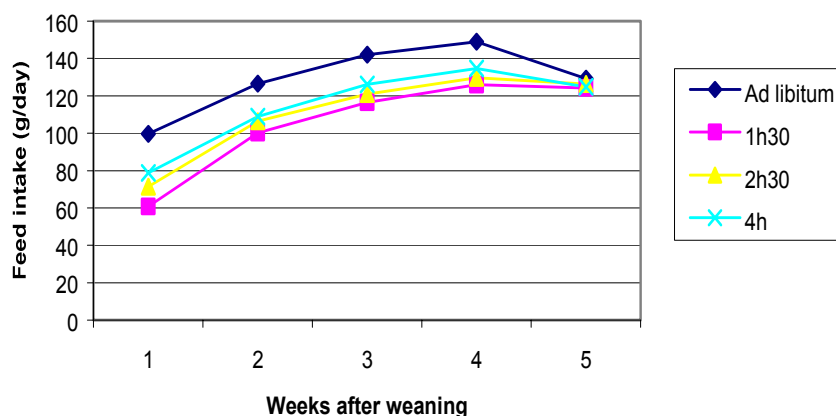


Figure 2. Feed intake between weaning and slaughter.

Rabbit growth

Rabbit growth was significantly slowed down during the water restriction period compared to unlimited rabbits, but a compensatory growth was observed during the last week when animals were given unlimited access to water (Figure 3). This results in a difference in rabbit weight at slaughter between 3.7 to 6% of the control weight. The

difference with the control group was significant only for rabbits with limited access to water during 1h30. The feed conversion ratio was lower when the time of access was shorter.

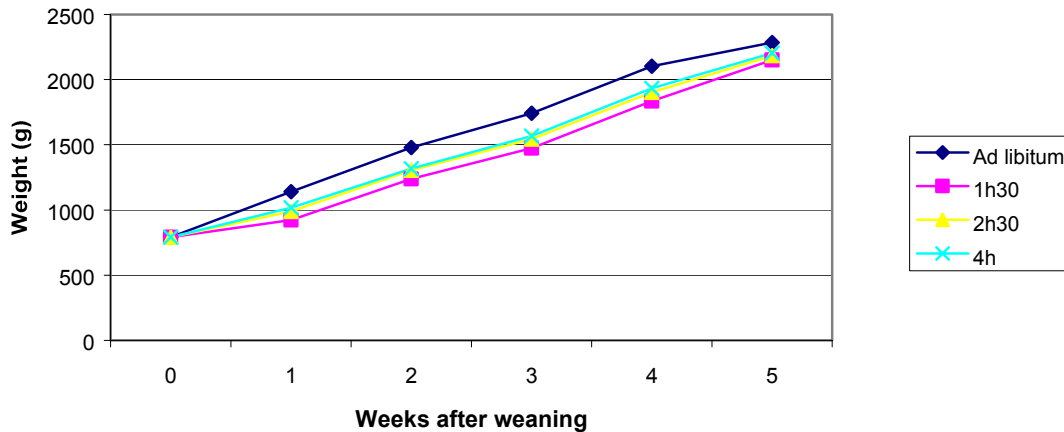


Figure 3. Rabbit growth between weaning and slaughter.

Some works have observed a significant decrease in rabbit growth but only during the few days after the beginning of water restriction. This difference could be explained by the use of collective cages and by the improvement in the growth potential of the animals for 30 years.

Sanitary conditions

During this trial, the average mortality rate was of 2.6% without significant differences between the treatments (Table 4). Mortality was mainly due to digestive problems. Morbidity rate, corresponding to ill animals that have survived, was of 3.8%.

Table 4 : mortality and morbidity from 32 to 69 days

Water distribution	24h	1h30	2h30	4h	X ²
Rabbits at weaning	84	84	84	84	
Died rabbits	0	2	1	3	NS
Ill rabbits that have survived	1	3	4	5	NS

NS p>0.05

CONCLUSION

A limited access to drinking water, between 1h30 and 4h per day, led to a decrease in water consumption from 23 % to 13 %. Thus, this allowed to reproduce feed restriction, ranging from 78 to 87%, with a limited decrease in rabbit growth.

In good sanitary conditions, there was no significant effect of water restriction on fattening mortality. However, further study should be conducted to evaluate the effect of water restriction on digestive mortality and morbidity rates in case of digestive disorders.

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