

EFFECT OF RESTRICTING FEEDING PERIODS ON FEED INTAKE AND
DIGESTIBILITY OF DRY MATTER IN RABBITS

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INTRODUCTION

The application of diets to the rabbits once a day for limited time may be useful from some points. Firstly the daily efforts would be lesser. Secondly, the measuring of daily feed intake will be more accurate in comparison to ad-libitum feeding where the ad-libitum fed rabbit has enough time to scratch the feed and thus increases the feed loss which leads to some errors in calculating feed intake. It was found that when feed is available for only 5 hours per day the Angora rabbit's intake could be reduced by 25 % in comparison to ad-libitum feeding as reported by Schlelaut (1976). However, if it is limited to 4 hours feed consumption would be reduced by 40 % as found by Hornicke *et al.* (1976). Berek and Holl (1981) found that the daily feed intake of piglets fed ad-libitum, 90 or 120 minutes / day from 30 to 90 days of age was 1.01, 0.86 and 0.88 kg, respectively.

The present study aimed to investigate the effect of restricting feeding periods on feed intake and digestibility of dry matter in rabbits.

MATERIALS AND METHODS

This experiment was carried out at the Rabbit Farm of

the Animal Breeding and Nutrition Research Institute in Godollo, Hungary in summer 1987.

Non pregnant adult New Zealand White females having an average body weight of 3800 ± 100 g were used for two experiments in this study. The animals of each experiment were divided into five groups. Each group consisted of 4 animals.

Rabbits of all experimental groups were individually housed in metabolic cages. During 4 days pre-experimental period feed was offered ad-libitum and the mean of daily voluntary feed intake for each animal was measured to be considered as control for itself. The feeding periods in the two experiments are shown in Table 1.

Table 1 : Daily feeding durations in the two experiments

Experimental groups	Feeding duration / day (hours)	
	1 st exp.	2 nd exp.
1	½	3
2	1	4
3	1½	5
4	2	6
5	24 (ad lib.)	24 (ad lib.)

Animals were fasted for 18 hours before the beginning of the experiments and then fed a pelleted diet containing 9.6 MJ ME / kg, 12.3 % digestible crude protein and 12 % crude fiber. After the restricted feeding period feeders were emptied. Feed intake and excreted faeces were recorded daily for each rabbit for 8 days.

Dry matter of the diet and faeces was determined according to the A.O.A.C. (1980) in the laboratory of Nutrition Department of the same Institute. Data were statistically analysed after Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

I. Dry matter intake :

Data presented in table 2 and Fig. 1 showed that the daily dry matter intake increased gradually up to the end of the experiment at the 8th day for all restricted

feeding periods in the first experiment. While that of the control group (ad libitum feeding) was approximately constant where it ranged between 158.3 and 169.0 g dry matter per day.

Differences between the control group and the other experimental groups in respect of daily dry matter intake were significant (P 0.01) as shown in table 2 . However, the differences in daily dry matter intake among the restricted feeding periods were not significant throughout the experimental period.

It was noticed that the rabbits after 8 experimental days could not eat more than 30, 35.3, 35.1 and 38.6 % of their pre-experimental dry matter ad libitum intake for the restricted feeding groups fed only ½, 1, 1½ and 2 hours , respectively.

In the second experiment, the feeding period was restricted to be 3, 4, 5 and 6 hours in addition to the ad lib. group. Dry matter intake of rabbits fed in restricted time groups was also increased with the advancing of the experimental days, where it was 208.0, 150.8, 164.1 and 173.6 % at the 8 th experimental day in comparison to that of the 1st day for the groups fed for 3, 4, 5 and 6 hours / day, respectively as shown in table 3 and Figure 2 .

At the 8 th day of the 2 nd experiment, rabbits could not eat more than 58.8, 59.7, 65.9 and 74.2 % of their full intake (ad libitum) of dry matter. Dry matter intake of the ad libitum group was approximately constant throughout the experimental period where it varied between 169.2 and 172.3 g / day and was significantly (P 0.01) higher than the other experimental groups as shown in table 3.

Rabbits fed for 6 hours / day had significantly (P 0.01) higher dry matter intake than those fed 3 or 4 hours/day but when the feeding time was 5 hours, the differences were not significant.

II. Digestibility of dry matter :

Data presented in Table 4 showed that the digestibility coefficient of dry matter did not differ significantly among feeding periods in the 1st experiment. It must be mentioned that the digestibility coefficient of dry matter in the groups fed for $\frac{1}{2}$, 1 , $1\frac{1}{2}$ and 2 hours was higher than that of those fed ad libitum from the 2nd day up to the 8th day. The digestibility coefficient of dry matter was approximately stable from the 7th day for the groups fed $\frac{1}{2}$, 1 and 2 hours / day and from the 6th day for those fed $1\frac{1}{2}$ hours/day as shown in table 4 and Figure 3.

At the second experiment, the differences in digestibility coefficient between the feeding periods were significant (P 0.05) only at the 1st day where the digestibility coefficient of rabbits fed 3 hours / day was significantly (P 0.05) lower than that of those fed 5, 6 hours and ad lib. and after that the differences were not significant as shown in table 5.

As obtained in the 1st experiment, rabbits fed for 3, 4, 5 and 6 hours/day had slightly higher digestibility coefficient than those fed ad libitum as shown in table 5. The digestibility coefficient was found to be approximately stable from the 7th experimental day for all experimental groups as shown in table 5 and Figure 4.

Generally, it was concluded that when the feed was available one time a day for only $\frac{1}{2}$, 1 , $1\frac{1}{2}$, 2 , 3 , 4 , 5 and 6 hours the dry matter intake of adult New Zealand White females can be reduced by 70 , 65 , 65 , 61 , 40 , 34 and 26 % from their ad libitum intake.

These results are in agreement with those reported by Schlolaut (1976) and Hornicke et al. (1976).

It was concluded also that the digestibility coefficient of dry matter when the feed was available for a restricted time was slightly higher than that of the ad libitum feeding. This result agreed with that reported by Fekete and Gippert (1981) and Holdas (1985) who concluded that

the increasing of daily feed intake decreases the digestibility of the feed.

SUMMARY AND CONCLUSION

This study aimed to investigate the effect of restricting feeding time on the daily intake and digestibility of dry matter. Twenty females of New Zealand White rabbits were divided into 5 groups each of 4 animals for two sequential experiments. rabbits were fed for $\frac{1}{2}$, 1 , $1\frac{1}{2}$, 2 hours daily as well as ad libitum in the 1st experiment and for 3 , 4 , 5 , 6 hours daily in addition to ad libitum in the 2nd experiment for the 1st, 2nd, 3rd, 4th and 5th group, respectively. The obtained results showed that :

Rabbits fed ad libitum had significantly (P 0.01) higher feed intake than those fed for a restricted time/day. Rabbits fed for $\frac{1}{2}$, 1 , $1\frac{1}{2}$, 2 , 3 , 4 , 5 , and 6 hours could not eat more than 30, 35.3, 35.1, 38.6, 58.8, 59.7, 65.9 and 74.2 % of their ad libitum intake.

Digestibility coefficient of dry matter in the 1 st experiment increased up to the 3rd day and then decreased with the increasing of feed intake. On the other hand, when the feeding period varied between 3 and 6 hours/day in the 2 nd experiment, the digestibility of dry matter not considerably changed from the 2nd day up to the end of the experiment.

It could be concluded that the digestion trial being more accurate and needed less working time when the daily feeding period is ranged between 3 and 6 hours.

The application of restricted feeding period might be used satisfactorily in the feeding of over fattened rabbits and during no breeding times as occurs in summer under the Egyptian conditions.

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Table 2 : Daily dry matter intake as affected by the length of daily feeding period in the 1st experiment in grams ($\bar{x} \pm s.d.$):

	Daily feeding		Periods (hours)		
	0.5	1.0	1.5	2.0	ad libitum
<u>Pre-experimental period:</u>					
	162.5 ± 14.9	171.6 ± 19.9	173.3 ± 10.5	162.7 ± 15.5	161.6 ± 11.9
<u>Experimental days:</u>					
1	5.0 ± 2.9 ^a	8.5 ± 6.7 ^a	8.0 ± 5.6 ^a	13.5 ± 12.4 ^a	162.0 ± 19.6 ^b
2	22.3 ± 6.4 ^a	27.5 ± 5.5 ^a	31.8 ± 8.5 ^a	33.8 ± 16.9 ^a	158.5 ± 14.1 ^{b1}
3	31.3 ± 10.5 ^a	37.0 ± 5.7 ^a	39.8 ± 7.5 ^a	39.0 ± 18.1 ^a	158.3 ± 11.2 ^{b2}
4	36.5 ± 9.6 ^a	38.0 ± 9.9 ^a	50.3 ± 8.0 ^a	48.0 ± 18.3 ^a	159.5 ± 16.4 ^{b4}
5	37.5 ± 13.7 ^a	41.8 ± 14.3 ^a	49.5 ± 12.2 ^a	56.5 ± 24.4 ^a	162.0 ± 8.7 ^{b7}
6	42.0 ± 16.4 ^a	48.8 ± 13.4 ^a	51.0 ± 8.8 ^a	60.0 ± 27.1 ^a	166.3 ± 20.2 ^{b8}
7	45.0 ± 17.5 ^a	56.8 ± 11.2 ^a	55.5 ± 11.4 ^a	61.5 ± 22.1 ^a	167.0 ± 1.4 ^{b4}
8	48.8 ± 18.9 ^a	60.5 ± 13.2 ^a	60.8 ± 12.7 ^a	62.8 ± 22.7 ^a	169.0 ± 2.2 ^{b2}
Average	33.53 ± 17.7 ^a	39.84 ± 18.5 ^a	43.31 ± 18.3 ^a	45.63 ± 23.9 ^a	156.7 ± 19.1 ^b

Means within each row having the same letter are not significantly different.

Table 3 : Daily dry matter intake as affected by the length of feeding period in the 2nd experiment in grams ($\bar{x} \pm s.d.$).

	Daily feeding periods (hours)				
	3	4	5	6	ad libitum
<u>Pre-experimental period:</u>					
	160.0 ± 15.0	163.9 ± 12.5	169.7 ± 13.4	170.3 ± 10.3	170.5 ± 7.9
<u>Experimental days:</u>					
1	45.2 ± 13.6 ^a	64.9 ± 5.8 ^{ab}	68.2 ± 15.1 ^{bc}	72.8 ± 7.6 ^{bc}	169.2 ± 9.3 ^d
2	64.9 ± 10.7 ^a	68.3 ± 4.3 ^{ab}	71.6 ± 19.3 ^{aba}	86.2 ± 4.3 ^{abc}	169.2 ± 5.5 ^a
3	67.1 ± 12.6 ^a	78.3 ± 7.8 ^{ab}	79.5 ± 17.3 ^{abc}	93.6 ± 3.8 ^{bc}	170.1 ± 10.3 ^d
4	77.2 ± 14.8 ^a	85.0 ± 3.6 ^{ab}	88.4 ± 19.5 ^{abc}	113.0 ± 4.3 ^c	170.1 ± 10.3 ^d
5	82.8 ± 16.9 ^a	87.3 ± 2.6 ^{ab}	102.9 ± 15.9 ^{abc}	120.9 ± 5.1 ^c	171.2 ± 9.2 ^d
6	87.3 ± 16.9 ^a	90.6 ± 2.3 ^{ab}	107.4 ± 15.9 ^{abc}	125.3 ± 5.2 ^c	172.3 ± 7.7 ^d
7	94.0 ± 15.1 ^{ab}	92.9 ± 4.3 ^a	110.8 ± 12.9 ^{abc}	125.3 ± 5.2 ^c	170.1 ± 10.3 ^d
8	94.0 ± 15.0 ^{ab}	97.9 ± 4.3 ^{ab}	111.9 ± 12.1 ^{abc}	126.4 ± 5.7 ^c	171.2 ± 9.9 ^d
Average	76.6 ± 20.5 ^a	82.5 ± 11.2 ^{ab}	91.33 ± 23.8 ^b	107.9 ± 20.4 ^c	170.4 ± 8.2 ^d

Means within each row having the same letter are not significantly different.

Table : 4

Digestibility coefficient of dry matter as affected by the length of feeding period in the 1st experiment as %

Experimental days	Daily feeding periods (hours)				
	0.5	1.0	1.5	2.0	ad-libitum
1	47.8 ± 29.0	62.7 ± 38.0	42.7 ± 22.0	51.9 ± 26.0	64.8 ± 5.7
2	78.4 ± 18.6	82.7 ± 2.7	82.3 ± 2.2	76.7 ± 8.9	67.8 ± 4.0
3	83.9 ± 9.2	82.2 ± 13.2	79.8 ± 7.8	72.8 ± 16.0	66.8 ± 3.0
4	76.2 ± 10.2	77.0 ± 11.7	73.5 ± 4.4	81.6 ± 8.7	67.2 ± 6.7
5	78.4 ± 7.1	72.5 ± 10.4	71.6 ± 5.8	77.2 ± 8.4	68.4 ± 2.4
6	76.3 ± 2.3	76.4 ± 3.4	74.2 ± 3.0	74.1 ± 6.7	70.2 ± 2.2
7	72.6 ± 5.3	74.3 ± 9.7	74.9 ± 8.9	71.2 ± 2.3	68.7 ± 4.9
8	72.3 ± 3.9	73.7 ± 4.8	74.1 ± 5.3	70.5 ± 3.6	69.3 ± 3.3
Average	73.2 ± 16.0	75.2 ± 15.9	71.6 ± 18.6	72.0 ± 15.9	67.9 ± 4.2

Table 5 : Digestibility coefficient of dry matter as affected by the length of feeding period in the 2nd experiment as percentage ($\bar{x} \pm s.d$):

Experimental days	Daily feeding periods (hours)				
	3	4	5	6	ad libitum
1	54.6 ± 15.6 ^a	64.6 ± 6.1 ^{ab}	77.0 ± 4.7 ^{bcd}	69.5 ± 2.6 ^{bc}	73.2 ± 8.1 ^{bcd}
2	66.6 ± 4.8	70.5 ± 1.1	64.8 ± 5.6	71.1 ± 4.5	67.6 ± 2.2
3	69.9 ± 6.9	74.1 ± 4.8	68.8 ± 4.1	67.9 ± 4.1	65.0 ± 0.6
4	71.4 ± 2.5	70.9 ± 2.3	71.3 ± 0.6	69.5 ± 5.1	67.1 ± 2.9
5	70.9 ± 0.9	75.1 ± 5.1	69.1 ± 4.7	69.5 ± 3.2	67.0 ± 3.9
6	65.7 ± 5.2	70.1 ± 1.4	71.1 ± 1.1	69.3 ± 9.5	64.1 ± 1.8
7	66.8 ± 5.3	69.9 ± 0.9	71.5 ± 1.6	68.1 ± 7.3	66.3 ± 2.1
8	66.9 ± 6.1	69.5 ± 1.1	71.7 ± 1.2	67.8 ± 3.0	66.8 ± 2.0
Average	66.6 ± 8.2	70.6 ± 4.3	70.7 ± 4.5	68.7 ± 5.1	67.1 ± 4.1

Means within each row having the same letter are not significantly different.

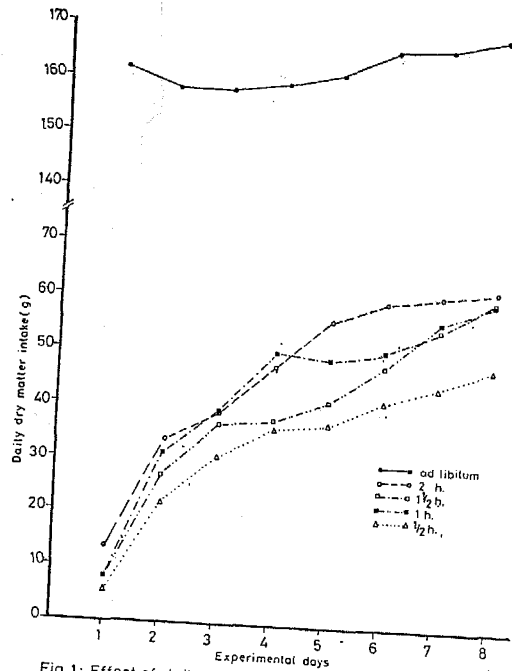


Fig.1: Effect of daily feeding period on dry matter intake in the first experiment.

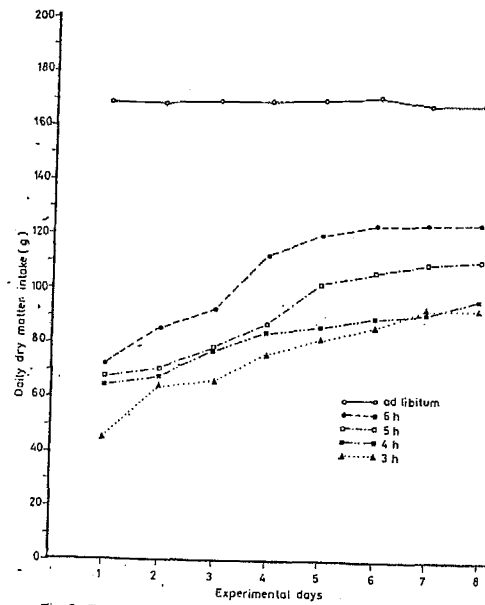


Fig.2: Effect of daily feeding period on dry matter intake in the second experiment.

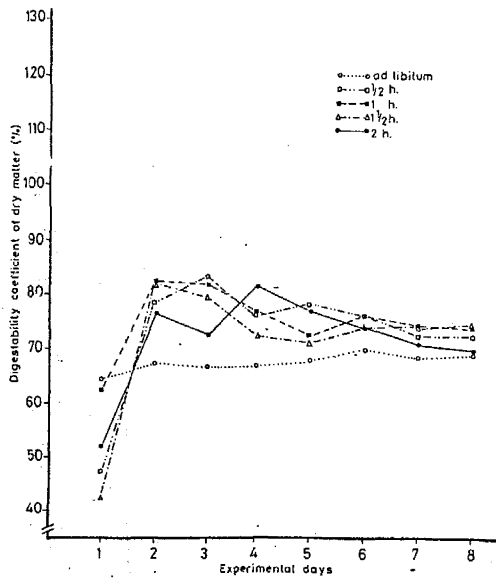


Fig.3: Effect of daily feeding period on digestibility of dry matter in the first experiment.

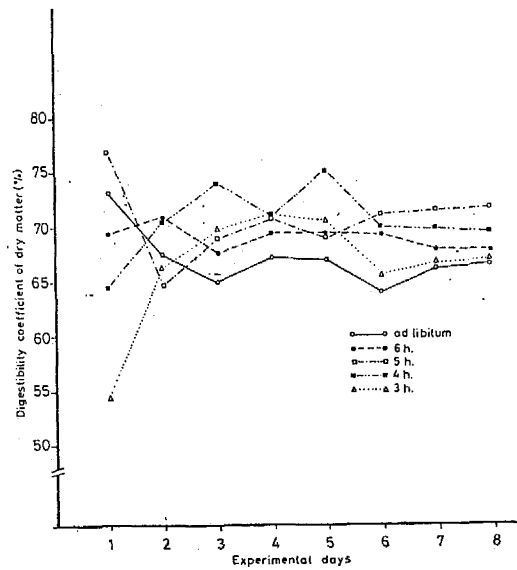


Fig.4: Effect of daily feeding period on digestibility of dry matter in the second experiment.

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This study aimed to investigate the effect of restricting feeding time on the daily intake and digestibility of dry matter. 20 females of NZW rabbits were divided into 5 groups each of 4 animals for two sequential experiments. Rabbits were fed for ½, 1, 1½, 2 hours and ad lib. in the 1st experiment and for 3, 4, 5, 6 hours and ad lib. in the 2nd one for the 1st, 2nd, 3rd, 4th and 5th group, respectively. The obtained results showed that :

Rabbits fed ad lib. had significant (P 0.01) higher dry matter intake than those fed for a restricted time. Rabbits fed for ½, 1, 1½, 2, 3, 4, 5 and 6 h. could not eat more than 30, 35.3, 35.1, 38.6, 58.8, 59.7, 65.9 and 74.2 % of their ad lib intake. Digestibility coefficient of dry matter in the 1st exp. increased up to the 3rd day and then decreased with the increasing of feed intake. On the other hand, when the feeding period varied between 3 and 6 h /day in the 2nd exp. the digestibility of dry matter not considerably changed from the 2nd day up to the end of the experiment.

It could be concluded that the digestion trial being more accurate and needed less working time when the daily feeding period is ranged between 3 and 6 hours. The application of restricted feeding period might be used satisfactorily in the feeding of over fattened rabbits and during no breeding times as occurs in summer under the Egyptian conditions.

Einfluß von die Zeitmalen auf die essen intake Und digestibility von drucken materials auf die kaninchens

Der Einfluß von die Zeitmalen auf die essen intake und digestibility von drucken materials auf die kaninchens wurde untersucht. Zwanzig Females von Art Weiß NZW sind fünf gruppen geteilt, jede groupe ist 4 Tieren und die Untersuchungen wurde Zwuei mal durchgefart. Die kaninchen wurde ½, 1, 1½, 2 studen in jeden Tage gegessen, und die ad lib in die ersten versuche, aber in die secund versuche wurde 3, 4, 5, 6 stunden in Der Tag ad lib fur die 1, 2, 3, 4 and 5 grupen. Die Ergebnisse lassen sich wie folgt Zusammenfassen: Die kaninchens wurde ad lib higher Futter intake gefutter mit vergleich Das Essen von a restricted Zeit per Tage. Die kaninchen waren von ½, 1, 1½, 2, 3, 4, 5 und 6 stunden gefutten haben konnten nicht mare mit vergleich zu 30, 35.3, 35.1, 38.6, 58.8, 59.7, 65.9 und 74.2 % von ihre ad lib intake. In der Ersten Versuche war die digestibility grupe geworden bis die dretten Tag danach wurde die Benutzung des essen winig geworden. In der scund Versuche gab keine Unterschiede nach der scand Tage. Die ergebnisse Zeigt deutlich, daß die digestibility ist genau and braucht wienig Arbeit mit das essen periods von 3-6 stunden und können wir Benutzung genau Zeit fur malen Zeit.



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