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DOES. 2. WEIGHT GAIN, BODY WEIGHT AND MORTALITY
OF YOUNG**

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TRIALS TO PRODUCE RABBIT YOUNG NURSED BY TWO DOES

2. WEIGHT GAIN, BODY WEIGHT AND MORTALITY of young

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Abstract

In two experiments the authors compared weight gain, body weight and mortality in young rabbits which suckled once daily in the traditional manner and were weaned at the age of 35 days (S) with young which suckled twice daily and were weaned at the age of 21 or 25 days (D). In total, the performances of 1466 young were examined. The results obtained indicate substantial difference between groups S and D with respect to body weight at the age of 21 days (S: 300-342 g, D: 372-466 g). Body weight of the rabbits of group D were higher at every stage of the fattening period, and they reached the weight of 2.5 kg 5 to 6 days earlier than the rabbits of group S. Evaluation of the mortality data revealed differences between the treatments, but these differences seems not to be connected with the applied method of rearing.

introduction

A number of experiments (McNitt *et al.*, 1988; Szendró *et al.*, 1998, Gyarmati *et al.*, 1999 and 2000) have provided evidence that young rabbits reach slaughter weight 8 to 9 days earlier as a result of the rearing by two does. In part 1 of this paper (Szendró *et al.*, 2000) the authors examined the milk production of both does whose litters have been weaned at the age of 21 or 25 days when they were used as secondary suckling does (i.e., substitute mothers), and the quantity of milk consumed per young rabbit. Part 2 of the paper deals with an analysis of growth and mortality in young rabbits, which suckled either once daily, or, for different periods, twice a day.

Material and method

The Pannon White rabbits used for the trials were kept under conventional housing conditions, described in part 1 of the paper (Szendró *et al.*, 2000). Control litters were nursed once daily (traditional way) or experimental by two does. The following groups were involved in the two experiments. (In the interest of ensuring continuity between the two papers, the two experiments were designated as experiments 2 and 3; n= number of suckling rabbits.)

Experiment 2:

- S = the young rabbits were reared in the traditional way, by one doe, until they were weaned at the age of 35 days (n=403).
- D = the young were reared by two does until they were weaned at the age of 21 days. *Within this group:*
 - DP = half of the does were inseminated on the 11th day after parturition (n=190);
 - DNP = the other half of the does were not inseminated, and thus remained empty (n=197).

Experiment 3:

- S = the young rabbits were also reared by one doe, until they were weaned at the age of 35 days (n=257).
- D = the young were reared by two does until they were weaned at the age of 25 days. *Within this group:*
 - DG = half of the does were treated with GnRH subsequent to parturition (n=203);
 - DNG = the other half were not treated (n=216).

The young rabbits of group D were nursed at 8 a.m. each day by their own mother, and at 4 p.m. by a substitute doe whose litter had been weaned at the age of 21 or 25 days. The method used is described in detail in Szendrő *et al.* (2000).

Up to the age of 56 days the young rabbits were fed a medicated diet (DE 10.3 MJ/kg, CP 18.2 %, CFat 3.3 %, CF 12.2 %, Clinacox prx 0.02 %, oxytetracycline 0.1 %). From then off an unmedicated diet was fed (DE 10.3 MJ/kg, CP 16.8 %, CFat 2.9 %, CF 14.1 %). Drinking water was available *ad libitum* from weight-valve self-drinkers.

The young rabbits were weighed once a week up to the age of 5 weeks, and subsequently only at the ages of 8 and 10 weeks. Mortality was recorded on a continuous basis.

One-way analysis of variance was performed to examine the differences observed in body weight and weight gain. The chi-square test was applied for the purpose of detecting significant differences between the mortality figures for the experimental groups. SPSS 7.5 software was used for the statistical processing of the data.

RESULTS AND DISCUSSION

Body weight and daily weight gain (DWG)

Experiment 2

In the first two weeks of life, suckling rabbits of group D gained significantly more quickly than those of group S (Table 1). The DP and the DNP young gained 82 and 70 % more weight respectively in the first week, and 37 and 75 % more in the second week than controls (S). During the third week, still a 58 % higher DWG was recorded but only in the DNP young. The quantities of milk produced by the secondary suckling does are responsible for this increase (Szendrő *et al.*, 2000). The milk production of P does declined already from the second week off, and consequently from then off weight gain of the young decreased significantly compared to DNP young.

Weight gain in D young was comparable with single suckling young in the 4th week although they were weaned at 21 days of age. However, during the 5th week a significant lower DWG was observed in D young (43.2 and 40.6 versus 45.3 for controls). Between the ages of 6 and 8 weeks, D rabbits had again a significantly higher DWG compared to controls (group S). In the final stage of the fattening period, DP rabbits showed higher ($P < 0.05$) DWG than those reared in group DNP.

Table 1. Effect of double suckling on daily weight gain of the young (in g) (Experiment 2)

Age (weeks)	Experimental treatments						s.e.
	Normal suckling (S)		Double suckling				
			Non-pregnant does (DNP)		Pregnant does (DP)		
	n	mean	n	Mean	n	mean	
1	403	8.2 ^a	197	13.9 ^b	190	14.9 ^b	0.40
2	360	13.5 ^a	192	23.6 ^b	173	18.5 ^c	0.63
3	348	13.3 ^a	185	21.0 ^b	162	11.8 ^a	0.72
4	343	28.7	171	26.9	149	28.8	0.97
5	329	45.3 ^a	157	43.2 ^b	142	40.6 ^c	0.32
6-8	86	45.9 ^a	89	50.1 ^b	73	52.3 ^c	0.44
9-10	86	37.3 ^{ab}	89	34.0 ^a	73	38.7 ^b	0.87
0-3	348	11.7 ^a	185	19.5 ^c	162	15.1 ^b	0.47
4-5	329	37.4	157	35.3	142	34.8	0.63
6-10	86	42.3 ^a	89	43.7 ^a	73	46.9 ^b	0.46

^{a,b,c} denote significant differences ($P < 0.05$) within a given row of data.

The effect of double suckling led to a substantial increase in body weight of the young rabbits (Table 2). Due to the different milk production of the secondary does, a significant different weight was observed between DNP and DP young, already from the age of 2 weeks off. This difference was sustained until the age of 8 weeks. In consequence of the higher DWG observed in DP young between the age of 8 and 10 weeks, body weight of rabbits of both D groups was comparable at the age of 10 weeks. Compared to controls (S), D rabbits reached slaughter weight (2.5 kg) 5 to 6 days earlier.

Table 2. Effect of double suckling on the weight of the young (in g) (Experiment 2)

Age (weeks)	Experimental groups						s.e.
	Normal suckling (S)		Double suckling (D)				
			Non-pregnant does (DNP)		Pregnant does (DP)		
	n	mean	n	mean	n	mean	
At birth	45	55.3	23	55.8	21	55.7	0.64
1	45	113 ^a	23	153 ^b	21	160 ^b	3.0
2	44	207 ^a	23	318 ^b	21	290 ^c	6.8
3	44	300 ^a	23	466 ^b	21	372 ^c	9.9
4	343	497 ^a	171	651 ^b	149	572 ^c	4.3
5	334	813 ^a	159	964 ^b	144	863 ^c	5.2
8	107	1790 ^a	104	2010 ^b	99	1950 ^c	10.4
10	87	2290 ^a	89	2480 ^b	73	2500 ^b	17.5

^{a,b,c} denote significant differences ($P < 0.05$) within a given row of data.

Up to the age of 3 weeks individual weight was calculated from litter weight.

Experiment 3

The D rabbits gained 58 to 60 % more weight than those of group S during the first week and 45 to 46 % more in the second week (Table 3). In the third week, a significant difference in DWG was ascertained between treatments DG and DN. This can be explained by the fact that the untreated does dried up somewhat sooner. In the fourth week, as a result of weaning at 25 days and also due to their lower feed intake, as observed by Gyarmati *et al.* (2000), weight gain among the D young was lower compared to controls (significant between S and DG).

During the period 6 - 8 weeks, again D young gained significantly more weight, by 8 to 10 % compared to controls. This can be explained by the observation of Gyarmati *et al.* (2000), that nutrient intake among the rabbits of group D exceeded that of the S rabbits, even after weaning. At the end of the experimental period (i.e., between the ages of 9 and 10 weeks), D rabbits still gained 6 to 9 % more weight, but these differences proved not to be significant.

Table 3. Effect of double suckling on DWG of the young (in g)
(Experiment 3)

Age (weeks)	Experimental treatments						s.e.
	Normal suckling (S)		Double suckling				
			Treated does (DG)		Untreated does (DN)		
	n	mean	n	mean	n	mean	
1	257	8.9 ^a	203	14.0 ^b	216	14.7 ^b	0.41
2	244	15.0 ^a	202	21.8 ^b	203	21.9 ^b	0.62
3	241	16.6 ^a	198	19.4 ^a	196	15.4 ^b	0.63
4	240	28.7 ^a	193	25.7 ^b	189	25.3 ^{ab}	0.64
5	236	49.4 ^{ab}	181	47.5 ^a	172	50.3 ^b	0.43
6-8	54	49.5 ^a	54	53.9 ^b	33	53.5 ^b	0.63
9-10	40	39.1	48	42.6	27	41.3	0.94
0-3	241	13.5 ^a	198	18.4 ^b	196	17.4 ^b	0.39
4-5	236	39.0	181	36.8	172	37.8	0.50
6-10	40	45.2 ^a	48	47.9 ^b	27	47.9 ^b	0.50

^{a,b} denote significant differences ($P < 0.05$) within a given row of data.

By the end of the first week, young which suckled twice daily had already attained a substantial weight advantage of 30 to 33 % over those of group S (Table 4). This difference in favour of D young was maintained throughout the fattening period and they reached slaughter weight (2.5 kg) 5 to 6 days sooner. No difference developed between groups DG and DN, which indicates that treatment with GnRH subsequent to parturition had no substantial effect. The slightly superior milk production observed in the third week (Szendrő *et al.*, 2000) did not result in a significant positive effect on body weight.

Table 4. Effect of double suckling on the weight development of the young (in g)
(Experiment 3)

Age (weeks)	Experimental groups						s.e.
	Normal suckling (S)		Double suckling				
			Treated does (DG)		Untreated does (DN)		
	n	mean	n	Mean	n	mean	
At birth	30	58.6	24	59.4	25	57.4	0.65
1	30	121 ^a	24	157 ^b	25	161 ^b	3.1
2	30	226 ^a	24	310 ^b	24	314 ^b	6.5
3	30	342 ^a	24	446 ^b	24	422 ^b	8.4
4	236	540 ^a	192	628 ^b	176	599 ^b	4.1
5	235	889 ^a	181	961 ^b	172	953 ^b	5.6
8	53	1923 ^a	54	2174 ^b	33	2125 ^b	16.7
10	43	2444 ^a	49	2697 ^b	28	2656 ^b	21.0

^{a,b} denote significant differences ($P < 0.05$) within a given row of data.

Up to the age of 3 weeks individual weight was calculated from litter weight.

Mortality

Substantial differences in mortality rate were observed between the experimental groups

(Table 5), but these differences are more likely to have been the consequences of occasional cases of a less favourable state of health affecting individual litters. This conclusion is drawn by the fact that, while group S showed a 3 % higher mortality rate than group D in experiment 2, a 3 % higher mortality rate was recorded in group D in experiment 3. In the experiment launched the most recently by the authors (which has not yet been completed) no significant difference was observed between the two groups with respect to mortality between the ages of 0 and 3 weeks (S: 3.0; D: 4.6 %).

Table 5. Effect of double suckling on mortality of the young (Experiments 2 and 3)

Mortality (%)	Experimental groups			
	<i>Experiment 2</i>			
	Normal suckling (S)	Double suckling		
		Non-pregnant does (DNP)	Pregnant does (DP)	All double-suckled (D)
0-3 weeks	16.1 ^a	18.7 ^a	7.6 ^b	13.1
3-5 weeks	3.7	6.0	1.9	3.9
5-8 weeks	0.9	0.0	0.0	0.0
8-10 weeks	8.0	22.2	10.5	16.3
	<i>Experiment 3</i>			
	Normal suckling (S)	Double suckling		
		Treated does (DG)	Untreated does (DN)	All double-suckled (D)
0-3 weeks	6.2 ^a	12.5 ^b	5.8 ^a	9.1
3-5 weeks	1.2 ^{aA}	7.1 ^b	2.7 ^{ab}	4.9 ^B
5-8 weeks	1.8	0.0	0.0	0.0
8-10 weeks	7.4	6.0	7.4	6.7

^{a,b} denote significant ($P < 0.05$) difference among the three experimental groups.

^{A,B} denote significant ($P < 0.05$) difference between groups S and D.

The mortality rates recorded in the second experiment, between 3 and 5 weeks and 5 and 8 weeks, provide some evidence that, when a medicated diet is fed, weaning at 21 days has no effect on mortality. The increased mortality observed at the end of the experimental period was not attributable to the treatment given but to the discontinuation of the medicated diet.

The significant difference, which developed in the favour of group S in the third to the fifth week (experiment 3), does not provide yet enough evidence for far-reaching conclusions. The more, as Scholout and Lange (1971) found, that no problems are to be anticipated when young rabbits are weaned at the age of 25 days.

Conclusions

On the basis of the results obtained in these experiments it can be established that both of the methods used (i.e., weaning at 21 and 25 days) proved similarly favourable if double suckling is performed.

The findings of the first experiment indicate that double suckling in the first week is the determinant factor. Further studies are necessary to verify whether double suckling in the first week is sufficient or whether it is necessary to continue it until the age of 21 days.

Double suckling combined with early weaning resulted in reaching 5–6 days earlier slaughter weight. However, the practical application of early weaning is questionable because future EU regulations on animal welfare will probably propose delayed weaning ages.

In contrast with the results of previous studies, no indication was observed in the present study that double suckling exerts a positive effect on mortality.

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