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EFFECT OF SUCKLING TWICE A DAY ON THE PERFORMANCE OF SUCKLING AND GROWING RABBITS

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ABSTRACT

584 Pannon White young from 73 litters were divided into 5 groups. The young in group SS were suckled once a day during the first 35 days of life (traditional method of nursing). Group DD was raised by 2 does and the young were suckled both in the morning and in the evening until 35 days of age. Group DS was suckled twice a day for 23 days, and then once a day until weaning. Part of group DS was suckled at 8 a.m. and 8 p.m. (i.e. every 12 hours, DS12), the rest at 8 a.m. and 4 p.m. (DS8). The young of the 5th group (D0) were suckled twice a day for 23 days, after which they were weaned. Rabbits which were suckled twice a day consumed 89 % more milk until 23 days of age, and the 21-day body weight of these rabbits was 70 % higher than that of the SS young. Rabbits which were suckled twice a day reached 2.5 kg body weight 9 days earlier than those suckled once daily. SS rabbits were the first and DD ones the last to start consuming solid feed. The feed consumption of the DS young was similar to that of the DD group until the 23rd day, and similar to that of the SS rabbits later on. The D0 rabbits were reluctant to eat for 2 days after weaning on the 23rd day. Afterwards, their feed intake increased very quickly. Rabbits which were suckled twice a day consumed throughout the total fattening period more feed than the SS animals (157 g vs. 137 g), but their total feed consumption between 21 days of age and 2.5 kg liveweight was lower (4.7 kg vs. 5.3 kg). Suckling twice a day did not affect dressing percentage. Nevertheless, young which were suckled twice a day had more perirenal and scapular fat.

INTRODUCTION

It is a particular feature of rabbit does that they nurse once a day (ZARROW *et al.*, 1965). Under natural circumstances the young also suckle once a day, and spend the rest of the day sleeping (HUDSON and DISTEL, 1982). However, in commercial rabbit cages 30-50% of the does nurse their young 2 times/day (SEITZ *et al.*, 1997). Suckling only takes about 3 to 4 minutes, but the young are able to take in enough milk for their daily needs (one sixth of their body weight) in such a short time (LEBAS, 1975).

Suckling rabbits do not start significant solid feed intake before 20 days of age. This is why their survival and weight gain depend on the doe's milk production, i.e. how much milk each individual kit consumes..

Experiments in which attempts have been made to induce does to nurse twice a day have been unsuccessful (HERCZEG, 1981). Ethological observations have emphasised that suckling is dependent only on the willingness of the doe and not on the inclination of the young.

In human-related research, nursing twice a day was used as a model for overfeeding babies (HARMAND *et al.*, 1970, SPENCER and HULL, 1984). Twice-daily suckling was used in

experiments by MCNITT *et al.* (1988). In this study the young were also raised by 2 does, the effect of suckling on the growth of the young being investigated. PADILHA *et al.* (1994, 1996) used two does for suckling the young after the lactation peak, with the objective of evaluating the effect of a postponed shift to solid feed on caecum microflora and the fermentation pattern.

The objective of this research project was to establish whether suckling young are ready and able to suckle milk from two does within one day, and how twice-daily nursing influences their viability, milk and feed consumption, growth, fat deposition and carcass traits, in relation to the length of the nursing period.

MATERIAL AND METHOD

Pannon White does were housed in single-floor wire cages in a building heated in winter (minimum 15 °C) but not cooled in summer (maximum 26-28 °C). The length of daily illumination was 16 hours. The does were fed a commercially available rabbit feed *ad libitum*. The diet fed in the first 18 days contained no medication (CP: 16.8 %, CFat: 2.9 %, CF: 14.1 % and 10.3 DE MJ/kg), but subsequently a medicated diet was given (10.3 DE MJ/kg, 18.2 % CP, 3.3 % Cfat, 12.2 % CF, 0.02 % Clinacox prx, 0.1 % Oxytetracycline). The does had free access to drinking water from self-drinkers.

The does were treated with 5 IU oxytocin on the 31st day of pregnancy. The young were allocated to litters such that each contained 8 kits of average weight. To maintain the standard litter size all young which died were replaced with suckling rabbits of similar age and weight previously not included in the experiment.

The experimental groups were formed based on the number of times the young suckled per day (i.e., once or twice). The additional daily suckling was carried out by an additional doe which had produced a litter at the same time but whose progeny had been removed.

Irrespective of the number of sucklings (groups SS and D), one doe was put into the nest box at 8 a.m. every day. For the second nursing the other doe was put in at 8 p.m. (DD, DS12 and D0). One more group (DS8) was formed, in which the interval between morning and afternoon nursing (at 8 a.m. and 4 p.m.) was only 8 hours. Suckling twice a day was maintained until weaning (DD) or until the 23rd day. After the 23rd day the young either were nursed by only one doe (DS12 and DS8) or were weaned (D0).

The following experimental treatments were established:

- *Group SS*: suckled once a day until weaning at 35 days of age (n = 15 litters, 120 kits)
- *Group DD*: suckled twice a day until weaning at 35 days of age (n=16 litters, 128 kits)
- *Group DS12*: suckled twice a day with a 12-hour interval between sucklings until 23 days of age, and then once a day until weaning (n=13 litters, 104 kits)
- *Group DS8*: suckled twice a day with an 8-hour interval between morning and afternoon suckling until 23 days of age, and then once a day until weaning (n=15 litters, 120 kits)
- *Group D0*: suckled twice a day until 23 days of age and then weaned (n=14 litters, 112 kits).

Daily milk production was calculated from the difference in the body weight of the doe immediately before and after suckling. Individual body weight of young was recorded once a week. Solid feed consumption was recorded from the 18th day of life off.

At the end of the experiment the rabbits were slaughtered and dissected at 2.6 to 3.2 kg liveweight, as recommended by BLASCO *et al.* (1993). After the measurements relating to the

individual body parts had been taken, the empty body was ground twice and a random sample of 100 g was taken for laboratory analyses. The fat content of the empty body was determined by means of the ether extraction method developed by Soxhlet.

Single-variable analysis of variance was performed in order to compare milk production, body weight and carcass traits. The chi-square test was applied to detect significant differences between mortality figures for the experimental groups. SPSS 7.5 software was used for the statistical processing of the data.

RESULTS AND DISCUSSION

Milk consumption

Young which suckled twice a day (DD, DS12, DS8 and D0) consumed 89 % more milk between day 1 and 23 than the SS rabbits (taken as 100 %). Groups DS12 and DS8 did not differ in milk intake, so similar intake may be anticipated irrespective of whether suckling intervals are 12 hours constantly or 8 and 16 hours alternately. This makes twice-daily suckling more manageable for breeders (on the basis of an 8-hour working day). The milk consumption data for the rabbits suckled twice a day until 23 days of age and subsequently once a day (DS12 and DS8) became similar to those for the SS group after evening suckling ceased. The young of the DD group suckled 74 % more milk between day 24 and 35 than those of the S groups (Figure 1).

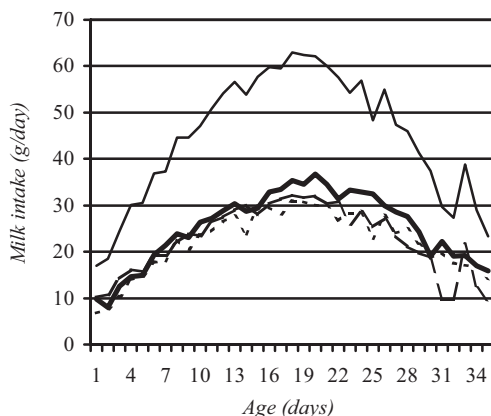


Fig. 1. Milk intake of young suckled once a day (SS —) or twice a day (DD ———): in the morning (DDm) and in the evening (DDe -·-·-·)

These findings are in agreement with those published by MCNITT *et al.* (1988); who determined a 84% higher intake of milk by young which suckled twice a day before the age of 19 days. The difference observed between the milk intake of the SS and the DD rabbits reveals that rabbits do not have access to sufficient milk in the traditional nursing system. They begin to starve and consequently cannot gain as much weight as would be expected on the basis of their growth potential. Milk intake for 1 g weight gain between birth and 21 days of age was 2.02, 1.98, 1.96, 1.98 and 2.01 g in groups SS, DD, DS12, DS8 and D0 respectively. This implies that almost doubled levels of milk consumption did not affect milk efficiency.

Body weight and weight gain

Throughout the experimental period the body weight of the young which suckled once a day remained lower than that of the young which suckled twice a day (Table 1). All of the 4 treatments which suckled twice a day (DD, DS12, DS8 and D0) had almost the same body weight on the 21st day of life, and the weight of these surpassed that of the SS rabbits by 70 %. This provides clear evidence that young suckling twice a day had 70 % greater growth potential than if they had been allowed to suckle only once a day. At 28 day of age, the DD rabbits had the highest live weight, while the weight of D0 was significantly lower. Due to early weaning, the weight gain of the D0 rabbits between the 21st and 28th day was lower (14.9 g/day) than that of the others (23.1-26.3 g/day). Afterwards, during the fattening period,

these rabbits compensated for their deficit. Ninety % of the DD rabbits reached their slaughter weight of 2.5 kg already at 9 weeks of age. In contrast, at 10 weeks only 70 % of those which suckled once a day reached a similar body weight (Table 1).

The results obtained demonstrate that the difference in body weight arising from twice-daily suckling is sustained up to slaughter age. MCNITT *et al.* (1988) recorded similar results, but recorded a somewhat lower difference than that observed in this study.

Table 1. *Body weight of rabbits suckled once and twice a day*

Body weight (g)	n	Experimental groups				s.e.
		SS	DD	DS	D0	
at birth	mean	57.9	58.3	57.5	57.6	0.22
3 weeks	mean	318 ^a	547 ^b	543 ^b	538 ^b	5.6
9 weeks	mean	2192 ^a	2568 ^b	2559 ^b	2576 ^b	16.0
10 weeks	mean	2487 ^a	2909 ^b	2828 ^b	2915 ^b	20.6

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

Feed consumption

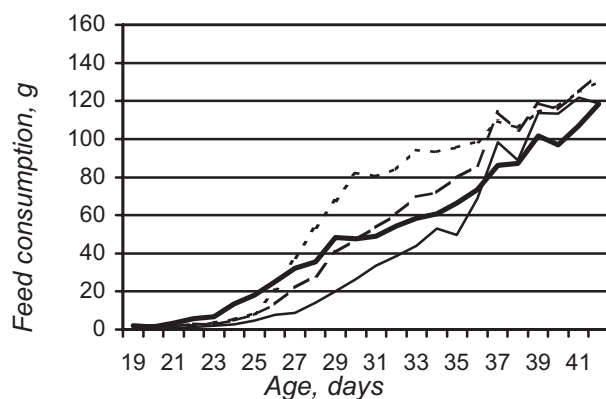


Fig. 2. *Feed consumption (g/day) until 6 weeks of age (SS —; DD - - -; DS . . .; D0 - · - ·)*

Significant intake of solid feed did not start before day 21. SS young switched to solid feed sooner, and their intake was higher (day 21-26) than all those which had access to milk twice a day (Figure 2). In our study the feed intake of the DD rabbits was the lowest throughout the lactation period. The solid feed consumption of the DS young, which had access to milk twice a day until 23 days of age and once a day subsequently, increased steadily after the turning point of 23 days.

The D0 young, which suckled twice a day until 23 days of age before being weaned abruptly, consumed very little for 2 days after weaning, but from the 25th day their feed consumption rose suddenly, as the solid diet became the only source of nutrients to fulfil their requirements. PIATTONI and MAERTENS (1999) reported similar observations with rabbits weaned at 18 days of age. The intake of the young was at starvation level for several days, but then their feed intake increased abruptly. However, in comparison with normal housing, the start of solid feed could be delayed in our experiment because the doe's were not able to initiate drinking and eating of their young, as was reported by MAERTENS and DE GROOTE (1990).

The feed consumption of the DD rabbits increased rapidly after weaning and exceeded that of the SS group by the 40th day. Up to the age of 10 weeks the feed intake of the DD group remained at a high level which was also characteristic in the other treatments which had suckled twice daily (DS and D0). However, calculation of the total quantities of feed

consumed from the 3rd week until the rabbits reached the slaughter weight of 2.5 kg enables us to conclude that the rabbits which suckled twice a day consumed less solid diet during the fattening period than those which suckled once a day, since the DD rabbits reached slaughter weight on average 9 days earlier than the SS rabbits did.

Mortality

Mortality rates in the experimental groups did not differ significantly either before the 23rd day, up to the point of weaning, or after weaning. Mortality was below 10 % in every group between birth and 70 days of age; this was attributable to the diet fed, not to the method of suckling used. Although not statistically different, mortality in the SS group was twice as high than the average of all the treatments which suckled twice a day. PIATTONI and MAERTENS (1999) also reported acceptable mortality figures when kits were weaned at 18 days of age. MCNITT *et al.* (1988) hypothesised that suckling twice a day is beneficial for survival after birth. As a medicated diet was used in our study, the findings made should be interpreted solely in connection with such feeding conditions, and cannot be generalised. This explains probably why we did not find a higher post weaning mortality in treatments with a delayed and very quickly increased feed intake as was observed by MAERTENS and DE GROOTE (1990).

Slaughter value

No significant difference between the groups with respect to dressing percentage was observed. In the case of the SS rabbits the ratio of fore and hind parts increased, while that of the intermediate part decreased slightly. The differences between the groups proved significant in some cases (Table 2).

Table 2. Slaughter traits and whole body fat content in the experimental groups

Slaughter trait	Experimental groups				s.e.
	SS	DD	DS	D0	
N	12	22	23	19	
Body weight at slaughter, g	2647 ^a	2857 ^b	2799 ^b	2772 ^{ab}	22
Dressing percentage, %	61.0	61.1	61.0	60.7	0.27
Ratio in carcass, %					
fore part	32.3 ^a	31.8 ^{ab}	32.0 ^a	31.2 ^b	0.001
middle part	30.7 ^a	32.2 ^b	31.9 ^b	32.2 ^b	0.002
hind part	36.9 ^a	36.0 ^{ab}	36.0 ^b	36.7 ^{ab}	0.002
Liver, %	2.39 ^a	3.07 ^b	2.72 ^{ab}	2.92 ^b	0.072
Kidneys+heart+lungs, %	1.73	1.72	1.62	1.70	0.021
Head, %	5.13 ^a	4.85 ^b	4.84 ^b	4.75 ^b	0.041
Full gastrointestinal tract, %	17.1	15.1	15.5	16.1	0.34
Perirenal+scapular fat, %	1.09 ^a	1.47 ^b	1.40 ^b	1.42 ^b	0.004
Crude fat, %	10.3 ^a	13.2 ^b	10.8 ^a	10.4 ^a	0.37

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

Liver weight and its ratio to slaughter weight were statistically higher in the groups which suckled twice a day than in the SS rabbits. Overfeeding of suckling rabbits seems to result in a larger liver, as was also reported by SPENCER and HULL (1984). However, the ratio of the weight of kidneys+heart+lungs to slaughter weight showed no significant difference between the groups (Table 2). Head weight compared to slaughter weight was highest in the SS group.

The proportion accounted for by the digestive tract did not vary significantly among the experimental treatments. The amount of perirenal+scapular fat and its ratio to slaughter weight increased as a result of suckling twice a day. The data obtained support those reported by SPENCER and HULL (1984). These findings demonstrate that the overfeeding of suckling rabbits influences the accumulation of fat in the deposits.

The empty body fat content of the DD rabbits was significantly higher than that of the rabbits of the other treatments. The increased degrees of fat deposition measured in groups DS and D0, however, were not significant in comparison with group SS. It seems that the fat content of the body increased only when the rabbits suckled twice a day up to the point of weaning.

CONCLUSIONS

- This research reveals that most does are also willing to nurse in the evening. The young are willing and able to suckle twice within 24 hours, regardless of whether the interval is 8 or 12 hours.
- Twice daily suckling resulted in a 89% increased milk intake and consequently weight gain improved and body weight was 70 % higher at 21 days of age than kits nursing once a day. Double suckling resulted even after weaning in a quicker growth. They reached slaughter weight (2.5 kg) on average 9 days earlier.
- Exploitation of the advantages of suckling twice daily enabled the young to be weaned at 23 days of age. These rabbits were raised successfully on a commercial medicated diet.
- Suckling twice a day had no effect on dressing percentage but influenced the accumulation of fat in the deposits.
- This experiment clearly demonstrate that the growth potential of the young are not fully exploited with normal milk intake. Twice-daily suckling could allow a new system of reproduction and rearing to be evolved in rabbit husbandry. For reasons of efficiency and safety, however, such a system needs to be designed in accordance with the aspects of practical feasibility.

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