

EFFECT OF NURSING METHOD AND STOCKING DENSITY ON THE PERFORMANCE OF EARLY WEANED RABBITS

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ABSTRACT

A 2 x 2 factorial experiment was performed to study the effect of the rearing method (one or two-phase method) and their milk supply until weaning (one or 2 mothers). Two hundred fifty eight early weaned young (21 days of age), previously nursed by 1 or 2 does were caged per 3 between 21 and 70 days of age (Group 3/3) or caged per 6 between 21 and 42 days of age and later 3/cage till 70 days of age (Group 6/3). The effect of number of nursing does was significant on the feed intake (85 or 81 g/days; $P < 0.05$) and on the weight at 70 days of age (2093 or 2005 g; $P < 0.05$) for rabbits nursed by 2 or 1 does, respectively. The difference in favour of the higher density caging is ascribed to the fact that these young could reach easier the nipple drinkers. Moreover, when previously nursed by 2 does their weight was higher at weaning and by consequence they could also more easily reach the drinkers. But the rearing method had no effect on the overall weight gain between the age of 21 and 70 days, on the body weight, feed intake and feed conversion. The effect of stocking density was significant on kit mortality between days 21 and 70, its value was 36 and 18% for the group 3/3 and group 3/6, respectively. Rearing the rabbits in two phases, 6 rabbits/cage between 21-42 days and 3 kits/cage between 42-70 days of age was found to be economically advantageous since more rabbits were housed in a cage or in a building matched with lower mortality and without any negative influence on the other traits.

Key words: rabbits, nursing method, stocking density, growth.

INTRODUCTION

The free choice of rabbits, weaned at the age of 21 days, among different-sized, neighbouring cages was studied by MATICS *et al.* (2002). This study showed that rabbits are gathering in one of the smallest cages in the post-weaning period, leading to stocking density values of 50-70 rabbits/m². On the basis of this experience, a possibility – in connection with nursing by two does – was studied, where early weaned rabbits are reared in larger groups (6 rabbits/cage) at the beginning of the fattening period, while in the following period the conventional density (3 rabbits/cage) is applied. This, so-called „two-phase” method (6 rabbits in the post-weaning period in one cage, 3 rabbits

afterwards) could lead to better utilization of the fattening cages and that of the rabbit house, leading to a more economical rearing period.

The „two-phase” method was investigated in combination with the double-nursing method. In the rearing methodology described by SZENDRO *et al.* (2000) to the own doe an other is placed that is subjected to weaning at the third week of nursing. The early weaning is an obligatory element of the double-nursing, therefore, the development of a new rearing method is reasonable.

MATERIAL AND METHODS

The experiment was carried out at the University of Kaposvár, on Pannon White rabbits. Rabbits were reared in a closed building, in flat-deck fattening cages (400 x 300 mm). The building was not climatized, the summer temperature therefore reached 28-30°C occasionally. The aeration was provided by blowers on the back-wall of the stable. The daily lighting was 16 hours. Rabbits were fed a commercial rabbit feed (DE: 10.3 MJ/kg, crude protein: 16.5%, crude fibre: 15.5%). Water was provided from nipple drinkers *ad libitum*.

One half of the rabbits were reared with one, the other by two does, as described by SZENDRO *et al.* (2000). One of the does was the mother of the litter, while from the other one the young were weaned at 20 days of age so the kits could intake the milk of the first part of the lactation of the own doe and that of the second half of the lactation curve of the second doe. Both groups were halved thereafter. To study the effects of stocking density, a half of the rabbits weaned at the 21st day of life were stocked three-by-three in one cage (3/3), while the other half was stocked six-by-six (n=84). In latter group, at the age of 42 days the number of rabbits was halved, from this point only 3 rabbits were fattened in one cage (6/3).

Individual bodyweight and feed intake per cage was measured every week. Mortality was recorded continuously. Production trait data were evaluated by variance analysis, by means of the software SPSS 10. Between-group differences were analysed by the Duncan test.

RESULTS AND DISCUSSION

Nursing with one or two does

As shown in Table 1, the bodyweight at the 21st day (485 g) in the group nursed by two does significantly ($P<0.01$) exceeded that of those nursed with one doe (432 g); former was identical with the bodyweight at the 28th day of the latter group (432 g). Differences between the two groups persisted until the age of 70 days (2093 and 2005 g).

In the daily body weight gain, differences ($P<0.01$) were only proven in the periods between 35-42 and 49-63 days. Between days 35 and 42 the group with one doe, while

in the period between 49 and 63 days the other group reached higher gain. In the total fattening period (21-70 days) rabbits reared with two does showed better results (32,8 g/day), though the difference was not significant. Although the results supported the advantage of the double-nursing method, the difference between the two groups was lower, than before (SZENDRO *et al.*, 2000).

The rabbits nursed with two does took up significantly more feed in the period between the 42nd and 49th days (97 and 89 g/day; $P < 0.01$), between the 63rd and 70th days (121 and 112 g/day; $P < 0,01$) as well as in the total fattening period (85 and 81 g; $P < 0.01$) than those nursed with one doe. In earlier studies similar differences were found (GYARMATI, 2001). One reason of the difference is the higher maintenance requirement arising from the higher body weight, while, on the other hand, rabbits consuming more milk before weaning may take up more feed also after it.

With regard of feed conversion, in the period between 21 and 28 days the double-nursed, while in the period between 35 and 49 days the other group showed significantly better results. In the total fattening period these differences were nullified, rabbits reared with one or two does consumed 2.53 and 2.59 kg feed (NS) for one kg body weight gain, respectively.

Mortality peaked at the 3rd week after weaning (Fig. 1), though either in this, or in the total fattening period the two groups showed no statistical difference. As experienced in former studies, the mortality by the double-nursing is more advantageous (GYARMATI, 2001).

Number of rabbits per cage

From the viewpoint of the body weight at 28 (535 and 505 g, $P < 0.01$) and 35 days (760 and 716 g, $P < 0.05$), the density of 6 rabbits/cage was advantageous (Table 1). Although in the „6/3” group slightly higher results were found in the total experiment, this was not statistically provable.

As shown in Table 1, the body weight gain was different between the days 21 and 28. The lower values were reached by the threesome stocked rabbits with one doe; this was followed by the group of two does stocked threesome and the one doe and six rabbits in one cage; the best results were reached in the group nursed by two does and stocked by six. The differences might have been caused by the location of the nipple drinkers. Though the drinkers were not too high in the fattening cage (250 mm), but those were slightly far from the vertical wall of the cage that led to heavier drinking. Rabbits nursed by one doe and stocked threesome were in the most disadvantageous situation. In this case rabbits of relatively low body weight could not help each other in the drinking, or at least not so effective as those stocked by six in the one doe-nursed group. In latter case the six rabbits had better opportunities to help each other in reaching the drinkers and drinking. Rabbits were in the most advantageous situation from this viewpoint when they were nursed by two does and stocked by six; this ensured more help in the drinking process. The other explanation could be the lower weight of groups nursed by one doe.

Table 1. Effect of nursing method and stocking density on performance of kits.

Age, days	Number of nursing does				Effect	
	1		2		Does	Density
	Stocking density					
3/3	6/3	3/3	6/3			
	Mean ± SE	Mean ± SE	Mean ± SE	Mean ± SE		
Body weight, g						
21	434 ^A ± 12.1	429 ^A ± 5.9	486 ^B ± 10.3	483 ^B ± 8.1	**	NS
28	460 ^A ± 21.5	499 ^A ± 9.9	549 ^B ± 19.7	570 ^B ± 11.4	**	**
35	654 ^A ± 30.1	717 ^B ± 15.3	777 ^{BC} ± 28.4	802 ^C ± 16.0	**	*
42	936 ± 31.8	961 ± 16.4	993 ± 31.2	995 ± 16.7	*	NS
49	1213 ^A ± 36.5	1233 ^{AB} ± 18.4	1302 ^B ± 31.2	1259 ^{AB} ± 20.1	**	NS
56	1500 ^A ± 37.0	1535 ^{AB} ± 20.3	1611 ^B ± 35.5	1579 ^{AB} ± 21.5	**	NS
63	1736 ^A ± 34.2	1786 ^{AB} ± 20.6	1863 ^{BC} ± 36.9	1873 ^C ± 21.5	**	NS
70	1975 ^A ± 35.3	2035 ^{AB} ± 20.7	2079 ^B ± 41.5	2107 ^B ± 21.9	**	NS
Weight gain, g/day						
21-28	3.7 ^A ± 3.4	10.1 ^{AB} ± 1.9	9.0 ^{AB} ± 3.4	12.3 ^B ± 1.6	NS	*
28-35	29.9 ± 2.3	31.1 ± 2.1	32.5 ± 4.0	32.0 ± 2.5	NS	NS
35-42	33.5 ^B ± 0.8	34.0 ^B ± 1.5	27.2 ^A ± 1.8	26.6 ^A ± 1.0	**	NS
42-49	39.3 ± 1.1	38.7 ± 1.2	40.1 ± 3.0	37.6 ± 1.1	NS	NS
49-56	39.8 ^A ± 0.8	43.2 ^B ± 0.9	44.7 ^B ± 1.9	45.8 ^B ± 0.6	**	*
56-63	33.6 ^A ± 1.0	36.0 ^A ± 0.9	36.4 ^A ± 1.7	41.4 ^B ± 1.1	**	**
63-70	34.9 ± 1.6	35.6 ± 1.3	31.6 ± 3.2	33.6 ± 1.6	NS	NS
21-70	31.0 ± 0.6	32.8 ± 0.6	32.7 ± 1.4	32.9 ± 0.4	NS	NS
Feed intake, g/day						
21-28	24.4 ± 1.9	25.2 ± 1.6	23.7 ± 2.8	24.0 ± 1.6	NS	NS
28-35	49.5 ± 4.0	52.4 ± 1.9	53.0 ± 4.8	55.4 ± 2.9	NS	NS
35-42	63.0 ± 3.3	69.5 ± 2.0	67.8 ± 3.0	68.1 ± 2.5	NS	NS
42-49	87.4 ± 3.4	90.8 ± 3.1	98.0 ± 4.5	95.7 ± 2.4	**	NS
49-56	109.1 ± 5.4	114.4 ± 1.9	120.9 ± 12.0	118.6 ± 2.2	NS	NS
56-63	109.7 ± 3.9	109.7 ± 1.9	108.2 ± 3.1	110.6 ± 1.7	NS	NS
63-70	109.3 ^A ± 2.4	114.9 ^{AB} ± 1.9	117.9 ^{AB} ± 8.0	124.5 ^{BC} ± 2.7	**	NS
21-70	78.9^A ± 2.1	82.4^{AB} ± 1.4	84.2^{AB} ± 3.5	85.3^{BC} ± 1.3	*	NS
Feed conversion						
21-28	6.52 ± 2.03	2.43 ± 0.90	2.73 ± 1.03	1.95 ± 0.33	**	**
28-35	1.67 ± 0.13	1.77 ± 0.13	1.63 ± 0.30	1.73 ± 0.11	NS	NS
35-42	1.88 ^A ± 0.09	2.07 ^A ± 0.06	2.54 ^B ± 0.16	2.63 ^B ± 0.16	**	NS
42-49	2.22 ^A ± 0.01	2.36 ^{AB} ± 0.02	2.50 ^{AB} ± 0.15	2.57 ^B ± 0.02	**	NS
49-56	2.75 ± 0.17	2.66 ± 0.05	2.69 ± 0.19	2.59 ± 0.05	NS	NS
56-63	3.28 ^B ± 0.16	3.07 ^B ± 0.09	3.00 ^B ± 0.12	2.69 ^A ± 0.05	**	**
63-70	3.15 ± 0.11	3.25 ± 0.14	3.92 ± 0.33	3.93 ± 0.40	*	NS
21-70	2.55 ± 0.04	2.52 ± 0.02	2.59 ± 0.07	2.60 ± 0.03	NS	NS

A, B, C in the same row mark significant differences, at P<0.05 level.

* P<0.05

** P<0.01

NS= not significant

According to the results of XICCATO *et al.* (2003) the kits weaned at 21d with lower weight showed a lower daily gain and feed intake than the rabbits with higher body weight.

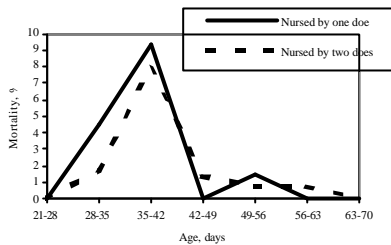


Figure 1. Effect of nursing does on mortality of growing rabbits weaned at the age of 21 days.

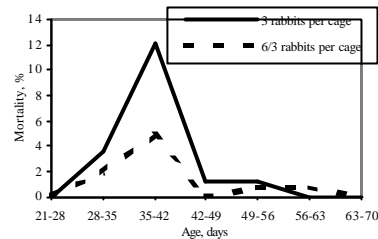


Figure 2. Effect of stocking density on the mortality of growing rabbits.

In the latter period stocking density had only significant effect at the age of 42-63 days. The „6/3” group showed better body weight gain, independently from the condition whether they were nursed by one or two does. Differences are hard to explain, since in this period rabbits were stocked threesome everywhere. Stocking had practically no effect on the body weight gain between days 21 and 70.

No differences were found in the feed intake in none of the above cases. This is rather remarkable, as from the differences in the body weight gain in the period between 21 and 28 days differences were expected; rabbits of lower gain may have consume less.

The „6/3” group showed higher feed conversion ratio values in the periods between days 21 and 28 and in period between days 56 and 63 (4.63 and 2.19 g/g; $P < 0.01$). As in these periods the feed intake was not, while the body weight gain was different, the favourable feed conversion may arise from the higher body weight gain.

Mortality had a peak at the 3rd week after the weaning, though the „6/3” group showed significantly lower values than found in the groups stocked threesome (Figure 2). Though later no differences were shown, arising from the relatively strong post-weaning differences in the mortality, between 21 and 70 days significant difference was found .

In another experiment, where rabbits weaned at the age of 21 days were reared in cages of 250 x 400 mm, either in the total period twosome, or before the 42nd day foursome and after it twosome, no differences were found in the above traits (MATICS *et al.*, 2004). This again supports that the location of the drinkers modified the results obtained in the one-phase and two-phase rearing.

CONCLUSIONS

The nursing with two does, just like shown in earlier studies, shortened the fattening period with some days. Under the present experimental conditions this method had a further advantage. Rabbits with higher body weight were able to reach the drinkers better, therefore, the badly located drinker is less disadvantageous from the viewpoint of post-weaning body weight gain, when compared to the group nursed with one doe. Rearing six rabbits in a cage was pronouncedly advantageous from the viewpoint of drinking. It seems that the rabbits could reach the drinkers this way more effectively, possibly by learning on each other. Of course, the aim in the future is not to help rabbits in drinking from badly located drinkers, but to pay more attention on the location of the drinkers in case of early weaning.

In further traits only minor differences were found for the „3/3” and the „6/3” groups. Since two-phase rearing is advantageous from the viewpoint of mortality, it did not influence all other traits inversely (maybe it was a little advantageous). Therefore, it can be concluded that this rearing method does not influence the production badly. It is thus evident that the two-phase rearing, in joint with the double nursing is economically beneficial, since it improves the utilization of cages and rabbit houses.

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