

EFFECT OF THE FLOOR TYPE AND STOCKING DENSITY ON THE PRODUCTIVE PERFORMANCE OF GROWING RABBITS

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ABSTRACT

The aim of the experiment was to study the effect of the floor type and stocking density on the performance of growing rabbits. Five-week-old Pannon White rabbits (n=120) were housed in pens (0.82 m²) until 11 weeks of age. Three groups were established according to the floor type. Straw was put into the pens at different times after weaning: 6W = wire net during the whole fattening period, 4W2D = wire net between the 5th and 9th and straw between the 9th and 11th week, 2W4D = wire net between the 5th and 7th and straw between the 7th and 11th week. The number of rabbits per pen was 13, 10 or 7 using the stocking density of 16, 12 or 8 rabbits/m². Rabbits were fed *ad libitum* with a commercial diet in pellet with and without medication after weaning and during the last two weeks of fattening period, respectively. The time at which the straw was placed into the pens had a weak effect on the average daily gain, feed intake and feed conversion ratio. In groups 4W2D and 2W4D the feed intake and average daily gain decreased after placing straw into the pen. The stocking density did not affect significantly the productive performance of growing rabbits. We conclude that housing of rabbits on wire net after weaning and rearing them on a straw floor during the second part of the fattening period could be a good strategy for preventing enteritis (coccidiosis) and achieving a good production.

Key words: Growing rabbit, Floor type, Stocking density, Productive traits.

INTRODUCTION

The changing consumer habits are demanding to obtain rabbit meat from animals reared in environments in accordance with their welfare. Several experiments were conducted to evaluate the effects of alternative technologies (e.g., group housing of rabbits in straw) on the rabbits' production (Lambertini *et al.*, 2001; Dal Bosco *et al.*, 2002; Kustos *et al.*, 2003a, 2003b). We have to consider, however, that housing with straw poses the risk of coccidiosis (Lambertini *et al.*, 2001), and can also decrease the animals' average daily weight gain (Dal Bosco *et al.*, 2002). During the latter part of the fattening period increased frequency of aggressive behaviour has also been reported (Maertens and Van Herck, 2000; Princz *et al.*, 2007). Therefore, it is advisable to mix the advantageous elements of the two rearing methods, i.e., wire net and straw.

The objective of the present experiment was to examine the effect of the time of straw introduction into the pens and stocking density on the rabbits' production.

MATERIALS AND METHODS

The experiment was carried out at the University of Kaposvár using 120 Pannon White rabbits of both sexes, weaned at the age of 5 weeks. Animals were housed in a closed air-conditioned rabbitry, where the room temperature and the daily lighting were 18 °C and 16 hours, respectively.

Rabbits were fed a commercial pellet *ad libitum* (5-9 weeks of age: 10.3 MJ DE/kg, 14.5% crude protein, 2.0% fat, 17.5% crude fibre, 50 ppm Tiamulin, 500 ppm Oxitetracycline, 1 ppm Diclazuril; 9-

11 weeks of age: 10.6 MJ DE/kg, 16.0% crude protein, 3.0% fat, 16.0% crude fibre). Water was available *ad libitum*.

From weaning until the age of 11 weeks the rabbits were placed in pens of equal size (0.86 m²). Depending on the time when the wheat straw was placed into the pen the following groups were formed:

- 6W = wire net during the whole fattening period (5-11 weeks of age),
- 4W2D = wire net between weeks 5-9 and straw between weeks 9-11,
- 2W4D = wire net between weeks 5-7 and straw between weeks 7-11.

The number of rabbits per pen was 13, 10 or 7 using the stocking density of 16, 12 or 8 rabbits/m², respectively. Some straw was put on the top of the deep litter daily (depending on its condition), and the whole bedding was replaced weekly.

Production data was evaluated by means of multi-factor (floor type, stocking density) analysis of variance; mortality was analysed by a chi-square test using the SPSS 10.0 software package.

RESULTS AND DISCUSSION

Average daily gain and body weight

In groups 4W2D and 2W4D the weight gain decreased after placing straw into the pen (Table 1). Kustos *et al.* (2003b) observed the same phenomenon which may be explained with the possible straw consumption of the rabbits (Jekkel *et al.*, 2008). According to several authors (Lambertini *et al.*, 2001; Dal Bosco *et al.*, 2002) the weight gain of rabbits is decreased when reared on straw. Although the body weight at the age of 11 weeks ranked according to our expectations 6W>4W2D>2W4D, the differences were not significant.

Table 1: Effect of floor type and stocking density on the weight gain and body weight of growing rabbits

Rabbits (n)	Floor type			Stocking density (rabbits/m ²)			SE	Probability	
	6W	4W2D	2W4D	8	12	16		Floor	Stock
	30	30	30	28	40	52			
Age (weeks)	Weight gain (g/day)								
5-6	37.6	36.3	36.2	33.5	38.4	36.9	0.76	0.806	0.057
6-7	43.1	42.5	44.5	45.3	43.3	41.7	0.60	0.421	0.077
7-8	40.5b	39.6b	33.5a	43.2c	39.2b	34.4a	0.73	0.003	<0.001
8-9	41.1b	41.0b	37.0a	43.7	40.0	41.0	0.81	<0.001	0.229
9-10	32.7b	31.9b	29.9a	34.4	30.8	35.4	0.98	0.008	0.054
10-11	34.3	33.5	31.1	34.9	36.0	31.9	0.90	0.175	0.151
5-11	38.2	36.9	34.1	38.6	38.5	36.8	0.55	0.062	0.381
	Body weight (g)								
5	835	830	845	831	836	841	5.3	0.770	0.778
6	1094	1082	1097	1059	1102	1102	8.1	0.927	0.085
7	1387	1412	1416	1402	1410	1389	9.1	0.448	0.548
8	1660	1687	1640	1677	1679	1634	9.8	0.330	0.079
9	1947	1948	1903	1966	1961	1912	14.2	0.508	0.200
10	2197	2186	2127	2246	2168	2175	15.3	0.199	0.079
11	2458	2406	2372	2456	2457	2403	18.9	0.314	0.577

^{a,b,c}differences are significant at P<0.05

The effect of stocking density on weight gain and on body weight was not substantial. Significant differences were only recorded at the age of 7-8 weeks. Daily weight gain and the body weight between 5 and 11 weeks were identical in the three groups. Previous experiments proved that weight gain and body weight of rabbits kept on wire net only decreased when more than 15.4-19.8 rabbits were placed per m² (Maertens and De Groote, 1984; Aubret and Duperray, 1992). In the present trial the largest stocking density was 16 rabbits/m² although certain groups were partly reared on straw.

Feed consumption and feed conversion

The floor type had no significant effect on feed consumption (Table 2). Although from the age of 7 weeks the 6W group showed the biggest feed consumption and after placing the straw into the pens the feed consumption of the 2W4D and 4W2D groups also decreased relative to the 6W group (from the 7th and 9th week, respectively), the differences were not significant.

Table 2: Effect of floor type and stocking density on the feed intake and feed conversion of growing rabbits

Rabbits (n)	Floor type			Stocking density (rabbits/m ²)			SE	Probability	
	6W 30	4W2D 30	2W4D 30	8 28	12 40	16 52		Floor	Stock
Age (weeks)	Feed intake (g/day)								
5-6	99.0	104	101	101	101	101	1.3	0.627	0.999
6-7	109	115	121	114	119	115	2.1	0.141	0.707
7-8	129	124	123	131b	126ab	118a	2.3	0.833	0.028
8-9	144	140	135	149	142	134	3.1	0.599	0.140
9-10	144	134	137	154	132	132	5.9	0.934	0.213
10-11	151	144	134	151	140	138	6.1	0.844	0.661
5-11	130	126	125	133	127	124	2.5	0.110	0.637
	Feed conversion (g/g)								
5-6	1.59	1.75	1.62	1.81	1.54	1.61	0.05	0.791	0.096
6-7	2.52	3.06	2.63	2.92	2.74	2.80	0.11	0.151	0.812
7-8	3.15	3.05	3.56	2.96	3.25	3.40	0.09	0.163	0.162
8-9	3.37	3.48	3.49	3.42	3.42	3.31	0.05	0.178	0.645
9-10	4.74	4.99	5.83	4.64	5.96	4.31	0.34	0.518	0.110
10-11	4.95	4.62	5.20	5.47	4.56	5.33	0.28	0.645	0.412
5-11	3.40	3.41	3.67	3.48	3.32	3.37	0.09	0.743	0.813

^{a,b} differences are significant at $P \leq 0.05$

Kustos *et al.* (2003b) observed that after placing the straw into the pens the feed consumption significantly decreased in most cases. Several authors noted that the rabbits consumed this material (Lambertini *et al.*, 2001; Dal Bosco *et al.*, 2002; Jekkel *et al.*, 2008) which can explain the decreased feed consumption (ranging from 12-18%).

In our experiment the feed conversion between weeks 5-11 hardly changed. In the groups that were placed in straw at ages of 7 and 9 weeks, a reduced feed conversion was found (2W4D group showed 2.63 g/g vs. 3.56 g/g, 4W2D group showed 3.48 g/g vs. 4.99 g/g). Nevertheless these differences were not significant.

Applying a stocking density of 16 rabbits/m² significantly lowered ($P \leq 0.05$) feed consumption was at the age of 7-8 weeks. Similar tendencies were observed during the following weeks but the differences were not significant. Stocking density had no effect on feed conversion ratio between the age of 5 and 11 weeks.

Using a stocking density of 8 and 16 (Lambertini *et al.*, 2001) or 12 and 16 rabbit/m² (Trocino *et al.*, 2004) no significant differences were found in the feed consumption of the growing rabbits. Kustos *et al.* (2003b) found similar results.

Mortality

The time when the straw was placed inside the pens did not affect mortality (Table 3), perhaps due to the use of a medicated pellet. There is no clear explanation for the highest mortality of the 6W group. Stocking density did not affect mortality of the growing rabbits. Similar results were reported by Maertens and De Groote (1984), and by Aubret and Duperray (1992).

Table 3: Effect of floor type and stocking density on the mortality of growing rabbits

Rabbits (n)	Floor type			Stocking density (rabbits/m ²)			Probability	
	6W 30	4W2D 30	2W4D 30	8 28	12 40	16 52	Floor	Stock
Age (weeks)	Mortality (%)							
5-6	0	3.3	3.3	3.6	2.5	0	0.565	0.434
6-7	0	3.5	0	3.7	0	0	0.377	0.183
7-8	0	0	0	0	0	0	-	-
8-9	0	0	0	0	0	0	-	-
9-10	3.3	0	3.5	0	5.1	1.9	0.809	0.407
10-11	13.7	3.6	0	3.9	5.4	7.8	0.163	0.768
5-11	16.6	10.0	6.6	10.7	12.5	9.6	0.651	0.907

CONCLUSIONS

Placing growing rabbits on wire net and adding straw as litter material during the latter part of the fattening offers the possibility of avoiding coccidiosis and obtaining a good performance simultaneously. However, adding straw without medicated pellets can raise problems of hygiene.

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