Proceedings 5th World Rabbit Congress, 25-30 July 1992, Corvallis – USA, 656-660.

EFFECT OF CAGE DENSITY ON THE PERFORMANCE AND HEALTH OF THE GROWING RABBIT

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INTRODUCTION

The technical and economic results which have been observed during these last years in rabbit breeding show an obvious improvement in the unit productivity for each mother cage above all in relation to an increase in housing density and to a lesser degree to an improvement in the prolificity of the females. This evolution leads to a revising of the number of places for fattening cages which must be planned for a mother cage : a four years ago 11 places were planned, then 14 places are to be planned and sometimes more. That is why a lot of breeders must cope with an excessive density in fattening cages.

Previous experiments (Maertens, 1983 ; Maertens and De Groote, 1984) have shown that a too high density (19 rabbits/sqm) led to a growth decrease and an ingestion decrease and made the slaughter period 3 to 5 days longer ; according to Maertens and De Groote (1984), a bad effect on growth is noticed for a weight superior to 40 kg/sqm cage when rabbits are removed. According to other authors (Anonymous, Cuniculture, 98, 1991), 38 kg/sqm cage must be planned and never excess 42 kg/sqm cage at the end of fattening. Maertens and De Groote (1985) have also shown that densities of 15 to 20 rabbits/sqm have no influence on zootechnical parameters in larger cages (0.46 sqm). More recently, Prawirodigdo and al (1985) have shown that beyond 14 rabbits/sqm, it was possible to obtain better weight gains and better feed efficiency.

The purpose of this study is then to sum up the topic and to show the real effect of cage density observed in breeding on zootechnical performances and on the sanitary state of growing rabbits.

MATERIEL AND METHODS

This trial took place at the experimental station of Guyomarc'h Animal Nutrition in Saint-Nolff (France) between May, 7th 1991 and June, 26th 1991. The breeding includes group breeding management with a sanitary vacuum of the fattening cells after each group.

320 young rabbits hybrid strains Hy-plus weaned at 32 ± 1 days of age were divided into 5 groups with 8 repetitions each raccording to the weaning weight, the litter and the sex. The animals were allocated in wire flat-deck cages the measures of which were : 46 cm width, 77 cm depth, (= 0.354 sqm) and 29 cm height. Each cage was equipped with a feeder planned for 5 rabbits simultaneously ; water was provided by a nipple drinker. The experimental hutch is equipped with a dynamic ventilation system : warm air entrance being carried out thanks to a polyane shaft, extraction being made at pit level thanks to a deep passage along one side of the pit. Rabbits were submitted to an artificial lighting 12 hours out of 24.

During the whole trial period, some feed was fed and libitum (see Table 1) from 32 days of age up to the slaughter (at 68 days of age). The measures (weight at 32, 42, 55 and 68 days of age, consumption and carcass performances) were analyzed by a variance analyses (Snedecor and Cochran, 1967) with a comparison between the averages. Mortality rate was analyzed with the Khi-2 test. The carcass performances (weight with the head, liver, kidney and with legs) was determined on half the animals (160 rabbits) after 24 hours sweating at + 4°C.

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The following housing densities were compared :

. rabbits per cage	6	7	8	9	10
. density (sqm/cage)	16.9	19.8	22.6	25.4	28.2

The feed efficiency (fe) at 2.3 kg was calculated :

fe 2300 = (2.300 − TW68) + FFe

TW68 is the average of the weight at 68 days

FFe is the feed efficiency of the group during the 32-68 days period.

RESULTS

The average growths on the whole fattening period (from 32 to 68 days of age) are significantly different for the 5 housing densities : they are the highest ones for the densities '16.9/sqm' and '19.8/sqm'. The difference in the average daily gain is very clear as soon as the animals are 42 days old and is still more emphasized during the 55-68 days period (see Table 2). For the 13 last finishing days, the weight gain of the group '16.9/sqm' and '19.8/sqm' increases respectively from 14.6 % to 15.8 % compared to the group '28.2/sqm'.

Under our favourable healthy conditions, there was no effect of the density in fattening cages on mortality rate (Table 2) which is globally very low if we take the whole trial into account (0.94 %).

The consumptions of the group having a low density (until 22.6 rabbits/sqm) are significantly higher than the ones of the group having high density ($p < 0.01$). The effect is significant as soon as the animals are 42 days old and it is still for the 55-68 days period that the differences are the most emphasized : + 11.4 % and + 10.3 % respectively for the group '16.9/sqm' and '19.8/sqm' compared to the density '28.2/sqm' (Table 2).

No effect has been registered concerning the feed efficiency : the lowest weight gains corresponding to the lowest consumptions ; the lowest feed efficiency (corrected at 2.330 kg) was however obtained with the group '19.8/sqm' (NS).

The rabbit number/sqm didn't lead to significant variance of the carcass performances (Table 2) ; heavier carcasses tend to be obtained with the groups "low densities" in relation to the slaughter live weight (NS).

DISCUSSION - CONCLUSIONS

Our results show that a density of 22.8 rabbits/sqm cage must not be exceeded without taking the risk of a growth decrease (significant decrease in the live weight and the weight gain). This is especially true from the 42 days old and the differences are still more emphasized for the 55-68 days period. We have then calculated the total weight of the animals sqm/cage and we have established the relationship of this measure to the growth results obtained for the different periods : we must not go beyond a 46 kg/sqm density at the end of the fattening, even if a group breeding management has been choosen with a sanitary vacuum without taking the risk of a growth decrease (against 40 kg according to Maertens and De Groote, 1984).

It also seems that the consumption decrease owing to an increase in the rabbits number/sqm cage is more due to a comfort problem rather than to a problem of access to the feeder. In several cages having a high density, there were problems of fur plucking and ear troubles. But despite this, the appearance of mortaldigestrie disorders or any other causes of mortality was not effected ; it is besides likely that our breeding conditions have allowed it.

Consumption feed and carcass performances were not affected by the density of fattening cages. This corresponds to the results observed by Stevelink (1984), by ITAVI (1983), by Ferreira (1984) and by Maertens and De Groote (1985).

The technical and economic maximum is contained between the '16.9/sqm' and '19.8/sqm' density. The high densities (9 and 10/cage) must be prohibited because a high significant decrease in consumption growth, and slaughter live weight have been noticed with them. They allow to make the fattening period longer (3 to 4 days) : this is important above all during the hot period and in the perspective of a group breeding management. It is all the more true since under breeding field conditions, high density makes up a risk from a healthy point of view : quicker contamination due to infections agent, stress of the animal in relation to discomfort problems which lead to an increase in the mortality rate (ENITA Dijon and al, 1990) and probably to condemnations (owing to abcesses).

SUMMARY

The effect of the density obtained by measuring the number of rabbits sqm/cage on the zootechnical performances and sanitary state of fattening rabbits have been studied. 320 young rabbits belonging to Hy-plus hybrid strain weaned at 32 ± 1 days old were divided into 5 groups with 8 repetitions each according to the weaning weight, to the litter and the sex. The animals were allocated in wire flat-deck cages of 0.354/sqm and fed ad libitum with a feed containing 16.4 % raw proteins, 16.1 % crude fibres, 12 % starch and 12 % moisture. The '16.9', '19.8', '22.6', '25.4' and '28.2' rabbits/sqm densities were compared. The highest growths were obtained with the '16.9' and '19.8' densities as soon as the animals were 42 days old. Under our favourable healthy conditions (low mortality, group breeding management, sanitary vacuum) no effect on mortality rate was observed. On the other hand, consumptions of the lowest density groups are highly superior to the ones of the high density groups ($p < 0.001$) : + 11.4 % and + 10.3 % for the groups '16.9' and '19.8'. No significant effect on the feed efficiency has been noticed neither on the carcass performances. The high densities (superior to 22.6 rabbits/sqm) are to be prohibited because they lead to a high decrease in growth and consumption. They make the fattening period from 3 to 4 days longer. Going beyond a total slaughter weight of 46 kg/sqm cage leads to a decrease in the growth and consumption results, even under healthy conditions.

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Table 1 : COMPOSITION OF THE EXPERIMENTAL DIET

Co-products of cereal processing	Moisture (%) 12.00
Soyleanmeal and other N-products (vegetables origin)	Proteins (%) 16.40
Cereals and starchy products	Crude fibre (%) 16.10
Products and co-products from sugar manufacturing	Starch (%) 12.00
Minerals	Lignine (%) 4.20
Oils and fats	Digestible energy 2350

Table 2 : ZOOTECHNICAL PERFORMANCES AND MORTALITY OF THE GROWING RABBITS ACCORDING TO THE DENSITY OF THE FATTENING CAGES

	Rabbits per cage					
	6	7	8	9	10	
	Housing density (number/sqm cage)					
	16.9	19.8	22.6	25.4	28.2	
Initial weights (g)	772.8	772.5	772.3	770.3	771.5	NS
Daily weight gain (g/d)						
.32 to 42 days	44.4	45.0	44.0	44.1	44.3	NS
.42 to 55 days	46.3 b	46.6 b	46.6 b	45.2 b	42.6 a	a≠b (p<0.001)
.55 to 68 days	40.3 bc	40.7 c	38.5 bc	37.3 b	35.1 a	a≠b≠c(p<0.001)
.32 to 68 days	43.6 c	44.1 c	42.9 bc	42.1 b	40.3 a	a≠b≠c(p<0.001)
Daily feed intake (g/d)						
.32 to 42 days	100.3	98.9	96.7	97.8	98.9	
.42 to 55 days	132.8 b	131.2 b	130.4 b	124.0 a	122.7 a	a≠b (p<0.01)
.55 to 68 days	154.7 b	153.2 b	151.9 b	149.5 b	138.9 a	a≠b (p<0.05)
.32 to 68 days	131.7 c	130.2 bc	128.8 bc	125.9 ab	121.9 a	a≠b≠c (p<0.01)
Feed efficiency (kg feed/ kg gain)						
.32 to 42 days	2.27	2.20	2.20	2.22	2.24	NS
.42 to 55 days	2.88	2.82	2.80	2.74	2.89	NS
.55 to 68 days	3.86	3.76	3.96	4.01	3.95	NS
.32 to 68 days	3.03	2.96	3.01	3.00	3.03	NS
.2300 g	2.99	2.90	2.99	3.01	3.11	NS
Slaughter performances (%)	56.28	56.24	56.50	56.45	56.82	NS
Total weight (kg/sqm)						
. to 32 days	13.099	15.275	17.454	19.584	21.794	
. to 42 days	20.619	24.172	27.389	30.801	34.297	
. to 55 days	30.811	36.111	41.092	45.740	49.952	
. to 68 days	39.684	46.614	52.362	58.071	62.782	
Mortality dead/total	0/48	2/56	1/64	0/72	0/80	NS
(%)	0	3.57	1.56	0	0	NS