SOME RESULTS ABOUT NUMBER OT TEATS IN 3 STRAINS OF RABBITS

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INTRODUCTION

Several research workers think that number of teats could be a good selection criterion. To test this idea we have taken number of teats in a sample of does, and we studied the relation with number of teats of their young rabbits and effect on their production traits. We have also compared number of teats in three strains of rabbits.

MATERIALS AND METHODS

The experimental population was maintained in an enclosed, environmentally controlled building. Bucks and does were lighted 16 hours per day. Each breeding rabbit have an individual wire cage. The water supply was automated. Bucks and does were fed with a commercial pellet diet. Mating first occured roughy at 152 days and diagnosis of pregnancy through abdominal palpation followed 10 days later. Does diagnosed not pregnant were returned to a buck for remating. At 25 days of gestation, pregnant does were provided with a wood nest box containing wood shavings. Doe management utilized a 10 days half-intensive breeding schedule. Young rabbits were weaned at 28 days.

Performance traits collected from does were number of young rabbits born dead (NB.MO), number of young rabbits born alive (NB.VI), number of young rabbits weaned (NB.SE), total litter weight at weaning (P.TOT), individual rabbit weight at weaning (P. IND). Then we have two other data : number of young rabbits born alive but dead before weaning (MOR.NS = NB.VI - NB. SE) and total number of young rabbits dead before weaning (MOR.TOT = NB.MO + MOR.NS).To resume the reproduction life of each doe we used mean data : mean number of young rabbits born alive per litter (NM.VI), mean number of young rabbits weaned per litter (NM.SE), mean total litter

weight at weaning per litter (PM.TOT), mean individual rabbit weight at weaning per litter (PM. IND). The data are computed with all the litters made by one doe.

Number of alive teats were taken one time for each doe the 10th day of suckling (NB. TET). At the same time weight of the doe was taken (P. FEM). Number of teats were taken also on young rabbits at birth.We used 3 strains. One is a New Zeland White strain selected for litter size at weaning (77 S), one is a New Zeland White control strain (77 T) (MATHERON, 1982, MATHERON and POUJARDIEU, 1984). The last (66) one is a Californian strain (BRUN and ROUVIER, 1984 ; BRUN et ROUVIER, 1986).

Numbers of teats were analysed wich chi-squarred test. We will give the critical probality. Production data were analyzed by least-squares procedures through analysis of variance. The mathematical model included number of teats as a potential source of variation. It is a fixed effect.

RESULTS AND DISCUSSION

In the three strains number of teats is between 8 and 10. A few does have 11 teats : 2 from 929 in the 77 S strain and 2 from 191 in the 66 strain. They were pooled with the does which had 10 teats. Mean number of teats is 9,08 in the 77 S strain ; 8,86 in the 77 T strain, and 9,30 in the 66 strain. These differences are significant (Table 1). Other studies showed that the 66 strain has a greater number of corpus luteus than the 77 S strain (MATHERON, 1982). Likewise the 77 S strain has more corpus luteus than the 77 S strain (BRUN, 1988). On the other hand, litter size at birth or at weaning is greater in the 77 S strains than in the 66 strain or in the 77 T strain (BRUN and ROUVIER, 1986 ; MATHERON, 1982 ; MATHERON and POUJARDIEU, 1984). The link between number of teats and litter size is not trivial. The link seems to be more clear with number of corpus luteus. The 77 S strain and the 77 T strain come from the same strain. The New Zealand White strain was splited en 1975. One strain was selected on litter size at weaning and the other strain is a control (MATHERON, 1982 ; MATHERON and POUJARDIEU, 1984).The difference on number of teats between the two strains could be an indirect selection response. The strains studied by SZENDRO (SZENDRO and HOLDAS, 1984 ; SZENDRO and KAMPITS, 1985) have respectively 8,87 - 8,60 and 8,44 teats. The Flemish Giant and the New Zeland White strains studied by LUKEFAR at al (1984) have respectively 8,27 and 8,19 teats.

Number of teats taken at birth in a sample of 631 young rabbits of the 77 S and 77 T strain is not free of number of teats of their dams (Table 2). Mean number of teats of a young rabbit bred from a dam with 8 teats is 8, 77. If it mother have 9 teats mean number of teats is 9,14. If it dam have 10 teats mean number of teats is 9,16. Then young rabbits bred from dam with 9 and 10 teats have more teats than young rabbits bred from dam with 8 teats.

Effects of number of teats on litter performance of a doe are small. The part of the variance explained by the model is always less than 2 % (Table 3 and 4). There is no effect on litter size or on the litter weight at weaning. The only significant effect is on number of young rabbits dead before weaning with the same number of young rabbits born alive per litter. . Does with 8 teats have 0,25 young rabbit dead before weaning less than does with 9 or 10 teats. It is only 18 % on the residual standart deviation, but it is equal to the genetic progress made after 3 generations in the 77 S strain (MATHERON and POUJARDIEU 1984). The results do not corroborate those of SZENDRO (SZENDRO and HOLDAS, 1984 ; SZENDRO AND KAMPITS, 1985). In the sample studied by SZENDRO et al., does with 8 teats have 0,75 young rabbit alive at birth less than does with 10 teats. This disparity explains the disparity observed at weaning (0,94 young rabbit).

FLEISCHHAUER et al (1985) have made an interesting hypothesis : when number of young rabbits is greater than number of teats, number of teats become important. To test this hypothesis we used a sample of litters with more than 10 young rabbits alive at birth (Table 5). In this sample, number of teats have a highly significant effect on litter size and litter weight at weaning. Does with 8 teats have 1,5 rabbits less than does with 10 teats. Their litters are lighter (-713 gramms). We observe a greater mortality between birth and weaning (-1,22 rabbit). The effect of litter size at birth is not significant (0,29 rabbit).

In conclusion, influence of the number of teats on rabbit's rearing performance is small. Number of teats is important only when there is more rabbits than teats. To obtain a strain with a very high prolificacy, it could be useful to choose only does with 10 teats. However genetic parameters of number of teats are not known. Our results suggest that a selection is possible.

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Table 1 : Distribution of number of teats in 3 strains of rabbits
(Pc : critical probability of the Chi squarred with 2 degrees of freedom).

Strains Teats	77 S	77 T	66
8	278	77	43
9	311	61	51
10	340	50	97
Mean	9,08	8,86	9,30

X^2_2 (77 S-77 T)=10,2 Pc<0,025

X^2_2 (77 S-66)=13,9 Pc<0,01

X^2_2 (77 T-66)=27,6 Pc<0,01

Table 2 : Distribution of number of teats in a sample of 621 young rabbits of the 77 S and 77 T strains in relation with number of teats of their dams (Pc : critical probability of the Chi squarred with 2 degrees of freedom.

Rabbit Doe	8	9	10	Total
8	68	75	29	172
9	51	65	80	196
10	69	75	109	253
Total	188	215	218	621
Frequency	0,30	0,35	0,35	

X^2_2 = 35,6 Pc<0,01

Table 3 : Variance analysis of doe traits [mean number of alive young rabbits at birth (NM.VI.), of mean number of alive young rabbits at weaning (NM.SE), of mean total litter weight at weaning (PM.TOT), of mean individual weight at weaning (PM. IND), and of weight of the doe (P.FEM)] with 1 fixed effect (number of teats) (R2 is the part of the total variance explained by the model. * :significant at 5 %, ** significant at 1 %. N is the size of the sample).

		N	NM.VI	NM.SE	PM.TOT	PM.IND	P.FEM
Mean		216	7,31	6,70	4544	687	3878
Number of	8	68	0,02	- 0,09	- 101	- 6	3
teats	9	67	- 0,18	- 0,12	- 9	+ 12	2
	10	81	0,13	+0,18	+ 92	- 47	- 4
	Effect		0,7	1,0	0,9	1,1	0,6
	R2		0,01	0,01	0,01	0,02	0,01
Residual standart deviation			1,6	1,5	870	78	275

Table 4 : Variance analysis of litter traits [number of young rabbits born dead (NB.MO), of number of young rabbits born alive (NB.VI), of number of young rabbits at weaning (NB.SE), of litter weight at weaning (P.TOT), of individual weight at weaning (P.IND), of number of young rabbits dead before weaning (MOR.NS) and of total number of young rabbit dead before weaning (MOR.TOT)] with one fixed effect (number of teats). (R2 is the part of the total variance explained by the model. * significant at 5 % ; N is the size of the sample).

		N	NB.MO	NB.VI	NB.SE	P.TOT	P.IND	MOR.NS	MOR.TOT
Mean		1020	0,48	7,29	6,61	4495	679	0,67	1,14
Number of	8	299	0,01	0,10	-0,07	-83	-5	0,17	0,18
teats	9	340	0,03	-0,18	-0,09	-11	4	-0,08	-0,05
	10	381	-0,04	0,08	0,14	75	0	-0,06	-0,10
	effect		0,03	0,10	0,9	0,8	0,3	4,5*	2,4
	R2		0,00	0,00	0,00	0,00	0,00	0,01	0,00
Residual standart deviation			1,3	0,9	2,6	1620	174	1,18	1,73

Table 5 : Same variance analysis that in table 4, but with only the litters which have more than 10 young rabbits alive at birth.

		N	NB.MO	NB.VI	NB.SE	P.TOT	P.IND	MOR.NS	MOR.TOT
Mean		108	2,69	11,78	9,54	5885	620	2,24	2,51
Number of	8	36	-0,07	-0,19	-0,92	-465	10	0,73	0,66
teats	9	32	0,07	0,09	0,31	213	3	-0,21	-0,13
	10	40	0,06	0,10	0,59	248	-12	-0,49	-0,48
effect			0,5	1,1	10,7**	5,8**	1,1	4,7*	3,6*
R2			0,01	0,02	0,17	0,09	0,02	0,08	0,07
Residual standart deviation			0,6	1,0	1,5	1000	67	1,8	1,9

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The number of teats was taken on young rabbits at birth and on does at the
10th day of suckling in 3 strains of rabbits. The number of teats is bet-
ween 8 and 10 ; a few rabbits have 11 teats. In the selected 77 strain
(New-Zealand White), the mean number of teats is 9,08 (estimation on a sam-
ple of 929 rabbits). In the control 77 strain and in the 66 strain (Cali-
fornian) the mean numbers are respectively 8.86 (180 rabbits) and 9.30
(193 rabbits). The number of teats taken in a sample of 631 young rabbits
of the 77 strains is not free of the number of teats of their dams. The
does with 9 and 10 teats have more rabbits with 10 teats. To study the re-
lationship between the number of teats and the production traits we used a
sample of 216 does, which have made 1020 litters. Looking at the data of
the litters, the number of teats has a significant effect only on the num-
ber of rabbits dead between the birth and the weaning. There is a very si-
gnificant interaction between the litter size at birth and the number of
teats for these numbers. In the litters with more than 10 young rabbits at
birth,the effect of the number of teats is much greater than in the smal-
ler litters. This effect is -0.92 ; +0.31 ; +0.59 rabbit for does which ha-
ve respectively 8, 9 and 10 teats.

QUELQUES RESULTATS CONCERNANT LE NOMBRE DE TETINES DANS DES SOUCHES
DE LAPINS

Le nombre de tétines a été mesuré chez des lapereaux à la naissance ainsi
que chez des femelles dix jours après la mise bas dans 3 souches de lapins.
Le nombre de tétines varie entre 8 et 10 ; quelques individus ont 11 téti-
nes. Dans la souche 77 sélectionnée d'origine Néo-Zélandaise blanche, il
est en moyenne de 9,08 (estimation obtenue sur 929 individus). Dans la sou-
che 77 témoin, et dans la souche 66, d'origine Californienne, il est res-
pectivement de 8,86 (180 individus) et 9,30 (193 individus). Le nombre de
tétines mesurées chez 631 lapereaux de la souche 77 n'est pas indépendant
du nombre de tétines de leur mère. Les mères qui ont 9 et 10 tétines ont
un plus grand nombre de lapereaux qui ont 10 tétines. Nous avons consti-
tué un échantillon de 216 femelles, qui avaient réalisé 1020 portées pour
préciser l'effet du nombre de tétines sur quelques composantes de la pro-
ductivité numérique. Si nous analysons les résultats mesurés à chaque
portée, l'effet du nombre de tétines est significatif seulement sur le nom-
bre de lapins morts entre la naissance et le sevrage. Par ailleurs, il
existe pour ces mêmes variables une interaction très significative entre
la taille de portée à la naissance et le nombre de tétines. Pour les por-
tées de plus de 10 lapereaux, l'effet du nombre de tétines sur la taille
de portée au sevrage est beaucoup plus marqué. Pour des femelles ayant res-
pectivement 8, 9 et 10 tétines, il vaut -0,92 ; +0,31 ; +0,59 lapereau.

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