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HERITABILITY OF TEAT NUMBER ON RABBITS

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Introduction

Earlier, it was stated by some books and publications that when selecting the does the number of teats should be also taken into account. For this probable practical observation could not be found any experimental experiences and evidences. About the relations between the number of teats and the fertility - rearing ability of the does the first report was given on the World Rabbit Congress in Rome. The does with 10 teats had greater litters (Szendrő and Holdas, 1984; Szendrő and Kampits, 1985) and better rearing ability (Fleischhauer at al., 1984; Torres and Pla, 1988; Rochambeau et.al., 1988). From the higher litter size at birth and better rearing results it may be concluded that the does having more teats are able to rear up more suckling animals. The litter size of the does with 10 teats was by 0.66 - 1.25 higher compared to the does having 8 teats (Szendrő and Kampits, 1985). The relations between the number of teats and the fertility - rearing ability was observed in other animal species too (pigs: Hámori, 1974; Zhang et al., 1983; Krilova, 1986; minks: Hernesniemi, 1980; Elofson and Swensson, 1982).

The favourable relations between the number of teats and the reproduction ability conveys the suggestion that the fertility could be indirectly improved by the early preselection for the number of teats (Szendrő, 1986). We have a fair chance of the success because the number of teats could be stated on both sexes and according to the observations of various authors (Hámori,1974; Zhang et al., 1983; Toro et al., 1986; Shi et al., 1986; Elofson and Swensson, 1982; Kalinowski, 1979 cit. Rudolph et al., 1982) the trait has an average heritability. Rochambeau et al., (1988) observed an average increase of the number of teats influenced by the selection for the litter size at the weaning. Probably, this relation could be valid also in the opposite direction.

According to the investigations of Lange (1976) and Rochambeau et al., (1988) more progrenies with 10 teats could be stated for the does having 10 teats compared to the does with 8 teats.

In our experiment, knowing the number of teats of the parents, we investigated

the number of teats of the new-born animals from various mating combinations.

Material and Methods

The investigations were carried out on the Research Station on the Fac. of Animal Sci., Pannon University of Agr. Sci. 4693 NZW and 2336 Californian new-born animals were evaluated from 612 and 284 matings. The number of teats of the parents were counted before the matings and that of the new-born animals at the age of 1 day.

The heritability of the number of teats was stated by the distribution of the new-born animals according to the number of teats from the mating of parents having different number of teats instead of the classic h^2-estimations. This practical system was chosen because only 3 or 4 groups with no-normal distribution could be formed on the basis of number of teats and by this, the traditional estimations would be inaccurate.

Results and Discussion

The number and distribution of the new-born rabbits based on the number of teats and the average number of teats from the various matings are shown on the Table 1 and 2. The main results are also plotted (Figure 1).
From the matings of the NZW and Californian breeding animals having 8 teats about 6 and 18 per cent of the progenies had 10 teats and from the matings of the animals with 10 teats about 40 and 57 % of the progenies had 10 teats. It was proved by the data that the selection for the increase of teats could be carried out more quickly and effectively than on the basis of the h^2-value estimations. Significant differences could be stated between the groups of progenies originated parents with 8 or 10 teats (Table 2). No doubt additive genetic effect is far higher in the case of teat number than in other production traits of rabbits.
It seems that the heritability of teat number depends on the average number of nipples on the examined breeds too. The ration of new-born rabbits with 10 teats is higher in all crossing groups in the Californian breed than in the NZW one. According to this investigation and our former experiment (Szendrő and Kampits, 1985) there are more rabbits with 10 teats in Californian breed than in NZW ones.
Probably there is resemblance between the teat number and mortality rate because both of them are threshold characters. Examing the mortality, only two groups, as alive and dead animals, can be divided similar to the 3 main groups of nipple number (rabbits with 8, 9 or 10 teats). But the genetic

background of rabbits with 8, 9 or 10 teats is wider. Some of the rabbits with e.g. 9 teats are nearer to the genotype of 8 teats and other ones are closer to 10 teats. So if the average teat number of breeding animals are higher the ratio of progenies with 10 teats is higher too. This is the reason why the selection for increasing the teat number is more quickly if the average number of teats are higher in the examined breed.

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Table 1

Distribution and the average number of teats on new-born NZW rabbits depending on the teat number of their parents

Teat number of bucks	8												
Teat number of does	8				9					10			
Teat number of progenies	7	8	9	10	7	8	9	10	11	8	9	10	11
No of new-born rabbits	2	1423	457	121	-	267	123	38	-	114	114	50	-
Distribution, %	0.1	71.0	22.8	6.0	-	62.4	28.7	8.9	-	41.0	41.0	18.0	-
Average no of teats	8.35				8.46					8.77			

Teat number of bucks	9												
Teat number of does	8				9					10			
Teat number of progenies	7	8	9	10	7	8	9	10	11	8	9	10	11
No of new-born rabbits	-	389	179	85	1	171	73	51	1	94	107	88	1
Distribution, %	-	59.6	27.4	13.0	0.3	57.6	24.6	17.2	0.3	32.4	36.9	30.3	0.1
Average no of teats	8.53				8.59					8.99			

Teat number of bucks	10												
Teat number of does	8				9					10			
Teat number of progenies	7	8	9	10	7	8	9	10	11	8	9	10	11
No of new-born rabbits	-	98	87	44	-	31	45	34	-	102	142	160	1
Distribution, %	-	42.8	38.8	19.2	-	28.2	40.9	30.9	-	25.2	35.1	39.5	0.2
Average number of teats	8.76				9.02					9.15			

Table 2

Distribution and the average number of teats on Californian rabbits depending on the teat number of their parents

Teat number of bucks	8									
Teat number of does	8			9			10			
Teat number of progenies	8	9	10	8	9	10	8	9	10	11
No of new-born rabbits	316	225	120	82	74	32	46	54	41	1
Distribution, %	47.8	34.0	18.2	43.6	39.4	17.0	32.4	38.0	28.9	0.7
Average no of teats	8.70			8.73			8.98			

Teat number of bucks	9									
Teat number of does	8			9			10			
Teat number of progenies	8	9	10	8	9	10	8	9	10	11
No of new-born rabbits	68	65	25	71	73	33	11	27	21	-
Distribution, %	43.0	41.1	15.8	40.1	41.2	18.6	18.6	45.8	35.6	-
Average no of teats	8.73			8.78			9.17			

Teat number of bucks	10									
Teat number of does	8			9			10			
Teat number of progenies	8	9	10	8	9	10	8	9	10	11
No of new-born rabbits	44	58	38	140	188	179	42	90	172	-
Distribution, %	31.4	41.4	27.1	27.6	37.1	35.3	13.8	29.6	56.6	-
Average no of teats	8.96			9.08			9.43			

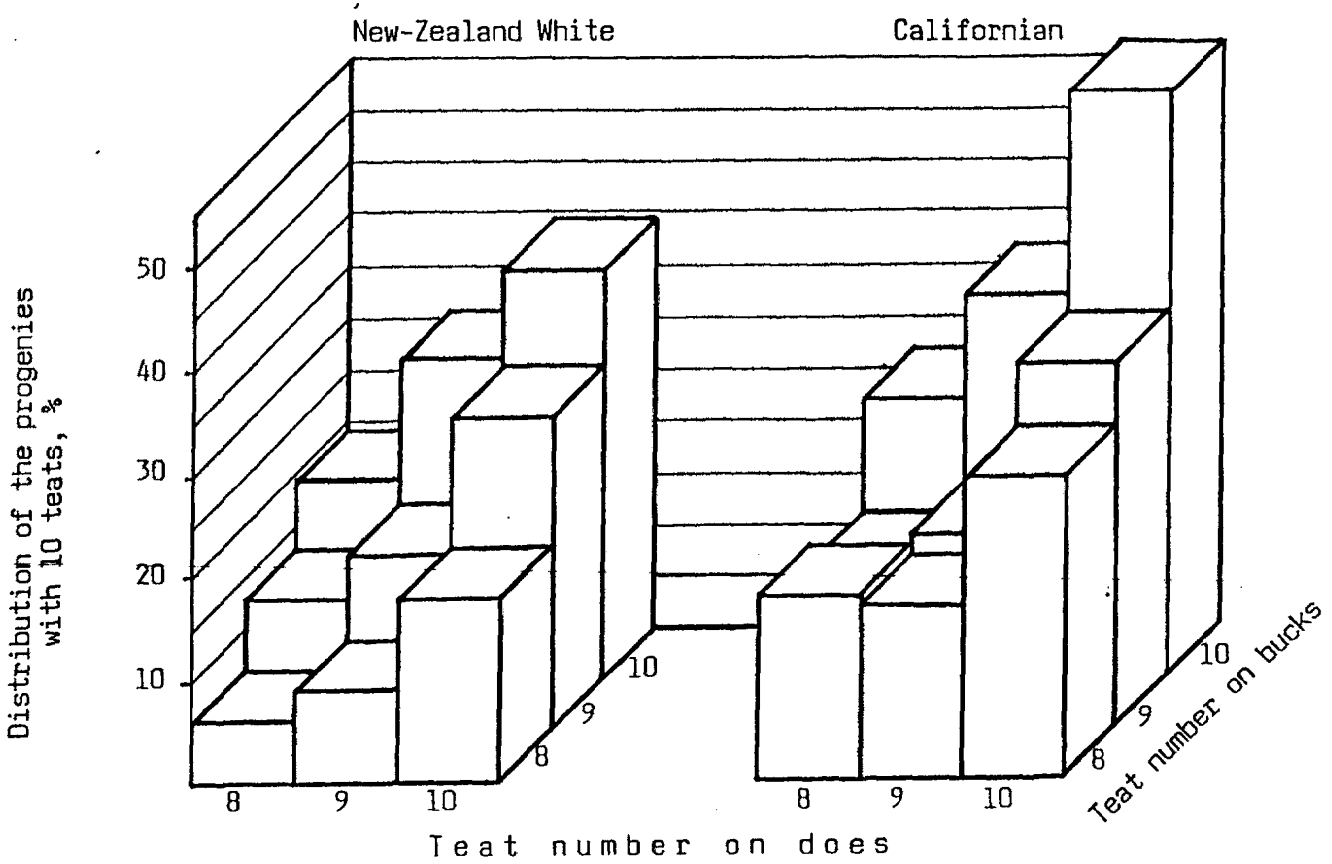

Figure 1. Ratio of the progenies with 10 teats depending on the number of teats on the parents

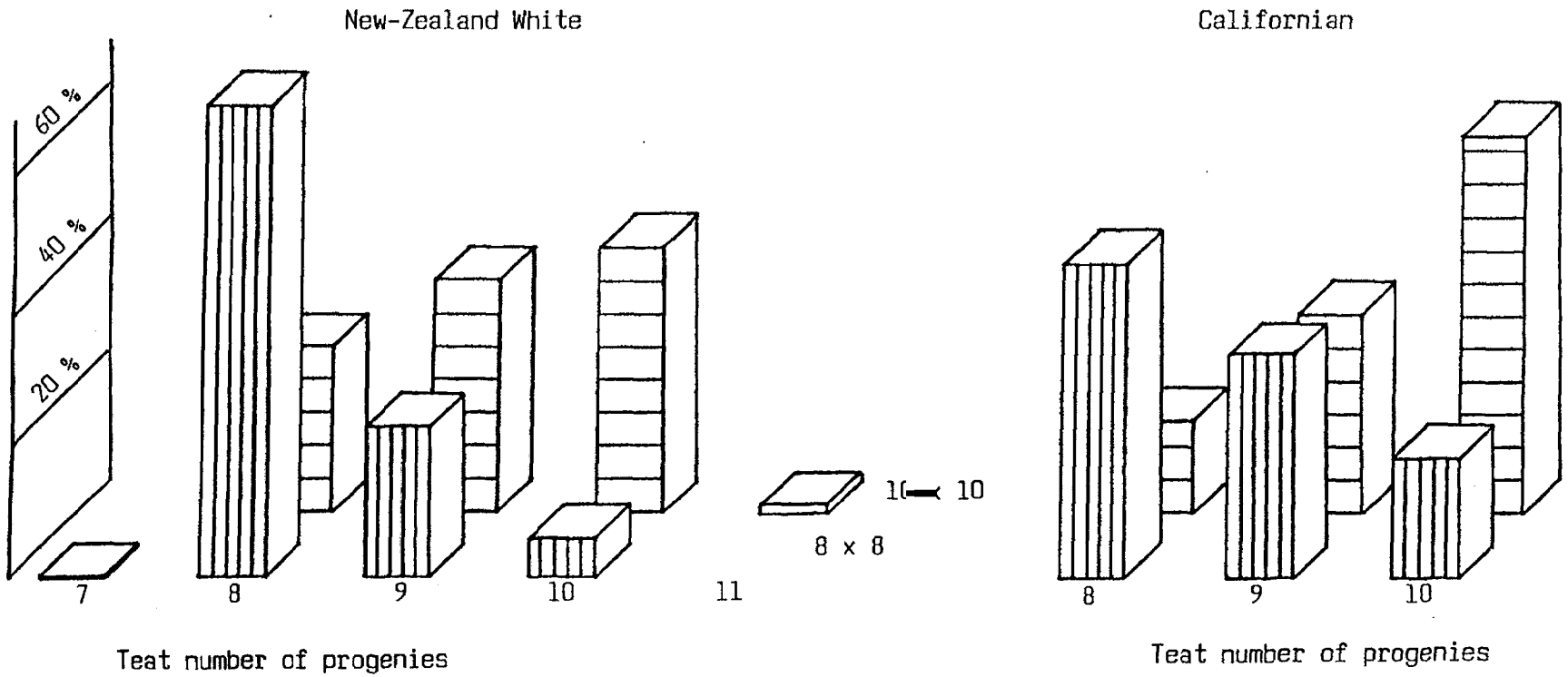

Figure 2. Distribution of progenies with 7, 8, 9, 10 and 11 teats depending on the number of teats having the parents eight (8 x 8) or ten (10 x 10)