

A STUDY ON GROWTH AND REPRODUCTIVE TRAITS OF CALIFORNIA AND NEW ZEALAND WHITE RABBITS IN SHANXI (CHINA)

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Abstract - An experiment of upgrading and improving New Zealand White and California rabbits imported in China is described. The study was carried out in the experimental farm of the Shanxi Animal Husbandry Institute, involving four generations for each breed. The objective was to improve maternal and growing traits in California, and mainly growing traits in New Zealand White, paying attention to the standard phenotype of the breeds.

Average values, for California, of total litter size, number of born alive and litter weight at weaning were 7.33 ± 1.40 , 7.13 ± 1.74 and 3733.64 ± 877.73 in the last generation.

Similar values for New Zealand White were 7.74 ± 1.03 , 7.50 ± 1.31 , 3323.10 ± 1200.38 . An average daily gain between 35 and 77 days of 27.73 g and a dressing percentage of 50.6 were estimated for New Zealand White. A good approximation of the standards of both breed were achieved, with the exception of adult live weight of California, that averaged 3600 g a little bit lower than the standard.

INTRODUCTION

California and New Zealand White are two well-known meat purpose rabbit breeds extensively spread all over the world (Rochambeau, 1988). Both breeds were introduced in China in the seventies and were distributed in many provinces. In recent years they were introduced by batches of hundred and more than one thousand, from the United States and/or Germany at the expense of big amount of hard currency by the enterprises of import and export coop. or the concerned animal husbandry department, as for example the Department of Foreign Trade (Shanxi Province). These introductions often fail to obtain expected effect because of neither so ideal quality of the introduced strains nor so well organized systematic breeding work.

A such systematic work was undertaken in the late eighties by the Shanxi Animal Husbandry and Veterinary Institute (Shanxi Academy of Agricultural Sciences) aiming at upgrading and adapting the imported stock, under the idea of using both breeds in the future in a single cross taking advantage of the maternal ability of the California breed and growth potentiality of New Zealand White breed.

The objective of this paper is to show the results of the work carried out by the Institute cited before with the two breeds for three generations of intra breed breeding.

MATERIAL AND METHODS

The experiment was conducted in the experimental rabbit farm. The Animal Husbandry and Veterinary Institute, SAAS, where 6 half-open rabbit houses, more than 800 cages and 1 laboratory to test growth intensity are available. The experimental farm was set in 1981 and has been engaged in elite extension from then on. In the farm California rabbit have been introduced from Pekin and Hebei Province, and New Zealand White rabbits, have been introduced by small batches from other provinces, such as Jiling, Hebei, Jianshu and Shanghai. Based on the record of production and experiments for years, pedigree and characters of rabbit from various sources were combined, the 0-generation foundation stock was established in 1990, which consisted of does 45 and bucks 19 for each breed.

The breeding purpose was to obtain basic phenotype of New Zealand White of white coat hair, obtuse round head, medium length and slight forward bending ear, and medium body size with adult weight of 4.0-4.5 kg and daily gain of 25-30 g at the age from 35 to 77 days. In California breed, the breeding objective was to obtain standard phenotype, with pure white, heavy underhair, well-developed chest, shoulders, hind limb and thick flesh, superior reproductivity with litter size of 7.5-8.0, weaning weight of litter of the age of 35-day over 3500 gram, and medium body size with adult weight of 3.5-4.5 kilogram.

In this study four generations were conducted for each breed. All experimental rabbits were weaned at the age of 35 days and body weight was recorded. The weaners were individually marked and placed individual cages. At the age of eight months, measurements of adult body weight and size were made and consideration of standard phenotype was made to select animals. In New Zealand White, weight gain and meat yield were measured in the last generation. Thus, 30 experimental young rabbits (wean at the age of 35 day) were caged every two in a single cage (0.25 square meter), *ad libitum* feeding and drinking with supplementary feeding of delicate alfalfa. Their body weight were measured and recorded every week, and feed consumption was calculated until the 77 day. Before slaughtering, body weight of eight experimental rabbits, with body weight around 2000 g, was taken. After slaughtering their dressing and meat percentages were measured. All the experimental does or bucks were feeded in individual cages with peletized feed in controlled amount. In summer delicate alfalfa and the other grasses and in winter carrot were supplementary feeding for the experiment rabbit. The pellet consisted of maize, bran, soybean oil meal and grass powder with digestible energy of 2800-2900 kilocalorie/kg, crude protein 16 %, crude fibre 15 % of low-medium plane of nutrition (Table 1).

Table 1. Formula of Diet for grower Rabbit and Plane of nutrition

diet	ratio (%)	diet	ratio (%)
maize	27.3	powder of soyban	33.4
bran	21.3	stone meal	0.7
soybean oil meal	16.3	bone meal	0.7
salt	0.3		

plane of nutrition :
 crude protein 16-13 : crude fibre 14.57 ; crude fat 2.33 ; crude ash 5.63 % : calcium 0.46
 and potasium 0.41 %

RESULTS AND DISCUSSION

Production performance of New Zealand White

During May 10 to June 21 1994, growth condition at early stage of 30 rabbits of the last generation was measured and the results are shown in the tables 2 and 3.

Table 2 : Measurement of the growth (unit : g, g/d)

Strain	N°	initial weight	final weight	average daily gain	feed conversion efficiency
NZW	28	579.28 ± 123.54	1924.2 ± 187.73	27.73 ± 4.34	2.89

Note : the supplementary grass feeding was excluded.

Table 3 : Results for slaughtering (unit : gram)

Strain	N°	live weight	carcass weight	dressing percentage
NZW	8	1996.3 ± 71.3	1010.0 ± 48.1	50.6

The measurement results show that body weight of New Zealand White at the age of 77 days is 1924 g and daily gain from age of 35 to 77 days is 27.3 ± 4.34 g, lower than the level of 29.63 g/day for the initial breed introduced from the West Germany (Liang et al., 1989) ; but significantly higher than the level of 24.6 g/d. for the former introduced ones. The results from the slaughtering experiment shows that dressing percentage for the NWZ is 50.6 % (all clean chest) increasing 3 % and 7.4 % than reported 49.55 % by Liu and al. (1989) and 46.83 % by Jing and al. (1989) respectively.

Reproductive performance

Tables 4 and 5 give the reproductive performance by generation for New Zealand White and California breeds, respectively.

The results show a continuous improvement in all recorded traits, that could be summarized in the improvements achieved in the last generation relative to the zero generation. These figures are 12.5, 29.2 and

39.0 % for New Zealand White and 10.4, 11.7 and 69.8 % for California. The traits referred are total born, born alive by litter and litter weight at weaning (35 days).

Table 4 : The Reproductive Performances for New Zealand White (unit : g)

generation	N°	birth litter size	live litter size	litter weight weaning at 35 d.	rate of the still born
0	39	6.00 ± 2.65	5.31 ± 2.85	2026.53 ± 844.88	11.5
1st	26	6.14 ± 2.46	5.81 ± 1.96	2158.94 ± 902.63	6.1
2nd	38	7.82 ± 1.90	7.47 ± 2.05	2839.52 ± 1269.60	4.5
3rd	38	7.74 ± 1.03	7.50 ± 1.31	3323.11 ± 1020.38	3.1

Table 5. The Reproductive Performances for California (unit : g)

generation	N°	birth litter size	live litter size	litter weight weaning	rate of the still birth
0	21	7.00 ± 2.47	6.59 ± 2.69	2199.01 ± 883.59	6.1
1st	26	7.27 ± 2.09	6.85 ± 2.17	2589.69 ± 817.31	5.8
2nd	51	7.80 ± 2.23	7.59 ± 2.33	3338.91 ± 1281.56	2.7
3rd	33	7.73 ± 1.40	7.33 ± 1.74	3733.64 ± 877.73	5.2

Phenotype

In New Zealand White rabbits, the phenotype has showed basical uniformity with pure white coat hair, obtuse round head and medium length slight forward bending ear. During the course of selection, body weight and size showed no great change but obtained a better uniformity. The results listed in Table 6 show the improvement in rabbit quality.

Table 6 : Body Weight and Body Size for New Zealand White (unit : g, cm)

generation	sex	number	body weight	body size	chest girth
0	♂	19	4078 ± 569	46.16 ± 2.30	35.24 ± 2.18
		45	4249 ± 554	47.07 ± 2.88	34.51 ± 1.91
1st	♂	22	4090 ± 718	41.00 ± 3.18	33.5 ± 2.91
		48	4304 ± 855	40.52 ± 3.39	33.71 ± 3.02
2nd	♂	12	4062 ± 535	39.75 ± 2.38	34.42 ± 2.11
		32	4260 ± 701	39.34 ± 2.72	34.06 ± 3.15
3rd	♂	73	4284 ± 220	40.62 ± 1.33	36.08 ± 1.89
		40	4309 ± 305	41.08 ± 1.42	36.08 ± 1.25

Table 7. Body Size and Weight for California (unit : g, cm)

generation	sex	number	body weight	body size	chest girth
0	♂	7	3292.86 ± 391.35	42.71 ± 1.70	34.50 ± 1.29
		34	3495.29 ± 471.06	41.81 ± 2.63	34.99 ± 2.44
1st	♂	26	3402.31 ± 618.04	40.00 ± 3.32	31.31 ± 2.44
		44	3560.68 ± 645.40	39.22 ± 3.17	32.91 ± 2.66
2nd	♂	26	3517.00 ± 492.00	39.30 ± 2.50	33.20 ± 2.40
		39	3435.00 ± 438.00	38.20 ± 2.30	33.20 ± 1.80
3rd	♂	35	3594.71 ± 315.29	38.71 ± 1.25	34.26 ± 1.44
		40	3670.25 ± 296.70	38.13 ± 1.56	34.23 ± 1.53

In California rabbits it is observed, also, an improvement in uniformity of appearance and conformation. The adult weight has been improved (Table 7), but it is a bit lower than the breed standard.

All the results show that the current performance and type of New Zealand White and California rabbits have been improved in relation with the foundation stock and are closer to the breed standards.

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