

Demographic description of Danubia Alba and Debrecen White rabbit breeds

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Introduction

- The main purpose in the Hungarian rabbit breeding is meat production
- The Danubia Alba and Debrecen White rabbit breeds cover most of the national rabbit breeding stock
- The aim of this research was to evaluate pedigree quality before further genetic analyses.



Materials and Methods

- The production data as well as the pedigree information was supplied by the breeding organizations of Danubia Alba and Debrecen White rabbit breeds
- The pedigree information was traced back from the actual breeding rabbits up to the founder animals
- The quality of the pedigree, gene origin, inbreeding, and effective population size were computed
- The reference population was the active breeding stock in 2023.
- Parameters were estimated using the Endog 4.8 and Grain software

Results and Discussion

Pedigree completeness in the reference populations

	Danubia Alba			Debrecen White
	Line “C”	Line “D”	Line “X”	
Equivalent complete generations	23.69 ± 0.610	24.35 ± 0.579	25.35 ± 0.708	8.98 ± 0.693
Number of full generations traced	17.68 ± 0.609	18.32 ± 0.706	17.49 ± 0.715	4.80 ± 0.478
Maximum number of generations	30.67 ± 0.808	30.87 ± 0.732	36.84 ± 0.928	17.56 ± 1.109

Results and Discussion

Estimated generation intervals

Pathways	Danubia Alba			Debrecen White
	Line “C”	Line “D”	Line “X”	
Buck-to-son	0.99 ^a	0.77 ^c	0.88 ^a	1.65 ^a
Buck-to-daughter	1.00 ^a	0.77 ^c	0.83 ^b	1.69 ^a
Doe-to-son	0.96 ^b	0.97 ^a	0.83 ^b	0.88 ^b
Doe-to-daughter	0.93 ^c	0.94 ^b	0.82 ^b	0.87 ^b
Average	0.97	0.85	0.83	1.27

Different superscript letters show significant differences (p < 0.05).

Results and Discussion

Founders and ancestors in the reference populations

Parameter	Danubia Alba		Debrecen White	
	Line “C”	Line “D”	Line “X”	
N_f	136	305	112	204
N_a	128	482	112	58
f_e	55	92	23	50
f_a	31	58	18	15
f_a/f_e	0.56	0.63	0.78	0.30

N_f = number of founders, N_a = number of ancestors, f_e = effective number of founders, f_a = effective number of ancestors

Results and Discussion

Homozygosity in the reference populations

Parameter	Danubia Alba		Debrecen White	
	Line “C”	Line “D”	Line “X”	
Inbred animals (%)	100	100	100	1004
AR	13.30	8.84	18.73	4.39
F _X	9.26	5.28	12.83	5.37
F _{Ballou}	53.23	38.73	69.29	11.17
F _{Kal}	7.51	3.66	11.70	1.66
F _{Kal_new}	1.75	1.62	1.12	3.71

Results and Discussion

Effective population sizes in the reference populations

Parameter	Danubia Alba			Debrecen White
	Line “C”	Line “D”	Line “X”	
Ne _f	122.17	321.09	85.49	53.38
Ne _{reg}	84.85	182.69	73.36	156.54
Ne _{log}	85.08	183.06	73.03	168.55

Conclusions

- The high values for pedigree quality allow for reliable estimations of pedigree-based population genetic parameters
- The bottleneck effect was proven for each breed; the decrease in genetic variability might be due to strong selection
- The evaluation of genetic drift might be a topic for future genomic analyses
- Effective population sizes are not critical
- The present inbreeding level was mostly the result of previously fixed alleles for Danubia Alba and recent matings for Debrecen White



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