

RESEARCHES REGARDING THE RETAINED RATIO, THE SELECTION INTENSITY AND THE GENERATION INTERVAL IN TWO LINES OF RHODE-ISLAND

Iuliana Neagu, C-tin Culea, Dana Tăpăloagă, A. Marmandiu,
Ileana Păunescu, Paul-Rodian Tăpăloagă

U.S.A.M.V. București
e-mail: drtapaloaga@yahoo.com

Abstract

Selection, as a non random reproductive process of the genotypes, is achieved after the random reproductive discrimination and the natural selection and represents as a matter of fact the choosing of the possible parents of the future generations, based upon some observations made in the testing period (checking period). The present study consists of 12 generations for the two Rhode-Island hen lines and there was carried out the retained ratio and the selection intensity for the both sexes that representing a base for the future estimation of the selection answer. The estimation of the generation interval is an important factor in achieving the genetic gain, this being indirect proportional with the size of the generation interval and direct proportional with the selection intensity and precision.

Key words: selection intensity, generation interval, genetic gain

INTRODUCERE

The size of the waited selection answer from a generation to another (R) Δ or the annual one (ΔG) depends on the superiority that the retained individuals as parents recorded beside the average of the all candidates, which is called selection differential or selection difference (S) [1,2,3].

The choosing between the selection candidates for being possible parents who will reproduce the next generation supposed to be better than the generation they come from, it is done upon an existent difference between their performances and the performances of the selection candidates and the selected individuals represent a proportion of the total individuals entered in testing. This proportion is much different in both sexes, that means it is higher in females and lower in males, the last ones representing the way the genetic gain is achieved, and its maximization imposes the decrease of the retained proportion and also the increasing of the selection intensity [1,2,3].

The estimation of the selection intensity is made starting from the retained proportion known for the both sexes before selection

and it is used to asses the selection response. As the selection intensity increases, the selection differential increases, too and also the selection effect increases.

In the actual concept of the animal breeders, the generation interval is defined as the main age of the parents when their descendents are born, retained for reproduction [1,2,3]. There is a permanent trend in the breeders work to reduce it without affecting the selection precision and intensity.

MATERIAL AND METHODS

The retained proportion was established separately in the paternal and maternal line. To establish it was used the formula:

Retained proportion = (number of retained individuals/ number of candidates to selection) x 100. This was applied per each sex.

The selection intensity was read in the standardized values table, based upon the retained proportion, separated by sexes in the two studied lines.

The generation interval in the two studied lines was established starting from each generation hatching day and there were

calculated by days all the stages from parents' data to hatching day and after this it was finding the generation interval, expressed in weeks and years after the model:

Hatching 29.04.2007

Youth 30.04.2007- 2.09.2007 126 days

Transfer 03.09.2007- 16.09.2007 14 days

Test 03.09.2007 – 03.02.2008 140 days.

By computerization and hierarchy the individuals family consisting, egg quality checking and the artificial insemination are within:

04.02.2008 – 23.03.2008 48 days

Eggs collecting 24.03.2008 - 05.04.2008 13 days

Incubation 06.04.2008 - 28.04.2008 22 days

Hatching 28.04.2008

Total 363 days.

The calculated generation interval in weeks **363 days: 7 days = 51,6 weeks or a year minus two days (0,994) days.**

RESULTS AND DISCUSSIONS

The retained proportion

By the data in the table 1 it may notice that the real size of the paternal line in the 13 studied generation presents larger variations due to some conjuncture factors as best results in hatching, very good evolutions during the youth period with less mortalities, but the most important factor was the selection program which needs the maximizing of selection intensity and differential.

Table 1

The retained proportion in the paternal line

Year	Hens					Roosters				
	Hatched	Selection candidates		Selected		Hatched	Selection candidates		Selected	
1996	3910	2943	0,75	560	0,19	1380	690	0,50	40	0,058
1997	3925	3300	0,84	560	0,17	1420	710	0,50	40	0,056
1998	4804	3850	0,80	560	0,14	1320	650	0,49	40	0,062
1999	3900	2948	0,75	480	0,16	1170	620	0,53	40	0,065
2000	3420	2619	0,80	480	0,18	1310	710	0,56	40	0,056
2001	2700	2157	0,80	480	0,22	1100	660	0,60	40	0,060
2002	2892	2376	0,82	480	0,20	1200	680	0,56	40	0,059
2003	3300	2780	0,84	480	0,17	1210	700	0,58	40	0,057
2004	2986	2249	0,75	480	0,21	1010	620	0,61	40	0,065
2005	3413	2678	0,78	480	0,18	1035	563	0,54	40	0,071
2006	3060	2445	0,80	480	0,19	1200	646	0,54	43	0,067
2007	3499	3104	0,88	540	0,17	1376	620	0,45	45	0,072
2008	3180	2592	0,81	540	0,21	1406	670	0,47	45	0,067
Total period	44809	36041	0,80	6600	0,18	16137	8539	0,53	533	0,062

The line reproduction is made in the first ten studied generation in 40 paternal families and then, from technical point of view regarding selection this number increases to 43 in 2006 and starting to 2007 it reached 45 paternal families, this number being established for many generations.

Regarding the paternal line, the retained proportion in hens was 75-88% for the first stage and 14-22% for the second stage and for roosters of 45-61% for the first stage and 5,6-7,2% for the second stage. The second stage, which is the main moment of the selection when the hierarchy and choosing of the individuals as possible future parents is

made conformingly the performances achieved in the testing period, the proportion of retained individuals decreased a lot in both sexes, but especially in roosters.

In the table two it is presented the real size of the maternal line in the six studied generations. The maternal line is reproduced in 40 paternal families and the retained proportion for the first stage is 75-88% for hens and 58-65% for roosters, and for the second stage is 15-19% for hens and 7,1-9,2% for roosters. As in the paternal line, it may notice that the selection is more severe for both sexes in the second stage, the most important of the selection.

Table 2
 The retained proportion in the maternal line

Year	Hens					Roosters				
	Hatched	Selection candidates	Selected			Hatched	Selection candidates	Selected		
2003	2800	2100	0,75	400	0,19	820	480	0,58	40	0,083
2004	2839	2382	0,82	400	0,17	860	500	0,58	40	0,080
2005	2691	2131	0,79	320	0,15	850	556	0,65	40	0,071
2006	2722	2307	0,84	400	0,17	843	452	0,53	40	0,088
2007	2592	2291	0,88	400	0,17	825	496	0,60	40	0,080
2008	2383	2025	0,85	400	0,19	730	434	0,59	40	0,092
Total period	16027	13180	0,82	2320	0,17	4920	2918	0,59	240	0,082

The selection intensity

In the table 3 it is presented the selection intensity expressed in standard deviation. During the 13 studied generations in the paternal line the highest selection intensity is 1, 5719 s (1998) for hens and 2, 0150 s (1997) for roosters. As an observation in this line it may notice that for maximization of

the selection effect it was emphasized the maximum decreasing of the retained proportion and the increasing of the selection intensity in both sexes, but especially in males. In the maternal line, the highest achieved selection intensity are 1, 5544 s for hens (2005) and 1, 9118 s for roosters (2005).

Table 3

The achieved selection intensity

Year	Paternal line				Maternal line			
	Hens p	Hens i	Roosters p	Roosters i	Hens p	Hens i	Roosters p	Roosters i
1996	0,190	1,4283	0,058	2,0000	-	-	-	-
1997	0,170	1,4886	0,056	2,0150	-	-	-	-
1998	0,145	1,5719	0,062	1,9712	-	-	-	-
1999	0,163	1,5109	0,065	1,9506	-	-	-	-
2000	0,185	1,4488	0,056	2,0150	-	-	-	-
2001	0,223	1,3381	0,060	1,9853	-	-	-	-
2003	0,202	1,3943	0,059	1,9925	-	-	-	-
2003	0,175	1,1792	0,057	2,0074	0,190	1,4283	0,083	1,8416
2004	0,213	1,3643	0,067	1,9376	0,172	1,4823	0,080	1,8584
2005	0,179	1,4608	0,071	1,9118	0,150	1,5544	0,071	1,9118
2006	0,196	1,4111	0,067	1,9376	0,173	1,4792	0,088	1,8148
2007	0,174	1,4761	0,073	1,8995	0,174	1,4761	0,080	1,8584
2008	0,208	1,3778	0,067	1,9376	0,197	1,4082	0,092	1,7941

The generation interval

Conformingly the results in table 4 it may notice that the generation interval varies from a year to another year. In the paternal line the lowest value is recorded in 2000, 51, 0 weeks and in the maternal line is 50,0 weeks in 2004. The maximum values are recorded in 2001, being 53 weeks in the paternal line and in 2008 is 52,6 weeks in the maternal line.

Following the evolution of the generation interval in the two lines it may notice that there is not a trend of decreasing this value beside the special literature, the optimum value being one year. Annually, it oscillates around 52 weeks and it may also noticed that there were variations due to some conjuncture factors.

Table 4

Year/generation	Line	
	paternal	maternal
1995	51,3	-
1996	52,0	-
1997	51,5	-
1998	52,0	-
1999	52,3	-
2000	51,0	-
2001	53,0	-
2002	52,0	-
2003	51,5	51,0
2004	52,1	50,0
2005	52,0	52,0
2006	52,2	52,2
2007	51,2	51,2
2008	52,6	52,5
Generation interval per period	51,6	51,5

CONCLUSIONS

1. For the whole studied period the retained proportion in the paternal line was 80% in hens and 53% in roosters in the first stage and 18% in hens and 6,2% in roosters in the second stage.

2. In the maternal line, the retained proportion was 75-88% in hens and 53-59% in roosters in the first stage of selection and 15-19% in hens and 7,1-9,2% in roosters for the second stage.

3. In the paternal line it may notice that it was emphasized the maximum decreasing of the retained proportion and increasing of the selection intensity in both sexes, but especially in males.

4. In the maternal line, under the selection activity for a small number of generations,

the retained proportions are higher and the selection intensity is lower comparatively the paternal line.

5. It may notice that the generation interval was not a main way to maximize the selection intensity, and the values in this paper, 51,6 weeks in the paternal line and 51,5 weeks in the maternal line are due to the selection program mainly.

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