

## CROSS PERFORMANCE FOR EGG PRODUCTION WITH SELECTION IN ONE PARENTAL LINE

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### SUMMARY

Black Australorp males were mated to females of a White Leghorn selection line and a control line, seven generations after these two lines originated from the same base population. The mean half-year and total egg production in the selection line were 22.4 and 44.7 eggs higher than the control mean. The cross of the selection line also had a higher egg production than the control cross but only about 30% of the superiority of the selection line was carried over to its cross progeny.

### INTRODUCTION

One of the possible breeding methods to produce hybrid commercial layers is selection within pure lines which are crossed afterwards. The success of this method will be determined by the extent to which gains made in the pure lines are carried over to their cross progeny. Ayyagari *et al.* (1982) found over five generations of selection that the improvement for egg number was more for the crosses than their mid-parent values. Results of Brah *et al.* (1987) over eight generations of selection, showed a high correspondence between gains in the average of the pure lines and the average of their reciprocal crosses.

### MATERIAL AND METHODS

A closed White Leghorn flock was selected for increased number of eggs produced to the age of 500 days for four generations. From the birds hatched in 1962 a sample was randomly selected to establish a pedigreed genetic control line, maintained by replacing each sire by a son and each dam by a daughter.

The selection line was from this date selected for increased number of eggs produced to the age of 275 days, by combined selection based on individual, half- and full-sib performances. The number of sires, dams and individuals measured over the next seven generations were respectively 18, 107 and 525 for the selection line and 50, 164 and 200 for the control line. After seven years (generations) of selection 20 males from a Black Australorp line were mated to a sample of 100 females from the selection line and also from the control line. These two progeny groups were hatched unpedigreed on the same date and raised as one flock, housed in single cages and egg production recorded daily (Poggenpoel and Erasmus, 1978).

The traits measured were sexual maturity as the age in days at first egg, number of eggs produced to the age of 275 days (half-year production), and to the age of 500 days (total production), early egg weight as the mean weight of the first 10 eggs laid, the mean egg weight of about five eggs laid during October at the age of about 14 months and body weight at 500 days of age. The pullets were housed according to a randomized block design and the data were analysed in this way.

Table 1 Means of the parental lines and crosses

	Sexual maturity days	Half- year production eggs	Total produc- tion eggs	Early egg weight g	October egg weight g	Body weight 500d g	Morta- lity %	Number
Black Australorp	159.3	84.5	220.7	41	60.2	2845	2.37	464
W.L. Selection	154.3	90.0	226.4	40.0	57.2	2028	10.5	523
W.L. Control	169.2	67.6	181.7	46.1	62.5	2126	12.1	199
Selection-Control	-14.9	22.4	44.7	-6.1	-5.3	- 98	-1.6	
B. Aust x W.L. Select.	158.5	92.5	235.7	43.9	60.2	2618	4.45	248
B.Aust. x W.L. Control	163.3	85.5	224.3	46.0	62.0	2650	5.98	235
Aust. x Select -	-4.8	7.0	11.4	-2.1	-1.8	- 32	-1.5	
Aust. x Control	**	**	**	**	**	ns		
Significance								

\*\*p 0.01

ns not significant

## RESULTS AND DISCUSSION

The means of the parental lines and their crosses are presented in Table 1.

After seven years of selection there were marked differences between the White Leghorn selection line and control line. For the characteristic of selection, half-year egg production, the mean of the selection line deviated by 22.4 eggs and for total egg production by 44.7 eggs from the control. Part of the increased number of eggs produced can be ascribed to the decrease of 14.9 days in age at sexual maturity. The increased egg production was accompanied by a correlated decrease of 6.1 g in early egg weight, 5.3 g in October egg weight and 98 g in body weight at 500 days.

Comparison of the means of the two cross populations, Australorp x Selection and Australorp x Control, shows a higher egg production for the selection line cross. This indicates that a proportion of the superiority of the selection line, as a result of pure line selection, was also carried over to its cross progeny. The differences in number of eggs between the selection line cross and the control cross were, however, much smaller than the differences between the pure selection and control lines. For half-year production only 31.3% (7.0 of 22.4 eggs) and for total egg production 25.9% (11.4 of 44.7 eggs) of the difference between the pure lines were transmitted to their crosses. For the traits sexual maturity, egg weight and body weight also about 30% of the differences between the pure lines was transmitted to their crosses. From the results it is clear that selection in the parental selection line had an advantageous effect on the performance of its cross progeny, but pure line selection for improvement of cross performance was not as efficient as found by other workers like Ayyagari *et al.* (1982) and Brah *et al.* (1987).

## REFERENCES

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