INBREEDING IN TRANGIE SELECTED LINES

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SUMMARY

Inbreeding was calculated from pedigree records of Trangie selected lines during 1951-1969. Average annual rate of increase in inbreeding varied from 0.21% in the Fleece Plus line to 0.50% in the Folds Plus line. The ratio of observed inbreeding to that predicted by the Turner and Young formula ranged from 0.93 to 1.99.

INTRODUCTION

Inbreeding in selected lines causes inbreeding depression and loss of genetic variation. Despite recent advances (Wray and Thompson 1990) it is still not possible to predict accurately rates of inbreeding in selected populations with overlapping generations. This paper reports rates of inbreeding in Trangie selection lines during 1951-1969.

METHODS

The Trangie selected lines were described in detail by McGuirk (1973). After correction of pedigree anomalies the inbreeding coefficients were calculated by Tier's (1990) algorithm. Within each year these coefficients were averaged over all individuals to get an average inbreeding coefficient for that year. Zero inbreeding was assumed in the base population. Average annual rate of increase in inbreeding and final inbreeding were estimated by the Turner and Young (1969) formula.

RESULTS AND DISCUSSION

The means and standard deviations of the inbreeding coefficients across the years for different flocks are presented in figures 1 and 2. By year 19 the Folds Plus and the Fleece Plus lines had the highest (9.09%) and lowest (3.79%) inbreeding respectively, corresponding to an average annual rates of 0.505% and 0.211%. At the end the Fleece Minus flock was 63% more inbred than Fleece Plus and was more variable. Both flocks had higher inbreeding in year 17 because of parent-offspring matings. Standard deviations increased consistently in both flocks. In the Crimp flocks the mean and standard deviation of inbreeding showed similar patterns in plus and minus lines.

In Weight flocks the pattern of change in average inbreeding coefficients was linear and similar up to year 13 . After year 13 the linear pattern continued in Weight Plus ,but in Weight Minus a nonlinear pattern was observed with a decreasing trend in the last three years. The standard deviation of inbreeding coefficients increased erratically up to year 11 in Weight Plus and year 9 in Weight Minus. Final average inbreeding in the Weight Plus line was 30% higher than in the Weight Minus line. The annual rates of

inbreeding of Folds flocks were linear with 28 % higher inbreeding in the Folds Plus line. The standard deviation of average inbreeding coefficients had an increasing pattern in both lines up to year 7-8 and declined with more fluctuations in the Folds Minus flock.

Generally there were similar fluctuating patterns in the means of inbreeding coefficients across years with higher standard deviations in the early years and different rates of increase in inbreeding in different flocks. The only exception were the Fleece flocks with an increasing trend in standard deviations across the years and high fluctuations even in average inbreeding coefficients in final years. The observed inbreeding coefficients and the inbreeding coefficients estimated from the Turner and Young equation are shown in Table 1. Although the lines were established with the same number of individuals in the base population and with nearly the same average number of sires for each year there were considerable differences between the flocks in final inbreeding.

Table 1. The observed and estimated inbreeding for Trangie selected flocks

	Inbreeding(%)							
	Wt+	Wt-	Fo+	Fo-	Fl+	Fl-	Cr+	Cr-
Actual	7.40	5.70	9.10	7.13	3.80	6.04	6.13	6.23
Estimated	3.71	3.55	4.90	4.29	4.10	4.23	4.38	4.14
Ratio	1.99	1.60	1.86	1.66	.93	1.45	1.40	1.50

Remark:Wt=Weight, Fo=Fold, Fl=Fleece, Cr=Crimp, +=Plus, -=Minus

CONCLUSION

There are considerable differences (up to 100%) between the observed inbreeding and that predicted from the Turner and Young formula for different flocks. For prediction of rates of inbreeding in selection programs when generations overlap there are still no results similar to those of Wray and Thompson for discrete generations. Usually breeders use the Turner and Young (1969) formula to predict the rate of inbreeding, but these results showed that we need to be cautious in using this formula in selected populations.

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