14 days at 18°C then mated for 24 hours at 25°C. All progeny were raised on a constant volume of yeast agar medium in 100 x 25 mm vials at 25°C.

No significant differences were observed between replicate lines. In all lines except those subjected to strong stabilizing selection (i.e. the control lines) the residual variances were very small compared with the regression variances ($p < 0.001$).

The total selection differential, S, calculated for each intensity was the sum of the individual differentials over eight generations. The total response, R, was calculated as the difference between the regression lines for the directional and stabilized line at generation 8. The realized heritability = R/S.

In neither aged nor young lines were the heritabilities constant over the range of selection intensities. At each level of selection the heritability of aged lines exceeded the corresponding 3-day parent. The difference in heritabilities was slightly higher in males than in females. At low intensities (i = 1.0) heritabilities in aged lines were 0.49 (female) and 0.42 (male) as compared with those in young lines 0.25 (female) and 0.21 (male), 100% difference; at medium intensities (i = 1.5), heritabilities in aged lines were 0.39 (female) and 0.33 (male), as compared with those in young lines 0.35 (female) and 0.29 (male), 10% difference; at high intensities (i = 2.0), the heritabilities in aged lines were 0.35 (female) and 0.35 (male) as compared with those in young lines 0.29 (female) and 0.26 (male), 20-25% difference.

It is concluded that as ageing proceeds the components of genetic variance alter. There may be a change in the quantity of genetic material passing into the gametes. The mechanism by which this could occur is unclear.

REFERENCE

BEARDMORE, J.A., LINTS, F. and AL-BALDAWI, A.L.F. (1975) Parental age and heritability of sternopleural chaeta number in *Drosophila melanogaster*. *Heredity* 34: 71-82.

* * * *

SELECTION OF MICE FOR GROWTH RATE UNDER *AD LIBITUM* OR RESTRICTED FEEDING

D.J.S. Hetzel† and F.W. Nicholas

Department of Animal Husbandry, University of Sydney, Sydney, N.S.W. 2006

Various biological models for animal growth have been proposed, including one which suggests that genetic differences in growth result from genetic differences in voluntary food intake (appetite) and in the ability of animals to convert food into various tissues (partition). From this model has come the suggestion that selection for growth rate on a restricted diet, where phenotypic variance for appetite is zero, will concentrate all available selection pressure on partition and hence on ability to turn food into animal

† Present address: Centre for Research and Development, P.O. Box 123, Bogor, West Java, Indonesia.

protein. Furthermore, undesirable increases in appetite, mature size and fatness, so often associated with selection under *ad libitum* feeding, should not occur with selection under restricted feeding.

MATERIALS AND METHODS

With this model in mind, two lines of mice were selected during seven generations for post-weaning growth rate (3-6 weeks), one on an *ad libitum* or full feeding regime (line SF) and one on a restricted feeding regime (line SR). Each selection line had a contemporaneous control (CF and CR respectively). At generations 4 and 7, samples from all 4 lines were raised on each feeding level. Since the results at generation 4 were in general verified and magnified at generation 7, only the latter results will be presented. In addition, only the results on full feeding will be considered.

RESULTS ON FULL FEEDING

For the post-weaning growth phase, between 3 and 6 weeks, SF had a 49% greater growth rate, a 14% greater appetite and a 31% greater gross efficiency (weight gain/food) than its control. For the same period, SR had a 12% greater growth rate, no change in appetite, and a 17% increase in gross efficiency in comparison to its control.

Between 6 and 13 weeks, the growth curves of SR and both controls were the same, but SF was approximately 25% heavier.

With respect to body composition, SF showed a small decrease in proportion of protein but no change in fat content at a given weight. However, due to SF being considerably heavier at most ages, it was generally fatter than its control at a given age. SR had a lower rate of fat deposition relative to body weight, and became progressively leaner than its control as growth proceeded. It was consequently less fat at almost all ages. In relation to lean tissue food conversion (LTFC) between 3 and 6 weeks, SF and SR showed improvements over controls of 20% and 12% respectively.

DISCUSSION

When allowed to express their appetites, mice selected on restricted feeding showed improved gross efficiency and LTFC without any associated increases in appetite, mature size or fatness. However, the penalty incurred in avoiding these associated increases was an improvement in growth rate of only one-quarter, and in gross efficiency and LTFC of only one-half that obtained with selection on full feeding. This result is easier to understand by noting that the realized genetic correlation between growth rate on the two feeding levels was only 0.28 ± 0.08, which indicates a very different genetic basis for growth rate, and hence presumably for gross efficiency and LTFC, at the two feeding levels.

* * * *