

Pig selection experiments

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Over the past 25 years we have carried out a continuous series of selection experiments in pigs for improved efficiency of lean growth (lean gain per unit of food eaten).

- In the first experiment, performance testing was carried out on *ad lib* feeding.

Relative to an unselected Control line, the Selected line showed an improved efficiency of lean growth resulting largely from a reduced food intake and an increased percentage of lean in the carcass. Growth rate actually declined (McPhee, 1981).

- At the end of this experiment, the base population was reformed by outcrossing sows from the selected line to superior Large White boars from industry.

Selection for efficient lean growth was resumed but performance testing now took place on a fixed total food intake over a 12 week testing period starting at 20 kg liveweight. This eliminated appetite variation between pigs.

Comparing the Selected line with the Control line on *ad lib* feeding showed an improved efficiency of lean growth. This was brought about by an increase in lean growth rate due to some diversion of energy toward lean and away from fat deposition (McPhee.etal.1988).

The piggery is at Biloela in Central Queensland and the pigs are subject to long distance transport to the abattoir and high summer temperatures. Relative to the Control, Selected line pigs (hal gene free) experienced higher death rates and incidences of DFD in their carcasses (McPhee et al. 1994, 1995). These conditions together with an increase in appetite suggest increased basal metabolic rates in Selected line pigs relative to Control pigs.

- The base population was reformed again by crossing sows from the Selected line with superior Large White boars from industry, both parents being hal gene free.

Again performance testing is carried out on time scale feeding but now the test period is 6 weeks following 50 kg liveweight and the selection criterion is liveweight gain over the test period. The aim is to increase efficiency of lean growth partly through an increase in energy partitioning toward lean as before but also by reducing the energy used for maintenance. This procedure is based on the outcome of a mouse selection study (McPhee et al 1980).

Two lines are being selected, one for high weight gain and the other for low gain. This divergent selection speeds up the study, makes the results more generally applicable and gives more accurate estimates of genetic parameters.

We are now in the second generation of selection and already there is substantial divergence between the lines in efficiency of lean growth. This has been accompanied by a reduction in voluntary food intake for growers and lactating sows in the high growth line relative to the low line. This is consistent with our expectation of a bias toward lean deposition and a reduced maintenance requirement in the high line relative to the low line. Further development and testing of the lines will be needed before the technique can be recommended to the seedstock industry.

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References

McPhee, C.P., Trappett, P.C., Neill, A.R. and Duncaife, F. (1980). *Theor. Appl. Genet.*, 57: 49-56.

McPhee, C.P. (1981). *Aust. J. Agric. Res.*, 32: 681-690.

McPhee, C.P., Rathmell, G.A., Daniels, L.J. and Cameron, N.D. (1988). *Anim. Prod.*, 47: 149-156

McPhee, C.P., Daniels, L.J., Kramer, H.L., Macbeth, G.M. and Noble, J.W. (1994). *Livest. Prod. Sci.*, 38: 117-123.

McPhee, C.P. and Trout, G.R. (1995). *Livest. Prod. Sci.*, 42: 55-62