# LIMITATIONS AT THE HERD LEVEL TO GENETIC IMPROVEMENT IN PIGS

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Genetic improvement has great potential, but the path is strewn with obstacles. Improvement is a slow process, changes are near impossible to measure and breeding programs can only be expected to achieve success if continued without deviation for many years.

To highlight some of these 'limitations'to genetic improvement, I shall relate the experiences of one large intensive pig unit. I shall trace the history of the Huntly herd from establishment to the present day, and perhaps surprisingly, attempt to show that some degree of progress has been made.

Mayfair Farms commenced establishment in 1965 and was the first large intensive unit in Australia.

Fifty head of foundation stock were purchased from twenty-one different "studs" in Victoria. These consisted of 8 Berkshire sows and one boar; 2 Large Black sows and one boar; 2 Wessex Saddleback sows and one boar; one Tamworth boar; 14 Large White sows and three boars, plus 14 Landrace sows and three boars. These animals were housed away from the new Unit and the litters produced by hysterectomy and moved into the new unit as the base genetic stock.

To boost the numbers, 250 LW x LR sows were imported from Queensland, and these I understand, originated from the 'Cefn' stud.

I am unable to define any particular breeding program other than to multiply XB from the base stock. However, economic needs would have made a mess of any 'designed' breeding program embarked on.

An expansion program required the base stock of approximately 300 sows to reach 2,000 by 1968 and 4,000 by 1970. A further approximate 5,000 sows were supplied to other new developing intensive Units during 1968-1971.

In 1969 a Board decision was made to cull all the coloured breeds as they were regarded as being the cause of too many unsatisfactory carcases.

1970 saw the farms change ownership. By this time, five years after first stock purchase, the Nucleus herd was showing all the signs of a rapid development program without adequate resources of stock, people and facilities.

Some 60-70 females of each Large White and Landrace breed remained and many of these animals were inbred, and/or, of doubtful origin.

In 1971 a formal breeding program was established. A Nucleus Large White and Landrace herd that would provide performance tested boars to service the Huntly and Menangle multicross commercial sow herds was the main base of the program.

Six Landrace and five Large White performance tested boars were imported from New Zealand. New blood lines were essential to re-establish the Huntly Nucleus herds, and New Zealand was the only source of stock available with known performance testing records.

To safeguard herd health, the boars were housed away from the Huntly Unit and sows were served by artificial insemination. In 1971 we were breaking new ground commercially in Australia to overcome the problems of achieving successful pregnancies via artificial insemination.

Still present in the herd were aged XB daughters of the original coloured breeds that were culled from the herd in 1969. An examination of their records showed a superiority over other sows for fecundity and fertility. A decision was made to retain this as a synthetic line which was called the "M" breed.

1973 saw the first use of a boar performance test facility which caters for a throughput of 26 boars per week and provides individual feed conversion between the weights of 45 and 90 kg. Also in 1972, a computer (ICL1905) was used for the first time to keep track of herd performance.

A selection program provided for all males to be performance tested for growth rate, food efficiency and backfat. A scanogram was used for backfat and eye muscle measurements. Selections were made on the basis of index difference from contemporary mean. Except for rejections for deformed feet and legs or shortfall in teat number, no other selection criteria was imposed.

Female selections, both for Nucleus and XB, were based on an index which included weight for age and 'C' and 'K' fat. As for boars, no criteria other than sound feet, legs and teats was imposed.

No defined generation turnover was applied, nor could have been maintained if it had been. Maintaining families within breeds was a continuous problem with the number and quality of stock available; this was especially so with the Landrace breed.

A progeny performance test was set up to identify the above and below average commercial herd boars. We needed to know which to replace with the new performance tested sons.

By the use of a computer program, all bacon slaughter pigs had dressed weight, fat and sex related back to their sires. This data made sire comparisons possible.

The program came to an end when the meat industry started removing ears to conform to new standards of hygiene and we lost the identity of our pigs. However, it continued long enough to enable us to quite quickly sort out the commercial herd sires and replace them with the best performance tested sons.

Real significant improvement programs became a reality after the pressures of expansion ceased and adequate systems and facilities were developed in 1973.

This was especially so of the XB commercial herd. Female replacements were selected in the same manner as the Nucleus Large Whites and Landraces. As herd size stabilised, selection pressure increased.

In 1973 two Large White boars from the Dookie College minimal disease herd were introduced direct into the herd.

1976 saw the Huntly herd expand to 3,200 sows and boars from the 'M' breed first used as a third breed in the commercial herd.

Sufficient confidence was available in 1977 for a decision to be made to change the whole herd to ad libitum feeding for all stages of fattening. This had a small impact on growth, but no other measurable effect. In the course of the next three years it became more and more evident that genetic merit as expressed in the test shed was not repeated in the commercial herd.

The genetic merit of the herd could not be expressed because of inadequate environment.

1980 saw a further expansion to 4,800 sows in a new pig Unit and this will be further expanded by 1,600 sows this year.

The new facilities, designed specifically to eliminate known environmental inadequacies present in the original units areproviding interesting results.

Improvement is hard to measure, but using a long time period, many thousands of pigs, plus the simple judgement of food used per one kg pig meat sold, some advantageous change is evident.

This is set out in the accompanying tables and graph.

Total Herd Performance

| Year | Total food used per kg meat sold |
|---|---|
| 1970 | 5.24 |
| 1973 | 5.07 |
| 1976 | 4.88 |
| 1979 | 4.49 |
| 1981 | 4.41 |
| (New Unit performance 4.17) | |

This overall production measurement can be broken down further into the sow herd as pigs born alive sow year.

| | |
|---|---|
| 1970 | 19.20 |
| 1973 | 20.10 |
| 1976 | 17.97 |
| 1979 | 21.64 |
| 1981 | 21.86 |

and the fattening herd as dressed weight gain per day,

| | |
|---|---|
| 1970 | .346 |
| 1973 | .348 |
| 1976 | .378 |
| 1979 | .375 |
| 1981 | .380 |

(New Unit performance .430)

and the quality of the carcase as measured by the factory.

Weight Fat Distribution Both Sex

SEE GRAPH

What of the Future?

We have attempted to assess our herd's genetic strengths and weaknesses; our changing situation; our technical abilities and new opportunities for new genetic material. Unfortunately perhaps, goals in the form of carcase type and quality are not forthcoming from the meat industry.

Even the question of optimum weight cannot be decided. Our farm optimum dressed weight is 80 kg, but both improved sow productivity and feed cost will change this. I believe there is only one target for pig breeders, and that is meat, at the lowest possible cost.

When we looked at ourselves critically we decided that our herd is now of sufficient number to handle a breeding program that maximises the benefits of X breeding. We judged our fattening herd to be very efficient by today's standards, an area to be jealously guarded but the sow herd production was inadequate for our needs and this especially related to the Landrace breed.

Technically we are equipped to embark on any program desired for improvement.

Our new breeding program, recently launched, has three Nucleus herds, a multiplication herd and the commercial herd.

The Nucleus herds consist of 300 Large White sows, 200 Landrace sows and 200 Terminal Sire line sows. The multiplication herd will be approximately 800 LW x LR sows producing first cross gilts for the commercial herds.

The existing herds have been screened for the most productive sow lines with special emphasis on sow productivity.

The Landrace Group is made up of only the highest production sows of the Landrace and "M" line and LR XB sows. These foundation sows are to be mated with pure Landrace to change them to "pure" status and it is hoped that the high sow productivity will be retained.

The Terminal Sire line is a new venture and will be treated as an experiment. The base stock are being selected from the multicross commercial herd, and represent the top 1% of females, and .1% of males produced each week. These animals are 30 to 40% above the mean of those tested.

The line will be managed to allow maximum rate of improvement for growth rate and lean meat production.

All of our recording systems have been updated to meet the needs of our larger herds, an enlarged workforce and the new breeding program. We now use a VAX 11-780 to make all this possible.

The opportunity to buy in bloodlines of existing breeds and even new breeds, either as live male and females, or as frozen semen is now a reality.

The value of the new opportunities is extremely hard to judge. I believe it unfortunate for our industry that no screening of importation by the pig industry prior to general release is made.

Our approach will be a cautious one; progeny of purchased stock will only be retained subject to the results of careful testing. We will assume that most of the herds that are supplying stock and semen have not the performance or our history of test and selection, and could be detrimental to our herd.

We are conscious of traits difficult to measure, such as - temperament and ability to withstand our particular environment.

To summarise, Mayfair Farms appears to have, by testing and selection procedures, made some genetic progress.

The standards reached in 1982 have probably been detrimentally affected by -

1. The quality of original stock selected.
2. The lack of numbers representing particular breeds.
3. No facilities, expertise or equipment to carry out a testing and selection program in the early years.
4. The economic needs for rapid expansion and sales for big numbers of breeding stock.
5. The need to protect the health of the herd.
6. The lack of ability to identify outstanding genetic herds in Australia and in more recent times, the same applies to stock and semen offered for export to Australia.
7. The extremes of genetic merit exhibited in a large herd have not been taken advantage of.
8. Until recently, genetic merit developed and available in our herds has not been utilised to its full value due to inadequate environment.

**Carcase Fat Measurements**