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Sheep improving faster!

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We are often asked “How much progress are New Zealand sheep breeders making?” Previously this was difficult to measure, but we can now do so with reasonable accuracy. A recent study shows average rates of genetic gain are increasing dramatically across the sheep industry. These increases highlight how successfully breeders, and industry groups supporting them, are working together to improve New Zealand sheep genetics.

Rates of genetic gain were low and static prior to the establishment of SIL (Sheep Improvement Ltd). When SIL was introduced (1999), rates of genetic gain doubled. Since its inception, SIL has routinely produced more accurate BVs than previous systems, and drawn more traits into the evaluations to obtain more robust genetic analyses. We believe that part of the increase in rates of genetic gain is due to greater accuracy and part is due to breeders placing more emphasis on SIL figures when selecting sheep, as their confidence in the system increased.

SIL has been collaborating in the M&WZN Central Progeny Test (CPT, previously funded by Alliance Group) and since 2004 has regularly produced SIL ACE, a large-scale, across-flock, across-breed, genetic evaluation using genetic links built by the CPT. These initiatives led to rates of genetic gain further increasing as breeders could, for the first time in NZ, fairly compare sheep for genetic merit across a large part of the breeding industry. SIL ACE allows breeders to benchmark their own progress and to identify rams from other flocks which can drive their genetic gains further.

How the data were analysed...

To successfully breed sheep there are two important requirements:

1. Performance recording (data collected by the breeder) and
2. Genetic evaluation (e.g. SIL).

Information collected on farm by the breeder is analysed by SIL to give all animals in their flock “breeding values” (BVs). BVs are essentially “best estimates” of genetic merit for key production traits where non-genetic effects that we know about are removed. Because some rams are used over several years SIL can estimate year effects. This means that changes in genetic merit over time, genetic trends, can be plotted. With many flocks now connected through use of common rams, we can study genetic trends across the industry.

To determine rates of genetic gain since 1990, Dr Peter Amer of AbacusBio in Dunedin, analysed results of the December 2007 SIL ACE run, in a study funded by **Ovita**. Of 202 ram breeding flocks studied, 140 were Dual Purpose (DP, ewe breed, evaluated for Growth, Wool & Reproduction) and 62 were Terminal Sire (TS, meat breed, evaluated for Growth and carcass merit (Meat)). Over 300 flocks are in SIL ACE but the study was restricted to those with strong genetic connections.

Dr Amer’s findings are shown for overall merit (\$), carcass weight (kg) and number of lambs born (%) in Figures 1-3. These clearly show that the flocks studied are increasing their rates

of genetic gain. After SIL was established in 1999, genetic gains almost doubled from that previously achieved for both DP and TS flocks. A further lift occurred after 2004, when SIL ACE was introduced using genetic links created by the CPT, and rates of genetic gain were close to three times that achieved prior to SIL.

Figure 1. Average rate of gain in SIL overall indexes for Dual Purpose (ewe breed – solid line) & Terminal Sire (meat breed – dashed line) sheep. These are rates of gain so increases illustrate accelerating rates of genetic gain. Times that SIL & CPT/ACE were established are indicated.

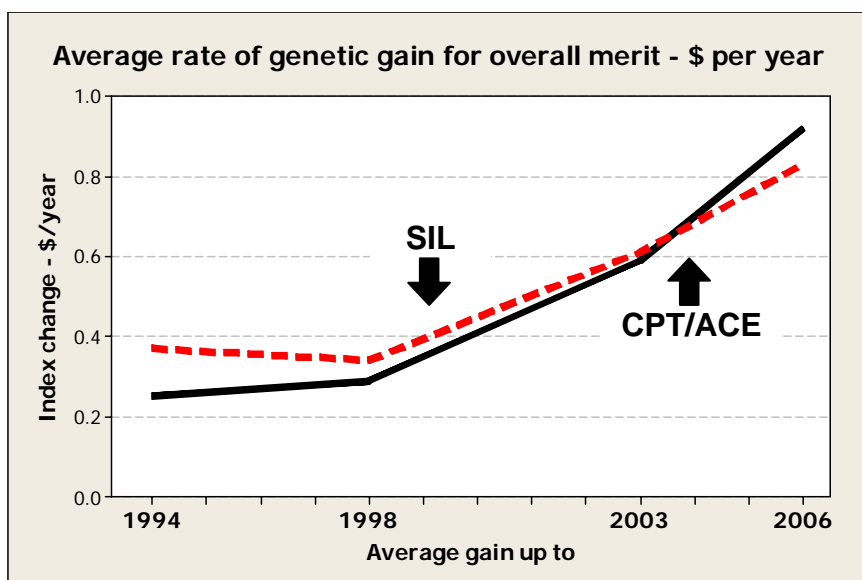


Figure 2. Average rate of gain for carcass weight (predicted from liveweights collected on farm) for Dual Purpose (ewe breed - solid line) & Terminal Sire (meat breed – dashed line) sheep. Note these are rates of gain so increases illustrate accelerating rates of genetic gain. Times that SIL & CPT/ACE were established are indicated.

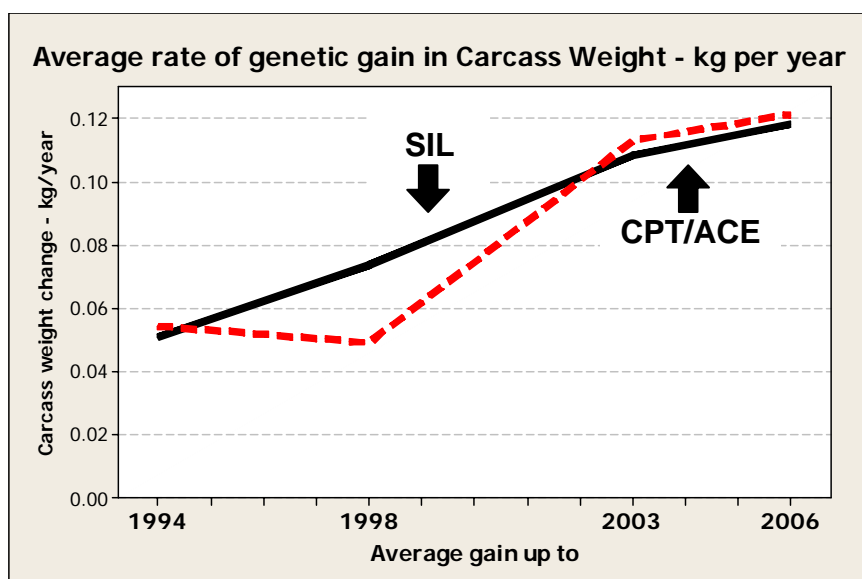
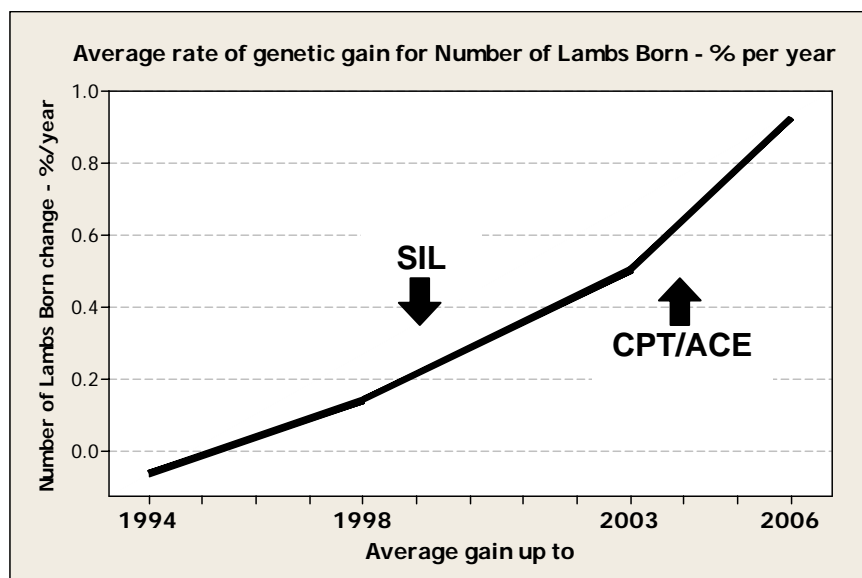


Figure 3. Average rate of gain for number of lambs born for Dual Purpose (ewe breed) sheep. Note these are rates of gain so increases illustrate accelerating rates of genetic gain. Times that SIL & CPT/ACE were established are indicated.



Cumulative gains over the years studied were greater than \$8 for overall index, with more than \$5 of this coming after 1999. Equivalent figures for carcass weight were 1.4kg (more than 900g coming after 1999), and for number of lambs born were greater than 5% (most coming after 1999).

Not just genetics...

Actual flock performance is not a good indicator of genetic merit since non-genetic effects generally make a greater contribution to flock performance than do genetic effects. Feeding and environment always greatly influence farm performance. The best farm performance will be achieved with a combination of good management and good genetics.

It is interesting to think back to farming practices over a decade ago. Most farmers could name many changes in the way they do things now. Genetic improvements since then have paralleled changes in farm management.

Overall performance of the sheep industry has improved over the time period studied here. M&WNZ Economic Service information shows that carcass weight increased by 2.5kg (14.4 to 16.9) and average lambing percentage by 16% (101.6 to 117.9). While these changes are greater than the genetic improvement for carcass weight (1.4kg) and lambing percentage (5%) they clearly indicate that genetics have made a significant contribution to increases in industry performance.

Other sources of genetic gain...

Increased rates of genetic gain have also come from sources other than use of SIL, CPT and ACE information. Breed substitution, or “blending” has occurred in some flocks so “breed” composition of the industry has changed. Exotic breeds imported into NZ in the last few decades brought new genetics into the mix. However, SIL ACE results clearly show that many sheep with exceptional, high genetic merit are from “traditional” breeds.

Dr Amer found major differences between flocks in rates of genetic gain. While the average flock gained close to \$1/year on index from 2004 to 2006, some flocks gained more than \$1.50/year and others gained less than 50c/year. His work provides compelling evidence that breeders with a long-term commitment to using modern genetic improvement methods are making very good gains and can produce sheep with performance equal to the more exotic new composites.

This study considered traits common to most SIL flocks (for DP, Growth + Wool + Reproduction and for TS, Growth + Meat). If your breeder is selecting on other traits as well (e.g. Resistance to disease or Survival), their economic gains for an overall index can be greater still.

Some of these genetic gains made by breeders have not yet got out to the national flock. Older ewes are from sires born earlier in the period studied. Such “lag” occurs whenever a breeder is making genetic progress because the commercial farmer takes some years to get improved genetics throughout their flock. By buying better rams each year, commercial farmers can ride on the coat tails of their breeder’s genetic improvement success.

Clearly, genetic gains made by breeders have contributed to lifts in performance of our sheep industry. Together with improved management (e.g. pasture management, stocking rate), genetic improvement has helped the industry produce more lambs per ewe and heavier lamb carcasses. Some argue that such genetic gains in performance come at a lower cost than equivalent gains from changed management.

What does this mean for you when buying rams?

The major benefit of the SIL system and the large-scale SIL ACE evaluation is that they allow you to locate genetics best suited to the goals of your farming business. Not all SIL breeders participate in the SIL ACE evaluation, but the number of participating flocks is growing. For breeders not on SIL it is difficult to assess genetic merit of their sheep to compare on these scales.

By buying rams from a SIL breeder, you are buying into the progressive genetic gains they are making. Furthermore, by using SIL figures to select higher merit rams, you can gain a further increment in genetic performance.

We emphasise that **when buying rams**, remember to **consider the long-term benefits they will give**, don’t just focus on their cost.

The **Ovita** (consortium) is a partnership between Meat & Wool New Zealand and AgResearch with matching funding from the **Foundation for Science Research and Technology** (FRST). The full report from which this information was extracted is available from Ovita (tel. 03 477 5920 or email e.linscott@ovita.co.nz).

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For more information on how you can use SIL information when selecting rams, send an email to silhelp@sheepimprovement.co.nz or telephone 0800-745-435 (0800-SIL-HELP).