



ACE technical history

The objectives of the Advanced Central Evaluation (ACE) analysis are to:

- Identify the **best** rams used in participating flocks, across all breeds, for specific traits and a variety of useful industry endpoints,
- Make these results available to both breeders and commercial farmers,
- Over time introduce analyses for additional traits and flocks as genetic links improve and flocks involved increase in number.

NOTE: ACE is not a breed evaluation. The wide mix of breeds and breed crosses in the top echelons of the sire lists makes this obvious.

This document is written for interested researchers and breeders using performance recording systems that wish to know more detail of the ACE evaluation. It is not intended for commercial farmers. However, it should be readily understandable to those interested in performance recording.

The Advanced Central Evaluation (ACE) analysis is undertaken in the following way:

Flock selection and data validation – 2003/2004

- All SIL breeders were posted letters in November 2003 and December 2004 asking if they wished to take part under the conditions outlined.
- Initially 154 breeders from a wide variety of breeds agreed to take part.
- A preliminary analysis was undertaken in July 2004 and genetic linkages examined to identify those flocks that were well enough linked to be included in the analysis.
- Some ram parentage and anomalous results were followed up with individual breeders.
- A revised and updated analysis was undertaken in late June 2004 and the individual breeders involved were sent draft results for their flock only and asked to check parentage identification and breed composition of listed animals.
- During that period a number of independent checks of the results were undertaken by SIL, AgResearch and Abacus Biotech staff including:
 - consistency of results with existing within breed analyses,
 - contacting breeders and checking of results and stock management for key across breed linkages external to the Alliance CPT,
 - summary of breeding value means, and ranges, for individual traits by breed and subsequent following up of any unusual results.
- Since that time more ACE reports have been released and further checks on links and anomalous results have been undertaken.

Listing criteria – August 2004

- SIL and the Alliance CPT management committee met and resolved the criteria for listing rams within the constraints of the breeder agreements in August 2004 including:
 - Rams had to have both parents listed.
 - Rams bred outside the ACE linked flocks had to have 100 measured progeny in ACE flocks. This typically meant that they had been evaluated in two or more flock/years and provided sufficient progeny for accurate evaluation given the lack of parental and half sib data.
 - Rams had to have been used in the last 3 birth years, and be less than 10 years old.

- Rams born in ACE flocks required 20 measured progeny to be listed, but they also have extensive information from parents and other relatives
- Breed composition is listed for the two most predominant breeds in an animal's pedigree
- One new SIL innovation used was the calculation and listing of number of lambing records available from daughters and from half sibs.
- Because of the number of animals involved maternal breeding values for weaning weight were not calculated at this time.
- Because of concerns about variability between farms in recording lamb survival, this trait was not included in the indexes at this time.

Economic Indices used – August 2004

- SIL and the Alliance CPT management committee also considered the economic indices to be used in August 2004:
 - The exact format of the lists was determined including the indices to be used and their format. The intention was to provide a minimum of information, while conveying all that is essential.
 - Revised SIL economic values released in September 2004 were accepted for use in indexes of genetic merit.
 - Index lists were for the Terminal Sire index, Dual Purpose index and a High Performance Dual Purpose index developed as part of the ACE project. The latter list is suitable for ram clients weaning over 155% lambs weaned/ewes mated. In addition, “trait leader lists” are listed for key objectives.
 - A small number of flocks had extensive records including parasite resistance as well as growth, wool, ultrasound measurements and reproduction. These were used in the ACE Dual Purpose WormFEC listing.

Wool Economic Sub-indices included – May 2005

- Initially wool records were not included due to lack of information in some breeds in the dual purpose listings. It was felt more valuable to include additional flocks which had reproductive records. However the increased number of analysis flocks has meant that there are sufficient flocks linked for wool as well as growth and reproduction (86 flocks in May 2005 versus 43 in October 2004) for the dual purpose and high performance dual purpose indexes to be based on all 3 goal trait groups, rather than just growth and reproduction.
- A new list was developed for flocks linked for growth and reproduction - the dual purpose maternal index.

Weaning weight maternal breeding values added – August 2007

- From August 2007 weaning weight maternal breeding values were calculated and included in the growth sub-index.

Analysis description

- An updated data file is created from the SIL database at about 2 monthly intervals.
- The data is analysed using the existing SIL genetic engine for all traits. The evaluation is a multi-trait, repeated trait, animal model BLUP.
- There is no correction for hybrid vigour - for further details see www.sil.co.nz/files/acereports/hybrid.pdf .
- All animals born between 1990 and the current year and their parentage (pedigree) information is used in the analysis. There are more than 300 flocks in the analysis and the total number of animals exceeds 2,500,000.
- The SIL base year is set to 1995: i.e. the year where the average animal born has a breeding value of zero for all traits.

- Lists of the top 200 sires (<10%) for a range of indices are available at www.sil.co.nz . For WormFEC lists the top 100 sires are listed.
- Breeding values are stored within the SIL database and breeders can obtain lists for all animals for their flock, including rising two-tooth sires, via their SIL bureau.
- Representations of genetic linkage between flocks for key traits are available on the website at www.sil.co.nz.
- Genetic trends for the national evaluation are also available on the website at www.sil.co.nz . These trends clearly show genetic progress is occurring for a large proportion of the sheep industry.

Summary of ACE participation

Participation	October 2004		May 2005		August 2006		August 2007	
No. breeders	125		207		214		215	
No. flocks	152		275		288		292	
Total animals	1,200,000		1,982,000		2,314,000		2,640,000	
No. flocks & sires linked for:								
Traits & indexes	<i>flock</i>	<i>sires</i>	<i>flock</i>	<i>sires</i>	<i>flock</i>	<i>sires</i>	<i>flock</i>	<i>sires</i>
Growth	104	1884	197	3247	240	4203	253	4389
Meat	70	1415	161	2705	190	3200	197	2886
Wool	58	1339	106	2274	107	2305	117	2416
Reproduction	80	1664	168	2930	167	3113	181	3447
WormFEC	17	543	29	777	35	996	38	973
TS	70	1415	151	2569	190	3200	187	2886
DP & HP	68	1468	86	1941	94	2140	108	2312
DP Maternal	-	-	146	2679	161	3050	176	3409
DP WormFEC	17	543	29	777	35	996	35	933

Future Intentions

ACE lists are updated 2 monthly, with overall summary lists posted only on the website. Breeding values are available on the SIL database for all animals in the ACE evaluation so individual breeders can use the results for their flocks as required.

There is the possibility of shifting to a monthly evaluation if demand requires it. This will require more flocks participating in the ACE evaluation and genetic connectedness (linkage) across more flocks.

Queries

People interested in further reading about performance recording and genetic improvement in sheep using SIL are referred to the SIL Technical Notes on the SIL website at www.sil.co.nz and to "**Introduction to SIL & Performance Recording**" 2006. 35pp, Mark Young, ISBN 0-473-10810-0 which can also be downloaded from on the SIL website.