

# Maternal breeding values

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## SIL Technical Note

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Relates to: Focusing on genetic merit for ewe traits – milking ability & mothering ability  
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### Summary

Genes in both ewes and lambs help lambs to survive and grow to weaning. SIL estimates merit for survival and for growth in terms of both the ewe's contribution and the lamb's contribution. These maternal genetic effects are important where females are bred for a commercial ewe flock.

Maternal genetic effects are estimated from the performance of progeny of sons and daughters of an individual.

SIL recommends that overall merit be used as the primary selection criterion. SIL indexes are designed so that maternal BVs receive appropriate emphasis.

### Background

Some ewes consistently wean heavy lambs. Many breeders use this information to aid their selection of superior breeding stock. Often it is not obvious if these ewes are good mothers or good growers themselves, passing on their own growth genes to their lambs.

Consistent mothering ability can be genetic or it can be due to environmental effects that permanently influence the ewe throughout her life. It may be due to both. Permanent environmental effects may be due to things such as conditions in her early life (small placental attachment in the uterus, difficult birth, multiple birth and rearing rank, age of her dam, bad disease check during growth, harsh season, etc.). Despite the opportunity to recover, these effects can have permanent effects on the ewe's ability as a mother herself, but they will not influence the genes she passes on.

It is well known that permanent environmental effects are stronger than the genetic effects they are associated with. Unfortunately this means that a ewe's consistent performance, be it good or poor, is more likely to NOT be genetic, and therefore NOT passed on to its offspring than it is to be genetic and passed on. A separate Technical Note on "Repeatability and Heritability" examines this issue.

Despite these effects, we can improve maternal genetics through selection. By estimating genetic merit for maternal effects we can make better selection decisions to improve ewe maternal traits such as lamb survival & weaning weight than if we use actual ewe performance as a guide. This is because we separate out lamb effects from ewe effects and we look for evidence that superior performance is inherited (e.g. through performance of relatives).

### Genetics of maternal effects

Developments in the tools used for genetic evaluations mean we can now routinely estimate both direct and maternal effects on survival and growth to weaning. All four traits have low heritability (0-15%) with the trend for this to be lower in maternal traits than direct traits, and lower for survival compared to weaning weight. However, the advantage of predicting merit for maternal traits is that we better characterise genetic merit.

### Recording maternal data

You don't need to record any extra data to get maternal BVs. However, there are some things you can do to maximise accuracy, particularly for Survival. To have accurate data for Survival, report all lamb deaths you know of. Accurate pedigrees are important for estimating BVs in general and maternal BVs are no exception.

### Genetic evaluation

SIL predicts two breeding values (BVs) are produced for each trait. One for the genes the ewe expresses and one for the genes the lamb expresses. We call these Maternal and Direct BVs respectively. It is helpful to think of the Maternal BVs as “mothering ability” (maternal survival) and “milking ability” (maternal weaning weight).

Two advantages come from including these maternal BVs in the evaluation. Firstly, we estimate the “direct” BVs for weaning weight ( $WWT_D$ ) and survival ( $SUR_D$ ) more accurately by taking account of the maternal effect. Secondly, maternal BVs can be used to focus on ewe performance.

*How is the maternal BV calculated?* Maternal BVs are most accurate for animals that have sons and daughters with progeny. For other animals they are based on estimates from relatives with these grand-progeny. This means the maternal BVs of young animals, including young sires, are often based on those of their parents or grandparents.

This does not mean the maternal BV data are no use. Rather, it focuses our attention on where we can effect genetic improvement. Sire Summaries can be the best place to look for superior, or inferior, genetics for  $WWT_M$  and  $SUR_M$ .

### Reporting on maternal effects

SIL does not put the “maternal” BVs ( $SUR_M$  &  $WWT_M$ ) into Terminal Sire indexes because most ram buyers do not retain female progeny. So it is not important to them if the daughters of a ram will be good mothers or not. They just want them to grow fast and produce a good carcass.

There are two additional BVs in the indexes for Dual-Purpose (including Mid-Micron) and Fine Wool sheep, for  $SUR_M$  &  $WWT_M$ . For commercial farmers of these sheep, the ewe's ability as a mother affects farm profit.

Maternal BVs are incorporated into SIL indexes where appropriate. You do not need them on reports. Making reports more comprehensive (cluttered!) is often counter-productive. SIL believes it is important to simplify, rather than complicate, selection decisions at ram selling. Particularly for ram-buyers. You can have two report formats – a simple one to summarise merit in key areas and a more comprehensive report for the times when that may be required.

SIL recommends the use of sub-indexes, rather than BVs, on reports. SIL suggests your main selection focus should be the overall index for your type of sheep (e.g. Dual-Purpose, or Terminal Sire or Fine Wool). If you want to know more about the nature of the superiority of one animal compared to another, the sub-indexes are the next thing to consider. These will show if an animal is strong (or weak) in areas such as Growth, Meat (carcass quality), Wool, Reproduction or Survival. If you are farming or breeding dual-purpose sheep (including use of the standard SIL indexes for Mid-Micron and Fine Wool sheep), then genetic merit for ewe performance in milking ability ( $WWT_M$ ) and mothering ability ( $SUR_M$ ) can be considered by looking at maternal BVs.

### Selecting for genetic improvement in maternal performance

You should not select rams and ewes to breed replacements on the basis of their mother's actual performance. Use maternal BVs if you want to improve ewe traits in particular. You will improve mothering and milking abilities faster.

It is helpful to consider whether a ewe is a flock improver or a lamb producer. Some ewes will be both good producers and pass on good genes. Some may do only one of these things, or neither! For a ewe to be a flock improver in these traits she MUST have good BVs for  $WWT_M$  and  $SUR_M$ . A ewe with good performance but poor maternal BVs is a good lamb producer but not a flock improver. In other words, for ewes where actual performance and the BVs do not match up, the information SIL has indicates that her superior performance is not genetic.

Obviously a ewe with poor genes for these traits that does not raise good lambs is very likely to be culled while a ewe with good genes and which produces good lambs will be kept. But some ewes may have high BVs for  $WWT_M$  and  $SUR_M$  yet have much more modest or even poor actual performance in these traits. How can this be? A ewe with modest actual performance but good BVs may be affected by her own birth rank, her date of birth and the age of her dam, which SIL adjusts for, and her female relatives must show good performance in these traits. So whether to cull her or not depends on whether you think you gain more from her producing good lambs available for selection than you lose in genetic improvement of these maternal traits from favouring her over another ewe. Selection is full of such difficult choices!

SIL recommends that you do not cull ewes on actual performance as a means to genetic improvement. Use the  $WWT_M$  and  $SUR_M$  BVs. We will qualify this by saying "By all means cull them if they do not produce lambs available for selection or sale!"

Comparing two rams on a selection list, one may be better at  $WWT_D$  BV while another is better at  $WWT_M$  BV. *Which is best?* **The one on the list that is good at both!** Like any combination of traits, we are looking for the good all-rounders. However if you had a client with poor ewe milking ability, a ram strong in this area could be a better bet for them.

### Need more information?

Contact your SIL bureau, local SIL adviser or call 0800-745-435 (0800-SIL-HELP).