Lamb survival

SIL Technical Note

Relates to: Selection to increase number of lambs sold
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Date: 20 June 2006

Summary

- Record all dead lambs on SIL using lamb fate (BFATE) codes
- With regard to time of death, use the codes J, K, 1 (earliest to latest)
- Record date of death where possible
- Avoid using code "M" (Died by Misadventure)
- Code lambs missing at weaning as dead – when you are likely to be correct for most of these lambs
- Address any queries to your bureau

Background

You can increase number of lambs sold in two ways. One is to increase number of lambs born, the other is to increase survival. Improvements are best obtained by selecting for both.

Increases in average lambing percentage lead to higher rates of multiple births in flocks. In some cases high proportions of ewes have triplets. These often have lower rates of survival than twin or single born lambs. However lamb survival is important in litters of all sizes.

Survival depends on many factors including genes, management and the environment (particularly weather conditions). Genetically, it is influenced by a combination of genes expressed by the ewe, as a mother, and by the lamb itself. SIL estimates genetic merit for both ewe and lamb effects.

Definition of survival

SIL measures survival in terms of lambs born that die before weaning. Currently, it does not consider how animals died or when they died. While lamb fate codes (BFATE) allow discrimination between deaths at different times, in practice SIL "groups" data to determine whether an animal survived to weaning or not.

Historically, genetic evaluation schemes did not routinely estimate merit for survival directly. So there was no need for breeders to collect complete data on lamb deaths. If we are interested in survival, we MUST know about relatives that have not survived. If we do not, we cannot accurately estimate genetic merit for survival in the animals available for selection. For this reason, breeders are encouraged to record information for all lamb deaths.

Genetics of Survival

Survival is lowly heritable (<5%). This means many non-genetic effects have a large influence. We can split the small amount of variation due to genes into those acting in the lamb ("lamb vigour") and those acting in the ewe ("mothering ability"). SIL estimates genetic merit for survival as both effects.

Since the heritability is so low, family information is VERY important for estimating genetic merit for survival. A dead litter mate has some impact, but survival in the wider half-sib family is more important. This is why SIL wants comprehensive survival information

collected for the flock. While 100% complete data on survival is probably unattainable, we should aim to have it as complete as is practically possible.

Selecting for Survival

Separate sub-indexes for Survival can be included in standard SIL overall indexes. For Dual Purpose sheep this includes both the direct (lamb vigour) and the maternal (ewe mothering ability) breeding values, with appropriate economic weightings. Previously it was based on only the SUR (direct) breeding value. For Terminal Sire sheep the Survival sub-index was, and is currently, based on only the direct (lamb vigour) breeding value since female progeny are not kept as replacements in most commercial situations.

SIL lamb fate (BFATE) codes

- SIL uses lamb fate codes (BFATE) to tell which animals are dead. Breeders submit animal IDs together with these codes to their bureau for entry onto the system. Usually this is done when submitting data collected on farm for lambing and performance traits.
- Table 1 lists SIL lamb fate codes.
- Some BFATE codes refer to the "status" of the animal in the period near birth. If a BFATE does not refer to a dead lamb (e.g. progeny of AI) it is assumed to be alive.
- An animal can have more than one BFATE code e.g. LFK – *AI progeny, fostered, died later*
- SIL assumes lambs are alive unless told otherwise.
- Note that any animal fated as "dead" but which is subsequently found can be easily recoded as alive.
- Lambs that have been tagged but are culled before weaning do not need a fate code

Table 1. SIL lamb fate (BFATE) codes

Birth fate	
J	Born dead
K	Died later
1	Died between birth & weaning
M	Died due to misadventure
4	Culled at birth
F	Fostered
H	Hand reared
L	AI progeny
E	ET progeny

How the BFATE codes influence Survival

- F, H, L, E – have no effect on genetic merit for Survival.
- 4 – if culled at birth, or later, a lamb is assumed to have survived to weaning. Lambs that have been tagged but are later culled before weaning do not need a lamb fate code but should be given a status of culled.
- M – assumes a lamb would have survived to weaning but for this chance event
- 1, J, K – all influence genetic merit for Survival in the same way – the lamb is assumed to have NOT survived to weaning.
- Note SIL no longer uses code "Q", Died Dam's Fault – Now that SIL fits a maternal effects model when analyzing the data, this is not needed. SIL estimates the genetic propensity of ewes for mothering ability by using all the performance (BFATE codes) and pedigree information available.

SIL has produced a Survival Quick Reference Guide that is a handy summary of the lamb fate codes and how to use them.

Best practice

Currently it doesn't matter if an animal is coded as J, K or 1 – SIL assumes it did not survive. However, in the future SIL may adopt a more comprehensive approach to the analysis of survival data. In order to "futureproof" your flock survival data, information on time of death is important. SIL suggests you record (approximate) date of death where known.

A problem occurs if there are a significant number of animals missing at weaning. While a few may reappear, usually most do not. If these are not fated as dead SIL will underestimate lamb losses. The rule of thumb to apply is whether you will be better off by assuming these missing animals are dead. If you assume this, usually you will be right more often than you will be wrong. SIL considers it best to fate these missing lambs as "dead" (BFATE = 1). This can always be changed for the few that reappear for a later measurement.

Missing fate codes can be a problem when follow-up sire(s) are used and no progeny of these are tagged or kept. Effectively these are culled. If they are not tagged we cannot say which ewes lost lambs after lambing. If it is not practical to tag or collect information on these lambs, they should be coded as "culled" (BFATE = 4).

SIL recommends the following practices:

- For animals dying at or near birth, record this as J.
- Animals that get up and feed, and are with their dam for several days but which die before docking should be coded as K.
- Deaths between docking and weaning should be coded as 1.
- A date of death should be submitted where possible
- The old code "Q" (Died – dam's fault) is no longer relevant now that SIL analyses Survival for maternal effects
- Use code M judiciously – SIL assumes these dead lambs would have survived, but there may be more in some families
- Code lambs that are missing at weaning as dead. Unless you will cause problems for a significant number of lambs e.g. non-tagged, cull lambs from ewe hoggets and follow-up sires.
- Lambs culled at birth are coded as 4. They are assumed to survive to weaning. NB: tagged lambs that are culled later do not need a lamb fate code (BFATE).

Lambing without shepherding

A number of breeders stay away from the ewes at lambing to allow them to "get on with the job" without disturbance. This means some deaths will not be found and some cannot be attributed to a sire or a dam. There are good reasons to practice this type of management but it affects the accuracy with which genetic merit for Survival is estimated. It is not clear how much of an effect this has.

While it is theoretically possible to use "pregnancy scanning data" (=litter size) together with "lambs present at weaning" (i.e. with a weaning weight) to measure survival under such management, currently SIL does not do this.

For this to work, data collected on farm would have to meet strict conditions with regard to completeness of data for pregnancy scanning, deaths post-tagging, weaning weights and any fates recorded. You can record under such strict conditions now to provide good data if a future analysis uses pregnancy scanning data in this way.

What about storms or unforeseen events?

Concern is often expressed that a storm causes more lamb deaths than usual and some of these lambs would have survived in finer weather. So should they be coded as "M"? This assumes the storm was "too challenging". The logic about the effect of the weather on survival is correct, however it is open to argument with regard to the genetic analysis. We want to know which animals are less vigorous, or poorer mothers – survivors of the storm may still show up genetic differences if the daughters of one sire are better mothers or the lambs of another sire showed more vigour. Coding a lot of lambs as "M" hides this. **SIL recommends that lamb deaths under such conditions simply be coded as dead (codes J, K & 1).**

There are rare circumstances where one sire's progeny may suffer more losses and it is not genetic. For example, a link sire used by AI may have 80% of his progeny born in a 3 day storm where other sires have fewer than 20% born in the same period. SIL does not recommend coding these lambs as BFATE = M. Coding a lot of dead lambs from one sire as "M" will cause another bias. The SIL analysis needs to know that some families had better, or poorer, survival under such a challenge.

It is possible one sire gets a worse "throw of the dice" when a lot of his ewes lamb in a storm period. There is no simple way to correct for this that will not introduce other anomalies.

To avoid such biases, **SIL recommends that sires be mated to all ewes in an age group at the same time.** This includes AI sires. They will then have lambs born at a similar time.

Note that the three main ewe age groups (hogget, 2-tooth & older ewes) can be mated at different times if this suits management but that **SIL recommends a sire be used to link ewe age groups within a year**.

Why doesn't SIL currently use a more complex approach to analysis of Survival?

Lamb deaths have many causes. The first step to improving it genetically is to collect information on survival for **all lambs born**. Since some historical data is incomplete, most breeders will get most benefit from working to collect complete information on lamb survival using standard SIL codes, as far as is practical on farm.

Attributing lamb deaths to other causes is not a precise science. Research is underway looking at lamb survival to better understand it and to come up with practical methods for recording more detailed information on farm. SIL will ensure that such data can be collected and stored on its database so that it can be used in the future if new, practical approaches for genetic analysis of survival are developed.

Reporting on Survival

SIL recommends you report on the Survival sub-index only. However, if you want to look at maternal traits, the maternal breeding value could be included on a report. Your bureau can provide you with advice on this.

Need more information?

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