Ewe longevity (or stayability)

SIL Technical Note - Advanced draft

Relates to: Length of time a productive ewe stays in the flock
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Summary

- Ewe stayability (productive longevity) affects flock replacement rate. Ewes leaving the flock at a younger age means more replacements are needed
- Accuracy in data recording is important for future proofing genetic evaluation of this trait
- Every ewe should have a ewe exit code recorded for the reason she leaves the flock
- Ewes may leave a flock for the same reasons as they would in a commercial, non-pedigree flock. These are "**C**ommercial" reasons (C).
- Ewes may leave a pedigree flock for reasons that are known about the individual ewe that would not be known in a commercial flock where animal pedigree is not known, or because it is nothing to do with the ewe herself. These are "**K**nowledge" reasons (K).
- A minimum level of recording for this trait requires ewes leaving the flock to be coded as C, K or U (unknown). More detailed sub-codes can be used.
- Ewe Longevity is a recording trait only at this stage. Genetic evaluation will come later.

Background

Many sheep farmers have observed that some ewes last longer than others. This is (productive) longevity or stayability. Commonly poor production, or assessments that suggest that, is a major reason for culling.

Flocks with ewes that 'last longer' need fewer replacement ewes to maintain flock numbers. It is generally accepted that if a flock needs fewer replacement ewes, this reduces the cost of maintaining flock size and increases flock efficiency. If ewes leave the flock ***prematurely*** through death or culling, fewer ewe lambs can be sold, higher numbers of hoggets need to be wintered and reared to two tooths, or replacements extra replacements purchased. There is also more scope to cull ewes prior to entry into the flock, so more selection pressure is placed on "likely" ewe productivity.

The extent to which better productive longevity in ewes is genetic is not known. Some ewes are more 'hardy', more suited to specific farm and management conditions or more fertile than others. Some ewes leave the flock because they die, while others are culled for known reasons. Usually such culling is related to expectations of future productivity or because it is thought she may pass on poor genetic merit for some trait.

Collecting SIL Ewe Exit codes detailed in this document will provide information from which we can gain a better understanding of this trait. Breeders who begin recording this trait now will be well positioned to take advantage of genetic evaluations developed for this trait.

Longevity *versus* rate of genetic gain

A pedigree ewe in a genetic improvement programme does two things. She passes on genetic merit to her offspring and she produces numbers of sound lambs to drive the selection programme. Ewes contributing fewer sound lambs for the selection process are reducing the extent to which selection can occur.

While low replacement rates are preferred to reduce flock overhead costs, high replacement rates are better for genetic improvement, i.e. new improved blood being introduced more frequently into the flock. Usually, there is an intermediate optimum for these factors.

However, for a commercial flock, most of the genetic gain comes through the rams used. Typically, ewe replacements are chosen primarily for their likely future productivity, and culling is on the same basis. It is easier to judge productive merit than genetic merit for commercial ewes.

Defining ewe longevity

Deaths and culls are influenced by environmental factors e.g. farm type, weather or management. However, some families may be more susceptible to dying or showing undesirable traits in some situations. Chance effects also occur. A ewe may be affected by something that others do not encounter. It is important that we record the reasons ewes leave the flock so that a genetic evaluation can separate genetic effects from non-genetic effects.

There are many reasons a ewe may leave the flock. Sometimes determining causes on farm can be difficult. In a typical commercial flock, individual ewe identity is not known so at weaning we don't know which ewes reared all their lambs and which did not.

The different reasons a ewe leaves the flock can be classified as "**C**ommercial" i.e. they would lead to her leaving the flock even when we don't know her identity and past history. If they are reasons that a pedigree breeder would know (e.g. poor indexes, past lamb production) or nothing to do with the ewe's ability to survive and produce, then they are based on "**K**nowledge" the breeder has i.e. a ewe would not exhibit poor longevity compared to her contemporaries for these reasons in a commercial flock.

The difference between "**C**ommercial" and "**K**nowledge" reasons are fundamentally important to the recording system described here. We look at this in more detail below.

Genetics of ewe replacement rate

Very little is known about the inheritance of ewe longevity or its genetic relationship with other traits. A number of studies are currently underway in New Zealand related to ewe longevity. Data collected on farm by breeders using this SIL protocol will be used to gain a better understanding of this trait. Already a number of breeders have agreed to make their flock data available to researchers working in this area.

Genetic evaluation of ewe longevity

SIL is calling this goal trait **Ewe Longevity**. What is recorded on farm is Ewe Exit code(s) - the reason(s) a ewe leaves (exits) the flock. The aim is to develop a recording system from which we can develop a genetic evaluation for ewe longevity. The goal is to be able to select ewes that have longer, more productive lives.

Initially, SIL is just defining a recording system to collect ewe longevity information. Later, we plan to introduce a genetic evaluation system for Ewe Longevity based on this data.

Recording ewe longevity

Reasons ewes leave the flock are numerous and can be subjective or objective. They are highly influenced by management, environmental effects or just plain chance. A ewe may have died, been ill or her performance was below acceptable levels. We need to record the reason(s) a ewe leaves the flock. To produce robust data for development of a genetic evaluation system, we need this information for ALL ewes no longer in the flock.

__C__ommercial versus __K__nowledge reasons

SIL's ewe exit codes are for recording reasons that a ewe has left (exited) the flock, not just the fact she has left it. It is critical to distinguish between "**C**ommercial" and "**K**nowledge" reasons for a ewe leaving a pedigree recording flock. This is so the focus will be on the trait that is "ewe longevity" in a commercial flock.

Commercial reasons are those that lead to a ewe dying or being culled, compared to her contemporaries in a commercial flock. There are a few exceptions to this guideline.

Knowledge reasons are those that lead to her being culled or dying, but which would not be known in a typical commercial flock or are not her fault.

For example, a pedigree ewe may be culled because she had a single and not twins, or her lambs died near weaning. In a commercial flock at weaning she would have just been another ewe that had had lambs. So a pedigree breeder may have this information for a ewe, but a commercial farmer is less likely to. Where the pedigree recorded flock culls ewes for reasons a commercial farmer is less likely to, we must distinguish these decisions from those decisions the two situations share in common.

A breeder should not be concerned that this is letting ewes away with "poor" production. With other major production traits measured under SIL, this is taken account of in the wider genetic evaluation – not in ewe longevity but in other traits. If a ewe is culled for low lamb production, this is "Knowledge" because the commercial farmer seldom knows the number of lambs, or their weight, that a ewe weaned. However these traits contribute to BVs for Growth and Reproduction traits. It is OK for such culling to occur in a pedigree flock, but we must distinguish between Commercial and Knowledge reasons if we are to focus on "commercial longevity" for the ram buying clients of the ram breeder.

Where death or culling is not a ewe's fault (e.g. misadventure) or she is culled for age, these do not affect "natural" longevity in a commercial flock. So these are "Knowledge" reasons.

Ewe exit codes

Every ewe that leaves the breeding needs a ewe exit code and the date she left.

As a minimum, they need to be coded as C (commercial), K (Knowledge) or U (unknown or missing). If you want to record more detail, SIL has sub-codes to cover most situations. Where a sub-code is recorded, you do not have to record a C, K or U code as well.

It is up to each breeder as to whether they record the main code type or the sub-codes. You can use the main code for some sheep and sub-codes for other sheep but there is merit in sticking to one system for all ewes leaving the flock each year. Use of the more detailed sub-codes will help researchers better understand why some ewes live longer and may allow selection to improve longevity to be more focused in the future.

If a ewe does not have any ewe exit code, SIL assumes she is still alive. If a ewe is no longer in the flock but the reason is not known i.e. she was culled after weaning (no reason) or is simply missing, tell your bureau she has exited (left) the flock for an unknown reason so she can be coded as U (unknown). If a 'missing' ewe turns up at a later date, it is easy to switch her status to alive and reset her Ewe Exit code to a blank value.

U codes (unknown or missing reason for ewe exit) may not contribute to future genetic evaluations of ewe replacement rate, as they are effectively 'missing data'. SIL recommends the U code be used sparingly.

Deciding on what code to give a ewe

1. First, consider whether it is a reason classified as "Commercial". If it is, record it as "C" (code type) or an associated sub-code. If it is none of these,
2. Consider whether is a reason classified as "Knowledge". If it is, record it as "K" (code type) or an associated sub-code. If it is none of these,
3. Record it as "U" for unknown reason.

There is an option to record comments as well as codes for Ewe Exit information on SIL.

Where you are unsure of what code to use or if you have a reason for culling a ewe that SIL does not have a code for, record the details and get in contact with your bureau or SIL (contact details are given below). It may help SIL improve this recording system.

Multiple codes

Sometimes there is more than one reason a ewe leaves the flock e.g. she has a bad udder and wool problems. If there is more than one reason SIL recommends recording both i.e. this ewe would get a C (udder problem) and K (wool problem) if you used the Main Code Types, or it would get H7 (udder problem) and X2 (wool problem) if you used the sub-codes. SIL can deal with multiple codes - the more information submitted the better.

NB: **Where there is more than one reason, record all codes that apply.** This is useful information when several other ewes in a family all have one of these codes. SIL will develop evaluation systems that may make optimal use of data recorded in this way.

Ewe Exit codes *versus* Dam Fate codes

Ewes are dams each year. So they can have different dam fate codes for each lambing. Dam Fate codes are a "repeated" trait. However, they only leave the flock once, so there is only one time when Ewe Exit code(s) are recorded for a ewe.

Ewe replacement rate versus other traits

A ewe may die or be culled for physical, health or production reasons. There is no point having a ram whose daughters live longer than average but are not as fecund (number of lambs born) or that have lambs with poor growth rates. For this reason SIL recommends that Ewe Longevity be part of a comprehensive recording programme alongside other key production traits to help interpret Ewe Longevity data.

Culling ewes

By all means continue to cull ewes on criteria you think are important. This document just shows a way of recording your culling decisions. Research using such data will examine how longevity is influenced by other production traits so that we can tease out the unique reasons ewes don't last from those related to other traits. This may lead to refinement of the recording protocol as well as development of a robust genetic evaluation for ewe longevity.

Summary

- Use Exit Codes to record why ewes leave the flock due to death or culling.
- Be consistent in how you make decisions when choosing Ewe Exit codes to use.
- Record a Ewe Exit code with a date for all ewes no longer in the ewe flock.

Other relevant technical notes

SIL technical information relating to ewe replacement rate and other topics can be found on the SIL website, www.sil.co.nz, under Technical Notes.

Need more information?

Contact your SIL bureau, send an email to silhelp@sheepimprovement.co.nz or telephone 0800-745-435 (**0800-SIL-HELP**).

Ewe Exit Types and Codes. Either a Code Type or Sub-code should be recorded for every ewe leaving the flock along with a (approximate) date. When deciding on what reason to record for a ewe, check first on whether it is "Commercial" (C). If it is not, then check on whether it is "Knowledge" (K). If it is neither, it must be "unknown" (U). Ewes can have more than one exit code. Where there is more than one reason, record them all.

Should you have reasons not listed here but which you think are valid to code separately, please contact *silhelp* (email silhelp@sheepimprovement.co.nz or phone 0800-silhelp).

The table below is best printed in colour.

Code Type	Sub-Code	General Category	Detailed reason
C	D1	**Died**	Died unknown reason - not at lambing
C	D2		Died at lambing
C	D3		Died due to pregnancy related disease e.g. pregnancy toxaemia
C	D4		Died due to other known disease - **specify**
C	P1	**Pregnancy & lambing**	Culled as failed to get pregnant
C	P2		Culled as mated late (e.g. to follow-up sire)
C	P4		Culled due to bearing problem
C	P5		Culled due to assisted birth
C	H1	**Health & physical condition**	Culled due to poor condition
C	H2		Culled due to excess (fat) condition
C	H3		Culled due to disease - non-fatal e.g. footrot, FE
C	H4		Culled due to teeth or mouth breakdown
C	H5		Culled due to feet or leg breakdown
C	H6		Culled due to eye problem
C	H7		Culled due to udder problem
C	H9		Culled due to other reason - **specify**
C	A1	**Abortion**	Culled due to being **one of a few ewes aborting** (no abortion storm)
K	A2	*Note key difference between A1 and A2*	Culled due to being **one of many ewes aborting** (when there is an abortion storm)
K	L1	**Lamb production**	Culled as lambs born dead
K	L2		Culled as poor mother (at lambing)
K	L3		Culled due to number of lambs over 2 or more lambings
K	L4		Culled due to lamb losses - scan to birth or scan to wean or birth to wean - this lambing or over several
K	L5		Culled due to litter size from most recent lambing only. Possibly from scanning
K	L6		Culled due to low total weight of lambs weaned
K	M1	**Misadventure**	Died due to misadventure e.g. smothered in yards, killed in collision with farm transport
K	M2		Culled due to misadventure e.g. shearing injury
K	X1	**Physical faults**	Culled due to lambs born with obvious fault
K	X2		Culled due to wool problem e.g. break or quality
K	X3		Culled due to faults seen in other relatives
K	G1	**Genetic merit**	Culled due to ewes own BVs or indexes
K	G2		Culled due to BV or index of relative e.g. sire
K	G3		Culled due to own gene test result
K	S1	**Structure of flock**	Culled for age - flock policy
K	S2		Culled when flock size was reduced i.e. greater than normal culling
U	U	**Missing**	Unknown - ewe missing