

Across-flock connectedness – best practice

SIL Technical Note

Relates to: How to establish and manage genetic connections between flocks

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Summary

- Genetic links between flocks are required to be able to validly compare genetic merit of animals in different flocks – this is termed “connectedness”
- Good connectedness is achieved through the sharing of rams (link sires) within years
- SIL recommends ram sharing on a regular, ongoing basis for across-flock evaluations
- SIL requires a link sire have a minimum of 20 progeny with performance measurements, within each flock, to contribute to across-flock connectedness calculations
- SIL recommends a minimum of 25-30 progeny with performance measurements in each flock, for each link sire
- A simple checklist of “best practice” is provided at the end of this document

Background

Across-flock evaluations are conducted to enable fair comparison of animals with different genetic backgrounds or raised in different environments. In order to make fair comparisons we need to adjust for differences due to the different environments. This is done by comparing the performance of animals with a common genetic background (the same sire) in the different environments. Such sires are termed “link sires”.

Another SIL Technical Note describes the principles of connectedness across flocks in more detail with examples of how flock connectedness is assessed.

How many link sires should be used?

You only need to use one but it is better to spread risk by using two, if possible. Then, if a ram fails at mating, or a more progeny than expected need to be culled, there will still be sufficient link sire progeny to form good connectedness with other flocks.

How often do I need to use link sires?

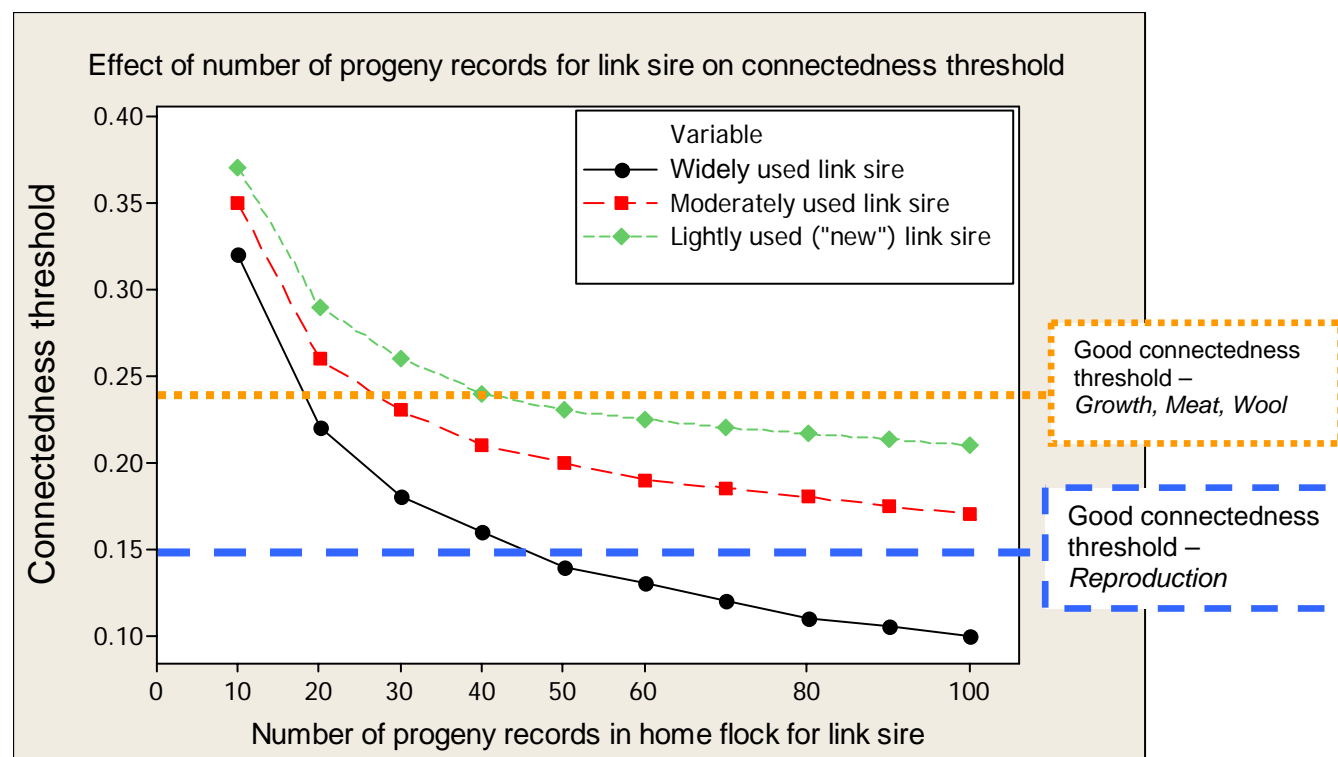
It is best to use link sires each year. This ensures maximum accuracy in comparisons of young replacement animals across flocks. For difficult traits like reproduction, where we need more data to get good connectedness, it is a case of having a policy of building and maintaining connectedness through use of link sires each year.

How many ewes should go to link sire(s)?

The critical number is the number of link sire progeny in a group with performance measurements. Fifty progeny from one link sire provides the same connectedness as 25 progeny from each of two link sires. **SIL requires a minimum of 20 progeny with performance measurements for a link sire in order to contribute to across-flock connectedness calculations.** This minimum is to ensure that sire merit is accurately assessed within each flock.

How many ewes need to be mated to link sires will depend on lambing percentage, on whether ewe and ram progeny are measured, and on culling prior to measurement. The aim should be to obtain a certain number of link sire progeny records for a trait – i.e. progeny with measurements. Convert this back to number of ewes mated based on lambing percentage, culling and whether ewes and rams are measured.

The following graph can be used to determine how many progeny records are needed in your home flock from link sires used in the group your flock wants to connect to. Three types of link sire are considered – from widely used (>100 progeny records) in the group, through moderately used (50-100 progeny records), to lightly used (approx. 30 progeny records).



For example, a flock that wants to connect with an existing breeding group would need to collect **30+** progeny records for sire(s) used moderately in that group to get good connectedness (<0.24) for meat scanning traits. If lambing percentage is **150%**, 20% of lambs are culled prior to measurement (**80%** kept) and **only ram progeny** are measured, the link sire(s) would need to be mated to a minimum of 50 ewes ($=30/1.5/0.80/0.5$). Obviously, only 25 ewes would be needed if both male and female progeny were measured ($=30/1.5/0.80/1$).

It is harder to get good flock connectedness by using rams other than those widely used across the breeding group. Where connectedness for reproduction (NLB) is important, it is valuable to have a policy of using just a few link sires (possibly one), widely, across all flocks.

Making sure other factors don't cause biases

We need to remove non-genetic, between-flock, effects in order to validly compare animals for genetic merit. In order to do so we need good estimates of effects due to year and dam age so that these can be clearly separated from the genetic effects of sires used in different years and different ewe age groups. To do this we need to have sires within the flock that connect across ewe age groups within year, and sires that connect across years. Therefore:

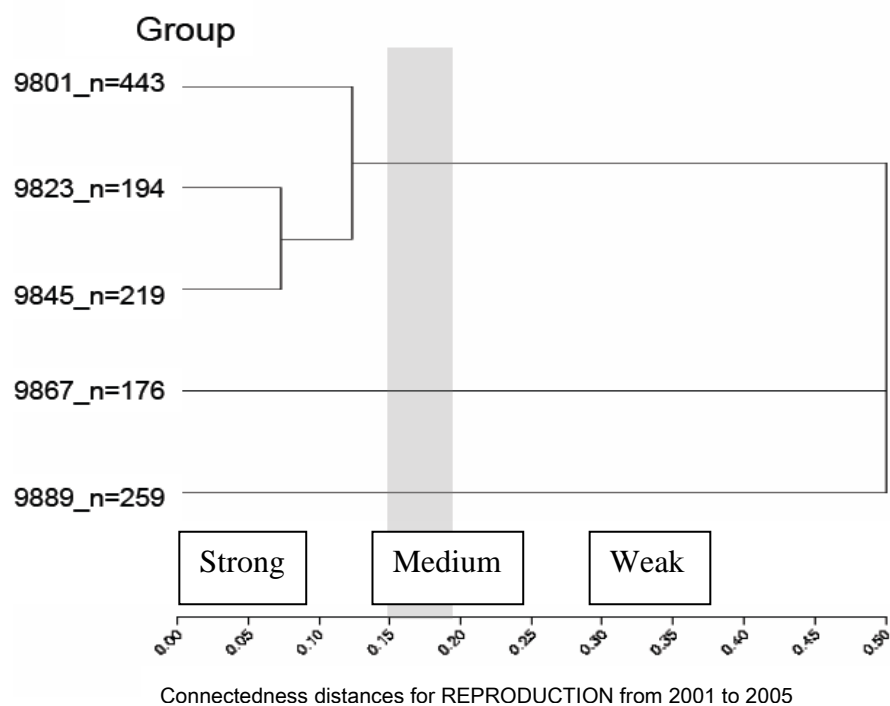
- **Use some sires to connect ewe age groups (hogget, 2-tooth or mixed age) in a flock within each year** – otherwise it is difficult to separate dam age effects from sire effects
- **Repeat use of some sires across years within a flock** – otherwise it is difficult to separate year effects from sire effects
- **You do not have to use the same sires to connect ewe age groups within a flock within a year, to connect years within a flock or to connect flocks within a year**
- If a link sire is used by AI, or for a short period at mating (e.g. 7 days), and his lambs are born in different conditions to average, biases can occur in genetic evaluations.

SIL connectedness analyses

SIL depicts flock connectedness in terms of a connectedness graph (see following example). Connectedness is based on the total number of link sire progeny records for that flock within the window of data considered. Critical thresholds for connectedness on these graphs are given in the following table.

Trait	Threshold on connectedness graph		
	Good connectedness	Needs attention	Inadequate connectedness
Growth, Meat, Wool, WormFEC	<0.24	0.24-0.30	>0.30
Reproduction	<0.15	0.15-0.19	>0.19

Connectedness graph for Reproduction. There are 5 flocks (9801 to 9889). Critical connectedness thresholds are shown as a grey bar. Flocks connected by lines to the left of the grey bar are well connected. Flocks connected by lines to the right of the grey bar are inadequately connected. Flocks 9801, 9823 & 9845 are strongly connected. Flocks 9867 & 9889 are NOT connected with the three other flocks.



Need more information?

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

Across-flock connectedness

A best practice check-list

- Use link sires regularly. Each year is ideal. This will build and maintain connectedness to ensure the focus is on valid comparisons of upcoming, replacement stock.
- Share one to two rams with other flocks. Two is best to spread risk i.e. if one ram doesn't "fire" or if progeny of one ram need to be culled more heavily.
- Have 20-25 progeny per link sire with measurements i.e. you will need more progeny born to allow for some not surviving and others being culled prior to measurement. Together with expected lambing percentage, this will determine the number of ewes a ram is mated to.
- *SIL requires a minimum of 20 progeny with performance measurements per link sire for connectedness calculations - be careful that link sire progeny are not culled more than those of other sires before measurements are collected*
- Ideally share rams with another flock in the same year.
- To compare unproven replacement rams for genetic merit, we need good connectedness in recent years (last 3-4 years). Good connectedness a long time ago is not useful. SIL estimates flock connectedness based only on data from recent years.
- You should also use some sires within a flock to connect across years and to connect ewe age groups within a year. These do not need to be the same sires used to connect with other flocks.
- Monitor flock connectedness regularly (yearly) using SIL connectedness graphs.