

Technical Note

Lamb Survival as a trait for Blackface sheep breeding programmes

Background

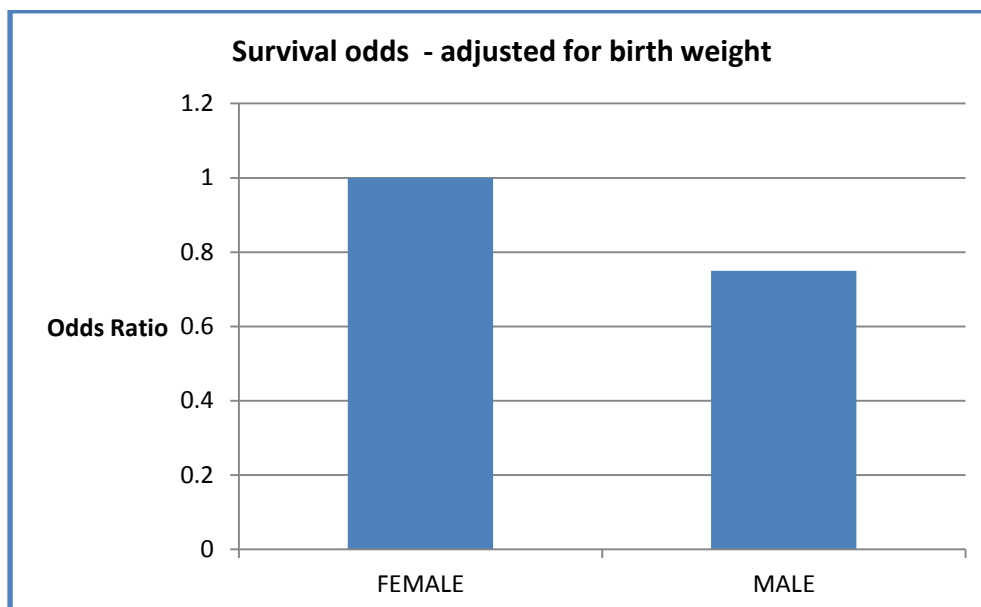
Lamb survival is a complex trait because of the interaction between the lamb, dam and litter mates, the environment it's reared in (farm, management, weather, feed, shelter availability etc), and the lamb and dam's own genes as drivers for survival. These include disease resistance, several different aspects of 'get up and go', suckling success and shelter-seeking ability traits, amongst others.

Improving the number of lambs reared for the Blackface breed alone by 0.5% is worth around £0.4M per annum in the UK, and including 'lamb survival' as a breeding goal into sheep selection strategies would help to pick animals with the best genes for survival as well as for other traits of economic importance.

Genetic improvement of lamb survival

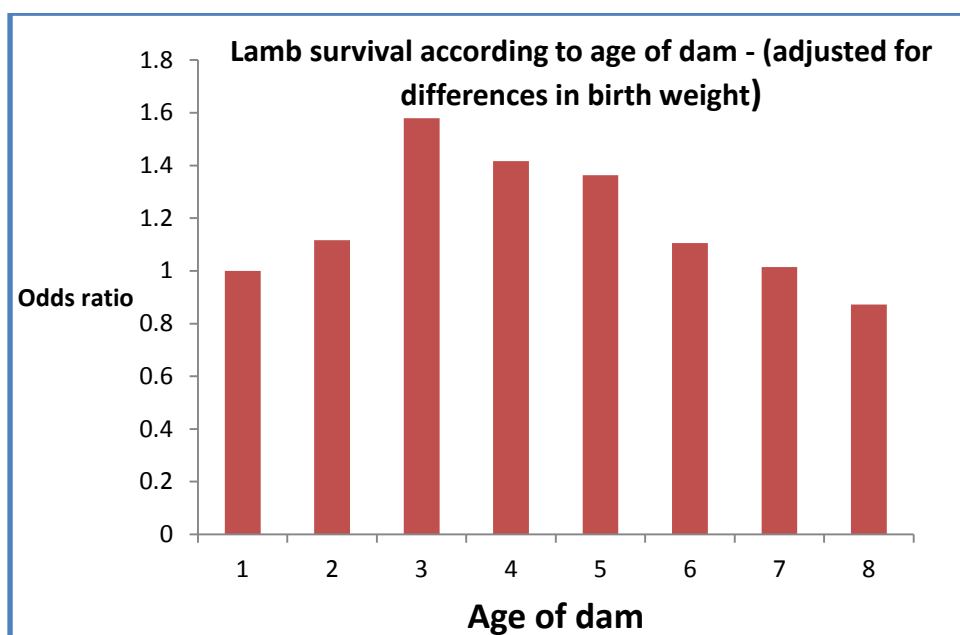
Genetic improvement for this trait accounts for the known key 'risk factors' associated with important influences on lamb survival. These include the age of dam, sex of lamb, flock, litter size and lamb birth weight, amongst others. Approximately 50,000 Blackface lambing records from 29 flocks that record lamb birth weight with Signet's Sheepbreeder Service was used to quantify these known risk factors. Figure 1 below shows the survival 'odds' (or 'risk') of being a male or female lamb, irrespective of the inevitable differences in live weight at birth as well as the other known risk factors listed above. The graph shows that on average, female lambs are 1.3 (1 / 0.75) times more likely to survive compared to male lambs.

Figure 1: Survival of female vs male lambs



Similarly, Figure 2 shows the effect that dam age has on lamb weight, again corrected for differences in lamb live weight at birth and the other risk factors listed above. It shows that lambs from 3 year old ewes are 1.4 (1.58/1.11) times more likely to survive compared to lambs from 2 year old ewes and have the highest likelihood of survival compared to all other dam ages.

Figure 2: Effect of dam age on lamb survival



To what degree is lamb survival inherited?

Typically, lamb survival, litter size and some other aspects of functional fitness have relatively low levels of heritability¹ for most animal species. This means that the environment has a bigger influence on the expression of lamb survival. However, it's important to include these characteristics into breeding programmes so that any potential antagonisms among the breeding goal traits can be overcome (e.g. at a genetic level, increasing litter size will lead to an increase in lamb mortality). In that way, improvements in animal performance can be achieved without detriment to animal welfare.

The estimate of heritability for lamb survival in the Blackface breed is 0.09, which includes both maternal and 'direct' lamb components of variance. This means that two EBVs for lamb survival will be delivered, one that separates out the lamb's own genes for lamb survival and the other for the 'maternal' EBV for lamb survival. This will help breeders to pick rams with good maternal genes for lamb survival.

What does recording lamb survival entail?

Every lamb that is born dead or alive should be recorded as such, along with sex identified and birth weight. These lambs should be identified to the correct dam. Lambs that are born

¹ The heritability of a trait is expressed on a scale of 0 to 1 (or %), and describes the extent to which the variation in a given trait is due to the genetic make-up of the population that it relates to.

alive but die before their 8 week weight will be recorded as being dead. Lambs that miss their 8 week weight but are weighed at scanning will be recorded as being alive. Farmers need to make sure that every effort is made so that live lambs have at least one live weight recorded. Lambs that are not weighed at all - or that are transferred out of the flock for any reason before backfat scanning with no weights attributed to them, currently will be assumed to be dead.