LIMOUSIN

New Limousin Genomic Breeding Values (GEBVS)

Delivering £'s value for commercial producers

Background

- **New Female Fertility and Calf Survival GEBVs for Limousin released in 2017**
- **These follow introduction of the Carcase Trait GEBVs in 2016**
- **The Limousin GEBVs are the first of their kind in the UK's beef sector**
- **New income potential presented for pedigree and commercial Limousin producers**

The British Limousin Cattle Society is pleased to announce that, in 2017, new Female Fertility and Calf Survival Genomic Breeding Values (GEBVs) have been added to the range of commercial breeding values now available. Already established in other agricultural sectors, GEBVs first became available for Limousin producers in 2016 with the introduction of eight new Carcase Trait breeding values. All the GEBVs are the first of their kind within the UK's beef sector and are the result of more than six years of research and £1.7 million investment co-funded by partners ABP, SRUC, Innovate UK and BBSRC.

This leaflet explains what GEBVs are, how they will be used and, importantly, the value they will bring to commercial producers of Limousin-bred cattle.

What are Genomic Breeding Values?

Animal performance is a combination of genetic merit and the effects of the environment, such as season, management regime, health etc.

Traditional Estimated Breeding Values (EBVs) use a series of statistical procedures to establish how much of an animal's performance is down to the genes it has inherited and how much is down to the environment in which it is reared. The EBV value is the genetic component and indicates the strengths and weaknesses the animal is likely to pass to the next generation.

GEBVs take this a step further by using information from animals' DNA as well as the usual measurements of performance. The DNA is supplied by a hair or tissue sample (blood and semen can also be used) and compared to a DNA 'key' for the breed:

- This key is developed from a core population of Limousin animals that have been measured on-farm, and/or have calving records within BCMS, and/or have abattoir records as well as having DNA collected.
- The key is like a library that cross refers information from the DNA strand with different levels of slaughter and maternal performance.
- GEBVs are produced by comparing the DNA of an animal with the key. They are calculated from the correspondence of that animal's DNA with those in the library.

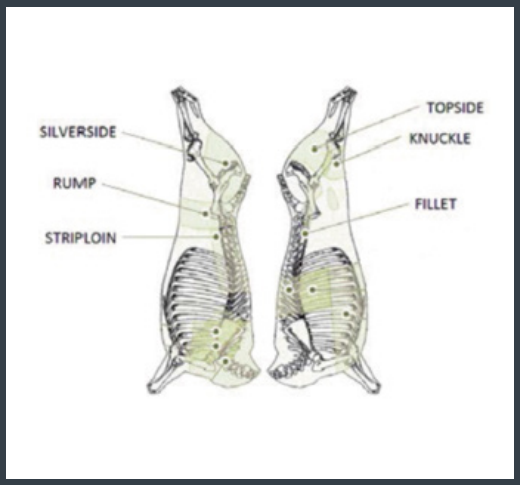
GEBVs are calculated from a 'SNP (snip) Key'. This key is like a library that cross refers information from the DNA strand with different levels of slaughter and maternal performance for thousands of animals. An animal's DNA can then be compared to this key to produce its GEBVs"

What Traits Do GEBVs Measure?

There are currently two groups of GEBVs available for Limousin cattle:

VIA Carcase Trait GEBVs: these are all based on VIA measurements (Visual Image Analysis) supplied by selected ABP abattoirs as well as DNA from related animals to produce the key. GEBVs are produced for:

- Age to Slaughter
- Carcase Weight
- Six Primal Cuts: Fillet, Loin, Rump, Topside, Silverside and Knuckle.



Female Fertility Traits GEBVs: these are based on the maternal performance of all Limousin-bred dams in the BCMS database as well as DNA from related pedigree animals. GEBVs are produced for:

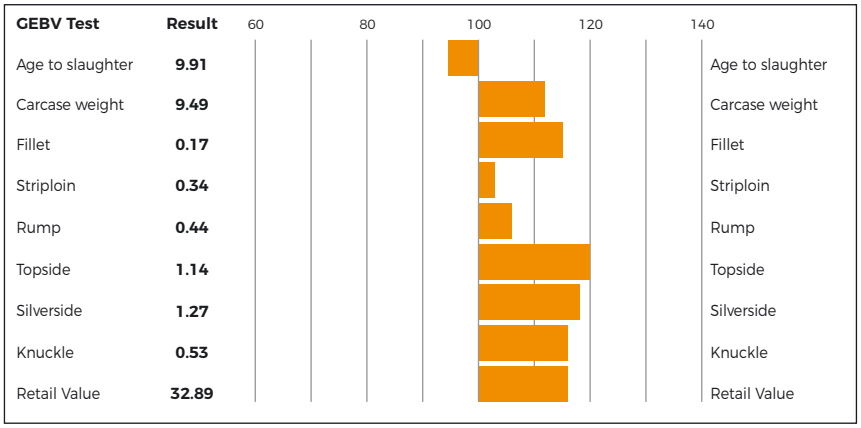
- Age at 1st Calving
- Calving Interval
- Cow Longevity
- Calf Survival (3 weeks-10 months)

British Cattle Movement Service

How to Use GEBVs to Select Breeding Animals

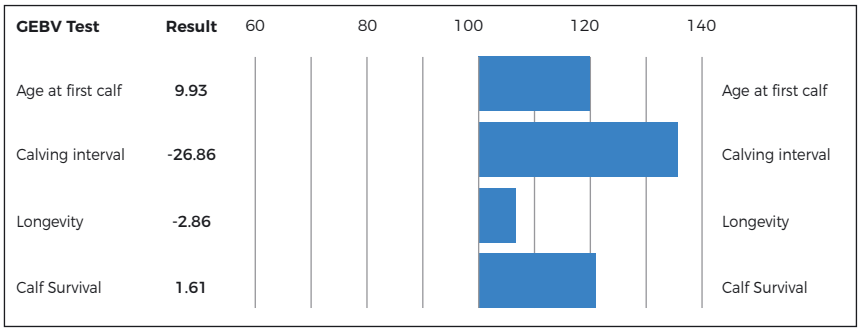
GEBVs will be used in exactly the same way as EBVs when breeding decisions are being made. Albeit they have been produced in slightly different ways, they are in essence breeding values that indicate genetic merit and the way producers use them should not differ.

As with the traditional EBVs, the numeric values and accuracies will be shown for each GEBV trait, along with a bar chart illustration. For additional information, it will be clear which traits are EBVs and which are GEBVs ie those which have been derived from on-farm measurements alone and those which have also used information from the animal's DNA.



Carcase Trait GEBVs

The Retail Value is an economically weighted breeding index incorporating the GEBVs of the six primal cuts



Female Fertility and Calf Survival GEBVs

- ✓ The centre line of the graph represents Breed Average for all traits
- ✓ Bars that lie to the right of the centre line indicate the GEBV is above Breed Average (superior). The further to the right, the further above Breed Average it is.
- ✓ In a similar way, bars that lie to the left of the centre line indicate the GEBV is below Breed Average. The further to the left, the further below Breed Average it is.

Interpretation: In the example above, a bull with a Striploin GEBV of 0.34 kg has the genetic potential to pass on an additional 0.17 kg of fillet to its progeny when compared with a bull with a GEBV of 0 kg. As with EBVs, the bull's GEBV is halved when considering what he will pass on, since 50% of the calves' genes will come from their dam.

When considering which EBV and GEBV traits to focus on, consider...

- Those that will earn you the greatest margin
- Your anticipated end market
- Your farm type and feed/labour availability
- Areas of strong and weak herd performance, both financial and physical
- The effect of your decisions on other traits such as calving and maternal performance.

Where to find available GEBV information:

- On the Limousin pedigree database www.basco.org, click 'beef search' then 'ebv search' to find animals meeting your criteria
- On the Genesure website www.genesure.co.uk
- At pedigree sales in catalogues and on pen cards
- Direct from breeders
- At agricultural shows and technical events

Benefits of GEBVs

The research phases of the projects that established the Carcase Trait and Female Fertility trait GEBVs revealed some interesting information about Limousin cattle that has direct impact on commercial beef producers:

- ✓ **The retail value of calves sired by bulls with high (favourable) Carcase Trait GEBVs has been found to be £100-£150/calf more than bulls with low GEBVs.**
- ✓ **In comparison to the next two most popular dam types in the UK, BCMS records reveal that Limousin has:**
  - **The lowest national replacement rate**
  - **The greatest longevity at 8 years of age**
  - **The lowest nationwide mortality rate**

Limousin Performance - the Carcase Trait Project

✓ Examination of abattoir records revealed genetic variation in the population as follows:

Traits	Range in Genetic Potential
Fillet	1.0 kg
Striploin	2.4 kg
Topside	3.4 kg
Silverside	4.5 kg
Rump	2.0 kg
Knuckle	2.0 kg

In other words, using Fillet as an example, some sires have the genetic potential to produce an additional kilogram of Fillet at slaughter. At a retail value in the region of £40/kg* for fillet, it is not difficult to see the advantage in identifying the animals with the genes to produce it.

✓ **When the additional value of all the cuts is multiplied up, it equates to an estimated difference in retail value of £100-150/carcase* between the sires with high GEBVs and sires with low GEBVs.** Money for the taking when all it involves is selection of the correct sire. (* source: Meat Prices Index)

Limousin Performance - the Maternal Traits Project

Investigation using the BCMS database revealed:

✓ **Limousin has the Lowest National Replacement Rate:** At 14.6%, the heifer replacement rate of Limousin-bred cows is the lowest in the UK. The next two most popular types of suckler cow in the UK have replacement rates of 19.4% and 21.6% respectively, with very little difference in the age that the heifers are calved

✓ **Greatest longevity at 8 years of age:** Approximately 2% more Limousin-bred dams in Britain are producing a 6th calf at 8 years old compared to the next two most popular suckler cow types

✓ **Lower nationwide mortality rates:** Up to 2% more Limousin-bred calves survive to 10 months of age than the next two most popular suckler cow types in the UK

Opportunities for Producers from GEBVs

GEBVs for the Carcase and Female Fertility traits are only available for Limousin-bred cattle. They offer Limousin producers considerable opportunity to:

- ✓ **Reduce costs of production by increasing calf returns and reducing the replacement cost for breeding stock**
- ✓ **Dovetail the new GEBVs with the existing Carcase Trait GEBVs to identify breeding animals with the genetic potential to excel across several areas of production.**
- ✓ **Find new markets and generate new income streams through the sale of high performance genetics for these traits**
- ✓ **Increase the rate of genetic improvement in the herd for these traits**
- ✓ **Use GEBVs as an additional promotional tool when selling breeding stock**

Summary

This exciting area of work is the first of its kind for beef cattle in the UK. It represents delivery of the aims set out in the BLCS Breeding Improvement Plan. The objective of this is to invest in targeted areas of the breed's performance to ensure it delivers market-focussed genetics for today and the future. The new GEBVs present quantifiable financial opportunity to commercial producers of all Limousin-bred cattle.

> ***"Feed efficiency, slaughter traits and maternal traits are the genomic prizes for beef production".***
>
> Professor Theo Meuwissen, co-founder of genomic techniques used in livestock, plant and human science today, speaking at this year's British Cattle Breeders Conference

LIMOUSIN:
Best breeding females

LIMOUSIN:
Reliably cheapest to feed

COMMERCIAL PRODUCER

LIMOUSIN:
Highest % in new and evolving market specifications

LIMOUSIN

BUILDING A FUTURE

The British Limousin Cattle Society's 10-year plan of breeding improvement will yield

1. Fertile dams...
2. That produce vigorous calves...
3. That are cheap to grow, and....
4. Produce high quality carcases quickly

Meeting the market now and working hard to deliver the genetics of the future

genesure

www.genesure.co.uk

Research projects supported by InnovateUK and BBSRC

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