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Limousin Factsheet 4

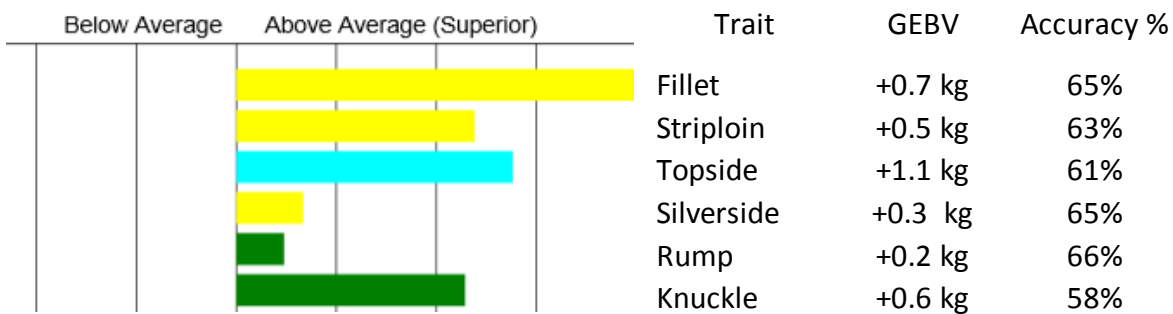
Using Genomic Breeding Values (GEBVs)

Introduction

Already established in other agricultural sectors, **Genomic Breeding Values (GEBVs)** are now available for all **Limousin cattle for a range of new Carcase Traits**. They are the first of their kind within the UK's beef sector and are the result of a £1.5 million four-year research project between the British Limousin Cattle Society, ABP Food Group and SRUC (funded by Innovate UK and BBSRC).

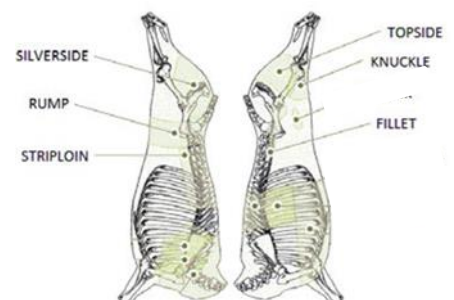
GEBVs are used in exactly the same way as EBVs...

Albeit they are produced in slightly different ways (see overleaf), GEBVs are in essence breeding values that indicate genetic merit as EBVs do and the way producers use them should not differ.



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

In the case of the new Carcase Trait GEBVs, they are all based on VIA measurements (Visual Image Analysis) supplied by selected ABP abattoirs as well as DNA from over 2000 related animals to produce the key. The GEBVs indicate genetic merit for Carcase Weight and a selection of new carcase cuts: **Fillet, Loin, Rump, Topside, Silverside and Knuckle**.



Interpretation

Using the example bar chart above, a bull with a Fillet GEBV of 0.7 kg has the genetic potential to pass on an additional 0.35 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.

Trait Definitions

GEBV	GEBV indicates genetic potential for...	Look for...
Age to Slaughter GEBV (days)	Age at slaughter assuming a standard carcass weight of 350kgs	High negative values (less days) for animals that will reach 350 kg deadweight quicker
Carcass Weight GEBV (kg)	Carcass weight at a standard slaughter age of 600 days	High positive values for animals that will reach heavier carcass weights at 600 days of age
Fillet GEBV (kg)	Weight of fillet at a standard slaughter age of 600 days and carcass weight of 350kg	High positive values for higher fillet weights in the carcass
Striploin GEBV (kg)	Weight of striploin at a standard slaughter age of 600 days and carcass weight of 350kg	High positive values for higher striploin weights in the carcass
Rump GEBV (kg)	Weight of rump at a standard slaughter age of 600 days and carcass weight of 350kg	High rump values for higher fillet weights in the carcass
Topside GEBV (kg)	Weight of topside at a standard slaughter age of 600 days and carcass weight of 350kg	High positive values for higher topside weights in the carcass
Silverside GEBV (kg)	Weight of silverside at a standard slaughter age of 600 days and carcass weight of 350kg	High positive values for higher silverside weights in the carcass
Knuckle GEBV (kg)	Weight of knuckle at a standard slaughter age of 600 days and carcass weight of 350kg	High positive values for higher knuckle weights in the carcass
Retail Value (index)	An economically-weighted index comprising all carcass trait values above	High positive values for animals that will achieve slaughter weight quickly and with high proportions of the high quality carcass cuts

2016 Limousin Benchmark – Carcass Trait EBVs and GEBVs

In addition to reading GEBVs from the bar chart diagram, the Breed Benchmark can also be used to establish genetic merit...

Trait	Bottom			Breed Avge	Top		
	1%	10%	25%		25%	10%	1%
Carcass Weight (kg)	-4.9	-0.4	2.3	5.2	8.1	10.7	15.2
Slaughter Age (days)	19.1	13.5	10.2	6.5	2.8	-0.5	-6.1
Fillet (kg)	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Striploin (kg)	0.1	0.1	0.1	0.2	0.2	0.2	0.3
Topside (kg)	0.2	0.3	0.3	0.4	0.4	0.5	0.5
Rump (kg)	0.1	0.1	0.2	0.2	0.2	0.3	0.3
Silverside (kg)	0.2	0.3	0.4	0.4	0.5	0.6	0.6
Knuckle (kg)	0.1	0.1	0.2	0.2	0.2	0.3	0.3
Retail Value	LM5R	LM8R	LM10R	LM12R	LM13R	LM15R	LM18R

How are GEBVs Calculated?

GEBVs take conventional EBVs (Estimated Breeding Values) a step further by using information from animals' DNA as well as the usual measurements of performance. To produce the breeding value the DNA is compared to a DNA 'key' for the breed:

This key is created from a core population of Limousin animals that have been measured on-farm and in the abattoir as well as having DNA collected

The key is like a library that cross refers information from the DNA strand with different levels of abattoir performance.

GBVs 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

Why Do All Animals' GEBVs Not Reflect Their Current EBVs?

Typically, animals with favourable EBVs for the conventional growth and carcass traits will have favourable GEBVs for these new carcass traits. However, in some instances this may not be the case, for the following reasons:

- The standard slaughter age used in the GEBV evaluation is 600 days. This is clearly much older than growth or muscle and backfat recorded for conventional EBVs at 400 days of age and research has shown that as time between measurements increases, the genetic relationship between them decreases.
- This means that the relationships between 400day weight EBV and the Carcass Weight GEBV, and the Muscle/Backfat EBVs and the Carcass Trait GBVs, are moderate. There are animals with favourable 400 day EBVs and favourable carcass weight GBVs for example, and there are also animals with favourable 400 day EBVs and unfavourable carcass weight GBVs. They are, in effect, very different traits.
- Differences in growth curves of animals will contribute to this. Some animals mature at an early age and then hold constant to their final slaughter weight. Other animals may be older when they mature but have a better slaughter weight.

What are the Benefits of Using GEBVs?

- ✓ **Work to date has identified a difference in retail value of around £100-150/carcass* between progeny from high GEBV sire and progeny from low GEBV sires.** Money for the taking when all it involves is selection of the correct sire. (* source: Meat Prices Index)
- ✓ **Longer term, release of new breeding values for carcass traits will eventually be linked to a more sophisticated VIA payment grid taking into account the animals' measurements.**

On a wider level, the advantages of GEBVs over EBVs also include:

- ✓ **DNA and abattoir records come from independent sources:** representing a move away from breeders' own records
- ✓ **Speed:** GEBVs can be obtained shortly after a calf is born, thereby enhancing the accuracies of genetic merit predictions much quicker than performance recording alone.
- ✓ **Improved accuracy:** For many traits that have low heritabilities or are particularly difficult or expensive to measure, GEBVs will offer higher levels of accuracy than conventional EBVs.
- ✓ **All owners of Limousin-bred cattle can gain GBVs:** A significant difference between an EBV and a GEBV is that the former relies on the collection of performance records across groups of animals all managed in the same way. To gain the latter – a GEBV – all that is required is the DNA sample and the identity of the animal. It offers commercial producers significant opportunity in assessing current and future sires and replacement heifers.

Where to Find Limousin GEBVs

- ✓ On the Limousin pedigree database www.basco.org, click 'beef search' then 'ebv search' to find animals meeting your criteria
- ✓ At pedigree sales in catalogues and on pen cards
- ✓ Direct from breeders

Further Information...

- ✓ The Genesure website www.genesure.co.uk
- ✓ Limousin GEBV User Guide (go to www.limousin.co.uk, click on 'Performance Programmes' then 'Carcass Trait GEBVs')
- ✓ Alison Glasgow, Technical Manager email alison@limousin.co.uk telephone 02476 696500