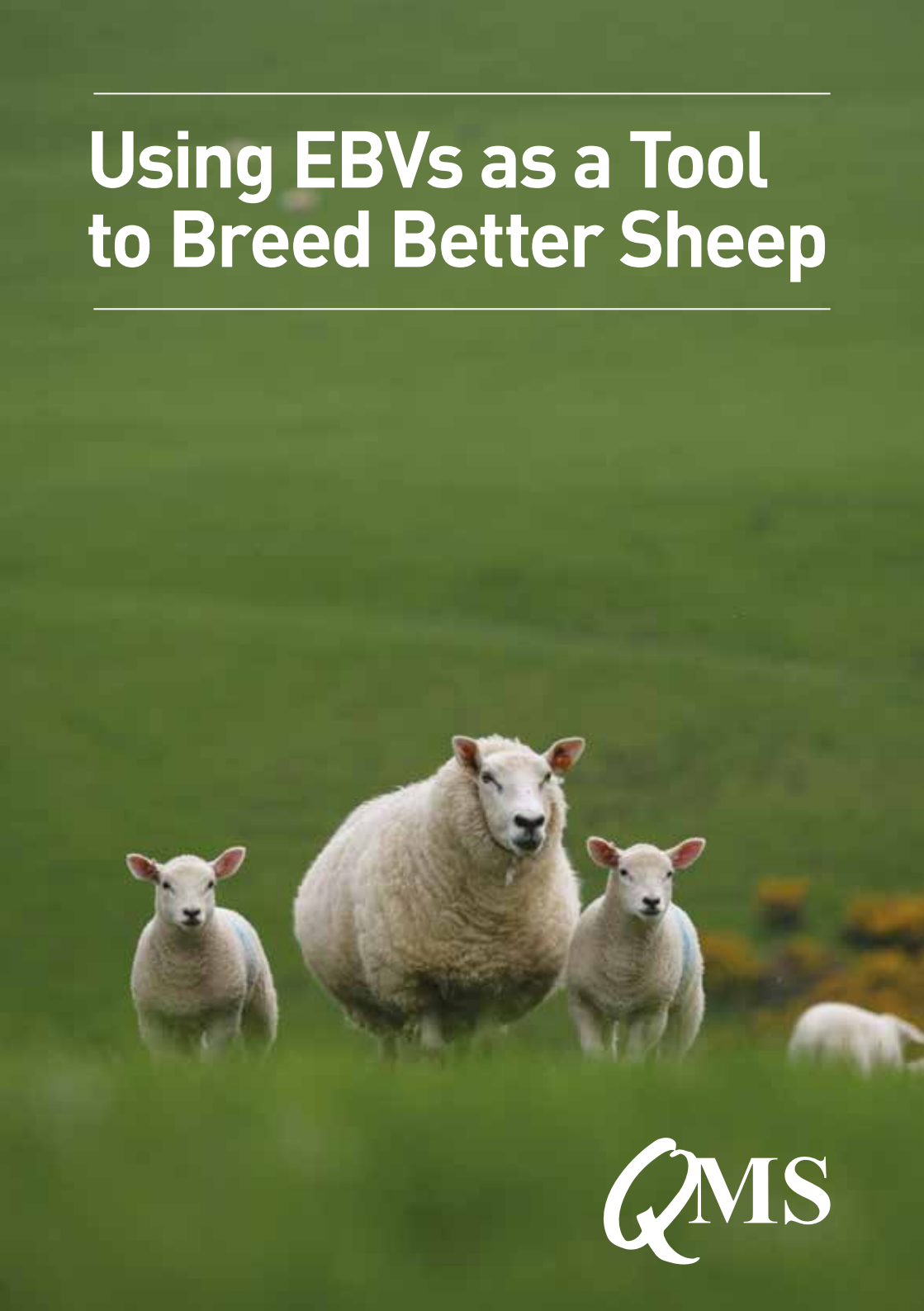
Using EBVs as a Tool to Breed Better Sheep



QMS

Using EBVs as a Tool to Breed Better Sheep

Quality Meat Scotland (QMS)

Contents

Section 1. Introduction

The factors that influence livestock performance can be divided into those that are due to an animal's breeding potential, as determined by its genes, and those due to the environment in which it is reared.

It is important to get both these aspects of production right, but whilst the management of a sheep can be changed throughout its productive lifetime, breeding potential can only be influenced by the genetic value of its parents. This makes the selection of breeding stock extremely important.

The only influence that a ram has over the performance of its offspring is through its genes, so it is vitally important to assess this element of a ram's performance separately from the combined visual impact created by feeding, management and breeding. Choosing a high-performing ram by eye alone can lead to unpredictable results, so ram buyers and pedigree breeders can really benefit from an objective way of assessing the genetic potential of rams. The best way to do this is by performance recording.

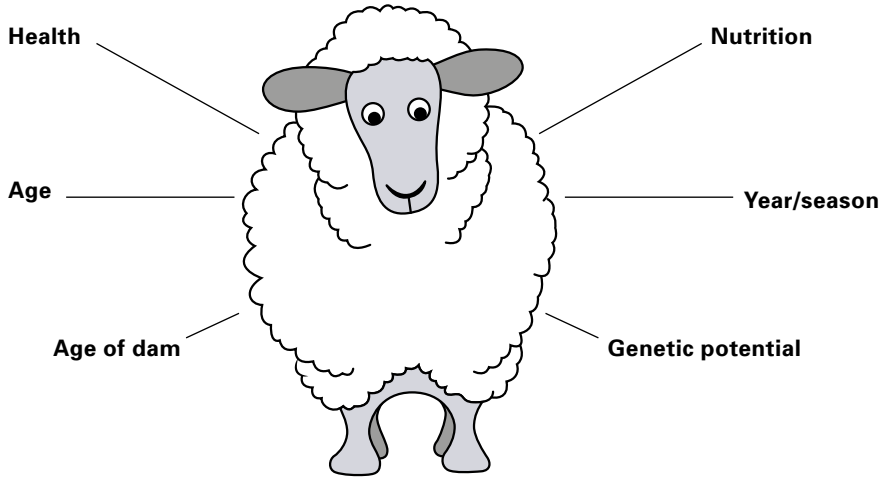


Figure 1. There are many factors that influence a ram's performance. However, it is only genetic potential that can be passed on from one generation to another.

Why is genetic improvement important?
Genetic improvement is an important technique that sheep farmers can use to enhance the performance of their flocks.

Genetic improvement is:

Permanent: unlike with variations in feeding, for example, the performance of an animal is influenced for life.

Cumulative: improvements made in one generation are added to those improvements made in previous generations.

Sustainable: improvements can continue to be made as long as there is genetic variation and as long as higher genetic value animals are used.

Section 2. Selecting the right ram

A six year study conducted by Quality Meat Scotland (QMS) showed that High Index rams consistently outperformed rams selected by eye alone. It is, therefore, financially critical to identify rams and ewes with superior genetic merit (breeding potential).

This is easier said than done, because so many factors influence an animal's appearance – including its age, whether it was reared as a single or twin and (most importantly) the amount it was fed.

When selecting rams at a sale to breed faster-growing progeny, the biggest rams on sale might be those with the best genes for growth… or they might be the best-fed or oldest rams on sale. When selecting rams for maternal attributes, such as their genetic potential for prolificacy and milk production, a visual inspection will not give you information pertaining to these aspects.

Performance recording schemes were developed to make the process of identifying superior genetics easier. They produce estimated breeding values (EBVs), which are an unbiased assessment of genetic potential, taking into account non-genetic influences on performance – such as age, rear-type and feeding regime.

EBVs indicate exactly where an animal ranks against others for specific traits of economic importance, and this information enables buyers to select rams on the basis of their genetic potential, not just their appearance.

Fit-for-purpose rams

Purchasing a ram of good genetic merit is very important. However, the ram's ability to work hard at tupping time and last for a number of seasons is even more vital. Buying rams that are not "correct" or not "fit for purpose" is likely to lead to reduced working life and a lower number of ewes mated per season.

How many lambs a ram produces in its lifetime determines the return on his purchase cost. The table overleaf shows the effect of the number of mating seasons and ewes per ram mated on cost per lamb born, assuming a lambing percentage of 150% and £550 ram.

Over-fed rams may last two seasons and mate 40 ewes per year, which means it costs £4.58 per lamb born.

If a forage-fed ram is able to tup 80 ewes per season and lasts four years, his cost per lamb produced is around £1.

Increasing the ewe:ram ratio needs careful management, including provision of good enclosed grazing land, thoughtful pre-tupping care, no excessive concentrate feeding, and selection from flocks that focus on ram breeding fitness.

	No. of Ewes per Ram			
Number of Mating Seasons	40	60	80	100
1	£ 9.17	£ 6.11	£ 4.58	£ 3.67
2	£ 4.58	£ 3.06	£ 2.29	£ 1.83
3	£ 3.06	£ 2.04	£ 1.53	£ 1.22
4	£ 2.29	£ 1.53	£ 1.15	£ 0.92

Table 1. Ram cost per lamb reared depending on work rate and longevity (Source: SAC Consulting)

"Fit for purpose" can mean a variety of things, from structural soundness to fertility, from the amount of concentrates fed prior to purchase to disease status. These are all elements that can influence how well the ram will work throughout his lifetime.

Ensuring that any purchased rams have two testicles of adequate size and consistency is vital. Try to avoid rams that have been overfed concentrates, as these are more at risk of joint and kidney issues as well as potentially lower libido and sperm quality.

Structural soundness is vital for the longevity of the ram as well as the number of ewes he can potentially mate. If his ewe lambs are to be kept, any structural fault may continue in the flock through his progeny. Ideally, the rams we choose should be sexual athletes, built well to enable them to mate with as many ewes as possible in a short period of time.

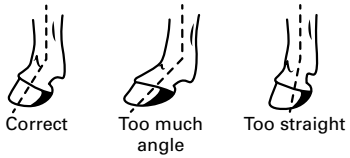
Structural correctness is a huge subject – teeth need to be right, head shape and shoulders not too extreme, a straight back and conformation as you want it. Legs and feet are very important too:

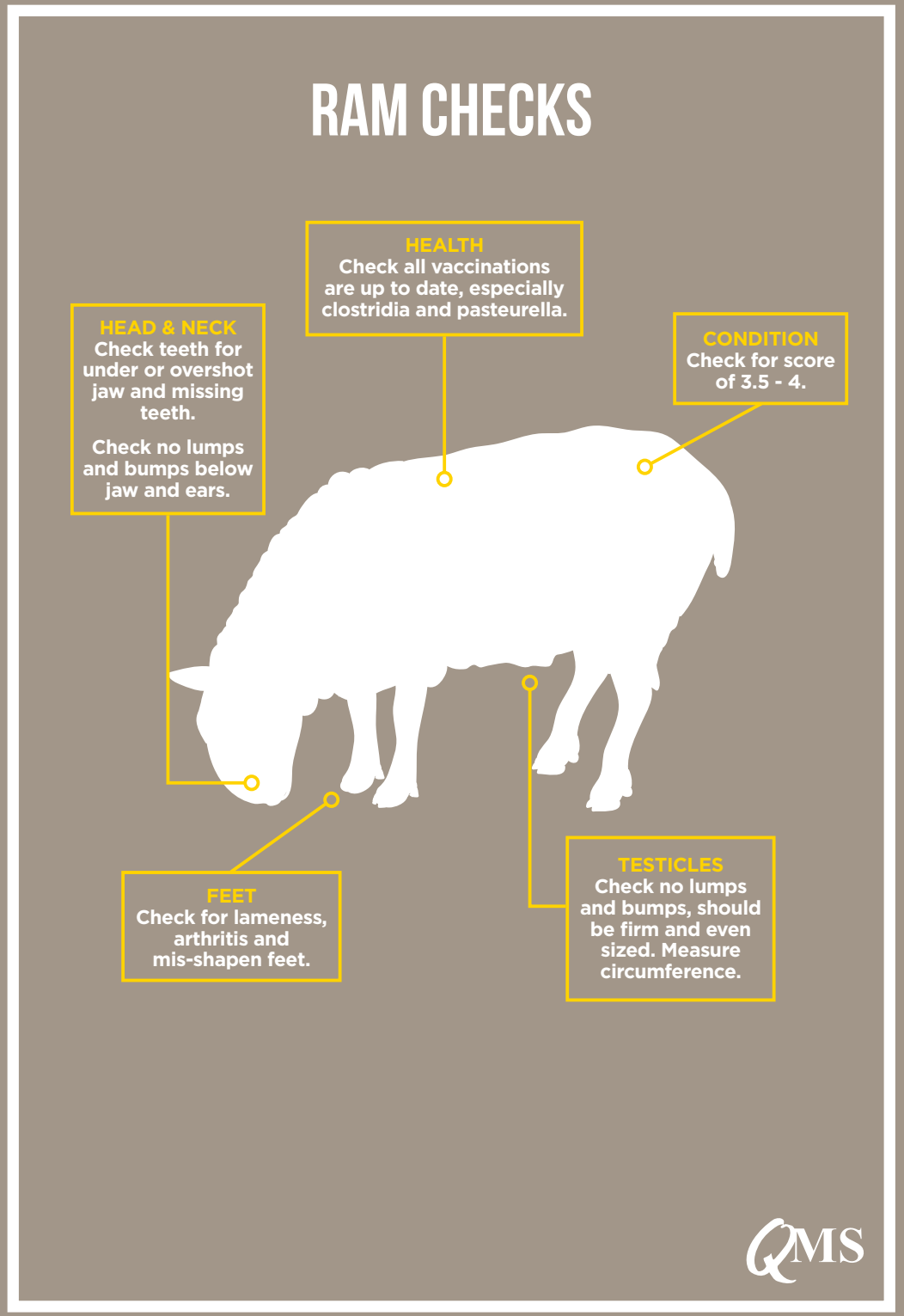
Front view of sheep knees

Back view of the hind legs

Side view of the back legs

Angle of different pastern joints





Section 3. What are Estimated Breeding Values (EBVs)?

Simply put, Estimated Breeding Values (EBVs) are values assigned to animals that predict differences in the performance of their offspring.

They are calculated from the animal's own performance, and from the performance of its relatives.

For each particular trait, animals are assigned EBV values that predict the differences in the performance of the animals' offspring. Normally, larger values equate to better EBVs (scan weight and number of lambs born); however, some exceptions occur in which smaller is better (faecal egg counts) or even where extremes of either too high or too low are seen as bad (fat depth, ewe mature size).

EBVs are generally recorded in the same units as the trait (e.g. kg for Scan Weight trait).

EBVs are easy to interpret, for example:

A farmer has two rams from which to choose. Ram A has an Eight Week Weight EBV of +1.5 and Ram B has an Eight Week Weight EBV of -1.5. A ram will only pass on half of its genes to its lambs so its EBVs must be halved in order to estimate the average genetic worth for each lamb. So, if they were bred to a similar set of ewes - and let's assume breed average is 0, Ram A is estimated to have lambs that are 0.75kg heavier at 8 weeks than the breed average. Ram B's offspring are predicted to be 0.75kg lighter than the breed average. If a farmer used both ram A and B on his flock, then the difference between lambs is estimated to be 1.5kgs (the difference between -0.75 and +0.75).

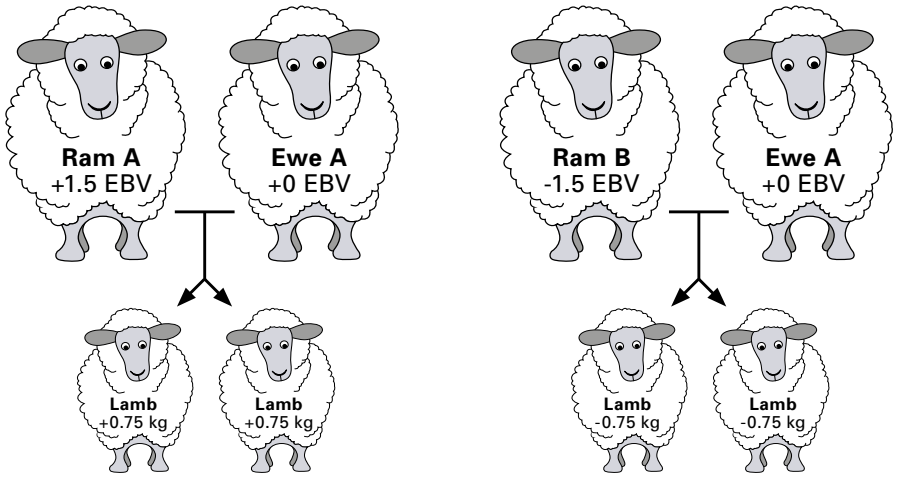


Figure 1. Example of differences in 8 week weight from Ram A and Ram B compared to assumed breed average of 0.

To allow buyers to find the best genetics within a breed, EBVs are reported on a breed basis. For most terminal breeds, the EBVs are calculated all together. For those breeds where good genetic linkage exists, Signet can provide a conversion factor which can be used by buyers to allow animals of different breeds to be compared.

For maternal breeds, EBVs cannot currently be compared across different breeds.

Eight Week Weight EBV

This is a measure of the animal's genetic potential for growth from birth to 8 weeks of age and is measured in kg.

	8-week weight EBV of sires	Difference in breeding merit of sires	Predicted progeny difference
Ram A	2.53	2kg	Lambs of Ram A will be 1.0kg heavier at 8 weeks than lambs of Ram B
Ram B	0.53		

Scan Weight EBV

This is a measure of the animal's genetic potential for growth from birth to muscle and fat depth scanning, and is measured in kg. Selection for high scan weights result in animals that grow more quickly to slaughter weight. Lambs will therefore have a reduced number of days to slaughter.

	Scan Weight EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	6.03	5kg	Lambs of Ram A will be 2.5kg heavier at scanning date Ram B
Ram B	1.03		

Muscle Depth EBV

This is an assessment of loin muscle depth and, therefore, likely lean meat yield at slaughter and is measured in mm.

	Muscle Depth EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	1.47	1.00mm	Lambs of Ram A will have 0.5mm more muscle depth on the loin than lambs of Ram B
Ram B	-0.53		

Fat Depth EBV

This is an assessment of fat depth and therefore gives an indication of fat cover at slaughter. Fat depth is measured in mm. Negative values indicate animals with lower fat levels, which will produce leaner carcases or which can be taken to heavier weights without becoming over-fat. Positive values may be useful for lambs that are finished quickly off grass. Depending on breeding objectives, it may be worthwhile targeting a balance of not over fat or over lean. Knowing if your lambs are under or over fat at slaughter weight will help identify if you could benefit from selecting a ram with more (positive) or less (negative) fat depth.

	Fat Depth EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	+0.40	0.80mm	Lambs of Ram A will have 0.40mm more fat depth on the loin than lambs of Ram B
Ram B	-0.40		

Maternal Trait EBVs

Many traits are expressed by both sexes (e.g. growth rate and muscling), but maternal traits (e.g. Litter Size and Maternal Ability EBVs) are only expressed by females. A ram's maternal EBVs, when halved, provide an indication as to how his female offspring will perform when they become mothers.

Mature Size EBV

Higher figures identify breeding lines that will be bigger at maturity. In certain breeds, even though it is advantageous to enhance lamb growth rates, it may be desirable to restrict increases in the mature size of the ewe. This EBV is measured in kg.

	Mature Size EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	6.30	7kg	Ewe lambs of Ram A will be 3.5kg heavier when mature than lambs of Ram B
Ram B	-0.7		

Litter Size Born EBV

The higher the figure, the more prolific ewe lambs sired by a particular ram are likely to be as ewes.

	Litter Size Born EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	0.21	0.20	Ewe lambs of Ram A will produce 0.10 more lambs than ewe lambs of Ram B
Ram B	0.01		

Litter Size Reared EBV

The higher the figure the more lambs that will be successfully reared by the daughters of a particular ram.

	Litter Size Reared EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	0.20	0.18	Ewe lambs of Ram A will rear 0.09 more lambs that ewe lambs of Ram B
Ram B	0.02		

Maternal Ability EBV

This is the maternal component of the 8-week weight measurement and is measured in kg. It gives an indication of how well a ram's ewe lambs will perform as mothers. A ewe's EBV for maternal ability estimates how much of its lambs' performance up to eight weeks of age is due to maternal characteristics such as milkiness and maternal care of the lamb.

	Maternal Ability EBV	Difference in breeding merit of sires	Predicted progeny difference
Ram A	1.28	1.10	Ewe lambs of Ram A will rear lambs 0.55kg heavier at eight weeks than lambs of Ram B
Ram B	0.18		

In self replacing flocks maternal EBVs have the potential to be much more financially important than growth and carcase traits. If ewes are bred from rams with high maternal traits and these are then sired by other rams with high maternal EBVs and this is done generation after generation, maternal performance can be significantly increased.

Breed benchmarks

Comparing one ram with another is useful, but knowing how good a ram is compared with all other rams in his breed is even more worthwhile. Breed benchmarks can be found on the Signet website (**www.signetfbc.co.uk**) and look like this:

Breed Benchmark for 2018 for SCOTCH BLACKFACE

Analysed on Hill Index

Trait	Bottom 1%	Bottom 5%	Bottom 10%	Bottom 25%	Breed Average	Top 25%	Top 10%	Top 5%	Top 1%
Eight week weight	-0.70	-0.14	0.16	0.66	**1.21**	1.76	2.26	2.56	3.12
Mature size	-0.99	0.14	0.75	1.76	**2.89**	4.02	5.03	5.64	6.77
Litter size	-0.04	0.00	0.03	0.07	**0.12**	0.17	0.21	0.24	0.28
Maternal ability	0.09	0.34	0.47	0.69	**0.93**	1.17	1.39	1.52	1.77
Scan weight	-0.49	0.34	0.79	1.53	**2.35**	3.17	3.91	4.36	5.19
Muscle depth	-0.56	-0.04	0.24	0.71	**1.23**	1.75	2.22	2.50	3.02
Fat depth	-0.19	-0.07	-0.01	0.10	**0.21**	0.32	0.43	0.49	0.61
Lean weight	-0.74	-0.22	0.06	0.52	**1.03**	1.54	2.00	2.28	2.80
Fat weight	-1.33	-0.81	-0.53	-0.07	**0.44**	0.95	1.41	1.69	2.21
FEC	0.08	0.06	0.05	0.03	**0.01**	-0.01	-0.03	-0.04	-0.06
HILL Index	80	122	144	181	**222**	263	300	322	363

Many breeders will give an indication of where the rams they are selling stand within the relevant breed, i.e. whether they are top 25% or top 10% for the breed. Yet it is sometimes useful to use the benchmark in a general sale to assess fully how high the potential performance is of individual rams.

How are EBVs calculated?

EBVs are based on actual measurements of sheep performance. Ram breeders are expected to record the following as a minimum:

- Lamb identity
- Sire and dam
- Sex
- Date of birth
- Whether each lamb is born a single, twin, triplet etc
- 8 week weight
- Weight at muscle and backfat scanning
- Muscle depth (measured by an ultrasound scanner at close to slaughter weight)
- Fat depth (measured by an ultrasound scanner at close to slaughter weight)

In addition, further information that is commonly reported by breeders includes:

- Birth weight and lambing ease
- Pre-tupping weights of gimmers for mature size
- Faecal Egg Count (FEC) of lambs to identify resistance to worms

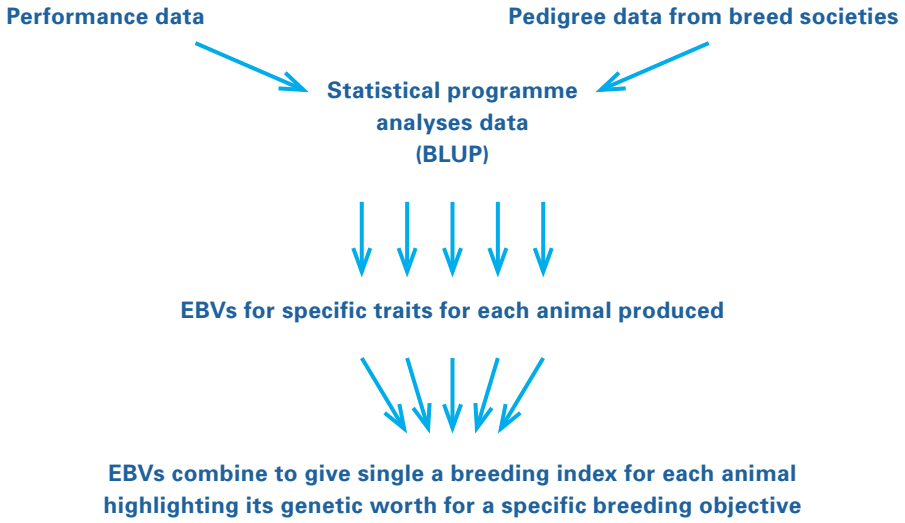
Some breeders also make use of Computed Tomography (CT) Scanning. This takes a full body scan, measuring how much muscle fat and bone is in the live sheep. This information can be used to give EBVs for;

- Lean weight
- Fat weight
- Eye muscle area
- Intramuscular fat
- Gigot muscularity
- Spine length
- Vertebrae number

These actual measurements are what EBVs rely on. They are cross-referenced with other animals in other flocks that are genetically related. The more actual measurements of performance in progeny and genetically related animals that have been recorded, the higher the accuracy of the EBVs of particular sheep.

Raw data alone is not a fair way of comparing animal performance, however. An example may be two ram lambs on the same farm – one born a single on 1st February and the other born a twin a fortnight later. Raw data is likely to show a good result for the single, older lamb but it may be the younger, twin lamb that has the better genetics. Hence there needs to be a balancing up of all the genetic and environmental differences each lamb faces. This is done through a statistical computer program.

Similarly adjustments need to be made when comparing some animals reared on a lowland farm that may be heavily fed with concentrate with others that are reared solely on grass at 350m above sea level.



In reality it is difficult to fool the statistical analysis through – say – the presentation of false records. There are a large number of statistical checks, be they comparing the performance of relatives within the flock or on other farms.

EBVs are figures for individual traits that you can use to make sure a ram will meet your breeding priorities.

The index is one figure that sums up a rams EBVs in one number. It reflects the economic value of the individual traits and helps simplify decision making. The indexes are calculated with a different weighting on each trait according to its economic value and depending on whether the breed is being used as a Terminal sire or Maternal breed.

Accuracy

Accuracy is a measure of how near the EBV is to the 'real' breeding value of the animal.

Accuracy values (acc) indicate how much we know about an animal and its relatives for a specific trait and are measured on a scale of 0 to 100, with 100 being the animal's true breeding value (TBV).

There are several factors that affect the accuracy of an EBV:

- Amount of information for the animal
- Amount of information from relatives
- Heritability of the trait
- Amount of information from traits correlated with the trait of interest and the strength of these correlations
- Number of animals being compared (contemporaries)

An important feature of BLUP EBVs is that they are risk averse. EBVs based on limited amounts of information get adjusted back towards an average figure until more data becomes available. This adjustment applies to both high and low EBVs. In other words, it is difficult to get either a very high or very low EBV on the basis of little information. The more information available on an animal and its relatives, the less the EBVs are adjusted and the more accurate they are.

Accuracy is an important part of using EBVs to improve flock production; however, commercial sheep producers should not overanalyse accuracy values when making multiple breeding decisions. Selecting rams that have high predicted genetic merit is more important than selecting rams with high accuracies.

Section 4. What are the main performance traits that are recorded?

Table 1. Standard Performance Traits

EBV	Trait	Things to look for
Litter Size Born	Prolificacy	High positive EBVs if you want good prolificacy in the daughters.
Litter Size Reared	Prolificacy and maternal care/lamb survival	High positive EBVs if you want to rear lots of lambs per ewe.
Maternal Ability (kg)	Maternal ability of ewe, relates to milk production	High positive EBVs if you want daughters to rear heavy lambs due to their maternal performance.
Eight-week Weight (kg)	Growth rate to 8 weeks of age	High positive EBVs if you want lamb growth to 8 weeks of age.
Scan Weight (kg)	Growth rate to scanning date	High positive EBVs if you want high lamb growth rates to weaning and heavier carcases.
Muscle Depth (mm)	Carcase muscling	High positive EBVs if you want good lamb conformation.
Fat Depth (mm)	Leanness	A balance is required to optimise this trait. Negative EBVs if you want leaner carcases or lambs that will go to heavier weights without penalty for fatness. Positive values will identify fatter, potentially faster finishing breeding lines when combined with high growth and muscle genetics.
Mature Size (kg)	Ewe efficiency	High positive EBVs if you want larger adult animals. Lower values will select smaller, potentially more efficient females.
FEC	Resistance to worms	Negative EBVs if you want lambs or daughters to be more resistant to worms.

Table 1. (cont.) Standard Performance Traits

EBV	Trait	Things to look for
Index (points) Shown as maternal or terminal	Gives an indication of breeding value by combining and weighting the most economically important traits	High indexes indicate animals with a combination of EBVs that make them more profitable for a given breeding objective.

Table 2. CT Recorded Performance Traits

EBV	Trait	Things to look for
Carcase Lean Weight (kg)	Muscle yield	High positive EBVs if you want good lamb conformation and meat yield.
Carcase Fat Weight (kg)	Leanness	Balanced EBVs – not too high, not too low if you want lambs with reasonable fat cover but not overfat.
Gigot Muscularity (mm^2)	Carcase shape	High positive EBVs if you want good lamb conformation around the hind quarter.
Eye Muscle Area (mm2)	Muscle yield	High positive EBVs if you want good lamb conformation and meat yield.
Intramuscular Fat (%)	Meat quality	High positive EBVs can influence meat eating quality.
Total Spine Length (cm) Thoracic Length (cm) Lumbar Length (cm)	Carcase length	High positive EBVs if you want good lamb conformation and meat yield.
Total Spine Vertebrae Count Thoracic Vertebrae Count Lumbar Vertebrae Count	Carcase length	High positive EBVs if you want good lamb conformation and meat yield.

Section 5. Using EBVs when buying rams

First consider which trait(s) you wish to change in your flock. What are your breeding objectives and which trait(s) will make you most money? This should help you decide which EBVs are most relevant to you, and the priority they should be given. For example:

The traits that may be of interest to a prime lamb producer are:

- Average or high Scan Weight EBV (depending on when you want to sell)
- High Muscle Depth EBV
- Average Fat Depth EBV (avoiding extremes)

The traits that may be of interest to a ewe lamb producer breeding flock replacements are:

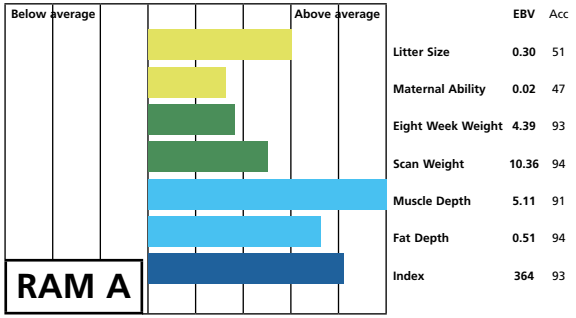
- High Maternal Ability EBV
- High Litter Size Reared EBV
- Average Mature Size EBV

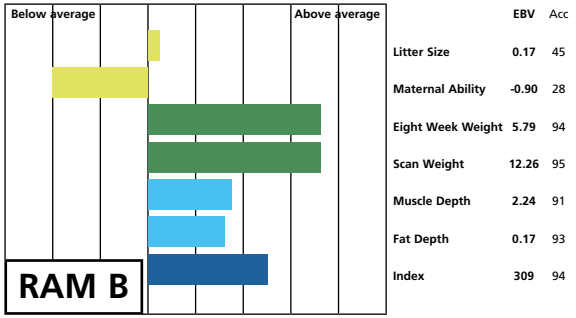
EBVs can be found in a variety of formats at ram sales, including sale cards, sale graphs and sale catalogues.

Breeding charts

One way in which you may see EBV information presented is on EBV breeding charts. Generally, the bars to the right of the chart are deemed "above average" for the breed and are higher, whilst the bars to the left of the chart are deemed "below average" for the breed and are generally lower.

The actual EBVs and accuracy values are also included next to the graph. Generally, both Ram A and Ram B have good breeding potential, depending on your breeding priorities. Most bars are on the right side of average.



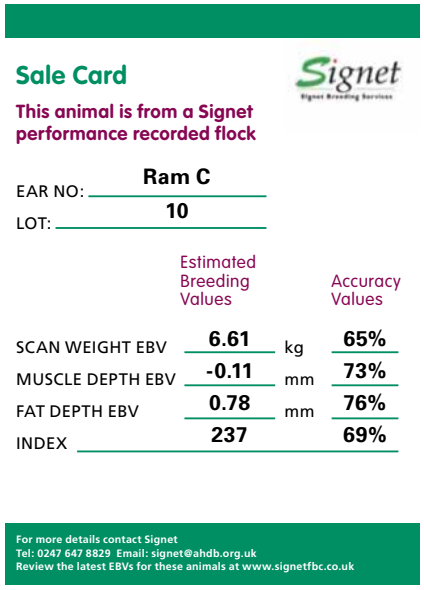


If you want to use a ram as a terminal sire and your priority is to finish your lambs as fast as possible, Ram B would be the preferred choice. Both Eight-Week Weight and Scan Weight EBVs are higher, with muscle and fat above average. He has relatively poor maternal EBVs, however. Ram A has good maternal EBVs and significantly outperforms Ram B in these traits. Ram A is also very strong in muscle depth and still above average in growth traits. He would suit a system that targets the production of longer-keep finishing lambs.

The index indicates that Ram A is better than Ram B. Generally this is the case – he is likely to breed lambs that will grade better at slaughter and any ewe lambs retained for breeding will eventually produce more lambs and be better ewes. However if your system relies on getting lambs away quickly Ram B is better for you. This illustrates the benefit of understanding the individual EBVs rather than just relying on the Index alone.

Sale Cards

Sale cards may be displayed with each individual animal. Only the EBVs for the main traits are displayed, along with the overall breeding index for the animal and the accuracy values associated with each figure.



Sale Card

Signet

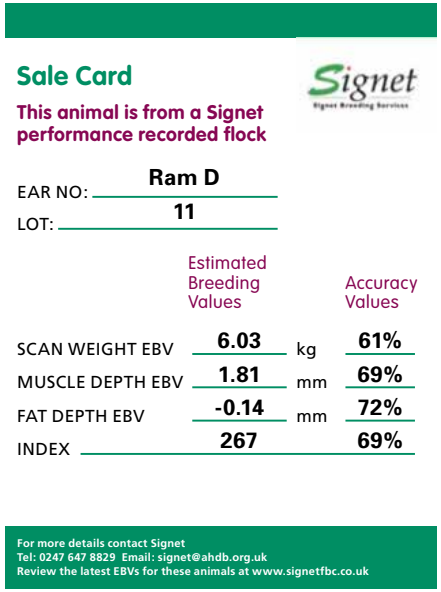
This animal is from a Signet performance recorded flock

EAR NO: **Ram C**

LOT: **10**

	Estimated Breeding Values		Accuracy Values
SCAN WEIGHT EBV	6.61	kg	65%
MUSCLE DEPTH EBV	-0.11	mm	73%
FAT DEPTH EBV	0.78	mm	76%
INDEX	237		69%

For more details contact Signet
Tel: 0247 647 8829 Email: signet@ahdb.org.uk
Review the latest EBVs for these animals at www.signetfbc.co.uk



Sale Card

Signet

This animal is from a Signet performance recorded flock

EAR NO: **Ram D**

LOT: **11**

	Estimated Breeding Values		Accuracy Values
SCAN WEIGHT EBV	6.03	kg	61%
MUSCLE DEPTH EBV	1.81	mm	69%
FAT DEPTH EBV	-0.14	mm	72%
INDEX	267		69%

For more details contact Signet
Tel: 0247 647 8829 Email: signet@ahdb.org.uk
Review the latest EBVs for these animals at www.signetfbc.co.uk

Two sale cards are shown above.

Ram C has a fractionally higher Scan Weight EBV than Ram D. His offspring are predicted to be 0.29kg heavier than Ram D's offspring at scanning. (In reality they are both exceptional Scan Weight EBVs ranking in the Top 5% of the breed - see Breed Benchmark on page 21).

Ram D has a higher Muscle Depth EBV than Ram C. His offspring are predicted to have 0.96mm more muscle depth than Ram C at a fixed weight. (If we refer to the breed benchmark below on page 21 we can see Ram D is in the Top 5% for muscle and Ram C is in the Bottom 25%).

Ram D has a lower Fat Depth EBV than Ram C. His offspring are predicted to have 0.46mm less fat at a fixed weight. Remember Fat Depth EBVs need to have a good balance – not too fat and not too lean. Ram C is particularly high in fat and Ram D is relatively lean.

The Indexes of both rams are high. Ram D has a better balance of traits putting his Index in the top 1% but Ram C still has an impressive growth figure and has merit.

Breed Benchmark for rams, C, D, E and F.

Trait	Bottom 5%	Bottom 10%	Bottom 25%	Breed Average	Top 25%	Top 10%	Top 5%
Birth Weight	0.28	0.23	0.14	0.05	-0.04	-0.13	-0.18
Maternal Ability	-0.46	-0.37	-0.22	-0.05	0.12	0.27	0.36
Litter Size Born	-0.09	-0.07	-0.04	-0.01	0.02	0.05	0.07
Litter Size Reared	-0.11	-0.09	-0.05	-0.01	0.03	0.07	0.09
Eight Week Weight	-1.22	-0.82	-0.15	0.59	1.33	2	2.4
Scan Weight	-3.15	-2.14	-0.44	1.44	3.32	5.02	6.03
Muscle Depth*	-0.83	-0.55	-0.08	0.44	0.96	1.43	1.71
Fat Depth*	-0.46	-0.35	-0.18	0.02	0.22	0.39	0.5
Lean Weight*	-0.64	-0.52	-0.31	-0.08	0.15	0.36	0.48
Fat Weight*	-0.32	-0.24	-0.11	0.03	0.17	0.3	0.38
Gigot Muscularity*	-0.45	-0.36	-0.19	-0.01	0.17	0.34	0.43
Mature Size	-2.33	-1.53	-0.18	1.32	2.82	4.17	4.97
FEC - Faecal Egg Count	0.05	0.03	0.01	-0.02	-0.05	-0.07	-0.09
CT Muscle Area EBV*	-0.63	-0.45	-0.15	0.19	0.53	0.83	1.01
CT Intramuscular Fat %*	-0.12	-0.09	-0.03	0.03	0.09	0.15	0.18
Total Spine Length*	-8.7	-6.23	-2.11	2.47	7.05	11.17	13.64
Total Spine Vertebrae Count	-0.12	-0.09	-0.03	0.04	0.11	0.17	0.2
Terminal Sire Index	**36**	**56**	**89**	**126**	**163**	**197**	**217**
Maternal Index	**41**	**58**	**86**	**116**	**147**	**175**	**191**

EBVs and indexes are expressed relative to the average animal in 2010.

Weight adjusted traits

Please note that all traits marked * are now weight adjusted. This means that EBVs are a better prediction of carcase composition at a fixed weight.

Sale catalogues

EBV and breeding index information may also be found in the sales catalogue of certain ram sales. Again, each trait is shown along with its EBV and accuracy figure.

How Ram E sits within the breed benchmark

EBVs:	Litter Size	8 Wk Wgt	Maternal	Scan Wgt	Musc Dpth	Fat Dpth	CT Gigot Musc	Index
	0.01	2.63kgs	-0.49kgs	6.68kgs	1.52mm	0.22mm	0.47mm	237
Accuracy	42%	74%	38%	76%	71%	75%	63%	75%

How Ram F sits within his breed benchmark

EBVs:	Litter Size	8 Wk Wgt	Maternal	Scan Wgt	Musc Dpth	Fat Dpth	CT Gigot Musc	Index
	-0.05	-0.93kgs	-0.47kgs	-2.89kgs	-0.89mm	-0.47mm	-0.41mm	37
Accuracy	33%	70%	28%	74%	67%	72%	63%	69%

As an example, let's say that the above rams which are the same breed as Ram C and Ram D in the earlier example, were selected on looks alone at a sale. In this instance, it might be useful to look at the breed benchmark shown on page 21. We could mark the important traits as top 5% or top 25% etc. on the catalogue or even highlight them in different colours:

EBV	How Ram E sits within his breed	How Ram F sits within his breed
Litter Size	Just average	Bottom 25%
Eight Week Weight	Top 5%	Bottom 10%
Maternal Ability	Bottom 5%	Bottom 5%
Scan Weight	Top 5%	Bottom 10%
Muscle Depth	Top 10%	Bottom 5%
Fat Depth	Top 25% (slightly fatter)	Bottom 5% (really lean)
CT Gigot Muscle	Top 5%	Bottom 10%
Terminal Index	Top 5%	Bottom 5%

Neither Ram E or Ram F are maternal rams and would produce disappointing ewes. Ram E is a very impressive terminal sire though. Ram F should be avoided unless your breeding objectives are not performance based.

Ram E's lambs – on average – are predicted to be 1.78kg heavier at eight weeks than Ram F's lambs; 4.78kg heavier at scanning; with 1.20mm more loin muscle depth; and 0.44mm more muscle around the gigot. There would also be a concern that Ram F's lambs would be hard to fatten as he has one of the lowest EBV values for fat depth in the breed.

Section 6. How do I start recording my flock?

If your flock is registered with a breed society, it is worthwhile contacting them first if you are interested in performance recording.

Sheepbreeder is a service operating from Signet Headquarters at Stoneleigh, Warwickshire and is the service used by most of the breeds in the UK.

If you opt to scan your flock you will receive a visit from a Signet-approved technician when lambs are close to slaughter weight and averaging around 40 kgs. Lambs will be weighed and measured for muscle and fat depths using an ultrasound scanner.

Contact Signet for further information. Tel: 0247 647 8829
Email: signet@ahdb.org.uk www.signetfbc.co.uk

Key points to remember:

1. EBVs are a tool for you to use if you want – they're not compulsory but offer a huge opportunity to add another source of information to a flockmaster's existing skills.

2. They should not be used on their own but rather in conjunction with traditional ram selection skills.

3. Before looking at EBVs, ensure other issues are satisfied – e.g. health, fertility, structural correctness.

4. Know what your breeding priorities are and what traits suit your system most.

5. Try to look at individual EBVs rather than just the index.

6. Always remember breeding sheep is about balance. Extremes should generally be avoided if they compromise other important traits.

7. Detailed EBV data for most breeds can be found on the Signet website at www.signetdata.com. Registered Texel EBV data can be found on the BASCO website at www.basco.org. On either system you can search by breeder, flock prefix, flock number or tag number. For information on Innovis breed EBVs contact www.innovis.org.uk.

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